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

### Part 2: Pipes

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

*Partie 1: Tuyaux*

[Revision of third edition (ISO 4437:2007)]

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## Foreword

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ISO 4437-2 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 of fitness for purpose are covered in ISO 4437-5. ISO/TS 10839 [1] gives recommended practices for installation.

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# Plastics piping systems for the supply of gaseous fuels — Polyethylene (PE) — Part 2: Pipes

## 1 Scope

This International Standard specifies the characteristics of pipes made from polyethylene (PE) 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, 3, 4 and 5 of ISO 4437, it 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) 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.

NOTE 2 For above ground application of pipes conforming to this International Standard, the pipes should be protected by a casing pipe.

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

It covers three types of pipe:

- PE pipes (outside diameter  $d_n$ ) including any identification stripes;
- PE pipes with co-extruded layers on either or both the outside and/or inside of the pipe (total outside diameter  $d_n$ ) as specified in Annex A, where all PE layers have the same MRS rating;
- PE pipes (outside diameter  $d_n$ ) with a peelable, contiguous thermoplastics additional layer on the outside of the pipe ('coated pipe') as specified in Annex B.

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 any relevant national regulations and installation practices or codes.

## 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 1133-1:2011, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

## ISO/DIS 4437-2

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 2505, *Thermoplastics pipes — Longitudinal reversion — Test method and parameters*

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

ISO 4065:1996, *Thermoplastics pipes — Universal wall thickness table*

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

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

ISO 6259-3:1997, *Thermoplastics pipes — Determination of tensile properties — Part 3: Polyolefin pipes*

ISO 9969, *Thermoplastics pipes — Determination of ring stiffness*

ISO 11357-6:2008, *Plastics — Differential scanning calorimetry (DSC) — Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)*

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, *Polyolefin pipes for the conveyance of fluids — Determination of resistance to crack propagation — Test method for slow crack growth on notched pipes*

ISO 13968, *Plastics piping and ducting systems — Thermoplastics pipes — Determination of ring flexibility*

ISO 13480:1997, *Polyethylene pipes — Resistance to slow crack growth — Cone test method*

EN 12106, *Plastics piping systems — Polyethylene (PE) pipes — Test method for the resistance to internal pressure after application of squeeze-off*

### 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 apply.

### 4 Material

#### 4.1 Compound for pipes

The pipes shall be made from virgin material or rework material from the same PE compound or a mixture of both materials. Rework material from coextruded pipes or from pipes reprocessed with the peelable layer attached shall not be used. Rework material from the base pipe of peelable layer pipes can be used.



The compound(s) from which the pipes are made shall conform to ISO/DIS 4437-1:2012.

## 4.2 Compound for identification stripes

For pipe with identification stripes, the compound used for these identification stripes shall be made from the same base polymer (PE) as one of the pipe compounds for which fusion compatibility has been proven.

## 4.3 Recyclable material

Recyclable material including rework material obtained from external sources shall not be used.

# 5 General characteristics

## 5.1 Appearance

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

The ends of the pipe shall be cut cleanly and square to the axis of the pipe.

## 5.2 Colour

Pipes shall be black (PE 80 or PE 100), yellow (PE 80) or orange (PE 100). In addition black PE 80 pipes may be identified by yellow stripes and black PE 100 pipes may be identified by yellow or orange stripes, according to national preference.

The outer coextruded layer of coextruded pipes (see Annex A) or the outer peelable layer of peelable layer pipes (see Annex B) shall be either black, yellow or orange. In addition identification stripes may be used according to national preference.

# 6 Geometrical characteristics

## 6.1 Measurement of dimensions

The dimensions of the pipe shall be measured in accordance with ISO 3126, and rounded to the next 0.1 mm. In case of dispute the measurement shall not be made less than 24 h after manufacture after being conditioned for at least 4 h at  $(23 \pm 2)$  °C.

NOTE Indirect measurement at the stage of production is allowed at shorter time periods providing evidence is shown of correlation.

## 6.2 Mean outside diameters, out-of-roundness (ovality) and tolerances

The mean outside diameters of the pipe,  $d_{em}$  shall conform to Table 1.

For straight pipes, the maximum out-of-roundness shall conform to Table 1. For coiled pipes, the maximum out-of-roundness shall be specified by agreement between the manufacturer and the end-user.

**Table 1 <sup>3/4</sup> Mean outside diameters and out-of-roundness**

Dimensions in millimetres

Nominal size DN/OD	Nominal outside diameter $d_n$	Mean outside diameter		Maximum out-of-roundness for straight pipes <sup>b c</sup>
		$d_{em,min}$	$d_{em,max}$ <sup>a</sup>	
16	16	16,0	16,3	1,2
20	20	20,0	20,3	1,2
25	25	25,0	25,3	1,2
32	32	32,0	32,3	1,3
40	40	40,0	40,4	1,4
50	50	50,0	50,4	1,4
63	63	63,0	63,4	1,5
75	75	75,0	75,5	1,6
90	90	90,0	90,6	1,8
110	110	110,0	110,7	2,2
125	125	125,0	125,8	2,5
140	140	140,0	140,9	2,8
160	160	160,0	161,0	3,2
180	180	180,0	181,1	3,6
200	200	200,0	201,2	4,0
225	225	225,0	226,4	4,5
250	250	250,0	251,5	5,0
280	280	280,0	281,7	9,8
315	315	315,0	316,9	11,1
355	355	355,0	357,2	12,5
400	400	400,0	402,4	14,0
450	450	450,0	452,7	15,6
500	500	500,0	503,0	17,5
560	560	560,0	563,4	19,6
630	630	630,0	633,8	22,1

a Grade B according to ISO 11922-1:1997 [2].  
 b Measurement of out-of-roundness shall be made at the point of manufacturing.  
 c If other values for the out-of-roundness than those given in this table are necessary (eg coiled pipes), they shall be agreed between the manufacturer and the end-user.

**6.3 Wall thicknesses and related tolerances**

**6.3.1 Minimum wall thicknesses**

The use of any SDR derived from the pipe series S given according to ISO 4065 is permitted.

The minimum wall thickness,  $e_{min}$ , of pipes shall conform to Table 2.