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Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X) —

Part 3: Fittings

Systèmes de canalisations en plastique pour les installations d'eau chaude et froide — Polyéthylène réticulé (PE-X) —

Partie 3: Raccords

Reference number
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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 document 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).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 2, *Plastics pipes and fittings for water supplies,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 155, *Plastics piping systems and ducting systems,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 15875-3:2003), which has been technically revised. It also incorporates the Amendments ISO 15875-3:2003/Amd. 1:2020 and ISO 15875-3:2003/Amd. 2:2021.

— clarification has been added concerning plastics fitting body material not identical to PE-X due to a distinction between:

  — plastics fitting body material not identical to PE-X, but specified by other ISO documents;

  — plastics fitting body material not identical to PE-X and not specified by other ISO documents;

— a new clause for plastics material of auxiliary fittings parts subjected to mechanical stress in 5.2;

— a 2 500 h at 95 °C confirmation test has been introduced in 5.1.2, 5.1.3 and 5.1.4.

A list of all parts in the ISO 15875 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The ISO 15875 series specifies the requirements for a piping system consisting of pipe, fitting and the jointing made of it, when the pipe is made from crosslinked polyethylene (PE-X). The ISO 15875 series consists of ISO 15875-1, ISO 15875-2, ISO 15875-2 and ISO 15875-5, and covers the requirements and related test methods for all components used in the system (e. g. pipes and fittings). In addition, the ISO 15875 series includes requirements and related test methods to verify the performance and compatibility of the jointing of components.

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 the ISO 15875 series:

— the ISO 15875 series 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 ISO 15875-1 and ISO 15875-2. Characteristics for fitness for purpose (mainly for joints) are covered in ISO 15875-5. ISO/TS 15875-7 gives guidance for the assessment of conformity.

This document specifies the characteristics of the fittings.

At the date of publication of this document, standards for piping systems of other plastics materials used for the same application include

— the ISO 15874 series,

— the ISO 15875 series,

— the ISO 15876 series,

— the ISO 15877 series,

— the ISO 21003 series, and

— the ISO 22391 series.

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Plastics piping systems for hot and cold water installations — Crosslinked polyethylene (PE-X) —

Part 3: Fittings

1 Scope

This document specifies the characteristics of fittings for crosslinked polyethylene (PE-X) 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) and for heating systems under design pressures and temperatures according to the class of application (see ISO 15875-1:—, Table 1).

This document also specifies the test parameters for the test methods referred to herein.

This document is applicable to fittings made from PE-X or other plastics or non-plastics materials, which are intended to be connected to pipes conforming to ISO 15875-2 for hot and cold water installations, whereby the joints conform to the requirements of ISO 15875-5.

This document is applicable to fittings of the following types:

— mechanical fittings;

— electrofusion fittings;

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).

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

ISO 527-2:2025, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

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 1167-3, *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 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

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ISO 6259-1:2015, *Thermoplastics pipes — Determination of tensile properties — Part 1: General test method*

ISO 6509-1, *Corrosion of metals and alloys — Determination of dezincification resistance of copper alloys with zinc — Part 1: Test method*

ISO 6957, *Copper alloys — Ammonia test for stress corrosion resistance*

ISO 7686, *Plastics pipes and fittings — Determination of opacity*

ISO 9080, *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 15875-1, *Plastics piping system for hot and cold water installations — crosslinked polyethylene (PE-X) — Part 1: General*

ISO 15875-2, *Plastics piping system for hot and cold water installations — crosslinked polyethylene (PE-X) — Part 2: Pipes*

ISO 15875-5, *Plastics piping system for hot and cold water installations — crosslinked polyethylene (PE-X) — Part 5: Fitness for purpose of the system*

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

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15875-1 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1.1 General

3.1.1.1
fitting
component of a piping system, which connects two or more pipes and/or fittings together, without any further function

3.1.1.2
tolerance
permitted variation of the specified value of a quantity, expressed as the difference between the permitted maximum and the permitted minimum value

3.1.1.3
control point
pressure test parameters to verify compliance with the predicted hydrostatic strength

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3.1.1.4
service coefficient
overall service (design) coefficient
C
overall coefficient with a value greater than one, which takes into consideration service conditions as well as properties of the components of a piping system other than those represented in the lower confidence limit of the predicted hydrostatic strength, σ_{LPL}

3.1.2 Mechanical fittings

3.1.2.1
compression fitting
fitting with internal support in which the joint is made by screwing a union nut along a thread to compress a ring on the outside wall of the pipe and finally to cause a clamping of the pipe between the ring and the inner support of the fitting

Note 1 to entry: The fitting may be with or without elastomeric sealing element.

3.1.2.2
radial press fitting
fitting, with internal support in which the joint is made by a radial compression of a ring with a pressing tool on the outside wall of the pipe to cause a clamping of the pipe between the ring and the inner support of the fitting

Note 1 to entry: The fitting may be with or without sealing element.

3.1.2.3
axial press fitting
fitting with internal support in which the joint is made by an axial movement of a sleeve with a pressing tool to cause a clamping of the pipe between the sleeve and the inner support of the fitting

Note 1 to entry: The fitting may be with or without sealing element.

3.1.2.4
push-fit fitting
fitting, which incorporates a sealing element, a gripping device and uses optionally an internal support

Note 1 to entry: The joint is made by pushing the pipe into the fitting and a seal is achieved without the use of heat or tools.

Note 2 to entry: In some designs, this type of joint can be disconnected and re-connected or disconnected and the fitting re-used elsewhere.

Note 3 to entry: The internal support can be an integrated part of the fitting or a separate part (supporting sleeve).

3.1.2.5
radial shrink fitting
fitting, with internal support in which the joint is made by a radial shrinking of the PE-X pipe and a previously expanded visco-elastic polymeric ring on the outside wall of the pipe to cause a clamping of the pipe between the ring and the inner support of the fitting

Note 1 to entry: The fitting may be with or without a sealing element.

Note 2 to entry: The internal support can be an integrated part of the fitting or a separate part (supporting sleeve).

3.1.2.6
plastic transition fitting
plastic fitting with a metal end, where a metallic part is embedded in the plastic fitting body

Note 1 to entry: The metal end could be e. g. a metallic thread or a soldering end.

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3.1.2.7
electrofusion fitting
fitting in which the joint with the pipe is made by melting together the outer part of the pipe and the inner part of the fitting by means of heat induced by current flowing in an appropriate resistor inserted in the fitting body

3.2 Symbols

C	overall service (design) coefficient
d_e	outside diameter (at any point)
d_n	nominal outside diameter
d_{sm}	mean inside diameter of socket
p	internal hydrostatic pressure
p_D	design pressure
T	temperature
T_D	design temperature
T_{mal}	malfunction temperature
T_{max}	maximum design temperature
t	time
σ	hydrostatic stress
σ_D	design stress
σ_{DF}	design stress of plastics fitting material
σ_F	hydrostatic stress values of plastics fitting material taken from the reference line for the applicable time and temperature
σ_{LPL}	lower confidence limit of the predicted hydrostatic strength

4 Generic requirements, instructions and explanations

4.1 Designation PE-X

The designation crosslinked polyethylene is used together with the abbreviation PE-X throughout this document.

4.2 Application classes, design pressures and pipe dimension classes restrictions

ISO 15875-1 covers a range of application classes, design pressures and pipe dimension classes. For values of design temperature (T_D), maximum temperature (T_{max}) and malfunction temperature (T_{mal}) and service times in excess of those defined in ISO 15875-1, this document does not apply.

4.3 Application classes — Responsibility of the purchaser or specifier

It is the responsibility of the purchaser or specifier to make the appropriate selections from these application classes (see ISO 15875-1), taking into account their particular requirements and any relevant national regulations and installation practices or codes.

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