Designation: E2734/E2734M – 10

Standard Specification for Dimensions of Knife-Edge Flanges[1]

This standard is issued under the fixed designation E2734/E2734M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This standard specifies the dimensions of knife-edge style flanges and their associated gaskets used in vacuum systems for pressures ranging from 10^5 Pa to 10^{-11} Pa. Such flanges are widely used throughout vacuum technology applications in semiconductor processing tools, surface analysis systems, space simulation systems, and general research requiring vacuum.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E673 Terminology Relating to Surface Analysis (Withdrawn 2012)[3]

2.2 *Other Standards:*[4]

ISO 4288:1996 Geometrical Product Specifications (GPS)—Surface Texture: Profile Method—Rules and Procedures for the Assessment of Surface Texture

3. Terminology

3.1 *Definitions*— For definitions used in this specification, see Terminology E673.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *knife-edge flange, n*—Vacuum flanges seal with a metal gasket; two mating surfaces with identical circular (triangular profile) knife-edges are bolted together; a deformable metal gasket, captured between the knife-edges provides a leak-free seal.

3.2.1.1 *Discussion*—Vacuum flanges that seal with a metal gasket were originally developed as Conflat flanges (trademark) by the Varian Corporation.

3.2.2 *type, n*—Knife-edge flanges come in a variety of sizes; historically, the flange sizes were identified in North America as the flange's outside diameter (in inches) and in Europe as the maximum nominal bore of the tube (in millimetres) that might be welded to the flange; for this specification, the flange identification "type" is used where the type is approximately equal to the flange's outside diameter in inches.

4. Materials and Manufacture

4.1 *Flange*—Flanges must be manufactured from a sufficiently hard or hard-coated material to resist deformation of the knife-edge profile despite repeatedly forming a vacuum seal with metal gaskets.

4.2 *Gasket*—Gasket must be manufactured from a soft, annealed, or partially-tempered metal such that the mating flanges' knife-edges cause sufficient (initial) plastic deformation that a vacuum seal is accomplished.

5. Dimensions, Mass, and Permissible Variations

5.1 Figs. 1-3 and Tables 1 and 2 contain the required dimensions and tolerances for rotatable and non-rotatable knife-edge vacuum flanges.

6. Workmanship, Finish, and Appearance

6.1 Knife-edge vacuum flanges are typically used in applications which require: (*1*) a high degree of leak integrity, and (*2*) the lowest possible contamination from outgassing. To achieve both characteristics, the finish of the flanges' knife-edges and gaskets must be free of visible cracks, pits, inclusions, scratches, and foreign materials. The knife-edge

[1] This specification is under the jurisdiction of ASTM Committee E42 on Surface Analysis and is the direct responsibility of Subcommittee E42.13 on Vacuum Technology.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, http://www.iso.ch.