



Designation: E1603/E1603M – 11 (Reapproved 2017)

Standard Practice for Leakage Measurement Using the Mass Spectrometer Leak Detector or Residual Gas Analyzer in the Hood Mode¹

This standard is issued under the fixed designation E1603/E1603M; 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 practice covers procedures for testing the sources of gas leaking at the rate of 1×10^{-8} Pa m³/s (1×10^{-9} standard-cm³/s at 0°C) or greater. These test methods may be conducted on any object that can be evacuated and to the other side of which helium or other tracer gas may be applied. The object must be structurally capable of being evacuated to pressures of 0.1 Pa (approximately 10^{-3} torr).

1.2 Three test methods are described;

1.2.1 *Test Method A*—For the object under test capable of being evacuated, but having no inherent pumping capability.

1.2.2 *Test Method B*—For the object under test with integral pumping capability.

1.2.3 *Test Method C*—For the object under test as in Test Method B, in which the vacuum pumps of the object under test replace those normally used in the leak detector (LD).

1.3 *Units*—The values stated in either SI or std-cc/sec 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.

1.4 *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.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This practice is under the jurisdiction of ASTM Committee E07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.08 on Leak Testing Method.

Current edition approved June 1, 2017. Published July 2017. Originally approved in 1994. Last previous edition approved in 2011 as E1603 - 11. DOI: 10.1520/E1603_E1603M-11R17.

2. Referenced Documents

2.1 *ASTM Standards*:²

E1316 Terminology for Nondestructive Examinations

2.2 *ASNT Standards*:³

SNT-TC-1A Recommended Practice for Personnel Qualification and Certification in Nondestructive Testing
ANSI/ASNT-CP-189 Standard for Qualification and Certification of Nondestructive Testing Personnel

2.3 *Military Standard*:

MIL-STD-410 Nondestructive Testing Personnel Qualification and Certification⁴

2.4 *AIA Standard*:

NAS-410 Certification and Qualification of Nondestructive Test Personnel⁵

3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, see Terminology E1316.

4. Summary of Practice

4.1 These test methods covered in this practice require a helium LD that can provide a system sensitivity of 10 % or less of the intended leakage rate to be measured.

4.2 *Test Method A*—This test method is used to helium leak test objects that are capable of being evacuated to a reasonable test pressure by the LD pumps during an acceptable length of time (see Fig. 1). This requires that the object be clean and dry. Auxiliary vacuum pumps having greater capacity than those in the LD may be used in conjunction with them. The leak test sensitivity will be reduced under these conditions.

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 Available from American Society for Nondestructive Testing (ASNT), P.O. Box 28518, 1711 Arlingate Ln., Columbus, OH 43228-0518, <http://www.asnt.org>.

⁴ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://dodssp.daps.dla.mil>.

⁵ Available from Aerospace Industries Association of America, Inc. (AIA), 1000 Wilson Blvd., Suite 1700, Arlington, VA 22209-3928, <http://www.aia-aerospace.org>.