



Designation: A1018/A1018M – 23a

Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawing, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength¹

This standard is issued under the fixed designation A1018/A1018M; 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 reappraisal. A superscript epsilon (ε) indicates an editorial change since the last revision or reappraisal.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers hot-rolled, heavy-thickness coils beyond the size limits of Specification **A1011/A1011M**.

1.2 The product is available in six designations: Commercial Steel, Drawing Steel, Structural Steel, High-Strength Low-Alloy Steel, High-Strength Low-Alloy Steel with Improved Formability, and Ultra-High Strength Steel.

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 [From 6.0 through 25]
Sheet	Over 12 [Over 300]	0.230 to 1.000, incl [From 6.0 through 25]

NOTE 1—The changes in width limits with the publication of **A635/A635M** – 06a result in a change in tensile testing direction for material from 0.180 in. [4.5 mm] to 0.230 in. exclusive [6.0 mm exclusive] over 48 in. [1200 mm] wide as that material is now covered by Specification **A568/A568M** – 06a. The purchaser is advised to discuss this change with the supplier.

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 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.

1.4.2 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). Plate converted from coils is no longer

governed by this sheet steel specification and since this material is now a plate, the requirements of the appropriate plate specification shall apply, except in cases where there is a conflict between the requirements of the plate specification and this specification. In these cases, the more restrictive limits of either specification shall apply.

1.4.3 The dimensional tolerances of Specification **A635/A635M** are applicable to material produced to this specification.

1.4.4 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 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.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²
A6/A6M Specification for General Requirements for 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

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
A568/A568M Specification for Steel, Sheet, Carbon,
 Structural, and High-Strength, Low-Alloy, Hot-Rolled and
 Cold-Rolled, General Requirements for
A572/A572M Specification for High-Strength Low-Alloy
 Columbium-Vanadium Structural Steel
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 Require-
 ments for
A751 Test Methods and Practices for Chemical Analysis of
 Steel Products
A941 Terminology Relating to Steel, Stainless Steel, Related
 Alloys, and Ferroalloys
A1011/A1011M Specification for Steel, Sheet and Strip,
 Hot-Rolled, Carbon, Structural, High-Strength Low-
 Alloy, High-Strength Low-Alloy with Improved
 Formability, and Ultra-High Strength
E29 Practice for Using Significant Digits in Test Data to
 Determine Conformance with Specifications
G101 Guide for Estimating the Atmospheric Corrosion Re-
 sistance of Low-Alloy Steels

3. Terminology

3.1 *Definitions*—For definitions of other terms used in this specification refer to Terminology **A941**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *inclusion control, n*—the process of reducing the volume fraction of inclusions or modifying the shape of inclusions to improve formability, weldability, and machinability.

3.2.1.1 *Discussion*—Inclusions, especially those elongated during the rolling process, create the conditions for initiating or propagating cracks, or both, when the material is stretched or bent during the manufacture of a part. The adverse effects of inclusions are minimized by reducing the content of inclusions in the steel, or by altering the shape of inclusions through the use of additions during the steelmaking process that change the elongated shape of the inclusions to less harmful small, well dispersed globular inclusions, or both.

4. General Requirements for Delivery

4.1 Material furnished under this specification shall conform to the applicable requirements of the current edition of Specification **A635/A635M**, unless otherwise provided herein.

5. Classification

5.1 Heavy thickness coils are available in the following designations:

5.1.1 *Commercial Steel (CS Types A, B, and C):*

5.1.1.1 *Commercial Steel*, CS Types A and B combined with chemistry grade in accordance with Specification **A635/A635M** Table X1.3. (CS Type A-1006, CS Type A-1008, and so forth).

5.1.1.2 *Commercial Steel Designations*, in accordance with Specification **A635/A635M** Table X1.1, with no type specified, (CS-1005, CS-1006, CS-1020, and so forth).

5.1.2 *Drawing Steel (DS Types A and B):*

5.1.2.1 *Drawing Steel*, DS Types A and B combined with chemistry grade per Specification **A635/A635M** Table X1.3. (DS Type A-1005, DS Type B-1006, and so forth.)

5.1.3 *Structural Steel*—(SS Grades 30[205], 33[230], 36[250] Types 1 and 2, 40[275], 45[310], 50 [340], and 55 [380]).

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

5.1.4.1 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.

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

5.1.5.1 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, and so forth. The steel shall 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 2—For methods of establishing the atmospheric corrosion resistance of low-alloy steels, see Guide **G101**.

5.1.6 *Ultra-High Strength Steel*—(UHSS Grades 90 [620] and 100 [690], Types 1 and 2).

5.1.6.1 This material has increased strength compared with HSLAS-F. The steel is killed and made to a fine ferritic grain practice, and includes microalloying elements such as columbium (niobium), titanium, vanadium, molybdenum, and so forth. The steel shall be treated to achieve inclusion control. The material is intended for miscellaneous applications where higher strength, savings in weight, 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.

5.1.7 When required for HSLAS, HSLAS-F, and UHSS steels, limitations on the use of one or more of the microalloy elements shall be specified on the order.

5.2 The limits for copper, chromium, nickel, and molybdenum are available in two levels, Limits A and Limits B (see Table 1).