



Standard Specification for UNS N08020, UNS N08024, and UNS N08026 Nickel Alloy Round Weaving Wire¹

This standard is issued under the fixed designation B 475; 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.

^{e1} NOTE—Paragraph 1.3 was added editorially in June 2002.

1. Scope

1.1 This specification covers UNS N08020, UNS N08026, and UNS N08024 round weaving wire.

NOTE 1—Weaving wire is customarily not welded. For applications involving welding in which the wire should be stabilized against loss of corrosion resistance, the purchaser should refer to Specification B 473.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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

2. Referenced Documents

2.1 ASTM Standards:

B 473 Specification for UNS N08020, UNS N08026, and UNS N08024 Nickel Alloy Bar and Wire²

E 8 Test Methods for Tension Testing of Metallic Materials³

E 1473 Test Methods for Chemical Analysis of Nickel, Cobalt, and High-Temperature Alloys⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *weaving wire, n*—term weaving wire as used in this specification shall be understood to cover round wire intended especially for weaving.

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 Annual Book of ASTM Standards, Vol 02.04.

³ Annual Book of ASTM Standards, Vol 03.01.

⁴ Annual Book of ASTM Standards, Vol 03.05.

4. Ordering Information

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

4.1.1 Quantity (weight),

4.1.2 Name of material or UNS number,

4.1.3 Dimensions,

4.1.4 Condition (9.2),

4.1.5 Finish (9.2),

4.1.6 Inspection (14.1),

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

4.1.8 ASTM designation and year of issue, and

4.1.9 If possible, the intended end use.

NOTE 2—A typical ordering description is as follows: 200 lb (90.7 kg), UNS N08020, 0.020 in. (0.508 mm), annealed and pickled, ASTM Specification B 475.

5. Materials and Manufacture

5.1 The last heat treatment shall be a solution-annealing heat treatment.

NOTE 3—The recommended annealing temperatures are 1900 to 2100°F (1038 to 1149°C) for UNS N08020 and 2050 to 2200°F (1121 to 1204°C) for UNS N08026 and UNS N08024, all followed by quenching in water or rapidly cooling by other means.

5.2 Wire shall be annealed or cold drawn as a final operation to produce the specified mechanical properties.

6. Chemical Composition

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

6.2 If a product (check) analysis is performed by the purchaser, the material shall conform to the product (check) analysis variations prescribed in Table 2.

TABLE 2 Product Analysis Tolerances

Elements	Tolerances Over the Maximum Limit or Under the Minimum Limit		
	UNS N08026	UNS N08020	UNS N08024
Carbon	0.005	0.01	0.005
Manganese	0.03	0.04	0.03
Phosphorus	0.005	0.005	0.005
Sulfur	0.005	0.005	0.005
Silicon	0.05	0.05	0.05
Chromium	0.25	0.25	0.25
Nickel	0.30	0.30	0.30
Molybdenum	0.10	0.10	0.10
Columbium (Nb) + tantalum	...	0.05	0.05
Copper	0.10	0.10	0.10
Nitrogen	0.01

TABLE 1 Chemical Requirements

Element	Composition, %		
	UNS N08026	UNS N08020	UNS N08024
Carbon, max	0.03	0.07	0.03
Manganese, max	1.00	2.00	1.00
Phosphorus, max	0.03	0.045	0.035
Sulfur, max	0.03	0.035	0.035
Silicon, max	0.50	1.00	0.50
Nickel	33.00 to 37.20	32.00 to 38.00	35.00 to 40.00
Chromium	22.00 to 26.00	19.00 to 21.00	22.50 to 25.00
Molybdenum	5.00 to 6.70	2.00 to 3.00	3.50 to 5.00
Copper	2.00 to 4.00	3.00 to 4.00	0.50 to 1.50
Columbium (Nb) + tantalum	...	8 × carbon-1.00	0.15 to 0.35
Nitrogen	0.10 to 0.16
Iron	remainder ^A	remainder ^A	remainder ^A

^ABy difference.

7. Mechanical Properties

7.1 The material shall conform to the requirements as to mechanical properties prescribed in Table 3 at room temperature.

8. Dimensions and Permissible Variations

8.1 The diameter of the wire shall not vary from that specified by more than the permissible variations prescribed in Table 4.

9. Workmanship, Finish, and Appearance

9.1 The wire shall be uniform in diameter and free of injurious seams, laps, pits, die marks, or defects tending to impair the use of the wire.

TABLE 3 Mechanical Properties

Condition	Diameter, in. (mm)	Tensile Strength, psi (MPa)
Annealed	Over 0.006 to 0.019 (0.152 to 0.483), incl	115 000 (790) max
	Over 0.019 to 0.049 (0.483 to 1.245), incl	110 000 (760) max
	Over 0.049 to 0.099 (1.245 to 2.515), incl	105 000 (720) max
	Over 0.099 (2.515)	100 000 (690) max
	Cold-drawn ^A	Over 0.030 to 0.125 (0.762 to 3.175), incl
Over 0.125 (3.175)		110 000 to 140 000 (760 to 970)

^AWire ordered in the cold-drawn condition can be supplied to higher tensile strength levels as specified by the purchaser.

TABLE 4 Permissible Variations in Diameter

Diameter, in.	Permissible Variations in Diameter, ±, in. ^A	
	Cold-Drawn Condition	Annealed Condition
0.312 to 0.044 incl	0.001	0.002
Under 0.044 to 0.033, incl	0.0008	0.0013
Under 0.033 to 0.024, incl	0.0005	0.0008
Under 0.024 to 0.012, incl	0.0004	...
Under 0.012 to 0.008, incl	0.0003	...
Under 0.008 to 0.006, incl	0.0002	...
Diameter, mm	Permissible Variations in Diameter, ±, mm ^A	
	Cold-Drawn Condition	Annealed Condition
7.925 to 1.118, incl	0.0254	0.0508
Under 1.118 to 0.838, incl	0.0203	0.0330
Under 0.838 to 0.610, incl	0.0127	0.0203
Under 0.610 to 0.305, incl	0.0102	...
Under 0.305 to 0.203, incl	0.0076	...
Under 0.203 to 0.152, incl	0.0051	...

^AThe wire shall not be out-of-round more than one half the total permissible variation specified above.

9.2 The wire shall be supplied as annealed or cold-drawn having a finish as pickled, bright-annealed, or cold-drawn.

10. Sampling

10.1 *Lot:*

10.1.1 A lot for chemical analysis shall consist of one heat.

10.1.2 A lot for mechanical properties shall consist of the same gage of each heat in each heat treatment charge.

10.2 *Test Material Selection:*

10.2.1 *Chemical Analysis*—Representative samples shall be taken during pouring or subsequent processing.

10.2.1.1 *Check analysis* shall be wholly the responsibility of the purchaser.

10.2.2 *Mechanical Properties*—Samples of the material to provide test specimens shall be taken from such locations in each lot as to be representative of that lot.

11. Number of Tests

11.1 *Chemical Analysis*—One test per lot.

11.2 *Mechanical Properties*—One test per lot.

12. Specimen Preparation

12.1 Tension test specimens shall be taken from material after final heat treatment and cold drawing. The tension test specimens shall conform to the appropriate sections of Test Methods E 8.

13. Test Methods

13.1 The chemical composition and mechanical properties of the material as enumerated in this specification shall, in case of disagreement, be determined in accordance with the following methods:

Test	ASTM Designations
Chemical analysis	E 1473 ^A
Tension	E 8

^AIron shall be determined arithmetically by difference.

14. Inspection

14.1 If specified, source inspection of the material by the purchaser at the manufacturer's plant shall be made as agreed upon between the purchaser and the manufacturer 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 require-

ments. When specified in the purchase order or contract, a report of the test results shall be furnished.

17. Product Marking

17.1 The size of the wire, ASTM specification number, grade or UNS number, heat number, and name or trademark of the manufacturer shall be marked on a tag securely attached to each coil or spool.

18. Packaging and Package Marking

18.1 Each coil or spool shall be one continuous length of wire, properly coiled or spooled, and firmly tied. Unless otherwise specified, coils shall be placed in drums or shall be paper-wrapped, and spools shall be packaged in such a manner as to assure safe delivery to their destination when properly transported by any common carrier.

19. Keywords

19.1 UNS N08020; UNS N08024; UNS N08026; wire

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