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Standard Specification for High-Strength Low-Alloy Structural Steel Plate With Atmospheric Corrosion Resistance¹

This standard is issued under the fixed designation A871/A871M; 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 high-strength low-alloy steel plate intended for use in tubular structures and poles or in other suitable applications. Two grades, 60 and 65, may be provided as-rolled, normalized or quenched and tempered as required to meet the specified mechanical requirements.

1.2 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.

NOTE 1—For methods of estimating the atmospheric corrosion resistance of low-alloy steels, see Guide G101.

1.3 When the steel is to be welded, it is presupposed that welding procedures suitable for the grade of steel and intended use or service will be utilized. See Appendix X3 of Specification A6/A6M for information on weldability.

1.4 Supplementary requirements in accordance with Specification A6/A6M are available, but shall apply only when specified by the purchaser at time of ordering.

1.5 The values stated in either inch-pound units or SI units are to be regarded 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. Combining values from the two systems may result in nonconformance with the specification.

2. Referenced Documents

2.1 *ASTM Standards*:²

A6/A6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A673/A673M Specification for Sampling Procedure for Impact Testing of Structural Steel

G101 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 A6/A6M, 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.

5. Heat Treatment

5.1 Grade 65 in thicknesses of $\frac{3}{16}$ to $\frac{3}{4}$ in. [5 to 20 mm] and Grade 60 in thicknesses of $\frac{3}{16}$ to $1\frac{3}{8}$ in. [5 to 35 mm] are normally furnished in the as-rolled condition. The manufacturer has the option to heat treat this material to meet the mechanical requirements of Section 7. Quenched and tempered material shall be heat treated by heating to 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 [595°C]. Heat treating temperatures shall be reported on the test certificates.

5.2 The maximum thickness of plates is limited only by the capacity of the composition to meet the specified mechanical

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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.

requirements. The individual manufacturer shall be contacted to determine the actual maximum thickness for each grade and heat treatment method.

6. Chemical Requirements

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

6.2 The steel shall conform on product analysis to the chemical requirements of Table 1, subject to the product analysis tolerances in Specification A6/A6M.

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TABLE 1 Chemical Requirements (Heat Analysis)

Element	Composition, %			
	Type I	Type II	Type III	Type IV
Carbon ^A	0.19 max	0.20 max	0.15 max	0.17 max
Manganese ^A	0.80–1.35	0.75–1.35	0.80–1.35	0.50–1.20
Phosphorus	0.04 max	0.04 max	0.04 max 0.04 max	0.04 max
Phosphorus	0.04 max	0.04 max	0.04 max	0.04 max
Sulfur	0.05 max	0.05 max	0.05 max 0.05 max	0.05 max
Sulfur	0.05 max	0.05 max	0.05 max	0.05 max
Silicon	0.30–0.65	0.15–0.50	0.15–0.40	0.25–0.50
Nickel	0.40 max	0.50 max	0.25–0.50	0.40 max
Chromium	0.40–0.70	0.40–0.70	0.30–0.50	0.40–0.70
Molybdenum	0.10 max
Copper	0.25–0.40	0.20–0.40	0.20–0.50	0.30–0.50
Vanadium	0.02–0.10	0.01–0.10	0.01–0.10	...
Columbium	0.005–0.05 ^B

^AFor 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 %.

^B For plates under ½ in. [13 mm] in thickness, the minimum columbium is waived.