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Submitted for recognition as an American National Standard

(R) Fasteners—Part Standard—Cap Screws, Hex Bolts, and Hex Nuts

1. Scope—This SAE Part Standard covers selected screws, hex bolts, and nuts manufactured in accordance with American Society for Testing and Materials (ASTM) fastener standards. This document covers materials often used in ship systems and equipment but its use may be applied wherever fasteners of the covered materials are used. This document permits the fasteners covered to be identified and ordered by a part or identifying number (PIN) as defined in this document.

1.1 Purpose—The purpose of this document is to assist the designer and other personnel in providing requirements and part identifying numbers for the most commonly used fasteners for ship systems and equipment. A part or identification number (PIN) is normally required for all military applications and provides a useful means of communicating fastener requirements to suppliers and manufacturers in a very succinct manner.

1.2 Fastener Part Numbers—This document provides part or identifying numbers which can be used to identify socket head cap screws, hex head cap screws, and bolts and hex nuts for the parts covered by this document. The parts covered by this document are manufactured in accordance with fastener standards issued by the ASTM. The part identification number (PIN) identifies material, material strength, nominal diameter, thread configuration, fastener length, marking requirements, along with the applicable ASTM fastener specification.

2. References

2.1 Applicable Publications—The following documents form a part of this specification to the extent specified herein. The latest issue of the documents shall be used except in those cases where an invitation for bid or procurement contract specifically identifies the issues in effect on a particular date.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, Pa 15096-0001.

SAE AMS 2485—Black Oxide Coating

SAE AMS 2487—Anodic Treatment of Titanium and Titanium Alloys

SAE AS5272—Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting Procurement Specification

SAE J121—Decarburization In Hardened and Tempered Unified Threaded Fasteners

SAE J2270—Ship Systems and Equipment—Fasteners—Test, Inspection, and Installation Requirements

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SAE J2271—Ship Systems and Equipment—Part Standard for Studs—Continuous and Double End (Inch Series)

SAE J2271M—Ship Systems and Equipment—Part Standard for Studs—Continuous and Double End (Metric Series)

SAE J2280—Ship Systems and Equipment—Fasteners—Selection and Identification Requirements

- 2.1.2 AEROSPACE INDUSTRIES ASSOCIATION PUBLICATIONS—Available from the Aerospace Industries Association, 1250 Eye Street NW, Washington, DC 20005.

NAS 1283—Fasteners, Male, Threaded, Self-locking

NAS 1351—Screw, Cap, Socket Head, UNRF-3A Threads

NAS 1352—Screw, Cap, Socket Head, UNRC-3A Threads

- 2.1.3 ASME PUBLICATIONS—Available from the American Society of Mechanical Engineers, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300.

ASME B1.1—Unified Inch Screw Thread

ASME B1.13M—Metric Screw Threads - M Profile

ASME B18.2.3.3M—Metric Heavy Hex Screws

ASME B18.2.4.2M—Metric Hex Nuts, Style 2

ASME B18.2.4.6M—Metric Heavy Hex Nuts

ASME B18.18.2M—Inspection and Quality Assurance for High Volume Machine Assembly Fasteners

- 2.1.4 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM A 153—Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 193/A193M—Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service

ASTM A 194/A194M—Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service

ASTM A 307—Carbon Steel Bolts and Studs, 60,000 Psi Tensile Strength

ASTM A 325—Structural Bolts, Steel Heat Treated, 120/105 ksi Minimum Tensile Strength

ASTM A 325M—High-Strength Bolts for Structural Steel Joints [Metric]

ASTM A 342—Standard Test Methods for Permeability of Feebly Magnetic Materials

ASTM A 354—Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners

ASTM A 449—Quenched and Tempered Steel Bolts and Studs

ASTM A 453/A 453M—Bolting Materials, High-Temperature, 50 to 120 ksi [345 to 827 MPa] Yield Strength, with Expansion Coefficients Comparable to Austenitic Steels

ASTM A 490—Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile

ASTM A 490M—High Strength Steel Bolts, Classes 10.9 and 10.9.3 for Structural Steel Joints (Metric)

ASTM A 563—Carbon and Alloy Steel Nuts

ASTM A 563M—Carbon and Alloy Steel Nuts [Metric]

ASTM A 574—Alloy Steel Socket Head Cap Screws

ASTM A 574M—Alloy Steel Socket Head Cap Screws [Metric]

ASTM B 633—Electrodeposited Coatings of Zinc on Iron and Steel, Standard Specification For

ASTM B 695—Coatings of Zinc Mechanically Deposited on Iron and Steel, Standard Specification For

ASTM F 467—Nonferrous Nuts for General Use

ASTM F 467M—Nonferrous Nuts for General Use [Metric]

ASTM F 468—Nonferrous Bolts, Hex Capscrews and Studs for General Use

ASTM F 468M—Nonferrous Bolts, Hex Capscrews and Studs for General Use [Metric]

ASTM F 568—Carbon and Alloy Steel Externally Threaded Metric Fasteners

ASTM F 593—Stainless Steel Bolts, Hex Cap Screws and Studs

ASTM F 594—Stainless Steel Nuts

ASTM F 738M—Stainless Steel Metric Bolts, Screws, and Studs

ASTM F 788/F 788M—Surface Discontinuities of Bolts, Screws, and Studs, Inch and Metric Series

ASTM F 812/F 812M—Surface Discontinuities of Nuts, Inch and Metric Series
ASTM F 835—Alloy Steel Socket Button and Flat Countersunk Head Cap Screws
ASTM F 835M—Alloy Steel Socket Button and Flat Countersunk Head Cap Screws [Metric]
ASTM F 836M—Stainless Steel Metric Nuts
ASTM F 837—Stainless Steel Socket Head Cap Screws
ASTM F 837M—Stainless Steel Socket Head Cap Screws [Metric]
ASTM F 879—Stainless Steel Socket Button and Flat Countersunk Head Cap Screws
ASTM F 879M—Stainless Steel Socket Button and Flat Countersunk Head Cap Screws [Metric]

2.1.5 U.S. GOVERNMENT PUBLICATIONS—Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

2.1.5.1 *Federal Specifications*

QQ-N-286—Nickel-Copper-Aluminum Alloy, Wrought

3. Fastener Part or Identifying Numbers

3.1 SAE Fastener Part Standards—These SAE part standards are for fasteners manufactured to ASTM fastener standards in accordance with the requirements defined herein. ASTM has issued many fastener standards but generally has not established part or identifying numbers for fasteners to these standards. When using the ASTM standards, it is necessary to identify the applicable dimensional configuration, coating requirements, and supplemental quality assurance requirements. This SAE part standard provides for the identification of many frequently used fasteners by identifying the applicable dimensional, coating, and other special features with simple part identifying numbers that can be easily recognized by both manufacturers and users.

3.2 Part or Identifying Numbers (PINs) for Selected Fasteners—PINs are provided herein for selected bolts, cap screws, and hex nuts for the purpose of common logistics parts identification between designers, shipbuilders, repair activities, and ship operators. Part numbers are provided for only those fastener configurations and materials most likely to be needed for ship systems and equipment. Industry or military specifications and standards with part numbers already exist for many types of fasteners and therefore part numbers to cover similar ASTM fasteners have usually not been developed.

3.2.1 **PINS FOR SCREWS AND BOLTS**—Figure 1 provides part or identifying numbers for hex and socket head screws and bolts in accordance with selected ASTM product standards. Figure 2 is a listing of the standards with the selected materials identified. The part number consists of a number of fields in the following order as identified in Figure 1:

- a. ASTM product standard
- b. Thread form
- c. Thread class
- d. Type of fastener
- e. Nominal Size (diameter)
- f. Special Features: Self-Locking, coatings
- g. Nominal length
- h. A letter/number designating the PIN suffix for the selected material as obtained from Figure 2 (This suffix usually consists of the mechanical property marking for the material except that the portion of the mechanical property marking containing the number of the fastener standard is not included.)

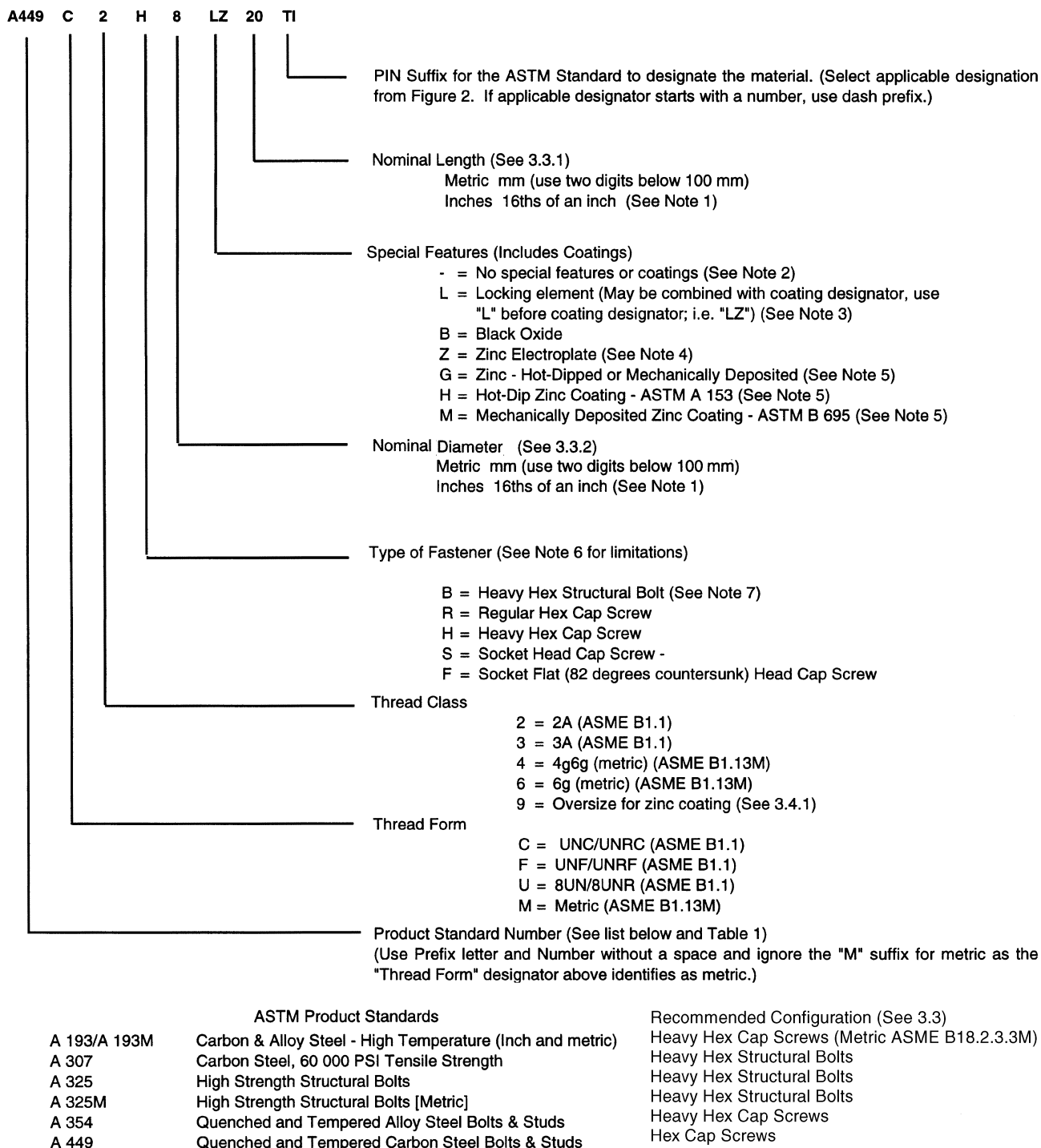


FIGURE 1—PART NUMBER SYSTEM FOR PREFERRED HEX AND SOCKET HEAD FASTENERS IN ACCORDANCE WITH SELECTED ASTM PRODUCT STANDARDS

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A 453/A 453M	High-Temperature Bolting Materials (Inch and metric)	Heavy Hex Cap Screws (Metric ASME B18.2.3.3M)
A 490	Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength	Heavy Hex Structural Bolts
A 490M	High Strength Steel Bolts, Classes 10.9 and 10.93 for Structural Steel Joints (Metric)	Heavy Hex Structural Bolts
A 574	Alloy Steel Socket Head Cap Screws	Socket Head Cap Screws
A 574M	Alloy Steel Socket Head Cap Screws [Metric]	Socket Head Cap Screws
F 468	Nonferrous Bolts, Hex Cap Screws, and Studs	Hex Cap Screws
F 468M	Nonferrous Bolts, Hex Cap Screws, and Studs [Metric]	Hex Cap Screws
F 568	Carbon and Alloy Steel Metric Fasteners	Metric Hex Cap Screws
F 593	Stainless Steel Bolts and Hex Cap Screws	Hex Cap Screws
F 738M	Stainless Steel Metric Bolts, Screws, and Studs	Hex Cap Screws (ASME B18.2.3.3M)
F 835	Alloy Steel Flat Countersunk Head Cap Screws	Flat Countersunk Head Cap Screw
F 835M	Alloy Steel Flat Countersunk Head Cap Screws [Metric]	Flat Countersunk Head Cap Screw
F 837	Stainless Steel Socket Head Cap Screws	Socket Head Cap Screws
F 837M	Stainless Steel Socket Head Cap Screws [Metric]	Socket Head Cap Screws
F 879	Stainless Steel Flat Countersunk Head Cap Screws	Flat Countersunk Head Cap Screws
F 879M	Stainless Steel Flat Countersunk Head Cap Screws [Metric]	Flat Countersunk Head Cap Screws

NOTES:

- (1) For inch type fasteners, express nominal lengths and diameters in 16ths of an inch. For sizes 9/16 inch and smaller, use only one digit.
- (2) A "." is used when there are no special features or optional coatings. However, passivation shall be provided on CRES fasteners and the coating requirements of 3.4.3 shall apply to all titanium fasteners.
- (3) Locate locking element in accordance with NAS 1283. Performance and test for locking element in accordance with SAE J2270. Fasteners with self-locking elements shall be identified on the head by six raised or depressed dots, equally spaced in a circle pattern where possible.
- (4) Electrodeposited zinc coating per ASTM B 633. (See 3.4.1.3)
- (5) Either Hot-Dipped or Mechanically Deposited Zinc may be supplied when the "G" designator is used. Use the "H" or "M" designator if a specific coating is required. Designate threads as oversize when these coatings are used. (See 3.4.1. for additional restrictions.)
- (6) Dimensional configurations shall be limited to those in the applicable ASTM material product specifications except for those additional metric ASME dimensional standards listed in the Recommended Configuration column of Figure 1. In addition, for standardization purposes, dimensions should be restricted to those diameters and length increments identified in 3.3.

Examples of Part Numbers:

Part number shown in Figure 1 (A449C2H8LZ20T1) is for a Heavy Hex Cap Screw 1/2 in (8/16ths) diameter with UNC Class 2A threads and a length of 1-1/4 in (20/16ths) of material in accordance with ASTM A 449 Type 1, with the "LZ" in the features code indicating a self-locking element and zinc electroplating.

A193U2H20-72B16 is the part number for a Heavy Hex Cap Screw 1-1/4 in (20/16ths) in diameter with 8UN Class 2A threads and a length of 4-1/2 in (72/16ths) of material in accordance with ASTM A 193, Grade B16 (chromium-molybdenum-vanadium steel for high temperature applications).

F568M6R16-80-9.8 is the part number for a regular hex metric cap screw with a diameter of 16 mm and metric threads with a class 6g thread fit and a length of 80 mm in medium carbon 9.8 steel per ASTM F 568.

FIGURE 1—PART NUMBER SYSTEMB FOR PREFERRED HEX AND SOCKET HEAD FASTENERS
IN ACCORDANCE WITH SELECTED ASTM PRODUCT STANDARDS (CONTINUED)

ASTM Standard	ALLOY GROUP & CONDITION	MECHANICAL PROPERTY MARKINGS *	PIN SUFFIX FOR SELECTED MATERIALS
A 193/ A 193 M	Chromium-molybdenum steel, Grades B7, B7M	B7, B7M	"B7" or "B7M" as applicable
	Chromium-molybdenum-vanadium steel, Grade B16 (For standardization preferred to B7)	B16	"B16"
A 307	Carbon steel, Grade B, Plain and Zinc Coatings "G", "H" and "M" per Figure 1 special features	307B	"B"
A 325	Type 1 (medium carbon steel), Plain and Zinc Coatings "G", "H" and "M" per Figure 1 Type 3 (weathering steel)	A325 and optional three radial lines. <u>A325</u>	"T1"
			"T3"
A 325M	Type 1 (medium carbon steel), Plain and Zinc Coatings "G", "H" and "M" per Figure 1 Type 3 (weathering steel)	A325M	"MT1"
		A325M and 8S3	"MT3"
A 354	Alloy steel, Grade BD	Marked with "BD", six radial lines, optional.	"BD"
A 449	Type 1 medium carbon steel (For zinc coating, see Figure 1 special features code "Z")	3 radial lines, 120° apart.	"T1"
A 453/ A 453M	Grade 660 Class A, B, or C (Any class may be furnished for the part number)	660 Rolled threads are marked "Ty 2"	"-660"
A 490	Type 1 alloy steel Type 3 alloy steel (weathering)	A490 <u>A490</u>	"T1" "T3"
		"A490" & "10S" "A490" & "10S3"	"T1" "T3"
A 574 or A 574 M	Alloy steel (Use "B" for Black oxide coating in special features code)	Currently, no marking per standard**	No Pin Suffix Required
		12.9	
F 468 or F 468 M	Nickel-Copper, Alloy 400 (Preferred) Alloy 405	F468U, F468MU F468V, F468MV	Use only the letter(s) after "F468" in the mechanical property marking. For example, "U" or "MU". The letter M after "F468" denotes metric.

* Per the applicable ASTM standard.

**Recommend invoking "A574" for marking.

FIGURE 2—HEX AND SOCKET HEAD FASTENER MARKINGS AND PIN IDENTIFIERS FOR PREFERRED MATERIALS

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ASTM Standard	ALLOY GROUP & CONDITION	MECHANICAL PROPERTY MARKINGS *	PIN SUFFIX FOR SELECTED MATERIALS
F 468 or F 468M	Nickel-Copper-Aluminum, Alloy 500**	F468W, F468MW**	See footnote for marking Ni-Cu-Al material QQ-N-286.
	Titanium, Alloy 19 (See 3.4.3 for coating)	F468FT, F468MFT	
	Brass, Alloy Cu 462	F468C, F468MC	
	Silicon Bronze, Alloy Cu 651	F468K, F468MK	
F 568 (Metric)	Carbon and Alloy steel - Atmospheric corrosion resistance	8.8.3, 10.9.3	Use designation assigned to property class. 8.8.3 = "H3", 10.9.3 = "K3"
	Carbon and Alloy steel (zinc plated - Use "Z" special feature except for classes 10.9 and 12.9)	4.6, 8.8, 9.8, 10.9	4.6 = "E", 8.8 = "H", 9.8 = "J", 10.9 = "K",
F 593	Stainless GP 1 - Alloys 304, 305, 384, XM7 Cold Worked 1 (1/2 to 5/8 Inch Diam.) Cold Worked 2 (3/4 to 1-1/2 Inch Diam.)	593C 593D	For PIN for Cold Worked and Precipitation Hardened Condition, use only the letter following "F593" in the mechanical property marking. For example "C".
	Strain Hardened 1 (1/4 to 5/8 in Diam.) Strain Hardened 2 (3/4 to 1 in Diam.) Strain Hardened 3 (1-1/8 to 1-1/4 in Diam.) Strain Hardened 4 (1-3/8 to 1-1/2 in Diam.)	<u>593A</u> <u>593B</u> <u>593C</u> <u>593D</u>	
	Stainless Gr 2 - Alloy 316 Cold Worked 1 (1/2 to 5/8 in Diam.) Cold Worked 2 (3/4 to 1-1/2 in Diam.) Strain Hardened 1 (1/4 to 5/8 in Diam.) Strain Hardened 2 (3/4 to 1 in Diam.) Strain Hardened 3 (1-1/8 to 1-1/4 in Diam.) Strain Hardened 4 (1-3/8 to 1-1/2 in Diam.)	F593G F593H <u>F593E</u> <u>F593F</u> <u>F593G</u> <u>F593H</u>	
	Stainless Gp 7 - Precipitation Hardening Alloy 630 Condition AH (Solution annealed and age hardened)	F593U	
F 738M	Class A1-70, Alloy 304, 305, 384, XM7 Cold Worked Class A1-80, Alloy 304, 305, 384, XM7 Strain Hardened	F738D F738G	For PIN, use only the letter following "F738" in the mechanical property marking. For example, "F".
	Class A4-70, Alloy 316 (Cold Worked) Class A4-80, Alloy 316 (Strain Hardened)	F738F F738J	

* Per the applicable ASTM standard.

**For improved material characteristics it is recommended that the material be in accordance with QQ-N-286 rather than ASTM F 468 or ASTM F 468M Alloy 500. When the QQ-N-286 material is specifically required, as for most military applications, an "X" shall be added at the end of the "W" or "MW" PIN Suffix for material and the marking on the fasteners shall be "•K•", rather than the ASTM F 468 marking. The finished material condition of QQ-N-286 material shall be annealed and age hardened. Fasteners produced by hot or cold heading shall be annealed and age hardened after heading. Threads formed after final anneal or final anneal and aging shall be formed by machining operations only.

FIGURE 2—HEX AND SOCKET HEAD FASTENER MARKINGS AND PIN IDENTIFIERS
FOR PREFERRED MATERIALS (CONTINUED)

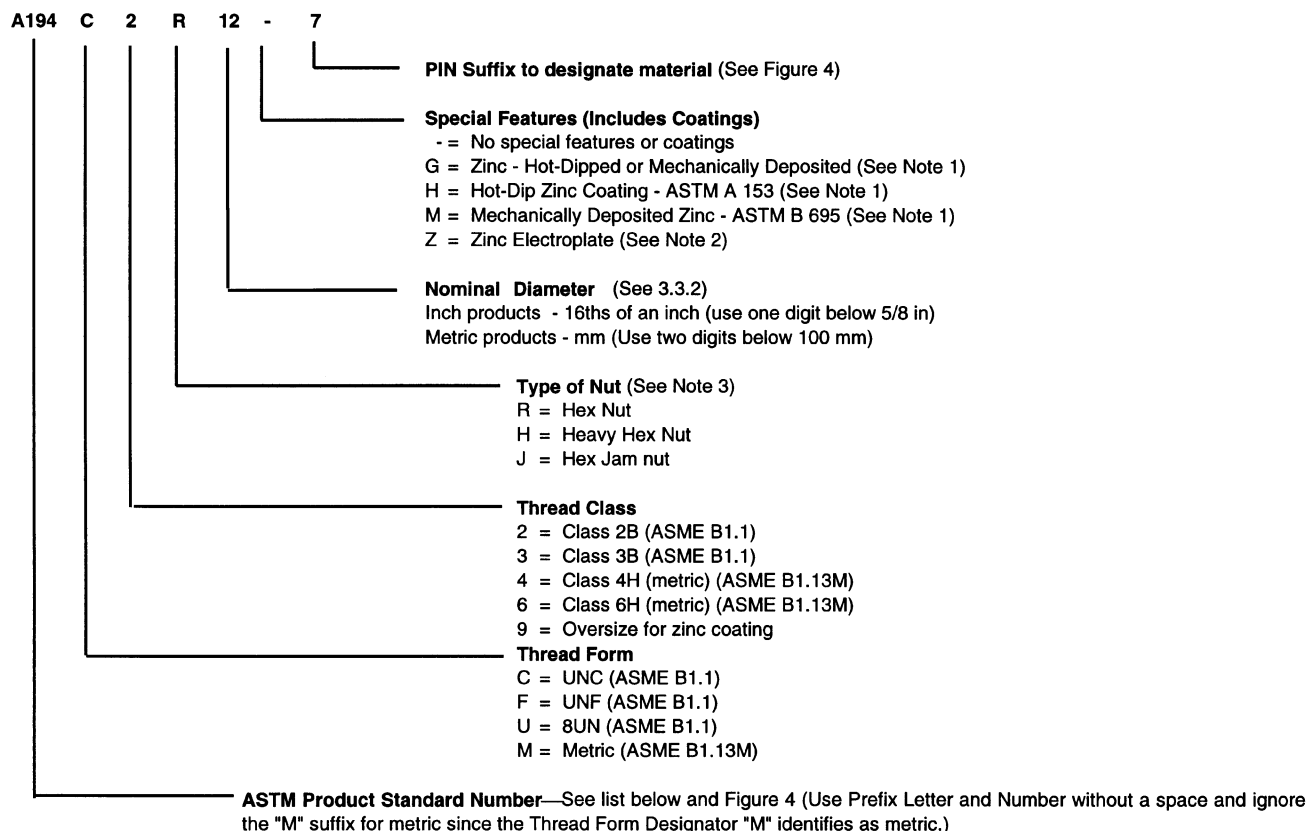
ASTM Standard	ALLOY GROUP & CONDITION	MECHANICAL PROPERTY MARKINGS *	PIN SUFFIX FOR SELECTED MATERIALS
F 835 or F 835M	Alloy steel	None	None
F 837	Alloy Gp 1 - Austenitic Alloys 304, 305, 384 & XM7 - Cold worked	CW (marking optional)	"CW"
	Alloy Gp 5 - Martensitic Alloy 410 Cond HT	HT (marking optional)	"HT"
F 837 M	Alloy Gp 1 (304, 305, 384 & XM7) Grade A1-50	A1-50	"A150"
	Alloy Gp 1 (304, 305, 385 & XM7) Grade A1-70	A1-70	"A170"
	Alloy Gp 5 (410) Grade C1-110 Cond HT	C1-110	"C1"
F 879	Alloy 304, 305, 384, XM7 (Cold Worked)	None (Package only)	"CW"
F 879M	Property Class A1-70, Alloy 304, 305, 384 & XM7 (Cold Worked)		

* Per the applicable ASTM standard.

FIGURE 2—HEX AND SOCKET HEAD FASTENER MARKINGS AND PIN IDENTIFIERS
FOR PREFERRED MATERIALS (CONTINUED)

3.2.2 PINS FOR NUTS—Figure 3 provides part or identifying numbers for hex nuts in accordance with selected ASTM product standards. Figure 4 lists the standards with the selected materials identified. The part number consists of a number of fields in the following order as identified in Figure 3:

- a. ASTM product standard
- b. Thread form
- c. Thread class
- d. Type of nut: Hex, Heavy Hex or Jam
- e. Nominal Size (diameter)
- f. A letter/number designating the PIN suffix for the selected material as obtained from Figure 4. (This suffix usually consists of the mechanical property marking for the material except that the portion of the mechanical property marking containing the number of the fastener standard is not included.)



ASTM Product Standard		Recommended Configuration (See 3.3)
A 194/A 194M	Carbon & Alloy Steel Nuts for High-Pressure and High Temperature Service (Inch and Metric)	Heavy Hex Nuts - (Metric ASME B18.4.2M)
A 453/A 453M	High-Temperature Corrosion Resistant Bolting Materials	Heavy Hex Nuts - (Metric ASME B18.2.4.6M)
A 563	Carbon & Alloy Steel Nuts - (inch only)	Hex and Heavy Hex Nuts
A 563M	Carbon & Alloy Steel Nuts (Metric)	Hex and Heavy Hex Nuts
F 467	Nonferrous Nuts for General Use - (inch only)	Hex Nuts, Heavy Hex Nuts
F 467M	Nonferrous Nuts for General Use (Metric)	Hex Nuts, Heavy Hex Nuts
F 594	Stainless Steel Nuts - (inch only)	Hex Nuts
F 836M	Stainless steel Metric Nuts	Hex Nuts

NOTES:

- (1) Either Hot-Dipped or Mechanically Deposited Zinc shall be supplied when the "G" designator is used. Use the "H" or "M" designator if a specific coating is required. Designate oversize internal threads when these coatings are used. (See 3.4.1. for additional restrictions.)
- (2) Electrodeposited zinc coating per ASTM B 633. (See 3.4.1.3)
- (3) Dimensional configurations shall be limited to the configurations in the ASTM material product specification except for the additional metric configurations listed in the Recommended Configuration column.

PART NUMBER EXAMPLES—The part number in Figure 4 is for a regular hex nut with 3/4 (12/16ths) in diameter Class UNC-2B threads in chromium-molybdenum steel Grade 7 in accordance with ASTM A 194. F836M6R20-F is the part number for a metric hex nut with M20, Class 6H threads in Alloy 316, cold worked condition per ASTM F 836M. A563U2H20GDH is a heavy hex nut with 1-1/4 8UN Class 2B threads in carbon steel Grade DH with either hot-dipped or mechanically deposited zinc coating.

FIGURE 3—PART NUMBER SYSTEM FOR PREFERRED HEX NUTS IN ACCORDANCE WITH SELECTED ASTM STANDARDS

ASTM	ALLOY GROUP & CONDITION	MECHANICAL PROPERTY MARKINGS *	PIN SUFFIX FOR SELECTED MATERIALS
A 194/ A 194M	4, Carbon molybdenum steel 7, 7M - AISI 4140, 4142, 4145, 4140H, 4142H, 4145H	4, 4B 7, 7B, 7M, 7MB	"4" "7"
A 453/ A 453M	Grade 660 Class A, B, or C (Any class may be furnished for the part number.)	660	"660
A 563	Carbon steel, Plain - (Uncoated or with zinc electroplate "Z" per Figure 3 of insufficient thickness to require overtapped nuts) Grade A Grade D Grade DH	Not normally marked. D DH	"A" "D" "DH"
	Carbon steel - (Zinc coating G, H or M per Figure 3 - Overtapped nuts required)	Same as above	Same as immediately above
	Atmospheric corrosion resistant weathering steel, Grades C3 & DH3, uncoated	Grade C3 marked on one face with three circumferential marks 120 degrees apart and the numeral "3". Grade DH3 marked "DH3"	"C3" "DH3"
A 563M	Carbon steel - (Plain - Uncoated or with zinc coating "Z" per Figure 3 of insufficient thickness to require overtapped nuts) Gr 5 M5 to M36 B18.2.4.1M hex nut, Style 1 M42 to M100 ASME B18.2.4.6M heavy hex Gr 10 M5 to M36 B18.2.4.1M hex nut Style 1 Gr 10S M12 to M36 B18.2.4.6M Heavy hex	5 5 10 10S	"5" "5" "10" "10S"
	Carbon steel - (Zinc Coating G, H or M per Figure 3) - Overtapped nuts (See 3.4.1)	Same as above except no Grade 10S	Same as immediately above - No Grade 10S
	Atmospheric corrosion resisting steel Gr 10S3 (plain, uncoated)	"10S3"	"10S3"
F 467 or F 467 M	Nickel Copper, Alloy 400 Nickel Copper, Alloy 405 (preferred)	F467U & F467MU F467V & F467MV	For PIN, use only the letter(s) following "F467"
	Nickel-Copper-Aluminum, Alloy 500**	F467W & F467MW**	See footnote for marking Ni-Cu-Al material to QQ-N-286
	Titanium, Alloy 19 (See 3.4.3 for coating)	F467FT & F467MFT	
	Brass, Alloy Cu 462	F467C & F467MC	

* Per the applicable ASTM standard.

**For improved material characteristics it is recommended that the material be in accordance with QQ-N-286 rather than ASTM F 468 or ASTM F 468M Alloy 500. When the QQ-N-286 material is specifically required, as for most military applications, an "X" shall be added at the end of the "W" or "MW" Pin Suffix for material and the marking on the fasteners shall be "•K•", rather than the ASTM F 468 marking. The finished material condition of QQ-N-286 material shall be annealed and age hardened. Fasteners produced by hot or cold heading shall be annealed and age hardened after heading. Threads formed after final anneal or final anneal and aging shall be formed by machining operations only.

FIGURE 4—PREFERRED MATERIAL FOR NUTS, THEIR MARKING DESIGNATIONS, AND PIN IDENTIFIERS

ASTM	ALLOY GROUP & CONDITION	MECHANICAL PROPERTY MARKINGS *	PIN SUFFIX FOR SELECTED MATERIALS
F 467 or F 467 M	Silicon Bronze, Alloy Cu 651	F467K & F467MK	
F 594	Stainless Alloy Gp 1 - 304, 305, 384, XM7 CW1 1/4 to 5/8 CW2 3/4 and greater	F594C F594D	For Cold Worked condition, use only the letter following "F594" For example, "C"
	Stainless Gp 2 - Alloy 316 CW1 1/4 to 5/8 CW2 3/4 and greater	F594G F594H	
	Stainless Alloy Gp 1 - 304, 305, 384, XM7 SH1 1/4 to 5/8 Diam. SH2 3/4 to 1 in Diam. SH3 1-1/8 to 1-1/4 Diam. SH4 1-3/8 to 1-1/2 Diam.	<u>F594A</u> <u>F594B</u> <u>F594C</u> <u>F594D</u>	For strain hardened condition, use the letter following "F594" and add "- SH" for strain hardened rather than the underlined property marking For example, "E-SH"
	Stainless Alloy Gp 3- Alloy 316 SH1 1/4 to 5/8 Diam. SH2 3/4 to 1 in Diam. SH3 1-1/8 to 1-1/4 Diam. SH4 1-3/8 to 1-1/2 Diam.	<u>F594E</u> <u>F594F</u> <u>F594G</u> <u>F594H</u>	
	Stainless Alloy Gp 7- Precipitation Hardening Alloy 630 (Cond. AH - Age Hardened)	F594U	Use only the letter "U" following "F594"
F 836M	Class A1-70 Alloys 304, 305, 384 & XM7(CW) Class A1-80 Alloys 304, 305, 384 & XM7 (SH)	F836D F836G	For PIN, use only letter following "F836".
	Class A4-70 Alloy 316 (CW) Class A4-80 Alloy 316 (SH)	F836F F836J	For example, "F"

AH - Solution annealed and aged hardened after forming

CW - Annealed and cold worked. 3/4 in and > may be hot worked

SH - Machined from strain hardened stock

* Per the applicable ASTM standard.

FIGURE 4—PREFERRED MATERIAL FOR NUTS, THEIR MARKING DESIGNATIONS, AND
PIN IDENTIFIERS (CONTINUED)

3.3 Dimensional Requirements for ASTM Fasteners—The dimensional requirements for a particular fastener are based on the applicable ASME configuration as identified in the particular ASTM fastener standard. Dimensional configurations and fits shall be limited to those identified in the applicable ASTM fastener standards unless other dimensional configurations are identified in the listing with the applicable ASTM Standard product in Figures 1 and 3. This listing also contains recommendations as to which configurations are to be used for each ASTM standard. The part identification numbering system of this document can accommodate some of the additional configurations of the ASTM standards if needed. The reasons for the recommended configurations are:

- a. When both hex head cap screws and hex head bolts can be procured to the applicable ASTM standard, the hex head cap screws are preferred since they are suitable for use as both bolts and screws and are often more readily available.
- b. Heavy hex configurations have been chosen for the higher strength fasteners and in most cases this is in accordance with the recommendations of the ASTM standards.
- c. Certain configurations are not listed as recommended configurations because there are other industry standards with part identifying numbers which are preferred. For example, socket head cap screws are not listed for ASTM A 453 since socket head cap screws of similar material are more widely available to National Aerospace Standards NAS 1351 and NAS 1352. Similarly stud configurations are not listed since they are covered by SAE J2271 and J2271M.
- d. To achieve standardization and minimize logistic support requirements.

3.3.1 LENGTHS OF FASTENERS—Lengths shall be restricted to those lengths identified in the applicable dimensional standards. When guidance is not provided in the dimensional standard, the length shall be limited to the increments in Table 1:

TABLE 1—INCREMENTS

Units	Screw Length	Length Increments
Metric	0 to 20 mm	2 mm
	25 to 100 mm	5 mm
	110 to 200 mm	10 mm
	220 mm and longer	20 mm
Inch	0 to 1.5 in	0.125 in
	1.75 to 5.0 in	0.250 in
	5.50 and longer	0.500 in

3.3.2 DIAMETERS OF FASTENERS—Diameters shall be restricted to those identified in the applicable dimensional standards. For new design, diameters should be restricted to the following sizes when possible:

- a. Metric—M1, M2, M3, M4, M5, M6, M8, M10, M12, M16, M20, M24, M30, M36, M42, M48

NOTE—The part numbering system does not accommodate metric sizes M1.2, M1.6, M2.5, and other intermediate nonpreferred metric diameters.

- b. Inch—1/8, 3/16, 1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1-1/8, 1-1/4, 1-3/8, 1-1/2, 1-3/4, 2

3.3.3 THREAD TYPES AND FITS—See SAE J2280 for guidance on thread selection. For fit, classes 2A (inch series) and 6g (metric) are recommended for externally threaded fasteners and classes 2B (inch series) and 6H (metric) are recommended for internally threaded fasteners. For plated fasteners, fits after plating shall meet classes 3A (inch series) and 4g6g (metric) for externally threaded fasteners and classes 3B (inch) and 4H (metric) for internally threaded fasteners. See Notes on Figures 1 and 3 for dimensions of fasteners with hot-dipped or mechanically deposited zinc.

3.4 Coating Requirements—Coatings shall be limited to those identified for the applicable material standards in Figures 2 and 4. The requirements for the applicable coatings are as follows:

3.4.1 ZINC COATINGS AND ELECTROPLATING

3.4.1.1 Zinc (Hot-Dip Galvanized) Coatings—Hot-dip galvanized coating shall be in accordance with ASTM A 153 with thickness and other requirements per the applicable ASTM fastener standard. See the applicable fastener standard for details on dimensions and nut requirements.

3.4.1.2 Mechanically Deposited Zinc—Mechanically deposited zinc coatings shall be in accordance with ASTM B 695 and with the thickness and other requirements per the applicable ASTM fastener standard. These thicker coatings require nuts with oversize internal threads. See the applicable fastener standard for details on dimensions and nut requirements.

3.4.1.3 Electrodeposited Zinc Coatings—Electrodeposited zinc shall be in accordance with ASTM B 633 and as provided herein. The finish shall be Type II unless otherwise approved by the purchaser. A specific coating class should not be specified. Rather the coating shall be to a thickness of 1/6 the allowance of ASME B1.1 or ASME B1.13 as applicable.

3.4.2 BLACK OXIDE COATINGS—Black oxide coatings shall be in accordance with SAE AMS 2485.

3.4.3 COATINGS FOR TITANIUM FASTENERS—Fasteners of titanium alloy shall be anodized in accordance with SAE AMS 2487 (except testing requirements may be negotiated between manufacturer and coating supplier) and then coated with a molybdenum disulfide dry film lubricant in accordance with SAE AS5272 Type II.

3.4.4 PASSIVATION—All corrosion-resistant steel fasteners shall be passivated in accordance with the applicable fastener standard.

3.5 Product Marking—All fasteners shall be marked in accordance with the applicable product standard. Applicable mechanical property markings are listed in Figures 2 and 4. When the applicable product standards permit diameters less than 6 mm (1/4) inch, the property marking shall be applied to all products with a nominal diameter of 5 mm (3/16 inch) or greater.

3.6 Quality Assurance—The ordering document must address quality assurance requirements. Many of the ASTM standards have supplementary requirements which apply only when specified by the purchaser in the contract or order. SAE J2280 Appendix A identifies additional test/inspection requirements that are to be applied when SAE J2280 Appendix A is contractually invoked, such as for most military procurements. If the ordering document does not address quality control requirements, the following inspections shall apply:

3.6.1 SURFACE DISCONTINUITIES—Non-destructive inspection for surface discontinuities shall be in accordance with ASTM F 812/F 812M for nuts and ASTM F 788/F 788M for externally threaded products using MT or PT inspection.

3.6.2 DECARBURIZATION—Decarburization inspection of externally threaded and heat treated carbon or alloy steels shall be in accordance with SAE J121 Class B. Unless otherwise specified, only one sample per lot is required.

NOTE—If certification of in-process inspections is provided, the inspection of a finished fastener is not required.

3.6.3 DIMENSIONS—Dimensional inspections in accordance with the referenced ASME dimensional standard. Unless otherwise specified, samples shall be as specified in the ASME dimensional standard.



- 3.6.4 **STRENGTH AND MATERIAL TESTS AND DIMENSIONAL INSPECTIONS**—These tests and inspections shall be in accordance with the applicable referenced ASTM fastener standard except the number of samples shall be in accordance with ASME B18.18.2 unless the manufacturer utilizes a quality assurance process that provides equivalent or better assurance.
4. **Notes**—This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.
- 4.1 **Intended Use**—This document establishes requirements and part or identifying numbers for selected materials from ASTM fastener standards. While this document was developed specifically for ship systems and equipment, its use is not restricted to these applications.
- 4.2 **Identification of Part Numbering System on Drawings**—On drawings where a column exists for identifying the manufacturer or his Commercial and Government Entity (CAGE) Code, indicate the CAGE Code "81343/J2295" or "SAE J2295" as required by the drawing standard. If no column exists or there is space only for the 5-digit CAGE Code, then a note must indicate that the part numbers are defined in SAE J2295. This is necessary since reference to the applicable ASTM standard will not explain the part identifying number.
- 4.3 **Key Words**—Fasteners, bolts, nuts, screws, part or identifying numbers

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Rationale—The most significant change is that the document has been changed from a part numbering system for selected fasteners to part standards for selected fasteners. The listing of industry and military sources for fastener part or identifying numbers along with the Appendix A and B listings of selected part standards for metric and inch fasteners has been deleted. This information may be incorporated into a new SAE standard. As a result, references to many of these standards has been deleted from the document. Recommended configurations for the ASTM fasteners for which part identifying numbers are provided have been listed in order to promote standardization. References for ASME dimensional standards have been retained only when the ASTM product standard does not adequately identify the applicable ASME dimensional standard. Part numbers for fasteners made of ASTM B 446, B 637, and B 805 bar stock materials have been deleted. Guidance on selection of thread fit has been added. The requirement for dry film lubricants has been changed from SAE AS 1701 to SAE AS 5272. A paragraph on product marking has been added. Default quality assurance requirements have been added. SAE J121, ASTM F 788, and F 812 added as references.

Relationship of SAE Standard to ISO Standard—Not applicable.

Application—This SAE Part Standard covers selected cap screws, hex bolts, and hex nuts manufactured in accordance with American Society for Test and Materials (ASTM) fastener standards most often needed for ship systems and equipment.

The purpose of this document is to assist the designer and other personnel in providing requirements and part identifying numbers for the most commonly used fasteners for ship systems and equipment. A part or identification number (PIN) is normally required for all military applications and provides a useful means of communicating fastener requirements to suppliers and manufactures in a very succinct manner.

This document provides a part or identifying numbers which can be used to identify socket head cap screws, hex head cap screws, hex head bolts, and hex nuts for the parts covered by this document. The part identification number (PIN) system identifies material, material strength, thread configuration, nominal diameter, fastener length, marking requirements along with the applicable ASTM fastener specification.

Reference Section

SAE AMS 2485—Black Oxide Coating

SAE AMS 2487—Anodic Treatment of Titanium and Titanium Alloys

SAE AS5272—Lubricant, Solid Film, Heat Cured, Corrosion Inhibiting Procurement Specification

SAE J121—Decarburization in Hardened and Tempered Unified Threaded Fasteners

SAE J2270—Ship Systems and Equipment—Fasteners—Test, Inspection, and Installation Requirements

SAE J2271—Ship Systems and Equipment—Part Standard for Studs—Continuous and Double End (Inch Series)

SAE J2271M—Ship Systems and Equipment—Part Standard for Studs—Continuous and Double End (Metric Series)

SAE J2280—Ship Systems and Equipment—Fasteners—Selection and Identification Requirements

NAS 1283—Fasteners, Male, Threaded, Self-locking

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NAS 1351—Screw, Cap, Socket Head, UNRF-3A Threads

NAS 1352—Screw, Cap, Socket Head, UNRC-3A Threads

ASME B1.1—Unified Inch Screw Thread

ASME B1.13M—Metric Screw Threads - M Profile

ASME B18.2.3.3M—Metric Heavy Hex Screws

ASME B18.2.4.2M—Metric Hex Nuts, Style 2

ASME B18.2.4.6M—Metric Heavy Hex Nuts

ASME B18.18.2M—Inspection and Quality Assurance for High Volume Machine Assembly Fasteners

ASTM A 153—Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 193/A193M—Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service

ASTM A 194/A194M—Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service

ASTM A 307—Carbon Steel Bolts and Studs, 60,000 Psi Tensile Strength

ASTM A 325—Structural Bolts, Steel Heat Treated, 120/105 ksi Minimum Tensile Strength

ASTM A 325M—High-Strength Bolts for Structural Steel Joints [Metric]

ASTM A 342—Standard Test Methods for Permeability of Feebly Magnetic Materials

ASTM A 354—Quenched and Tempered Alloy Steel Bolts, Studs and Other Externally Threaded Fasteners

ASTM A 449—Quenched and Tempered Steel Bolts and Studs

ASTM A 453/A 453M—Bolting Materials, High-Temperature, 50 to 120 ksi [345 to 827 MPa] Yield Strength, with Expansion Coefficients Comparable to Austenitic Steels

ASTM A 490—Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile

ASTM A 490M—High Strength Steel Bolts, Classes 10.9 and 10.9.3 for Structural Steel Joints (Metric)

ASTM A 563—Carbon and Alloy Steel Nuts

ASTM A 563M—Carbon and Alloy Steel Nuts [Metric]

ASTM A 574—Alloy Steel Socket Head Cap Screws

ASTM A 574M—Alloy Steel Socket Head Cap Screws [Metric]

ASTM B 633—Electrodeposited Coatings of Zinc on Iron and Steel, Standard Specification For

ASTM B 695—Coatings of Zinc Mechanically Deposited on Iron and Steel, Standard Specification For



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ASTM F 467—Nonferrous Nuts for General Use

ASTM F 467M—Nonferrous Nuts for General Use [Metric]

ASTM F 468—Nonferrous Bolts, Hex Capscrews and Studs for General Use

ASTM F 468M—Nonferrous Bolts, Hex Capscrews and Studs for General Use [Metric]

ASTM F 568—Carbon and Alloy Steel Externally Threaded Metric Fasteners

ASTM F 593—Stainless Steel Bolts, Hex Cap Screws and Studs

ASTM F 594—Stainless Steel Nuts

ASTM F 738M—Stainless Steel Metric Bolts, Screws, and Studs

ASTM F 788/F 788M—Surface Discontinuities of Bolts, Screws, and Studs, Inch and Metric Series

ASTM F 812/F 812M—Surface Discontinuities of Nuts, Inch and Metric Series

ASTM F 835—Alloy Steel Socket Button and Flat Countersunk Head Cap Screws

ASTM F 835M—Alloy Steel Socket Button and Flat Countersunk Head Cap Screws [Metric]

ASTM F 836M—Stainless Steel Metric Nuts

ASTM F 837—Stainless Steel Socket Head Cap Screws

ASTM F 837M—Stainless Steel Socket Head Cap Screws [Metric]

ASTM F 879—Stainless Steel Socket Button and Flat Countersunk Head Cap Screws

ASTM F 879M—Stainless Steel Socket Button and Flat Countersunk Head Cap Screws [Metric]

QQ-N-286—Nickel-Copper-Aluminum Alloy, Wrought

Developed by the SAE Ship Systems and Equipment Committee