

ISO/~~DIS~~ PRF 4437-~~1~~-2:2023(E)

~~Date: 2023-09-12~~

ISO-~~TC~~-138/SC-4/~~WG~~3

Secretariat: ~~NEN~~

Date: 2023-12-01

Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — 1

Part 1: General

Systèmes de canalisations en plastique pour la distribution de combustibles gazeux — Polyéthylène (PE)
1

Partie 1: Généralités

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/PRF 4437-1

<https://standards.iteh.ai/catalog/standards/sist/8e4a5234-1428-4c22-9dd7-b92a85a007b8/iso-prf-4437-1>

PROOF

© ISO 2023

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~~copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: + 41 22 749 01 11

~~Email: copyright@iso.org~~

~~E-mail: copyright@iso.org~~

~~Website: www.iso.orgwww.iso.org~~

Published in Switzerland-

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[ISO/PRF 4437-1](#)

<https://standards.iteh.ai/catalog/standards/sist/8e4a5234-1428-4c22-9dd7-b92a85a007b8/iso-prf-4437-1>

Contents

Foreword	v
Introduction.....	vii
Part 1: General.....	1
1 Scope	1
2 Normative references.....	1
3 Terms and definitions	3
3.1 Terms related to geometry.....	3
3.2 Terms related to material.....	4
3.3 Terms related to material characteristics	5
3.4 Terms related to service conditions.....	6
3.5 Terms related to joints	7
4 Symbols and abbreviated terms	7
4.1 Symbols.....	7
4.2 Abbreviated terms.....	8
5 Material.....	8
5.1 Material of the components.....	8
5.2 Compound.....	9
5.2.1 Additives and pigments.....	9
5.2.2 Colour.....	9
5.2.3 Characteristics.....	9
5.3 Fusion compatibility.....	13
5.4 Classification and designation.....	14
5.5 Design coefficient and design stress	14
5.6 Change of compound formulation	14
Annex A (informative) Additional information related to the installation of PE 100-RC systems.....	15
A.1 Pipe material.....	15
A.2 Installation conditions	16
Annex B (informative) LPG and manufactured gas.....	18
Annex C (informative) Resistance to rapid crack propagation (RCP).....	19
C.1 General.....	19
C.2 Initiation	19
C.3 Parameters governing propagation/arrest.....	19
C.4 Discussion	19
C.5 Test methods	20
Bibliography	21

Foreword	4
Introduction	5
1	Scope 1
2	Normative references 1
3	Terms and definitions 3
3.1	Terms related to geometry 3
3.2	Terms related to material 4
3.3	Terms related to material characteristics 4
3.4	Terms related to service conditions 5
3.5	Terms related to joints 6
4	Symbols and abbreviated terms 7
4.1	Symbols 7
4.2	Abbreviated terms 7
5	Material 8
5.1	Material of the components 8
5.2	Compound 8
5.2.1	Additives and pigments 8
5.2.2	Colour 9
5.2.3	Characteristics 9
5.3	Fusion compatibility 13
5.4	Classification and designation 14
5.5	Design coefficient and design stress 14
5.6	Change of compound formulation 15
Annex A (informative)	Additional information related to the installation of PE 100-RC systems 16
Annex B (informative)	LPG and manufactured gas 18
Annex C (informative)	Resistance to rapid crack propagation (RCP) 19
Bibliography	21

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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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, fittings and valves for the transport of fluids*, Subcommittee SC 4, *Plastics pipes and fittings for the supply of gaseous fuels*.

This second edition cancels and replaces the first edition (ISO 4437-1:2014), which has been technically revised.

The main changes are as follows:

- PE 100-RC type materials with enhanced resistance to slow crack growth (SCG) have been added;
- **Annex A** has been added, ~~which discusses~~ discussing the performance of PE 100-RC type materials with enhanced resistance to slow crack growth (SCG) and ~~gives~~ giving additional information for installation techniques;
- test methods have been updated and new test methods have been added for PE 100-RC materials.

A list of all parts in the ISO 4437 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

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[ISO/PRF 4437-1](https://standards.itih.ai/catalog/standards/sist/8e4a5234-1428-4c22-9dd7-b92a85a007b8/iso-prf-4437-1)

<https://standards.itih.ai/catalog/standards/sist/8e4a5234-1428-4c22-9dd7-b92a85a007b8/iso-prf-4437-1>

Introduction

The ISO 4437 series specifies the requirements for a piping system and its components made from polyethylene (PE) compounds, which is intended to be used for the supply of gaseous fuels.

This document covers materials and the general aspects of the plastics piping system.

Requirements and test methods for components of the piping system are specified in ISO 4437-2¹, ISO 4437-3² and ISO 4437-4.

Characteristics for fitness for purpose of the system are covered in ISO 4437-5-3³.

Recommended practice for design, handling and installation is given in ISO/TS 10839.

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[ISO/PRF 4437-1](#)

<https://standards.iteh.ai/catalog/standards/sist/8e4a5234-1428-4c22-9dd7-b92a85a007b8/iso-prf-4437-1>

¹ Under preparation. Stage at the time of publication: ISO/PRF 4437-2:2023

² Under preparation. Stage at the time of publication: ISO/PRF 4437-3:2023

³ Under preparation. Stage at the time of publication: ISO/PRF 4437-5:2023

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

Part 1: General

1 Scope

This document specifies materials and the general aspects of polyethylene (PE) 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 document.

In conjunction with ISO 4437-2, ISO 4437-3, ISO 4437-4 and ISO 4437-5, this document is applicable to PE pipes, fittings and valves, their joints, and joints with components of PE and other materials intended to be used under the following conditions:

- a) a maximum operating pressure (MOP) up to and including 10 bar⁴, at a reference temperature of 20 °C for design purposes;
- b) an operating temperature between -20 °C and 40 °C.

For operating temperatures between 20 °C and 40 °C, derating coefficients are defined in ISO 4437-5.

The ISO 4437 series covers a range of MOPs and gives requirements concerning colours.

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.

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 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*

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

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 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 4437-~~2~~; ~~—~~⁵, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipes*

ISO 4437-~~3~~; ~~—~~⁶, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 3: Fittings*

ISO 4437-~~4~~, *Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part ~~4~~: Valves*

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

ISO 6259-~~3~~, *Thermoplastics pipes — Determination of tensile properties — Part 3: Polyolefin pipes*

ISO 6964, *Polyolefin pipes and fittings — Determination of carbon black content by calcination and pyrolysis — Test method*

ISO 9080, *Plastics piping and ducting systems — Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation*

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

ISO 11413:2019, *Plastics pipes and fittings — Preparation of test piece assemblies between a polyethylene (PE) pipe and an electrofusion fitting*

ISO 11414:2009, *Plastics pipes and fittings — Preparation of polyethylene (PE) pipe/pipe or pipe/fitting test piece assemblies by butt fusion*

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 13479-~~—~~; ~~—~~[—]:2022, *Polyolefin pipes for the conveyance of fluids — Determination of resistance to crack propagation — Test method for slow crack growth on notched pipes*

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

⁵ Under preparation. [Stage at the time of publication: ISO/PRF 4437-2:2023.](#)

⁶ Under preparation. [Stage at the time of publication: ISO/PRF 4437-3:2023.](#)

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 15512, *Plastics — Determination of water content*

ISO 16770, *Plastics — Determination of environmental stress cracking (ESC) of polyethylene — Full-notch creep test (FNCT)*

ISO 16871, *Plastics piping and ducting systems — Plastics pipes and fittings — Method for exposure to direct (natural) weathering*

ISO 18488, *Polyethylene (PE) materials for piping systems — Determination of Strain Hardening Modulus in relation to slow crack growth — Test method*

ISO 18489, *Polyethylene (PE) materials for piping systems — Determination of resistance to slow crack growth under cyclic loading — Cracked Round Bar test method*

ISO 18553, *Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds*

EN 12099, *Plastics piping systems — Polyethylene piping materials and components — Determination of volatile content*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472, ISO 1043-1 and the following apply.

ISO and IEC maintain terminology 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 Terms related to geometry

3.1.1

nominal size

DN/OD

numerical designation of the size of a component related to the outside diameter

Note 1 to entry:—It is a convenient round number approximately equal to the manufacturing dimension in millimetres (mm). It is not applicable to components designated by thread size.

3.1.2

nominal outside diameter

d_n

specified outside diameter assigned to a *nominal size* (3.1.1)

Note 1 to entry:—Nominal outside diameter is expressed in millimetres (mm).