



Standard Specification for Pressure Vessel Plates, Alloy Steel, Quenched and Tempered, Manganese-Molybdenum and Manganese-Molybdenum-Nickel¹

This standard is issued under the fixed designation A533/A533M; 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.

^{ε1} NOTE—Supplementary Requirement S14, Bend Test, was editorially removed in September 2004.

1. Scope

1.1 This specification² covers manganese-molybdenum and manganese-molybdenum-nickel alloy steel plates for use in the quenched and tempered condition for the construction of welded pressure vessels.

1.2 This specification includes four types of chemical analysis and three classes of strength levels as follows:

Type	Nominal Molybdenum Content, %	Nominal Nickel Content, %
A	0.50	0.11
B	0.50	0.55
C	0.50	0.85
D	0.50	0.30

Class	Tensile Strength, ksi [MPa]
1	80–100 [550 to 690]
2	90–115 [620 to 795]
3	100–125 [690 to 860]

1.3 The maximum thickness of Class 1 and Class 2 plates 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 12 in. [300 mm].

1.4 The maximum thickness of Class 3 plates is 2½ in. [65 mm].

1.5 The minimum nominal thickness of plates of all classes is 0.25 in. [6.5 mm].

1.6 These alloy steel plates in the as-rolled condition are sensitive to cracking during transit and handling, particularly in thicknesses over about 1 or 2 in. [25 or 50 mm]. They should be shipped in the as-rolled conditions only with the mutual agreement of manufacturer and fabricator.

1.7 Plates covered by this specification are often used in the beltline region of nuclear reactor vessels where the material properties may be affected by high levels of radiation. **Appendix X1** provides some information pertinent to this usage.

1.8 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:³

[A20/A20M Specification for General Requirements for Steel Plates for Pressure Vessels](#)

[A435/A435M Specification for Straight-Beam Ultrasonic Examination of Steel Plates](#)

[A577/A577M Specification for Ultrasonic Angle-Beam Examination of Steel Plates](#)

[A578/A578M Specification for Straight-Beam Ultrasonic Examination of Rolled Steel Plates for Special Applications](#)

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 A01.11 on Steel Plates for Boilers and Pressure Vessels.

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² For ASME Boiler and Pressure Vessel Code applications, see related Specification SA-533/SA-533M in Section II of that Code.

³ 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.