SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS-S-7947B

Issued 1998-12
Noncurrent 2002-09
Cancelled 2007-11

Superseding AMS-S-7947A

Steel, Sheet and Strip (1095) (Aircraft Quality)

RATIONALE

AMS-S-7947A has been designated cancelled as similar requirements are provided by ASTM A 684/ A684M, Grade 1095.

CANCELLATION NOTICE

This specification has been declared “CANCELLED” by the Aerospace Materials Division, SAE, as of November, 2007. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications indicating that it has been “CANCELLED”.

Cancelled specifications are available from SAE.

Similar but not necessarily identical products are covered in the following specification. However, this listing is provided for information only and does not constitute authority to substitute these specifications for the “CANCELLED” specification.

ASTM A684/A684M Standard Specification for Steel, Strip, High-Carbon, Cold-Rolled (Grade 1095)

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. SCOPE:

1.1 Scope:

This specification covers carbon steel (1095) sheet and strip of aircraft quality.

1.2 Classification:

The steel shall be furnished in one grade only, and in one of the following conditions, as specified (see 6.2):

Condition 1. Hot rolled and spheroidized annealed

Condition 2. Cold rolled and spheroidized annealed

Condition 3. Cold rolled and hardened

2. APPLICABLE DOCUMENTS:

The following publications, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

2.1 SAE Publication:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2301 Aircraft Quality Steel Cleanliness

2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-L-7870 Lubricating Oil, General Purpose, Low Temperature

FED-STD-151 Metals; Test Methods
FED-STD-183 Continuous Identification Marking of Iron and Steel Products

MIL-STD-163 Steel Mill Products Preparation for Shipment and Storage

AND10355 Tolerances-Carbon Steel Sheet and Strip

3. REQUIREMENTS:

3.1 Quality:

The steel shall comply with the size and frequency limits for magnetic indications as defined by Aeronautical Material Specification 2301.

3.2 Chemical composition:

The chemical composition shall be as specified in table I.

TABLE I - Chemical composition

Element	Range (percent)	Check analysis tolerance (percent)[1]
Carbon	0.90 - 1.03	-0.03,+0.06
Manganese	0.30 - 0.50	±0.03
Phosphorus	0.025 (max)	+0.01
Sulfur	0.025 (max)	+0.01
Silicon	0.15 - 0.30	±0.02
Nickel	0.25 (max)	+0.03
Chromium	0.20 (max)	+0.03
Molybdenum	0.06 (max)	+0.01

1/ Individual determinations may vary from the specified range to the extent shown in the check analysis column, except that elements in any heat shall not vary both above and below the specified range.

3.3 Hardness:

3.3.1 Annealed temper: The hardness of material in the annealed condition shall be not greater than Rockwell B85, or equivalent.

3.3.2 Hard temper: The hardness of condition 3 material shall be within the range of Rockwell C47 to C52, or equivalent.

3.4 Bending:

3.4.1 Annealed condition: Test specimens representing annealed materials shall, with the long axis of the specimen parallel to the direction of rolling, withstand without cracking, bending at room temperature through an angle of 180 degrees over a diameter equal to the thickness of the specimen. Test specimens with the long axis of the specimen perpendicular to the direction of rolling shall, withstand without cracking, cold bending through an angle of 180 degrees over a diameter equal to twice the thickness of the specimen.

3.4.2 Hard temper: Material or finished parts shall be capable of bending sufficiently to take a permanent deformation without cracking, with the axis of bend parallel to the direction of rolling.

3.5 Grain size:

Not less than 70 percent of the austenitic grains shall be of size No. 5 or finer, with grains as large as No. 3 permissible.

3.6 Decarburization:

Material shall be free from complete decarburization as determined microscopically. The increase in hardness from the surface to any point below the surface of an oil-quenched specimen shall be not more than two points on the Rockwell 30-N scale.

3.7 Structure:

Microscopic examination of etched specimens shall show freedom from segregation, complete decarburization, banding, or other injurious defects.

3.8 Tolerances:

The tolerances on dimensions shall be as specified on Standard AND 10355. Thickness measurements shall be taken 3/8 inch from the edge on strips and sheets 1 inch or more in width. For strips narrower than 1 inch, thickness tolerances shall apply at any point.

3.9 Product identification:

The marking of sheet and strip steel shall be in accordance with FED-STD-183, using a suitable marking fluid which is not soluble in water or lubricating oil conforming to Specification MIL-L-7870. The markings produced shall not rub off or be smeared by contact incident to normal handling during shipment and storage.

3.10 Workmanship:

All sheets and strips shall be of uniform quality and condition, and free from seams, laminations, blisters, cracks, and other injurious defects, shall be commercially flat, and have a smooth, clear, bright finish. Edges of the sheet or strip shall be straight and free from slivers, burrs, or fine cracks caused by shearing.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for inspection:

Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of tests:

All the tests required herein are classified as quality conformance tests, for which necessary sampling techniques and methods of testing are specified.

4.3 Sampling plans:

4.3.1 Sampling for chemical analysis: Sampling for chemical analysis shall be in accordance with Method 111 or 112 of FED-STD-151 to represent each heat of material.

4.3.1.1 Waiver: Samples for check chemical analysis may be waived at the discretion of the inspector, provided that all of the material under inspection can be identified as being made from a heat previously analyzed and found to be in conformance with the chemical composition specified herein.

4.3.2 Unidentifiable materials: Where the material is taken from stock and is not identifiable as to heat and method of manufacture, additional samples to determine conformance with the requirements specified herein shall be selected in accordance with table II to represent each size and thickness of sheet or strip to be supplied.

TABLE II. Sampling for unidentifiable materials

Lot size	Sample size	Acceptance number
1 to 15	All	0
16 to 180	15	0
181 to 300	35	0
301 to 500	50	1
Over 500	75	2

4.3.3 Sampling for hardness: At least five specimens shall be selected in accordance with Method 243 of FED-STD-151 from each lot of 200 sheets or less, or 10 coils or less of strip steel produced from the same heat and of the same thickness and temper.

4.3.4 Sampling for bend test (annealed material): At least two specimens shall be selected from each lot of 200 sheets or less, or 10 coils or less of strip steel produced from the same heat and of the same thickness and temper.

4.3.4.1 Preparation of specimens: Specimens shall conform to the requirements of Method 231 of FED-STD-151. The long axis of one specimen shall be parallel to the direction of rolling, and the long axis of the other specimen shall be perpendicular to the direction of rolling. Transverse specimens are not required for material 1/2 inch or less in width.

4.3.5 Microstructure: A sample shall be selected to represent each condition, thickness, and heat of flat rolled product.

4.4 Examinations:

4.4.1 Examination of product: Sheets and strips shall be carefully examined as necessary, to assure conformance with this specification with respect to tolerances, workmanship, and identification.

4.4.2 Packaging, packing, and marking: Preparation for delivery shall be inspected for conformance to section 5.

4.5 Test methods:

4.5.1 Chemical analysis: Specimens shall be analyzed in accordance with Method 111 or 112 of FED-STD-151. In the event of dispute, analysis shall be by Method 1.1, except for carbon, which shall be by the combustion method. Results of this test shall be within the limits specified in 3.2.

4.5.2 Hardness test: Specimens shall be subjected to the hardness test Method 243 of FED-STD-151, using the “B” scale for annealed materials and the “C” scale for hardened materials. On material less than 0.025 inch in thickness, the hardness shall be determined by an appropriate superficial hardness method acceptable to the procuring activity.

4.5.3 Bend test: Specimens shall be bent cold, either by pressure or blows, in accordance with Method 231 of FED-STD-151. In case of dispute, tests shall be made by pressure. The results of this test shall conform to the requirements of 3.4.

4.5.4 Microstructure: Specimens for microscopic examination shall have a prepared surface not less than 1 inch in length, and shall include the full thickness of the sheet or strip. One specimen shall have a prepared surface parallel to the direction of rolling, and the other specimen shall have a prepared surface perpendicular to the direction of rolling. Specimens for microscopic examination may be taken from bend test specimens. Specimens shall be suitably etched to reveal segregation, grain size, and the presence of defects or any decarburized zone.

4.5.4.1 Unless otherwise specified, the grain size shall be determined in accordance with Method 311 of FED-STD-151.