



## Standard Practice for Acoustic Emission Monitoring During Continuous Welding<sup>1</sup>

This standard is issued under the fixed designation E 749; 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 practice provides recommended guidelines for acoustic emission (AE) monitoring of weldments during and immediately following their fabrication by continuous welding processes. The technique is in a developmental stage and is not used routinely on production welding. Depending on the results of ongoing research and preproduction weld monitoring experience, these procedures are subject to change before routine implementation on production welds.

1.2 The procedure described in this practice is applicable to the detection and location of AE sources in weldments and in their heat-affected zone during fabrication, particularly in those cases where the time duration of welding is such that fusion and solidification take place while welding is still in progress.

1.3 The effectiveness of acoustic emission to detect discontinuities in the weldment and the heat-affected zone is dependent on the design of the AE system, the calibration procedure, the weld process, and the material type. Materials that have been monitored include low-carbon steels, low-alloy steels, stainless steels, and some aluminum alloys. The system performance must be verified for each application by demonstrating that the defects of concern can be detected with the desired reliability.

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 543 Practice for Evaluating Agencies that Perform Non-destructive Testing<sup>2</sup>

E 569 Practice for Acoustic Emission Monitoring of Structures During Controlled Stimulation<sup>2</sup>

E 650 Guide for Mounting Piezoelectric Acoustic Emission Sensors<sup>2</sup>

E 1316 Terminology for Nondestructive Examinations<sup>2</sup>

#### 2.2 ASNT Standards:<sup>3</sup>

SNT-TC-1A Recommended Practice for Nondestructive Testing Personnel Qualification and Certification

ANSI/ASNT CP-189 Standard for Qualification and Certification of Nondestructive Testing Personnel

#### 2.3 Military Standard:

MIL-STD-410 Nondestructive Testing Personnel Qualification and Certification<sup>4</sup>

### 3. Terminology

3.1 *Definitions*—For definitions of terms relating to acoustic emission testing, see Section B of Terminology E 1316.

### 4. Significance and Use

4.1 Detection and location of AE sources in weldments during fabrication may provide information related to the integrity of the weld. Such information may be used to direct repair procedures on the weld or as a guide for application of other nondestructive evaluation (NDE) methods. A major attribute of applying AE for in-process monitoring of welds is the ability of the method to provide immediate real-time information on weld integrity. This feature makes the method useful to lower weld costs by repairing defects at the most convenient point in the production process. The AE activity from discontinuities in the weldment is stimulated by the thermal stresses from the welding process. The AE activity resulting from this stimulation is detected by AE sensors in the vicinity of the weldment which convert the acoustic signals into electronic signals. The AE instrumentation similar to that described in Practice E 569 processes signals and may provide means for immediate display or indication of AE activity and for permanent recordings of the data.

4.2 Items to be considered in preparation and planning for monitoring should include but not be limited to the following:

4.2.1 Description of the system or object to be monitored or examined,

4.2.2 Extent of monitoring, that is, entire weld, cover passes only, and so forth,

4.2.3 Limitations or restrictions on the sensor mounting procedures, if applicable,

<sup>1</sup> 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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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 03.03.

<sup>3</sup> Available from American Society of Nondestructive Testing, 1711 Arlingate Plaza, P. O. Box 28518, Columbus, OH 43228-0518.

<sup>4</sup> Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.