



# AEROSPACE MATERIAL SPECIFICATION

**AMS2300™****REV. N**

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Revised 2026-03

Superseding AMS2300M

Steel Cleanliness, Premium Aircraft-Quality,  
Magnetic Particle Inspection Procedure

## RATIONALE

AMS2300N is the result of a Five-Year Review and update of the specification. The revision updates definitions (see 2.4.1), clarifies sampling (see 3.2.3.2 and 3.2.3.3), adds instructions for flat bars (see 3.2.3.4), and removes the hardness limit for machinability (see 3.2.5).

### 1. SCOPE

1.1 This specification covers steel cleanliness requirements for premium aircraft-quality ferromagnetic steels, including hardenable, corrosion-resistant steels, by magnetic particle inspection methods. This specification contains sampling, sample preparation, inspection procedures, and cleanliness rating criteria (see 8.2).

### 1.2 Application

This procedure has been used typically for the cleanliness evaluation of blooms, billets, tube rounds, stock for forging or flash-welded rings, slabs, bars, sheet, plate, tubing, and extrusions used in fabricating highly stressed parts where very strict magnetic particle inspection standards are used in final inspection of such parts, but it may be used for qualification of a heat, melt, or lot of steel.

### 2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms 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

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AMS2301 Steel Cleanliness, Aircraft Quality, Magnetic Particle Inspection Procedure

AS7766 Terms Used in Aerospace Metals Specifications

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## 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](http://www.astm.org).

ASTM A604 Macroetch Testing of Consumable Electrode Remelted Steel Bars and Billets

ASTM E1444/E1444M Magnetic Particle Testing

## 2.3 ANSI Publications

Copies of these documents are available online at <https://webstore.ansi.org>.

ANSI B46.1 Surface Texture

## 2.4 Definitions

Terms used in AMS are defined in AS7766 and as follows:

### 2.4.1 HEAT

For multiple melted products, a heat shall be the usable product of steel processed as a single furnace charge in the first melt cycle. An individual batch/melt of metal produced every time in a steel melting furnace will represent a heat.

## 3. TECHNICAL REQUIREMENTS

### 3.1 Melting Practice

If the material specification does not require a specific method or methods of consumable electrode remelting and the purchaser has not authorized an alternate method, steel supplied to this specification shall be produced using only the vacuum arc consumable electrode process in the remelt cycle, except that steel cast as rectangular ingots for slab and plate may be produced by electroslag remelting.

### 3.2 Specimen Preparation

#### 3.2.1 Heat Qualification

Sampling shall be in accordance with 4.3.1, 4.3.2, or 4.3.3. Samples shall be converted into test specimens in accordance with 3.2.3.

#### 3.2.2 Product Qualification

Product from a heat not qualified based on sampling as in 4.3.1, 4.3.2, or 4.3.3 shall be sampled in accordance with 4.3.4. Samples shall be converted into test specimens in accordance with 3.2.3.

#### 3.2.3 Working and Rough Machining

##### 3.2.3.1 Solid Product 12 Inches (305 mm) and Over in Nominal Diameter or Distance Between Parallel Sides

A quarter section shall be cut from each sample sufficiently oversize that the center and the surface of the original sample will be approximately on the surface of the specimen after generating to test size. The quartered section shall then be forged to a 3- to 6-inch (76- to 152-mm) round or square, maintaining the axis of the forging approximately parallel to the original direction of rolling. As an alternate method, the full section may be rolled or forged to a 6-inch (152-mm) round or square and an oversize quarter obtained as in 3.2.3.3. Specimens shall be rough machined to a “one-step” straight cylinder nominally 5 inches (127 mm) long. Minimum stock removal shall be consistent with the machining allowance specified in 3.2.4.1.

### 3.2.3.2 Solid Product Over 6 to 12 Inches (152 to 305 mm), Exclusive, in Nominal Diameter or Distance Between Parallel Sides Except Slabs and Plates

A quarter section shall be cut from each sample sufficiently oversize that the center and the surface of the original sample will be approximately on the surface of the specimen after generating to test size. The quarter section shall be converted into a test specimen by machining, or forging and machining, to a 3- to 6-inch (76- to 152-mm) round or square. The 3-inch sample representing a quarter section of 6-inch solid product, and the 6-inch sample representing a quarter section of 12-inch solid product. Other solid product sizes will have quarter sections that fall between the 3 inch and 6 inch. Specimens shall be rough machined to a "one-step" straight cylinder nominally 5 inches (127 mm) long. Minimum stock removal shall be consistent with the machining allowance specified in 3.2.4.1. Maximum stock removal is governed by the requirement that the finished machined surface must approximately represent the original center and original surface of the solid product.

### 3.2.3.3 Solid Product 6 Inches (152 mm) and Under in Nominal Diameter or Distance Between Parallel Sides Except Flat Bars, Slabs, and Plates

A quarter section shall be cut from each sample sufficiently oversize that the center and surface of the original sample will be approximately on the surface of the specimen after generating to test size. The quarter section shall be converted into a test specimen by machining to a "one-step" straight cylinder nominally 5 inches (127 mm) long whose machined surface represents the surface to mid-thickness of the original solid product. Minimum stock removal shall be consistent with the machining allowance specified in 3.2.4.1. Maximum removal is governed by the requirement that the finished machined surface must approximately represent the original center and original surface of the solid product

#### 3.2.3.3.1 As an alternate method, a step-down specimen may be generated from the full cross section in equal circumferential steps as in Table 1.

**Table 1A - Step-down specimens, cylindrical (inch/pound units)**

| Nominal<br>Diameter or Distance<br>Between Parallel Sides<br>Inches | Step<br>Length<br>Inches | Step 1<br>Diameter | Step 2<br>Diameter | Step 3<br>Diameter | Step 4<br>Diameter | Step 5<br>Diameter |
|---------------------------------------------------------------------|--------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| 0.250 to 0.500, incl                                                | 5.000                    | D                  | --                 | --                 | --                 | --                 |
| Over 0.500 to 0.750, incl                                           | 2.500                    | D                  | 2/3D               | --                 | --                 | --                 |
| Over 0.750 to 1.000, incl                                           | 1.665                    | D                  | 3/4D               | 1/2D               | --                 | --                 |
| Over 1.000 to 1.500, incl                                           | 1.250                    | D                  | 4/5D               | 3/5D               | 2/5D               | --                 |
| Over 1.500                                                          | 1.000                    | D                  | 4/5D               | 3/5D               | 2/5D               | 1/5D               |

D = Original diameter or distance between parallel sides minus machining stock removed.

**Table 1B - Step-down specimens, cylindrical (SI units)**

| Nominal<br>Diameter or Distance<br>Between Parallel Sides<br>Millimeters | Step<br>Length<br>Millimeters | Step 1<br>Diameter | Step 2<br>Diameter | Step 3<br>Diameter | Step 4<br>Diameter | Step 5<br>Diameter |
|--------------------------------------------------------------------------|-------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| 6.35 to 12.70, incl                                                      | 127.00                        | D                  | --                 | --                 | --                 | --                 |
| Over 12.70 to 19.05, incl                                                | 63.50                         | D                  | 2/3D               | --                 | --                 | --                 |
| Over 19.05 to 25.40, incl                                                | 42.29                         | D                  | 3/4D               | 1/2D               | --                 | --                 |
| Over 25.40 to 38.10, incl                                                | 31.75                         | D                  | 4/5D               | 3/5D               | 2/5D               | --                 |
| Over 38.10                                                               | 25.40                         | D                  | 4/5D               | 3/5D               | 2/5D               | 1/5D               |

D = Original diameter or distance between parallel sides minus machining stock removed.

### 3.2.3.4 Flat Bars

Specimens, nominally 5 inches (127 mm) long, shall be rough machined to equal-length steps across the width of the specimen in accordance with Table 2, allowing 20% of the thickness or 0.100 inch (2.54 mm), whichever is less, for minimum stock removal. Allowance of 0.010 inch (0.25 mm) shall be made for finish machining. Flat bars exceeding 3 inches thickness may be prepared in accordance with 3.2.3.5.

**Table 2A - Step-down specimens, flat bar (inch/pound units)**

| Nominal Thickness<br>Inches | Step<br>Length<br>Inches | Step 1<br>Thickness | Step 2<br>Thickness | Step 3<br>Thickness | Step 4<br>Thickness | Step 5<br>Thickness |
|-----------------------------|--------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Up to 0.250, incl           | 5.000                    | T                   | --                  | --                  | --                  | --                  |
| Over 0.250 to 0.500, incl   | 2.500                    | T                   | 2/3T                | --                  | --                  | --                  |
| Over 0.500 to 1.000, incl   | 1.250                    | T                   | 3/4T                | 1/2T                | 1/4T                | --                  |
| Over 1.000                  | 1.000                    | T                   | 4/5T                | 3/5T                | 2/5T                | 1/5T                |

T = Original nominal thickness minus machining stock removed.

**Table 2B - Step-down specimens, flat bar (SI units)**

| Nominal Thickness<br>Millimeters | Step<br>Length<br>Millimeters | Step 1<br>Thickness | Step 2<br>Thickness | Step 3<br>Thickness | Step 4<br>Thickness | Step 5<br>Thickness |
|----------------------------------|-------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Up to 6.35, incl                 | 127.00                        | T                   | --                  | --                  | --                  | --                  |
| Over 6.35 to 12.70, incl         | 63.50                         | T                   | 2/3T                | --                  | --                  | --                  |
| Over 12.70 to 25.40, incl        | 31.75                         | T                   | 3/4T                | 1/2T                | 1/4T                | --                  |
| Over 25.40                       | 25.40                         | T                   | 4/5T                | 3/5T                | 2/5T                | 1/5T                |

T = Original nominal thickness minus machining stock removed.

### 3.2.3.5 Slabs or Plates

A straight cylindrical or rectangular specimen shall be machined, or forged and machined, from each slab or plate to be tested. The specimen shall be taken essentially parallel to the direction of rolling at the center of the slab or plate width and thickness and shall be nominally 5 inches (127 mm) in length and not more than 4 inches (102 mm) in final diameter or thickness.

#### 3.2.3.5.1 Product Up to 4 Inches (102 mm), Inclusive, in Nominal Thickness

A straight cylindrical specimen shall represent the full thickness consistent with the machining allowance specified in 3.2.4.1.

#### 3.2.3.5.2 Product Over 4 to 8 Inches (102 to 203 mm), Inclusive, in Nominal Thickness

A straight cylindrical specimen shall represent surface to mid-thickness consistent with the machining allowance specified in 3.2.4.1.

#### 3.2.3.5.3 Product Over 8 Inches (203 mm) in Nominal Thickness

A straight cylindrical specimen shall be taken so that the axis is approximately midway between the surface and mid-thickness and shall have a diameter equal to one-third the nominal thickness of the section.

### 3.2.3.6 Tubing

#### 3.2.3.6.1 Nominal Wall Thickness 0.250 Inch (6.35 mm) and Over

Specimens, nominally 5 inches (127 mm) long, shall be rough machined to four equal circumferential steps, T, 3/4T, 1/2T, and 1/4T, allowing 0.100 inch (2.54 mm) on the diameter for stock removal. Allowance of 0.010 inch (0.25 mm) on the radii for finish machining shall be made. T equals the nominal wall thickness minus the machining allowance.

#### 3.2.3.6.2 Nominal Wall Thickness Under 0.250 Inch (6.35 mm)

Specimens, nominally 5 inches long (127 mm), after heat treatment as in 3.2.5, shall have 10% of the wall thickness or 0.015 inch (0.38 mm), whichever is less, removed from the outer diameter and be tested as a straight cylinder.