AEROSPACE MATERIAL SPECIFICATION

AMS5905™	REV. D

Issued 1992-01
Reaffirmed 2012-04
Revised 2024-03

Superseding AMS5905C

Steel, Corrosion-Resistant, Sheet and Strip
18Cr - 9.0Ni (302)
Cold Rolled, 3/4 Hard, 175 ksi (1207 MPa) Tensile Strength
(Composition similar to UNS S30200)

RATIONALE

AMS5905D is the result of a Five-Year Review and update of the specification. The revision updates composition testing and reporting requirements (see 3.1 and 3.1.1), removes microhardness testing (see 3.3.2.1 from AMS5905C), adds strain rate control to tensile tests (see 3.3.1.2), clarifies bend test requirements (see 3.3.3), and updates the prohibition on exceptions to the product (see 1.1, 3.3.1.1, and 8.5).

1. SCOPE

1.1 Form

This specification covers a corrosion-resistant steel in the form of sheet and strip over 0.005 inch (0.13 mm) in nominal thickness.

1.2 Application

These products have been used typically in aircraft structural components requiring moderate forming and bending during fabrication and where corrosion resistance up to 800 °F (427 °C) is required, but usage is not limited to such applications.

1.2.1 Mechanical properties specified herein are obtained by cold working (strain hardening) and not by heat treatment. Therefore, the cold-worked product should not be heated to a temperature that adversely affects the mechanical properties or corrosion resistance before, during, or after fabrication.

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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS5905D

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2242 Tolerances, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium and Titanium Alloy Sheet, Strip, and Plate

AMS2248 Chemical Check Analysis Limits, Corrosion- and Heat-Resistant Steels and Alloys, Maraging and Other Highly Alloyed Steels, and Iron Alloys

AMS2371 Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock

AMS2807 Identification, Carbon and Low-Alloy Steels, Corrosion and Heat-Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing

AS7766 Terms Used in Aerospace Metals Specifications

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.

ASTM A370 Mechanical Testing of Steel Products

ASTM A751 Chemical Analysis of Steel Products

ASTM E140 Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness

ASTM E290 Bend Testing of Material for Ductility

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Composition shall conform to the percentages by weight shown in Table 1, determined in accordance with ASTM A751 or by other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.15
Manganese	--	2.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	17.00	19.00
Nickel	8.00	10.00
Molybdenum	--	0.75
Copper	--	0.75

3.1.1 The producer may test for any element not listed in Table 1 and include this analysis in the report of 4.4. Reporting of any element not listed in the composition table is not a basis for rejection unless limits of acceptability are specified by the purchaser.

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Condition

Sheet and strip shall be solution heat treated, descaled unless solution heat treatment is performed in an atmosphere yielding a bright finish, and cold rolled.

3.3 Properties

The product shall conform to the following requirements; tensile properties and hardness shall be determined in accordance with ASTM A370:

3.3.1 Tensile Properties

Tensile properties shall be as shown in Table 2 for product over 0.005 inch (0.13 mm) in nominal thickness.

3.3.1.1 Mechanical property requirements for product outside of the range covered by 1.1 shall be agreed upon between the producer and the purchaser and reported as in 4.4.1.

Table 2 - Minimum tensile properties

Property	Value
Tensile Strength	175 ksi (1207 MPa)
Yield Strength at 0.2% Offset	135 ksi (931 MPa)
Elongation in 2 Inches (50 mm) or 4D	
Nominal Thickness	
Over 0.005 to 0.015 inch	
(0.13 to 0.38 mm), incl	5%
Over 0.015 inch (Over 0.38 mm)	6%

3.3.1.2 Unless otherwise specified, the strain rate shall be set at 0.005 in/in/min (0.005 mm/mm/min) and maintained within a tolerance of ±0.002 in/in/min (±0.002 mm/mm/min) through 0.2% offset yield strain. After the yield strain, the speed of the testing machine shall be set between 0.05 in/in and 0.5 in/in (0.05 mm/mm and 0.5 mm/mm) of the length of the reduced parallel section (or distance between the grips for specimens not having a reduced section) per minute. Alternatively, an extensometer and strain rate indicator may be used to set the strain rate between 0.05 in/in/min and 0.5 in/in/min (0.05 mm/mm/min and 0.5 mm/mm/min). The requirement for compliance becomes effective for material produced 1 year after the publication date of this specification.

3.3.2 Hardness

Hardness shall be not lower than 37 HRC, or equivalent (see 8.2). The product shall not be rejected on the basis of hardness if the tensile properties of 3.3.1 are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

3.3.3 Bending

Product 0.050 inch (1.27 mm) and under in nominal thickness shall be tested in accordance with ASTM E290 using a sample prepared nominally 0.75 inch (19.0 mm) in width with its axis of bending parallel to the direction of rolling. Testing shall be performed at room temperature through the angle and around a bend diameter equal to the bend factor multiplied by the nominal thickness of the product, as shown in Table 3. The specimen shall exhibit no cracking when visually examined. In case of dispute, the results of tests using the guided bend test of ASTM E290 shall govern.

Table 3 - Bending

Nominal Thickness Inches	Nominal Thickness Millimeters	Angle Deg	Bend Factor
Up to 0.050, incl	Up to 1.27, incl	180	3

3.4 Quality

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

3.5 Tolerances

Tolerances shall conform to all applicable requirements of AMS2242.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

All technical requirements are acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling and Testing

Sampling and testing shall be in accordance with AMS2371.

4.4 Reports

The producer of the product shall furnish with each shipment a report showing the producer's name, the country where the metal was melted (e.g., final melt in the case of metal processed by multiple melting operations), the results of tests for composition of each heat and for tensile, hardness, and bending properties of each lot, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, heat and lot numbers, AMS5905D, size, and quantity.

4.4.1 When material produced to this specification has exceptions authorized by the purchaser taken to the technical requirements listed in Section 3 (see 5.1.1), the report shall contain a statement "This material is certified as AMS5905D(EXC) because of the following exceptions:" and the specific exceptions shall be listed.

4.5 Resampling and Retesting

Resampling and retesting shall be in accordance with AMS2371.