



Standard Practice for Acoustic Emission Examination of Welded Steel Sphere Pressure Vessels Using Thermal Pressurization¹

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1. Scope*

1.1 This practice is commonly used for periodic inspection and testing of welded steel gaseous spheres (bottles) is the acoustic emission (AE) method. AE is used in place of hydrostatic volumetric expansion testing. The periodic inspection and testing of bottles by AE testing is achieved without depressurization or contamination as is required for hydrostatic volumetric expansion testing.

1.2 The required test pressurization is achieved by heating the bottle in an industrial oven designed for this purpose. The maximum temperature needed to achieve the AE test pressure is $\leq 250^{\circ}\text{F}$ (121°C).

1.3 AE monitoring of the bottle is performed with multiple sensors during the thermal pressurization.

1.4 This practice was developed for periodic inspection and testing of pressure vessels containing Halon (UN 1044), which is commonly used aboard commercial aircraft for fire suppression. In commercial aircraft, these bottles are hermetically sealed by welding in the fill port. Exit ports are opened by explosively activated burst disks. The usage of these pressure vessels in transportation is regulated under US Department of Transportation (DOT), Code of Federal Regulations CFR 49. A DOT special permit authorizes the use of AE testing for periodic inspection and testing in place of volumetric expansion and visual inspection. These bottles are spherical with diameters ranging from 5 to 16 in. (127 to 406 mm).

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

1.6 *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 applica-*

bility of regulatory limitations prior to use. Specific precautionary statements are given in Section 8.

2. Referenced Documents

2.1 ASTM Standards:²

E543 Specification for Agencies Performing Nondestructive Testing

E650 Guide for Mounting Piezoelectric Acoustic Emission Sensors

E976 Guide for Determining the Reproducibility of Acoustic Emission Sensor Response

E1316 Terminology for Nondestructive Examinations

E2075 Practice for Verifying the Consistency of AE-Sensor Response Using an Acrylic Rod

E2374 Guide for Acoustic Emission System Performance Verification

2.2 ASNT Standards:³

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

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

2.3 Code of Federal Regulations:

Section 49 Code of Federal Regulations, Hazardous Materials Regulations of the Department of Transportation, Paragraphs 173.34, 173.301, 178.36, 178.37, and 178.45⁴

2.4 Compressed Gas Association Standard:

Pamphlet C-5 Service Life, Seamless High Pressure Cylinders⁵

3. Terminology

3.1 *Definitions*—See Terminology E1316 for general terminology applicable to this test method.

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 Arlington Ln., Columbus, OH 43228-0518, <http://www.asnt.org>.

⁴ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.

⁵ Available from Compressed Gas Association (CGA), 4221 Walney Rd., 5th Floor, Chantilly, VA 20151-2923, <http://www.cganet.com>.

¹ This practice is under the jurisdiction of ASTM Committee E07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.04 on Acoustic Emission Method.

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