Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 5635B
Superseding AMS 5635A
Issued 1-31-64
Revised 1-15-81

UNS S30360

STEEL BARS AND FORGINGS, CORROSION RESISTANT
18Cr - 9Ni (303Pb)
Free-Machining

SAE Technical Board rules provide that: "All technical reports, including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade or their use by governmental agencies is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

1. SCOPE:

1.1 Form: This specification covers a free-machining, corrosion-resistant steel in the form of bars, wire, forgings, and forging stock.

1.2 Application: Primarily for parts on which the amount of machining warrants the use of a free-machining grade of steel and requiring corrosion resistance similar to the 18-8 type of steel but not subjected to temperatures exceeding 700°F (370°C) during fabrication or in service.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2241 - Tolerances, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
AMS 2248 - Chemical Check Analysis Limits, Wrought Heat and Corrosion Resistant Steels and Alloys
AMS 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock
AMS 2374 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Forgings and Forging Stock
AMS 2375 - Control of Forgings Requiring First Article Approval
AMS 2806 - Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Heat and Corrosion Resistant Steels and Alloys
AMS 2808 - Identification, Forgings

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103

ASTM A370 - Mechanical Testing of Steel Products
ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

SAENORM.COM : Click to view the full PDF of ams5635b

Copyright 1981 by Society of Automotive Engineers, Inc.
All rights reserved.

Printed in U.S.A.

2.3.2 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser:

	min	max
Carbon	--	0.15
Manganese	--	2.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	0.12	0.30
Chromium	17.00	19.00
Nickel	8.00	10.00
Lead	0.12	0.30
Molybdenum	--	0.75
Copper	--	0.75

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

3.2 Condition: The product shall be supplied in the following condition:

3.2.1 Bars, Wire, and Forgings: Solution heat treated free from continuous carbide network.

3.2.1.1 All hexagons, other bars 2.75 in. (70.0 mm) and under in nominal diameter or distance between parallel sides, and wire shall be cold finished.

3.2.1.2 Bars, other than hexagons, over 2.75 in. (70.0 mm) in nominal diameter or distance between parallel sides shall be hot finished.

3.2.1.3 Forgings shall not be supplied except when specified on the drawing or purchase order.

3.2.2 Forging Stock: As ordered by the forging manufacturer.

3.3 Properties: Bars, wire, and forgings shall conform to the following requirements; hardness and tensile testing shall be performed in accordance with ASTM A370. Properties of forging stock shall be as agreed upon by purchaser and vendor.

3.3.1 Tensile Properties: Shall be as follows:

3.3.1.1 Hot Finished Bars:

Tensile Strength, min	75,000 psi (517 MPa)
Yield Strength at 0.2% Offset, min	30,000 psi (207 MPa)
Elongation in 4D, min	40%
Reduction of area, min	50%

SAENORM.COM : Click to view the full PDF of ams5635b

3.3.1.2 Cold Finished Bars and Wire:

TABLE I

Nominal Diameter or Distance Between Parallel Sides Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 in. or 4D %, min	Reduction of Area %, min
Up to 0.500, incl	90,000	45,000	35	45
Over 0.500	75,000	30,000	40	50

TABLE I (SI)

Nominal Diameter or Distance Between Parallel Sides Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50 mm or 4D %, min	Reduction of Area %, min
Up to 12.50, incl	621	310	35	45
Over 12.50	517	207	40	50

3.3.2 Hardness:

3.3.2.1 Bars: Shall be as follows, or equivalent, determined approximately at midradius.

Nominal Diameter or Distance Between Parallel Sides		
Inches	(Millimetres)	Hardness
Up to 0.75, incl	(Up to 19.0, incl)	170 - 255 HB
Over 0.75	(Over 19.0)	140 - 241 HB

3.3.2.2 Forgings: Shall be not higher than 187 HB or equivalent.

3.4 Quality: The product, as received by purchaser, shall be uniform in quality and condition, sound, and, consistent with the type of steel involved, free from foreign materials and from internal and external imperfections detrimental to usage of the product.

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

3.6 Tolerances: Unless otherwise specified, tolerances for bars and wire shall conform to all applicable requirements of AMS 2241.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product 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 4.5. Purchaser reserves the right to sample and to perform such confirmatory testing as he deems necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.

SAENORM.COM : Click to view the full PDF of ams5635b

4.2.2 Preproduction Tests: Tests of forgings to determine conformance to all applicable technical requirements of this specification when AMS 2375 is specified are classified as preproduction tests and shall be performed on the first-article shipment of a forging to a purchaser, when a change in material or processing requires reapproval as in 4.4, and when purchaser deems confirmatory testing to be required.

4.2.2.1 For direct U.S. Military procurement of forgings, substantiating test data and, when requested, preproduction forgings shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be in accordance with the following:

4.3.1 Bars and Wire: AMS 2371.

4.3.2 Forgings and Forging Stock: AMS 2374.

4.4 Approval: When specified, approval and control of forgings shall be in accordance with AMS 2375.

4.5 Reports:

4.5.1 The vendor of the product shall furnish with each shipment three copies of a report showing the results of tests for chemical composition of each heat and the results of tests on each lot to determine conformance to the hardness and tensile property requirements. This report shall include the purchase order number, heat number, AMS 5635B, size, and quantity from each heat. If forgings are supplied, the part number and the size and melt source of stock used to make the forgings shall also be included.

4.5.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, AMS 5635B, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.6 Resampling and Retesting: Shall be in accordance with the following:

4.6.1 Bars and Wire: AMS 2371.

4.6.2 Forgings and Forging Stock: AMS 2374.

5. PREPARATION FOR DELIVERY:

5.1 Identification: The product shall be identified as follows:

5.1.1 Bars and Wire: In accordance with AMS 2806.

5.1.2 Forgings: In accordance with AMS 2808.

5.1.3 Forging Stock: As agreed upon by purchaser and vendor.

5.2 Packaging:

5.2.1 The product shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

SAENORM.COM : Click to view the full PDF of ams5635b