



METRIC
Designation: F 836M – 01a₂

Standard Specification for Style 1 Stainless Steel Metric Nuts¹

This standard is issued under the fixed designation F 836M; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers the chemical and mechanical requirements for stainless steel metric nuts with nominal thread diameters M1.6 through M36; and intended for use in engineering applications requiring general corrosion resistance.

1.2 Eight groups of stainless steel alloys are covered, including three austenitic (Grades A1, A2, and A4), one ferritic (Grade F1), three martensitic (Grades C1, C3, and C4), and one precipitation hardening (Grade P1).

1.3 Seventeen property classes are covered, including nine austenitic, one ferritic, six martensitic, and one precipitation hardening. The property classes with the permissible alloys for each are listed in Table 1.

1.4 This specification is based in concept and content on ISO 3506. The chemical and mechanical requirements specified for all property classes, except as given in 1.4.1, are essentially identical with classes of the same designation in ISO 3506.

1.4.1 This specification includes 13 of the 16 property classes covered in ISO 3506. Additionally, it includes property classes A1-70, A2-70, A4-70, A1-80, A2-80, and A4-80 for products with nominal thread diameters larger than M20; and four non-ISO property classes, C1-110, C4-110, C3-120, and P1-90.

1.5 Supplementary requirements of an optional nature are provided, applicable only when agreed upon between the manufacturer and the purchaser at the time of the inquiry and order.

1.6 Suitable bolts, hex cap screws, and studs for use with nuts included in this specification are covered by Specification F 738M. Unless otherwise specified, all bolts, hex cap screws, and studs used with these nuts shall conform to the requirements of Specification F 738M and shall be of the same alloy group.

2. Referenced Documents

2.1 ASTM Standards:

A 262 Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels²

¹ This specification is under the jurisdiction of ASTM Committee F16 on Fasteners and is the direct responsibility of Subcommittee F16.04 on Nonferrous Fasteners. Current edition approved ~~Oct. 10, 2001~~ April 10, 2002. Published ~~November 2001~~ May 2002. Originally published as F 536 – 83. Last previous edition F 836 – 01a.

TABLE 1 Property Classes of Stainless Steel Nuts

Property Class	Permissible Alloys
A1-50	304, 304L, 305 ^A
A1-70	384, XM7
A1-70	<u>384, 18-9LW, 302HQ</u>
A1-80	
A2-50	
A2-70	321, 347
A2-80	
A4-50	
A4-70	316, 316L
A4-80	
F1-45	430 ^B
C1-70	410
C1-110	
C3-80	431
C3-120	
C4-70	416, 416Se
C4-110	
P1-90	630

^A When approved by the purchaser, Alloys 303, 303Se, or XM1 may be furnished.

^B When approved by the purchaser, Alloy 430F may be furnished.

A 342 Test Methods for Permeability of Feebly Magnetic Materials³

A 380 Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems²

A 493 Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging Wire²

A 555/A 555M Specification for General Requirements for Stainless and Heat-Resisting Steel Wire and Wire Rods²

A 564/A 564M Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes²

A 582 Specification for Free-Machining Stainless Steel Bars²

A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products²

D 3951 Practice for Commercial Packaging⁴

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications⁵

~~E 353 Test Methods for Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys⁶~~

F 606M Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets [Metric]⁶

² Annual Book of ASTM Standards, Vol 01.03.

³ Annual Book of ASTM Standards, Vol 03.04.

⁴ Annual Book of ASTM Standards, Vol 15.09.

⁵ Annual Book of ASTM Standards, Vol 14.02.

⁶ Annual Book of ASTM Standards, Vol-03.05: 01.08.

F 738M Specification for Stainless Steel Metric Bolts, Screws, and Studs⁶
 F 1470 Guide for Fastener Sampling for Specified Mechanical Properties and Performance Inspection⁶

2.2 ISO Standard:

ISO 3506 Corrosion-Resistant Stainless Steel Fasteners⁷

2.3 ASME Standards:

ASME B1.13M Metric Screw Threads—M Profile⁷

ASME B18.2.4.1M Metric Hex Nuts, Style 1⁷

NOTE 1—The following ASTM standards are noted for information only as suitable sources of material for the manufacture of nuts to this specification: Specifications A 493, A 564, and A 582.

3. Classification

3.1 The designation of each property class is comprised of three parts, a letter followed by a single digit, followed by either two or three digits (see Table 1).

3.1.1 The letter indicates the general composition type of stainless steel:

3.1.1.1 *A* for austenitic steels,

3.1.1.2 *F* for ferritic steels,

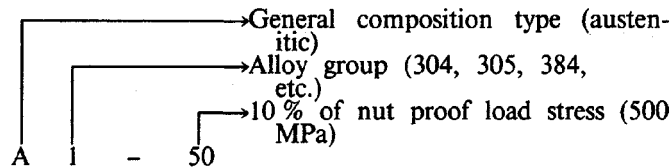
3.1.1.3 *C* for martensitic steels, and

3.1.1.4 *P* for precipitation-hardening steel.

3.1.2 The first digit (1, 2, 3, or 4) indicates the alloy group. The permissible alloys within each group are given in Table 1.

3.1.3 The last two or three digits (50, 70, 110, etc.) indicate 10 % of the specified nut proof load stress of the property class.

3.1.4 For example, Class A1-50 is an austenitic steel of any one of ~~seven~~ six permitted alloys, and the manufactured nut has a proof load stress of 500 MPa.



4. Ordering Information

4.1 Orders for nuts under this specification shall include the following :

4.1.1 Quantity (number of pieces of each item);

4.1.2 Name of item (specific type and style, and references to dimensional standard when appropriate);

4.1.3 Size (nominal diameter, thread pitch);

4.1.4 Property class;

4.1.5 Supplementary requirements, if any (S1 through S3).

4.1.6 Orders for nuts under this specification may include the following optional requirements:

4.1.6.1 Forming (5.1);

4.1.6.2 Alloy condition (5.2);

4.1.6.3 Alloy selection (7.2.1 and S2);

4.1.6.4 Test report (15.2);

4.1.6.5 Additional testing (11.3);

4.1.6.6 Corrosion resistance testing (11.2);

4.1.6.7 Inspection (13.1);

4.1.6.8 Heat number (11.1.1);

4.1.6.9 Certification (15.1);

4.1.6.10 Proof load testing (9.2).

4.1.7 ASTM specification and date of issue. When date of issue is not specified, nuts shall be furnished to the latest issue.

NOTE 2—Example: 10 000 pieces, hex nut, ASME B18.2.4.1M, M6 × 1, Class A2-70, furnish test report, ASTM F 836M – XX.

15 000 pieces, Hex Flange Nuts, ASME B18.2.4.4M, M8 × 1.25, class A4-50, Supplementary Requirement S3, ASTM F 836 – XX.

5. Materials and Manufacture

5.1 *Forming*—Unless otherwise specified, nuts shall be cold-formed, hot-formed, or machined, at the option of the manufacturer.

⁷ Available from American Society of ASTM Standards, Vol 01.08: Mechanical Engineers, P.O. Box 2300 Fairfield, NJ 07007-2300.

5.2 *Condition*—Nuts shall be furnished in the condition specified for the property class in Table 2. If other conditions are required, the condition and resultant mechanical properties shall be as agreed upon between the manufacturer and the purchaser.

5.3 *Surface Finish*—Unless otherwise specified, nuts shall be cleaned and descaled in accordance with Practice A 380.

6. Heat Treatment

6.1 Austenitic Alloys, Grades A1, A2, and A4:

6.1.1 When Condition A is specified, the nuts shall be machined from annealed or solution annealed stock, thus retaining the properties of the original material, or hot formed and solution annealed.

6.1.2 When Condition AF is specified, the nuts, following manufacture, shall be annealed by heating to $1040 \pm 30^\circ\text{C}$, at which time the chromium carbide will go into solution. The nuts shall be held for a sufficient time and then cooled at a rate sufficient to prevent precipitation of the carbide and to provide the properties specified in Table 2.

6.1.3 When Condition CW is specified, the austenitic alloy shall be annealed as specified in 6.1.1, and then cold-worked to develop the properties specified in Table 2.

6.1.4 When Condition SH is specified, nuts shall be machined from strain hardened stock.

6.2 Ferritic Alloys, Grade F1:

6.2.1 When Condition A is specified, the ferritic alloy shall be heated to a temperature of $790 \pm 30^\circ\text{C}$, held for an appropriate time, and then air-cooled to provide the properties specified in Table 2.

6.2.2 When Condition AF is specified, nuts shall be treated as specified in 6.1.2.

6.3 Martensitic Alloys, Grades C1, C3, and C4:

6.3.1 When Condition H is specified, the nuts shall be hardened and tempered by heating to $1010 \pm 30^\circ\text{C}$ sufficient for austenitization, holding for at least 1 h and then air-cooling to provide the properties specified in Table 2.

6.3.2 When Condition HT is specified, the nuts shall be hardened and tempered by heating to $1010 \pm 30^\circ\text{C}$ sufficient for austenitization, holding for at least $\frac{1}{2}$ h, rapid air- or oil-quenching, reheating to 275°C minimum, and holding for at least 1 h and then air-cooling to provide the properties specified in Table 2.

6.4 *Precipitation-Hardening Alloy, Grade P1*—When Condition AH is specified, the nuts shall be solution-annealed and aged by heating to $1040 \pm 15^\circ\text{C}$, holding for at least $\frac{1}{2}$ h, rapid air- or oil-quenching to 27°C maximum, reheating to $620 \pm 10^\circ\text{C}$ minimum, holding for 4 h, and then air-cooling to provide the properties specified in Table 2.

TABLE 2 Mechanical Property Requirements

Property Class	Condition ^A	Alloy/Mechanical Property Marking	Nominal Thread Diameter	Proof Load Stress, MPa	Hardness			
					Vickers		Rockwell	
					min	max	min	max
A1-50 A2-50 A4-50	A or AF	F836A F836B F836C	M1.6 to M36	500	155	220	B81	B95
A1-70 A2-70 A4-70	CW	F836D F836E F836F	M1.6 to M20 over M20 to M36	700 550	220 160	330 310	B96 B83	C33 C31
A1-80 A2-80 A4-80	SH	F836G F836H F836J	M1.6 to M20 over M20 to M24 over M24 to M30 over M30 to M36	800 700 650 600	240 220 200 180	350 330 310 285	C23 B96 B93 B89	C36 C33 C30 C28
F1-45	A or AF	F836K	M1.6 to M36	450	135	220	B74	B96
C1-70 C4-70	H	F836L F836M	M1.6 to M36	700	220	330	B96	C34
C1-110 C4-110	HT	F836N F836P	M1.6 to M36	1100	350	440	C36	C45
C3-80	H	F836R	M1.6 to M36	800	240	340	C23	C35
C3-120	HT	F836S	M1.6 to M36	1200	380	480	C39	C48
P1-90	AH	F836T	M1.6 to M36	900	285	370	C28	C38

^A Legend of Conditions:

AF—formed and annealed.

CW—formed from annealed stock, thus acquiring a degree of cold work.

SH—machined from strain hardened stock.

A—machined from annealed or solution annealed stock, thus retaining the properties of the original material, or hot formed and solution annealed.

H—hardened and tempered at 565°C medium.

HT—hardened and tempered at 275°C minimum.

AH—solution annealed and age hardened after forming.

7. Chemical Composition

7.1 It is the intent of this specification that nuts shall be ordered by property class.

7.2 Unless otherwise specified in the inquiry and purchase order (see Supplementary Requirement S2), when two or more alloys are permitted for nuts of a specified property class, the choice of alloy to be used shall be that of the fastener manufacturer as determined by his nut fabrication methods and material availability. The specific alloy used by the manufacturer shall be identified clearly on any certification required in the purchase order and shall have a chemical composition conforming to the limits specified in Table 3.

7.2.1 When the purchaser specifies that a specific alloy be used, the alloy shall have a chemical composition conforming to the limits specified in Table 3.

7.3 Product analysis may be made by the purchaser from nuts representing each lot. The chemical composition thus determined shall conform to the limits specified in Table 3 for the specific alloy within the product analysis tolerances specified in Specification A 555.

7.3.1 In the event of discrepancy, a referee analysis of samples for each lot shall be made in accordance with 12.1.

8. Corrosion Resistance

8.1 Carbide Precipitation:

8.1.1 Rod, bar, and wire in the austenitic Alloy Groups A1, A2, and A4, except the free-machining grades, 303 and 303Se, used to make nuts in accordance with this specification, shall be capable of passing the test for susceptibility to intergranular corrosion as specified in Practice E of Practices A 262.

8.1.2 As stated in Practices A 262, samples may be subjected to the faster and more severe screening test in accordance with Practice A. Failing Practice A, specimens may be tested in accordance with Practice E and be considered satisfactory if passing Practice E.

9. Mechanical Properties

9.1 The hardness of nuts of each class shall not exceed the maximum hardness specified for the class in Table 2. This shall be

TABLE 3 Chemical Requirements

Alloy Group	Alloy	UNS Designation	Composition, % maximum except as shown									
			Carbon	Manganese	Phosphorus	Sulfur	Silicon	Chromium	Nickel	Copper	Molybdenum	Others
Austenitic Alloys												
A1	303	S30300	0.15	2.00	0.20	0.15 min	1.00	17.0 to 19.0	8.0 to 10.0		0.60 max ^A	
A1	303Se	S30323	0.15	2.00	0.20	0.060	1.00	17.0 to 19.0	8.0 to 10.0			Se 0.15 min
A1	304	S30400	0.08	2.00	0.045	0.030	1.00	18.0 to 20.0	8.0 to 10.5	1.00		
A1	304L	S30403	0.03	2.00	0.045	0.030	1.00	18.0 to 20.0	8.0 to 12.0	1.00		
A1	305	S30500	0.12	2.00	0.045	0.030	1.00	17.0 to 19.0	10.5 to 13.0	1.00		
A1	384	S38400	0.08	2.00	0.045	0.030	1.00	15.0 to 17.0	17.0 to 19.0			
A1	XM1	S20300	0.08	5.0 to 6.5	0.040	0.18 to 0.35	1.00	16.0 to 18.0	5.0 to 6.5	1.75 to 2.25	0.50 max ^A	
A1	XM7	S30430	0.03	2.00	0.045	0.030	1.00	17.0 to 19.0	8.0 to 10.0	3.0 to 4.0		
A1	18-9LW	S30430	0.10	2.00	0.045	0.030	1.00	17.0 to 19.0	8.0 to 10.0	3.0 to 4.0		
A1	302HQ	S30433	0.03	2.00	0.045	0.030	1.00	17.0 to 19.0	8.0 to 10.0	3.0 to 4.0		
A4	316	S31600	0.08	2.00	0.045	0.030	1.00	16.0 to 18.0	10.0 to 14.0		2.00–3.00	
A4	316L	S31603	0.03	2.00	0.045	0.030	1.00	16.0 to 18.0	10.0 to 14.0		2.00–3.00	
A4	321	S32100	0.08	2.00	0.045	0.030	1.00	17.0 to 19.0	9.0 to 12.0			Ti 5 × C min
A2	347	S34700	0.08	2.00	0.045	0.030	1.00	17.0 to 19.0	9.0 to 13.0			Cb + Ta 10 × C min
Ferritic Alloys												
F1	430	S43000	0.12	1.00	0.040	0.030	1.00	16.0 to 18.0				
F1	430F	S43020	0.12	1.25	0.060	0.15 min	1.00	16.0 to 18.0			0.60 max ^A	
Martensitic Alloys												
C1	410	S41000	0.15	1.00	0.040	0.030	1.00	11.5 to 13.5				
C4	416	S41600	0.15	1.25	0.060	0.15 min	1.00	12.0 to 14.0			0.60 max ^A	Se 0.15 min
C4	416Se	S41623	0.15	1.25	0.060	0.060	1.00	12.0 to 14.0				
C3	431	S43100	0.20	1.00	0.040	0.030	1.00	15.0 to 17.0	1.25 to 2.50			
Precipitation Hardening Alloy												
P1	630	S17400	0.07	1.00	0.040	0.030	1.00	15.0 to 17.5	3.0 to 5.0	3.0 to 5.0		Cb + Ta 0.15–0.45

^A At manufacturer's option, determined only when intentionally added.

the only hardness requirement for nuts that are proof load tested.

9.2 Unless proof load testing is specified in the inquiry and purchase order, nuts of all classes in nominal thread diameters M4 and smaller, and nuts of all classes with proof loads greater than 530 kN, as specified in Table 4, shall be furnished on the basis of having a hardness not less than the minimum hardness specified in Table 2.

9.3 All classes of nuts, except those covered in 9.2 shall withstand the proof load as specified in Table 4.

10. Dimensions

10.1 Unless otherwise specified, nuts shall conform to dimensions for hex nuts, Style 1, as given in ASME B18.2.4.1M.

10.2 Unless otherwise specified, threads shall be metric coarse threads with class 6H tolerances as specified in ASME B1.13M.

11. Number of Tests and Retests

11.1 The mechanical and chemical composition requirements of this specification shall be met in continuous mass production for stock, and the manufacturer shall make sample inspections to ensure that the product conforms to the specified requirements. Additional tests of individual shipments of material are not ordinarily necessary.

11.1.1 Individual heats of steel are not identified in the finished product. When specified in the purchase order that the heat number shall be identified for the products in an individual shipment, the manufacturer shall control the product by heat analysis and additionally shall conduct the testing program specified in 11.1.

11.2 Unless otherwise specified, tests for corrosion resistance shall be in accordance with the manufacturer's standard quality control practices. A specific number of tests is not required but the nuts shall be produced by manufacturing practices and subjected to tests and inspection to assure compliance with the specified requirements.

11.2.1 When specified on the purchase order, not less than one corrosion test to determine freedom from precipitated carbides shall be made to represent each lot.

11.3 When the purchaser requires that additional tests be performed by the manufacturer to determine that the properties of nuts in an individual shipment are within specified limits, the purchaser shall specify Supplementary Requirement S1 in the inquiry and purchase order.

11.3.1 When the purchaser does not specify the sampling plan and basis of acceptance the following shall apply:

11.3.1.1 The lot, for purposes of selecting samples, shall consist of all nuts offered for inspection and testing, at one time, that are the same type, style, nominal diameter, thread pitch, material (alloy), property class, and surface finish.

11.3.1.2 From each lot, samples shall be selected at random and tested for each requirement in accordance with the following plan:

TABLE 4 Nut Proof Load Values, kN

Nominal Size and Thread Pitch	Stress Area, mm ²	Proof Load Stress, MPa ^A									
		450	500	550	600	650	700	800	900	1100	1200
M1.6 × 0.35	1.27	0.57	0.64	...	0.76	...	0.89	1.02	1.14	1.40	1.52
M2 × 0.4	2.07	0.93	1.04	...	1.24	...	1.45	1.66	1.86	2.28	2.48
M2.5 × 0.45	3.39	1.52	1.70	...	2.03	...	2.37	2.71	3.05	3.73	4.07
M3 × 0.5	5.03	2.26	2.52	...	3.02	...	3.52	4.02	4.53	5.53	6.04
M3.5 × 0.6	6.78	3.05	3.39	...	4.07	...	4.75	5.42	6.10	7.46	8.14
M4 × 0.7	8.78	3.95	4.39	...	5.27	...	6.15	7.02	7.90	9.66	10.5
M5 × 0.8	14.2	6.39	7.10	...	8.52	...	9.94	11.4	12.8	15.6	17.0
M6 × 1	20.1	9.05	10.1	...	12.1	...	14.1	16.1	18.1	22.1	24.1
M8 × 1.25	36.6	16.5	18.3	...	22.0	...	25.6	29.3	32.9	40.3	43.9
M10 × 1.5	58.0	26.1	29.0	...	34.8	...	40.6	46.4	52.2	63.8	69.6
M12 × 1.75	84.3	37.9	42.2	...	50.6	...	59.0	67.4	75.9	92.7	101
M14 × 2	115	51.7	57.5	...	69.0	...	80.5	92.0	104	127	138
M16 × 2	157	70.7	78.5	...	94.2	...	110	126	141	173	188
M20 × 2.5	245	110	123	135	147	...	172	196	221	270	294
M24 × 3	353	159	177	194	212	...	247	282	318	388	424
M30 × 3.5	561	252	281	309	337	365	393	449	505	617	673
M36 × 4	817	368	409	449	490	...	572	654	735	899	980

^A Proof Load = A_s × Proof Load Stress

$$A_s = 0.7854 (D - 0.9382 P)^2$$

where:

D = nominal, mm,

P = thread pitch, mm, and

Proof Load Stress is found in Table 2.

Number of Pieces in Lot	Number of Tests	Acceptance Criteria Acceptance Number	Rejection Number
800 and less	1	0	1
801 to 8000	2	0	1
8001 to 22 000	3	0	1
Over 22 000	5	0	1

11.3.1.3 If the failure of a test specimen is due to improper preparation of the specimen or to incorrect testing technique, the specimen shall be discarded and another test specimen substituted.

12. Test Methods

12.1 *Chemical Analysis*— Chemical analysis shall be performed in accordance with Test Methods, Practices and Terminology A 751.

12.2 Mechanical Tests:

12.2.1 Hardness and proof load tests of nuts shall be performed in accordance with requirements of Test Methods F 606M.

12.2.2 For nut proof load testing, the speed of testing as determined with a free-running crosshead shall be a maximum of 25 mm/min.

12.3 *Corrosion Resistance*—Corrosion tests to determine freedom from precipitated carbide shall be performed in accordance with Practice A 262, Practices A or E, as applicable.

12.4 For the purposes of determining compliance with the specified limits for properties listed in this specification, an observed value or calculated value shall be rounded in accordance with Practice E 29.

13. Inspection

13.1 If the inspection described in 13.2 is required by the purchaser, it shall be specified in the inquiry, order, or contract.

13.2 The inspector representing the purchaser shall have free entry to all parts of the manufacturer's works that concern the manufacture of the material ordered. The manufacturer shall afford the inspector all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification. All tests and inspection required by the specification that are requested by the purchaser's representative shall be made prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the work.

14. Rejection and Rehearing

14.1 Unless otherwise specified, any rejection based on tests specified herein and made by the purchaser shall be reported to the manufacturer within 30 working days from the receipt of the product by the purchaser.

15. Certification

15.1 When specified in the purchase order, the manufacturer shall furnish certification that the product was manufactured and tested in accordance with this specification and the purchaser's order and conforms to all specified requirements.

15.2 When specified in the purchase order, the manufacturer shall furnish a test report certified to be the last complete set of chemical analysis and mechanical tests for each nut size in each shipment.

15.3 All certifications shall indicate the purchase order number and the applicable requirements of Section 4.

16. Product Marking

16.1 Nuts in nominal thread diameters M4 and smaller need not be marked.

16.2 All products with a nominal size of M5 and larger shall be marked with a symbol identifying the manufacturer. In addition, they shall be marked with the alloy/mechanical property marking specified in Table 2. The marking shall be raised or depressed at the option of the manufacturer.

16.3 The manufacturer's symbol shall be of his design.

16.4 The markings shall be on the top of nut, top of flange, or on one of the wrenching flats.

16.5 Markings located on one of the wrenching flats shall be depressed. Markings on all other locations shall be raised or depressed at the option of the manufacturer.

17. Packaging and Package Marking

17.1 Packaging:

17.1.1 Unless otherwise specified packaging shall be in accordance with Practice D 3951.

17.1.2 When special packaging requirements are required by the purchaser, they shall be defined at the time of inquiry and order.

17.2 *Package Marking*—Each shipping unit shall include or be plainly marked with the following:

17.2.1 ASTM specification,

17.2.2 Alloy number,

17.2.3 Alloy/mechanical property marking,

- 17.2.4 Size,
- 17.2.5 Name and brand or trademark of the manufacturer,
- 17.2.6 Number of pieces,
- 17.2.7 Country of origin, and
- 17.2.8 Purchase order number.

SUPPLEMENTARY REQUIREMENTS

One or more of the following supplementary requirements shall apply only when specified by the purchaser in the inquiry and order (4.1.6). Supplementary requirements shall in no way negate any requirement of the specification itself.

S1. Additional Tests

S1.1 When tests for additional mechanical properties, corrosion resistance, etc., are desired by the purchaser, the test(s) shall be made as agreed upon between the manufacturer and the purchaser at the time of the inquiry or order.

S2. Alloy Control

S2.1 When Supplementary Requirement S2 is specified on the inquiry and order, the manufacturer shall supply that alloy specified by the customer on his order with no group substitutions permitted without the written permission of the purchaser.

S3. Permeability

S3.1 When Supplementary Requirement S3 is specified on the inquiry and order, the permeability of nuts of Grades A1, A2, and A4 in Conditions A or AF shall not exceed 1.5 at 100 oersteds when determined by Methods A 342.

S4. Shipment Lot Testing

S4.1 When Supplementary Requirement S4 is specified on the order, the manufacturer shall make sample tests on the individual lots for shipment to ensure that the product conforms to the specified requirements.

S4.2 The manufacturer shall make an analysis of a randomly selected finished nut from each lot of product to be shipped. Heat or lot control shall be maintained. The analysis of the starting material from which the nuts have been manufactured may be reported in place of the product analysis.

S4.3 The manufacturer shall perform mechanical property tests in accordance with this specification and Guide F 1470 on the individual lots for shipment.

S4.4 The manufacturer shall furnish a test report for each lot in the shipment showing the actual results of the chemical analysis and mechanical property tests performed in accordance with Supplementary Requirement S4.

S5. Heat Control

S5.1 When Supplementary Requirement S5 is specified on the inquiry or order, the manufacturer shall control the product by heat analysis and identify the finished product in each shipment by the actual heat number or lot number that is heat lot traceable.

S5.2 When Supplementary Requirement S5 is specified on the inquiry or order, Supplementary Requirements S2 and S4 shall be considered automatically invoked with the addition that the heat analysis shall be reported to the purchaser on the test report.

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