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Plastics piping systems for non-pressure underground drainage and sewerage -  
Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U),  
polypropylene (PP) and polyethylene (PE) - Part 3: Specifications for pipes and fittings  
with smooth internal and profiled external surface and the system, Type B

Kunststoff-Rohrleitungssysteme für erdverlegte drucklose Abwasserkanäle und -  
leitungen - Rohrleitungssysteme mit profilierter Wandung aus weichmacherfreiem  
Polyvinylchlorid (PVC-U), Polypropylen (PP) und Polyethylen (PE) - Teil 3:  
Anforderungen an Rohre und Formstücke mit glatter Innen- und profilierter Außenfläche  
und an das Rohrleitungssystem, Typ B

Systèmes de canalisations en plastique pour les branchements et les collecteurs  
d'assainissement sans pression enterrés - Systèmes de canalisations à parois  
structurées en poly(chlorure de vinyle) non plastifié (PVC-U), polypropylène (PP) et  
polyéthylène (PE) - Partie 3: Spécifications pour les tubes et raccords avec une surface  
interne lisse et une surface externe profilée et le système, de Type B

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**Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) - Part 3: Specifications for pipes and fittings with smooth internal and profiled external surface and the system, Type B**

Systèmes de canalisations en plastique pour les branchements et les collecteurs d'assainissement sans pression enterrés - Systèmes de canalisations à parois structurées en poly(chlorure de vinyle) non plastifié (PVC-U), polypropylène (PP) et polyéthylène (PE) - Partie 3: Spécifications pour les tubes et raccords avec une surface interne lisse et une surface externe profilée et le système de Type B

Kunststoff-Rohrleitungssysteme für erdverlegte drucklose Abwasserkanäle und -leitungen - Rohrleitungssysteme mit profilierter Wandung aus weichmacherfreiem Polyvinylchlorid (PVC-U), Polypropylen (PP) und Polyethylen (PE) - Teil 3: Anforderungen an Rohre und Formstücke mit glatter Innen- und profilierter Außenfläche und an das Rohrleitungssystem, Typ B

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This European Standard was approved by CEN on 5 March 2007 and includes Amendment 1 approved by CEN on 27 November 2008.

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**EN 13476-3:2007+A1:2009 (E)****Foreword**

This document (EN 13476-3:2007+A1:2009) has been prepared by Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems", the secretariat of which is held by NEN.

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 July 2009, and conflicting national standards shall be withdrawn at the latest by July 2009.

This document includes Amendment 1, approved by CEN on 2008-11-27.

This document supersedes EN 13476-3:2007.

The start and finish of text introduced or altered by amendment is indicated in the text by tags  $\boxed{A_1}$   $\boxed{A_1}$ .

This standard is a Part of a System Standard for plastics piping systems of particular materials 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 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 13476 consists of the following Parts under the general title Plastics piping systems for non-pressure underground drainage and sewerage - Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE):

- *Part 1: General requirements and performance characteristics;*
- *Part 2: Specifications for pipes and fittings with smooth internal and external surface and the system, Type A;*
- *Part 3: Specifications for pipes and fittings with smooth internal and profiled external surface and the system, Type B (this standard);*
- *Part 4: Assessment of conformity (CEN/TS).*
- $\boxed{A_1}$  *deleted text*  $\boxed{A_1}$

For pipes and fittings which have conformed to the relevant national standard before May 2007, as shown by the manufacturer or by a certification body, the national standard may continue to be applied until May 2009.

National standards specifically for pipes and fittings for the transport of surface water are not considered to be conflicting with this standard and may thus be allowed to coexist.

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

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## Introduction

This standard provides optional choices for impact resistance (see Annex G and Annex H) and ring flexibility (see Annex I).

As appropriate, the individual countries may select between those options in their national forewords.

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## 1 Scope

This part of EN 13476, together with EN 13476-1, specifies the definitions and requirements for pipes, fittings and the system based on unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) structured-wall piping systems that are intended to be used for non-pressure underground drainage and sewerage systems.

This part is applicable to pipes and fittings with smooth internal and profiled external surfaces, designated as Type B.

It specifies test methods and test parameters as well as requirements.

This part is applicable to:

- a) structured-wall pipes and fittings, which are intended to be used buried underground outside the building structure, reflected in the marking of products by "U";
- b) structured-wall pipes and fittings, which are intended to be used buried underground both outside (application area code "U") and within the building structure (application area code "D"), reflected in the marking of products by "UD".

This part is applicable to structured-wall pipes and fittings with or without an integral socket with elastomeric ring seal joints as well as welded and fused joints.

This part covers a range of pipe and fitting sizes, materials, pipe constructions, stiffness classes, application classes, and tolerance classes and gives recommendations concerning colours.

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.

NOTE 2 For dimensions larger than DN 1200 OD/ID this document may be applied regarding appearance, colour, physical and mechanical characteristics as well as performance requirements.

## 2 Normative references

The following referenced documents are indispensable for the application 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 476, *General requirements for components used in discharge pipes, drains and sewers for gravity systems*

EN 580, *Plastics piping systems — Unplasticized poly(vinyl chloride) (PVC-U) pipes — Test method for the resistance to dichloromethane at a specified temperature (DCMT)*

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

EN 681-2, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 2: Thermoplastic elastomers*

EN 681-4, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 4: Cast polyurethane sealing elements*

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

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EN 728, *Plastics piping and ducting systems — Polyolefin pipes and fittings — Determination of oxidation induction time*

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

EN 922, *Plastics piping and ducting systems — Pipes and fittings of unplasticized poly(vinyl chloride) (PVC-U) — Specimen preparation for determination of the viscosity number and calculation of the K-value*

EN 1053, *Plastics piping systems — Thermoplastics piping systems for non-pressure applications — Test method for watertightness*

EN 1055:1996, *Plastics piping systems — Thermoplastics piping systems for soil and waste discharge inside buildings — Test method for resistance to elevated temperature cycling*

EN 1277, *Plastics piping systems — Thermoplastics piping systems for buried non-pressure applications — Test methods for leaktightness of elastomeric sealing ring type joints*

EN 1401-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Unplasticized poly(vinyl chloride) (PVC-U) — Part 1: Specifications for pipes, fittings and the system*

EN 1411, *Plastics piping and ducting systems — Thermoplastics pipes — Determination of resistance to external blows by the staircase method*

EN 1437, *Plastics piping systems — Piping systems for underground drainage and sewerage — Test method for resistance to combined temperature cycling and external loading*

EN 1446, *Plastics piping and ducting systems — Thermoplastics pipes — Determination of ring flexibility*

EN 1852-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Polypropylene (PP) — Part 1: Specifications for pipes, fittings and the system*

EN 1905, *Plastics piping systems — Unplasticized poly(vinyl chloride) (PVC-U) pipes, fittings and material — Method for assessment of the PVC content based on total chlorine content*

EN 1979, *Plastics piping and ducting systems — Thermoplastics spirally-formed structured-wall pipes — Determination of the tensile strength of a seam*

EN 12061, *Plastics piping systems — Thermoplastics fittings — Test method for impact resistance*

EN 12256, *Plastics piping systems — Thermoplastics fittings — Test method for mechanical strength or flexibility of fabricated fittings*

EN 12666-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Polyethylene (PE) — Part 1: Specifications for pipes, fittings and the system*

EN 13476-1:2007, *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — Part 1: General requirements and performance characteristics*

EN 13476-2:2007, *Plastics piping systems for non-pressure underground drainage and sewerage — Structured-wall piping systems of unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE) — Part 2: Specifications for pipes and fittings with smooth internal and external surface and the system, Type A*

CEN/TS 14541:2007, *Plastics pipes and fittings for non-pressure applications — Utilisation of non-virgin PVC-U, PP and PE materials*

EN 14741, *Thermoplastics piping and ducting systems — Joints for buried non-pressure applications — Test method for the long-term sealing performance of joints with elastomeric seals by estimating the sealing pressure*

EN 14758-1, *Plastics piping systems for non-pressure underground drainage and sewerage — Polypropylene with mineral modifiers (PP-MD) — Part 1: Specifications for pipes, fittings and the system*

EN ISO 580, *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Methods for visually assessing the effects of heating (ISO 580:2005)*

EN ISO 1133:2005, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics (ISO 1133:2005)*

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 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer and titration method (ISO 1183-1:2004)*

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

EN ISO 3451-1, *Plastics — Determination of ash — Part 1: General methods (ISO 3451-1:1997)*

EN ISO 9967, *Plastics pipes — Determination of creep ratio (ISO 9967:1994)*

EN ISO 9969, *Thermoplastics pipes — Determination of ring stiffness (ISO 9969:1994)*

ISO 12091, *Structured-wall thermoplastics pipes — Oven test*

ISO 13967, *Thermoplastics fittings — Determination of ring stiffness*

### 3 Terms, Definitions, symbols and abbreviations

#### 3.1 Definitions

For the purposes of this document, the terms and definitions given in EN 13476-1:2007 apply.

#### 3.2 Symbols

$A$	length of engagement, or maximum pull-out whilst maintaining tightness
$C$	length of the sealing zone
$d_e$	outside diameter
$d_{em}$	mean outside diameter
$d_{im}$	mean inside diameter
$d_n$	nominal diameter

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$d_{sm,min}$	minimum mean inside diameter of socket
$e$	wall thickness (at any point)
$e_c$	construction height
$e_{min}$	minimum wall thickness of pipe or spigot
$e_2$	wall thickness at any point of the cylindrical part of a socket
$e_3$	wall thickness at any point of a sealing ring groove of a socket
$e_4$	wall thickness of the inside layer (waterway wall thickness)
$e_5$	wall thickness of the inside layer under a hollow section
$F$	distance from the end of a spigot to the effective sealing point
$l$	effective length of a pipe
$L_{1,min}$	minimum length of a spigot
$S_{so}$	actual stiffness of the cylindrical part of the socket
$S_{sp}$	actual stiffness of the spigot
IMP 23C	impact resistance determined at +23 °C
❄	impact resistance determined at -10 °C

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**3.3 Abbreviations**

CaCO <sub>3</sub>	calcium carbonate
CT	close tolerance
DN	nominal size
DN/ID	nominal size related to inside diameter
DN/OD	nominal size related to outside diameter
H50	value for impact resistance of a pipe
MgCO <sub>3</sub>	magnesium carbonate
MFR	melt mass-flow rate
Mg <sub>3</sub> Si <sub>4</sub> O <sub>10</sub> (OH) <sub>2</sub>	magnesiumsilicate, talcum
OIT	oxidation induction time
PE	polyethylene

PP	polypropylene
PP-MD	mineral modified PP
PVC-U	unplasticized poly(vinyl chloride)
RF	ring flexibility performance
S	pipe series S
SDR	standard dimension ratio
SN	nominal ring stiffness
TIR	true impact rate
TPE	thermoplastic elastomer
VST	Vicat softening temperature

## 4 Material

### 4.1 General

The material shall be one of the following: unplasticized poly(vinyl chloride) (PVC-U), polypropylene (PP) or polyethylene (PE), to which are added additives needed to facilitate the manufacture of components conforming to this standard, including the relevant annexes.

Spirally formed pipes Type B may include a support profile (see Figure 1) made from polymers other than PVC-U, PP or PE.

Spirally formed pipe constructions may include a continuous elastomeric sealing component of a material conforming to EN 681-1, EN 681-2 or EN 681-4 as applicable, or a continuous adhesive conforming to 4.7.

### 4.2 Unplasticized poly(vinyl chloride) (PVC-U)

#### 4.2.1 General

The raw material shall be PVC-U to which are added those additives needed to facilitate the manufacture of components conforming to the requirements of this standard (see also Annex A).

NOTE Additional information of the characteristics of PVC-U material or components made thereof is given in Annex A of EN 13476-1:2007.

#### 4.2.2 Pipe and fitting material characteristics

When tested in accordance with the test method as specified in Table 1, using the indicated parameters, the material shall have characteristics conforming to the requirements given in Table 1.