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Thermoplastics pipes for the conveyance of fluids — Nominal outside diameters and nominal pressures —

Part 1: **Metric series**

Tubes en matières thermoplastiques pour le transport des fluides — Diamètres extérieurs nominaux et pressions nominales —

Partie 1: Série métrique

Reference number
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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 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).

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For an explanation on 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 the following URL: 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*.

This fourth edition cancels and replaces the third edition (ISO 161-1:1996), which has been technically revised.

The significant changes are:

— Nominal diameters are extended up to 3 000 mm;

— Nominal pressure PN 25 bar is added;

— Nominal pressure PN 6 shall be designed using 6,3 bar; designation based on 6,0 bar is deleted;

— MRS values up to 20 are based on R 10 increments. MRS values above 20 are based on R 20 increments;

— Definitions are updated to follow modern plastics piping terminology.

A list of all the parts in the ISO 161 series, can be found on the ISO website.

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Thermoplastics pipes for the conveyance of fluids — Nominal outside diameters and nominal pressures —

Part 1: Metric series

1 Scope

This document specifies the nominal outside diameters for metric thermoplastics pipes for the conveyance of fluids in pressure and non-pressure applications. It also specifies nominal pressure ratings and minimum required strengths for pressure applications.

It is applicable to smooth thermoplastics pipes of constant circular cross-section along the whole length of the pipe, whatever their method of manufacture or material of construction.

It is not applicable to pipes designated according to the nominal inside diameter DN/ID.

This document is a basis for standards writers for the selection of nominal diameters and nominal pressures in the drafting of product standards.

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 3, *Preferred numbers — Series of preferred numbers*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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

3.1
nominal diameter

3.1.1
nominal size
DN
numerical designation of the size of a component, other than a component designated by thread size, which is approximately equal to the manufacturing dimension

Note 1 to entry: Nominal size is expressed in millimetres (mm).

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3.1.2
nominal outside diameter
d_n
specified outside diameter, assigned to a nominal size DN

Note 1 to entry: Nominal outside diameter is expressed in millimetres, mm.

Note 2 to entry: For metric pipes conforming to this document, the nominal outside diameter, expressed in millimetres, is the minimum mean outside diameter *dem.min* specified in the applicable pipe standard.

3.2
outside diameter, d_e

3.2.1
outside diameter at any point
d_e
value of the measurement of the outside diameter through its cross-section at any point of the pipe or spigot end, rounded to the next greater 0,1 mm

3.2.2
mean outside diameter
d_{em}
measured length of the outer circumference of the pipe divided by π, rounded up to the nearest 0,1 mm

Note 1 to entry: The value of π is taken to be 3,142.

3.2.3
minimum mean outside diameter
$d_{em\ min}$
minimum value of the mean outside diameter specified in the applicable pipe standard equal to the nominal outside diameter d_n

Note 1 to entry: Minimum mean outside diameter is expressed in millimetres, mm.

3.3
nominal pressure
PN
numerical designation used for reference purposes related to the mechanical characteristics of the components of a piping system

Note 1 to entry: It is a convenient number selected from the R 10 series as defined in ISO 3.

3.4
lower confidence limit
σ_{LPL}
quantity with the dimensions of stress representing the 97,5 % lower confidence limit of the predicted long-term hydrostatic strength at temperature *T* and time *t*

Note 1 to entry: Lower confidence limit is expressed in megapascals.

Note 2 to entry: The value can be considered as a property of the material under consideration.

3.5
minimum required strength
MRS
value of the lower confidence limit σ_{LPL} at 20 °C and 50 years rounded down to the next value in the R 10 series as defined in ISO 3 when σ_{LPL} is less than 20 MPa or down to the next value in the R 20 series as defined in ISO 3 when σ_{LPL} is greater than or equal to 20 MPa

Note 1 to entry: The minimum required strength is expressed in megapascals.

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Note 2 to entry: The R 10 series conforms to ISO 3 and the R 20 series conforms to ISO 497.

3.6
design coefficient
C
coefficient with a value greater than 1, which takes into consideration service conditions as well as properties of the components of a piping system other than those represented in the lower confidence limit

Note 1 to entry: Values of *C* for specified materials are given in ISO 12162.

3.7
design stress
σ_S
allowable stress for a given application derived by dividing the MRS by the design coefficient *C* and rounding to the nearest lower value in the R 20 series as defined in ISO 3

$$\sigma_s = \frac{\mathrm{MRS}}{C}$$

Note 1 to entry: Design stress is expressed in megapascals.

3.8
hydrostatic stress
σ
stress induced in the wall of a pipe when the pipe is filled with a fluid under pressure related to the pressure, the wall thickness and the outside diameter of the pipe by the following equation:

$$\sigma = \frac{p(d_e - e)}{2e}$$

where

p is the hydrostatic pressure, in megapascals;

d_e is the outside diameter of the pipe, in millimetres;

e is the wall thickness of the pipe, in millimetres.

Note 1 to entry: Hydrostatic stress is expressed in megapascals.

4 Nominal outside diameter, d_n

The nominal outside diameter d_n shall be selected from the values given in Table 1

Table 1 — Values of nominal outside diameters, d_n

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