



Standard Practice for Acoustic Emission Examination of Fiberglass Reinforced Plastic Resin (FRP) Tanks/Vessels¹

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1. Scope

1.1 This practice covers acoustic emission (AE) examination or monitoring of fiberglass-reinforced plastic (FRP) tanks-vessels (equipment) under pressure or vacuum to determine structural integrity.

1.2 This practice is limited to tanks-vessels designed to operate at an internal pressure no greater than 0.44 MPa absolute (65 psia) above the static pressure due to the internal contents. It is also applicable for tanks-vessels designed for vacuum service with differential pressure levels between 0 and 0.06 MPa (0 and 9 psi).

1.3 This practice is limited to tanks-vessels with glass contents greater than 15 % by weight.

1.4 This practice applies to examinations of new and in-service equipment.

1.5 The values stated in SI units are to be regarded as standard. The inch-pound units in parentheses may be approximate.

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 appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* (For more specific safety precautionary information see 8.1.)

2. Referenced Documents

2.1 ASTM Standards:

D 883 Terminology Relating to Plastics²

E 543 Practice for Evaluating Agencies that Perform Non-destructive Testing³

E 650 Guide for Mounting Piezoelectric Acoustic Emission Sensors³

E 750 Practice for Characterizing Acoustic Emission Instrumentation³

E 1316 Terminology for Nondestructive Examinations³

2.2 ANSI/ASNT Standards:

SNT-TC-1A Recommended Practice for Nondestructive

Testing Personnel Qualification and Certification⁴

ANSI/ASNT CP-189 Standard for Qualification and Certification of Nondestructive Testing Personnel⁴

2.3 Military Standard:

MIL-STD-410 Nondestructive Testing Personnel Qualification and Certification⁵

3. Terminology

3.1 Complete definitions of terms related to plastics and acoustic emission will be found in Terminology D 883 and E 1316.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *count value* N_c —an evaluation criterion based on the total number of AE counts. (See A2.4 of Annex A2.)

3.2.2 *FRP*—fiberglass reinforced plastic, a glass-fiber polymer composite with certain mechanical properties superior to those of the base resin.

3.2.3 *high-amplitude threshold*—a threshold for large amplitude AE events. (See A2.3 of Annex A2.)

3.2.4 *low-amplitude threshold*—the threshold above which AE counts (N) are measured. (See A2.2 of Annex A2.)

3.2.5 *operating pressure*—the pressure at the top of a vessel at which it normally operates. It shall not exceed the design pressure and it is usually kept at a suitable level below the setting of the pressure-relieving devices to prevent their frequent opening.

3.2.6 *pressure, design*—the pressure used in design to determine the required minimum thicknesses and minimum mechanical properties.

3.2.7 *processor*—a circuit that analyzes AE waveforms. (See Section 7 and A1.8.)

3.2.8 *summing amplifier (summer, mixer)*—an operational amplifier that produces an output signal equal to a weighted sum of the input signals.

3.2.9 *zone*—the area surrounding a sensor from which AE can be detected by that sensor.

4. Summary of Practice

4.1 This practice consists of subjecting equipment to increasing pressure or vacuum while monitoring with sensors

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 08.01.

³ *Annual Book of ASTM Standards*, Vol 03.03.

⁴ Available from American Society for Nondestructive Testing, 1711 Arlingate Plaza, P.O. Box 28518, Columbus, OH 43228-0518.

⁵ Available from Standardization Documents Order Desk, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.