



Standard Practice for Verifying the Consistency of AE-Sensor Response Using an Acrylic Rod¹

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1. Scope

1.1 This practice is recommended for routinely checking the sensitivity of acoustic emission (AE) sensors. It is intended to provide a reliable, precisely specified way of comparing a set of sensors, or telling whether an individual sensor's sensitivity is degrading during its service life, or both.

1.2 This procedure is not a "calibration" nor does it give frequency response information. It is simply a way of verifying consistency of sensor peak amplitude response.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are provided for information only.

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.*

2. Referenced Documents

2.1 ASTM Standards:

E 650 Guide for Mounting Piezoelectric Acoustic Emission Sensors²

E 750 Practice for Characterizing Acoustic Emission Instrumentation²

E 976 Guide for Determining the Reproducibility of Acoustic Emission Sensor Response²

3. Significance and Use

3.1 Degradation in sensor performance can occur due to dropping, mechanical shock while mounted on the test structure, temperature cycles, etc. It is necessary and desirable to have a simple measurement procedure that will check the

consistency of sensor response, over time or within a batch, while holding all other variables constant.

3.2 While test blocks of many different kinds have been used for this purpose for many years, an acrylic polymer rod offers the best all-round combination of suitable acoustic properties, practical convenience, ease of procurement and low cost.

3.3 Because the acoustic properties of the acrylic rod are known to depend on temperature, this standard practice requires that the rod, sensors, and couplant be stabilized at the same working temperature, prior to application of the practice.

3.4 Attention should be paid to storage conditions for the acrylic polymer rod. For example, it should not be left in a freezing or hot environment overnight, unless it is given time for temperature stabilization before use.

3.5 Properly applied and with proper record keeping, this procedure can be used in many ways. The user organization must determine the context for its use, the acceptance standards and the actions to be taken based on the lead break results. The following uses are suggested:

3.5.1 To determine when a sensor is no longer suitable for use;

3.5.2 To check sensors that have been exposed to high-risk conditions, such as dropping, overheating, etc;

3.5.3 To get an early warning of sensor degradation with time. This can lead to identifying conditions of use which are damaging sensors, and thus, to better equipment care and lower replacement costs;

3.5.4 To obtain matched sets of sensors, preamplifiers, or instrumentation channels for more uniform performance of the total system, or a combination thereof;

3.5.5 To save time and money, by eliminating the installation of bad sensors; and,

3.5.6 To verify sensors quickly but consistently in the field and to assist trouble-shooting when a channel does not pass a performance check.

3.6 All the above uses are recommended for consideration. The purpose of this practice is not to call out how these uses are

¹ This practice is under the jurisdiction of ASTM Committee E-07 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.04 on Acoustic Emission Method.

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² *Annual Book of ASTM Standards*, Vol 03.03.

