SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5657A

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Superseding AMS 5657

Steel Bars and Forgings, Corrosion and Moderate Heat Resistant 15Cr - 7.1Ni - 2.5Mo - 1.1Al

UNS S15700

RATIONALE

This document has been reaffirmed to comply with the SAE 5-year Review policy.

NONCURRENT NOTICE

This specification has been declared “NONCURRENT” by the Aerospace Materials Division, SAE, as of October 1, 1982. 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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

1. ACKNOWLEDGMENT:

A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. FORM:

Bars, forgings, and forging stock.

3. APPLICATION:

Primarily for parts requiring high strength and oxidation resistance up to 700 F, and where such parts may require welding during fabrication.

4. COMPOSITION:

Carbon	0.09 max
Manganese	1.00 max
Silicon	1.00 max
Phosphorus	0.040 max
Sulfur	0.030 max
Chromium	14.00 - 16.00
Nickel	6.50 - 7.75
Molybdenum	2.00 - 3.00
Aluminum	0.75 - 1.50

4.1 Check Analysis:

Unless otherwise specified, composition variations shall meet the requirements of the latest issue of AMS 2248.

5. CONDITION:

5.1 Bars:

Solution heat treated at 1950 F ± 25 and water quenched, having hardness as indicated below when tested midway between center and surface.

5.1.1 Rounds: Ground, turned, or polished, having hardness not higher than Brinell 269 or equivalent.

5.1.2 Hexagons: Cold drawn for size after solution treatment, having hardness not higher than Brinell 321 or equivalent.

5.1.3 Flats: Hot finished, solution heat treated, and descaled, having hardness not higher than Brinell 269 or equivalent.

5.2 Forgings:

Unless otherwise specified, solution treated at 1950 F ± 25 and water quenched, having hardness not higher than Brinell 321 or equivalent.

5.3 Forging Stock:

As ordered by the forging manufacturer.

6. TECHNICAL REQUIREMENTS:

6.1 Properties After Transformation and Precipitation Hardening:

Material shall conform to the following requirements after heating to 1400 F ± 25, holding at heat 90 min., cooling to 55 F ± 5 within 1 hr, holding at this temperature for not less than 30 min., heating to 1050 F ± 10, holding at heat for 90 min., and cooling in air:

6.1.1 Bars:

6.1.1.1 Tensile Properties: Applicable to sizes 6 in. and under in diameter or distance between parallel sides.

Tensile Strength, psi	180,000 min
Yield Strength at 0.2% Offset or at 0.0150 in. in 2 in. Extension Under Load (E = 29,000,000), psi	160,000 min
Elongation, % in 4D	8 min
Reduction of Area, %	25 min

6.1.1.1.1 Tensile test specimens shall be taken parallel to the direction of rolling and midway between center and surface where size permits.

6.1.1.2 Hardness: Not lower than Brinell 375 or equivalent.

6.1.2 Forgings:

6.1.2.1 Hardness: Not lower than Brinell 375 or equivalent.

6.2 Properties After Austenite Conditioning, Sub-Zero Transformation and Precipitation Hardening:

Material shall conform to the following requirements after heating to 1750 F ± 15, holding at heat for 10 min., and rapidly cooling to room temperature, cooling within 24 hr to -100 F ± 10, holding at this temperature for not less than 8 hr, warming in air to room temperature, heating to 950 F ± 10, holding at heat for 1 hr, and cooling in air.

6.2.1 Bars:

6.2.1.1 Tensile Properties: Applicable to sizes 6 in. and under in diameter or distance between parallel sides.

Tensile Strength, psi	200,000 min
Yield Strength at 0.2% Offset or at 0.0161 in. in 2 in. Extension Under Load (E = 29,000,000), psi	175,000 min
Elongation, % in 4D	7 min
Reduction of Area, %	25 min

6.2.1.1.1 Tensile test specimens shall be taken parallel to the direction of rolling and midway between center and surface where size permits.

6.2.1.2 Hardness: Not lower than Brinell 415 or equivalent.

6.2.2 Forgings:

6.2.2.1 Hardness: Not lower than Brinell 415 or equivalent.

7. QUALITY:

Material shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

8. TOLERANCES:

Unless otherwise specified, tolerances shall conform to the latest issue of AMS 2241 as applicable; diameter, thickness, and width tolerances shall be as specified below:

8.1 Rounds and Hexagons:

Table I.

8.2 Flats:

Table II.