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**Thermoplastics piping systems for  
fluids under pressure — Flange  
adapters and loose backing flanges —  
Mating dimensions**

*Systèmes de canalisations thermoplastiques pour fluides sous  
pression — Collets et brides folles plates — Dimensions de  
raccordement*

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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](http://www.iso.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](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://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*, Subcommittee SC 2, *Plastics pipes and fittings for water supplies*.

This second edition cancels and replaces the first edition (ISO 9624:1997), which has been technically revised.

The main changes compared to the previous edition are:

- increase of dimensions up to 2 500 mm;
- technical consistency with industrial applications standards;
- addition of two informative annexes on gaskets and torque application.

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](http://www.iso.org/members.html).

## Introduction

This document covers the dimensions of flange adapters and loose backing flanges which are commonly used in the connection of plastic piping systems to valves, pumping stations or other equipment, and to pipelines of the same or other material. Some equipment (e.g. butterfly valves) may require specific designs that are not covered by this document.

This revised version of this document covers dimensions allowing the connection of plastic piping systems up to DN 2500, to answer the increasing demand of large dimensions on the market.

Flanged joints should be able to transfer long-term axial forces with maintained tightness, which requires use of suitable components and a correct assembly. This revised version includes informative annexes addressing joint design and torque application and gives bibliographic references to installation guidelines which are available on the market.

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# Thermoplastics piping systems for fluids under pressure — Flange adapters and loose backing flanges — Mating dimensions

## 1 Scope

This document specifies the mating dimensions for thermoplastic flange adapters and corresponding loose backing flanges intended to be used in thermoplastic piping systems for the conveyance of fluids under pressure.

It applies to flange adapters and loose backing flanges for use with pipes with nominal outside diameters ( $d_n$ ) from 16 mm to 2 500 mm and nominal pressures up to 25 bar<sup>1)</sup> (PN 25).

This document specifies the dimensions of the flange adapters intended to be used for:

- butt fusion piping systems;
- socket fusion piping systems;
- adhesive jointed piping systems.

NOTE 1 For specific connections with dimensions (e.g.  $d_n$  450 or  $d_n$  630) not covered in this document, or specific equipment (butterfly valves), specific solutions are available on the market.

This document is applicable to loose backing flanges made from metal, thermoplastics, or a combination of metal and thermoplastics.

This document also provides information on gaskets and gives general recommendations on correct assembling practices.

NOTE 2 Industrial applications are not covered by this document. Products intended for industrial application are covered by ISO 15493<sup>[1]</sup>, ISO 15494 or ISO 10931<sup>[2]</sup>.

## 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 261, *ISO general purpose metric screw threads — General plan*

ISO 727-1, *Fittings made from unplasticized poly(vinyl chloride) (PVC-U), chlorinated poly(vinyl chloride) (PVC-C) or acrylonitrile/butadiene/styrene (ABS) with plain sockets for pipes under pressure — Part 1: Metric series*

ISO 1452-3, *Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure — Unplasticized poly(vinyl chloride) (PVC-U) — Part 3: Fittings*

ISO 4427-3, *Plastics piping systems — Polyethylene (PE) pipes and fittings for water supply — Part 3: Fittings*

ISO 7005-1, *Pipe flanges — Part 1: Steel flanges for industrial and general service piping systems*

1) 1 bar = 0,1 MPa = 10<sup>5</sup> N/m<sup>2</sup>.

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*

ISO 15874-3, *Plastics piping systems for hot and cold water installations — Polypropylene (PP) — Part 3: Fittings*

EN 1092-1, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated — Part 1: steel flanges*

### 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 <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1 nominal outside diameter

$d_n$   
specified outside diameter, in millimetres, assigned to a nominal size DN/OD

Note 1 to entry: The nominal outside diameter  $d_n$  of pipes is given in ISO 161-1<sup>[3]</sup>.

#### 3.2 nominal size DN

numerical designation of the size of a flange for reference purposes and only loosely related to manufacturing dimensions

#### 3.3 nominal pressure PN

numerical designation used for reference purposes related to the mechanical characteristics of the component of a piping system

Note 1 to entry: For plastic piping systems conveying water (including flange adapters), the PN symbols correspond to the allowable operating pressure (PFA) in bar, which can be sustained with water at 20 °C with a design basis of 50 years, and based on the minimum design coefficient in accordance with ISO 12162<sup>[4]</sup>. For loose backing flanges, the PN symbol is used to indicate its geometrical characteristics.

### 4 Symbols and abbreviated terms

- $d_n$  nominal (outside) diameter of connecting pipe and flange adapters, and nominal (inside) diameter of the socket
- D outside diameter of loose backing flange
- DN size designation of loose backing flange
- $D_1$  bolt hole diameter
- $D_2$  inside diameter of loose backing flange
- $D_3$  pitch circle diameter



$D_4$	outside diameter of flange adapter head
$D_5$	outside diameter of flange adapter shank
$n$	number of bolt holes
$r_f$	radius of shoulder of flange adapter

## 5 Dimensions

### 5.1 General

Loose backing flanges shall be designated by the relevant PN symbol, in consistency with [Table 2](#) to [Table 4](#), [Table 6](#) or [Table 8](#) as appropriate.

NOTE 1 The values of the outside diameter  $D$  of the loose backing flange and the pitch circle diameter  $D_3$  of the bolts are taken from EN 1092-1.

NOTE 2 The values of the bolt hole diameter  $D_1$  are taken from series medium in ISO 273.

The inside diameter  $D_2$  of the loose backing flange shall conform to the design of the flange adapter.

Unless otherwise specified, the diameters of the flange adapters as specified in [Table 1](#), [Table 5](#) and [Table 7](#) shall be suitable with the corresponding loose backing flanges, and therefore comply with ISO 7005-1 using the appropriate tolerances as given in EN 1092-1.

Flange adapters shall be designed in order to prevent stress concentration at any changes in cross section. The thickness of the flange adapter face and loose backing flange shall be dependent on the material used in the manufacture of the adapter and on the nominal pressure (PN) of the piping system for which it is designed.

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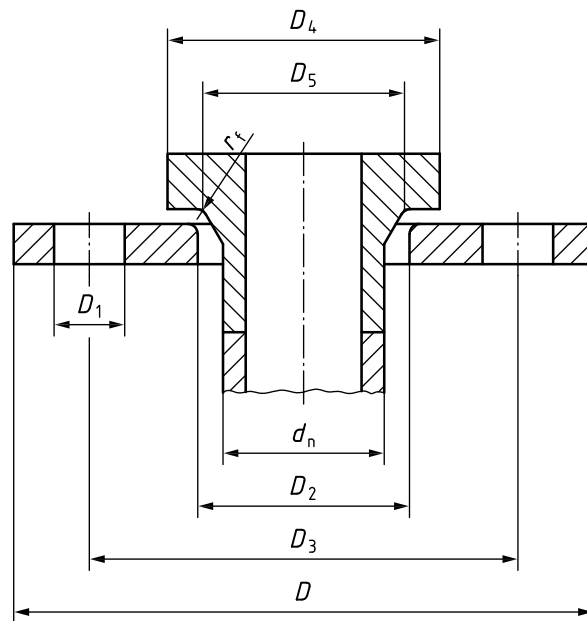
Flange adapters according to [Table 1](#) shall be associated with flanges of same  $d_n$ , from [Tables 2](#), [3](#) or [4](#) as relevant.

NOTE 3 The figures are schematic only, to indicate the relevant dimensions. They do not necessarily represent manufactured components, e.g. flange adapter with special geometry for connecting butterfly valves.

### 5.2 Butt fusion systems

The dimensions of the spigot ends shall comply with the relevant pipe system standard, e.g. ISO 4427-3.

All dimensions shall be measured in accordance with [Figure 1](#).



**Key**

- $d_n$  nominal (outside) diameter of connecting pipe and nominal (inside) diameter of the socket
- $D$  outside diameter of loose backing flange
- $D_1$  bolt hole diameter
- $D_2$  inside diameter of loose backing flange
- $D_3$  pitch circle diameter
- $D_4$  outside diameter of flange adapter head
- $D_5$  outside diameter of flange adapter shank
- $r_f$  radius of shoulder of flange adapter

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**Figure 1 — Butt fusion systems**

For butt fusion systems, the dimensions of the flange adapters shall conform to those given in [Table 1](#).

**Table 1 — Flange adapters — Dimensions for butt fusion systems**

Nominal outside diameter of pipe and spigot <sup>a</sup>	Outside diameter of flange adapter head <sup>b</sup>	Outside diameter of flange adapter shank <sup>c</sup>	Radius of shoulder of flange adapter
$d_n$	$D_4 \text{ min}$	$D_5 \text{ min}$	$r_f$ (+0,5 / -0,5)
16	40	22	3
20	45	27	3
25	58	33	3
32	68	40	3
40	78	50	3
50	88	61	3
63	102	75	4
75	122	89	4

<sup>a</sup> The diameter of the spigot shall conform to the relevant product standard.

<sup>b</sup> The actual value of  $D_4$  should be as high as possible to ensure fitness for purpose of the assembly. See [Annex C](#) for higher recommended values of  $D_4$  for PE100 flange adapters.

<sup>c</sup>  $D_5$  shall be measured in the middle of the radius  $r_f$ .

Table 1 (continued)

Nominal outside diameter of pipe and spigot <sup>a</sup>	Outside diameter of flange adapter head <sup>b</sup>	Outside diameter of flange adapter shank <sup>c</sup>	Radius of shoulder of flange adapter
$d_n$	$D_{4 \text{ min}}$	$D_{5 \text{ min}}$	$r_f$ (+0,5 / -0,5)
90	138	105	4
110	158	125	4
125	158	132	4
140	188	155	4
160	212	175	4
180	212	183	4
200	268	232	4
225	268	235	4
250	320	285	4
280	320	291	4
315	370	335	4
355	430	373	6
400	482	427	6
450	585	514	6
500	585	530	6
560	685	615	6
630	685	642	6
710	800	737	8
800	905	840	8
900	1 005	944	8
1 000	1 110	1 047	8
1 200	1 330	1 245	8
1 400	1 540	1 450	8
1 600	1 760	1 650	10
1 800	1 960	1 860	10
2 000	2 170	2 070	10
2 250	2 435	2 320	10
2 500	2 730	2 550	10

<sup>a</sup> The diameter of the spigot shall conform to the relevant product standard.

<sup>b</sup> The actual value of  $D_4$  should be as high as possible to ensure fitness for purpose of the assembly. See [Annex C](#) for higher recommended values of  $D_4$  for PE100 flange adapters.

<sup>c</sup>  $D_5$  shall be measured in the middle of the radius  $r_f$ .

The dimensions of PN 10 designated loose backing flanges shall conform to those given in [Table 2](#).