SLOVENSKI STANDARD

SIST EN ISO 15877-3:2004

maj 2004

Plastics piping systems for hot and cold water installations - Chlorinated poly(vinyl chloride) (PVC-C) - Part 3: Fittings (ISO 15877-3:2003)

ICS 23.040.45; 91.140.60

Referenčna številka
SIST EN ISO 15877-3:2004(en)

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 15877-3

December 2003

ICS 23.040.45; 91.140.80

English version

Plastics piping systems for hot and cold water installations - Chlorinated poly(vinyl chloride) (PVC-C) - Part 3: Fittings (ISO 15877-3:2003)

Systèmes de canalisations en plastique pour les installations d'eau chaude et froide - Poly(chlorure de vinyle) chloré (PVC-C) - Partie 3: Raccords (ISO 15877-3:2003)

Kunststoff-Rohrleitungssysteme für die Warm- und Kaltwasserinstallation - Chloriertes Polyvinylchlorid (PVC-C) - Teil 3: Formstücke (ISO 15877-3:2003)

This European Standard was approved by CEN on 17 March 2003.

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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 Management Centre has the same status as the official versions.

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

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Contents

Foreword

This document (EN ISO 15877-3:2003) has been prepared by Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems", the secretariat of which is held by NEN, in collaboration with Technical Committee ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids".

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of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by December 2005.

NOTE This draft was submitted for CEN enquiry as prEN 12731-3:1995.

This standard is 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 being undertaken in ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids", which is a Technical Committee of the International Organisation 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 recommended practices for installation.

EN ISO 15877 consists of the following Parts [1)], under the general title *Plastics piping systems for hot and cold water installations — Chlorinated poly(vinyl chloride) (PVC-C)*

— *Part 1: General*

— *Part 2: Pipes*

— *Part 3: Fittings* (the present standard)

— *Part 5: Fitness for purpose of the system*

— *Part 7 Guidance for the assessment of conformity* (CEN ISO/TS 15877-7).

This Part of EN ISO 15877 includes a Bibliography

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

EN ISO 15874, *Plastics piping systems for hot and cold water installations — Polypropylene (PP) (ISO 15874:2003)*

EN ISO 15875, *Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X) (ISO 15875:2003)*

EN ISO 15876, *Plastics piping systems for hot and cold water installations — Polybutylene (PB) (ISO 15876:2003)*

For pipes and fittings which have conformed to the relevant national standard before 1st November, 2003, as shown by the manufacturer or by a certification body, the national standard may continue to apply until 30th November 2005.

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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1) This System Standard does not incorporate a Part 4 *Ancillary equipment* or a Part 6 *Guidance for installation*. For ancillary equipment separate standards can apply. Guidance on installation of plastics piping systems made from different materials intended to be used for hot and cold water installations is given by ENV 12108 [1].

Introduction

The System Standard of which this is Part 3, specifies the requirements for a piping system when from chlorinated poly(vinyl chloride) (PVC-C). The piping system is intended to be used for hot and cold water installations.
In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by this standard:

— 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;

— 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.

Requirements and test methods for materials and components, other than fittings, are specified in Part 1 and Part 2 of EN ISO 15877:2003. Characteristics for fitness for purpose (mainly for joints) are covered in Part 5. Part 7 (CEN ISO/TS 15877-7) gives guidance for the assessment of conformity.

This Part of EN ISO 15877 specifies the characteristics of the fittings.

1 Scope

This Part of EN ISO 15877 specifies the characteristics of fittings made from chlorinated poly(vinyl chloride) (PVC-C) for piping systems intended to be used for hot and cold water installations within buildings for the conveyance of water, whether or not intended for human consumption (domestic systems) under design pressures and temperatures according to the class of application (see Table 1 of EN ISO 15877-1:2003).

This standard covers a range of service conditions (application classes) and design pressure classes. For values of T_D, T_{max} and T_{mal} in excess of those in Table 1of Part 1, this standard does not apply.

NOTE 1 It is the responsibility of the purchaser or specifier to make the appropriate selections from these aspects, taking into account their particular requirements and any relevant national regulations and installation practices or codes.

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

In conjunction with the other Parts of EN ISO 15877:2003 (see Foreword) it is applicable to PVC-C fittings, their joints and to joints with components of PVC-C, other plastics and non-plastics materials intended to be used for hot and cold water installations.

This standard is applicable to fittings of the following types:

— fittings for solvent cement joints;

— mechanical fittings;

— fittings with incorporated inserts.

NOTE 2 Fittings made from PVC-C are manufactured by injection-moulding.

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 (including amendments).

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

EN 681-1, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber*

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

EN 763:1994, *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Test method for visually assessing effects of heating*

EN 921:1994, *Plastics piping systems — Thermoplastics pipes — Determination of resistance to internal pressure at constant temperature*

EN 1254-3, *Copper and copper alloys — Plumbing fittings — Part 3: Fittings with compression ends for use with plastics pipes*

EN 10088-1, *Stainless steels — Part 1: List of stainless steels*

prEN 10226-1, *Pipe threads where pressure tight joints are made on the threads — Part 1: Taper external threads and parallel internal threads - Dimensions, tolerances and designation*

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

EN ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions (ISO 3126:2003)*

EN ISO 9080, *Plastics piping and ducting systems – Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation (ISO 9080:2003)*

EN ISO 15877-1:2003, *Plastics piping systems for hot and cold water installations — Chlorinated poly(vinyl chloride) (PVC-C) — Part 1: General (ISO 15877-1:2003)*

EN ISO 15877-2:2003, *Plastics piping systems for hot and cold water installations — Chlorinated poly(vinyl chloride) (PVC-C) — Part 2: Pipes (ISO 15877-2:2003)*

EN ISO 15877-5, *Plastics piping systems for hot and cold water installations — Chlorinated poly(vinyl chloride) (PVC-C) — Part 5: Fitness for purpose of the system(ISO 15877-5:2003)*

ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 12092, *Fittings, valves and other piping system components made of unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C), acrylonitrile-butadiene-styrene (ABS) and acrylonitrile-styrene-acrylester (ASA) for pipes under pressure — Resistance to internal pressure — Test method*

3 Terms and definitions, symbols and abbreviated terms

For the purposes of this standard, terms and definitions, symbols and abbreviations given in EN ISO 15877-1:2003 apply together with the following terms and definitions:

3.1 Terms and definitions

3.1.1
fitting for solvent cement joints
fitting in which the joint with the pipe or another component is made by means of an adhesive

3.1.2 Mechanical fittings

3.1.2.1
compression fitting
fitting in which the joint is made by the compression of a ring or sleeve on the outside wall of the pipe with or without additional sealing elements and with internal support

3.1.2.2
flanged fitting
fitting in which the pipe connection consists of two mating flanges which are mechanically pressed together and sealed by the compression of an elastomeric sealing element between them

3.1.2.3
flat seat union fitting
fitting in which the pipe connection consists primarily of two components, at least one of which normally incorporates a flat sealing surface, which are mechanically pressed together by means of a screwed nut or similar and sealed by the compression of an elastomeric sealing element between them

3.1.2.3
fitting with incorporated inserts
fitting in which the joint is made by means of connecting threads or other outlets, inserted in the injection-moulded fitting body, combined with at least one solvent cement socket injection-moulded fitting body, combined with at least one solvent cement socket

3.2 Symbols

d_{s1} : inside diameter of the socket at entry

d_{s2} : inside diameter of the socket at shoulder

d_1 : nominal diameter of the socket

d_2 : nominal diameter of the spigot

L : socket length

l_0 : free length

r : bending radius

Z : laying length (Z-length)

α_n : nominal angle of fitting

4 Material characteristics

4.1 General

The PVC-C material from which the fittings are made shall conform to this standard and to the relevant requirements of EN ISO 15877-1:2003.

4.2 Fitting material

The material from which the fittings are made shall be a chlorinated poly(vinyl chloride) (PVC-C) resin to which are added those additives that are needed to facilitate the manufacture of fittings conforming to this standard.

When tested in accordance with the test method as specified in Table 12 using the indicated parameters, injection moulded tubular test pieces shall withstand the hydrostatic (hoop) stress without bursting or leakage.

4.3 Evaluation of σ_{LCL}-values

The fitting material shall be evaluated in accordance with EN ISO 9080 or equivalent, where an internal pressure test is made in accordance with EN 921:1994 (together with EN 12107) to find the σ_{LCL}-values. The σ_{LCL}-values thus determined shall be at least as high as the corresponding values of the reference curves given in Figure 1 over the complete range of times.

NOTE 1 One equivalent way of evaluation is to calculate the σ_{LCL}-values for each temperature (e.g. for 20 °C, 60 °C and 90 °C) individually.

Equation (1) shall be used to determine the design stress, σ_{DF}, in the fitting material (see Annex A of EN ISO 15877-2:2003), as well as the values of the hydrostatic stress, σ_F, of the fitting material corresponding to the temperature and time control points given in Table 14.

$$\log t = -121{,}699 - \frac{25985}{T} \times \log \sigma + \frac{47143{,}18}{T} + 63{,}03511 \times \log \sigma \qquad (1)$$

NOTE 2 The reference curves in Figure 1 in the temperature range of 10 °C to 90 °C are derived from equation (1).

NOTE 3 Resistance to T_{mal} of PVC-C material is verified by testing in accordance with Annex A of EN ISO 15877-1:2003.

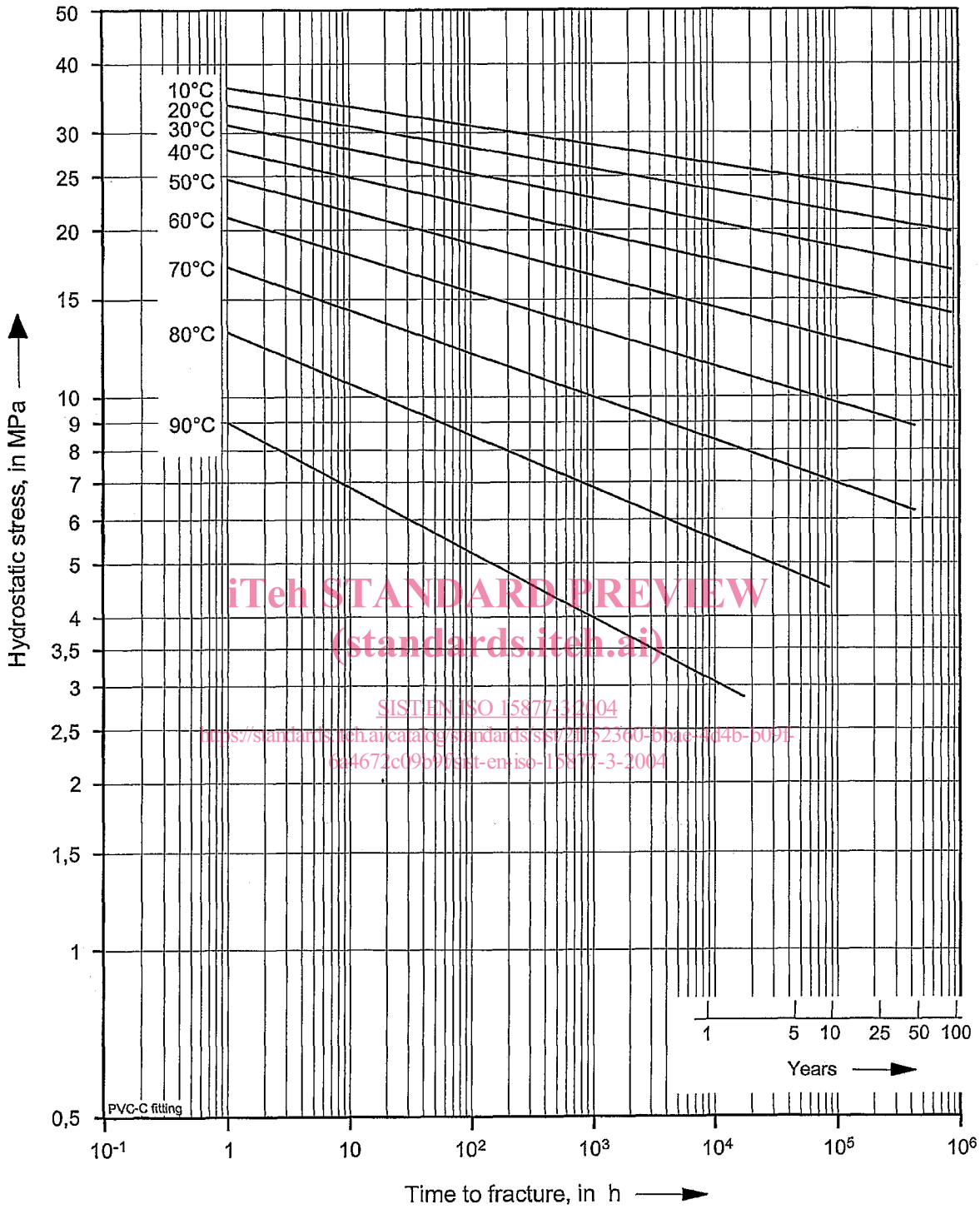

Figure 1 — Reference curves for the expected hydrostatic strength of PVC-C fitting material

4.4 Metallic material

Metallic material for fittings, intended to be used with components conforming to EN ISO 15877, shall conform to the requirements given in EN 1254-3 or EN 10088-1, as applicable.

4.5 Influence on water intended for human consumption

The material from which the fittings are made shall conform to EN ISO 15877-1:2003.

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 conformance with this standard. The material shall not contain visible impurities.

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

5.2 Opacity

PVC-C fittings that are declared to be opaque shall not transmit more than 0,2 % of visible light, when tested in accordance with EN 578.

6 Geometrical characteristics

6.1 General

Dimensions shall be measured in accordance with EN ISO 3126.

NOTE Figure 2 to Figure 9 cover schematic sketches only, to indicate the relevant dimensions. They do not necessarily represent the manufactured components.

6.2 Dimensions of fittings

6.2.1 Nominal diameter(s)

The nominal diameter(s), d_n, of a fitting shall correspond to and be designated by the nominal outside diameter(s) of the pipe(s) conforming to EN ISO 15877-2:2003 for which they are designed.

6.2.2 Wall thicknesses

The wall thickness, e, of the fitting body shall conform to Table 1 in relation to the pipe series S.

NOTE Compared with the wall thickness of the corresponding pipe conforming to EN ISO 15877-2:2003 the wall thickness, e, of the fitting body is increased by the factor 1,35.

Table 1 — Wall thicknesses of fitting bodies

Dimensions in millimetres

Nominal diameter	Pipe series		
	S 6,3	S 5	S 4
	Minimum wall thickness [a]		
d_n	e_{min}		
12	1,9	1,9	1,9
14	1,9	1,9	2,2
16	1,9	2,1	2,5
20	2,1	2,6	3,2
25	2,6	3,2	3,8
32	3,3	4,0	4,9
40	4,1	5,0	6,1
50	5,0	6,3	7,6
63	6,4	7,9	9,6
75	7,6	9,2	11,4
90	9,1	11,1	13,7
110	11,0	13,5	16,7
125	12,5	15,4	18,9
140	14,0	17,2	21,2
160	16,0	19,8	24,2

[a] The values are rounded up to the first place of the decimals (i.e. the nearest 0,1 mm).

6.2.3 Angles

The preferred nominal angle, α_n , of non-straight fittings is 45° and 90°.

6.2.4 Threads

Threads used for jointing shall conform to prEN 10226-1. Where a thread is used as a fastening thread for jointing an assembly (e.g. union nuts) it shall conform to ISO 228-1 except that these requirements need not apply to the threads used by the manufacturer to join component parts of a fitting together.

6.2.5 Laying lengths (*Z*-lengths)

For the following types of injection-moulded fittings the *Z*-lengths shall be calculated using one of the following equations (2) to (10), as applicable, where α is the angle of the fitting and r is the bending radius:

a) 90° elbow (see Figure 2 and Table 2) : $Z = \frac{d_n}{2} + 1$ (2)

b) 45° elbow (see Figure 2 and Table 2) : $Z = \left(\frac{d_n}{2} \times \tan\frac{\alpha}{2}\right) + 1$ (3)

c) 90° tee (see Figure 2 and Table 2) : $Z = \frac{d_n}{2} + 1$ (2)