Designation: A 852/A 852M – 03 (Reapproved 2007)

Standard Specification for Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi [485 MPa] Minimum Yield Strength to 4 in. [100 mm] Thick[1]

This standard is issued under the fixed designation A 852/A 852M; 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 quenched and tempered high-strength low-alloy structural steel plates for welded, riveted, or bolted construction. It is intended primarily for use in welded bridges and buildings where savings in weight, added durability, and good notch toughness are important. The atmospheric corrosion resistance of this steel in most environments is substantially better than that of carbon structural steels with or without copper addition (see Note 1). When properly exposed to the atmosphere, this steel can be used bare (unpainted) for many applications. Welding technique is of fundamental importance, and it is presupposed that the welding procedure will be suitable for the steel and the intended service. This specification is limited to material up to 4 in. [100 mm], inclusive, in thickness. See Appendix X3 of Specification A 6/A 6M for information on weldability.

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

1.2 Plates produced under this specification are impact tested at a temperature not higher than 50°F [10°C].

1.3 The values stated in inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each item are not exact equivalents. Therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with this specification.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 6/A 6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products

A 673/A 673M Specification for Sampling Procedure for Impact Testing of Structural Steel

G 101 Guide for Estimating the Atmospheric Corrosion Resistance of Low-Alloy Steels

3. General Requirements for Delivery

3.1 Material furnished under this specification shall conform to the requirements of the current edition of Specification A 6/A 6M, for the ordered material, unless a conflict exists in which case this specification shall prevail.

4. Materials and Manufacture

4.1 The steel shall be made to fine grain practice, and the fine austenitic grain size requirements of Specification A 6/A 6M shall be met.

5. Heat Treatment

5.1 The material shall be heat treated by the manufacturer by heating to a temperature that produces an austenitic structure, but not less than 1650°F [900°C], holding a sufficient time to attain uniform heat throughout the material, quenching in a suitable medium, and tempering at not less than 1100°F [593°C]. Heat treating temperatures shall be reported on the test certificates.

6. Chemical Composition

6.1 The heat analysis shall conform to the requirement prescribed in Table 1.

6.2 When product analysis is required, the steel shall conform on product analysis to the requirements prescribed in Table 1, subject to the product analysis tolerances in Specification A 6/A 6M.

6.3 The atmospheric corrosion-resistance index calculated on the basis of the heat analysis of the steel, as described in Guide G 101–Predictive Method Based on the Data of Larabee and Coburn, shall be 6.0 or higher.

[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 A01.02 on Structural Steel for Bridges, Buildings, Rolling Stock and Ships.

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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.**

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TABLE 1 Chemical Composition Requirements

Element	Composition, %
Carbon[A]	0.19 max
Manganese[A]	0.80–1.35
Phosphorus	0.035 max
Sulfur	0.04 max
Silicon	0.20–0.65
Nickel	0.50 max
Chromium	0.40–0.70
Copper	0.20–0.40
Vanadium	0.02–0.10

[A]For each reduction of 0.01 percentage point below the specified maximum for carbon, an increase of 0.06 percentage point above the specified maximum for manganese is permitted, up to a maximum of 1.50 %.

NOTE 2—The user is cautioned that the Guide G 101 (Predictive Method Based on the Data of Larabee and Coburn) for calculation of an atmospheric corrosion-resistance index has only been verified for the composition limits stated in that guide.

6.4 When required, the manufacturer shall supply evidence of corrosion resistance satisfactory to the purchaser.

7. Tensile Test Requirements

7.1 *Tension Tests*—The material as represented by the test specimens shall conform to the requirements specified in Table 2.

7.2 *Number of Tests*—One tension test shall be taken from a corner of each plate as heat treated. Plates wider than 24 in. [610 mm] shall be tested in the transverse direction and are subject to the modifications for elongation contained in Footnote C of Table 2.

TABLE 2 Tensile Requirements[A]

Yield strength, min, ksi [MPa][B]	70 [485]
Tensile strength, range, ksi [MPa]	90–110 [620–760]
Elongation in 2 in. [50 mm], min, %[C,D]	19

[A] See Specimen Orientation under the Tension Tests section of Specification A 6/A 6M.

[B]Measured at 0.2 % offset or 0.5 % extension underload.

[C]For thicknesses of ¾ in. [19 mm] and under, measured on 1½-in. [40-mm] wide full thickness rectangular specimen as shown in Fig. 3 of Test Methods A 370, the elongation is measured in a 2-in. [50 mm] gage length that includes the fracture and shows the greatest elongation.

[D]For plates wider than 24 in. [600 mm], the elongation requirement is reduced two percentage points. See Elongation Requirement Adjustments in the Tension Tests section of Specification A 6/A 6M.

8. Impact Test Requirements

8.1 Longitudinal Charpy V-notch impact tests shall be made in accordance with Test Frequency H of Specification A 673/A 673M. By agreement, Charpy V-notch impact tests may be made in accordance with Test Frequency P of Specification A 673/A 673M.

8.2 The tests results shall meet an average minimum value of 20 ft·lbf [27 J] at 50°F [10°C]. By agreement, a test temperature lower than 50°F [10°C] or an energy level greater than 20 ft·lbf, or both, may be specified.

9. Retest

9.1 The manufacturer may reheat treat plates that fail to meet the mechanical property requirements of this specification. All mechanical property tests shall be repeated when material is reheat treated.

SUPPLEMENTARY REQUIREMENTS

Supplementary requirements shall not apply unless specified in the purchase order or contract. Standardized supplementary requirements for use at the option of the purchaser are listed in Specification A 6/A 6M. Those that are considered suitable for use with this specification are listed by title.

S1. Vacuum Treatment,

S2. Product Analysis,

S3. Simulated Post-Weld Heat Treatment of Mechanical Test Coupons,

S6. Drop Weight Test (for Material 0.625 in. [16 mm] and Over in Thickness), and

S8. Ultrasonic Examination.

SUMMARY OF CHANGES

Committee A01 has identified the location of the following changes to this standard since A 852/A 852M – 01 that may impact the use of this standard.

(1) Table 1 has been revised.

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