AEROSPACE MATERIAL SPECIFICATION

AMS5858™	REV. E

Issued 1979-10
Reaffirmed 2015-04
Revised 2021-04

Superseding AMS5858D

Steel, Corrosion and Heat Resistant, Sheet, Strip, and Plate
15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V
Multiple Melted, 1800 °F (982 °C) Solution Heat Treated, Welding Grade
Precipitation Hardenable

(Composition similar to UNS S66286)

RATIONALE

AMS5858E revises composition testing (3.1), updates condition (3.3.1), updates heat treatment (3.4), fixes Table 2B conversions, adds strain rate control to tensile testing (3.5.1.1.1, 3.5.2.1.1), adds country of origin (4.4), prohibits unauthorized exceptions (3.8, 4.4.1, 5.1.1, 8.6) allows prior revisions (8.4), and is the result of a Five-Year Review and update.

1. SCOPE

1.1 Form

This specification covers a corrosion and heat resistant steel in the form of sheet, strip, and plate.

1.2 Application

These products have been used typically for parts requiring high strength up to 1300 °F (704 °C) and oxidation resistance up to 1500 °F (816 °C), particularly those parts which are welded and then heat treated to develop required properties, but usage is not limited to such applications.

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)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS5858E/

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

AMS2750 Pyrometry

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

ARP1917 Clarification of Terms Used in Aerospace Metals Specifications

AS4194 Sheet and Strip Surface Finish Nomenclature

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 A480/A480M Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip

ASTM A751 Chemical Analysis of Steel Products

ASTM E112 Determining Average Grain Size

ASTM E139 Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials

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

3. TECHNICAL REQUIREMENTS

3.1 Composition

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

Table 1 - Composition

Element	Min	Max
Carbon	--	0.08
Manganese	--	0.35
Silicon	--	0.30
Phosphorus	--	0.020
Sulfur	--	0.010
Chromium	13.50	16.00
Nickel	24.00	27.00
Molybdenum	1.00	1.50
Titanium	1.90	2.35
Boron	0.0030	0.010
Vanadium	0.10	0.50
Cobalt	--	1.00
Aluminum	--	0.35

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Melting Practice

Steel shall be produced by multiple melting using consumable electrode practice in the remelt cycle.

3.3 Condition

The product shall be supplied in the following condition:

3.3.1 Sheet and Strip

Hot rolled or cold rolled, solution heat treated, and, unless solution heat treatment is performed in an atmosphere yielding a bright finish, descaled having a surface appearance in accordance with ASTM A480/A480M and AS4194, and conforming to 3.3.1.1 or 3.3.1.2 as applicable.

3.3.1.1 Sheet

Shall be No. 2D finish, except No. 2B finish may be supplied if acceptable to purchaser.

3.3.1.2 Strip

Shall be No. 1 strip finish.

3.3.2 Plate

Hot rolled, solution heat treated, and descaled.

3.4 Solution Heat Treatment

The product shall be heat treated as follows; pyrometry shall be in accordance with AMS2750.

3.4.1 The product shall be solution heat treated by heating in a suitable atmosphere to 1800 °F ± 25 °F (982 °C ± 14 °C), holding at heat for a time commensurate with section thickness, and cooling at a rate equivalent to a rapid air cool or faster.

3.4.2 Continuous Heat Treating

When continuous heat treating is used process parameters (e.g., furnace temperature set points, heat input, travel rate, etc.) for continuous heat treating lines shall be established by the material producer and validated by testing of product to the requirements of 3.5.

3.5 Properties

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

3.5.1 As Solution Heat Treated

3.5.1.1 Tensile Properties

Shall be specified in Table 2.

Table 2A - Tensile properties, inch/pound units

Nominal Thickness Inches	Tensile Strength ksi, Max	Elongation in 2 Inches or 4D %, Min
0.001 to 0.0015, incl	105	10
Over 0.0015 to 0.002, incl	105	12
Over 0.002 to 0.004, incl	105	20
Over 0.004	105	25

Table 2B - Tensile properties, SI units

Nominal Thickness Millimeters	Tensile Strength MPa, Max	Elongation in 50 mm or 4D %, Min
0.025 to 0.038, incl	724	10
Over 0.038 to 0.050, incl	724	12
Over 0.050 to 0.100, incl	724	20
Over 0.100	724	25

3.5.1.1.1 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. The strain rate after yield may be increased to any value up to 0.5 in/in/min (or mm/mm/min) or equivalent crosshead speed as a function of gage length.

3.5.1.2 Hardness

Should be not higher than 90 HRB, or equivalent (see 8.2), for product 0.030 inch (0.76 mm) and over in nominal thickness but the product shall not be rejected on the basis of hardness if the tensile properties are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or another sample with similar nonconforming hardness.

3.5.1.3 Bending

Product 0.749 inch (19.02 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 and shall withstand, without cracking, when bending at room temperature through the angle indicated in Table 3 around a diameter equal to the nominal thickness of the product.

Table 3 - Bending parameters

Nominal Thickness Inches	Nominal Thickness Millimeters	Angle Deg, Min
Up to 0.249, incl	Up to 6.32, incl	180
Over 0.249 to 0.749, incl	Over 6.32 to 19.02, incl	90

3.5.1.4 Average Grain Size

Shall be predominantly 5 or finer for product up to 0.1875 inch (4.762 mm), exclusive, in nominal thickness, determined in accordance with ASTM E112.

3.5.1.4.1 Grain size may be determined in the solution heat treated condition or after precipitation heat treatment at the option of the producer.

3.5.2 After Precipitation Heat Treatment

Product shall have the following properties after being precipitation heat treated by heating to 1325 °F ± 15 °F (718 °C ± 8 °C), holding at heat for not less than 16 hours, and cooling in air:

3.5.2.1 Tensile Properties

Shall be shown in Table 4.

Table 4A - Minimum tensile properties, inch/pound units

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
0.0010 to 0.0015, incl	125	95	4
Over 0.0015 to 0.002, incl	130	95	8
Over 0.002 to 0.004, incl	135	95	10
Over 0.004	140	95	15

Table 4B - Minimum tensile properties, SI units

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50 mm or 4D %
0.025 to 0.038, incl	862	655	4
Over 0.038 to 0.050, incl	896	655	8
Over 0.050 to 0.100, incl	931	655	10
Over 0.100	965	655	15

3.5.2.1.1 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. The strain rate after yield may be increased to any value up to 0.5 inch/inch/min (or mm/mm/min) or equivalent crosshead speed as a function of gage length.

3.5.2.2 Hardness

Should be 24 to 35 HRC, or equivalent (see 8.2), but the product shall not be rejected on the basis of hardness if the tensile properties are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or another sample with similar nonconforming hardness.