

Standard specification for pressure vessel plates, carbon steel, low – and intermediate – tensile strength (1)

This standard is issued under the fixed designation A 285/a 285m; the number immediately following the designation indicate the year of original adoption or, in the case revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (e) indicates an editorial change since the last revision reapproval.

This specification has been approved for use by agencies of the department of defense and for listing in the DoD index of specifications and standards.

1. Scope

- 1.1. This specification (2) covers carbon steel plate of low and intermediate- tensile strengths which may be made by killed, semi-killed, capped, or rimmed steel practices 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	45-63 [310-450]
B	50-70 [345-485]
C	55-75 [380-515]

- 1.3. The maximum thickness of plates under this specification, for reason internal soundness, is limited to a maximum thickness of 2 in. [50 mm] for all grades.

Note- For killed carbon steels only refer to the following ASTM specifications.

- A 299/A 299M Pressure vessel plates, carbon steel, manganese-silicon.
- A 515/A 515M Pressure vessel plates, carbon steel, for intermediate- and higher-temperature service.
- A 516/A 516M Pressure vessel plates, carbon steel, for intermediate- and higher-temperature service.

- 1.4. The values stated in the either inch-pound units or 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 Document

- 2.1. ASTM standard
A 20/a20m Specification for general requirements for steel plates for pressure vessels(3).

3. General Requirement

- 3.1. Material supplied to this material specification shall conform to specification A 20/A 20M. 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 A 20/A 20M also establishes the rules for the ordering information that should be complied with when purchasing material to the 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. The purchaser is referred to the listed supplementary requirements in specification A20/A 20M.
- 3.4. If the requirements of this specification are in conflict with the requirements of specification A20/A 20M, the requirements of this specification shall prevail.

5. Heat treatment

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

6. Chemical Requirements

- 6.1. The steel shall conform to the requirements as to chemical composition as shown in table 1.

6. Mechanical Requeriments

6.1. Tension tests:

6.1.1. Requirements:

6.1.1.1. The material as represented by the tension test specimens shall conform to the requirement shown in the Table 2

Table 1 Chemical requirements

Elements	Composition, %		
	Grade A	Grade B	Grade C
Carbon, max*	0.17	0.22	0.28
Manganese, max			+9
Heat analysis	0.90	0.90	0.90
Product analysis	0.98	0.98	0.98
Phosphorus, max*	0.035	0.035	0.035
Sulfur, max*	0.040	0.040	0.040

*Applies to both heat and product analyses

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TABLE 2 Tensile Requirements

	Grade A		Grade B		Grade C	
	ksi	[MPa]	ksi	[MPa]	Ksi	[MPa]
Tensile Strength	45-65	[310-450]	50-70	[354-485]	55-75	[380-515]
Yield Strenght, min*	24	[165]	27	[185]	30	[205]
Elogation in 8 in. or [200 mm], min, %*	27		25		23	
Elogation in 2 in. Or [50 mm], min, %°	30		28		27	

*Determined by either the 0.2% offset method or the 0.5% extension under-load method

° See specification A 20/ A 20M

(1) This specification is under the jurisdiction of ASTM committee A-1 on Steel, Stainless Steel and related alloys is the direct responsibility of subcommittee A01.11 on steel boilers and pressure vessels.

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(2) For ASME Boilers and pressure vessel code applications, see related specifications SA-285 in Section II of that code.

(3) Annual book of ASTM Standards, vol. 01.04

Supplementary requirements

Supplementary requirements shall not apply unless specified in the order.

A list of standardized supplementary requirements for uses at the option of the purchaser are includes in specification A 20/ A 20m. Those which 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, and

S14. Bend test.

Additional Supplementary requirements

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

S57. Coper-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

S581. The maximum incidental copper content by heat analysis shall not exceed 0.25%