Designation: F467 – 13$^{\varepsilon 2}$

Standard Specification for Nonferrous Nuts for General Use[1]

This standard is issued under the fixed designation F467; 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 U.S. Department of Defense.

ε[1] NOTE—Table 2 was editorially corrected in February 2014.
ε[2] NOTE—17.1 was editorially corrected in May 2014.

1. Scope*

1.1 This specification covers the requirements for commercial wrought nonferrous nuts 0.250 to 1.500 in. inclusive in diameter in a number of alloys in common use and intended for general service applications.

1.2 Applicable bolts, cap screws, and studs for use with nuts covered by this specification are covered by Specification F468.

1.3 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

NOTE 1—This specification is the inch-pound companion to Specification F467M; therefore, no SI equivalents are presented in the specification.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B154 Test Method for Mercurous Nitrate Test for Copper Alloys

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

D3951 Practice for Commercial Packaging

E18 Test Methods for Rockwell Hardness of Metallic Materials

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

E34 Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys

E38 Methods for Chemical Analysis of Nickel-Chromium and Nickel-Chromium-Iron Alloys (Withdrawn 1989)[3]

E53 Test Method for Determination of Copper in Unalloyed Copper by Gravimetry

E54 Test Methods for Chemical Analysis of Special Brasses and Bronzes (Withdrawn 2002)[3]

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

E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[3]

E75 Test Methods for Chemical Analysis of Copper-Nickel and Copper-Nickel-Zinc Alloys (Withdrawn 2010)[3]

E76 Test Methods for Chemical Analysis of Nickel-Copper Alloys (Withdrawn 2003)[3]

E92 Test Method for Vickers Hardness of Metallic Materials (Withdrawn 2010)[3]

E101 Test Method for Spectrographic Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique (Withdrawn 1996)[3]

E120 Test Methods for Chemical Analysis of Titanium and Titanium Alloys (Withdrawn 2003)[3]

E165 Practice for Liquid Penetrant Examination for General Industry

E227 Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique (Withdrawn 2002)[3]

E354 Test Methods for Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys

E478 Test Methods for Chemical Analysis of Copper Alloys

E1409 Test Method for Determination of Oxygen and Nitrogen in Titanium and Titanium Alloys by Inert Gas Fusion

F468 Specification for Nonferrous Bolts, Hex Cap Screws, Socket Head Cap Screws, and Studs for General Use

[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 April 1, 2013. Published May 2013. Originally approved in 1976. Last previous edition approved in 2006 as F467 – 08$^{\varepsilon 1}$. DOI: 10.1520/F0467-13E01.

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

[3] The last approved version of this historical standard is referenced on www.astm.org.

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

F606 Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets
F1470 Practice for Fastener Sampling for Specified Mechanical Properties and Performance Inspection

2.2 *ASME Standards:*[4]
B 1.1 Unified Inch Screw Threads (UN and UNR Thread Form)
B 18.2.2 Square and Hex Nuts

3. Ordering Information

3.1 Orders for nuts under this specification shall include the following information:

3.1.1 Quantity (number of pieces of each item and size);

3.1.2 Name of item;

3.1.3 Size (diameter and threads per inch);

3.1.4 Alloy number (Table 1);

3.1.5 Stress relieving, if required (4.2.3);

3.1.6 "Shipment lot" testing, as required (Section 9);

3.1.7 Source inspection, if required (Section 14);

3.1.8 Certificate of compliance or test report, if required (Section 16);

3.1.9 Additional requirements, if any, to be specified on the purchase order (4.2.1, 7.2, 8.2, 12.1, and 13.1),

3.1.10 Supplementary requirements, if any; and

3.1.11 ASTM designation (including year or published date).

NOTE 2—A typical ordering description is as follows: 10 000 pieces, Hex Nut, 0.250" -20, Alloy 270, Furnish Certificate of Compliance, Supplementary Requirement S 1, ASTM Specification F 467-XX

4. Materials and Manufacture

4.1 *Materials:*

4.1.1 The nuts shall be manufactured from material having a chemical composition conforming to the requirements in Table 2 and capable of developing the required mechanical properties for the specified alloy in the finished fastener. See Specification B574 for nickel alloys.

4.1.2 The starting condition of the raw material shall be at the discretion of the fastener manufacturer but shall be such that the finished products conform to all the specified requirements.

4.2 *Manufacture:*

4.2.1 *Forming*—Unless otherwise specified, the nuts shall be hot pressed, cold formed, or machined from suitable material at the option of the manufacturer.

4.2.2 *Condition*—Except as provided in 4.2.3, the nuts shall be furnished in the condition specified below:

Alloy	Condition
Copper (all alloys)	As formed or stress relieved at manufacturer's option
Nickel alloys 400 and 405	As formed or stress relieved at manufacturer's option
Nickel alloy 500	Solution annealed and aged
Aluminum alloys:	
2024-T4	Solution treated and naturally aged
6061-T6	Solution treated and artificially aged
6262-T9	Solution treated, artificially aged, and cold worked
Titanium	As formed
625	Annealed

4.2.3 *Stress Relieving*—When required, stress relieving shall be specified by the purchaser for all copper alloys and nickel alloys 400 and 405.

5. Chemical Composition

5.1 *Chemical Composition*—The nuts shall conform to the chemical composition specified in Table 1 for the specified alloy.

5.2 *Manufacturer's Analysis:*

5.2.1 Except as provided in 5.2.2, when test reports are required on the inquiry or purchase order (3.1.8), the manufacturer shall make individual analyses of randomly selected finished nuts from the product to be shipped and report the results to the purchaser. Alternatively, if heat and lot identities have been maintained, the analysis of the raw material from which the nuts have been manufactured may be reported instead of product analysis.

5.2.2 For aluminum nuts, instead of 5.2.1, the manufacturer may furnish a certificate of conformance certifying compliance with the chemical composition specified in Table 1.

5.3 *Product Analysis:*

5.3.1 Product analyses may be made by the purchaser from finished products representing each lot. The chemical composition thus determined shall conform to the requirements in Table 1.

5.3.2 In the event of disagreement, a referee chemical analysis of samples from each lot shall be made in accordance with 12.1 and 13.1.

6. Mechanical Properties

6.1 The nuts shall be tested in accordance with the mechanical testing requirements for the applicable type and shall meet the mechanical requirements in Table 2 for the specified alloy.

6.2 Where both proof load and hardness tests are performed, the proof load test results shall take precedence for acceptance purposes.

7. Dimensions

7.1 *Nuts*—Unless otherwise specified, the dimensions of nuts shall be in accordance with the requirements of ASME B18.2.2.

7.2 *Threads*—Unless otherwise specified, the nuts shall have Class 2B threads in accordance with ASME B1.1.

[4] Available from Global Engineering Documents, 15 Inverness Way, East Englewood, CO 80112-5704, http://global.ihs.com.

TABLE 1 Chemical Requirements

UNS Designation Number	Composition, %												
	Copper and Copper-Base Alloys												
	Alloy	General Name	Aluminum	Copper, min	Iron, max	Manganese, max	Nickel, max	Phos-phorus	Silicon	Zinc, max[A]	Lead, max	Tin	Arsenic, max
C11000	110	ETP copper		99.9									
C26000	260	brass		68.5–71.5	0.05					balance	0.07		
C27000	270	brass		63.0–68.5	0.07					balance	0.10		
C46200	462	naval brass		62.0–65.0	0.10					balance	0.20	0.5–1.0	
C46400	464	naval brass		59.0–62.0	0.10					balance	0.20	0.5–1.0	
C51000	510	phosphor bronze		balance[A]	0.10			0.03–0.35		0.30	0.05	4.2–5.8	
C61300	613	aluminum bronze	6.0–7.5	[B]	2.0–3.0	0.10	0.15[C]	0.015	0.10	0.05	0.01	0.20–0.50	
C61400	614	aluminum bronze	6.0–8.0	88.0[D]	1.5–3.5	1.0							
C63000	630	aluminum bronze	9.0–11.0	78.0[D]	2.0–4.0	1.5	4.0–5.5		0.25 max			0.20 max	
C64200	642	aluminum silicon bronze	6.3–7.6	88.65[D]	0.30	0.10	0.25		1.5–2.2[E]	0.50	0.05	0.20 max	0.15
C65100	651	silicon bronze		96.0[D]	0.8	0.7			0.8–2.0	1.5	0.05		
C65500	655	silicon bronze		94.8[D]	0.8	1.5	0.6		2.8–3.8	1.5	0.05		
C66100	661	silicon bronze		94.0[D]	0.25	1.5			2.8–3.5	1.5	0.20–0.8		
C67500	675	manganese bronze	0.25 max	57.0–60.0	0.8–2.0	0.05–0.5				balance	0.20	0.5–1.5	
C71000	710	cupro-nickel		74.0[D]	0.60	1.00	19.0–23.0[C]			1.00	0.05		
C71500	715	cupro-nickel		65.0[D]	0.40–0.7	1.00	29.0–33.0[C]			1.00	0.05		

[A] Elements shown as balance shall be arithmetically computed by deducting the sum of the other named elements from 100.
[B] Copper plus specified elements = 99.8 min; copper plus silver = 88.5–91.5.
[C] Cobalt is to be counted as nickel.
[D] Minimum content of copper plus all other elements with specified limits shall be 99.5 %.
[E] An alloy containing as high as 2.6 % silicon is acceptable provided the sum of all the elements other than copper, silicon, and iron does not exceed 0.30 %.