INTERNATIONAL STANDARD

IEC 61518

First edition
2001-01

Mating dimensions between differential pressure (type) measuring instruments and flanged-on shut-off devices up to 413 bar (41,3 MPa)

Dimensions des raccords entre les instruments de mesure à différentiel de pression et les dispositifs d'arrêt sur bride allant jusqu'à 413 bar (41,3 MPa)

Reference number
IEC 61518:2001(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site (www.iec.ch)**

- **Catalogue of IEC publications**

  The on-line catalogue on the IEC web site (www.iec.ch/catlg-e.htm) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.

- **IEC Just Published**

  This summary of recently issued publications (www.iec.ch/JP.htm) is also available by email. Please contact the Customer Service Centre (see below) for further information.

- **Customer Service Centre**

  If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

  Email: custserv@iec.ch
  Tel: +41 22 919 02 11
  Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

IEC 61518

First edition
2000-11

Mating dimensions between differential pressure (type) measuring instruments and flanged-on shut-off devices up to 413 bar (41,3 MPa)

Dimensions des raccords entre les instruments de mesure à différentiel de pression et les dispositifs d'arrêt sur bride allant jusqu'à 413 bar (41,3 MPa)

International Electrotechnical Commission 3, rue de Varembé Geneva, Switzerland
Telefax: +41 22 919 0300 e-mail: inmail@iec.ch IEC web site http://www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE M

For price, see current catalogue

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

____

MATING DIMENSIONS BETWEEN DIFFERENTIAL PRESSURE (TYPE) MEASURING INSTRUMENTS AND FLANGED-ON SHUT-OFF DEVICES UP TO 413 bar (41,3 MPa)

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61518 has been prepared by subcommittee 65B: Devices, of IEC technical committee 65: Industrial-process measurement and control.

The text of this standard is based on the following documents:

FDIS	Report on voting
65B/415/FDIS	65B/423/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

In a process, many shut-off devices (manifolds) are flanged direct on to the differential pressure (type) measuring instrument (instrument).

Very often, however, the shut-off device and the measuring device are supplied by different manufacturers. It is, therefore, essential to have the mating dimensions properly defined. In the process industry, leakages must be avoided. In some plants, especially in processes involving flammable or toxic gases, such a leakage can lead to risks to the plant, to its installations, to the environment, and last, but not least, to personal safety of human beings.

In view of accidents reported from various locations, where the accident was caused by leakage between the instrument and the manifold, it was found necessary to standardize the mating dimensions, with its tolerances, for this combination.

MATING DIMENSIONS BETWEEN DIFFERENTIAL PRESSURE (TYPE) MEASURING INSTRUMENTS AND FLANGED-ON SHUT-OFF DEVICES UP TO 413 bar (41,3 MPa)

1 Scope

This International Standard is applicable to differential pressure (type) measuring instruments (instrument) with a shut-off device (manifold) directly bolted on to them.

This standard specifies mating dimensions and tolerances, threads, bolts, and gaskets for a maximum allowable working pressure of 41,3 MPa (413 bar) at 38 °C.

This standard does not apply to assemblies that provide additional sealing elements (adapters) between the instrument and the manifold.

Where the possibility exists, shut-off devices shall be mounted on either side of the instrument, and all connections shall then meet this standard.

Elements, such as flanged coupling joints, may apply this standard or parts thereof to increase standardization at the discretion of the supplier and the end-user.

This standard is only valid for instrument and manifold flanges manufactured from a metallic material with yield strength equal to, or larger than, 190 N/mm^2.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 48:1994, *Rubber, vulcanized or thermoplastic – Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 898-1:1999, *Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs*

ISO 1629:1995, *Rubber and latices – Nomenclature*

ISO 3506 (all parts), *Mechanical properties of corrosion-resistant stainless-steel fasteners*

ISO 3601-1:1988, *Fluid systems – Sealing devices – O-rings – Part 1: Inside diameters, cross-sections, tolerances and size identification code*

ISO 3601-3:1987, *Fluid systems – Sealing devices – O-rings – Part 3: Quality acceptance criteria*

ASME B18.3.1M:1986 (R1993), *Screws, socket head cap (metric series)*

ASME B18.2.1:1996, *Square and Hex Bolts and Screws Inch Series*

ASTM A193:1999, *Specification for alloy steel and stainless steel bolting materials for high-temperature service*

ASTM A449:1993, *Specification for quenched and tempered steel bolts and studs*

3 Dimensions

Dimensions in figures and tables are in millimetres, except where stated otherwise.

Leak-tight connection between the differential (type) measuring instrument and the flanged instrument manifold depends upon the conformance to the dimensions and the tolerances.

3.1 Connection dimensions at the differential pressure (type) instrument

See figure 1.

3.2 Connection dimensions at the shut-off device

Two designs for the manifold facings are recommended:

– Type A: design with an extended spigot (see figure 2);
– Type B: design without an extended spigot (see figure 3).

NOTE Type B design may also be suitable for differential pressure (type) transmitters, where the connecting dimensions are not in accordance with this standard. The user is responsible for ensuring compatibility for transmitters with different dimensions.

3.3 Seal rings

The specifications for the flat ring are those of tables 1 and 2.

The O-rings are in accordance with the ISO standards quoted.

Materials and temperature limits for the flat rings and the O-ring are for reference only. It is the responsibility of the user to ensure compatibility between the selected gasket ring material and the process requirements, such as pressure, temperature, and chemical compatibility.

3.3.1 Seals for manifold design, with extended spigot – type A (see figure 2)

3.3.1.1 Flat rings

Table 1 – Specifications applicable to flat rings – Manifolds with extended spigot

Material	PTFE	Graphite
Composition:	Virgin PTFE	98 % graphite, density $1{,}6\ ^{0{,}1}_{-0{,}1}$ g/cm^3
Dimensions:		
Outside diameter	$24{,}0\ ^{0{,}0}_{-0{,}1}$	$25{,}1\ ^{0{,}0}_{-0{,}1}$
Inside diameter	$17{,}7\ ^{+0{,}1}_{0{,}0}$	$18{,}0\ ^{+0{,}1}_{0{,}0}$
Thickness	$2{,}7\ ^{+0{,}1}_{0{,}0}$	$2{,}9\ ^{+0{,}2}_{-0{,}1}$
Temperature limits:	–10 °C to +80 °C	–40 °C to 120 °C (see note)
NOTE The manifold can be rated in accordance with the piping standards. The temperature limits given are based on the limits applicable to the transmitter.		

3.3.1.2 O-Ring

Dimensions: $d1$ = 20, $d2$ = 2,65 (according to ISO 3601-1)

Material FPM: according to ISO 1629

IRHD hardness: 90, according to ISO 48

Quality mark: "S" according to ISO 3601-3

3.3.2 Seals for manifold design, without extended spigot – type B (see figure 3):

3.3.2.1 Flat rings

Table 2 – Specifications applicable to flat rings – Manifolds without extended spigot

Material	PTFE	Graphite
Composition:	Virgin PTFE	98 % graphite, density $1{,}6\ ^{0{,}1}_{-0{,}1}$ g/cm^3
Dimensions:		
Outside diameter	$25{,}4\ ^{0{,}0}_{-0{,}1}$	$25{,}4\ ^{0{,}0}_{-0{,}1}$
Inside diameter	$20.0\ ^{+0{,}1}_{0{,}0}$	$19.9\ ^{+0{,}1}_{0{,}0}$
Thickness	$2{,}7\ ^{+0{,}1}_{0{,}0}$	$2{,}9\ ^{+0{,}2}_{-0{,}1}$
Temperature limits:	–10 °C to +80 °C	–40 °C to +120 °C (see note)
NOTE The manifold can be rated in accordance with the piping standards. The given temperature limits are based on the limits applicable for the transmitter.		

3.3.2.2 O-Ring

No suitable ISO-standardized O-ring is available for the manifold without the spigot. It is the user's responsibility to apply O-rings according to a local standard.

3.4 Flange connection (see figures 4 and 5)

Flange connections, as described, shall only be used within the defined limits for pressure and temperature of the instrument and manifold assembly.

4 Installation

Before mounting the instrument onto the manifold, it is necessary to check whether mating dimensions and alignment of the mating faces of the flanges of the instrument are within the requirements of this standard.

In an area of 28 mm around each process port, all surfaces shall be clean and without damage.

After the sealing rings have been installed between the manifold and the instrument, care should be taken to tighten all screws at the connection evenly.

For PTFE or graphite seals, it is unavoidable that some of the gasket material creeps between the metallic surfaces. After tightening of the bolts, the gap between the metallic surfaces of the flanged manifold and the instruments shall be less than 0,2 mm. The thread engagement shall be at least 0,8 times the thread diameter.

The required bolt length *L* should be stated as shown below (flange thickness *b*):

a) For blind threaded transmitters:
   – *L* min. = *b* + 9 mm
   – *L* max. = *b* + 14 mm;
b) For through threaded transmitters:
   – *L* min. = *b* + 9 mm.

5 Material for the bolts

The material for the bolts shall be chosen from the following materials, which are minimum material requirements.

– Medium-carbon steel, type 1, or low-carbon steel, type 2, according to ASTM A449.
– Carbon steel, quenched and tempered, Class 8.8, according to ISO 898-1.
– Austenitic steel, carbide solution treated and strain-hardened, according to ASTM A193, Group B8, Class 2.
– Austenitic steel, extra strain-hardened, according to ISO 3506, Group A2 or A4, Class 70.

Marking on the top of the bolts shall indicate conformance with the applicable standard.

6 Marking

Both the transmitter and the manifold, with the interface constructed to this standard, shall have a permanent mark "IEC" on the outside, which shall be visible after installation. The minimum letter height is 5 mm.