
Vacuum technology — Bakable flanges —
Part 2:
Dimensions of knife-edge flanges

Technique du vide — Brides étuvables —

Partie 2: Dimensions des brides à guillotine

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

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An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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.

ISO/TS 3669-2 was prepared by Technical Committee ISO/TC 112, *Vacuum technology*.

ISO 3669 consists of the following parts, under the general title *Vacuum technology — Bakable flanges*:

- *Dimensions*
- *Part 2: Dimensions of knife-edge flanges* [Technical Specification]

Introduction

This Technical Specification contains significant technical changes from ISO 3669:1986, which defined two series of bakable flanges:

- a preferred series, the main dimensions of which ensure compatibility with already standardized non-bakable flanges (see ISO 1609);
- a secondary series corresponding to flanges in common use.

This part of ISO 3669 specifies only one series and is no longer dependent on the preferred number. Effectively, the preferred series has been made obsolete, thereby promoting the secondary series into being the one and only set of specified dimensions. Furthermore, several dimensions in what was formerly the secondary series have been modified to correspond to flanges in common use. Finally, detailed dimensions for the knife-edge sealing profile have been incorporated.

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Vacuum technology — Bakable flanges —

Part 2: Dimensions of knife-edge flanges

1 Scope

This part of ISO 3669 specifies the dimensions of fixed or rotatable bolted knife-edge style bakable flanges used in vacuum systems for pressures ranging from atmospheric to as low as 10^{-13} Pa.

2 Terms and definitions

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

2.1

knife-edge style flange

metal sealed flange used for high and ultra-high vacuum service

NOTE 1 The sandwiching of one metal gasket between two knife-edge flanges and securely bolting these together makes a vacuum-tight joint. The seal is made when the *conical* knife edge profile of the flange cuts into the *flat* surface of a metal gasket.

NOTE 2 Originally developed as Conflat¹⁾ flanges. The widespread and continued use of knife-edge flanges has made these a *de facto* international standard, codified by this Technical Specification.

2.2

nominal bore

value intended to both identify the flange and specify the largest practical size of tubing that can be accommodated by the flange

NOTE See Table 1, in which the convention of identifying original flanges by the outside diameter of the flange (historically in inches) has been maintained.

2.3

leak check groove

groove machined into the seal side of the flange to facilitate the free passage of search gas from the outer perimeter of the flange to the seal zone near the metal gasket

1) Conflat® is the trade name of a product supplied by Varian Corporation. This information is given for the convenience of users of this Technical Specification and does not constitute an endorsement by ISO of the product named. Equivalent products may be used if they can be shown to lead to the same results.

3 Symbols

| Symbol | Description | Unit |
|-----------|--|---------|
| l_1 | nominal outside diameter of flange | mm (in) |
| l_2 | max tube | mm (in) |
| l_3 | bolt hole | mm (in) |
| l_4 | bolt circle | mm (in) |
| φ | position tolerance of bolt hole centre | mm |
| l_5 | seal recess | mm (in) |
| l_6 | knife edge | mm (in) |
| l_7 | thickness of inner rotatable ring | mm (in) |
| l_8 | depth of pipe connection | mm (in) |
| l_9 | flange thickness | mm (in) |
| l_{11} | outside diameter of metal gasket | mm (in) |

4 Requirements

4.1 Materials

4.1.1 Flange

The selection of the material shall be compatible with the requirements for the flanges. Considerations may include service temperature, sealing capacity, corrosion resistance, magnetic permeability, type of seal gasket used and dimensions.

NOTE Austenitic stainless steel is commonly used, but it is not the intent of this part of ISO 3669 to specify or limit the choice of flange material to austenitic stainless steel.

4.1.2 Bolt holes

The flange may have either clearance or tapped bolt holes.

NOTE As a number of flanges in use currently originated in the United States, the tapped flanges often have English tapped holes. Of increasing use are flanges with metric threads. Both are presented in this part of ISO 3669 (see Table 1).

4.1.3 Grooves

Leak check grooves should be used. The grooves shall be arranged equidistantly between the bolt holes.

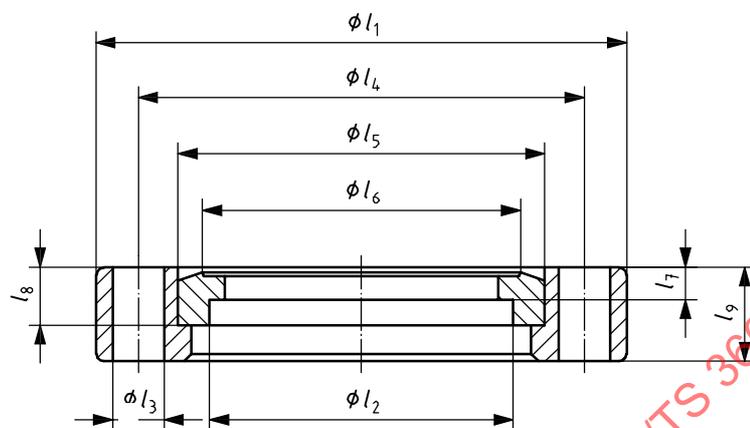
4.1.4 Gasket

In general, the gasket should be softer than the flange to avoid dulling of flange knife edge.

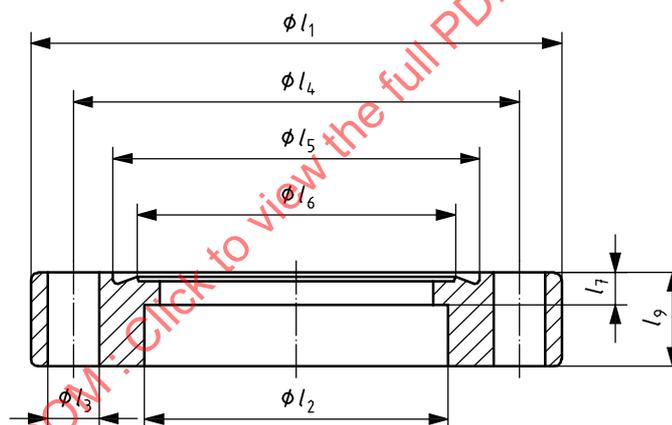
NOTE Oxygen-free high conductivity (OFHC) copper is commonly used, but it is not the intent of this part of ISO 3669 to specify or limit the choice of gasket material to OFHC copper.

4.2 Dimensions

Flange dimensions are shown and specified in Figures 1 to 3 and in Table 1 and Table 2. See Figure 4 for the recommended dimensions of leak check grooves.



a) Rotatable flange



b) Non-rotatable flange

Figure 1 — Basic flange dimensions

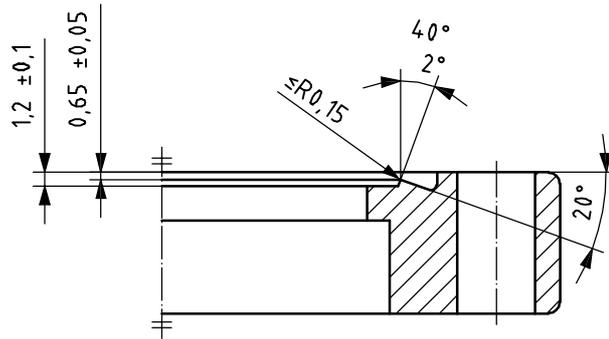


Figure 2 — Knife-edge detail

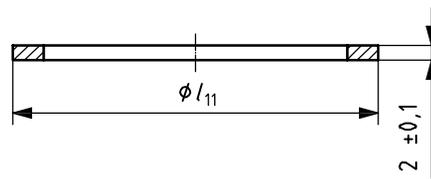
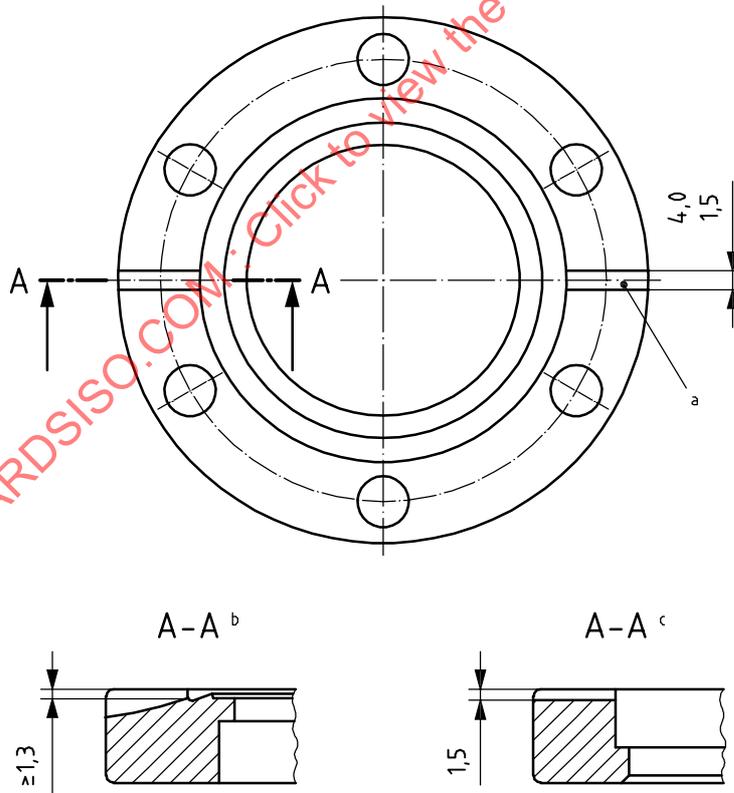


Figure 3 — Metal gasket



- a Recommendation: leak check groove equidistant ($\pm 0,15$ mm) between bolt holes.
- b Non-rotatable flange.
- c Rotatable flange.

Figure 4 — Recommended dimensions for leak check grooves

Table 1 — Flange dimensions

| Nominal bore | l_1 | l_2 | No. bolts ^b | l_3 | Bolt thread ^c | l_4 | φ | l_5 | l_6 | l_7 | l_8 | l_9 |
|--------------|--------------------------|------------------------|------------------------|--------------------------------|--------------------------|-------------|--|----------------------------------|----------------------------|--|--|-------------------------|
| | Nominal outside diameter | Max. tube ^a | | Bolt hole Tol. +0,2 0 | | Bolt circle | Position tolerance of bolt hole centre | Seal recess Tol. +0,2 0 | Knife edge Tol. ±0,1 | Thickness of inner rotatable ring min | Depth of pipe connection Tol. ±0,1 | Flange thickness min |
| | mm (in) | mm | | mm | | mm | mm | mm | mm | mm | mm | mm |
| 10CF | 25,0 (1,0) | 12,0 | 6 | 3,3 | M3 × 0,5 | 17,50 | φ 0,1 | 13,50 | 10,50 | 3,00 | | 6,0 |
| 16CF | 33,8 (1,33) | 19,4 | 6 | 4,4 | M4 × 0,7 (#8-32) | 27,00 | φ 0,1 | 21,40 | 18,30 | 3,30 | 5,90 | 7,0 |
| 25CF | 54,0 (2,12) | 25,8 | 4 | 6,8 | M6 × 1,0 (1/4"-28) | 41,30 | φ 0,2 | 33,00 | 27,70 | 4,30 | 6,00 | 11,5 |
| 40CF | 69,9 (2,75) | 40,0 | 6 | 6,8 | M6 × 1,0 (1/4"-28) | 58,70 | φ 0,2 | 48,30 | 41,90 | 4,30 | 7,70 | 12,5 |
| 50CF | 85,7 (3,38) | 51,0 | 8 | 8,4 | M8 × 1,25 (5/16"-24) | 72,40 | φ 0,2 | 61,80 | 55,90 | 4,90 | 9,70 | 16,0 |
| 63CF | 114,3 (4,50) | 70,0 | 8 | 8,4 | M8 × 1,25 (5/16"-24) | 92,20 | φ 0,2 | 82,50 | 77,20 | 6,40 | 12,70 | 17,0 |
| 75CF | 117,4 (4,62) | 76,2 | 10 | 8,4 | M8 × 1,25 (5/16"-24) | 102,30 | φ 0,2 | 91,60 | 85,20 | 6,50 | 13,00 | 17,5 |
| 100CF | 152,4 (6,00) | 108,0 | 16 | 8,4 | M8 × 1,25 (5/16"-24) | 130,30 | φ 0,2 | 120,60 | 115,30 | 7,20 | 14,30 | 19,5 |
| 125CF | 171,5 (6,75) | 127,0 | 18 | 8,4 | M8 × 1,25 (5/16"-24) | 151,60 | φ 0,2 | 141,80 | 136,30 | 7,20 | 14,30 | 21,0 |
| 160CF | 203,2 (8,00) | 159,0 | 20 | 8,4 | M8 × 1,25 (5/16"-24) | 181,00 | φ 0,2 | 171,40 | 166,10 | 8,00 | 15,90 | 21,0 |
| 200CF | 254,0 (10,00) | 205,0 | 24 | 8,4 | M8 × 1,25 (5/16"-24) | 231,80 | φ 0,2 | 222,20 | 216,90 | 8,60 | 17,20 | 24,0 |
| 250CF | 304,8 (12,00) | 256,0 | 32 | 8,4 | M8 × 1,25 (5/16"-24) | 284,00 | φ 0,2 | 273,10 | 267,50 | 9,00 | 18,00 | 24,0 |
| 275CF | 336,6 (13,25) | 273,4 | 30 | 10,8 | M10 × 1,5 (3/8"-24) | 306,30 | φ 0,2 | 294,40 | 288,20 | 9,90 | 19,80 | 28,0 |
| 300CF | 368,3 (14,5) | 306,0 | 32 | 10,8 | M10 × 1,5 (3/8"-24) | 338,10 | φ 0,2 | 326,40 | 320,00 | 9,90 | 19,80 | 28,0 |
| 350CF | 419,1 (16,5) | 356,0 | 36 | 10,8 | M10 × 1,5 (3/8"-24) | 388,90 | φ 0,4 | 376,70 | 373,00 | 10,40 | 20,70 | 28,0 |
| 400CF | 469,9 (16,5) | 406,0 | 40 | 10,8 | M10 × 1,5 (3/8"-24) | 437,90 | φ 0,4 | 424,40 | 419,00 | 10,40 | 20,70 | 28,0 |

^a Given for guidance only and corresponding to commonly used austenitic stainless steel flanges.

^b Number of bolts equispaced on bolt circle.

^c Metric tap (English tap), according to ISO 965-1.