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

AEROSPACE MATERIAL SPECIFICATION

AMS 6386B
Superseding AMS 6386A
Issued 7-15-61
Revised 12-15-74

STEEL SHEET AND PLATE
Low Alloy, Heat Treated
90,000 psi (621 MPa) and 100,000 psi (690 MPa) Yield Strength

1. SCOPE:

1.1 Form: This specification covers high-strength, low-alloy steels in the form of sheet and plate up to 4.000 in. (101.60 mm) in nominal thickness.

1.2 Application: Primarily for large structural parts requiring a good combination of strength, formability, and weldability without subsequent heat treatment.

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, Pennsylvania 15096.

2.1.1 Aerospace Material Specifications:

AMS 2252 - Tolerances, Alloy Steel Sheet, Strip, and Plate
AMS 2259 - Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS 2350 - Standards and Test Methods
AMS 2370 - Quality Assurance Sampling of Carbon and Low-Alloy Steels, Wrought Products Except Forgings and Forging Stock

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

ASTM A370 - Mechanical Testing of Steel Products
ASTM E350 - Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

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

2.3.1 Federal Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the percentages by weight shown in Table I for any one of the several compositions specified therein for the indicated thicknesses, determined by wet chemical methods in accordance with ASTM E350, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods.

3.1.1 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2259.

3.2 Condition: Hardened, tempered, and descaled.

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

3.3.1 Tensile Properties: Shall be as specified in Table II.

TABLE II

Nominal Thickness Inches	Tensile Strength psi min	Tensile Strength psi max	Yield Strength at 0.2% Offset psi, min	Elongation in 2 in. or 4D %, min
Up to 2.500, incl	110,000	130,000	100,000	18
Over 2.500 to 4.000, incl	100,000	130,000	90,000	17

TABLE II (SI)

Nominal Thickness Millimetres	Tensile Strength MPa min	Tensile Strength MPa max	Yield Strength at 0.2% Offset MPa, min	Elongation in 50.8 mm or 4D %, min
Up to 63.50, incl	758	896	690	18
Over 63.50 to 101.60, incl	690	896	621	17

3.3.1.1 For product under 0.312 in. (7.92 mm) in nominal thickness, the elongation requirement shall be reduced by 1.25% for each decrease of 0.031 in. (0.79 mm) of nominal thickness under 0.312 in. (7.92 mm). This reduction in elongation requirement shall not exceed 3%.

3.3.2 Hardness: Should be as shown below, or equivalent; however, if the tensile property requirements are met, hardness determinations are not required and the product shall not be rejected on the basis of hardness if it is determined:

Nominal Thickness Inches	Nominal Thickness (Millimetres)	Hardness Brinell
Up to 0.1875, incl	(Up to 4.762, incl)	As agreed upon
Over 0.1875 to 2.500, incl	(Over 4.762 to 63.50, incl)	235 - 293
Over 2.500 to 4.000, incl	(Over 63.50 to 101.60, incl)	229 - 293

3.3.3 Bending: The product shall withstand, without cracking, bending through an angle of 180 deg (3.14 rad) around a diameter equal to the bend factor shown below times the nominal thickness of the product with the axis of bend parallel to the direction of rolling:

Nominal Thickness Inches	Nominal Thickness (Millimetres)	Bend Factor
Up to 1.000, incl	(Up to 25.40, incl)	2
Over 1.000 to 2.500, incl	(Over 25.40 to 63.50, incl)	3
Over 2.500 to 4.000, incl	(Over 63.50 to 101.60, incl)	4

3.3.4 Impact: The results of three Charpy "V" impact tests conducted at -50° F, + 0, -3 (-45.6° C, + 0, -1.7) shall meet either the absorbed energy or the lateral expansion requirements indicated in Table III. Lateral expansion shall be determined by measuring the increase in width of the surface contacted by the striking edge of the pendulum.

TABLE III

Nominal Thickness Inches	Specimen Size, mm	Minimum Average of 3 tests ft-lb	Minimum Single Value ft-lb	Minimum Lateral Expansion in.
0.250 to 0.375, excl	10 x 5	10.0	7.0	0.015
0.375 to 0.438, excl	10 x 7.5	12.5	8.5	0.015
0.438 to 2.500, excl	10 x 10	15	10	0.015

TABLE III (SI)

Nominal Thickness Millimetres	Specimen Size, mm	Minimum Average of 3 tests N·m	Minimum Single Value N·m	Minimum Lateral Expansion mm
6.35 to 9.52, excl	10 x 5	13.5	9.5	0.38
9.52 to 11.13, excl	10 x 7.5	17.2	11.5	0.38
11.13 to 63.50, excl	10 x 10	20.2	13.5	0.38

3.3.4.1 Impact values for plate 2.500 to 4.000 in. (63.50 to 101.60 mm), incl, in nominal thickness shall ø be as agreed upon by purchaser and vendor.

3.4 Quality: The product shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections, consistent with the type of steel involved, detrimental to fabrication or to performance of parts.

3.5 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2252.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as ø required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to assure that the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification, except as specified in 3.3.2, are classified as acceptance or routine control tests. ø

ø 4.3 Sampling: Shall be in accordance with AMS 2370 and the following:

4.3.1 Tensile test specimens shall be taken with axis of specimen perpendicular to the direction of rolling.

4.3.2 Impact specimens shall be prepared in accordance with ASTM A370, Type A (10 x 10 mm) except that specimen sizes from product under 0.438 in. (11.13 mm) in nominal thickness shall be subsize test specimens as shown in Table III. Specimens shall be cut with their long dimensions parallel to the direction of final rolling of the product. The base of the notch shall be perpendicular to the surface of the product.

4.4 Reports:

4.4.1 The vendor of the product shall furnish with each shipment three copies of a report of the results of tests for chemical composition of each heat in the shipment and the results of tests on each size from ø each heat to determine conformance to the tensile, bend, and impact requirements. This report shall include the purchase order number, heat number, material specification number and its revision letter, size, and quantity from each heat.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, 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.

ø 4.5 Resampling and Retesting: Shall be in accordance with AMS 2370.

5. PREPARATION FOR DELIVERY:

5.1 Identification: The product shall be identified as in 5.1.1 unless purchaser permits a method from 5.1.2.

5.1.1 Each sheet and plate shall be marked on one face, in the respective location indicated below, with AMS 6386B, heat number, manufacturer's identification, and nominal thickness. The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be capable of being removed in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the material or its performance and shall be sufficiently stable to withstand normal handling. The specification number, manufacturer's identification, and nominal thickness shall be continuously line marked; the heat number may be included in the line marking or may be marked at one location on each piece.

5.1.2 Flat Sheet and Plate: Shall be marked in lengthwise rows of characters recurring at intervals not greater than 3 ft (914 mm), the rows being spaced not more than 6 in. (152 mm) apart and alternately staggered.

5.1.2.1 When purchaser permits, each sheet and plate may be marked near one end with AMS 6386B, heat number, manufacturer's identification, and nominal thickness, using any suitable marking fluid. As an alternate method, individual pieces and bundles shall have attached a durable tag marked with the above information or shall be boxed and the box marked with the same information.

5.2 Protective Treatment: The product shall be oiled prior to shipment.

5.3 Packaging: The product shall be prepared for shipment in accordance with commercial practice to ø assure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

6. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS: Material not conforming to this specification or to authorized modifications will be subject to rejection.

8. NOTES:

8.1 Marginal Indicia: The phi (ø) symbol is used to indicate technical changes from the previous issue of this specification.