
**Plastics piping systems for water
supply, and for drainage and sewerage
under pressure — Polyethylene (PE) —**

**Part 3:
Fittings**

*Systèmes de canalisations en plastique destinés à l'alimentation
en eau et aux branchements et collecteurs d'assainissement sous
pression — Polyéthylène (PE) —*

Partie 3: Raccords



This document is a preview generated by ERS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	2
3 Terms and definitions	3
4 Symbols and abbreviated terms	4
5 Material	4
5.1 PE compound	4
5.2 Material for non-polyethylene parts	4
5.2.1 General	4
5.2.2 Metal parts	4
5.2.3 Elastomers	5
5.2.4 Other materials	5
6 General characteristics	5
6.1 Appearance	5
6.2 Design	5
6.3 Colour	5
6.4 Electrical characteristics for electrofusion fittings	5
6.5 Appearance of factory-made joints	6
6.6 Effect on water quality	6
7 Geometrical characteristics	6
7.1 Measurement of dimensions	6
7.2 Dimensions of electrofusion socket fittings	6
7.2.1 Diameters and lengths of electrofusion sockets	6
7.2.2 Wall thickness	7
7.2.3 Out-of-roundness of the bore of a fitting (at any point)	8
7.2.4 Spigots	8
7.2.5 Other dimensions	8
7.3 Dimensions of electrofusion saddle fittings	8
7.4 Dimensions of spigot end fittings	9
7.4.1 Diameter and length	9
7.4.2 Wall thickness of the fusion end	12
7.4.3 Wall thickness of the fitting body	12
7.4.4 Other dimensions	12
7.5 Dimensions of socket fusion fittings	12
7.6 Dimensions of fabricated fittings	12
7.7 Design and dimensions of mechanical fittings	12
7.7.1 General	12
7.7.2 Mechanical fittings with polyethylene spigot ends	12
7.7.3 Mechanical fittings with polyethylene electrofusion sockets	12
7.7.4 Threads	13
7.8 Dimensions of loose backing flanges and flange adapters	13
8 Mechanical characteristics	13
8.1 General	13
8.2 Conditioning	13
8.3 Requirements	13
8.4 Retest conditions	15
8.5 Performance requirements	16
9 Physical characteristics	16
9.1 Conditioning	16
9.2 Requirements	16

10	Chemical resistance of fittings in contact with chemicals	17
11	Performance requirements	17
12	Marking	17
12.1	General	17
12.2	Minimum required marking	17
12.3	Fusion system recognition	18
13	Packaging	18
Annex A (normative)	Socket fusion fittings	19
Annex B (normative)	Fabricated fittings	21
Annex C (informative)	Examples of typical terminal connections for electrofusion fittings	28
Annex D (normative)	Short-term pressure test method	31
Annex E (normative)	Tensile test for fitting/pipe assemblies	33
Bibliography		35

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 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, fitting and valves for the transport of fluids*, Subcommittee SC 2, *Plastics pipes and fittings for water supplies*.

This second edition cancels and replaces the first edition (ISO 4427-3:2007), which has been technically revised.

The main changes compared to the previous edition are:

- Update of the normative references;
- Technical consistency with ISO 4437-3 (see Reference [1] in the Bibliography).

A list of all parts in the ISO 4427 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.

Introduction

The ISO 4427 series of standards are a set of system standards that specify the requirements for a piping system and its components when made from polyethylene (PE). The piping system is intended to be used in buried or above ground applications, for the conveyance of water for human consumption, raw water prior to treatment, drainage and sewerage under pressure, vacuum sewer systems, and water for other purposes.

In respect of potential adverse effects on the quality of water intended for human consumption caused by the products covered by the ISO 4427 series, it does not provide information on the restriction on the use of products.

NOTE Guidance for assessment of conformity can be found in Reference [\[2\]](#) in the Bibliography.

Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) —

Part 3: Fittings

1 Scope

This document specifies the fittings made from polyethylene (PE) for buried or above ground applications, intended for the conveyance of water for human consumption, raw water prior to treatment, drainage and sewerage under pressure, vacuum sewer systems, and water for other purposes.

NOTE 1 The intended uses include sea outfalls, laid in water and connection between pipes suspended below bridges.

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

In conjunction with the other parts of the ISO 4427 series, this document is applicable to PE fittings, to joints with components of PE or other materials, intended to be used under the following conditions:

- a) a maximum allowable operating pressure (PFA) up to and including 25 bar¹⁾;
- b) an operating temperature of 20 °C as the reference temperature.

NOTE 2 For other operating temperatures, guidance is given in ISO 4427-1:2019, Annex A.

This document covers a range of maximum allowable operating pressures and gives requirements 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 installation practices or codes.

This document is applicable to fittings of the following types:

1. fusion fittings;
 - a. electrofusion fittings;
 - b. spigot end fittings (for butt fusion using heated tools and electrofusion socket fusion);
 - c. socket fusion fittings (see [Annex A](#));
2. mechanical fittings;
 - a. compression fittings;
 - b. flanged fittings;
3. fabricated fittings (see [Annex B](#)).

1) 1 bar = 0,1 MPa = 10⁵ Pa; 1 MPa = 1 N/mm².

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.

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

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

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 1167-1:2006, *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 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

ISO 4427-1, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 1: General*

ISO 4427-2, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 2: Pipes*

ISO 4427-5, *Plastics piping systems for water supply, and for drainage and sewerage under pressure — Polyethylene (PE) — Part 5: Fitness for purpose of the system*

ISO 4433-1, *Thermoplastics pipes — Resistance to liquid chemicals — Classification — Part 1: Immersion test method*

ISO 4433-2, *Thermoplastics pipes — Resistance to liquid chemicals — Classification — Part 2: Polyolefin pipes*

ISO 9624, *Thermoplastics pipes for fluids under pressure — Mating dimensions of flange adapters and loose backing flanges* *Thermoplastics pipes for fluids under pressure — Mating dimensions of flange adapters and loose backing flanges*

ISO 11357-6, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*

ISO 12176-1, *Plastics pipes and fittings — Equipment for fusion jointing polyethylene systems — Part 1: Butt fusion*

ISO 13951, *Plastics piping systems — Test method for the resistance of plastic pipe/pipe or pipe/fitting assemblies to tensile loading*

ISO 13953, *Polyethylene (PE) pipes and fittings — Determination of the tensile strength and failure mode of test pieces from a butt-fused joint*

ISO 13954, *Plastics pipes and fittings — Peel decohesion test for polyethylene (PE) electrofusion assemblies of nominal outside diameter greater than or equal to 90 mm*

ISO 13955, *Plastics pipes and fittings — Crushing decohesion test for polyethylene (PE) electrofusion assemblies*

ISO 13956, *Plastics pipes and fittings — Decohesion test of polyethylene (PE) saddle fusion joints — Evaluation of ductility of fusion joint interface by tear test*

ISO 13957, *Plastics pipes and fittings — Polyethylene (PE) tapping tees — Test method for impact resistance*

ISO 17885, *Plastics piping systems — Mechanical fittings for pressure piping systems — Specifications*

EN 681-1:1996, *Elastomeric seals — Materials requirements for pipe joint seals used in water and drainage applications — Part 1: Vulcanized rubber*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4427-1 and the following apply.

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

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

3.1

electrofusion socket fitting

polyethylene (PE) fitting which contains one or more integral heating elements that are capable of transforming electrical energy into heat to realize a fusion joint with a spigot end or pipe

3.2

electrofusion saddle fitting

polyethylene (PE) fitting which contains one or more integral heating elements that are capable of transforming electrical energy into heat to realize a fusion joint onto a pipe

3.2.1

tapping tee

electrofusion saddle fitting (top-loading or wraparound) which contains an integral cutter used for cutting through the wall of the main pipe, which remains in the body of the tapping tee after installation

3.2.2

branch saddle

electrofusion saddle fitting (top-loading or wraparound) which requires an ancillary cutting tool for drilling the hole in the adjoining main pipe

3.3

spigot end fitting

polyethylene (PE) fitting where the outside diameter of the spigot length is equal to the nominal outside diameter, d_n , of the corresponding pipe

3.4

socket fusion fitting

polyethylene (PE) fitting where the socket mouth is designed to be fusion-jointed with a spigot end or a pipe using heated tools

3.5

fabricated fitting

fitting produced from pipe conforming to ISO 4427-2 and/or from injection-moulded fittings in accordance with this document