

**SLOVENSKI
STANDARD**

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

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English version

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

Systèmes de canalisations en plastique pour les
installations d'eau chaude et froide - Poly(chlorure de
vinyle) chloré (PVC-C) - Partie 2: Tubes (ISO 15877-
2:2003)

Kunststoff-Rohrleitungssysteme für die Warm- und
Kaltwasserinstallation - Chloriertes Polyvinylchlorid (PVC-
C) - Teil 2: Rohre (ISO 15877-2:2003)

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

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 Management Centre 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 Management Centre has the same status as the official versions.

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Foreword

This document (EN ISO 15877-2:2003) 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of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by December 2005.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 12731-2:1995.

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 recommended practices for installation.

EN ISO 15877:2003 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 (the present standard) [SIST EN ISO 15877-2:2004](https://standards.iteh.ai/catalog/standards/sist/en-iso-15877-2-2004)
- Part 3: Fittings <https://standards.iteh.ai/catalog/standards/sist/4258f18b-e3c9-4ac3-bd2e-64d240c949ac/sist-en-iso-15877-2-2004>
- 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 the following :

- Annex A (informative): Derivation of the maximum calculated pipe value, $S_{calc,max}$;
- Bibliography.

At the date of publication of this standard, System Standards for piping systems of other plastics materials used for hot and cold water installations are 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.

1) This System Standard does not incorporate Part 4: *Ancillary equipment* and 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].

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.

Introduction

The System Standard, of which this is Part 2, specifies the requirements for a piping system when made 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.

When using solvent cement, relevant national safety rules or regulations concerning their use (e.g. protection of workers) are to be observed.

Requirements and test methods for material and components, other than pipes are specified in Part 1 and Part 3 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 pipes.

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1 Scope

This Part of EN ISO 15877:2003 specifies the requirements of pipes 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 appropriate to the class of application (see Table 1 of EN ISO 15877-1:2003).

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

NOTE 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 test parameters for the test methods referred to in this standard.

In conjunction with the other Parts of EN ISO 15877 (see Foreword) it is applicable to PVC-C pipes, 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.

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

EN 743:1994, *Plastics piping and ducting systems — Thermoplastics pipes — Determination of the longitudinal reversion*

EN 744, *Plastics piping and ducting systems — Thermoplastics pipes — Test method for resistance to external blows by the round-the-clock method*

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

EN ISO 6259-1, *Thermoplastics pipes — Determination of tensile properties — Part 1: General test method (ISO 6259-1:1997)*

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

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)*

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

ISO 6259-2:1997, *Thermoplastics pipes — Determination of tensile properties — Part 2: Pipes made of unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C) and high-impact poly(vinyl chloride) (PVC-HI)*

3 Terms and definitions, symbols and abbreviated terms

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

- l : length of pipe
 σ_y : tensile strength at yield point.

4 Material

4.1 General

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

4.2 Pipe material

The material from which the pipes 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 pipes conforming to this standard.

4.3 Evaluation of σ_{LCL} -values

The pipe 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 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 95 °C) individually.

NOTE 2 The reference curves in Figure 1 in the temperature range of 10 °C to 95 °C are derived from the following equation (1):

$$\log t = -109,95 - \frac{21897,4}{T} \times \log \sigma + \frac{43702,87}{T} + 50,74202 \times \log \sigma \quad (1)$$

To demonstrate conformance to the reference lines pipe samples should be tested at following temperatures and at various hoop stresses such that, at each of the temperatures given, at least three failure times fall in each of the following time intervals:

Temperatures 20; 60-70; 95; °C

Time intervals 10-100 h, 100-1000 h, 1000-8760 h and above 8760 h

In tests lasting more than 8760 h, once failure is reached at a stress and time at least on or above the reference line, any time after that can be considered as the failure time. Testing should be carried out in accordance with EN 921.

Conformance to the reference lines should be demonstrated by plotting the individual experimental results on the graph. At least 97.5% of them should lie on or above the reference line.

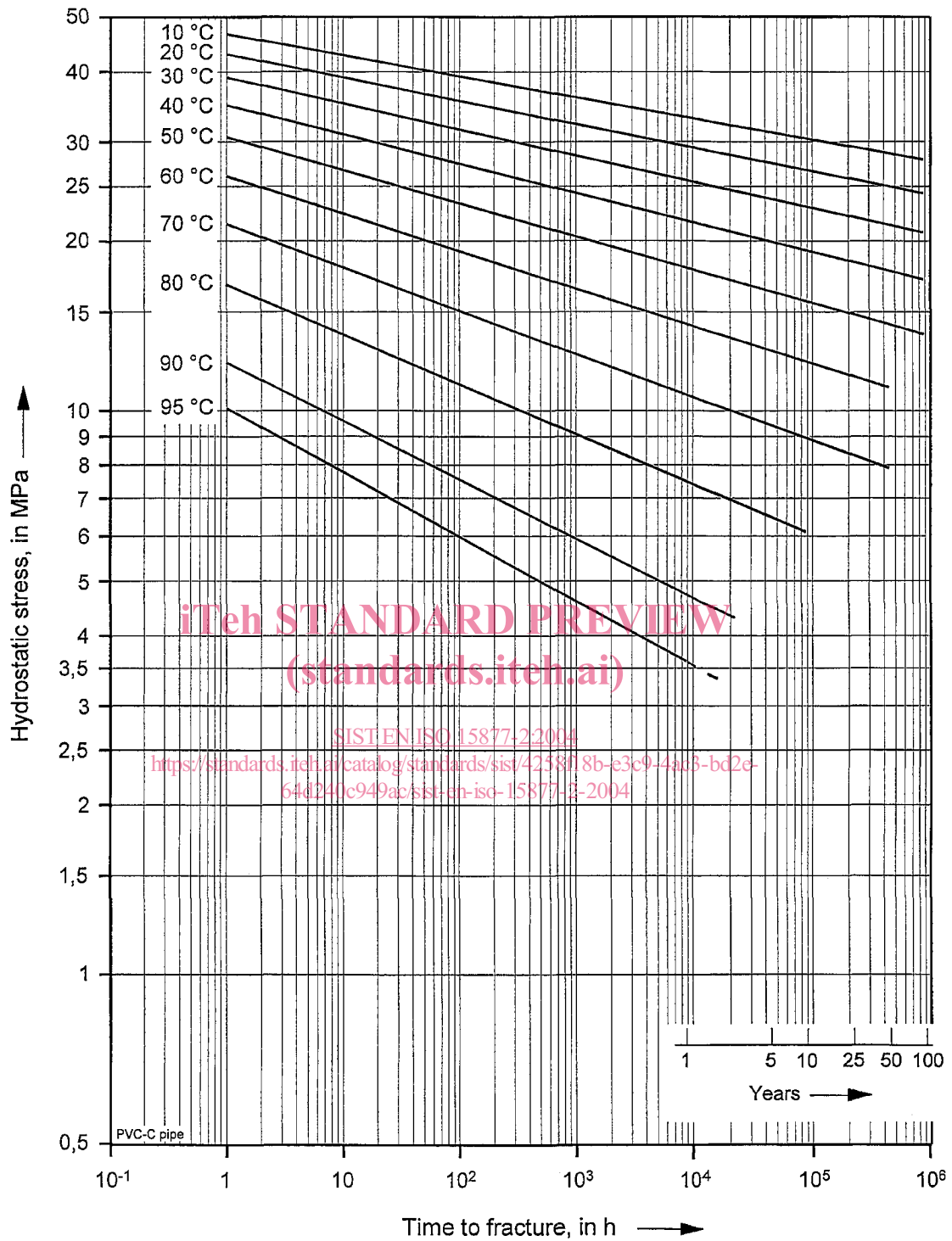


Figure 1 — Reference curves for the expected hydrostatic strength of PVC-C pipe material

4.4 Influence on water intended for human consumption

The material shall conform to EN ISO 15877-1:2003.

5 General characteristics

5.1 Appearance

When viewed without magnification the internal and external surfaces of pipes 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.

The ends of the pipe shall be cleanly cut and square to the axis of the pipe.

5.2 Chamfering

If a chamfer is required, the angle of chamfering shall be between 15° and 45° to the axis of the pipe. When pipes without chamfer are used, the pipe ends shall be deburred.

5.3 Opacity

PVC-C pipes 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

6.1.1 Dimensions shall be measured in accordance with EN ISO 3126.

NOTE Figure 2 covers schematic sketches only, to indicate the relevant dimensions. It does not necessarily represent the manufactured components.

6.1.2 The maximum calculated pipe value, $S_{\text{calc,max}}$, for the applicable class of service conditions and design pressure, p_D , shall conform to Table 1.

Table 1 — $S_{\text{calc,max}}$ -values

Design pressure p_D bar	Application class	
	Class 1	Class 2
	$S_{\text{calc,max}}$ -values ^a	
4	10,0	10,0
6	7,3	6,9
8	5,5	5,2
10	4,4	4,2

^a The values are rounded to the first place of decimals.

NOTE The derivation of $S_{\text{calc,max}}$ is provided in Annex A. The method described takes account of the properties of PVC-C under the service conditions for the classes given in Table 1 of EN ISO 15877-1:2003.

6.2 Dimensions of pipes

6.2.1 Outside diameters

The mean outside diameter, d_{em} , of a pipe shall conform to Table 2.

6.2.2 Wall thicknesses and their tolerances

For any particular class of service conditions, design pressure and nominal size, the minimum wall thickness, e_{\min} shall be chosen in such a way that the corresponding pipe series S is not greater than the values of $S_{\text{calc,max}}$ as given in table 1.

The wall thickness, e , shall conform to Table 2 in relation to the pipe series S.

The tolerance on the wall thickness, e , shall conform to Table 3.

Table 2 — Diameters and wall thicknesses

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter d_n	Mean outside diameter $d_{em,min}$ $d_{em,max}$		Pipe series		
				S 6,3	S 5	S 4
				Minimum wall thickness e_{\min}		
12	12	12,0	12,2	1,4	1,4	1,4
14	14	14,0	14,2	1,4	1,4	1,6
16	16	16,0	16,2	1,4	1,5	1,8
20	20	20,0	20,2	1,5	1,9	2,3
25	25	25,0	25,2	1,9	2,3	2,8
32	32	32,0	32,2	2,4	2,9	3,6
40	40	40,0	40,2	3,0	3,7	4,5
50	50	50,0	50,2	3,7	4,6	5,6
63	63	63,0	63,3	4,7	5,8	7,1
75	75	75,0	75,3	5,6	6,8	8,4
90	90	90,0	90,3	6,7	8,2	10,1
110	110	110,0	110,4	8,1	10,0	12,3
125	125	125,0	125,4	9,2	11,4	14,0
140	140	140,0	140,5	10,3	12,7	15,7
160	160	160,0	160,5	11,8	14,6	17,9