

PLASTTORUSTIKUSÜSTEEMID TÖÖNDUSLIKELE
RAKENDUSTELE. POLÜBUTEEN (PB), POLÜETÜLEEN
(PE), KÕRGE TEMPERATUURITALUVUSEGA
POLÜETÜLEEN (PE-RT), VÕRKSTRUKTUURIGA
POLÜETÜLEEN (PE-X) JA POLÜPROPÜLEEN (PP).
KOMPONENTIDE JA SÜSTEEMIDE
MEETERMÕÕDUSTIKUS SPETSIFIKATSIOONID

Plastics piping systems for industrial applications -
Polybutene (PB), polyethylene (PE), polyethylene of
raised temperature resistance (PE-RT), crosslinked
polyethylene (PE-X), polypropylene (PP) - Metric series
for specifications for components and the system (ISO
15494:2015)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 15494:2015 sisaldab Euroopa standardi EN ISO 15494:2015 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 15494:2015 consists of the English text of the European standard EN ISO 15494:2015.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 04.11.2015.	Date of Availability of the European standard is 04.11.2015.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 23.040.01

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:

Aru 10, 10317 Tallinn, Eesti; koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Aru 10, 10317 Tallinn, Estonia; homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

Plastics piping systems for industrial applications -
Polybutene (PB), polyethylene (PE), polyethylene of raised
temperature resistance (PE-RT), crosslinked polyethylene
(PE-X), polypropylene (PP) - Metric series for
specifications for components and the system (ISO
15494:2015)

Systèmes de canalisations en plastique pour les
applications industrielles - Polybutène (PB),
Polyéthylène (PE), polyéthylène de meilleure
résistance à la température (PE-RT), polyéthylène
réticulé (PE-X), polypropylène (PP) - Séries métriques
pour les spécifications pour les composants et le
système (ISO 15494:2015)

Kunststoff-Rohrleitungssysteme für industrielle
Anwendungen - Polybuten (PB), Polyethylen (PE),
Polyethylen erhöhter Temperaturbeständigkeit (PE
RT), vernetztes Polyethylen (PE-X), Polypropylen (PP)
- Metrische Reihen für Anforderungen an
Rohrleitungsteile und das Rohrleitungssystem (ISO
15494:2015)

This European Standard was approved by CEN on 13 June 2015.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

This document (EN ISO 15494:2015) has been prepared by Technical Committee ISO/TC 138 "Plastics pipes, fittings and valves for the transport of fluids" in collaboration with 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 May 2016, and conflicting national standards shall be withdrawn at the latest by May 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 15494:2003.

This document 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).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 15494:2015 has been approved by CEN as EN ISO 15494:2015 without any modification.

Annex ZA
(informative)
Relationship between this European Standard and the Essential Requirements of EU Directive for pressure equipment 97/23/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive for pressure equipment 97/23/EC.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in table ZA confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

For this harmonized supporting standard for materials, presumption of conformity to the Essential Requirements of the Directive is limited to technical data of the material in the standard and does not presume adequacy of the material to specific equipment. Consequently the technical data stated in the material standard should be assessed against the design requirements of the specific equipment to verify that the Essential Requirements of the Pressure Equipment Directive (PED) are satisfied.

Table ZA.1 — Correspondence between this European Standard and Directive for pressure equipment 97/23/EC

Clause(s)/sub-clause(s) of this EN	Subject	Qualifying remarks/Notes
8.2	Mechanical characteristics	Annex I 3.2.2 and 7.4 of the Directive
Clause 15	Declaration of compliance	Annex I 4.3 of the Directive
Annex A, A.6	Fitness for purpose of the system	Article 1 paragraph 2.1.2 and paragraph 2.1.5
Annex B, B.6	Fitness for purpose of the system	Article 1 paragraph 2.1.2 and paragraph 2.1.5
Annex C, C.6	Fitness for purpose of the system	Article 1 paragraph 2.1.2 and paragraph 2.1.5
Annex D, D.6	Fitness for purpose of the system	Article 1 paragraph 2.1.2 and paragraph 2.1.5
Annex E, E.6	Fitness for purpose of the system	Article 1 paragraph 2.1.2 and paragraph 2.1.5

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	2
3 Terms and definitions	4
3.1 Geometrical definitions.....	4
3.2 Material definitions.....	5
3.3 Definitions related to material characteristics.....	6
3.4 Definitions related to service conditions.....	6
4 Symbols and abbreviated terms	7
4.1 Symbols.....	7
4.2 Abbreviated terms.....	8
5 Material	9
5.1 General.....	9
5.2 Hydrostatic strength properties.....	9
5.3 Material characteristics.....	9
5.4 Reprocessable and recyclable material.....	9
5.5 Materials for components not made from PB, PE, PE-RT, PE-X, or PP.....	9
5.5.1 General.....	9
5.5.2 Metallic materials.....	10
5.5.3 Sealing materials.....	10
5.5.4 Other materials.....	10
6 General characteristics	10
6.1 Appearance.....	10
6.2 Colour.....	10
6.3 Influence of UV radiation.....	10
7 Geometrical characteristics	10
7.1 General.....	10
7.2 Mean outside diameters, out-of-roundness (ovality), and tolerances.....	11
7.3 Wall thicknesses and related tolerances.....	11
7.4 Angles.....	11
7.5 Laying lengths.....	11
7.6 Threads.....	11
7.7 Mechanical fittings.....	11
7.8 Joint dimensions of valves.....	11
8 Mechanical characteristics	11
8.1 Resistance to internal pressure of components.....	11
8.2 Calculation of the test pressure for components.....	12
8.2.1 Pipes.....	12
8.2.2 Fittings.....	12
8.2.3 Valves.....	12
8.2.4 Resistance to rapid crack propagation, RCP.....	12
9 Physical characteristics	12
10 Chemical characteristics	13
10.1 Effects on the component material(s).....	13
10.2 Effects on the fluids.....	13
11 Electrical characteristics	13
12 Performance requirements	13
12.1 General.....	13

12.2	Fusion compatibility	13
13	Classification of components	13
14	Design and installation	14
15	Declaration of conformity	14
16	Marking	14
16.1	General	14
16.2	Minimum required marking of pipes	14
16.3	Minimum required marking of fittings	15
16.4	Minimum required marking of valves	15
Annex A	(normative) Specific characteristics and requirements for industrial piping systems made from polybutene (PB)	16
Annex B	(normative) Specific characteristics and requirements for industrial piping systems made from polyethylene (PE)	29
Annex C	(normative) Specific characteristics and requirements for industrial piping systems made from polyethylene of raised temperature resistance (PE-RT)	56
Annex D	(normative) Specific characteristics and requirements for industrial piping systems made from crosslinked polyethylene (PE-X)	63
Annex E	(normative) Specific characteristics and requirements for industrial piping systems made from polypropylene (PP)	73
Annex F	(informative) Design and installation	99
Bibliography	100

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#).

The committee responsible for this document is Technical Committee ISO/TC 138, *Plastics piping systems*, Subcommittee SC 3, *Plastics pipes and fittings for industrial applications*.

This second edition cancels and replaces the first edition (ISO 15494:2003), which has been technically revised.

Introduction

This International Standard specifies the characteristics and requirements for a piping system and its components made from polybutene (PB), polyethylene (PE), polyethylene of raised temperature resistance (PE-RT), crosslinked polyethylene (PE-X), or polypropylene (PP), as applicable, intended to be used for industrial applications above ground or below ground by authorities, design engineers, certification bodies, inspection bodies, testing laboratories, manufacturers, and users.

At the date of publication of this International Standard, standards for piping systems of other plastics used for industrial applications are the following:

ISO 10931, *Plastics piping systems for industrial applications — Poly(vinylidene fluoride) (PVDF) — Specifications for components and the system*

ISO 15493, *Plastics piping systems for industrial applications — Acrylonitrile-butadiene-styrene (ABS), unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C) — Specifications for components and the system — Metric series*

Plastics piping systems for industrial applications — Polybutene (PB), polyethylene (PE), polyethylene of raised temperature resistance (PE-RT), crosslinked polyethylene (PE-X), polypropylene (PP) — Metric series for specifications for components and the system

1 Scope

This International Standard specifies the characteristics and requirements for components such as pipes, fittings, and valves made from one of the following materials intended to be used for thermoplastics piping systems in the field of industrial applications above and below ground:

- polybutene (PB);
- polyethylene (PE);
- polyethylene of raised temperature resistance (PE-RT);
- crosslinked polyethylene (PE-X);
- polypropylene (PP).

NOTE 1 Requirements for industrial valves are given in this International Standard and/or in other standards. Valves are to be used with components conforming to this International Standard provided that they conform additionally to the relevant requirements of this International Standard.

This International Standard is applicable to either PB, PE, PE-RT, PE-X, or PP pipes, fittings, valves, and their joints and to joints with components of other plastics and non-plastic materials, depending on their suitability, intended to be used for the conveyance of liquid and gaseous fluids as well as solid matter in fluids for industrial applications such as the following:

- chemical plants;
- industrial sewerage engineering;
- power engineering (cooling and general purpose water);
- mining;
- electroplating and pickling plants;
- semiconductor industry;
- agricultural production plants;
- fire fighting;
- water treatment;
- geothermal.

NOTE 2 Where relevant, national regulations (e.g. water treatment) are applicable.

Other application areas are permitted if the requirements of this International Standard and/or applicable national requirements are fulfilled.

National regulations in respect of fire behaviour and explosion risk are applicable.

The components have to withstand the mechanical, thermal, and chemical demands to be expected and have to be resistant to the fluids to be conveyed.

Characteristics and requirements which are applicable for all materials (PB, PE, PE-RT, PE-X, or PP) are covered by the relevant clauses of this International Standard. Those characteristics and requirements which are dependent on the material are given in the relevant normative annex for each material (see [Table 1](#)).

Table 1 — Material-specific annexes

Material	Annex
Polybutene (PB)	A
Polyethylene (PE)	B
Polyethylene of raised temperature resistance (PE-RT)	C
Crosslinked polyethylene (PE-X)	D
Polypropylene (PP)	E

Components conforming to any of the product standards listed in the bibliography or with national standards, as applicable, may be used with components conforming to this International Standard, provided that they conform to the requirements for joint dimensions and to the relevant requirements of this International Standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

ISO 179-2, *Plastics — Determination of Charpy impact properties — Part 2: Instrumented impact test*

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

ISO 472, *Plastics — Vocabulary*

ISO 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*

ISO 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

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 1167-2, *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 1167-3, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 3: Preparation of components*

ISO 1167-4, *Thermoplastics pipes, fittings and assemblies for the conveyance of fluids — Determination of the resistance to internal pressure — Part 4: Preparation of assemblies*

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

- ISO 1183-2, *Plastics — Methods for determining the density of non-cellular plastics — Part 2: Density gradient column method*
- ISO 2505, *Thermoplastics pipes — Longitudinal reversion — Test method and parameters*
- ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*
- ISO 4065, *Thermoplastics pipes — Universal wall thickness table*
- ISO 4427-1:2007, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 1: General*
- ISO 4437-2, *Plastics piping systems for the supply of gaseous fuels - Polyethylene (PE) — Part 2: Pipes*
- ISO 6964, *Polyolefin pipes and fittings — Determination of carbon black content by calcination and pyrolysis — Test method and basic specification*
- ISO 9080:2012, *Plastics piping and ducting systems — Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation*
- ISO 10147, *Pipes and fittings made of crosslinked polyethylene (PE-X) — Estimation of the degree of crosslinking by determination of the gel content*
- ISO 11357-6, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*
- ISO 11922-1, *Thermoplastics pipes for the conveyance of fluids — Dimensions and tolerances — Part 1: Metric series*
- ISO 12162, *Thermoplastics materials for pipes and fittings for pressure applications — Classification, designation and design coefficient*
- ISO 13477, *Thermoplastics pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Small-scale steady-state test (S4 test)*
- ISO 13478, *Thermoplastics pipes for the conveyance of fluids — Determination of resistance to rapid crack propagation (RCP) — Full-scale test (FST)*
- ISO 13760, *Plastics pipes for the conveyance of fluids under pressure — Miner's rule — Calculation method for cumulative damage*
- ISO 14531-1, *Plastics pipes and fittings — Crosslinked polyethylene (PE-X) pipe systems for the conveyance of gaseous fuels — Metric series — Specifications — Part 1: Pipes*
- ISO 15512, *Plastics — Determination of water content*
- ISO 15853, *Thermoplastics materials — Preparation of tubular test pieces for the determination of the hydrostatic strength of materials used for injection moulding.*
- ISO 16135, *Industrial valves — Ball valves of thermoplastics materials*
- ISO 16136, *Industrial valves — Butterfly valves of thermoplastics materials*
- ISO 16137, *Industrial valves — Check valves of thermoplastics materials*
- ISO 16138, *Industrial valves — Diaphragm valves of thermoplastics materials*
- ISO 16139, *Industrial valves — Gate valves of thermoplastics materials*
- ISO 16871, *Plastics piping and ducting systems — Plastics pipes and fittings — Method for exposure to direct (natural) weathering*
- ISO 18553, *Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds*