



Standard Practice for Hydrostatic Leak Testing¹

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 cm³/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 Personnel Qualification and Certification in Nondestructive Testing

ANSI/ASNT CP-189 ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel⁵

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 Methods.

Current edition approved Jan. 15, 2013. Published January 2013. Originally approved in 1984. Last previous edition approved in 2005 as E1003 – 05. DOI: 10.1520/E1003-13.

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 28588, 1711 Arlington Ln., Columbus, OH 43228-0588, <http://www.asnt.org>.

2.3 *ALA 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

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

Astm E1003 13 Standard Practice For Hydrostatic Leak Testing

Brendan G. Carr



Astm E1003 13 Standard Practice For Hydrostatic Leak Testing:

Heat Exchangers Kuppam Thulukkanam, 2024-02-29 Heat Exchangers Mechanical Design Materials Selection Nondestructive Testing and Manufacturing Methods Third Edition covers mechanical design of pressure vessels and shell and tube heat exchangers including bolted flange joint design as well as selection of a wide spectrum of materials for heat exchanger construction their physical properties corrosion behavior and fabrication methods like welding Discussing the basics of quality control the book includes ISO Standards for QMS and references modern quality concepts such as Kaizen TPM and TQM It presents Six Sigma and Lean tools for heat exchangers manufacturing industries The book explores heat exchanger manufacturing methods such as fabrication of shell and tube heat exchangers and brazing and soldering of compact heat exchangers The book serves as a useful reference for researchers graduate students and engineers in the field of heat exchanger design including pressure vessel manufacturers

Standard Practice for Hydrostatic Leak Testing , *Annual Book of ASTM Standards* ASTM International, American Society for Testing and Materials, 2004 **Annual Book of ASTM Standards** American Society for Testing and Materials, 2007 **Index and Directory of U.S. Industry Standards** , 1987 ASTM Standardization News American Society for Testing and Materials, 1996 **Standard Test Method for Hydrostatic Leak Testing** , **Standard Practice for Field Leak Testing of Polyethylene PE Pressure Piping Systems Using Gaseous Media Under Pressure Pneumatic Leak Testing** , Standard Practice for Field Leak Testing of Polyamide-12 PA12 Pressure Piping Systems Using Gaseous Testing Media Under Pressure Pneumatic Leak Testing , **Standard Guide for Selection of a Leak Testing Method** ASTM Subcommittee E07.08 on Leak Testing Method, 2011 Standard Practice for Leaks Using the Mass Spectrometer Leak Detector in the Inside-Out Testing Mode , **Standard Guide for Preparation of a Leak Testing Specification** , **Hydro Testing Handbook: Principles, Practices, Applications, Formulas, and Common Q&A** Chetan Singh, The Hydro Testing Handbook is an essential guide for anyone involved in the hydrostatic testing of pressure systems This comprehensive book covers all aspects of the hydrostatic testing process including principles practices applications formulas and common Q A The Hydrostatic test book provides a detailed explanation of the hydro testing process outlining the steps involved in planning preparation and execution as well as the interpretation of results It also covers the best practices to ensure that hydro testing is carried out safely and effectively Readers will learn how to determine critical parameters such as test pressure hold times and test volumes using the formulas and calculations provided in the book This information is essential to the accurate and successful execution of hydro testing The handbook also includes a comprehensive list of common Q A addressing frequently asked questions and common challenges that may arise during the testing process This section is particularly useful for those new to hydro testing or for those who need a quick reference guide to common issues Overall the Hydro Testing Handbook is an indispensable resource for anyone involved in hydrostatic testing of pressure systems from novice to experienced

professionals Code of Practice for the Release of Hydrostatic Test Water from Hydrostatic Testing of Petroleum Liquid and Gas Pipelines Alberta. Alberta Environmental Protection, Alberta, 1998* *Standard Guide for Selection of a Leak Testing Method* ASTM Subcommittee E07.08 on Leak Testing Method, 2011 *Standard Practice for Testing for Leaks Using the Halogen Leak Detector Alkali-Ion Diode* , Standard Test Method for Pneumatic Leak Testing of Tubing ,
 ASTM F2971 - 13 Standard Practice for Reporting Data for Test Specimens Prepared by Additive Manufacturing American Society for Testing and Materials (Philadelphia, Pennsylvania), 2013 **Standard Guide for Preparation of a Leak Testing Specification Withdrawn 2014** , Standard Practice for Testing for Leaks Using the Halogen Leak Detector Alkali-Ion Diode Withdrawn 2013 ,

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