



Standard Practice for Acoustic Emission Examination of Plate-like and Flat Panel Composite Structures Used in Aerospace Applications¹

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1. Scope*

1.1 This practice covers acoustic emission (AE) examination or monitoring of panel and plate-like composite structures made entirely of fiber/polymer composites.

1.2 The AE examination detects emission sources and locates the region(s) within the composite structure where the emission originated. When properly developed AE-based criteria for the composite item are in place, the AE data can be used for nondestructive examination (NDE), characterization of proof testing, documentation of quality control or for decisions relative to structural-test termination prior to completion of a planned test. Other NDE methods may be used to provide additional information about located damage regions. For additional information see X1.1 in [Appendix X1](#).

1.3 This practice can be applied to aerospace composite panels and plate-like elements as a part of incoming inspection, during manufacturing, after assembly, continuously (during structural health monitoring) and at periodic intervals during the life of a structure.

1.4 This practice is meant for fiber orientations that include cross-ply, angle-ply laminates or two-dimensional woven fabrics. This practice also applies to 3-D reinforcement (for example, stitched, z-pinned) when the fiber content in the third direction is less than 5 % (based on the whole composite).

1.5 This practice is directed toward composite materials that typically contain continuous high modulus greater than 20 GPa [3 Msi] fibers.

1.6 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 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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1.7 *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:²

E543 Specification for Agencies Performing Nondestructive Testing

E976 Guide for Determining the Reproducibility of Acoustic Emission Sensor Response

E1067 Practice for Acoustic Emission Examination of Fiber-glass Reinforced Plastic Resin (FRP) Tanks/Vessels

E1106 Test Method for Primary Calibration of Acoustic Emission Sensors

E1316 Terminology for Nondestructive Examinations

E1781 Practice for Secondary Calibration of Acoustic Emission Sensors

E2533 Guide for Nondestructive Testing of Polymer Matrix Composites Used in Aerospace Applications

2.2 Other Documents:

ANSI/ASNT CP-189 ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel³

ISO 9712 Non-destructive Testing—Qualification and Certification of NDT Personnel⁴

NAS-410 NAS Certification and Qualification of Nondestructive Personnel (Quality Assurance Committee)⁵

SNT-TC-1A Recommended for Personnel Qualification and Certification of Nondestructive Testing Personnel³

3. Terminology

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

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 International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.

⁵ Available from Aerospace Industries Association of America, Inc., 1250 Eye St., NW, Washington, DC 20005.

*A Summary of Changes section appears at the end of this standard