SPECIFICATION FOR PRESSURE VESSEL PLATES, CARBON STEEL, LOW- AND INTERMEDIATE-TENSILE STRENGTH

SA-285/SA-285M

(Identical with ASTM Specification A285/A285M-17.)

Standard Specification for Pressure Vessel Plates, Carbon Steel, Low- and Intermediate-Tensile Strength

1. Scope

1.1 This specification covers carbon steel plates of low- and intermediate-tensile strengths which may be killed or semi-killed at the producer's option. These plates are intended for fusion-welded 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	45–65 [310–450]
B	50–70 [345–485]
C	55–75 [380–515]

1.3 The maximum thickness of plates is limited by the capacity of the composition to meet the specified mechanical property requirements.

NOTE 1—For killed carbon steels only, refer to the following ASTM specifications:
A299/A299M Specification for Pressure Vessel Plates, Carbon Steel, Manganese-Silicon
A515/A515M Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service
A516/A516M Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service

1.4 For plates produced from coil and furnished without heat treatment or with stress relieving only, the additional requirements, including additional testing requirements and the reporting of additional test results, of Specification A20/A20M apply.

1.5 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.

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*
A20/A20M Specification for General Requirements for Steel Plates for Pressure Vessels
A299/A299M Specification for Pressure Vessel Plates, Carbon Steel, Manganese-Silicon
A435/A435M Specification for Straight-Beam Ultrasonic Examination of Steel Plates
A515/A515M Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service
A516/A516M Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service
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

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, permitted variations in dimensions, and mass, quality and repair of defects, marking, loading, and ordering information.

3.2 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. The purchaser is referred to the

TABLE 1 Chemical Requirements

Elements	Composition, %		
	Grade A	Grade B	Grade C
Carbon, max[A]	0.17	0.22	0.28
Manganese, max:			
Heat analysis	0.90	0.90	0.90
Product analysis	0.98	0.98	0.98
Phosphorus, max[A]	0.025	0.025	0.025
Sulfur, max[A]	0.025	0.025	0.025

[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	45–65	[310–450]	50–70	[345–485]	55–75	[380–515]
Yield strength, min[A]	24	[165]	27	[185]	30	[205]
Elongation in 8 in. or [200 mm], min, %[B]	27		25		23	
Elongation in 2 in. or [50 mm], min, %[B]	30		28		27	

[A] Determined by either the 0.2 % offset method or the 0.5 % extension-under-load method.
[B] See Specification A20/A20M for elongation adjustment.

listed Supplementary requirements in this specification and to the detailed requirements in Specification A20/A20M.

3.3 Coils are excluded from qualification to this specification until they are processed into finished plate. 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 2—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 plate produced from coil are described in Specification A20/A20M.

3.4 If the requirements of this specification are in conflict with the requirements of Specification A20/A20M, the requirements of this specification shall prevail.

4. Heat Treatment

4.1 Plates are normally supplied in the as-rolled condition. The plates may be ordered normalized or stress relieved, or both.

5. Chemical Composition

5.1 The steel shall conform to the requirements as to chemical composition as given in Table 1.

6. Mechanical Properties

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

7. Keywords

7.1 carbon steel plate; low-and-intermediate strength steel plate for pressure vessels; steel plate for pressure vessels

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 A20/A20M. Those that are considered suitable for use with this specification are listed below by title.

S3. Simulated Post-Weld Heat Treatment of Mechanical Test Coupons,
S4. Additional Tension Test,
S8. Ultrasonic Examination in accordance with Specification A435/A435M,
S11. Ultrasonic Examination in accordance with Specification A577/A577M, and
S12. Ultrasonic Examination in accordance with Specification A578/A578M.

ADDITIONAL SUPPLEMENTARY REQUIREMENTS

Also listed below are additional optional supplementary requirements suitable for this specification:

S57. Copper-Bearing

S57.1 The copper content, by heat analysis shall be 0.20–0.35 % and by product analysis 0.18–0.37 %.

S58. Restricted Copper

S58.1 The maximum incidental copper content by heat analysis shall not exceed 0.25 %.