
This standard is issued under the fixed designation B581; 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.

ε1 NOTE—Chemistry for N08031 molybdenum in Table 1 was corrected editorially in February 2013.

1. Scope

1.1 This specification2 covers rod of Ni-Cr-Fe-Mo-Cu alloys (UNS N06007, N06975, N06985, N06030, and N08031)* as shown in Tables 1-3, for use in general corrosive service.

1.2 The following products are covered under this specification:

1.2.1 Rods ⅛ to ⅜ in. (7.94 to 19.05 mm) excl in diameter, hot- or cold-finished, solution annealed and pickled or mechanically descaled.

1.2.2 Rods ⅜ to ⅞ in. (19.05 to 88.9 mm) incl in diameter, hot- or cold-finished, solution annealed, ground or turned.

1.3 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.

1.4 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 Material Safety Data Sheet (MSDS) for this product/material as provided by the manufacturer, to establish appropriate safety and health practices, and to determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:

B880 Specification for General Requirements for Chemical Check Analysis Limits for Nickel, Nickel Alloys and Cobalt Alloys

E8 Test Methods for Tension Testing of Metallic Materials

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition

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

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 rod, n—material of round solid section furnished in straight lengths.

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 Alloy—Table 1.

4.1.2 Dimensions—Nominal diameter and length. The shortest useable multiple length shall be specified (Table 4).

4.1.3 Certification—State if certification or a report of test results is required (Section 16).

4.1.4 Purchaser Inspection—State which tests or inspections are to be witnessed (Section 14).

4.1.5 Samples for Product (Check) Analysis—State whether samples shall be furnished (10.2.2).

5. Chemical Composition

5.1 Heat Analysis—The material shall conform to the composition limits specified in Table 1.

5.2 Product (Check) Analysis—If a product (check) analysis is made by the purchaser, the material shall conform to the requirements specified in Table 1 subject to the permissible tolerances in Specification B880.

6. Mechanical and Other Requirements

6.1 The material shall conform to the requirements of Table 2.
7. Straightness

7.1 The maximum curvature (depth of cord) shall not exceed 0.050 in. multiplied by the length in feet (0.04 mm multiplied by the length in centimetres).

8. Permissible Variations in Dimensions

8.1 Diameter—The permissible variations from the specified diameter and out-of-roundness shall be as prescribed in Table 3.

8.2 Machining Allowances—When the surfaces of finished material are to be machined, the following allowances are suggested for normal machining operations:

8.2.1 As-Finished Rounds (Annealed and Descaled)—For diameters of \( \frac{7}{16} \) to \( \frac{13}{16} \) in. (7.94 to 17.46 mm) incl, an allowance of \( \frac{3}{64} \) in. (1.59 mm) on the diameter should be made for finish machining.

8.3 Length—The permissible variations in length of finished rods shall be as prescribed in Table 4. Unless otherwise
specified, random mill lengths shall be furnished. Rods ordered to random or nominal lengths shall be furnished with either cropped or saw-cut ends; material ordered to cut lengths shall be furnished with square saw-cut or machined ends. Where rods are ordered in multiple lengths, a ¼-in. (6.35-mm) length addition shall be allowed for each uncut multiple length.

8.4 Weight—For calculation of mass or weight, the following densities shall be used:

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Density (lb/in.³)</th>
<th>Density (g/cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N06007</td>
<td>0.300</td>
<td>8.31</td>
</tr>
<tr>
<td>N06975</td>
<td>0.295</td>
<td>8.17</td>
</tr>
<tr>
<td>N06985</td>
<td>0.300</td>
<td>8.31</td>
</tr>
<tr>
<td>N06030</td>
<td>0.297</td>
<td>8.22</td>
</tr>
<tr>
<td>N08031</td>
<td>0.293</td>
<td>8.10</td>
</tr>
</tbody>
</table>

9. Workmanship, Finish, and Appearance

9.1 The material shall be uniform in quality and condition, smooth, commercially straight, and free of injurious imperfections.

10. Sampling

10.1 Lots for Chemical Analysis and Mechanical Testing:
10.1.1 A lot for chemical analysis shall consist of one heat.
10.1.2 A lot of rod for mechanical testing shall be defined as the material from one heat in the same condition and specified thickness.

10.2 Sampling for Chemical Analysis:
10.2.1 A representative sample shall be obtained from each lot during pouring or subsequent processing.
10.2.2 Product (check) analysis shall be wholly the responsibility of the purchaser and shall conform to the product (check) analysis variations per Specification B880.

10.3 Sampling for Mechanical Testing:
10.3.1 A representative sample shall be taken from each lot of finished material.

11. Number of Tests and Retests

11.1 Chemical Analysis—One test per lot.
11.2 Tension Tests—One test per lot.

11.3 Retests—If the specimen used in the mechanical test of any lot fails to meet the specified requirements, two additional specimens shall be taken from different sample pieces and tested. The results of the tests on both of these specimens shall meet the specified requirements.

12. Specimen Preparation

12.1 Tension test specimens shall be taken from material after final heat treatment and tested in the direction of fabrication.
12.2 Tension test specimens shall be any of the standard or subsized specimens shown in Test Methods E8.
12.3 In the event of disagreement, the referee specimen shall be the largest possible round specimen shown in Test Methods E8.

13. Test Methods and Chemical Analysis

13.1 The chemical composition and mechanical properties of the material as enumerated in this specification shall be determined, in case of disagreement, in accordance with the following ASTM methods:
13.1.1 Chemical Analysis—Test Methods E1473. For elements not covered by Test Methods E1473, the referee method shall be as agreed upon between the manufacturer and purchaser. The composition of the remainder element shall be determined arithmetically by difference.
13.1.2 Tension Test—Test Methods E8.
13.1.3 Method of Sampling—Practice E55.
13.2 For purposes of determining compliance with the limits in this specification, an observed value or a calculated value shall be rounded in accordance with the rounding method of Practice E8.

14. Inspection

14.1 Inspection of the material shall be made as agreed upon by the manufacturer and the purchaser as part of the purchase contract.

15. Rejection and Rehearing

15.1 Material that fails to conform to the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing.

16. Certification

16.1 When specified in the purchase order or contract, a manufacturer’s certification shall be furnished to the purchaser stating that material has been manufactured, tested, and inspected in accordance with this specification, and that the test
results on representative samples meet specification requirements. When specified in the purchase order or contract, a report of the test results shall be furnished.

17. Product Marking

17.1 Each piece of material ½ in. (12.7 mm) and over in diameter shall be marked with this specification number, name of the material, and size of the product.

17.2 Each bundle or shipping container shall be marked with the name of the material; this specification number; alloy; the size; gross, tare and net weight; consignor and consignee address; contract or other number; or such other information as may be defined in the contract or order.

18. Keywords

18.1 rod; N06007; N06975; N06985; N06030; N08031

APPENDIX

(Nonmandatory Information)

X1. HEAT TREATMENT

X1.1 Proper heat treatment during or subsequent to fabrication is necessary for optimum performance and the manufacturer shall be consulted for details.