



Designation: B462 – 26

Standard Specification for Forged or Rolled Nickel Alloy Pipe Flanges, Forged Fittings, and Valves and Parts for Corrosive High-Temperature Service ¹

This standard is issued under the fixed designation B462; 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 forged or rolled UNS N06030, UNS N06035, UNS N06022, UNS N06200, UNS N06059, UNS N10362, UNS N06686, UNS N10276, UNS N10665, UNS N10675, UNS N10629, UNS N08031, UNS N08034, UNS N08935, UNS N06045, UNS N06025, UNS N06699, and UNS R20033³ pipe flanges, forged fittings, and valves and parts intended for corrosive high-temperature service.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to become familiar with all hazards including those identified in the appropriate Safety Data Sheet (SDS) for this product/material as provided by the manufacturer, to establish appropriate safety, health, and environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This specification is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.07 on Refined Nickel and Cobalt and Their Alloys.

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² For ASME Boiler and Pressure Vessel Code applications see related Specification SB-462 in Section II of that Code.

³ New designation established in accordance with Practice E527 and SAE J1086, Practice for Numbering Metals and Alloys (UNS).

2. Referenced Documents

2.1 ASTM Standards:⁴

- A262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
- B166 Specification for Nickel-Chromium-Aluminum Alloy, Nickel-Chromium-Iron Alloys, Nickel-Chromium-Cobalt-Molybdenum Alloy, Nickel-Iron-Chromium-Tungsten Alloy, and Nickel-Chromium-Molybdenum-Copper Alloy Rod, Bar, and Wire
- B335 Specification for Nickel-Molybdenum Alloy Rod
- B408 Specification for Nickel-Iron-Chromium Alloy Rod and Bar
- B472 Specification for Nickel Alloy Billets and Bars for Reforging
- B473 Specification for Nickel-Iron-Chromium-Molybdenum-Copper Alloy Bar and Wire
- B574 Specification for Low-Carbon Nickel-Chromium-Molybdenum, Low-Carbon Nickel-Molybdenum-Chromium, Low-Carbon Nickel-Molybdenum-Chromium-Tantalum, Low-Carbon Nickel-Chromium-Molybdenum-Copper, and Low-Carbon Nickel-Chromium-Molybdenum-Tungsten Alloy Rod and Bar
- B581 Specification for Nickel-Chromium-Iron-Molybdenum-Copper Alloy Rod
- B649 Specification for Ni-Fe-Cr-Mo-Cu-N Low-Carbon Alloy and Cr-Ni-Fe-N Low-Carbon Alloy Bar and Wire, Ni-Cr-Fe-Mo-N Alloy Wire, and Ni-Fe-Cr-Mo-N Alloy Bar
- B880 Specification for General Requirements for Chemical Check Analysis Limits for Nickel, Nickel Alloys and Cobalt Alloys
- E8/E8M Test Methods for Tension Testing of Metallic Materials

⁴ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

B899 Terminology Relating to Non-ferrous Metals and Alloys

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

E1473 Test Methods for Chemical Analysis of Nickel, Cobalt, and High-Temperature Alloys

E1916 Guide for Identification of Mixed Lots of Metals

2.2 *ANSI Standard:*

B16.5 Steel Pipe Flanges and Flanged Fittings (for applicable alloy UNS N08020)⁵

2.3 *Manufacturers' Standardization Society of the Valve and Fittings Industry Standard:*

SP-25 Standard Marking System for Valves, Fittings, Flanges, and Unions⁶

3. Terminology

3.1 For definitions of terms used in this specification, refer to Terminology **B899**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *forgings, n*—the term forgings as used in this specification shall be understood to cover one or all of the products mentioned in **1.1**, either forged or rolled.

4. Ordering Information

4.1 It is the responsibility of the purchaser to specify all requirements that are necessary for material ordered under this specification. Examples of such requirements include, but are not limited to, the following:

- 4.1.1 Quantity (weight or number of pieces),
- 4.1.2 Name of material or UNS number,
- 4.1.3 Forging sketch when required (**5.2.4**),
- 4.1.4 Forging sectioning, if required (**5.2.3**),
- 4.1.5 ASTM designation and year of issue,
- 4.1.6 Inspection (**14.1**),
- 4.1.7 Supplementary requirements, if any, and
- 4.1.8 If possible, the intended end use.

NOTE 1—A typical ordering description is as follows: 200 forgings, UNS N10276, in accordance with the attached drawing and Specification B462.

5. Materials and Manufacture

5.1 *Discard*—A sufficient discard shall be made from each ingot to secure freedom from injurious piping and undue

segregation. The material shall have a homogeneous structure as shown by the macroetch test in **7.3**.

5.2 *Manufacturing Practice:*

5.2.1 Material for forging shall consist of a billet, bar, or forging produced in accordance with Specifications **B166**, **B335**, **B408**, **B462**, **B472**, **B473**, **B574**, **B581**, or **B649**.

5.2.2 The material shall be forged by hammering, pressing, rolling, extruding, or upsetting; it shall be brought as nearly as practicable to the finished shape and size by hot working; and shall be so processed as to cause metal flow during the hot-working operation in the direction most favorable for resisting the stresses encountered in service.

5.2.3 When specified in the order, a sample forging may be sectioned and etched to show flow lines and the condition as regards internal imperfections. In such cases, the question of acceptable and unacceptable character of metal flow shall be a subject for agreement between the manufacturer and the purchaser.

5.2.4 When specified in the order, the manufacturer shall submit for approval of the purchaser a sketch showing the shape of the rough forging before machining.

5.3 *Heat Treatment:*

5.3.1 The product of UNS N06022, UNS N06035, UNS N06030, UNS N06200, UNS N10362, UNS N10276, UNS N10665, UNS N10675, UNS N06699, UNS N08034, UNS N08935, and UNS R20033 alloys shall be furnished in the solution annealed condition.

NOTE 2—The recommended annealing temperatures all followed by water quenching or rapidly cooling by other means are: UNS N06030–2125 °F to 2175 °F (1163 °C to 1191 °C), UNS N06022–2025 °F to 2075 °F (1107 °C to 1135 °C), UNS N06035–2025 °F to 2075 °F (1107 °C to 1135 °C), UNS N06200–2075 °F to 2125 °F (1135 °C to 1163 °C), UNS N06059–2025 °F to 2125 °F (1107 °C to 1163 °C), UNS N10362–2075 °F to 2125 °F (1135 °C to 1163 °C), UNS N06686–2125 °F to 2225 °F (1163 °C to 1218 °C), UNS N10276–2025 °F to 2075 °F (1107 °C to 1135 °C), UNS N10665–1925 °F to 2000 °F (1052 °C to 1093 °C), UNS N10675–1925 °F to 2000 °F (1052 °C to 1093 °C), UNS N10629–1925 °F to 2000 °F (1052 °C to 1093 °C), UNS N08031–2050 °F to 2160 °F (1121 °C to 1182 °C) UNS N06045–2125 °F to 2190 °F (1163 °C to 1199 °C), UNS N06025–2175 °F to 2240 °F (1191 °C to 1227 °C), UNS N06699–1975 °F to 2065 °F (1080 °C to 1130 °C), UNS N08034–2085 °F (1140 °C) minimum, UNS N08935–1975 °F (1080 °C) minimum, and UNS R20033–2010 °F to 2150 °F (1100 °C to 1180 °C).

5.3.2 Heat treatment may be performed before machining.

6. Chemical Composition

6.1 The material shall conform to the requirements as to chemical composition prescribed in **Table 1**.

⁵ Available from American National Standards Institute (ANSI), 1180 Avenue of the Americas, 10th Floor, New York, NY 10036, <http://www.ansi.org>.

⁶ Available from Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park St., NE, Vienna, VA 22180-4602, <http://www.mss-hq.com>.