



Designation: A 1018/A 1018M – 01a

## Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, Columbium or Vanadium, and High-Strength Low-Alloy with Improved Formability<sup>1</sup>

This standard is issued under the fixed designation A 1018/A 1018M; 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 ( $\epsilon$ ) 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 specification A 1011.

1.2 The product is available in three designations: Structural Steel; High-Strength Low-Alloy Steel, Columbium or Vanadium; and High-Strength Low-Alloy Steel with Improved Formability.

1.3 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 to 48, incl [Over 300 to 1200]	0.230 to 1.000, incl [Over 6.0 to 25]
Sheet	Over 48 [Over 1200]	0.180 to 1.000, incl [Over 4.5 to 25]

1.4 Sheet and strip in coils of sizes noted in 1.3 are covered by this specification only with the following provisions:

1.4.1 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 A 6/A 6M (plates provided from coils) or A 20/A 20M (plates produced from coils). 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.

1.4.2 This specification is not applicable to the steels covered by Specification A 635/A 635M.

1.4.3 The dimensional tolerances of Specification A 635/A 635M are applicable to material produced to this specification.

1.4.4 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.

1.4.5 Not all strength levels are available in all thicknesses. The user should consult the producer for appropriate size limitations.

1.5 The values stated in either inch-pound units or SI units [metric] are to be regarded separately as standard. Within the text the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- A 6/A 6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling<sup>2</sup>
- A 20/A 20M Specification for General Requirements for Steel Plates for Pressure Vessels<sup>2</sup>
- A 370 Test Methods and Definitions for Mechanical Testing of Steel Products<sup>3</sup>
- A 1011 Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon and Structural, and High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability<sup>3</sup>
- A 635/A 635M Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled<sup>3</sup>
- A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products<sup>3</sup>
- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications<sup>4</sup>
- G 101 Guide for Estimating the Atmospheric Corrosion Resistance of Low-Alloy Steels<sup>5</sup>

### 3. General Requirements for Delivery

3.1 Material furnished under this specification shall conform to the applicable requirements of the current edition of

<sup>1</sup> 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.

Current edition approved Sept. 10, 2001. Published October 2001. Last previous edition A 1018/A 1018M-01.

<sup>2</sup> Annual Book of ASTM Standards, Vol 01.04.

<sup>3</sup> Annual Book of ASTM Standards, Vol 01.03.

<sup>4</sup> Annual Book of ASTM Standards, Vol 14.02.

<sup>5</sup> Annual Book of ASTM Standards, Vol 03.02.

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Specification A 635/A 635M, unless otherwise provided herein.

#### 4. Classification

4.1 Heavy thickness coils are available in the following designations:

4.1.1 *Structural Steel*—(SS grades 30[205], 33[230], 36[250] and 40[275]).

4.1.1.1 This material is intended for structural purposes where mechanical test values are required.

4.1.2 *High-Strength Low-Alloy Steel*—(HSLAS grades 45[310], 50[340], 55[380], 60[410], 65[450], 70[480]) in Classes 1 and 2.

4.1.2.1 This material is intended for miscellaneous applications where greater strength and savings in weight are important. The material is available in two classes. They are similar in strength level, except that Class 2 offers improved weldability and more formability than Class 1. Atmospheric corrosion resistance of these steels is equivalent to plain carbon steels. With copper specified, the atmospheric corrosion is somewhat enhanced.

4.1.3 *High-Strength Low-Alloy with Improved Formability*—(HSLAS-F grades 50[340], 60[410], 70[480], 80[550]).

4.1.3.1 This material has improved formability when compared with HSLAS. The steel is killed and made to a fine ferritic grain practice and includes microalloying elements such as columbium, titanium, vanadium, zirconium, etc. The steel may be treated to achieve inclusion control. The material is intended for miscellaneous applications where higher strength, savings in weight, improved formability, and weldability are important. Atmospheric corrosion resistance of these steels is equivalent to plain carbon steels. With copper specified, the atmospheric corrosion resistance is somewhat enhanced.

NOTE 1—For methods of establishing the atmospheric corrosion resistance of low-alloy steels, see Guide G 101.

#### 5. Ordering Information

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

5.1.1 ASTM specification number and year of issue.

5.1.2 Name of material and designation (hot-rolled steel sheet or hot-rolled strip) (include grade and, as appropriate, type and class for SS, HSLAS, and HSLAS-F) (see section 4.1).

5.1.2.1 For HSLAS, when a class is not specified class 1 will be furnished) (see section 4.1),

5.1.3 Copper bearing, (if required),

5.1.4 *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,

5.1.5 Type of edge must be specified for hot rolled sheet coils and strip coils, either mill edge or cut edge (sheet), mill edge or slit edge (strip),

5.1.6 Dimensions (decimal thickness and width of material),

5.1.6.1 As agreed upon between the purchaser and the

producer, material ordered to this specification will be supplied to meet the appropriate standard or restricted thickness tolerances shown in Specification A 635/A 635M,

NOTE 2—Not all producers are capable of meeting all the limitations of the thickness tolerance tables in Specification A 635/A 635M. The purchaser should contact the producer regarding possible limitations prior to placing an order.

5.1.7 Coils size and weight requirements (must include inside diameter (ID), outside diameter (OD), and maximum weight,

5.1.8 Quantity (weight),

5.1.9 Application (part identification and description).

5.1.10 Special requirements, if required, or supplementary requirements S1 for HSLAS,

5.1.11 A report is required of heat analysis and mechanical properties as determined by the tension test.

NOTE 3—A typical ordering description is as follows: (inch pound units) ASTM A 1018/A 1018M: Grade 50, High-Strength, Low-Alloy, Class 2, hot rolled sheet coils, pickled and oiled, cut edge, 0.500 by 40 in. by coil; ID 24 in. , OD 72 in., maximum; coil weight 40 000 lb., maximum; 200 000 lb. for roll forming shapes; (SI units) ASTM A 1018/A 1018M: Grade 345, High-Strength Low-Alloy, Class 2, hot-rolled sheet coils, pickled and oiled, cut edge; 10 mm by 900 mm by coil; ID 600 mm , OD 1800 mm, maximum; coil weight 18 000 kg maximum; 90 000 kg for roll forming shapes.

#### 6. Chemical Composition

6.1 The heat analysis of the steel shall conform to the requirements of Table 1.

6.1.1 Chemical analysis shall be conducted in accordance with Test Method A 751.

6.1.2 Each of the elements listed in Table 1 shall be included in the report of the heat analysis. When the amount of copper, nickel, chromium, or molybdenum is less than 0.02 %, the analysis may be reported as less than (<) 0.02 %. When the amount of columbium, titanium, or vanadium is less than 0.008 %, the analysis may be reported as less than (<) 0.008 %.

6.1.3 For Structural Steel (SS) the addition of microalloying elements, including columbium, vanadium, or titanium, as well as nitrogen, as strength enhancers is prohibited.

6.1.4 When the steel is used in welded applications, the welding procedure selected shall be compatible with the chemical composition of the steel grade specified and the intended service.

#### 7. Mechanical Properties

7.1 Test specimen preparation and mechanical testing shall be in accordance with Test Method A 370.

7.2 *Tensile Properties*—The material as represented by the test specimens shall conform to the mechanical property requirements as stated in Table 2. These requirements do not apply to the uncropped ends of unprocessed coils.

7.3 *Tension Test Specimen Location and Orientation*—Tension test specimens shall be taken sufficiently far from the as hot-rolled coil ends so that the sample is representative of material which received the designed processing. The test shall be taken approximately midway between the center and edge of the material as rolled. For coils wider than 24 in. [600 mm], Tension test specimens shall be taken such that the longitudinal