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Plastics pipes and fittings — Pressure reduction factors for polyethylene pipeline systems for use at temperatures above 20 °C

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National foreword

This British Standard is the UK implementation of ISO 13761:2017.

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Plastics pipes and fittings — Pressure reduction factors for polyethylene pipeline systems for use at temperatures above 20 °C

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Foreword

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This document was prepared by Technical Committee ISO/TC 138, *Plastic pipes, fittings and valves for the transport of fluids*, Subcommittee SC 5, *General properties of pipes, fittings and valves of plastic materials and their accessories — Test methods and basic specifications*.

This second edition cancels and replaces the first edition (ISO 13761:1996), which has been technically revised.

Introduction

This document provides pressure reduction factors for an increased temperature range up to 50 °C and guidance for dealing with higher temperatures. The use of these factors allows the operating pressure of polyethylene (PE) pipeline systems to be determined for use at higher temperatures.

INTERNATIONAL STANDARD ISO 13761:2017(E)

Plastics pipes and fittings — Pressure reduction factors for polyethylene pipeline systems for use at temperatures above 20 °C

1 Scope

This document specifies a method for the derivation of pressure reduction factors to obtain the allowable operating pressure for operation of polyethylene (PE) pipeline systems at temperatures between 20 °C and 40 °C or 50 °C, dependent on the classification of the material used for manufacture.

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 9080:2012, *Plastic piping and ducting systems — Determination of the long-term hydrostatic strength of thermoplastics materials in pipe form by extrapolation*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

4 Principle

For operation of systems at temperatures between 20 °C and up to 50 °C, the allowable pressure is reduced by applying the pressure reduction factor derived from the graph in Figure 1 or from Table 1 to the nominal pressure for 20 °C operation.

5 Procedure

5.1 Determination of the applicable pressure reduction factor

Select the pressure reduction factor at the required operating temperature from Table 1 or derive it from the graph in Figure 1. Table 1 and Figure 1 are applicable for PE 100 and PE 80 materials up to 50 °C, and for PE 63 and PE 40 materials up to 40 °C.

Multiply the nominal operating pressure of the system for 20 °C operation by the pressure reduction factor at the required operating temperature in order to obtain the allowable operating pressure.

Allowable operating pressure at elevated temperature = PN × reduction factor at that temperature

where PN is the nominal pressure rating of the system at 20 °C.

The end user should take into account the maximum temperature for continuous operation and duration of operation at that temperature.

NOTE 1 Basing the design on the maximum temperature only may result in over design of the system.

NOTE 2 When the temperature profile of operation is known, ISO 13760 can be used for design purposes. Reference lines for PE are provided in ISO 13760 and ISO 15494.

5.2 Analysis of data by extrapolation

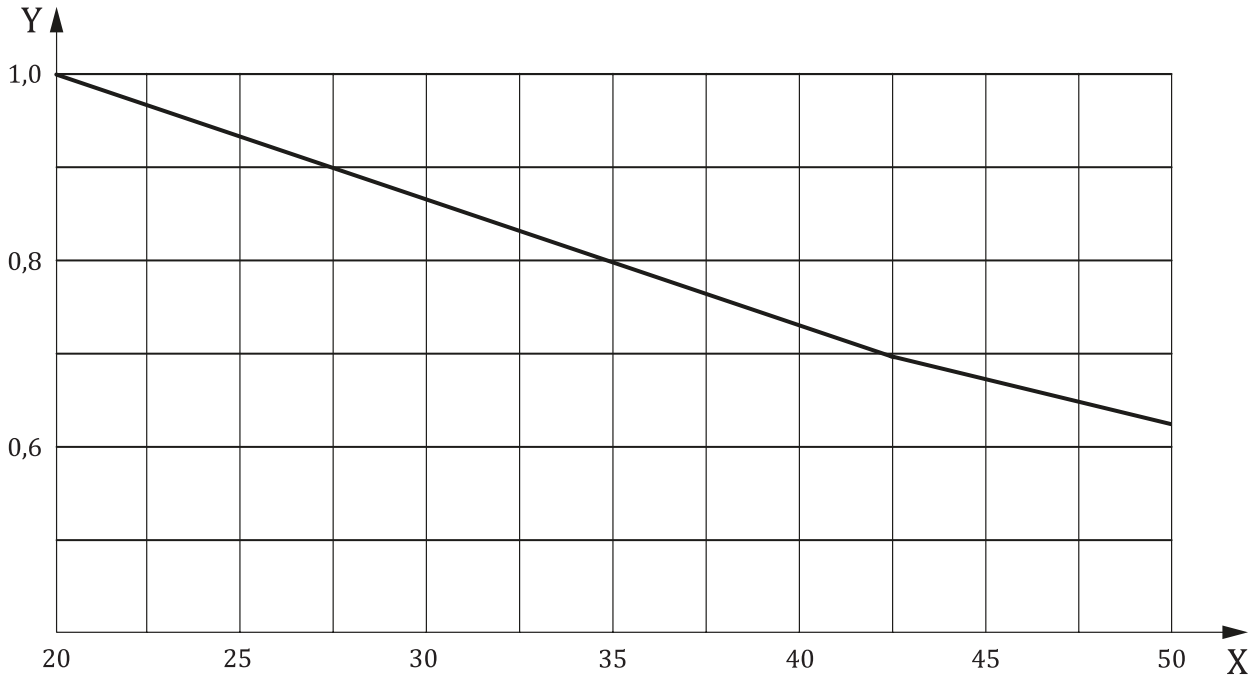
Factors higher than those obtained in accordance with 5.1, and hence higher operating pressures, may be applied providing the analysis of data in accordance with ISO 9080 demonstrates that less reduction is applicable.

Factors above 1,0 may be applied for temperatures up to 20 °C below the lowest test temperature of 20 °C in accordance with ISO 9080:2012, 5.1.3.

Pressure reduction factors at temperatures above 50 °C may be deduced taking into account the ISO 9080 extrapolation factors and time limits.

5.3 Design lifetime

This document does not specifically specify expected design life for operation. This shall be predicted by analysis in accordance with ISO 9080 taking into account the extrapolation time limits and the specific operating conditions.



Key

Y pressure reduction factor

X temperature °C

Figure 1 — Pressure reduction factor versus temperature

Table 1 — Pressure reduction factors for temperatures between 20 °C and 50 °C

Material classification	Pressure reduction factors[a] [b]						
	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C
PE 100 PE 80	1,00	0,92	0,85	0,79	0,73	0,67	0,63
PE 63	1,00	0,92	0,85	0,79	0,73		
PE 40	1,00	0,92	0,85	0,77	0,70		

[a] Reference to ISO 9080:2012 shall be made for extrapolation time limits, see 5.3.

[b] The ISO 9080:2012 extrapolation factors are 50 for 40 °C, 30 for 45 °C and 18 for 50 °C when the material is tested at a maximum temperature of 80 °C. If the material is tested at a higher temperature than 80 °C then other extrapolation factors may apply.

Bibliography

[1] ISO 13760, *Plastics pipes for the conveyance of fluids under pressure — Miner's rule — Calculation method for cumulative damage*

[2] ISO 15494, *Plastics piping systems for industrial applications — Polybutene (PB), polyethylene (PE), polyethylene of raised temperature resistance (PE-RT), crosslinked polyethylene (PE-X), polypropylene (PP) — Metric series for specifications for components and the system*

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