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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

# AEROSPACE MATERIAL SPECIFICATION

AMS 5040H
Superseding AMS 5040G

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## STEEL SHEET AND STRIP
## 0.15 max Carbon
## Deep Forming Grade

UNS G10100

1. SCOPE:

1.1 Form: This specification covers a carbon steel in the form of sheet and strip.

1.2 Application: Primarily for deep drawn and formed parts requiring a steel of high ductility.

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 SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2232 - Tolerances, Carbon 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, PA 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 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Federal Standards:

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

2.3.2 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, Ø 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 analytical methods approved by purchaser:

| | min | max |
|---|---|---|
| Carbon | -- | 0.15 |
| Manganese | 0.30 | 0.60 |
| Phosphorus | -- | 0.035 |
| Sulfur | -- | 0.040 |

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

3.2 Condition: Cold rolled.

3.3 Properties: The product shall conform to the following requirements; Ø hardness and bend tests shall be performed in accordance with ASTM A370:

3.3.1 Hardness: Shall be not higher than specified in the following table, or equivalent:

| Nominal Thickness | | |
|---|---|---|
| Inch | Millimetres | Maximum Hardness |
| 0.009 to 0.014, incl | 0.22 to 0.35, incl | 99 HV (1 kg Load) |
| Over 0.014 to 0.027, incl | Over 0.35 to 0.70, incl | 79 HR15T |
| Over 0.027 to 0.059, incl | Over 0.70 to 1.50, incl | 53 HR30T |
| Over 0.059 to 0.089, incl | Over 1.50 to 2.25, incl | 88 HRF |
| Over 0.089 | Over 2.25 | 55 HRB |

3.3.2 Bending: The product shall withstand, without cracking or producing an "orange peel" surface, bending at room temperature flat on itself with axis of bend parallel to the direction of rolling.

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

3.5 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2232.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all Ø samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical Ø requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling: Shall be in accordance with AMS 2370. Ø

4.4 Reports:

4.4.1 The vendor of the product shall furnish with each shipment three copies of a report showing the results of tests for chemical composition of each heat and the results of tests on each lot to determine conformance to the other technical requirements of this specification. This report shall include the purchase order number, lot number, AMS 5040H, size, and quantity.

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, AMS 5040H, 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 either a statement that the material conforms or copies of laboratory reports showing the results of tests to determine conformance.

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

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 strip shall be marked on one face, in the respective location indicated below, with AMS 5040H, manufacturer's identification, and nominal thickness. The characters shall be of such size as to be legible, shall be applied using a suitable marking fluid, and shall be removable in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the product 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.

5.1.1.1 Flat Strip 6 In. (150 mm) and Under in Width: Shall be marked in one or more lengthwise rows of characters recurring at intervals not greater than 3 ft (900 mm).

5.1.1.2 Flat Sheet and Flat Strip Over 6 In. (150 mm) in Width: Shall be marked in lengthwise rows of characters recurring at intervals not greater than 3 ft (900 mm), the rows being spaced not more than 6 in. (150 mm) apart and alternately staggered.

5.1.1.3 Coiled Sheet and Strip: Shall be marked near both the outside and Ø inside ends of the coil; the markings shall be applied as in 5.1.1 or shall appear on a durable tag or label attached to the coil and marked with the information of 5.1.1. When the inside end of the coil is inaccessible, as when the product is wound on cores, the tag or label may be attached to the core.

5.1.2 When purchaser permits, each sheet and strip shall be marked near one end, coils being marked near the outside end, with AMS 5040H, 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:

5.3.1 The product shall be prepared for shipment in accordance with commercial Ø practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.3.2 For direct U.S. Military procurement, packaging shall be in accordance Ø with MIL-STD-163, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.3.1 will be acceptable if it meets the requirements of Level C.

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