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Standard Specification for Pressure Vessel Plates, Alloy Steel, Chromium- Molybdenum-Tungsten¹

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1. Scope*

1.1 This specification covers Chromium-Molybdenum-Tungsten alloy steel plates intended primarily for welded boilers and pressure vessels designed for elevated temperature service.

1.2 Plates are available under this specification in ~~three~~ grades having different alloy contents as follows:

Grade	Nominal Chromium Content, %	Nominal Molybdenum Content, %	Nominal Tungsten Content, %
23	2.25	0.20	1.60
911	9.00	1.00	1.00
<u>92</u>	<u>9.00</u>	<u>0.45</u>	<u>1.75</u>
122	12.00	0.40	2.00

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

1.4 The specification is expressed in both inch-pound units and in SI units. However, unless the order specifies the applicable “M” specification designation (SI units), the material shall be furnished to inch-pound units.

~~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.~~

1.5 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

[ASTM A1017/A1017M-11](https://standards.iteh.ai/ASTM/A1017/A1017M-11)

<https://standards.iteh.ai/catalog/standards/sist/9d909bfc-f8ee-4853-8176-361eb3099c3f/astm-a1017-a1017m-11>

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.

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

2. Referenced Documents

2.1 ASTM Standards:²

A20/A20M [Specification for General Requirements for Steel Plates for Pressure Vessels](#)

A435/A435M [Specification for Straight-Beam Ultrasonic Examination of Steel Plates](#)

~~A577/A577M [Specification for Ultrasonic Angle-Beam Examination of Steel Plates](#)~~ [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

3.1 Material supplied to this material specification shall conform to Specification A20/A20M. ~~Such requirements outline the testing and retesting methods and procedures, permissible variations in dimensions and weight [mass], quality and repair of defects, marking, loading, and so forth.~~

~~3.2 Specification. 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 listed supplementary requirements in this specification and to the detailed requirements in Specification A20/A20M ~~also establishes the rules for the 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. The purchaser is referred to the listed supplementary requirements in this specification and to the detailed requirements in Specification A20/A20M.~~

3.4 ~~3.3~~ If the requirements of this specification are in conflict with the requirements of Specification A20/A20M, 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 Except as allowed by 5.2 and 5.3, all plates shall be normalized at 1900 to 1975°F [1040 to 1080°C]. Plates for Grades 23, 92, and 122 shall be tempered at 1350 to 1470°F [730 to 800°C]. Grade 911 plates shall be tempered at 1365 to 1435°F [740 to 780°C].

5.2 If permitted by the purchaser, plates for Grades 23, 92, and 122 may be austenitized at 1900 to 1975°F [1040 to 1080°C], subjected to accelerated cooling from the austenitizing temperature by air blasting or liquid quenching, and then tempered at 1350 to 1470°F [730 to 800°C].

5.3 Plates ordered without the heat treatment required by either 5.1 or 5.2 shall be furnished in either the stress-relieved or annealed condition, and the purchaser shall be responsible for the heat treatment of such plates to conform to either 5.1 or 5.2.

6. Chemical Composition

6.1 The steel shall conform to the requirements for chemical composition given in Table 1.

7. Mechanical Properties

7.1 Tension Test:

7.1.1 The material as represented by the tension test specimens shall conform to the applicable requirements given in Table 2.

7.2 Hardness Test:

7.2.1 Grade 23 plates shall have a hardness not exceeding 220 HB [97HRB].

7.2.2 Grade 122 plates shall have a hardness not exceeding 250 HB [25HRC].

8. Marking

8.1 In addition to the marking required in Specification A20/A20M, each plate shall be legibly stamped or stenciled, dependent upon the ordered thickness, with the letter “N” for normalized and tempered, “Q” for accelerated cooled and tempered, “S” for stress relieved, or “A” for annealed, whichever is applicable.

9. Keywords

9.1 alloy steel; alloy steel plate; pressure containing parts; pressure vessel steels; steel plates; steel plates for pressure vessels

² 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.