Designation: A 844/A 844M – 93 (Reapproved 1999)

Standard Specification for Steel Plates, 9 % Nickel Alloy, for Pressure Vessels, Produced by the Direct-Quenching Process[1]

This standard is issued under the fixed designation A 844/A 844M; 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.

1. Scope

1.1 This specification covers 9 % nickel-alloy steel plates produced by the direct-quenching process. The plates are intended primarily for use in welded pressure vessels.

1.2 The direct-quenching process consists of quenching the plates directly after rolling, without permitting the plates to cool below the critical temperature prior to initiation of the quenching operation, and subsequently tempering the plates. (This differs from the "conventional" process in which the plates are permitted to cool to a temperature significantly below the critical temperature, usually to ambient temperature, prior to reheating to a temperature above the upper critical temperature, then quenching, and subsequently tempering.)

1.3 The maximum nominal thickness of plates furnished under this specification shall not exceed 2 in. [50 mm].

1.4 This material is susceptible to magnetization. Use of magnets in handling after heat treatment should be avoided if residual magnetism would be detrimental to subsequent fabrication or service.

1.5 The values stated in either inch-pound 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.

2. Referenced Documents

2.1 *ASTM Standards:*

A 20/A20M Specification for General Requirements for Steel Plates for Pressure Vessels[2]

A 435/A435M Specification for Straight-Beam Ultrasonic Examination of Steel Plates[2]

A 577/A577M Specification for Ultrasonic Angle-Beam Examination of Steel Plates[2]

A 578/A578M Specification for Straight-Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications[2]

3. General Requirements and Ordering Information

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, 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 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. These include:

3.3.1 Vacuum treatment,

3.3.2 Additional or special tension testing,

3.3.3 Additional or special impact testing, and

3.3.4 Nondestructive examination.

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 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. Manufacture

4.1 *Steelmaking Practice*—The steel shall be killed and shall conform to the fine austenitic grain size requirement of Specification A 20/A 20M.

4.2 *Heat Treatment*:

4.2.1 The plates shall be quenched directly after rolling, without being allowed to cool below 1205°F [650°C]. The quenching shall be initiated from a temperature within the range from 1205 to 1670°F [650 to 910°C]. (The temperature shall be reported in accordance with 19.2 of Specification A 20/A 20M.)

4.2.2 Subsequent to quenching, the plates shall be tempered within the range from 1050 to 1175°F [565 to 635°C], holding at that temperature for a minimum of 30 min/in. [1.2 min/mm]

[1] This specification is under the jurisdiction of ASTM Committee A-1 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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[2] *Annual Book of ASTM Standards*, Vol 01.04.