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

Tubes et raccords en matières plastiques — Facteurs de réduction de pression des canalisations en polyéthylène utilisées à des températures supérieures à 20 °C

Reference number
ISO 13761:1996(E)

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.

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.

International Standard ISO 13761 was prepared by Technical Committee ISO/TC 138, *Plastics 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*.

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

1 Scope

This International Standard specifies a method for the derivation of reduction factors to apply to obtain the maximum allowable operating pressure for elevated-temperature operation of polyethylene (PE) pipeline systems.

The factors given in table 1 or derived from the graph in figure 1 are applicable to fluids which do not adversely affect the long-term properties of the polyethylene material at temperatures between 20 °C and 40 °C.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/TR 9080:1992, *Thermoplastics pipes for the transport of fluids — Methods of extrapolation of hydrostatic stress rupture data to determine the long-term hydrostatic strength of thermoplastics pipe materials.*

ISO 12162:1995, *Thermoplastics materials for pipes and fittings for pressure applications — Classification and designation — Overall service (design) coefficient.*

3 Principle

For operation of systems at temperatures between 20 °C and 40 °C, the nominal 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.

4 Procedure

4.1 Except when 4.2 is applicable, in order to determine the reduction line for the material used in the manufacture of a system for operation up to 30 °C or up to 40 °C, i.e. line A, line B or line C, follow the instructions given in figure 2. If the criteria for line A for operating temperatures up to either 30 °C or 40 °C are not met, then line B is applicable to PE 100, PE 80 et PE 63 materials, and line C is applicable to PE 50, PE 40 and PE 32 materials. Select the pressure reduction factor at the required operating temperature from table 1 or derive it from

the graph in figure 1 using the appropriate reduction line. Multiply the nominal pressure of the system for 20 °C operation by this pressure reduction factor in order to obtain the nominal operating pressure at the required operating temperature.

4.2 Factors higher than those obtained in accordance with 4.1, and hence higher pressures, may be applied to a material providing the analysis in accordance with ISO/TR 9080 demonstrates that less reduction is applicable.

NOTES

1 A lifetime of 50 years is used as the basis for the classification of material in accordance with ISO 12162. For longer lifetimes, for instance 100 years, it is necessary to consider each case individually, taking into account the rules given in ISO/TR 9080. At temperatures up to 20 °C, for materials which exhibit no knee in the 80 °C stress rupture curve in half a year, longer lifetimes of up to 100 years can be predicted.

2 For temperatures below 20 °C, a factor above 1 is applicable. Components made of certain materials may be operated at a temperature higher than 40 °C using a factor lower than that in table 1, determined by analysis in accordance with ISO/TR 9080.

3 The data used for the graph shown in figure 1 and those given in table 1 have been determined using the lowest (i.e. most unfavourable) values, rather than the best-fit values, in the analysis, in accordance with ISO/TR 9080, of hydrostatic stress rupture data for commercially available PE resins.

4 The period quoted (1 year at 80 °C, 1/2 year at 80 °C) may be conservative, and shorter times may turn out to be applicable following consideration of comments on ISO/TR 9080.

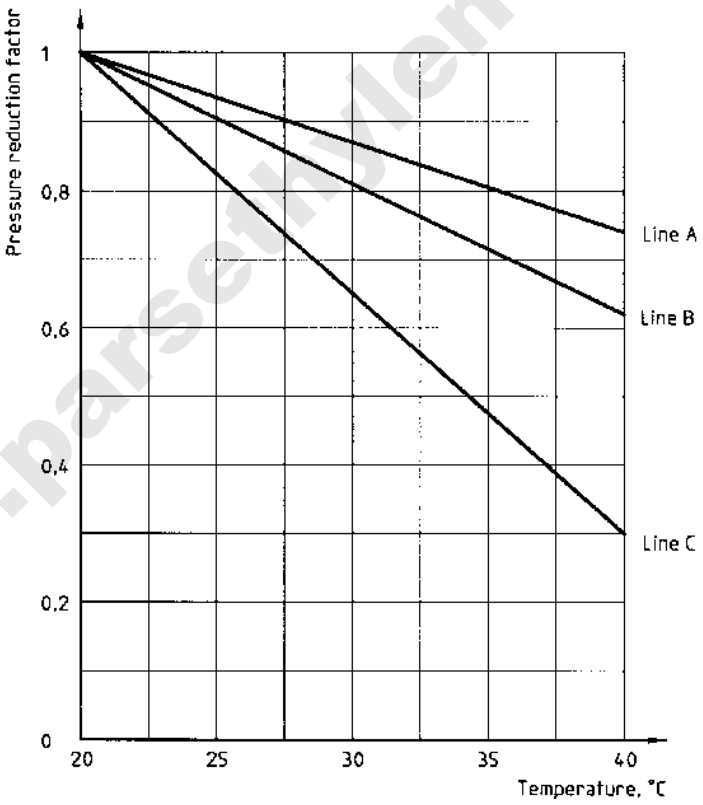

Figure 1 — Pressure reduction factor versus temperature, applicable to a 50-year lifetime

Table 1 — Pressure reduction factors at temperatures between 20 °C and 40 °C, applicable to a 50-year lifetime

Reduction line	Pressure reduction factors at				
	20 °C	25 °C	30 °C	35 °C	40 °C
Line A	1	0,93	0,87	0,8	0,74
Line B	1	0,9	0,81	0,72	0,62
Line C	1	0,82	0,65	0,47	0,3

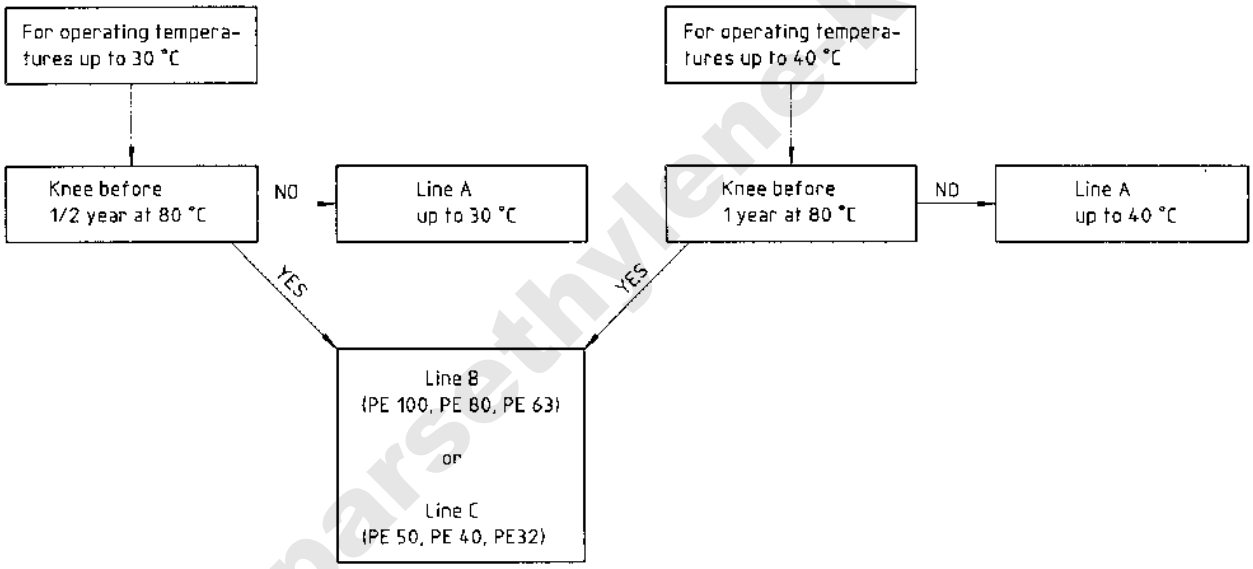

Figure 2 — Determination of reduction line

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Descriptors: fluid pipelines, plastics products, pipes (tubes), pipe fittings, polyethylene, plastic tubes, pressure pipes, working conditions, service pressure, reference data.

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