



# Standard Specification for Age-Hardening Low-Carbon Nickel-Copper-Chromium- Molybdenum-Columbium Alloy Structural Steel Plates<sup>1</sup>

This standard is issued under the fixed designation A 710/A 710M; 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.

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

## 1. Scope

1.1 This specification covers low-carbon age-hardening nickel - copper - chromium - molybdenum - columbium alloy steel plates for general applications.

1.2 One grade with three different conditions is provided as follows:

Grade and Class	Condition
Grade A, Class 1	as-rolled and precipitation heat treated
Grade A, Class 2	normalized and precipitation heat treated
Grade A, Class 3	quenched and precipitation heat treated

1.3 Grade A provides minimum yield strength levels ranging from 50 to 85 ksi [345 to 585 MPa], depending on thickness and condition.

1.4 Grade A, Class 1, plates are limited to a maximum thickness of 3/4 in. [20 mm]. The maximum thickness of Grade A, Classes 2 and 3, is limited only by the capacity of the composition to meet the specified mechanical property requirements; however, current practice normally limits the maximum thickness to 8 in. [200 mm].

1.5 Mandatory notch toughness requirements are specified for Grade A, Class 1.

1.6 When the steel is to be welded, it is presupposed that a welding procedure suitable for the grade of steel and intended use or service will be utilized. See Appendix X3 of Specification A 6/A 6M for information on weldability.

1.7 The values stated in either 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 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:

A 6/A 6M Specification for General Requirements for

Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling<sup>2</sup>

A 673/A 673M Specification for Sampling Procedure for Impact Testing of Structural Steel<sup>2</sup>

## 3. Terminology

### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *precipitation heat treatment*—a sub-critical temperature thermal treatment performed to cause precipitation of submicroscopical constituents, etc., so as to result in enhancement of some desirable property.

3.1.2 *soak*—to hold at temperature after the material has attained the temperature throughout.

## 4. General Requirements for Delivery

4.1 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.

## 5. Materials and Manufacture

5.1 The steel shall be made to fine grain practice.

## 6. Heat Treatment

6.1 Grade A, Class 1 material shall be precipitation heat treated in the temperature range from 1000 to 1300°F [540 to 705°C] for a time to be determined by the material manufacturer.

6.2 Grade A, Class 2 material shall be normalized at a temperature in the range from 1600 to 1700°F [870 to 930°C] and then precipitation heat treated at a temperature in the range from 1000 to 1300°F [540 to 705°C] for a time to be determined by the material manufacturer.

6.3 Grade A, Class 3 material shall be quenched in water or oil from a temperature in the range from 1600 to 1700°F [870 to 930°C] and then precipitation heat treated at a temperature in the range from 1000 to 1300°F [540 to 705°C] for a time to be determined by the material manufacturer.

6.4 If the purchaser elects to perform the thermal (heat) treatment, the material shall be accepted on the basis of mill tests from test coupons heat treated in accordance with the

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