



DRAFT INTERNATIONAL STANDARD ISO/DIS 4437-3

ISO/TC 138/SC 4

Secretariat: NEN

Voting begins on
2012-09-16

Voting terminates on
2012-12-16

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) —

Part 3: Fittings

*Systèmes de canalisations en matières plastiques pour la distribution de combustibles gazeux —
Polyéthylène (PE) —*

Partie 3: Raccords

[Revision of third edition (ISO 4437:2007, ISO 8085-1:2001, ISO 8085-2:2001 and ISO 8085-3:2001)]

ICS 75.200; 83.140.30

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/014d53c4-f475-40d1-808f-9842cfe49e7b/iso-4437-3-2014>

Copyright notice

This ISO document is a Draft International Standard and is copyright-protected by ISO. Except as permitted under the applicable laws of the user's country, neither this ISO draft nor any extract from it may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission being secured.

Requests for permission to reproduce should be addressed to either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Reproduction may be subject to royalty payments or a licensing agreement.

Violators may be prosecuted.

Contents

Page

Foreword.....	v
Introduction.....	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions, symbols and abbreviations.....	3
4 Material	4
4.1 PE Compound	4
4.2 Material for non-polyethylene parts.....	4
4.2.1 General.....	4
4.2.2 Metal parts.....	4
4.2.3 Elastomers.....	5
4.2.4 Other materials.....	5
5 General characteristics	5
5.1 Appearance	5
5.2 Colour	5
5.3 Design	5
5.4 Appearance of factory made joints.....	5
5.5 Electrical characteristics for electrofusion fittings.....	5
6 Geometrical characteristics.....	6
6.1 Measurement of dimensions	6
6.2 Dimensions of electrofusion socket fittings.....	6
6.2.1 Diameters and lengths of electrofusion sockets.....	6
6.2.2 Wall thicknesses.....	7
6.2.3 Out-of-roundness of the bore of a fitting (at any point).....	8
6.2.4 Spigots.....	8
6.2.5 Other dimensions	8
6.3 Dimensions of electrofusion saddle fittings.....	8
6.4 Dimensions of spigot end fittings.....	9
6.4.1 Diameters and lengths	9
6.4.2 Wall thickness of the fusion end.....	11
6.4.3 Wall thickness of the fitting body	11
6.4.4 Other dimensions	12
6.5 Dimensions of mechanical fittings	12
6.5.1 General.....	12
6.5.2 Mechanical fittings with polyethylene spigot ends.....	12
6.5.3 Mechanical fittings with polyethylene electrofusion sockets.....	12
6.5.4 Threads.....	12
7 Mechanical characteristics	12
7.1 General.....	12
7.2 Requirements	13
7.3 Performance requirements	15
8 Physical characteristics	16
8.1 Conditioning.....	16
8.2 Requirements	16
9 Performance requirements	16
10 Marking	17
10.1 General.....	17

10.2	Minimum required marking of fittings	17
10.3	Additional marking.....	18
10.4	Fusion system recognition	18
11	Delivery conditions	18
Annex A	(normative) Socket fusion fittings.....	19
Annex B	(informative) Examples of typical terminal connection for electrofusion fittings.....	21
Annex C	(normative) Short-term pressure test method	24
C.1	Principle	24
C.2	Apparatus.....	24
C.3	Test piece.....	24
C.4	Procedure.....	24
C.5	Test report.....	25
Annex D	(normative) Tensile test for fitting/pipe assemblies.....	26
D.1	Principle	26
D.2	Apparatus.....	26
D.3	Test piece.....	26
D.4	Procedure.....	26
D.5	Test report.....	26
Annex E	(normative) Formulae for calculating the equivalent dimensions of non metric fitting series	26
Bibliography	29

iTeh STANDARD PREVIEW
 (standards.iteh.ai)
 Full standard:
<https://standards.iteh.ai/catalog/standards/sist/01443534-f475-40d1-808f-9842cfe49e7b/iso-4437-3-2014>

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 4437-3 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 4, *Plastics pipes and fittings for the supply of gaseous fuels*.

This fourth edition, together with the other parts of ISO 4437, cancels and replaces ISO 4437:2007 and ISO 8085-1/2/3:2001, of which it constitutes a technical revision.

ISO 4437 consists of the following parts, under the general title *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE)*:

- *Part 1: General*
- *Part 2: Pipes*
- *Part 3: Fittings*
- *Part 4: Valves*
- *Part 5: Fitness for purpose of the system*

Introduction

Characteristics for fitness for purpose are covered in ISO 4437-5. ISO/TS 10839 gives recommended practices for installation.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Full standard:
<https://standards.iteh.ai/catalog/standards/sist/014d53c4-f475-40d1-808f-9842cfe49e7b/iso-4437-3-2014>

Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 3: Fittings

1 Scope

This International Standard specifies the characteristics of fusion fittings made from polyethylene (PE) as well as of mechanical fittings for piping systems in the field of the supply of gaseous fuels.

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

In conjunction with Parts 1, 2, 4 and 5 of ISO 4437, it is applicable to PE fittings, their joints and joints with components of PE and other materials intended to be used under the following conditions:

- a) the maximum operating pressure, MOP, is based on the design stress, determined from the compound MRS divided by the C factor, and taking into account RCP requirements;
- b) a temperature of 20 °C as reference temperature for the design basis.

NOTE 1 For other operating temperatures, derating coefficients should be used, see ISO/DIS 4437-5:2012..

ISO 4437 (all parts) covers a range of maximum operating pressures and gives requirements concerning colours and additives.

NOTE 2 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.

This International Standard is applicable for fittings of the following types:

- electrofusion socket fittings;
- electrofusion saddle fittings;
- spigot end fittings (for butt fusion using heated tools and electrofusion socket fusion);
- socket fusion fittings;
- mechanical fittings.

The fittings can for example be in the form of couplers, saddles, equal and reduced tees, reducers, bends or end caps.

NOTE 3 Fabricated fittings are normally not used for gas applications except for larger dimensions or in the absence of other solutions. Guidance may be found in ISO 4427-3:2007 Annex B [8].

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.

ISO/DIS 4437-3

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 the 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 1167-4, *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/DIS 4437-1:2012, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 1: General*

ISO/DIS 4437-2:2012, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipes*

ISO/DIS 4437-5:2012, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 5: Fitness for purpose of the system*

ISO 10838-1 1), *Mechanical fittings for polyethylene piping systems for the supply of gaseous fuels — Part 1: Metal fittings for pipes of nominal outside diameter less than or equal to 63 mm*

ISO 10838-2 1), *Mechanical fittings for polyethylene piping systems for the supply of gaseous fuels — Part 2: Metal fittings for pipes of nominal outside diameter greater than 63 mm*

ISO 10838-3 1), *Mechanical fittings for polyethylene piping systems for the supply of gaseous fuels — Part 3: Thermoplastic fittings for pipes of nominal outside diameter less than or equal to 63 mm*

ISO 12176-4, *Plastics pipes and fittings -- Equipment for fusion jointing polyethylene systems -- Part 4: Traceability coding*

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

ISO 13950, *Plastics pipes and fittings — Automatic recognition systems for electrofusion joints*

ISO 13951, *Plastics piping systems — Test method for the resistance of polyolefin 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*

1) These standards are under revision and may be replaced by ISO 17885

ISO 13956, *Plastics pipes and fittings — Determination of cohesive strength — 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 16010, *Elastomeric seals – Material requirements for seals used in pipes and fittings carrying gaseous fuels and hydrocarbon fluids*

EN 12117, *Plastics piping systems — Fittings, valves and ancillaries — Determination of gaseous flow rate/pressure drop relationships*

3 Terms and definitions, symbols and abbreviations

For the purposes of this document, the terms and definitions, symbols and abbreviations given in ISO/DIS 4437-1:2012 and the following apply.

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 realise a fusion joint with a spigot end or a 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 realise a fusion joint onto a pipe

3.2.1

electrofusion tapping tee

electrofusion saddle fitting (top loading or wrap round) which contains an integral cutter, to cut through the wall of the main pipe which remains in the body of the tapping tee after installation

3.2.2

electrofusion branch saddle

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

3.3

spigot end fitting

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

3.4

socket fusion fitting

polyethylene (PE) fitting heated by a purpose made heating tool to realise a fusion joint with a spigot end or a pipe

3.5

mechanical fitting

fitting, that generally includes a compression part to provide pressure integrity, leaktightness and resistance to end loads, for assembling polyethylene (PE) pipe to another PE pipe or any other element of the piping system

NOTE 1 A pipe-supporting sleeve providing a permanent support for a polyethylene (PE) pipe to prevent creep in the pipe wall under radial compressive forces, is applicable. The metallic parts of the fitting can be assembled to metallic pipes by screw-threads, compression joints, welded or flanged connections, including PE flanges. In some cases the supporting sleeve at the same time constitutes a grip ring.

NOTE 2 The fitting can allow either a dismantable or permanently assembled joint.

NOTE 3 The mechanical fitting can be supplied for field assembly or pre-assembled by the manufacturer.

3.6 voltage regulation
control of energy supplied, during the fusion process of an electrofusion fitting, by means of the voltage parameter

3.7 intensity regulation
control of energy supplied, during the fusion process of an electrofusion fitting, by means of the current parameter

4 Material

4.1 PE Compound

The PE compound from which the fittings are made shall conform to ISO/DIS 4437-1:2012.

The stress bearing parts shall only be made from virgin material conforming to ISO/DIS 4437-1:2012.

4.2 Material for non-polyethylene parts

4.2.1 General

All components shall conform to the relevant ISO standard(s). Alternative standards may be applied in cases where the suitable ISO standard(s) do not exist. In all cases fitness for purpose of the components shall be demonstrated.

The materials and the constituent elements used in making the fitting (including elastomers and any metal parts as may be used) shall be as resistant to the external and internal environments as the other elements of the piping system and shall have a life expectancy under the following conditions at least equal to that of the PE pipes conforming to ISO/DIS 4437-2:2012 with which they are intended to be used:

- a) during storage;
- b) under the effect of the gas conveyed therein;
- c) with respect to the service environment and operating conditions.

The requirements for the level of material performance of non-polyethylene parts shall be at least as stringent as that of the PE compound for the piping system. Rework materials shall not be used for stress bearing polymeric parts.

Other materials used in fittings in contact with the PE pipe shall not adversely affect pipe performance or initiate stress cracking.

NOTE Clause 4.2 does not apply to non-stress bearing fitting parts.

4.2.2 Metal parts

All metal parts susceptible to corrosion shall be adequately protected, providing this is necessary for the durability and function of the system.

When dissimilar metallic materials are used which can be in contact with moisture, steps shall be taken to avoid the possibility of galvanic corrosion.

4.2.3 Elastomers

Elastomeric seals shall conform to ISO 16010.

Other sealing materials are permitted if suitable for gas service.

4.2.4 Other materials

Greases or lubricants shall not exude onto fusion areas, and shall not affect the long-term performance of fitting materials.

5 General characteristics

5.1 Appearance

When viewed without magnification, the internal and external surfaces of fittings shall be smooth, clean and shall have no scoring, cavities and other surface defects to an extent that would prevent conformity to this standard.

No component of the fitting shall show any signs of damage, scratches, pitting, bubbles, blisters, inclusions or cracks to an extent that would prevent conformity of the fittings to the requirements of this standard.

5.2 Colour

The colour of the PE parts of the fitting shall be either black, yellow or orange.

5.3 Design

The design of the fitting shall be such that, when assembling the fitting onto the pipe or other component, electrical coils and/or seals are not displaced.

5.4 Appearance of factory made joints

The internal and external surfaces of the pipe and fitting after fusion jointing, examined visually without magnification, shall be free from melt exudation outside the confines of the fitting, apart from that which may be declared acceptable by the fitting manufacturer or used deliberately as a fusion marker.

Any melt exudation shall not cause wire movement in electrofusion fittings such that it leads to short-circuiting, when jointed in accordance with the manufacturer's instructions. There shall be no excessive creasing of the internal surfaces of the adjoining pipes.

5.5 Electrical characteristics for electrofusion fittings

The electrical protection that shall be provided by the fusion process depends on the voltage and the current used and on the characteristics of the electricity power source.

For voltages greater than 25 V, direct human contact with energized parts shall not be possible when the fitting is in the fusion cycle during assembly in accordance with the instructions of the manufacturers of the fittings and of the assembly equipment, as applicable.

NOTE 1 The fitting is during the fusion process part of an electrical system as defined in EN 60335-1 [2], HD 60364-1 [3] and IEC 60449 [4].

The tolerance on the electrical resistance of the fitting at 23 °C shall be stated by the manufacturer. The resistance shall be between nominal resistance (-10%) and nominal resistance (+10%) + 0,1 Ω.