Designation: E1003 – 13

Standard Practice for Hydrostatic Leak Testing[1]

This standard is issued under the fixed designation E1003; 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 the testing of components for leaks by pressurizing them inside with a liquid.

1.2 This practice can be used on piping, valves, and containers with welded or fitted sections which can be sealed at their ends and which are designed for internal pressure.

1.3 Basic procedures are described based on the type of inspection used. These procedures should be limited to finding leakage indications of 4.5×10^{-9} mol/s (1×10^{-4} Std cm^3/s)[2] or larger.

1.4 *Units*—The values stated in SI units are to be regarded as standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered standard.

1.5 *This standard does not purport to address 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:*[3]

E543 Specification for Agencies Performing Nondestructive Testing

E1316 Terminology for Nondestructive Examinations

2.2 *ASNT Documents:*[4]

SNT-TC-1A Recommended Practice for Personal Qualification and Certification in Nondestructive Testing

ANSI/ASNT CP-189 ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel[4]

2.3 *AIA Standard:*[5]

NAS-410 Certification and Qualification of Nondestructive Test Personnel

3. Terminology

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

4. Summary of Practice

4.1 Hydrostatic testing requires that a component be completely filled with a liquid, such as water. Pressure is slowly applied to the liquid until the required pressure is reached. This pressure is held for the required time at which point the component is inspected visually to locate leaks or the pressure on the gauge is recorded to determine the components total leakage.

4.2 The two basic procedures are described together with methods for improving their sensitivity.

4.2.1 *Pressure Drop Indication*—This procedure is used primarily to measure total system leakage.

4.2.2 *Visual Inspection for Leakage*— This procedure is intended primarily to locate leaks.

4.3 Ultrasonic pretesting for gross leaks is described.

5. Basis of Application

5.1 The following items are subject to contractual agreement between the parties using or referencing this practice:

5.2 *Personnel Qualification*

5.2.1 If specified in the contractual agreement. Personnel performing examinations to this practice shall be qualified in accordance with a nationally or internationally recognized NDT personnel qualification practice or standard such as ANSI/ASNT CP-189, SNT-TC-1A, NAS-410, or similar document and certified by the employer or certifying agency, as applicable. The practice or standard used and its applicable revision shall be identified in the contractual agreement.

5.3 *Qualification of Nondestructive Agencies*—If specified in the contractual agreement, NDT agencies shall be qualified

[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.

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[2] The gas temperature is referenced to 0°C. To convert to another gas reference temperature, T_{ref}, multiply the leak rate by $(T_{ref} + 273)/273$.

[3] 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.

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

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