



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 evaluation 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 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, screenshots, charts or graphs, calculations, and tabulations where applicable.

1.4 AE systems that use computers to control the collection, storage, display, and data analysis, might include waveform collection as well as a wide selection of measurement parameters (features) relating to the AE signal. 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.

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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 appro-*

priate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 *ASTM Standards:*²

[E1316 Terminology for Nondestructive Examinations](#)

2.2 *ANSI Standard:*

[ANSI/IEEE 100-1984 Dictionary of Electrical and Electronic Terms](#)³

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 [E1316](#).

4. Summary of Practice

4.1 Tests and measurements should be performed to determine the instrumentation bandwidth, frequency response, gain, noise level, threshold level, dynamic range, signal overload point, dead time, and counter accuracy.

4.2 Where acoustic emission test results depend upon the reproduced accuracy of the temporal, spatial, or spectral histories, additional measurements of instrumentation parameters should be performed to determine the specific limits of instrumentation performance. Examples of such measurements may include amplifier slew rate, gate window width and position, and spectral analysis.

4.3 Tests and measurements should be performed to determine the loss in effective sensor sensitivity resulting from the capacitive loading of the cable between the preamplifier and the sensor. The cable and preamplifier should be the same as that used for the acoustic emission tests without substitution. (See also Appendix [Appendix X2](#).)

¹ This practice 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 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 National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.