



Standard Specification for Pressure Vessel Plates, Alloy Steel, Molybdenum¹

This standard is issued under the fixed designation A 204/A 204M; 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 specification² covers molybdenum-alloy steel plates, intended particularly for welded boilers and other pressure vessels.

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

Grade	Tensile Strength, ksi [MPa]
A	65–85 [450–585]
B	70–90 [485–620]
C	75–95 [515–655]

1.3 The maximum thickness of 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 of plates furnished under this specification as follows:

Grade	Maximum Thickness, in. [mm]
A	6 [150]
B	6 [150]
C	4 [100]

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 this specification.

2. Referenced Documents

2.1 ASTM Standards:

A 20/A 20M Specification for General Requirements for Steel Plates for Pressure Vessels³

A 435/A 435M Specification for Straight-Beam Ultrasonic Examination of Steel Plates³

A 577/A 577M Specification for Ultrasonic Angle-Beam Examination of Steel Plates³

A 578/A 578M Specification for Straight-Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications³

3. 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, etc.

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.

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.

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.

Current edition approved Sept. 10, 2003. Published October 2003. Originally approved in 1937. Last previous edition approved in 1999 as A204/A 204M–93 (1999).

² For ASME Boiler and Pressure Vessel Code applications, see related Specification SA-204/SA 204M in Section II of that Code.

³ Annual Book of ASTM Standards, Vol. 01.04.

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

4. Materials and Manufacture

4.1 *Steelmaking Practice*—The steel shall be killed.

5. Heat Treatment

5.1 Plates 1½ in. [40 mm] and under in thickness are normally supplied in the as-rolled condition. The plates may be ordered normalized or stress relieved or both.

5.2 Plates over 1½ in. [40 mm] in thickness shall be normalized.

6. Chemical Requirements

6.1 The steel shall conform to the chemical requirements given in Table 1 unless otherwise modified in accordance with Supplementary Requirement S17, Vacuum Carbon-Deoxidized Steel, in Specification A 20/A 20M.

7. Mechanical Requirements

7.1 *Tension Test Requirements*—The plates, as represented by the tension-test specimens, shall conform to the requirements given in Table 2.

TABLE 1 Chemical Requirements

Element	Composition, %		
	Grade A	Grade B	Grade C
Carbon, max ^A :			
Up to 1 in. [25 mm] incl. in thickness	0.18	0.20	0.23
Over 1 in. to 2 in. [50 mm] incl. in thickness	0.21	0.23	0.26
Over 2 in. to 4 in. [100 mm] incl. in thickness	0.23	0.25	0.28
Over 4 in. [100 mm] in thickness	0.25	0.27	0.28
Manganese, max:			
Heat analysis	0.90	0.90	0.90
Product analysis	0.98	0.98	0.98
Phosphorous, max ^A	0.035	0.035	0.035
Sulfur, max ^A	0.035	0.035	0.035
Silicon:			
Heat analysis	0.15–0.40	0.15–0.40	0.15–0.40
Product analysis	0.13–0.45	0.13–0.45	0.13–0.45
Molybdenum:			
Heat analysis	0.45–0.60	0.45–0.60	0.45–0.60
Product analysis	0.41–0.64	0.41–0.64	0.41–0.64

^A Applies to both heat and product analyses.

TABLE 2 Tensile Requirements

	Grade A		Grade B		Grade C	
	ksi	[MPa]	ksi	[MPa]	ksi	[MPa]
Tensile strength	65–85	[450–585]	70–90	[485–620]	75–95	[515–655]
Yield strength, min ^A	37	[255]	40	[275]	43	[295]
Elongation in 8 in. [200 mm], min, % ^B	19		17		16	
Elongation in 2 in. [50 mm], min, % ^B	23		21		20	

^A Determined by either the 0.2 % offset method or the 0.5 % extension-under-load method.

^B See Specification A 20/A 20M for elongation adjustment.

SUPPLEMENTARY REQUIREMENTS

Supplementary requirements shall not apply unless specified in the purchase order.

A list of standardized supplementary requirements for use at the option of the purchaser is included in Specification A 20/A 20M. Those that are considered suitable for use with this specification are listed in this section by title.

- S1. Vacuum Treatment,
- S2. Product Analysis,
- S3. Simulated Post-Weld Heat Treatment of Mechanical Test Coupons,
- S4.1 Additional Tension Test,
- S5. Charpy V-Notch Impact Test,
- S6. Drop Weight Test,
- S7. High-Temperature Tension Test,

- S8. Ultrasonic Examination in accordance with Specification A 435/A 435M,
- S9. Magnetic Particle Examination,
- S11. Ultrasonic Examination in accordance with Specification A 577/A 577M,
- S12. Ultrasonic Examination in accordance with Specification A 578/A 578M, and
- S17. Vacuum Carbon-Deoxidized Steel.

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue (A 204/A 204M – 93 (1999)) that may impact the use of this standard.

(1) Added 3.5 and Note 1 to be consistent with the terminology and requirements of Specification A 20/A 20M. (2) 3.3 was revised to be more general.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).