



AEROSPACE MATERIAL SPECIFICATION

AMS2632™

REV. C

Issued	1974-03
Reaffirmed	1995-03
Revised	2022-06

Superseding AMS2632B

Inspection, Ultrasonic, of Thin Materials
0.50 Inch (12.7 mm) and Under in Cross-Sectional Thickness

RATIONALE

AMS2632C is the result of a Five-Year Review and update of the specification. The revision updates reference specifications (3.2.4.3.1, 3.3, 8.6), updates Figure 7 to be consistent with other AMS-UT specifications, adds Figure 8 as an example and adds reference to it (3.2.4.7.1, 3.2.4.7.2), and deletes recording of UT references (4.3.5) to standardize between other AMS-UT specifications.

1. SCOPE

1.1 Purpose

This specification covers the procedure for ultrasonic inspection of flat, contoured, round, and hollow cylindrical products having a cross-sectional thickness of 0.02 to 0.50 inch (0.5 to 12.7 mm). This specification does not apply to inspection of composite materials.

1.2 Application

This process has been used typically for locating and defining internal defects, such as cracks, voids, laminations, and other structural discontinuities, which may or may not be exposed to the surface, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order form a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2631 Ultrasonic Inspection, Titanium and Titanium Alloy Bar, Billet, and Plates

AMS5070 Steel, Bars and Forgings, 0.18 - 0.23C (SAE 1022)

AS7766 Terms Used in Aerospace Metals Specifications

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<https://www.sae.org/standards/content/AMS2632C/>

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

- ASTM E127 Fabrication and Control of Flat Bottomed Hole Ultrasonic Standard Reference Blocks
- ASTM E213 Ultrasonic Inspection Testing of Metal Pipe and Tubing
- ASTM E317 Evaluating Performance Characteristics of Ultrasonic Pulse-Echo Testing Systems Without the Use of Electronic Measurement Instruments
- ASTM E1065 Evaluating Characteristics of Ultrasonic Transducers
- ASTM E1316 Standard Terminology for Nondestructive Examinations

2.3 AIA Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

- NAS410 Certification and Qualification of Nondestructive Test Personnel

2.4 ASME Publications

Available from ASME, P.O. Box 2900, 22 Law Drive, Fairfield, NJ 07007-2900, Tel: 800-843-2763 (U.S./Canada), 001-800-843-2763 (Mexico), 973-882-1170 (outside North America), www.asme.org.

- ASME B46.1 Surface Texture

2.5 ASNT Publications

Available from American Society for Nondestructive Testing, Inc., 1711 Arlingate Plaza, Caller #28518, Columbus, OH 43228-0518, <https://www.asnt.org/>.

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

2.6 Airlines for America (A4A) Publications

Available from Airlines for America (A4A), 1275 Pennsylvania Avenue, NW, Suite 1300, Washington, DC 20004, Tel: 202-626-4062, www.airlines.org.

- Spec 105 Guidelines for Training and Qualifying Personnel in Nondestructive Testing Methods

3. TECHNICAL REQUIREMENTS

3.1 Qualification

3.1.1 Personnel

Shall be qualified and certified in accordance with NAS410. Alternate procedures, such as SNT-TC-1A or Spec 105, may be used if specified by the drawing or purchase order. It is the supplier's responsibility to ensure that personnel are certified and function within the limits of the applicable specification or procedure.

3.1.2 Facilities

Shall be subject to survey and approval by purchaser. The ultrasonic test facility equipment shall include, but not be limited to, the basic ultrasonic test instrument, transducers, appropriate ultrasonic references, couplant materials, fixtures, reference specifications, immersion tanks where applicable, and documentation necessary to verify the qualification of equipment and test personnel.

3.2 Ultrasonic Test System

3.2.1 Basic Ultrasonic Test Instrument

Shall be capable of producing, receiving, amplifying, and displaying high-frequency signals at specific frequencies as required by the ultrasonic test. The ultrasonic instrument shall be of a pulse-reflection (echo), pulse-transmission type capable of operation at frequencies from 2.0 to 10.0 MHz. The instrument shall be capable of being adapted with electronic circuitry, such as flaw gates, distance amplitude corrections, and alarms, that can aid in testing and interpretation of flaw signals. The instrument shall have a minimum dynamic range of 30 dB and shall have a transmit/receive crosstalk separation of at least 40 dB.

3.2.1.1 Instrument Requirements

The instrument performance characteristics shall be evaluated in accordance with ASTM E317 as follows:

Table 1 - Instrument performance requirements

Characteristic	Requirement
Signal to noise ⁽¹⁾	2:1
Vertical linearity	±5%
Horizontal linearity	±3%
Gain or attenuator accuracy	±2 dB per 20 dB of control range
Voltage regulation—Voltage fluctuations shall not cause amplitude variations exceeding:	±5%

⁽¹⁾ ASTM E127 reference block 1-0300.

3.2.1.2 Alarm

3.2.1.2.1 Alarms and visual monitoring of the A-scan are not required when C-scan data collection is used.

3.2.1.2.2 For unrecorded stop on defect inspections, test criteria and part configuration determine alarm use feasibility. When alarms cannot be used, this must be agreed upon by purchaser and vendor. Audible and/or visual alarms and/or stop on defect systems shall be used in conjunction with visual monitoring to identify signals which exceed the level established for the test. Alarm systems used for this purpose shall be capable of being adjusted to alarm at any point in the display range and shall be automatically triggered by indications exceeding the set level. The sound level produced by an audible alarm during operation shall be sufficiently above ambient to ensure being heard by the operator.

3.2.2 Ultrasonic Transducers

Ultrasonic transducers shall have the sensitivity and resolution required to detect the required reference reflectors.

3.2.2.1 Transducer Dimension and Styles

3.2.2.1.1 For testing thin materials, a variety of contact and immersion styles may be used. The choice is dependent on the test and the approved test procedure. Immersion flat and focused, contact, angle beam, liquid delay, phased array, and pressurized-couplant transducer systems may be used.

3.2.2.1.2 Phased Array Transducers

Linear phased array, annular phased array, and 2D array probes may be used for scanning and evaluation of wrought metals.