

Carbon Steel, Sheet, Strip, and Plate
(SAE 1020 and 1025)
Annealed

(Composition similar to UNS G10200 and G10250)

RATIONALE

AMS5046D results from a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers two types of carbon steel in the form of sheet, strip, and plate.

1.2 Application

These products have been used typically for use in fabrication of fittings, but usage is not limited to such applications. These products are not typically used for deep forming or cupping operations.

1.3 Classification

The steels covered by this specification are classified as follows:

Type 1 0.17 to 0.23 Carbon (SAE 1020)

Type 2 0.22 to 0.28 Carbon (SAE 1025)

1.3.1 Unless a specific type is ordered, either type may be supplied.

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.

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2.1 SAE Publications

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

AMS2232	Tolerances, Carbon Steel, Sheet, Strip, and Plate
AMS2259	Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS2370	Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel 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
AMS-H-6875	Heat Treatment of Steel Raw Materials

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 A 370	Mechanical Testing of Steel Products
ASTM E 112	Determining Average Grain Size
ASTM E 290	Bend Testing of Material for Ductility
ASTM E 350	Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

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 E 350, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - COMPOSITION

Grade	1020	1020	1025	1025
	Type 1	Type 1	Type 2	Type 2
Element	min	max	min	max
Carbon	0.17	0.23	0.22	0.28
Manganese	0.30	0.60	0.30	0.60
Phosphorus	--	0.040	--	0.040
Sulfur	--	0.050	--	0.050

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS2259.

3.2 Condition

The product shall be supplied in the following condition; annealing shall be performed in accordance with AMS-H-6875 as specified for alloy 1025 for both Type 1 and Type 2.

3.2.1 Sheet and Strip

Hot or cold rolled, annealed, and cold finished.

3.2.2 Plate

Hot rolled, annealed, and descaled.

3.2.2.1 If allowed by the purchaser, cold rolled, annealed if necessary and descaled as necessary, having hardness not higher than 25HRC, or equivalent (See 8.2).

3.3 Properties

The product shall conform to the following requirements; tensile tests shall be performed in accordance with ASTM A 370:

3.3.1 Tensile Properties

Shall be as shown in Table 2:

TABLE 2 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	55 ksi (379 MPa)
Yield Strength at 0.2% Offset	36 ksi (248 MPa)
Elongation in 2 inches (50.8 mm) or 4D	22%

3.3.1.1 For each 2 ksi (13.8 MPa) in excess of 55 ksi (379 MPa) tensile strength, a reduction in elongation of 1% to a minimum of 10% is permissible.

3.3.2 Bending

Sheet and strip shall be tested in accordance with ASTM E 290 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 and bend radius shown in Table 3. In case of dispute, the results of tests using the guided bend test of ASTM E 290 shall govern.

TABLE 3 - Bend Requirements

Bend Angle Degrees	Bend Radius t = nominal thickness
180	1/2t

3.3.3 Average Grain Size

Shall be ASTM No. 5 or finer, determined in accordance with ASTM E 112.

3.4 Quality

The product, as received by 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

Shall conform to all applicable requirements of AMS2232.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. 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

Shall be in accordance with AMS2370 and the following:

4.3.1 When a statistical sampling plan has been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3, and the report of 4.4 shall state that such plan was used.

4.4 Reports

The vendor of the product shall furnish with each shipment a report showing the results of tests for composition of each heat and for tensile properties, bending and average grain size 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, AMS5046D, size, product form, and quantity.

4.5 Resampling and Retesting

Shall be in accordance with AMS2370.

5. PREPARATION FOR DELIVERY

5.1 Identification

Shall be in accordance with AMS2807.

5.2 Protective Treatment

Product shall be protected from corrosion prior to shipment.

5.3 Packaging

The product shall be prepared for shipment in accordance with commercial 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.

6. ACKNOWLEDGMENT

A vendor shall include this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS

Product not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection.