Designation: E650 – 97 (Reapproved 2007)

# Standard Guide for Mounting Piezoelectric Acoustic Emission Sensors[1]

This standard is issued under the fixed designation E650; 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 document provides guidelines for mounting piezoelectric acoustic emission (AE) sensors.

1.2 *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]

E976 Guide for Determining the Reproducibility of Acoustic Emission Sensor Response

E1316 Terminology for Nondestructive Examinations

## 3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *bonding agent*—a couplant that physically attaches the sensor to the structure.

3.1.2 *couplant*—a material used at the structure-to-sensor interface to improve the transfer of acoustic energy across the interface.

3.1.3 *mounting fixture*—a device that holds the sensor in place on the structure to be monitored.

3.1.4 *sensor*—a detection device that transforms the particle motion produced by an elastic wave into an electrical signal.

3.1.5 *waveguide, acoustic*—a device that couples acoustic energy from a structure to a remotely mounted sensor. For example, a solid wire or rod, coupled to a sensor at one end and to the structure at the other.

3.2 *Definitions:*

3.2.1 For definitions of additional terms relating to acoustic emission, refer to Terminology E1316.

## 4. Significance and Use

4.1 The methods and procedures used in mounting AE sensors can have significant effects upon the performance of those sensors. Optimum and reproducible detection of AE requires both appropriate sensor-mounting fixtures and consistent sensor-mounting procedures.

## 5. Mounting Methods

5.1 The purpose of the mounting method is to hold the sensor in a fixed position on a structure and to ensure that the acoustic coupling between the sensor and the structure is both adequate and constant. Mounting methods will generally fall into one of the following categories:

5.1.1 *Compression Mounts*—The compression mount holds the sensor in intimate contact with the surface of the structure through the use of force. This force is generally supplied by springs, torqued-screw threads, magnets, tape, or elastic bands. The use of a couplant is strongly advised with a compression mount to maximize the transmission of acoustic energy through the sensor-structure interface.

5.1.2 *Bonding*—The sensor may be attached directly to the structure with a suitable adhesive. In this method, the adhesive acts as the couplant. The adhesive must be compatible with the structure, the sensor, the environment, and the examination procedure.

## 6. Mounting Requirements

6.1 *Sensor Selection*—The correct sensors should be chosen to optimally accomplish the acoustic-emission examination objective. Sensor parameters to be considered are as follows: size, sensitivity, frequency response, surface-motion response, and environmental and material compatibility. When a multichannel acoustic-emission examination is being conducted, a subset of sensors with characteristics similar to each other should be selected. See Guide E976 for methods of comparing sensor characteristics.

6.2 *Structure Preparation*—The contacting surfaces should be cleaned and mechanically prepared. This will enhance the detection of the desired acoustic waves by assuring reliable coupling of the acoustic energy from the structure to the sensor. Preparation of these surfaces must be compatible with the construction materials used in both the sensor and the structure. Possible losses in acoustic energy transmission caused by

[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.

Current edition approved July 1, 2007. Published July 2007. Originally approved in 1985. Last previous edition approved in 2002 as E650 - 97(2002)ε1. DOI: 10.1520/E0650-97R07.

[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.