



宇盛钢铁有限公司

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A204/A204M

Standard Specification for

Pressure Vessel Plates, Alloy Steel, Molybdenum

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

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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.

4. Materials and Manufacture

4.1 *Steelmaking Practice* The steel shall be killed.

5. Heat Treatment

5.1 Plates 1¹/₂ 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 1¹/₂ 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

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Over 2 in. to 4 in. [100 mm] incl. in thickness	0.23	0.25	0.28
Over 4 in. [100 mm] in thick- ness	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±8				75±9	
	5	[450±585]	70±90	[485±620]	5	[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	

SUPPLEMENTARY REQUIREMENTS

S1. Vacuum Treatment	S7.High-Temperature Tension Test
S2. Product Analysis	S8. Ultrasonic Examination in accordance with - A 435/A 435M
S3. Simulated Post-Weld Heat Treatment	S9.Magnetic Particle Examination
S4.1 Additional Tension Test	S11.Ultrasonic Examination in accordance with A 577/A 577M
S5.Charpy V-Notch Impact Test	S12.Ultrasonic Examination in accordance with A 578/A 578M
S6.Drop Weight Test	S17. Vacuum Carbon-Deoxidized Steel

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