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

This standard is issued under the fixed designation A 302/A 302M; 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—Editorial corrections were made to this standard in August 1999.

1. Scope*

1.1 This specification² covers manganese-molybdenum and manganese-molybdenum-nickel alloy steel plates intended particularly for welded boilers and other pressure vessels.

1.2 Plates under this specification ~~is~~ are available in four grades having different strength levels as follows:

Grade	Tensile Strength, ksi [MPa]	Type
—A	—75–95 [515–655]	Mn-Mo-B
—B	—80–100 [550–690]	Mn-Mo-C
—C	—80–100 [550–690]	Mn-Mo-Ni
—D	—80–100 [550–690]	Mn-Mo-NiD

1.3 The maximum thickness of plates is limited only by the capacity of the chemical composition to meet the specified mechanical property requirements. The minimum thickness is limited to 0.25 in. [6.5 mm].

1.4 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

A 20/A 20M Specification for General Requirements for Steel Plates for Pressure Vessels

A 435/A 435M Specification for Straight-Beam Ultrasonic Examination of Steel Plates

A 577/A 577M Specification for Ultrasonic Angle-Beam Examination of Steel Plates

A 578/A 578M Specification for Straight-Beam Ultrasonic Examination of Rolled Steel Plates for Special Applications

3. General Requirements and Ordering Information

3.1 Material supplied to this material specification shall conform to Specification A20/A20M. These requirements outline the testing and retesting methods and procedures, permissible variations in dimensions, and mass, quality and repair of defects, marking, loading, etc.

3.2 Specification A20/A20M also establishes the rules for ordering information that should be complied with when purchasing material to this specification.

3.3 In addition to the basic requirements of this specification, certain supplementary requirements are available when additional control, testing, or examination is required to meet end use requirements. These include:

3.3.1 Vacuum treatment;

3.3.2 Additional or special tension testing;

¹ This specification is under the jurisdiction of ASTM Committee A-1A01 on Steel, Stainless Steel, 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-302/SA-302M in Section II of that Code.

³ Annual Book of ASTM Standards, Vol 01.04.

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.

*A Summary of Changes section appears at the end of this standard.

3.3.3 Impact testing, and

3.3.4 Nondestructive examination.

3.4 The purchaser is referred to the listed supplementary requirements in this specification and to the detailed requirements in Specification A20/A20M.

3.5 If the requirements of this specification are in conflict with the requirements of Specification A20/A20M, the requirements of this specification shall prevail. General Requirements and Ordering Information

3.1 Plates supplied to this product specification shall conform to Specification A 20/A 20M, which outlines the testing and retesting methods and procedures, permissible variations in dimensions and mass, quality and repair of defects, marking, loading, and so forth.

3.2 Specification A 20/A 20M also establishes the rules for ordering information that should be complied with when purchasing plates to this specification.

3.3 In addition to the basic requirements of this specification, certain supplementary requirements are available where additional control, testing, or examination is required to meet end use requirements.

3.4 The purchaser is referred to the listed supplementary requirements in this specification and to the detailed requirements in Specification A 20/A 20M.

3.5 Coils are excluded from qualification to this specification until they are processed into finished plates. Plates produced from coil means plates that have been cut to individual lengths from coil. The processor directly controls, or is responsible for, the operations involved in the processing of coils into finished plates. Such operations include decoiling, leveling, cutting to length, testing, inspection, conditioning, heat treatment (if applicable), packaging, marking, loading for shipment, and certification.

NOTE 1—For plates produced from coil and furnished without heat treatment or with stress relieving only, three test results are reported for each qualifying coil. Additional requirements regarding plates from coil are described in Specification A 20/A 20M.

TABLE 2 1 Tensile Requirements

Elements	Composition, %			
	Grade A	Grade B	Grade C	Grade D
Tensile strength, ksi [MPa]	75–95 [515–655]			
Carbon, max: ^A				
80–100	0.20	0.20	0.20	0.20
[550–690]				
80–100	0.20	0.20	0.20	0.20
80–100	0.23	0.23	0.23	0.23
[550–690]				
80–100	0.23	0.23	0.23	0.23
80–100	0.25	0.25	0.25	0.25
[80–100]				
80–100	0.25	0.25	0.25	0.25
Yield strength, min, ksi [MPa]	45 [310]	50 [345]		
Manganese:				
50	0.95–1.30	1.15–1.50	1.15–1.50	1.15–1.50
[345]				
50	0.95–1.30	1.15–1.50	1.15–1.50	1.15–1.50
50 [3	45]	1.07–1.62	1.07–1.62	1.07–1.62
50	0.87–1.41	1.07–1.62	1.07–1.62	1.07–1.62
Elongation in 8 in. [200 mm], min, % ^A	15	15	17	17
Phosphorus, max ^A	0.035	0.035	0.035	0.035
Elongation in 2 in. [50 mm], min, % ^A	0.035	0.035	0.035	0.035
Sulfur, max ^A	0.035	0.035	0.035	0.035
Silicon:				
19	0.15–0.40	0.15–0.40	0.15–0.40	0.15–0.40
18	0.13–0.45	0.13–0.45	0.13–0.45	0.13–0.45
Molybdenum:				
20	0.45–0.60	0.45–0.60	0.45–0.60	0.45–0.60
20	0.41–0.64	0.41–0.64	0.41–0.64	0.41–0.64
Nickel:				
Heat analysis	0.40–0.70	0.70–1.00
Product analysis	0.37–0.73	0.67–1.03

^ASee Specification A20/A20M for both elongation and product analyses.

3.6 If the requirements of this specification are in conflict with the requirements of Specification A 20/A 20M, the requirements of this specification shall prevail.