



Standard Practice for Testing for Leaks Using the Halogen Leak Detector (Alkali-Ion Diode)¹

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1. Scope

1.1 This practice covers procedures for testing and locating the sources of gas leaking at the rate of 2.2×10^{-14} mol/s (5×10^{-10} Std cm³/s).² The test may be conducted on any device or component across which a pressure differential of halogen tracer gas may be created, and on which the effluent side of the area to be leak tested is accessible for probing with the halogen leak detector.

1.2 Five methods are described:

1.2.1 *Method A*—Direct probing with no significant halogen contamination in the atmosphere.

1.2.2 *Method B*—Direct probing with significant halogen contamination in the atmosphere.

1.2.3 *Method C*—Shroud test.

1.2.4 *Method D*—Air-curtain shroud test.

1.2.5 *Method E*—Accumulation test.

1.3 The values stated in inch-pound units are to be regarded as the standard. The metric equivalents of inch-pound units may be approximate.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*

E 1316 Terminology for Nondestructive Examinations³

2.2 *Other Documents:*

ASNT “Leak Testing Handbook” Volume One of “Nondestructive Testing Handbook”⁴

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

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 *Annual Book of ASTM Standards*, Vol 03.03.

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

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 Practice

4.1 Section 1.8 of NASA’s *Leakage Testing Handbook*⁵ will be of value to some users in determining which leak test method to use. Section 11 of the *ASNT Testing Handbook* may also be of value.

4.2 These methods require halogen leak detection equipment with a full-scale readout of at least 1.3×10^{-13} mol/s (3×10^{-10} Std cm³/s)² on the most sensitive range, a maximum 1 min drift of 0 and sensitivity drift of ± 15 percent of full scale on this range, and ± 5 percent or less on others (see 8.1.5).

4.3 Method A (Fig. 1) is the simplest test, requiring only that a halogen tracer-gas pressure be created across the area to be tested, and the searching of the atmospheric side of the area with the detector probe. This method detects leakage and locates its source or sources, when used in a test area free from significant halogen contamination in the atmosphere (see 7.1). Experience has shown that leak detection down to 4.5×10^{-10} mol/s (1×10^{-5} Std cm³/s)² in factory environments will usually be satisfactory if reasonable precautions are taken against releasing halogens in the building. If a test booth is constructed so as to be purged with clean outdoor air, this level may be reduced to 4.5×10^{-12} mol/s (1×10^{-7} Std cm³/s).² Testing down to 4.5×10^{-13} mol/s (1×10^{-9} Std cm³/s)² will require additional halogen removal. This can be accomplished by passing the test-booth purge air through a bed of activated charcoal.

4.4 Method B (Fig. 2) is essentially the same as Method A, except that the amount of air drawn by the probe from the test area is reduced, and the required sample flow is made up with pure (that is, zero-halogen) air. This reduced sample intake has the disadvantage of reducing the vacuum-cleaner effect of the

⁵ Marr, J. William, *Leakage Testing Handbook*, prepared for Liquid Propulsion Section, Jet Propulsion Laboratory, National Aeronautics and Space Administration, Pasadena, CA, Contract NAS 7-396, June 1967.