



Designation: A1031/A1031M – 12

Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Alloy, Drawing Steel and Structural Steel, Hot-Rolled¹

This standard is issued under the fixed designation A1031/A1031M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification covers hot-rolled, heavy thickness coils beyond the size limits of Specifications [A506](#) and [A507](#).

1.2 The product is available in three designations: Alloy Steel, Drawing Steel, and Structural Alloy Steel.

1.3 Alloy steel is furnished to chemical composition requirements and is intended primarily for general or miscellaneous use where bending and moderate forming is a requirement.

1.4 Drawing steel is produced principally for applications involving severe cold plastic deformation such as deep drawn or severely formed parts.

1.4.1 Drawing steel may be furnished in several conditions, heat treatments, surface finishes, and edges, as specified herein.

1.5 Structural steel is furnished to chemical composition requirements and to specific mechanical property requirements which may include tension tests, hardness tests, or other commonly accepted mechanical tests.

1.5.1 The formability of structural steel decreases with increasing yield strength or hardness. Therefore, product design in relation to the mechanical properties of the grade used must be considered.

1.6 This material is available only in coils described as follows:

| Product | Size Limits, Coils Only | |
|---------|---|---|
| | Width, in. [mm] | Thickness, in. [mm] |
| Strip | Over 8 to 12, incl [Over 200 to 300] | 0.230 to 1.000, incl [Over 6.0 to 25] |
| Sheet | Over 12 [Over 300] | 0.230 to 1.000, incl [from 6.0 through 25] |

1.7 Sheet and strip in coils of sizes noted in 1.6 are covered by this specification only with the following provisions:

1.7.1 The material is not to be converted into steel plates for structural or pressure vessel use unless tested in complete accordance with the appropriate sections of Specifications

[A6/A6M](#) (plates provided from coils) or [A20/A20M](#) (plates produced from coils). A plate produced in this manner is no longer governed by this sheet steel specification and since this material is now plate, the appropriate plate standard must now apply.

1.7.2 The dimensional tolerances of Specification [A635/A635M](#) are applicable to material produced to this specification.

1.7.3 The material is to be fed directly from coils into a blanking press, drawing or forming operation, tube mill, rolling mill, or sheared or slit into blanks for subsequent drawing or forming.

1.8 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.8.1 Within the text the SI units are shown in brackets.

2. Referenced Documents

2.1 *ASTM Standards*:²

[A6/A6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling](#)

[A20/A20M Specification for General Requirements for Steel Plates for Pressure Vessels](#)

[A370 Test Methods and Definitions for Mechanical Testing of Steel Products](#)

[A505 Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, General Requirements for](#)

[A506 Specification for Alloy and Structural Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled](#)

[A507 Specification for Drawing Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled](#)

¹ This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.19 on Steel Sheet and Strip.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard

TABLE 1 Standard Steels Commonly Produced for Alloy Steel Sheet and Strip

| Steel Designation No. | Chemical Composition Ranges and Limits, % (Heat Analysis) ^A | | | | | | | | |
|-----------------------|--|-----------|-------|-------|-----------------|-----------|-----------|-----------|-----------|
| | C | Mn | P | S | Si ^B | Ni | Cr | Mo | V |
| E3310 ^C | 0.08-0.13 | 0.45-0.60 | 0.025 | 0.025 | 0.15-0.30 | 3.25-3.75 | 1.40-1.75 | ... | ... |
| 4012 ^C | 0.09-0.14 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | ... | ... | 0.15-0.25 | ... |
| 4118 | 0.18-0.23 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.40-0.60 | 0.08-0.15 | ... |
| 4130 | 0.28-0.33 | 0.40-0.60 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.80-1.10 | 0.15-0.25 | ... |
| 4135 | 0.33-0.38 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.80-1.10 | 0.15-0.25 | ... |
| 4137 | 0.35-0.40 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.80-1.10 | 0.15-0.25 | ... |
| 4140 | 0.38-0.43 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.80-1.10 | 0.15-0.25 | ... |
| 4142 | 0.40-0.45 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.80-1.10 | 0.15-0.25 | ... |
| 4145 | 0.43-0.48 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.80-1.10 | 0.15-0.25 | ... |
| 4147 ^C | 0.45-0.50 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.80-1.10 | 0.15-0.25 | ... |
| 4150 | 0.48-0.53 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.80-1.10 | 0.15-0.25 | ... |
| 4320 | 0.17-0.22 | 0.45-0.65 | 0.025 | 0.025 | 0.15-0.30 | 1.65-2.00 | 0.40-0.60 | 0.20-0.30 | ... |
| 4340 | 0.38-0.43 | 0.60-0.80 | 0.025 | 0.025 | 0.15-0.30 | 1.65-2.00 | 0.70-0.90 | 0.20-0.30 | ... |
| E4340 | 0.38-0.43 | 0.65-0.85 | 0.025 | 0.025 | 0.15-0.30 | 1.65-2.00 | 0.70-0.90 | 0.20-0.30 | ... |
| 4520 ^C | 0.18-0.23 | 0.45-0.65 | 0.025 | 0.025 | 0.15-0.30 | ... | ... | 0.45-0.60 | ... |
| 4615 | 0.13-0.18 | 0.45-0.65 | 0.025 | 0.025 | 0.15-0.30 | 1.65-2.00 | ... | 0.20-0.30 | ... |
| 4620 | 0.17-0.22 | 0.45-0.65 | 0.025 | 0.025 | 0.15-0.30 | 1.65-2.00 | ... | 0.20-0.30 | ... |
| 4718 | 0.16-0.21 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | 0.90-1.20 | 0.35-0.55 | 0.30-0.40 | ... |
| 4815 | 0.13-0.18 | 0.40-0.60 | 0.025 | 0.025 | 0.15-0.30 | 3.25-3.75 | ... | 0.20-0.30 | ... |
| 4820 | 0.18-0.23 | 0.50-0.70 | 0.025 | 0.025 | 0.15-0.30 | 3.25-3.75 | ... | 0.20-0.30 | ... |
| 5015 | 0.12-0.17 | 0.30-0.50 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.30-0.50 | ... | ... |
| 5046 | 0.43-0.50 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.20-0.35 | ... | ... |
| 5115 | 0.13-0.18 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.70-0.90 | ... | ... |
| 5120 | 0.17-0.22 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.70-0.90 | ... | ... |
| 5130 | 0.28-0.33 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.80-1.10 | ... | ... |
| 5132 | 0.30-0.35 | 0.60-0.80 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.75-1.00 | ... | ... |
| 5140 | 0.38-0.43 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.70-0.90 | ... | ... |
| 5150 | 0.48-0.53 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.70-0.90 | ... | ... |
| 5160 | 0.56-0.64 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.70-0.90 | ... | ... |
| E51100 ^C | 0.95-1.10 | 0.25-0.45 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.90-1.15 | ... | ... |
| E52100 | 0.98-1.10 | 0.25-0.45 | 0.025 | 0.025 | 0.15-0.30 | ... | 1.30-1.60 | ... | ... |
| 6150 | 0.48-0.53 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.80-1.10 | ... | 0.15 min |
| 6158 ^C | 0.55-0.62 | 0.70-1.10 | 0.025 | 0.025 | 0.15-0.30 | ... | 0.90-1.20 | ... | 0.10-0.20 |
| 8615 | 0.13-0.18 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | ... |
| 8617 | 0.15-0.20 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | ... |
| 8620 | 0.18-0.23 | 0.70-0.90 | 0.035 | 0.035 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | ... |
| 8630 | 0.28-0.33 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | ... |
| 8640 | 0.38-0.43 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | ... |
| 8642 ^C | 0.40-0.45 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | ... |
| 8645 | 0.43-0.48 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | ... |
| 8650 ^C | 0.48-0.53 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | ... |
| 8655 | 0.501-0.59 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | ... |
| 8660 | 0.55-0.65 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.15-0.25 | ... |
| 8720 | 0.18-0.23 | 0.70-0.90 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | ... |
| 8735 ^C | 0.33-0.38 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | ... |
| 8740 ^C | 0.38-0.43 | 0.75-1.00 | 0.025 | 0.025 | 0.15-0.30 | 0.40-0.70 | 0.40-0.60 | 0.20-0.30 | ... |
| 9260 | 0.56-0.64 | 0.75-1.00 | 0.025 | 0.025 | 1.80-2.20 | ... | ... | ... | ... |
| 9262 ^C | 0.55-0.65 | 0.75-1.00 | 0.025 | 0.025 | 1.80-2.20 | ... | 0.25-0.40 | ... | ... |
| E9310 ^C | 0.08-0.13 | 0.45-0.65 | 0.025 | 0.025 | 0.20-0.35 | 3.30-35.0 | 1.00-1.40 | 0.08-0.15 | ... |

^A The chemical ranges and limits shown are subject to product analysis tolerances. See Specification A505.

^B Other silicon ranges are available. Consult the producer.

^C Not an SAE Steel Designation.

[A635/A635M Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for](#)

[E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)

3. General Requirements for Delivery

3.1 Material furnished under this specification shall conform to the applicable requirements of Specification A505, current edition, unless otherwise provided herein.

4. Ordering Information

4.1 Orders for material under this specification shall include the following information, as required, to adequately describe the desired material.

4.1.1 ASTM specification number and year of issue,

4.1.2 Classification of the material (hot-rolled sheet or hot-rolled strip),

4.1.3 Chemical composition (grade),

4.1.4 Condition—Material in accordance with this specification is furnished in the hot rolled condition. Pickled (or blast cleaned) must be specified if required. Material ordered as pickled (or blast cleaned) will be oiled unless ordered dry,