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**Cevni sistemi iz polimernih materialov za oskrbo z vodo in za podzemne in nadzemne sisteme odvodnjavanja, kanalizacije ter namakanja pod tlakom - Orientiran nemehčan polivinilklorid (PVC-O) - 3. del: Fitingi**

Plastics piping systems for water supply and for buried and above ground drainage, sewerage and irrigation under pressure - Oriented unplasticized poly(vinyl chloride) (PVC-O) - Part 3: Fittings

Kunststoff-Rohrleitungssysteme für die Wasserversorgung und für erdverlegte und nicht erdverlegte Entwässerungs-, Abwasser- und Bewässerungsdruckleitungen - Orientiertes weichmacherfreies Polyvinylchlorid (PVC-O) - Teil 3: Formstücke

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Systèmes de canalisations en plastique pour l'alimentation en eau, les branchements et collecteurs d'assainissement et les systèmes d'irrigation sous pression, enterrés ou aériens - Poly(chlorure de vinyle) non plastifié orienté (PVC-O) - Partie 3 : Raccords

**Ta slovenski standard je istoveten z: FprCEN/TS 17176-3**

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**ICS:**

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91.140.80	Drenažni sistemi	Drainage systems
93.030	Zunanji sistemi za odpadno vodo	External sewage systems

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**FprCEN/TS 17176-3**

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English Version

Plastics piping systems for water supply and for buried  
and above ground drainage, sewerage and irrigation under  
pressure - Oriented unplasticized poly(vinyl chloride)  
(PVC-O) - Part 3: Fittings

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Formstücke

This draft Technical Specification is submitted to CEN members for Vote. It has been drawn up by the Technical Committee CEN/TC 155.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## FprCEN/TS 17176-3:2021 (E)

### European foreword

This document (FprCEN/TS 17176-3:2021) has been prepared by Technical Committee CEN/TC 155 “Plastics piping systems and ducting systems”, the secretariat of which is held by NEN.

This document is currently submitted to the Vote on TS.

This document will supersede CEN/TS 17176-3:2019.

In comparison with the previous edition, the following modifications have been made:

- in Table 1 60 °C deleted,
- mistakes corrected in Table 2 and Annex B;
- additional information requests as in the B.5 Test report.

The revision of CEN/TS 17176-3:2019 is proposed to revise Annex B, in order to avoid misinterpretation and confusion in the market regarding reporting and use of the test results. In addition, mistakes identified in Table 2 are amended.

EN 17176 consists of the following parts, under the general title *Plastics piping systems for water supply and for buried and above ground drainage, sewerage and irrigation under pressure — Oriented unplasticized poly(vinyl chloride) (PVC-O)*:

- *Part 1: General*;
- *Part 2: Pipes*;
- *Part 3: Fittings* (this document);
- *Part 5: Fitness for purpose of the system*;
- *Part 7: Guidance for assessment of conformity* (in preparation).

For valves, see EN ISO 1452-4.

Guidance for installation is given in ISO/TR 4191 [3].

## Introduction

The System Standard, of which this is Part 3, specifies the requirements for a piping system made from oriented unplasticized poly(vinyl chloride) (PVC-O) pipes and its components. The piping system is intended to be used for water supply, pressurized drainage, sewerage, treated waste water and irrigation systems to be used underground or above ground where protected from direct sunlight.

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

- a) This document provides no information as to whether or not the products can be used without restriction.
- b) Existing national regulations concerning the use and/or the characteristics of these products remain in force.

Requirements and test methods for PVC-O material and components, other than fittings, are specified in EN 17176-1 and EN 17176-2. For other components (not manufactured from PVC-O) reference is made to the following standards: EN ISO 1452-3 (PVC-U) and EN 12842 (cast iron). Characteristics for fitness for purpose (mainly for joints) are specified in EN 17176-5.

This document specifies the characteristics of PVC-O fittings.

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**FprCEN/TS 17176-3:2021 (E)****1 Scope**

This document specifies the characteristics of solid-wall oriented unplasticized poly(vinyl chloride) (PVC-O) fittings for piping systems intended for water supply and for buried drainage, sewerage, treated waste water and irrigation under pressure or above-ground where protected from direct sunlight. The scope of this document is limited to double sockets, repair couplings, reducers and to non-end load bearing elbows.

NOTE 1 The scope of this document is restricted to fittings on the market during the preparation of this document. Therefore, tees, flange adaptors, etc., are excluded from this version of the standard.

NOTE 2 For double sockets, repair couplings and reducers there are no special fittings designs for end-load bearing applications. However, restrained gaskets can be used for end-load bearing applications. In that case, the requirements of EN 17176-5 are applicable.

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

In conjunction with EN 17176-1 and EN 17176-5, this document is applicable to oriented PVC-O fittings intended to be used for the following:

- a) water mains and services lines;
- b) conveyance of water for both outside and inside buildings;
- c) drainage, sewerage and treated waste water under pressure;
- d) irrigation under pressure.

This document is applicable to piping systems intended for the supply of water with a maximum allowable operating pressure (PFA) up to and including 25 bar<sup>1)</sup>. The piping system according to this document is intended for the conveyance of cold water up to and including 45 °C and especially in those applications where special performance requirements are needed, such as impact loads and pressure fluctuations. For temperatures between 25 °C and 45 °C, EN 17176-2:2019, Figure C.1 applies.

This document specifies a range of fittings sizes and pressure classes and gives a requirement and recommendations concerning colours.

NOTE 3 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.

**2 Normative references**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

EN 17176-1:2019, *Plastics piping systems for water supply and for buried and above ground drainage, sewerage and irrigation under pressure - Oriented unplasticized poly(vinyl chloride) (PVC-O) - Part 1: General*

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1) 1 bar = 0,1 MPa = 10<sup>5</sup> Pa; 1 MPa = 1 N/mm<sup>2</sup>.



EN 17176-2:2019, *Plastics piping systems for water supply and for buried and above ground drainage, sewerage and irrigation under pressure - Oriented unplasticized poly(vinyl chloride) (PVC-O) - Part 2: Pipes*

EN 17176-5, *Plastics piping systems for water supply and for buried and above ground drainage, sewerage and irrigation under pressure - Oriented unplasticized poly(vinyl chloride) (PVC-O) - Part 5: Fitness for purpose of the system*

EN ISO 1167-1, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 1: General method (ISO 1167-1:2006)*

EN ISO 1167-2, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 2: Preparation of pipe test pieces (ISO 1167-2:2006)*

EN ISO 1167-3, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids - Determination of the resistance to internal pressure - Part 3: Preparation of components (ISO 1167-3:2007)*

EN ISO 1183-1, *Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pycnometer method and titration method (ISO 1183-1:2019, Corrected version 2019-05)*

EN ISO 1452 (all parts), *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure - Unplasticized poly(vinyl chloride) (PVC-U) (ISO 1452)*

EN ISO 3126, *Plastics piping systems - Plastics components - Determination of dimensions (ISO 3126:2005)*

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

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

EN ISO 7686, *Plastics pipes and fittings - Determination of opacity (ISO 7686:2005)*

EN ISO 9080, *Plastics piping and ducting systems - Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation (ISO 9080:2012)*

EN ISO 9852, *Unplasticized poly(vinyl chloride) (PVC-U) pipes - Dichloromethane resistance at specified temperature (DCMT) - Test method (ISO 9852)*

ISO 161-1, *Thermoplastics pipes for the conveyance of fluids - Nominal outside diameters and nominal pressures - Part 1: Metric series*

ISO 2507-1, *Thermoplastics pipes and fittings - Vicat softening temperature - Part 1: General test method*

ISO 18373-1, *Rigid PVC pipes - Differential scanning calorimetry (DSC) method - Part 1: Measurement of the processing temperature*

## FprCEN/TS 17176-3:2021 (E)

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 17176-1, and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

**3.1**  
**PVC-O fitting**  
 fitting of oriented unplasticized poly(vinyl chloride) (PVC-O) made from stretching PVC-U preforms under certain conditions which improve its mechanical behaviour

Note 1 to entry: This means that fittings made from different components are excluded from the scope of this document.

**3.2**  
**laying length socketed outlet**  
**Z-length**  
 distance from the inserted tube or spigot end to the intersection point of the fitting/valve axis (fitting or valve centre)

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**3.3**  
**laying length spigot outlet**  
**Z-length**  
 distance from the outlet end to the intersection point of the fitting/valve axis (fitting or valve centre)

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**3.4**  
**laying length socket with parallel outlets**  
**Z-length**  
 distance between the ends of the inserted tubes or spigots

**3.5**  
**laying length one socket and one spigot with parallel outlets**  
**Z-length**  
 distance from the inserted tube or spigot end to the end of the spigot outlet

**3.6**  
**design length of bends**  
**Z<sub>d</sub>-length**  
 length of an outlet, excluding any socket length or insert length of spigot

**3.7**  
**lower confidence limit of the predicted hydrostatic pressure**  
**p<sub>LPL</sub>**  
 quantity with the dimension of pressure, which represents the 97,5 % (one sided) lower confidence limit of the predicted hydrostatic pressure at a temperature, T, and a time, t

**3.8****long-term hydrostatic pressure*****P*<sub>LTHS</sub>**

quantity with the dimension of pressure, which represents the predicted mean pressure at a temperature, *T*, and time, *t* (50 % confidence limit)

**3.9****Minimum Required Pressure****MRP**

minimum required pressure capability of the fitting is the value of the  $p_{LPL}$  at 20 °C for 50 years rounded to the nearest 0,01 bar

Note 1 to entry: The MRP is related with the PN by means of the overall safety coefficient *C*:

$$PN = \frac{MRP}{C} \quad (1)$$

**4 Symbols**

For the purposes of this document, the symbols and abbreviated terms given in EN 17176-1 and EN 17176-2, and the following apply.

$\alpha$	bend angle
$l_{1,min}$	minimum length of spigot
$r$	bend radius
$r_{min}$	minimum bend radius
$Z_d$	design laying length ( $Z_d$ -length)
$Z_{d,min}$	minimum design laying length
$Z_r$	design length reducing part
$Z_c$	design length connecting part double socket
$Z_{r,min}$	minimum design length reducing part
$Z_{c,min}$	minimum design length connecting part double socket

**5 Material****5.1 General**

The material from which the fittings are made shall conform to EN 17176-1 and to the requirements given in 5.2 and 5.3.

**5.2 Density**

The density,  $\rho$ , at 23 °C of the fitting, when measured in accordance with EN ISO 1183-1, shall be within the following limits:

$$1\,350 \text{ kg/m}^3 < \rho < 1\,460 \text{ kg/m}^3$$