SLOVENSKI STANDARD
SIST EN 1452-3:2000

01-junij-2000

Cevni sistemi iz polimernih materialov za oskrbo z vodo - Nemehļ an polivinilklorid (PVC-U) - 3. del: Fitingi

Plastics piping systems for water supply - Unplasticized poly(vinyl chloride) (PVC-U) - Part 3: Fittings

Kunststoff-Rohrleitungssysteme für die Wasserversorgung - Weichmacherfreies Polyvinylchlorid (PVC-U) - Teil 3: Formstücke

Systemes de canalisations en plastique pour alimentation en eau - Poly(chlorure de vinyle) non plastifié (PVC-U) - Partie 3: Raccords

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EUROPEAN STANDARD
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EN 1452-3

June 1999

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English version

Plastics piping systems for water supply - Unplasticized poly(vinyl chloride) (PVC-U) - Part 3: Fittings

Systèmes de canalisations en plastique pour alimentation en eau - Poly(chlorure de vinyle) non plastifié (PVC-U) - Partie 3: Raccords

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This European Standard was approved by CEN on 2 July 1998.

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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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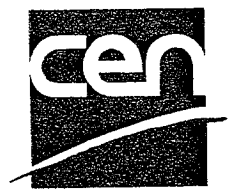

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

Ref. No. EN 1452-3:1999 E

Contents

For the English version :

For pipes and fittings which have comformed to the relevant national standard before 1999-06-23, as shown by the manufacturer or by a certification body, the national standard may continue to be applied until the 2001-06-30.

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 1999-12-31. Conflicting national standards shall be withdrawn at the latest by 2001-06-30.

Pour la version française :

Pour les tubes et les raccords dont la conformité à la norme nationale correspondante avant 1999-06-23 a été démontrée par le fabricant ou par un organisme certificateur, la norme nationale peut continuer à être appliquée jusqu'à 2001-06-30.

Cette norme européenne devra recevoir le statut de norme nationale, soit par publication d'un texte identique, soit par entérinement, au plus tard le 1999-12-31. Toutes les normes nationales en contradiction devront être retirées au plus tard le 2001-06-30.

Für die deutsche Fassung :

Auf Rohre und Formstücke, die vor 1999-06-23 der entsprechenden nationalen Norm entsprochen haben, wie durch den Hersteller oder eine Zertifizierungsstelle ausgewiesen, darf die nationale Norm bis 2001-06-30 weiter angewendet werden.

Diese Europäische Norm muß den Status einer nationalen Norm erhalten, entweder durch Veröffentlichung eines identischen Textes oder durch Anerkennung bis 1999-12-31. Etwaige entgegenstehende nationale Normen müssen bis 2001-06-30 zurückgezogen werden.

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems", the secretariat of which is held by NNI. It has been prepared with the cooperation of Eureau and in liaison with CEN/TC 164 "Water supply".

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 december 1999, and conflicting national standards shall be withdrawn at the latest by June 2001.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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

This standard is a Part of a System Standard for plastics piping systems of a particular material for a specified application. There are a number of such System Standards.

System Standards are based on the results of the work undertaken in ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids", which is a Technical Committee of the International Organization for Standardization (ISO).

They are supported by separate standards on test methods to which references are made throughout the System Standard.

The System Standards are consistent with general standards on functional requirements and on recommended practice for installation.

EN 1452 consists of the following Parts, under the general title *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U):*

- *Part 1: General*
- *Part 2: Pipes*
- *Part 3: Fittings (this standard)*
- *Part 4: Valves and ancillary equipment*
- *Part 5: Fitness for purpose of the system*
- *Part 6: Guidance for installation (ENV)*
- *Part 7: Guidance for the assessment of conformity (ENV).*

This Part of EN 1452 includes the following annexes:

- Annex A (normative): Imperial(inch)-sized fittings
- Annex B (informative): Bibliography.

At the date of publication of this standard, System Standards for piping systems of other plastics materials used for the same application are the following:

NOTE All listed System Standards have reached the Enquiry stage or are under preparation.

EN 1796, *Plastics piping systems for water supply with or without pressure — Glass-reinforced thermosetting plastics (GRP) based on polyester resin (UP)*

EN 12201, *Plastics piping systems for water supply — Polyethylene (PE)*

Introduction

The System Standard, of which this is Part 3, specifies the requirements for a piping system and its components made from unplasticized poly(vinyl chloride) (PVC-U). The piping system is intended to be used for water supply.

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the products covered by this standard:

1) this standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA;

2) it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

For material and components, other than fittings, requirements and test methods are specified in Part 1, Part 2 and Part 4 of the System Standard. Characteristics for fitness for purpose (mainly for joints) are covered in Part 5. Guidance for installation is given in ENV 1425-6. ENV 1452-7 covers guidance for the assessment of conformity.

This Part of EN 1452 covers the characteristics of fittings.

1 Scope

This Part of EN 1452 specifies the characteristics of fittings made from unplasticized poly(vinyl chloride) (PVC-U) for piping systems in the field of water supply.

It also specifies the test parameters for the test methods referred to in this standard.

In conjunction with Parts 1, 2, and 5 of EN 1452 and ENV 1452-7 it is applicable to PVC-U fittings and to joints with components of PVC-U, other plastics and non-plastics materials intended to be used for the following:

a) water mains and services buried in ground;

b) conveyance of water above ground for both outside and inside buildings;

for the supply of water under pressure at approximately 20 °C (cold water) intended for human consumption and for general purposes.

This standard is also applicable to fittings for the conveyance of water up to and including 45 °C. For temperatures between 25 °C and 45 °C figure A.1 in annex A of EN 1452-2:1999 applies.

Depending on the jointing method, this standard is applicable to the following types of fittings:

- fittings for solvent cementing;
- elastomeric ring seal fittings.

This standard is applicable to PVC-U flange adapters and to the corresponding flanges made from various materials.

PVC-U fittings can be manufactured by injection-moulding and/or be fabricated from pipe.

NOTE Fittings for mechanical joints, made from various materials are described in ENV 1452-6.

2 Normative references

This 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 Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

prEN 496, *Plastics piping and ducting systems — Plastics pipes and fittings — Measurement of dimensions and visual inspection of surfaces*

EN 578, *Plastics piping systems - Plastics pipes and fittings — Determination of the opacity*

EN 727, *Plastics piping and ducting systems — Thermoplastics pipes and fittings — Determination of Vicat softening temperature (VST)*

EN 763, *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Test method for visually assessing effects of heating*

EN 802, *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings for pressure piping systems — Test method for maximum deformation by crushing*

EN 921, *Plastics piping systems — Thermoplastics pipes — Determination of resistance to internal pressure at constant temperature*

EN 1452-1, *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U) — Part 1: General*

EN 1452-2:1999, *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U) — Part 2: Pipes*

EN 1452-5, *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U) — Part 5: Fitness for purpose of the system*

ENV 1452-7, *Plastics piping systems for water supply — Unplasticized poly(vinyl chloride) (PVC-U) — Part 7: Guidance for the assessment of conformity*

EN 12107, *Plastics piping systems — Injection-moulded thermoplastics fittings, valves and ancillary equipment — Determination of the long-term hydrostatic strength of thermoplastics materials for injection-moulding of piping components*

EN ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications — Classification and designation — Overall service (design) coefficient (ISO 12162:1995)*

EN ISO 13783:1997, *Plastics piping systems — Unplasticized poly(vinyl chloride) (PVC-U) end-load bearing double socket joints - Test method for leaktightness and strength while subjected to bending and internal pressure*

ISO/TR 9080:1992, *Thermoplastics pipes for the transport of fluids — Methods of extrapolation of hydrostatic stress rupture data to determine the long-term hydrostatic strength of thermoplastics pipe materials*

ISO/DIS 12092:1994, *Fittings, valves and other piping system components of unplasticized poly(vinyl chloride) (PVC-U) for pipes under pressure — Resistance to internal pressure — Test method*

3 Definitions, symbols and abbreviations

For the purposes of this standard, the definitions, symbols and abbreviations given in EN 1452-1 apply, together with the following.

3.1 Definitions

3.1.1
laying length (*Z*-length)

a) Laying length of fittings and valves with angled outlets:

1) for socketed outlet, the laying length is the distance from the inserted tube or spigot end to the intersection point of the fitting/valve axis (fitting or valve centre);

2) for spigot outlet, the laying length is the distance from the outlet end to the intersection point of the fitting/valve axis (fitting or valve centre).

b) Laying length of fittings and valves with parallel outlets:

1) in the case of sockets, the laying length is the distance between the ends of the inserted tubes or spigots;

2) in the case of one socket and one spigot, the laying length is the distance from the inserted tube or spigot end to the end of the spigot outlet.

3.1.2
design length of bends (Z_d-length)
the length of an outlet, excluding any socket length or insert length of spigot.

3.2 Symbols

Z : Laying length (Z-length)

Z_d : Z-design length (Z_d-length)

r : bend radius

4 Material

4.1 Fitting material

The fitting material to be used shall conform to EN 1452-1 and to the requirements given in 4.2 to 4.5 of this standard.

4.2 MRS-value

The fittings material shall be evaluated according to ISO/TR 9080:1992 method II [1)], where the pressure test is made in accordance with EN 12107 (together with EN 921), to find the LCL. The MRS-value shall be derived from the LCL and the fitting material shall be classified by the compound manufacturer in accordance with EN ISO 12162.

Where there is available long-term experience with the effect of a change in material/compound, it is not necessary to re-evaluate the MRS. In this case the values determined with 5 test pieces at 20 °C and 60 °C during 1000 h to 5000 h shall be located on or above the 97,5 % LCL long-term characteristic curve established prior to the material/compound change.

4.3 Designation of fittings material

The fittings material shall be designated as PVC-U, unless the material has an MRS of not less than 25 MPa, in which case the material shall be designated as PVC-UH.

4.4 Strength of injection-moulded material

When pressure tested in accordance with the procedure described in EN 12107, using injection-moulded tubular test pieces conforming to figure 1, the material shall conform to the requirements given in table 1.

1) In ISO/TC 138/SC 5 a new extrapolation method is under development, which is intended to replace ISO/TR 9080.

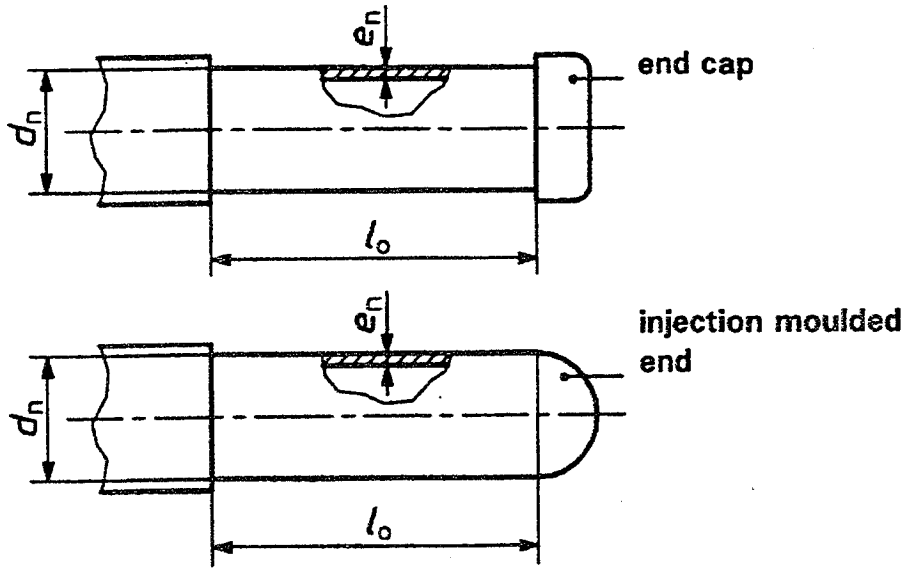

Figure 1 — Free length, l_o, of injection-moulded test pieces

Table 1 — Material characteristics

Characteristic	Requirements	Test parameters		Test method
		Parameter	Value	
Long-term strength	No break during the test period	Diameter Free length (see figure 1) Wall thickness Test temperature Sampling procedure Number of test pieces Circumferential (hoop) stress Type of test Type of end caps Test period	$d_n \geq 50$ mm $l_0 \geq 3\ d_n$ *) e_n of pipe series $6{,}3 \leq S \leq 10$ 60 °C Shall conform to ENV 1452-7 Shall conform to ENV 1452-7 10,0 MPa Water-in-water type a) ≥ 1000 h	EN 12107 (together with EN 921)

*) For the d_n of 50 mm a minimum free length of 140 mm may be used.

4.5 Material strength of fittings made from pipe

If the fitting is made from pipe, the pipe material shall conform to EN 1452-2:1999.

5 General characteristics

5.1 Appearance

When viewed without magnification, the internal and external surfaces of fittings shall be smooth, clean and free from scoring, cavities and other surface defects to an extent that would prevent conformity to this standard.

Each end of a fitting shall be square to its axis.

5.2 Colour

The colour of injection-moulded fittings shall be grey throughout the wall.

The colour of fittings made from pipes shall be grey, blue or cream throughout the wall. For above ground application, cream fittings shall not be used.

5.3 Opacity

The wall of the fittings shall be opaque and shall not transmit more than 0,2 % of visible light when measured in accordance with EN 578.

This requirement does not apply to cream fittings (see 5.2).

6 Geometrical characteristics

6.1 Measurement of dimensions

Dimensions shall be measured in accordance with prEN 496.

6.2 Nominal diameters

The nominal inside diameter(s), d_n, of a fitting shall correspond to, and be designated by, the nominal outside diameter(s) of the pipe(s) for which the fitting is designed.

6.3 Fittings for solvent cementing

6.3.1 Socket and spigot dimensions

The socket dimensions of the fittings shall be the same as for sockets on pipes and shall conform to EN 1452-2:1999.

The spigot length(s) shall be at least equal to the corresponding socket length(s).

The tolerance on the diameter of the spigot ends, d_2, of reducing bushing (see table 7 and table 8) shall always be positive and be as follows:

- maximum 0,2 mm for diameters equal to or less than 90 mm;
- maximum 0,3 mm for diameters 110 to 160 mm;
- maximum 0,4 mm for diameters 180 to 225 mm;
- maximum 0,5 mm for diameters 250 to 315 mm.

6.3.2 Diameters, laying lengths, bend radii and angles

6.3.2.1 For the following types of injection-moulded fittings the Z-lengths shall be calculated using one of the following equations as applicable, where α is the angle of the elbow and r is the radius of the bend.

a) 90° elbows, 90° tees (see table 2):

$$Z = \frac{d_n}{2} + 1$$

b) 45° elbows (see table 2):

$$Z = \frac{d_n}{2} \tan\frac{\alpha}{2} + 1$$

c) 45° tee (see table 2):

$$Z = \frac{d_n}{2} \cot\frac{\alpha}{2} + t$$

with

d_n	t
≤ 90	3
110	4
125	6
140	6
160	7

$$Z_1 = \frac{d_n}{2} \tan\frac{\alpha}{2} + 1$$

d) Bends (see table 3)

$$Z = r = 2d_n$$

e) Short bends (see table 6)

$$Z = r = 0{,}75 d_n$$

f) Reducing bushes long (see table 7)

$$Z = 0{,}75\, d_2 + 6$$

g) Reducing bushes short (see table 8)

$$Z = \left(\frac{d_2}{2} + 6\right) - \left(\frac{d_1}{2} + 6\right)$$

The calculated values are given in table 2 to table 8. The calculated values may be adapted by the manufacturer.

The manufacturer's information (e.g. catalogues) shall state the exact value(s) of the Z-length(s).

NOTE The deviation from the calculated values are recommended to be not greater than the values given in the table 2, table 3, table 6, table 7 and table 8 as applicable.

6.3.2.2 For bends made from pipe the Z-design-lengths, Z_d, and the bend radii shall be equal to or greater than the values given in table 4 and table 5, as applicable.

NOTE The Z_d-lengths are always greater than the corresponding socket lengths.

The wall thickness in the bend area of bends made from pipe shall be not less than the specified minimum wall thickness for the corresponding pipe given in EN 1452-2:1999.

NOTE If needed the next pipe series with the smaller S-number can be used.

6.3.2.3 Other fittings, in particular adapter- and connection-fittings, are shown in ENV 1452-6.

6.3.2.4 Figures and tables for fittings for solvent cementing