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

压力下供水、排水和排污用塑料管材系统—聚乙烯（PE）—第2部分：管材

(中英文版)

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Foreword

前言

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（国际标准化组织）是由各国标准机构（ISO成员机构）组成的全球联盟。制定国际标准的工作通常是通过ISO技术委员会进行的。对已成立技术委员会的主题感兴趣的每个成员机构都有权派代表参加该委员会。国际组织，无论是政府组织还是非政府组织，与ISO保持联系，也参与了这项工作。

ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

ISO与国际电工委员会（IEC）就电工技术标准化的所有事项密切合作。

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).

ISO/IEC指令第1部分描述了用于制定本文件的程序以及用于进一步维护的程序。特别是，应注意不同类型的ISO文件所需的不同批准标准。本文件是根据ISO/IEC指令第2部分的编辑规则起草的（见wwwiso.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).

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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.

关于标准的自愿性质、与合格评定相关的ISO特定术语和表达的含义，以及ISO在技术性贸易壁垒（TBT）中遵守世界贸易组织（WTO）原则的信息，请参阅www.iso.org/iso/pardery.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.

本文件由ISO/TC 138流体输送用塑料管、配件和阀门技术委员会SC 2供水用塑料管和配件小组委员会编制。

This second edition cancels and replaces the first edition (ISO 4427-2:2007), which has been technically revised. It also incorporates Amendment ISO 4427-2:2007/Amd. 1:2014.

第二版取消并取代了第一版（ISO 4427-2:2007），第一版已经过技术修订。它还纳入了ISO 4427-2:2007/Amd修正案。1:2014.

The main changes compared to the previous edition are:

与上一版相比，主要变化是：

— Update of the normative references;

—规范性引用文件的更新；

— Technical consistency with ISO 4437-2 (see Bibliography [1]).

—与ISO 4437-2的技术一致性（见参考文献[1]）。

A list of all parts in the ISO 4427 series can be found on the ISO website.

ISO 4427系列中所有零件的列表可以在ISO网站上找到。

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.

对本文件的任何反馈或问题应直接向用户的国家标准机构提出。这些机构的完整列表可以在www.iso.org/members.html上找到。

Introduction

介绍

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.

ISO 4427系列标准是一套系统标准，规定了由聚乙烯（PE）制成的管材系统及其组件的要求。管材系统旨在用于埋地或地上应用，用于输送人类用水、处理前的原水、压力下的排水和排污、真空下水道系统以及其他用途的水。

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.

关于ISO 4427系列所涵盖的产品对人类饮用水质量的潜在不利影响，它没有提供有关产品使用限制的信息。

NOTE: Guidance for assessment of conformity can be found in Reference [2] in the Bibliography.

注：合格评定指南见参考文献[2]。

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

压力下供水、排水和排污用塑料管材系统聚乙烯（PE）第2部分：管材

1 Scope

1范围

This document specifies the pipes made from polyethylene (PE) for buried or above ground applications, intended for the conveyance of:

本文件规定了用于埋地或地上应用的聚乙烯（PE）管材，用于输送：

— water for human consumption;

— raw water prior to treatment;

— drainage and sewerage under pressure;

— vacuum sewer systems;

— water for other purposes.

—人类饮用水；

—处理前的原水；

—压力下的排水和排污；

—真空下水道系统；

—水用于其他目的。

NOTE 1: The intended uses include sea outfalls, laid in water and pipes suspended below bridges. Pipes complying with this document are not intended for the transport of water intended for human consumption in contaminated soils unless special consideration has been taken.

注1：预期用途包括铺设在排水口中和悬挂在桥梁下方的管材。除非特别要求，否则符合本文件的管材不得用于在污染土壤中运输饮用水。

NOTE 2: For example, ISO 21004 provides an alternative solution for use in contaminated soils. See Reference [3] in the Bibliography.

注2：例如，ISO 21004提供了一种用于污染土壤的替代解决方案。参见参考文献[3]。

This document specifies three types of pipe:

本文档指定了三种类型的管材：

— PE pipes (outside diameter d n), including any identification stripes;

—PE管（外径d_n），包括任何标识条；

— PE pipes with co-extruded layers on either or both the outside and/or inside of the pipe (total outside diameter d n) where all layers have the same MRS rating;

—在管材的外部和/或内部或两者上具有共挤层的PE管（总外径d_n），其中所有层具有相同的MRS等级(最小强度要求)；

— PE pipes (outside diameter d n) having a peelable and contiguous thermoplastics additional layer on the outside of the pipe (“coated pipe”).

—PE管（外径d_n）在管外具有可剥离和连续的热塑性塑料附加层（“带可剥离层的管材”）。

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

本文件还规定了本文件中提及的测试方法的测试参数。

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

结合ISO 4427系列的其他部分，本文件适用于PE管、其接头以及由PE和其他材料制成的部件接头，拟在以下条件下使用：

a) a maximum allowable operating pressure (PFA) up to and including 25 bar [1)];

a）最大允许工作压力（PFA）高达25巴[1)]；

b) an operating temperature of 20 °C as the reference temperature.

b）工作温度为20°C作为参考温度。

NOTE 3: For other operating temperatures, guidance is given in ISO 4427-1:2019, Annex A.

注3：对于其他工作温度，ISO 4427-1:2019附录A中给出了指导。

This document covers a range of maximum allowable operating pressures and gives requirements concerning colours.

本文件涵盖了一系列最大允许工作压力(PFA)，并给出了有关颜色的要求。

NOTE 4: 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.

注4：买方或规定者有责任根据其特定要求和安装实践或规范，从这些方面做出适当的选择。

2 Normative references

2规范性引用文件

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.

以下文件在文本中的引用方式是，其部分或全部内容构成本文件的要求。凡是注日期的引用文件，仅引用的版本适用。对于未注明日期的引用文件，应采用引用文件的最新版本（包括任何修订）。

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 1133-1，塑料—热塑性塑料熔体质量流速（MFR）和熔体体积流速（MVR）的测定—第1部分：标准方法

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 1167-1:2006，流体输送用热塑性塑料管、配件和组件—耐内压性的测定—第1部分：一般方法

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 1167-2，流体输送用热塑性塑料管、配件和组件—耐内压性的测定—第2部分：管试样的制备

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

ISO 2505，热塑性塑料管—纵向回复—试验方法和参数

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

ISO 3126，塑料管材系统—塑料部件—尺寸的测定

ISO 4427-1:2019, Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply —Part 1: General

ISO 4427-1:2019，塑料管材系统—供水用聚乙烯（PE）管和配件—第1部分：总则

ISO 4427-5:2019, Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 5:Fitness for purpose of the system

ISO 4427-5:2019，塑料管材系统—供水用聚乙烯（PE）管和配件—第5部分：系统适用性

[1)] 1 bar = 0,1 MPa = 10 5 Pa; 1 MPa = 1 N/mm 2

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

ISO 4433-1，热塑性塑料管—耐液体化学品性—分类—第1部分：浸没试验方法

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

ISO 4433-2，热塑性塑料管—耐液体化学品性—分类—第2部分：聚烯烃管

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

ISO 6259-1，热塑性塑料管—拉伸性能的测定—第1部分：一般试验方法

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

ISO 6259-3，热塑性塑料管—拉伸性能的测定—第3部分：聚烯烃管

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

ISO 11357-6，塑料—差示扫描量热法（DSC）—第6部分：氧化诱导时间（等温OIT）和氧化诱导温度（动态OIT）的测定

3 Terms and definitions

3术语和定义

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

就本文件而言，ISO 4427-1中给出的术语和定义以及以下内容适用。

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

ISO和IEC在以下地址维护用于标准化的术语数据库：

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

—IEC电子百科全书：可在http://www.electropedia.org上找到/

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

—ISO在线浏览平台：可访问http://www.iso.org/obp

3.1

application code

用途代码

code letter which identifies the intended use of the product

标识产品预期用途的代码字母

Note 1 to entry: The code letter mentioned in this document is W indicating "water intended for human consumption".

注1：本文件中提到的代码字母为W，表示“供人类饮用的水”。

4 Symbols and abbreviated terms

4符号和缩略语

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

ISO 4427-1中给出的符号和缩写术语适用于本文件。

5 Material

5材料

5.1 Compound

5.1化合物

The pipes shall be made from virgin material or own reprocessed material from the same PE compound or a mixture of both materials.

Own reprocessed material from the base pipe of peelable-layer pipes can be used. Reprocessed (both own and external) material from peelable layers shall not be used.

The compound(s) from which the pipes are made shall conform to ISO 4427-1.

管材应由原始材料或由相同PE化合物或两种材料的混合物制成的再加工材料制成。

可使用可剥离层管基管中自己再加工的材料。不得使用可剥离层的再加工（包括自身和外部）材料。

制造管材的化合物应符合ISO 4427-1。

管道应由原始材料或由相同PE化合物或两种材料的混合物制成的再加工材料制成。

可以使用来自可剥离层管的基管的本身的再加工材料。不得使用来自外来或不同可剥离层的再加工(自有和外部)材料。

制造管道的化合物应符合ISO 4427-1标准。

NOTE: Since PE 40 is not commonly used for pressure applications, it is the intention of ISO/TC 138/SC 2 to withdraw all references to this compound at the next revision of the ISO 4427 series (all parts).

注：由于PE 40不常用于压力应用，ISO/TC 138/SC 2打算在ISO 4427系列（所有部分）的下一次修订中撤回对该化合物的所有引用。

5.2 Identification compound

5.2识别化合物

The compound used for identification stripes and co-extruded layers (see 6.2) shall be manufactured from a PE base polymer, which is the same as for one of the material producer’ s pipe compounds for which fusion compatibility has been proven

The compound used for identification stripes shall comply with the fusion compatibility requirements in ISO 4427-1 and with the resistance to weathering as described in ISO 4427-1:2019, Table 2.

The resistance to weathering of the identification stripe compound shall be declared by the manufacturer of the compound, confirming whether either a cumulative radiant exposure of >3,5 GJ/m 2 or >7 GJ/m 2 related to the outdoor storage ability limit is applicable.

用于标识条和共挤层的化合物（见6.2）应由PE基聚合物制成，该聚合物与材料生产商的一种管材化合物相同，其熔融相容性已得到证明

用于标识条的化合物应符合ISO 4427-1中的熔融相容性要求，并具有ISO 4427-1:2019表2中所述的耐候性。

标识条化合物的耐候性应由化合物制造商声明，确认与室外储存能力限制相关的累积辐射暴露量是否大于3.5 GJ/m ^{2}或大于7 GJ/m ^{2}。

For co-extruded layers used for identification purposes, Annex A applies.

对于用于标识目的的共挤层，附件A适用。

5.3 Reprocessed and recycled material

5.3再加工和回收料

Clean, reprocessed material generated from a manufacturer's own production and works testing of products according to the ISO 4427 series may be used if it is derived from the same compound as used

for the relevant production.

Reprocessed material obtained from external sources and recycled material shall not be used.

如果制造商根据ISO 4427系列对产品进行生产和工厂测试时产生的清洁、再加工材料来自与相关生产相同的化合物，则可以使用这些材料。

不得使用从外部来源获得的再加工材料和回收材料。

6 General characteristics

6一般特征

6.1 Appearance

6.1外观

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 of the pipe to this document.

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

管材符合本文件的要求，在不放大的情况下观察时，管材的内外表面应光滑清洁，不得有划痕、空腔和其他表面。

管材两端应切割干净，与管材轴线成直角。

6.2 Colour

6.2颜色

Blue pipes or black pipes with blue stripes are intended for the conveyance of water for human consumption only.

The outer coextruded layer of coextruded pipes (see Annex A) or the peelable layer of peelable layer pipes (see Annex B) for pipes intended for the conveyance of water for human consumption shall be either black or blue or black with blue stripes.

Pipes intended for drainage and sewerage under pressure shall be black or black with brown stripes or according to national preference.

For above-ground installations, all components with colours other than black should be protected from direct UV light.

NOTE :Yellow and orange colours are only used for gas applications, in accordance with the ISO 4437 series (all parts).

蓝色管材或带有蓝色条纹的黑色管材仅用于输送人类饮用水。

用于输送人类饮用水的管材的共挤管外层（见附件A）或可剥离层管的可剥离层（见附件B）应为黑色或蓝色或带有蓝色条纹的黑色。

用于压力排水和排污的管材应为黑色或带棕色条纹的黑色，或根据国家相关规定。

对于地面安装，应保护所有非黑色的组件免受直接紫外线照射。

注：根据ISO 4437系列（所有部分），黄色和橙色仅用于气体应用。

6.3 Effect on water quality

6.3对水质的影响

For pipes to be used in contact with water intended for human consumption, see ISO 4427-1.

与人类饮用水接触的管材见ISO 4427-1。

7 Geometrical characteristics

7几何特征

7.1 Measurements

7.1测量

The dimensions of the pipe shall be measured in accordance with ISO 3126. In case of dispute, the measurements of dimensions shall be made not less than 24 h after manufacture and after conditioning for at least 4 h at (23 ± 2) °C.

Indirect measurement at the stage of production is allowed at shorter time periods, provided that evidence is shown of correlation.

管材的尺寸应按照ISO 3126进行测量。如有争议，尺寸测量应在制造24小时后进行测量，并在（23±2）°C下调节状态至少4小时后进行测量。

在生产阶段，允许在较短的时间内进行间接测量，前提是有证据表明尺寸的有效性。

7.2 Mean outside diameter and out-of-roundness (ovality)

7.2平均外径和不圆度（椭圆度）

The mean outside diameters, d em, and the out-of-roundness (ovality) 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.

平均外径d_{em}和不圆度（椭圆度）应符合表1。对于盘管，最大不圆度应由制造商和最终用户协商确定。

Pipe from PE 40 materials shall be limited to diameters up to and including 63 mm.

PE 40材料制成的管材直径应限制在63毫米以内。

Table 1 — Mean outside diameters and out-of-roundness

表 1管材平均外径和不圆度

单位：mm

公称尺寸 DN/OD	公称外径	平均外径[a]		最大不圆度（椭圆度）[b]
	d_n	$d_{em\ min}$	$d_{em\ max}$	
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	1 10	110,0	110,7	2,2
125	125	125,0	125,8	2,5
1 40	140	140,0	140,9	2,8
1 60	160	160,0	161,0	3,2
1 80	1 80	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
710	710	710,0	716,4	24,9
800	800	800,0	807,2	28,0
900	900	900,0	908,1	d
1 000	1 000	1 000,0	1 009,0	_d
1 200	1 200	1 200,0	1 210,8[c]	_d
1 400	1 400	1 400,0	1 412,6[c]	_d
1 600	1 600	1 600,0	1 614,4[c]	_d
1 800	1 800	1 800,0	1 816,2[c]	_d
2 000	2 000	2 000,0	2 018,0[c]	_d
2 250	2 250	2 250,0	2 270,3[c]	_d
2500	2 500	2 500,0	2 522,5[c]	_d
2 800	2 800	2 800,0	2 825,2[c]	_d
3 000	3 000	3 000,0	3 027,0[c]	_d

a-根据ISO11922-1:2018，尺寸≤630mm时为B级，尺寸≥710mm时为A级。（见参考文献[4]）。

b-根据ISO11922-1:2018，N级，尺寸≤800mm，在制造现场点测量。

c-公差计算为0009 d_{em}，不符合ISO11922-1:2018中的A级。

d-对于直径≥900mm的直管，最大不圆度应由制造商和最终用户之间的协议规定。

NOTE :Tolerance bands in accordance with ISO 11922-1:2018 , are calculated as follows, as applicable (see Reference [3] in the Bibliography):

a) Grade A: 0,009d n rounded to the next greater 0,1 mm with a minimum value of 0,3 mm and a maximum value of 10,0 mm.

b) Grade B: 0,006d n rounded up to the next greater 0,1 mm with a minimum value of 0,3 mm and a maximum value of 4,0 mm.

c) Grade N:

1) for diameters ≤75 mm (0,008 d n + 1) mm,

2) for diameters ≥90 mm and ≤250 mm (0,02 d n) mm,

3) for diameters >250 mm (0,035 d n) mm,

4) rounded up to the next greater 0,1 mm.

注:根据ISO 11922-1:2018，公差带计算如下(如适用)(见参考文献中的参考文献[3]):

a) A级:0,009d_n四舍五入到下一个更大的0.1mm，最小值为0.3mm，最大值为10.0mm。

b) B级:0,006d_n向上舍入到下一个更大的0.1mm，最小值为0.3mm，最大值为4.0mm。

c)N级:

1)对于直径≤75毫米(0.008d_n+1)毫米，

2)对于直径≥90毫米且≤250毫米(0.02d_n)毫米，

3)对于直径>250毫米(0.035d_n)的情况，

4)向上舍入到下一个更大的0.1mm。

7.3 Wall thicknesses and their tolerances

7.3壁厚及其公差

The wall thickness shall be in accordance with Table 2.

NOTE： The relationship between PN, MRS, S and SDR is given in Annex C.

壁厚应符合表2。

注:PN（公称压力）、MRS（最小要求强度）、S（管系列）和SDR（标准尺寸比）之间的关系见附录C。

表2—管材壁厚

	Pipe series 管系列									
	SDR 6	SDR 7,4	SDR 9	SDR 11	SDR 13,6	SDR 17	SDR 21	SDR 26	SDR 33	SDR41
	S2,5	S 3,2	S4	S5	S 6,3	S8	S10	S 12,5	S16	S 20
	Nominal pressure (PN) bar,公称压力(PN)巴									
PE 40		PN 10	PN 8	PN 6	PN 5	PN 4	PN 3,2	PN 2,5		
PE 80	PN 25	PN 20	PN 16	PN 12,5	PN 10	PN 8	PN 6	PN 5	PN 4	PN 3,2
PE 100		PN 25	PN 20	PN 16	PN 12,5	PN 10	PN8	PN6	PN 5	PN 4

名义尺寸	Wall thicknesses [b] 壁厚 mm																			
	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}
16	3,0	3,4	2,3a	2,7	2,0a	2,3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20	3,4	3,9	3,0	3,4	2,3	2,7	2,0a	2,3	—	—	—	—	—	—	—	—	—	—	—	—
25	4,2	4,8	3,5	4,0	3,0	3,4	2,3a	2,7	2,0a	2,3	—	—	—	—	—	—	—	—	—	—
32	5,4	6,1	4,4	5,0	3,6	4,1	3,0	3,4	2,4a	2,8	2,0a	2,3	—	—	—	—	—	—	—	—
40	6,7	7,5	5,5	6,2	4,5	5,1	3,7	4,2	3,0	3,5	2,4a	2,8	2,0a	2,3	—	—	—	—	—	—
50	8,3	9,3	6,9	7,7	5,6	6,3	4,6	5,2	3,7	4,2	3,0	3,4	2,4	2,8	2,0a	2,3	—	—	—	—
63	10,5	11,7	8,6	9,6	7,1	8,0	5,8	6,5	4,7	5,3	3,8	4,3	3,0	3,4	2,5a	2,9	—	—	—	—
75	12,5	13,9	10,3	11,5	8,4	9,4	6,8	7,6	5,6	6,3	4,5	5,1	3,6	4,1	2,9a	3,3	—	—	—	—
90	15,0	16,7	12,3	13,7	10,1	11,3	8,2	9,2	6,7	7,5	5,4	6,1	4,3	4,9	3,5	4,0	—	—	—	—
110	18,3	20,3	15,1	16,8	12,3	13,7	10,0	11,1	8,1	9,1	6,6	7,4	5,3	6,0	4,2	4,8	—	—	—	—
125	20,8	23,0	17,1	19,0	14,0	15,6	11,4	12,7	9,2	10,3	7,4	8,3	6,0	6,7	4,8	5,4	—	—	—	—
140	23,3	25,8	19,2	21,3	15,7	17,4	12,7	14,1	10,3	11,5	8,3	9,3	6,7	7,5	5,4	6,1	—	—	—	—
160	26,6	29,4	21,9	24,2	17,9	19,8	14,6	16,2	11,8	13,1	9,5	10,6	7,7	8,6	6,2	7,0	—	—	—	—

注1：1巴=0.1兆帕=10 5帕；1兆帕=1牛顿/平方毫米。

注2：PN值基于C=1.25。

注3：根据ISO11922-1:2018，V级公差，从（0,1e_{min}+0.1）mm四舍五入到下一个0,1 mm。对于e>30 mm的某些应用，ISO 11922-1:2018，T级，公差可从0.15e_{min}四舍五入到下一个0.1mm。（见参考文献[3]。）

注4：根据ISO 4065:2018，e_{min}的计算值四舍五入到最接近的值2,0、2,3或3,0。这是为了满足某些国家要求（见参考文献[5]）

a-出于实际原因，建议电熔连接和对接熔接配件连接以及衬里应用的最小壁厚为3.0mm。

b-实际计算值另见附录C。