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Standard Guide for Acoustic Emission Examination of Small Parts¹

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1. Scope

1.1 This guide covers techniques for conducting acoustic emission (AE) examinations of small parts. It is confined to examination objects (or defined regions of larger objects) where there is low AE signal attenuation throughout the examination region. This eliminates the consideration of complex attenuation factor corrections and multiple sensor and array placements based on overcoming signal losses over distances.

1.2 The guide assumes a typical AE examination as one where there is a controlled or measured stress acting upon the part being monitored by AE. Particular emphasis is placed on

sensor and system selection, sensor placements, stressing considerations, noise reduction/rejection techniques, spatial filtering, location determination, use of guard sensors, collection of AE data, AE data analysis and report. The purpose of the AE examination is to analyze how an object under evaluation is withstanding the applied load.

1.3 Possible applications of this guide includes materials characterization, quality control of production processes, proof testing after fabrication, evaluating regions of interest of larger structures and retesting after intervals of service. The applied load may include mechanical forces (tension, compression or torsional) internal pressure and thermal gradients.

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.*

¹ This guide 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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2. Referenced Documents

2.1 *ASTM Standards*:²

E650 Guide for Mounting Piezoelectric Acoustic Emission Sensors

E750 Practice for Characterizing Acoustic Emission Instrumentation

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 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. Terminology

3.1 *Definitions*:

3.1.1 Terminology related to acoustic emission is defined in Terminology **E1316**.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *applied load*—a controlled or known force or stress which is applied to an object under examination for the purpose of analyzing the object's reaction (by means of AE monitoring) to that stress.

3.2.2 *guard sensors*—sensors whose primary function is the elimination of extraneous noise based on arrival sequences.

3.2.3 *spatial discrimination*—the process of using one or more (guard and data) sensors to eliminate extraneous noise based on arrival sequences.

3.2.4 *spatial filtering*—ability of an AE system or analysis to disregard AE activity based on source location of the AE event.