



AEROSPACE MATERIAL SPECIFICATION

AMS2633™**REV. D**

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Superseding AMS2633C

Ultrasonic Inspection
Centrifugally-Cast, Corrosion-Resistant Steel Tubular Cylinders

RATIONALE

AMS2633D has been stabilized because it represents mature technology that is not likely to change.

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1. SCOPE:

1.1 Purpose:

This procedure covers ultrasonic inspection of tubular, centrifugally-cast, corrosion-resistant steel cylinders.

1.2 Application:

This procedure has been used typically for locating defects such as cracks, voids, spongy areas, and other discontinuities, but usage is not limited to such applications. This procedure is not applicable to austenitic steels where grain boundaries mask results.

1.2.1 Immersion inspection is applicable to tubular products whose wall thickness is 0.5 to 9.0 inches (13 to 229 mm). Contact inspection is applicable to tubular product whose wall thickness is 3.0 to 9.0 inches (76 to 229 mm).

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J300 Crankcase Oil Viscosity Classification

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM E 428 Fabrication and Control of Steel Reference Blocks Used in Ultrasonic Inspection
ASTM E 1417 Liquid Penetrant Examination

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue,
Philadelphia, PA 19111-5094.

MIL-STD-410	Nondestructive Testing Personnel Qualification and Certification
MIL-STD-1949	Inspection, Magnetic Particle
MIL-STD-2175	Castings, Classification and Inspection of
MIL-STD-6021	Castings, Classification and Inspection of

2.4 ANSI Publications:

Available from American National Standards Institute, Inc., 11 West 42nd Street, New York, NY
10036-8002.

ANSI B46.1 Surface Texture

2.5 ASNT Publications:

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

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

2.6 ATA Publications: Available from Air Transport Association, 1301 Pennsylvania Avenue, Suite 1100, Washington, DC 20004-1707.

ATA-105 Guidelines for Training and Qualifying Personnel in Nondestructive Testing

3. TECHNICAL REQUIREMENTS:

3.1 Qualification:

3.1.1 Personnel: Shall be qualified and certified in accordance with MIL-STD-410. Alternate procedures, such as ASNT-TC-1A or ATA-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.

3.2 Equipment:

- 3.2.1 Electronic Apparatus: The ultrasonic instrument shall be of the pulse-echo type capable of operating at 2.25 through 10 megahertz. Gates, distance-amplitude correction systems, and other electronic aids to ultrasonic testing and interpretation shall be used as required. An alarm system and/or a recorder shall be used.
- 3.2.2 Transducers: The frequency used shall be the highest practical ultrasonic frequency which will provide the penetration and resolution required. The use of frequencies below 2.25 MHz or above 10 MHz is not permitted unless special permission is obtained from purchaser. The pulser/receiver shall be operated at the same test frequency as the transducer element being used for inspection. Transducers shall be 0.5 to 1.0 inch (13 to 25 mm), inclusive, in diameter except that rectangular search units with a length-to-width ratio of 2:1 may be used provided the length does not exceed 1.5 inches (38 mm).
- 3.2.3 Other Equipment: Tanks, bridges, rotators, manipulators, and other equipment shall be adequate to perform the required tests.
- 3.2.3.1 Voltage Regulator: A voltage regulator shall be used on the power source when fluctuations in line voltage cause variations exceeding $\pm 10\%$ in a signal with an amplitude equal to the upper linearity limit of the instrument.
- 3.2.4 Couplant:
- 3.2.4.1 Immersion Method: For inspection by the immersion method, clean tap water shall be used as the couplant material; rust inhibitors, wetting agents, or both, may be added. The water shall be free of air bubbles which could interfere with the ultrasonic test.
- 3.2.4.2 Contact Method: For inspection by the contact method, SAE 30 motor oil conforming to AE J300, or equivalent, or penetrant emulsifier shall be used as the couplant. Chloroprene rubber sheet or other similar materials may be used between the transducer and the part under inspection to prevent transducer wear providing adequate compensation for its use is made.
- 3.2.5 Reference Standards: Shall be fabricated in accordance with ASTM E 428 from centrifugally-cast, corrosion-resistant steel equivalent to the alloy to be tested; dimensions of reference standards shall conform to Table 1.