



Standard Practice for Shearography of Polymer Matrix Composites and Sandwich Core Materials in Aerospace Applications¹

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This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This practice describes procedures for shearography of polymer matrix composites and sandwich core materials made entirely or in part from fiber-reinforced polymer matrix composites. The composite materials under consideration typically contain continuous high modulus (greater than 20 GPa (3×10⁶ psi)) fibers, but may also contain discontinuous fiber, fabric, or particulate reinforcement.

1.2 This practice describes established shearography procedures that are currently used by industry and federal agencies that have demonstrated utility in quality assurance of polymer matrix composites and sandwich core materials during product process design and optimization, manufacturing process control, after manufacture inspection, and in service inspection.

1.3 This practice has utility for testing of polymer matrix composites and sandwich core materials containing but not limited to bismaleimide, epoxy, phenolic, poly(amideimide), polybenzimidazole, polyester (thermosetting and thermoplastic), poly(ether ether ketone), poly(ether imide), polyimide (thermosetting and thermoplastic), poly(phenylene sulfide), or polysulfone matrices; and alumina, aramid, boron, carbon, glass, quartz, or silicon carbide fibers. Typical as-fabricated geometries include uniaxial, cross-ply and angle-ply laminates; as well as honeycomb and foam core sandwich materials and structures.

1.4 This practice does not specify accept-reject criteria and is not intended to be used as a means for approving polymer matrix composites or sandwich core materials for service.

1.5 To ensure proper use of the referenced standards, there are recognized nondestructive testing (NDT) specialists that are certified according to industry and company NDT specifications. It is recommended that an NDT specialist be a part of

any composite component design, quality assurance, in-service maintenance, or damage examination activity.

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 applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:²

C274 Terminology of Structural Sandwich Constructions

D3878 Terminology for Composite Materials

D5687/D5687M Guide for Preparation of Flat Composite Panels with Processing Guidelines for Specimen Preparation

E543 Specification for Agencies Performing Nondestructive Testing

E1309 Guide for Identification of Fiber-Reinforced Polymer-Matrix Composite Materials in Databases

E1316 Terminology for Nondestructive Examinations

E1434 Guide for Recording Mechanical Test Data of Fiber-Reinforced Composite Materials in Databases

E1471 Guide for Identification of Fibers, Fillers, and Core Materials in Computerized Material Property Databases

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

E2982 Guide for Nondestructive Testing of Thin-Walled Metallic Liners in Filament-Wound Pressure Vessels Used in Aerospace Applications

F1364 Practice for Use of a Calibration Device to Demonstrate the Inspection Capability of an Interferometric Laser Imaging Nondestructive Tire Inspection System

2.2 ASNT Standards:³

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

¹ This practice is under the jurisdiction of ASTM Committee E07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.10 on Specialized NDT Methods.

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