



Designation: A 353/A 353M – 93 (Reapproved 1999)

Standard Specification for Pressure Vessel Plates, Alloy Steel, 9 Percent Nickel, Double-Normalized and Tempered¹

This standard is issued under the fixed designation A 353/A 353M; 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 specification² covers 9 % nickel steel plates, double-normalized and tempered, intended particularly for welded pressure vessels for cryogenic service.

1.2 Plates produced under this specification are subject to impact testing at -320°F [-195°C] or at such other temperatures as are agreed upon.

1.3 The maximum thickness of plates is limited only by the capacity of the material to meet the specific mechanical property requirements; however, current mill practice normally limits this material to 2 in. [50 mm] max.

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 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.

2. Referenced Documents

2.1 ASTM Standards:

A 20/A20M Specification for General Requirements for Steel Plates for Pressure Vessels³

A 435/A435M Specification for Straight-Beam Ultrasonic Examination of Steel Plates³

A 577/A577M Specification for Ultrasonic Angle-Beam Examination of Steel Plates³

A 578/A578M Specification for Straight-Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications³

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 For ASME Boiler and Pressure Vessel Code applications, see related Specification SA-353/SA-353M in Section II of that Code.

³ *Annual Book of ASTM Standards*, Vol 01.04.

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, 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 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 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.

5. Heat Treatment

5.1 All plates shall be heat treated in accordance with 5.2. Shell plates and other parts, including heads and reinforcing pads, which are heated for forming, shall be heat treated after forming in accordance with 5.2.

5.2 *Heat Treatment Procedure:*

5.2.1 *First Normalizing Treatment*—Heat the plate to a uniform temperature of $1650 \pm 25^{\circ}\text{F}$ [$900 \pm 15^{\circ}\text{C}$], hold at this temperature for a minimum of 1 h/in. [2.4 min/mm] of thickness, but in no case less than 15 min, and cool in air.