



Standard Practice for Examination of Gas-Filled Filament-Wound Composite Pressure Vessels Using Acoustic Emission¹

This standard is issued under the fixed designation E2191/E2191M; 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 provides guidelines for acoustic emission (AE) examination of filament-wound composite pressure vessels, for example, the type used for fuel tanks in vehicles which use natural gas fuel.

1.2 This practice requires pressurization to a level equal to or greater than what is encountered in normal use. The tanks' pressurization history must be known in order to use this practice. Pressurization medium may be gas or liquid.

1.3 This practice is limited to vessels designed for less than 275 bar [4,000 psi] maximum allowable working pressure and water volume less than 1 m³ or 1000 L [35.4 ft³].

1.4 AE measurements are used to detect emission sources. Other nondestructive examination (NDE) methods may be used to gain additional insight into the emission source. Procedures for other NDE methods are beyond the scope of this practice.

1.5 This practice applies to examination of new and in-service, Type II, filament-wound composite pressure vessels.

1.6 This practice applies to examinations conducted at ambient temperatures above 20°C [70°F]. This practice may be used at ambient temperatures below 20°C [70°F] if provision has been made to fill to the tank's rated pressure at 20°C [70°F]. Also that the test temperature must not exceed the glass transition temperature of the matrix material.

1.7 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.8 *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. 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

E2374 Guide for Acoustic Emission System Performance Verification

2.2 Natural Gas Vehicle Standard:³

American National Standard for Basic Requirements for Compressed Natural Gas Vehicle (NGV) Fuel Containers ANSI/AGA/NGV2

2.3 Compressed Gas Association Standard:⁴

Pamphlet C-6.4, Methods for Visual Inspection of AGA NGV2 Containers

2.4 U.S. Department of Transportation Reference:⁵

NHTSA Federal Motor Vehicle Safety Standard No. 304, March 27, 1995

2.5 ASNT Standards:⁶

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

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

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.

Current edition approved Feb. 1, 2016. Published February 2016. Originally approved in 2002. Last previous edition approved in 2010 as E2191 - 10. DOI: 10.1520/E2191_E2191M-16.

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 National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from Compressed Gas Association (CGA), 4221 Walney Rd., 5th Floor, Chantilly, VA 20151-2923, <http://www.cganet.com>.

⁵ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://www.dodssp.daps.mil>.

⁶ Available from American Society for Nondestructive Testing (ASNT), P.O. Box 28518, 1711 Arlingate Ln., Columbus, OH 43228-0518, <http://www.asnt.org>.