



Standard Practice for Characterizing Acoustic Emission Instrumentation¹

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1. Scope

1.1 This practice is recommended for use in testing and measuring operating characteristics of acoustic emission electronic components or units. (See Appendix X1 for a description of components and units.) It is not intended that this practice be used for routine checks of acoustic emission instrumentation, but rather for periodic calibration or in the event of a malfunction. The sensor is not addressed in this document other than suggesting methods for standardizing system gains (equalizing them channel to channel) when sensors are present.

1.2 Where the manufacturer provides testing and measuring details in an operating and maintenance manual, the manufacturer's methods should be used in conjunction with the methods described in this practice.

1.3 Difficult or questionable instrumentation measurements should be referred to electronics engineering personnel.

1.4 The methods set forth in this practice are not intended to be either exclusive or exhaustive.

1.5 The methods (techniques) used for testing and measuring the components or units of acoustic emission instrumentation, and the results of such testing and measuring should be documented. Documentation should consist of photographs, charts or graphs, calculations, and tabulations where applicable.

1.6 AE systems that use mini or micro computers to control the collection, storage, display, and analysis of data are in common use. Features of the computer-based systems include a wide selection of measurement parameters relating to the AE event. This selection, however, is usually made after the data have been acquired. This implies that the AE signals are individually recorded for later analysis, or that all the available parameters are measured on every AE signal that exceeds the selected threshold. The latter is usually the case. The manufacturer provides a specification for each system that specifies the operating range and conditions for the system. All calibration and acceptance testing of computer-based AE systems must use the manufacturer's specification as a guide. This practice does not cover testing of the computer or computer peripherals.

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:

E 1316 Terminology for Nondestructive Examinations²

2.2 ANSI Standard:

ANSI/IEEE 100-1984 Dictionary of Electrical and Electronic Terms³

2.3 Other Documents:

Manufacturer's Operating and Maintenance Manuals pertinent to the specific instrumentation or component

3. Terminology

3.1 *Definitions*—For definitions of additional terms relating to acoustic emission, refer to Terminology E 1316.

4. Apparatus

4.1 The basic test instruments required for measuring the operating characteristics of acoustic emission instrumentation include:

4.1.1 *Variable Sine Wave Generator,*

4.1.2 *True RMS Voltmeter,*

4.1.3 *Oscilloscope,*

4.1.4 *Variable Attenuator, graduated in decibels, and*

4.1.5 *Tone Burst Generator.*

4.2 Additional test instruments should be used for more specialized measurements of acoustic emission instrumentations or components. They are as follows:

4.2.1 *Variable-Function Generator,*

4.2.2 *Time Interval Meter,*

4.2.3 *Frequency Meter, or Counter,*

4.2.4 *Random Noise Generator,*

4.2.5 *Spectrum Analyzer,*

4.2.6 *D-C Voltmeter,*

4.2.7 *Pulse-Modulated Signal Generator,*

4.2.8 *Variable Pulse Generator, and*

¹ This practice is under the jurisdiction of ASTM Committee E-7 on Nondestructive Testing and is the direct responsibility of Subcommittee E07.04 on Acoustic Emission.

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

³ Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.

