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Vacuum technology — Bakeable flanges — Dimensions of knife-edge flanges

Technique du vide — Brides étuvables — Dimensions des brides à guillotine

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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).

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).

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

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 112, *Vacuum technology*.

This second edition cancels and replaces ISO/TS 3669-2:2007, which has been technically revised with the following changes:

— As a result of its relation to ISO 2861, ISO 9803-1, ISO 9803-2 and ISO 21358, the title has changed to *Vacuum technology — Bakeable flanges — Dimensions of knife-edge flanges*.

— Clause 1: pressure range in scope "from atmospheric to as low as 10^{-13} Pa" has changed to practical range "from atmospheric to as low as 10^{-11} Pa", since this document deals with industrial standards.

— Clause 3: "knife-edge style flange" has changed to "knife-edge flange".

— Clause 4: "l_8 – depth of pipe connection" has changed to "l_8 – setback for inner rotatable ring".

— Clause 4: "l_{11} – outside diameter of metal gasket" has changed to "l_{10} – outside diameter of metal gasket".

— Clause 4: units of l_2, l_3, l_4, l_5, l_6, l_7, l_8, l_9 and l_{10} are now in mm, rather than mm (in), since inch values are not given in Table 1.

— Table 1: effectual values of l_4, l_5, l_6, l_7 and l_8 have changed from XX.X0 to XX.X, after considering their tolerance, 0.1.

— Table 1: footnote added for the most commonly used flanges (16, 40, 63, 100, 160, 200 and 250CF).

— Table 1: l_1, Nominal outside diameter of 400CF has changed from 16,5 to 18,5.

Introduction

This document is the conversion of ISO/TS 3669-2:2007 and contains significant technical changes from the first edition (ISO 3669:1986), which defined two series of "bakeable" flanges:

— as a preferred series, the main dimensions of which ensure compatibility with already standardized non-bakeable flanges (see ISO 1609);

— a secondary series corresponding to flanges in common use.

This document 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 to be 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.

It is noted, however, that the original ConFlat® flange dimensions and tolerances, as developed by Varian, were not available during the development stage of this specification. The intent of this document is to ensure interchangeability of flanges. It is reasonable to accept that flanges manufactured to the original Varian specifications are compatible with flanges manufactured according to this ISO standard, even though they might not fall within all tolerances.

Vacuum technology — Bakeable flanges — Dimensions of knife-edge flanges

1 Scope

This document specifies the dimensions of fixed or rotatable bolted knife-edge flanges used in vacuum systems for pressures ranging from atmospheric to as low as 10^{-11} Pa.

2 Normative references

There are no normative references in this document.

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:

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

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

3.1
knife-edge flange
metal sealed flange used for high and ultra-high vacuum service

Note 1 to entry: Sandwiching one metal gasket between two knife-edge flanges and securely bolting these together makes a vacuum tight joint. The seal is made when the identical circular (triangular profile) knife-edges are bolted together. A deformable metal gasket captured between the knife-edge flanges establishes the sealing surface.

Note 2 to entry: 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 document.

3.2
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 1 to entry: See Table 1, in which the convention of identifying original flanges by the outside diameter of the flange (historically in inches) has been maintained.

3.3
leak check groove
groove machined into the seal side of the flange to facilitate the free passage of trace 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 the Varian corporation. This information is given for the convenience of users of this document 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.

4 Symbols and abbreviated terms

Symbol	Designation	Unit
l_1	nominal outside diameter of flange	mm (in)
l_2	max. tube	mm
l_3	bolt hole	mm
l_4	bolt circle	mm
φ	position tolerance of bolt hole centre	mm
l_5	seal recess	mm
l_6	knife-edge	mm
l_7	thickness of inner rotatable ring	mm
l_8	setback for inner rotatable ring	mm
l_9	flange thickness	mm
l_{10}	outside diameter of metal gasket	mm

5 Requirements

5.1 Materials

5.1.1 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 document to specify or limit the choice of flange material to austenitic stainless steel.

5.1.2 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 document (see Table 1)

5.1.3 Grooves

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

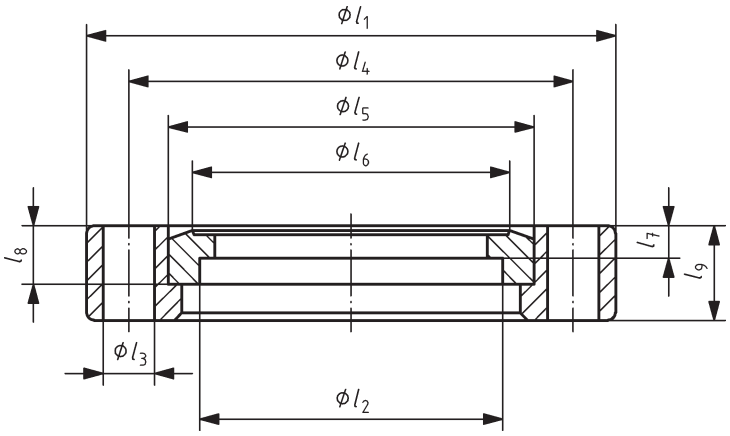
5.1.4 Gasket

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

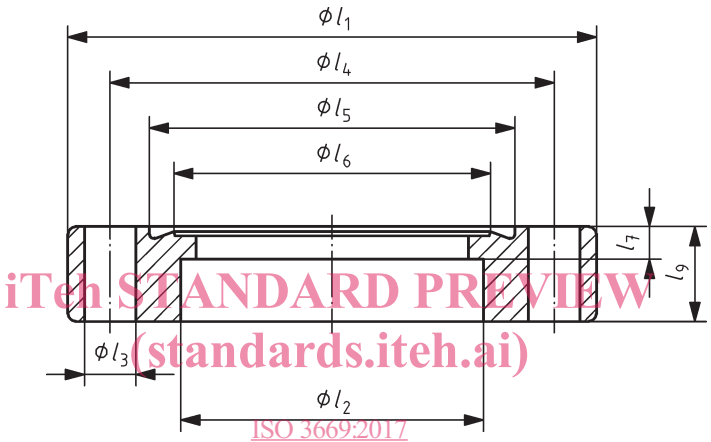
NOTE Oxygen-free high conductivity (OFHC) copper is commonly used, but it is not the intent of this document to specify or limit the choice of gasket material to OFHC copper.

5.2 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

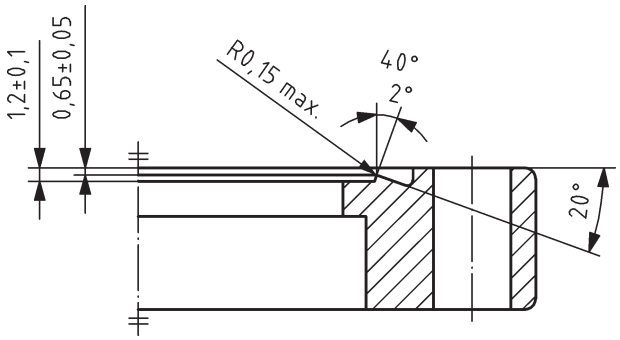


Figure 2 — Knife-edge detail

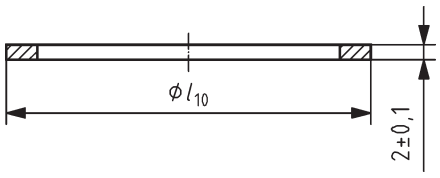


Figure 3 — Metal gasket