TECHNICAL SPECIFICATION

ISO/TS 3669-2

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2007-09-01

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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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.

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 Conflat[1)] 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.

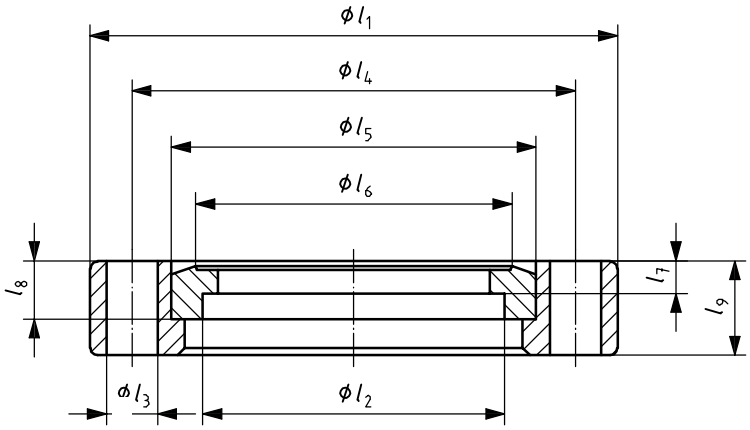
4.1.4 Gasket

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

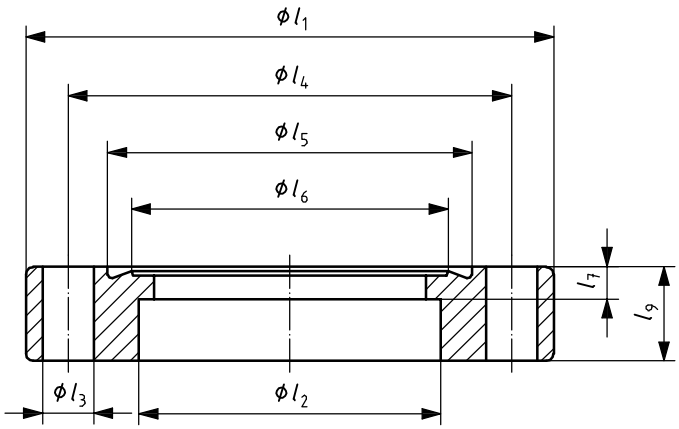
NOTE Oxygen-free high conductivity (OFHC) copper is commonly used, but it is not the intent of this part of ISO 3669 to specify or limit the choice of gasket material to OFHC copper.

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

Dimensions in millimetres

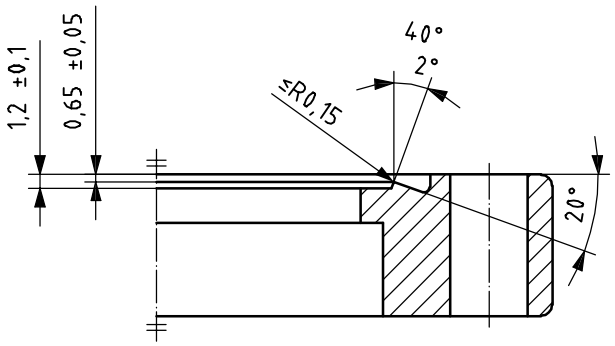


Figure 2 — Knife-edge detail

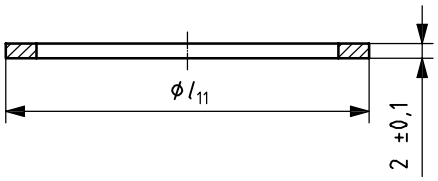
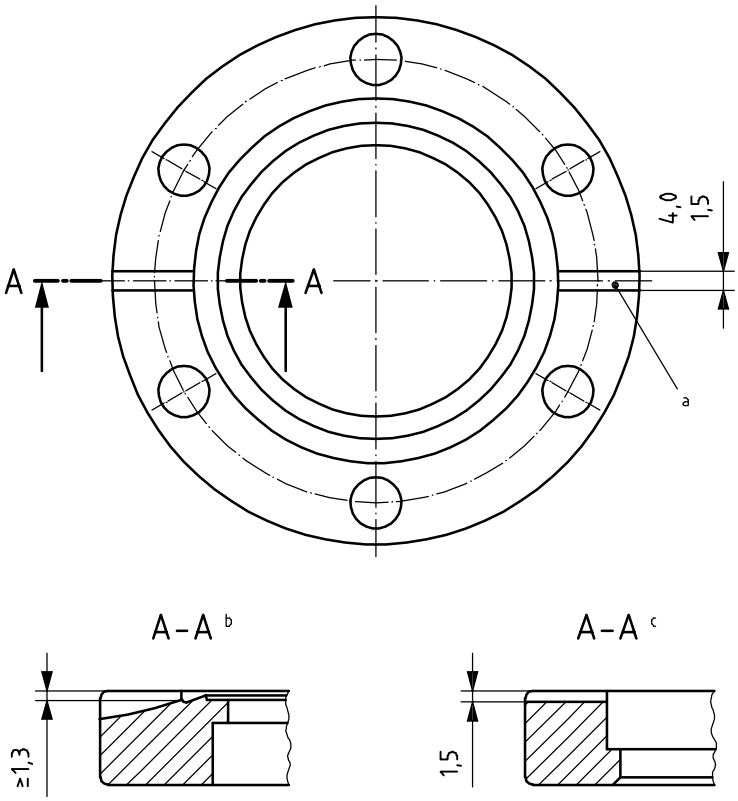


Figure 3 — Metal gasket



a Recommendation: leak check groove equidistant (± 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 Nominal outside diameter mm (in)	l_2 Max. tube [a] mm	No. bolts [b]	l_3 Bolt hole Tol. $^{+0,2}_{0}$ mm	Bolt thread [c]	l_4 Bolt circle mm	φ Position tolerance of bolt hole centre mm	l_5 Seal recess Tol. $^{+0,2}_{0}$ mm	l_6 Knife edge Tol. ±0,1 mm	l_7 Thickness of inner rotatable ring min mm	l_8 Depth of pipe connection Tol. ±0,1 mm	l_9 Flange thickness min 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.

Table 2 — Dimensions of metal gasket

Nominal bore	Outside diameter l_{11} mm	Tolerance mm
10	13,3	0 −0,2
16	21,3	
25	32,9	
40	48,2	
50	61,7	
63	82,4	
75	91,5	
100	120,5	0 −0,3
125	141,7	
160	171,3	
200	222,1	
250	272,9	0 −0,5
275	294,3	
300	326,2	
350	376,5	
400	423,9	

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