



Standard Specification for Stainless Steel Bars for Compressor and Turbine Airfoils¹

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1. Scope

1.1 This specification covers stainless steel bars for compressor and turbine bucket, blade, and airfoil applications.

1.2 The values stated in inch-pound units are to be considered the standard.

2. Referenced Documents

2.1 ASTM Standards:

A 275/A 275M Test Method for Magnetic Particle Examination of Steel Forgings²

A 484/A 484M Specification for General Requirements for Stainless Steel Bars, Billets, and Forgings³

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment²

A 941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys⁴

E 112 Test Methods for Determining Average Grain Size⁵

E 292 Test Methods for Conducting Time-for-Rupture Notch Tension Tests of Materials⁵

E 381 Method of Macroetch Testing Steel Bars, Billets, Blooms, and Forgings⁵

E 562 Test Method for Determining Volume Fraction by Systematic Manual Point Count⁵

3. Terminology

3.1 Refer to Terminology A 941 for definitions of terms used in this standard.

4. Ordering Information

4.1 It is the responsibility of the purchaser to specify all requirements that are necessary for product under this specification. Such requirements to be considered may include but are not limited to the following:

4.1.1 Quantity (weight or number of pieces).

4.1.2 Grade and Class (Table 3).

4.1.3 Applicable dimensions including size, thickness, width, and length.

4.1.4 Whether bars are to be rolled as bars or cut from plate.

4.1.5 Supplementary Requirements.

5. General Requirements

5.1 Product furnished to this specification shall conform to the requirements of Specification A 484/A 484M including any supplementary requirements that are indicated in the purchase order. Failure to comply with the general requirements of Specification A 484/A 484M constitutes nonconformance with this specification.

5.2 In case of conflict between the requirements of this specification and Specification A 484/A 484M, this specification shall prevail.

6. Manufacture

6.1 *Melting Process*—The steel shall be made using the Basic Electric Furnace Process with Argon-Oxygen-Decarburization (AOD) refining or by Vacuum Ladle Degasing. Use of Electro-Slag Remelting is permitted unless otherwise specified by the purchaser (see Supplemental Requirement S1).

6.2 *Heat Treatment*—Heat treating of all bars is required in accordance with Table 1 to develop the required mechanical properties.

6.2.1 *Number of Heat Treatments*—Two complete heat treatments, consisting of an austenitize, quench and temper, are permitted. Purchaser approval is required prior to any additional heat treatments.

6.2.2 *Temperature Variation*—Heat treating temperatures shall be controlled in the range of $\pm 25^{\circ}\text{F}$.

6.3 *Stress Relief*—When heat treatment for mechanical properties is followed by straightening, a stress relieving heat treatment is required in accordance with Table 1.

6.3.1 *Quenching after Stress Relief*—Water or oil quenching of stress-relieved bars is prohibited.

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 A01.17 on Flat-Rolled and Wrought Stainless Steel.

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² *Annual Book of ASTM Standards*, Vol 01.05.

³ *Annual Book of ASTM Standards*, Vol 01.03.

⁴ *Annual Book of ASTM Standards*, Vol 01.01.

⁵ *Annual Book of ASTM Standards*, Vol 03.01.