SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS5625 REV. D

Issued 1955-08
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Noncurrent 2000-03
Reaf. Nonc. 2013-04

Superseding AMS5625C

Steel Bars, High Expansion
9.5Ni - 5.5Mn (0.55 - 0.65C)
Cold Finished

K91456

RATIONALE

AMS5625D has been reaffirmed to comply with the SAE five-year review policy.

NONCURRENT NOTICE

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of March 2000. It is recommended, therefore, that this specification not be specified for new designs.

"NONCURRENT" refers to those materials which have previously been widely used and which may be required on some existing designs in the future. The Aerospace Materials Division, however, does not recommend these as standard materials for future use in new designs. Each of these "NONCURRENT" specifications is available from SAE upon request.

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1. SCOPE:

1.1 Form:

This specification covers a high-expansion steel in the form of bars 1.063 inch (27 mm) and under in nominal diameter or distance between parallel sides.

1.2 Application:

Primarily for bolts and screws requiring a coefficient of thermal expansion approaching that of aluminum alloys. This steel is hardenable only by cold working.

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.

2.1.1 Aerospace Material Specifications:

AMS 2241	Tolerances, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
MAM 2241	Tolerances, Metric, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
AMS 2248	Chemical Check Analysis Limits, Wrought Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
AMS 2371	Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock
AMS 2806	Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat Resistant Steels and Alloys

2.1.2 Aerospace Standards:

AS1182	Standard Machining Allowance, Aircraft Quality and Premium Aircraft Quality Steel Products

2.2 ASTM Publications:

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

ASTM A 370 Mechanical Testing of Steel Products
ASTM E 228 Linear Thermal Expansion of Solid Materials with a Vitreous Silica Dilatometer
ASTM E 353 Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

2.3 U.S. Government Publications:

Available from Naval Publications and Forms Center, Attn: NPODS, 5801 Tabor Avenue, Philadelphia, PA 19120-5099.

2.3.1 Military Standards:

MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

	min	max
Carbon	0.55	0.65
Manganese	5.00	6.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Nickel	8.50	10.50

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2248.

3.2 Condition:

Cold finished.

3.3 Properties:

Bars shall conform to the following requirements; tensile and hardness testing shall be performed in accordance with ASTM A 370:

3.3.1 Tensile Properties:

3.3.1.1 Shall be as follows for bars 1 inch (25 mm) and under in nominal diameter or distance between parallel sides:

Tensile Strength, minimum	125,000 psi (862 MPa)
Yield Strength at 0.2% Offset, minimum	100,000 psi (689 MPa)
Elongation in 4D, minimum	16%
Reduction of Area, minimum	30%

3.3.1.2 Shall be as follows for product over 1.0 to 1.063 inches (Over 25 to 27 mm), inclusive, in nominal diameter or distance between parallel sides:

Tensile Strength, minimum	120,000 psi (827 MPa)
Yield Strength at 0.2% Offset, minimum	90,000 psi (621 MPa)
Elongation in 4D, minimum	16%
Reduction of Area, minimum	30%

3.3.2 Hardness: Shall be as follows, or equivalent:

Nominal Diameter or Distance Between Parallel Sides		
Inches	Millimetres	Hardness, Brinell
Up to 1.000, incl	Up to 25.40, incl	255 - 331
Over 1.000 to 1.063, incl	Over 25.40 to 27.00, incl	248 - 331

3.3.3 Coefficient of Thermal Expansion: Shall be not lower than 11.5 x 10^{-6} inches/inch per degree F (20.7 x 10^{-6} mm/mm per degree C) over the temperature range 72° - 600 °F (22° - 316 °C), determined in accordance with ASTM E 228.

3.4 Quality:

Bars, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the bars.

3.4.1 Bars ordered cold finished or ground, turned, or polished shall, after removal of the standard machining allowances in accordance with AS1182, be free from seams, laps, tears, and cracks open to the thereby created ground, turned, or polished surfaces.

3.5 Sizes:

Except when exact lengths or multiples of exact lengths are ordered, straight bars will be acceptable in mill lengths of 6 - 20 feet (1.8 - 6.1 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 feet (3 m).

3.6 Tolerances:

Shall conform to all applicable requirements of AMS 2241 or MAM 2241.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of bars shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the bars conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for composition (3.1), tensile properties (3.3.1), hardness (3.3.2), and tolerances (3.6) are acceptance tests and shall be performed on each heat or lot as applicable.

4.2.2 Periodic Tests: Tests for coefficient of thermal expansion (3.3.3) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:

Shall be in accordance with AMS 2371; the number of specimens to be sampled shall be the minimum number of specimens tested.

4.4 Reports:

The vendor of bars shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and for tensile properties and hardness of each lot and, when performed, the results of tests to determine conformance to the periodic test requirements. This report shall include the purchase order number, lot number, AMS 5625D, size, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2371.