



Designation: E 1003 – 95 (Reapproved 2000)

Standard Test Method for Hydrostatic Leak Testing¹

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1. Scope

1.1 This test method covers the testing of components for leaks by pressurizing them inside with a liquid.

1.2 This test method 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 cm³/s)² or larger.

1.4 The values stated in SI units are to be regarded as the 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:*

E 1316 Terminology for Nondestructive Examinations³

2.2 *Other Documents:*

SNT-TC-1A Recommended Practice for Personal Qualification and Certification in Nondestructive Testing⁴

ANSI/ASNT CP-189 ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel⁴

3. Terminology

3.1 *Definitions*—For definitions of terms used in this standard, see Terminology E 1316 Section E.

4. Summary of Test Method

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 gage 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. Personnel Qualification

5.1 It is recommended that personnel performing leak testing attend a dedicated training course on the subject and pass a written examination. The training course should be appropriate for NDT level II qualification according to Recommended Practice No. SNT-TC-1A of the American Society for Nondestructive Testing or ANSI/ASNT Standard CP-189.

6. Significance and Use

6.1 This test method is useful for quality control testing and field inspection of piping systems, pipelines, valves, and containers that are expected to retain liquids. It is not sensitive enough for leak testing when toxic or explosive gas is expected to be retained under pressure.

7. Interferences

7.1 The interior and exterior welds and joints where leaks are often found must be free of oil, grease, flux, slag, or other contaminants that might temporarily block or mask leakage. New systems should be tested prior to painting, where practical.

7.2 Hydrostatic testing should not be performed before a leak test using air or a tracer gas. The liquid test media may clog small leaks causing later tests to be inaccurate.

7.3 Test liquid must be equal or above atmosphere temperature or droplets will form on the outside. The minimum temperature of the liquid should be 16°C (61°F).

¹ This test method is under the jurisdiction of ASTM Committee E-7 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.08 on Leak Testing.

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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 *Annual Book of ASTM Standards*, Vol 03.03.

⁴ Available from American Society for Nondestructive Testing, 1711 Arlinggate Plaza, P.O. Box 28518, Columbus, OH 43228-0518.