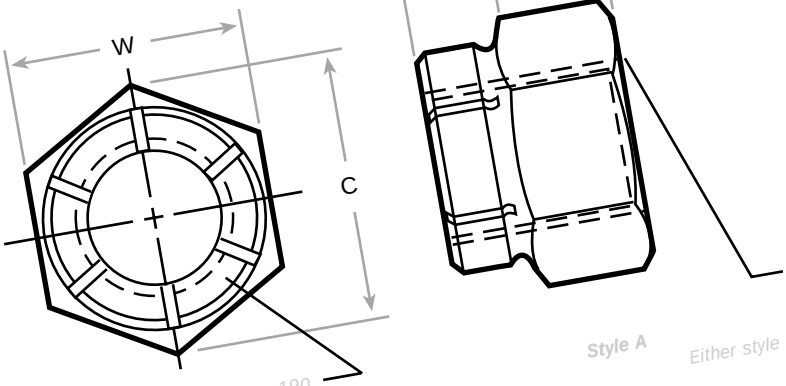
FLEXLOC® PRODUCTS

Standards and Specifications
NASM25027 except as noted

FLEXLOC® Full Height Military



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.

Style A

Style B

Either style to be supplied at manufacturer's opt

Countersink, counterbore or radius f

Type*	Dash No	Threads See Note 5	C Ref	H Max	S Min	W Max	W Min	X	
FH	440	.112-40 UNJC-3B	.268	.155	.050	.251	.243	.004	
FH	540	.125-40 UNJC-3B	.268	.155	.052	.251	.243	.004	
FH	632	.138-32 UNJC-3B	.339	.180	.075	.313	.305	.004	
FH	832	.164-32 UNJC-3B	.374	.243	.105	.345	.336	.004	
FH	1032	.190-32 UNJF-3B	.410	.243	.085	.376	.367	.004	
FH	428	.250-28 UNJF-3B	.482	.320	.135	.439	.430	.005	
		24 UNJF-3B	.552	.353	.150	.502	.492	.006	
			.622	.462	.210	.564	.553	.006	
						27	.616	.007	

SPS TECHNOLOGIES
Aerospace Fasteners Group

Drawings subject to revision. To assure you have current drawings contact SPS Technologies Aerospace Product Engineering Dept.

Usage Limitations: The self-locking nuts represented in this catalog are designed to be used on external threads within the limitations of MS33588.

Products listed as Military Standards have been manufactured to meet or exceed those standards. To verify latest qualifications status, contact SPS Technologies Aerospace Fasteners Group Customer Service Department.

The products in this catalog have been designed and manufactured to perform to specific standards for the military/aerospace markets.

Reworking, modifying, plating or re-plating, altering or causing the same to be done on any SPS product as manufactured, certified and supplied by SPS Technologies is prohibited. In the event that such action is taken, product cannot be represented as SPS product.

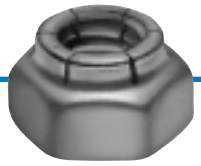
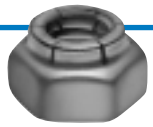
The standards contained herein take precedence over documents referenced herein. Referenced drawings, standards and documents shall be of the issue in effect on date of invitation to bid. Catalog drawings and part numbers are for ordering purposes only.

All FLEXLOC self-locking nuts presented in this catalog are manufactured at the SPS Technologies Aerospace Fasteners Group facility in Jenkintown, PA, USA.

CAGE NO. 56878

Table of Contents

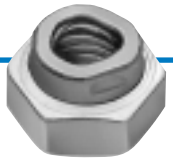
Quick Selector Guide

	Applications / Features	Material	size range Coarse	Fine	Page
FLEXLOC® Nut Full Height Heavy Duty Hex 	Ideal for severe service uses. One-piece, all-metal, heavy duty hex exhibits greater wrenchability	Steel Cres* Brass Aluminum	¼"–2"		8-9
Full Height Light Hex	Use this high performance fastener as both a stop- and locknut. All-metal, one-piece nut withstands extremes of temperature, shock and vibration	Steel Cres* Brass Aluminum	#2–2"	#4–2"	10-13
FLEXLOC Nut Thin Height Heavy Duty Hex 	All threads in this low height self-locking nut are load-carrying, imparting exceptional strength. Combines durability and space-savings.	Steel Cres* Brass Aluminum	¼"–1½"		14-15
Thin Height Light Hex	Delivers maximum weight and space savings. Full height locknut features, with 30% height, 20% weight reduction. Use for tight or compact assemblies.	Steel Cres* Brass Aluminum	#6–1"	#6–1½"	16-19
FLEXLOC Nut Giant Size Full Height 	Large diameter locknuts for use in critical applications where maximum strength and performance are required.	Steel	2¼"–4"	2¼"–4"	20-21
Giant Size Thin Height 	Large diameter applications requiring thin height locknut to perform under a load.	Steel	1⅜"–4"	1⅜"–4"	22-23
FLEXLOC Nut Military Standards Full Height 	AN 365, MS 20365, MS 21045, MS 21046, NAS 1021	Steel Cres*	#4–1"	#10–1¼"	24-25
Military Standards Full Height	AN 365, MS 20365, NAS 1021	Brass Aluminum	#4–#8	#10–1¼"	26-27
Military Standards Thin Height 	AN 364, MS 20364, NAS 1022	Steel Cres* Brass Aluminum	#6–#8	#10–1¼"	28-29

Our capabilities include custom sizes and materials which are not listed here. Please call us to discuss your requirements. For more information on available finishes see page 00.

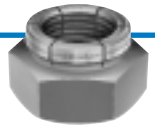
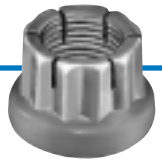
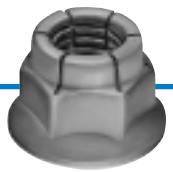
* Corrosion Resistant Steel

Quick Selector Guide

		Applications / Features	Material	size range Coarse	Fine	Page
FLEXLOC Nut High Temperature		Military Standard: MS 20500, application temperatures to 1200°F	Cres*	#8–1"	#10–1"	30-31
FLEXLOC Nut High Temperature High Beam		High temperature, high beam for use in applications to 1200°F. For use on reduced pitch diameter bolts.	Cres*	#8–½"	#10–½"	32-35
High Temperature High Beam		High beam for use in applications to 1200°F. Special locking torque.	Cres*	#6–½"	#10–½"	32-35
FLEXLOC Nut Microsize		For miniature threaded joints in micro-assemblies. Ideal for instruments, electronic apparatus, radar equipment, etc. One-piece, all metal construction. Precisely controlled locking torques.	Steel Cres* Brass Aluminum	#1–#4	#0–#4	36-37
Metric FLEXLOC Nut Full Height		Use in applications where maximum strength and wrenchability is required.	Steel Cres*	M3–M39	M3–M39	38-41
Metric FLEXLOC Nut Thin Height		All threads are load-carrying, imparting high strength in this low height nut. Locking torques held to uniform close limits. Combines ruggedness and space-savings.	Steel Cres*	M3.5–M39	—	42-45
Metric FLEXLOC Nut Microsize		For miniature threaded joints in micro-assemblies. Ideal for instruments, electronic apparatus, radar equipment, etc. One-piece, all metal construction. Precisely controlled locking torques.	Steel Cres*	M1.6–M2.5	—	46-47
FLEXLOC Nut 8-Pitch Series		Vibration resistant locking without excessive wrenching torques required to tighten nuts with more threads per inch.	Steel Cres*	1"–2½"	—	48-49

* Corrosion Resistant Steel

Quick Selector Guide

		Applications / Features	Material	size range Coarse	Fine	Page
FLEXLOC Nut Engine, Wheel and Brake		Ideal for high strength, close tolerance applications.	Steel	—	#10–½"	50-51
CLINCH Nut Regular		Special purpose fastener for blind-mounting in in thin section material. Saves time and money with equipment that is frequently dismantled and reassembled. One-piece, all-metal design. Only clinch nut available with exclusive FLEXLOC locking feature.	Steel Cres* Brass Aluminum	#4–½"	#4–½"	52-55
CLINCH Nut Microsize		This miniature locknut Exhibits all features of an inch size clinch nut. Replaces cage, anchor and weld nuts. For use in small assemblies.	Steel Cres* Brass Aluminum	#1–#4	#0–#4	56-57
FLEXITHRED™ Swage Nuts Self-Locking		Put load-bearing, self-locking threads in thin section materials. Ideal for electronic applications. Aids blind fastening. Requires only one tool to install.	Steel Cres*	#2–½"	#10–½"	64-65
FLEXITHRED Swage Nuts Non-Locking		Same as above, except non-locking. No installation tools required.	Steel Cres*	#2–½"	#10–½"	62-63
FLEXLOC Nut Double Hexagon Self-Locking Nut		High tensile strength. Maximum wrenchability.	Steel	#4	#4–1½"	66-67
Metric FLEXLOC FLANGED Nut Full Height		Increased bearing area eliminates the need for washers. One-piece construction eliminates lock wires and inserts. Simplifies joint design and assembly. Locks without seating. Can be used as stop nut.	Steel Cres*	M4–M24		68-70
FLEXLOC Nut Full Height Non-Slotted Self-Locking Nut		Non-slotted locknut with elliptical locking feature offers an alternative to the slotted locknut with the same high performance.	Steel Cres*	#4–1.250"		71-73

* Corrosion Resistant Steel

The Evolution of FLEXLOC® Self-Locking Nuts

Every threaded fastener has an inherent benefit: When servicing an assembly, the fastener can be removed and reused or replaced. This advantage can also have a drawback: If a nut inadvertently backs-off a bolt, the result might be a minor inconvenience or a major disaster. Locknuts were developed to overcome this potential problem.

A Brief History of SPS Self-Locking Nuts

SPS Technologies started as Standard Pressed Steel Co. in 1903. Early on, the company realized a need for high quality, dependable fasteners of all types for its manufacturing operations. None were available in the marketplace, so SPS designed their own unique self-locking nuts and developed the machinery needed to produce them. This was the origin of FLEXLOC® self-locking nuts.

Military Hero

World War II was the showcase for the FLEXLOC product's first real world, problem-solving application. U.S. Army Ordnance specified the self-locking nuts to stop track bolts from coming loose on army tanks in the field of combat.

This dramatic application brought FLEXLOC locknuts to the attention of the booming aircraft industry. The product's initial use in this demanding market was in the design of the Boeing B-29. According to a biography written by the founder of SPS, FLEXLOC locknuts were used extensively in the aircraft. This led to acceptance of the fastener throughout the industry.

Due to these and later successes, the defense industry sought out SPS for help in standardizing locknut products. To a large extent, the military specification NASM25027 for locknuts was written based on the FLEXLOC nut performance.

Today, SPS Technologies' FLEXLOC self-locking nuts are used by the military and aerospace industries in airframe, space vehicle and missile assemblies; piston, turbine and rocket engines; as well as ground support equipment. Virtually every major military and commercial program in production today utilizes SPS self-locking nuts.

FLEXLOC Self-locking nut features...

- One-piece, all metal, prevailing torque locknuts

FLEXLOC benefits...

- Higher temperature use than non-metallic insert type locknuts
- Every thread carries a portion of the induced load
- Impact, shock and vibration resistance
- Elimination of lock wires, lock washers and inserts
- Locking without seating–can be used as stop nuts
- Easy installation and removal
- Reusability - To NASM25027
- More reliable then plain nuts, lock washers, castellated nuts with cotter pins and jam nuts
- Identification - SPS stamp

For nearly a century SPS has been committed to providing products that offer a superior level of quality and performance. Whether we manufacture to industry, government or customer specification, we are dedicated to meeting the most stringent requirements of those specifications plus the SPS standards, which in many cases exceed those required by regulation.

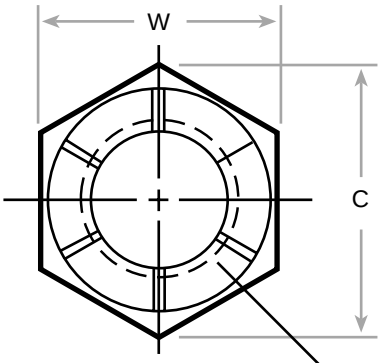
Achieving this level of product integrity requires uncompromising quality assurance. Statistical monitoring is an integral part of quality assurance at SPS. In place at every step of the manufacturing process, it assures the customer both dimensional and metallurgical integrity for every product produced.

This brochure is designed to give you an overview of the wide range of FLEXLOC products manufactured by SPS Aerospace Fasteners Group.

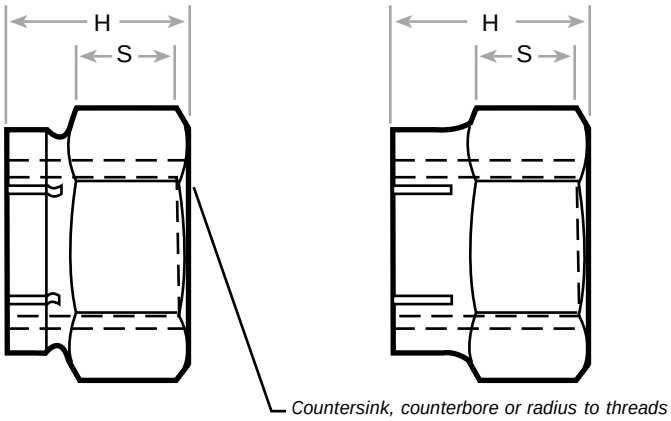
Standards & Specifications

NASM25027 except as noted

FLEXLOC® Full Height Heavy Duty Hex



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.



Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note 5	C Ref	H Max	S Min	W Max	W Min	Axial Strength Lbs Min Steel & Cres	Aluminum	Brass
FAC	420	.250-20 UNC-2B	.552	.290	.094	.502	.492	5,730	4,000	2,040
FA	518	.312-18 UNC-2B	.622	.321	.113	.564	.553	9,600	5,800	3,680
FA	616	.375-16 UNC-2B	.696	.384	.144	.627	.616	13,800	6,900	5,420
FA	714	.437-14 UNC-2B	.837	.446	.163	.752	.741	14,900	7,470	6,400
FA	813	.500-13 UNC-2B	.907	.509	.196	.814	.803	22,000	11,000	9,430
FAC	912	.562-12 UNC-2B	1.051	.571	.216	.940	.928	27,000	13,700	11,700
FA	1011	.625-11 UNC-2B	1.119	.634	.245	1.002	.990	34,000	17,000	14,500
FA	1210	.750-10 UNC-2B	1.260	.759	.325	1.127	1.115	50,000	24,900	21,300
FA	1409	.875-9 UNC-2B	1.470	.884	.397	1.314	1.301	64,600	34,100	29,200
FA	1608	1.000-8 UNC-2B	1.682	1.009	.462	1.502	1.489	85,000	42,400	37,900
FN	1807	1.125-7 UNC-2B	2.038	1.134	.549	1.814	1.801	106,000	53,000	46,700
FN	2007	1.250-7 UNC-2B	2.250	1.259	.616	2.002	1.988	125,000	63,300	55,000
FN	2206	1.375-6 UNC-2B	2.484	1.384	.684	2.190	2.176	145,000	72,500	62,100
FN	2406	1.500-6 UNC-2B	2.697	1.509	.748	2.377	2.363	182,000	91,000	78,000
FN	2605	1.625-5 1/2NS-2B	2.909	1.634	.814	2.564	2.549	194,000	97,000	83,100
FN	2805	1.750-5 UNC-2B	3.124	1.759	.882	2.752	2.737	233,000	116,500	99,800
FN	3005	1.875-5 NS-2B	3.338	1.884	.950	2.940	2.925	257,000	128,500	110,100
FN	3204	2.000-4 1/2UNC-2B	3.552	2.009	1.018	3.127	3.112	310,000	155,000	132,700

Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts.

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FA = FLEXLOC standard nut, coarse thread, light and heavy hex.
FAC = FLEXLOC standard nut, coarse thread, heavy hex.
FN = FLEXLOC standard nut, heavy hex over 1" diameter.

Standards & Specifications
NASM25027 except as noted

FLEXLOC® Full Height Heavy Duty Hex

1. Material — Steel, Carbon
Steel, Corrosion resistant austenitic
Brass, Naval half hard
Aluminum, 2024-T4 or 2024-T351

2. Finish — Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Silver plate per AMS 2410
Zinc plate per ASTM B633, Type II
Anodize per MIL-A-8625

3. Lubricant — Unless otherwise specified, parts shall be supplied with a non-dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

4. Locking Torque per NASM25027 as applicable. Sizes not listed in NASM25027 shall meet the locking torque requirements of the next smaller size listed. Reusability not required for unplated corrosion resistant nuts.

5. Threads, before lubrication, are per MIL-S-7742 for Class 2B threads.

6. Part Numbers — SPS part numbers consist of the following. Plus the ”type“ plus applicable dash number

20-Steel, sizes 1/4 thru 1/2
30-Steel, sizes 9/16 thru 2
21-Steel, cadmium plated, Type I, sizes 1/4 thru 1/2
31-Steel, cadmium plated, Type I, sizes 9/16 thru 2
23-Steel, zinc plated, sizes 1/4 thru 1/2
33-Steel, zinc plated, sizes 9/16 thru 2
27-Steel, cadmium plated, Type II, sizes 1/4 thru 1/2
37-Steel, cadmium plated, Type II, sizes 9/16 thru 2
28-Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, sizes 1/4 thru 1/2
38-Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, sizes 9/16 thru 2
50-Steel. corrosion resistant, passivated
59-Steel. corrosion resistant, silver plated
60-Brass
62-Brass, cadmium plated, Type I
70-Aluminum
75-Aluminum, anodized

Example: 37-FA-1210 = .7500-10 UNC-2B, Type II, cadmium plated steel nut

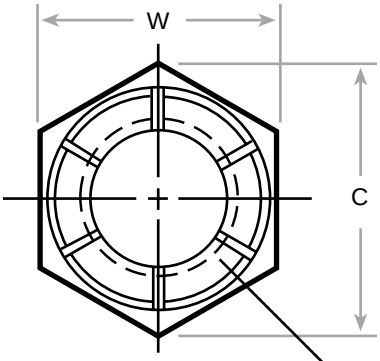
7. Part numbers other than listed on this drawing shall not be used.

**Type*
FA = FLEXLOC standard nut, coarse thread, light and heavy hex.
FAC = FLEXLOC standard nut coarse thread, heavy hex.
FN = FLEXLOC standard nut, heavy hex over 1" diameter.

Standards & Specifications

NASM25027 except as noted

FLEXLOC® Full Height Light Hex



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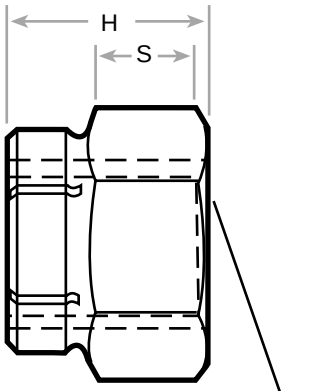
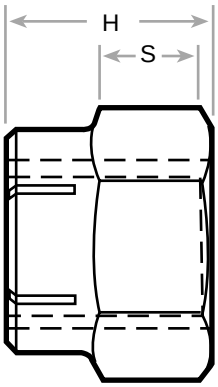




Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note 5	C Ref	H Max	S Min	W Max	W Min	Axial Strength Lbs Min Steel & Cres	Aluminum	Brass
FA	256	.086-56 UNJC-3B	.268	.155	.050	.251	.243	650	457	252
FA	348	.099-48 UNJC-3B	.268	.155	.050	.251	.243	865	605	333
FA	440	.112-40 UNJC-3B	.268	.155	.050	.251	.243	1,080	750	414
FC	448	.112-48 UNJF-3B	.268	.155	.050	.251	.243	1,190	830	458
FA	540	.125-40 UNJC-3B	.268	.155	.052	.251	.243	1,400	990	546
FC	544	.125-44 UNJF-3B	.268	.155	.052	.251	.243	1,450	1,030	568
FA	632	.138-32 UNJC-3B	.339	.180	.075	.313	.305	1,620	1,130	624
FC	640	.138-40 UNJF-3B	.339	.180	.075	.313	.305	1,890	1,320	728
FA	832	.164-32 UNJC-3B	.374	.243	.105	.345	.336	2,510	1,720	936
FC	836	.164-36 UNJF-3B	.374	.243	.105	.345	.336	2,620	1,800	979
FA	1024	.190-24 UNJC-3B	.410	.243	.085	.376	.367	3,120	2,140	1,130
FC	1032	.190-32 UNJF-3B	.410	.243	.085	.376	.367	3,590	2,460	1,300
FA	1224	.216-24 UNJC-3B	.482	.290	.122	.439	.430	4,350	3,000	1,530
FC	1228	.216-28 UNJF-3B	.482	.290	.122	.439	.430	4,630	3,190	1,630
FA	420	.250-20 UNC-2B	.482	.290	.122	.439	.430	5,730	4,000	2,040
FC	428	.250-28 UNJF-3B	.482	.320	.135	.439	.430	6,550	4,580	2,330

Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts.

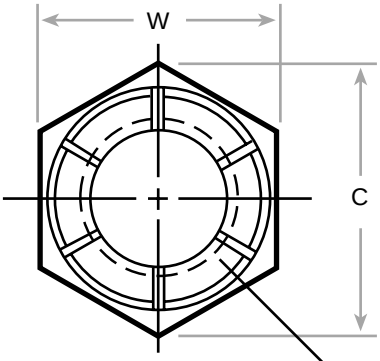
SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FA = FLEXLOC standard nut, coarse thread, light hex and heavy hex.
FC = FLEXLOC standard nut, fine thread, light hex.
FAF = FLEXLOC standard nut, coarse thread, light hex.

Standards & Specifications

NASM25027 except as noted

FLEXLOC® Full Height Light Hex



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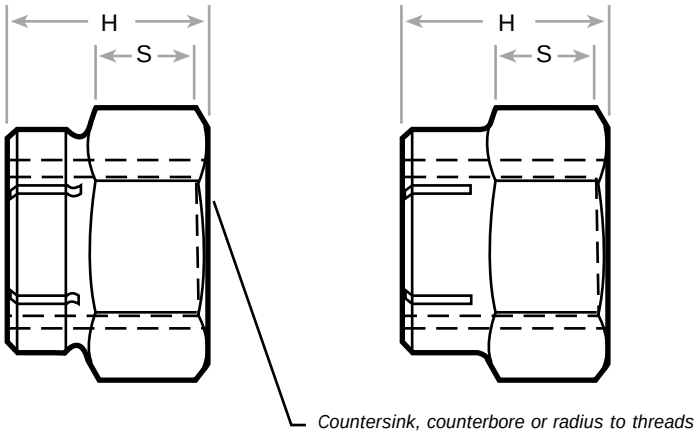


Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note 5	C Ref	H Max	S Min	W Max	W Min	Axial Strength Lbs Min Steel & Cres	Aluminum	Brass
FAF	518	.312-18 UNC-2B	.552	.353	.150	.502	.492	9,600	5,800	3,680
FC	524	.312-24 UNJF-3B	.552	.353	.150	.502	.492	9,950	6,390	3,810
FAF	616	.375-16 UNC-2B	.622	.462	.210	.564	.553	13,800	6,900	5,420
FC	624	.375-24 UNJF-3B	.622	.462	.210	.564	.553	13,500	7,250	5,700
FAF	714	.437-14 UNC-2B	.696	.462	.210	.627	.616	14,900	7,470	6,400
FC	720	.437-20 UNJF-3B	.696	.462	.210	.627	.616	15,450	7,750	7,730
FC	720 UN	.437-20 UNJF-3B	.766	.462	.210	.690	.679	18,300	9,150	8,520
FAF	813	.500-13 UNC-2B	.837	.602	.285	.752	.741	22,000	11,000	9,430
FC	820	.500-20 UNJF-3B	.837	.602	.285	.752	.741	23,800	11,900	10,300
FA	912	.562-12 UNC-2B	.978	.696	.385	.877	.865	27,000	13,700	11,700
FC	918	.562-18 UNJF-3B	.978	.696	.385	.877	.865	30,000	15,200	13,000
FAF	1011	.625-11 UNC-2B	1.051	.759	.410	.940	.928	34,000	17,000	14,500
FC	1018	.625-18 UNJF-3B	1.051	.759	.410	.940	.928	38,400	19,200	16,300
FAF	1210	.750-10 UNC-2B	1.191	.884	.505	1.064	1.052	50,000	24,900	21,300

*Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts. **UN following dash number signifies unified hex.*

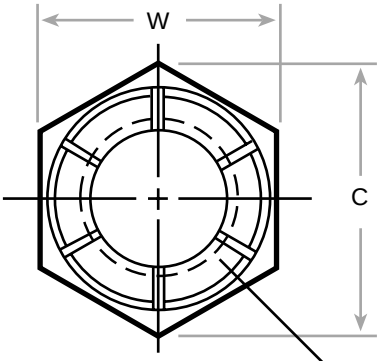
SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FA = FLEXLOC standard nut, coarse thread, light hex.
FC = FLEXLOC standard nut, fine thread, light hex.
FAF = FLEXLOC standard nut, coarse thread, light hex.

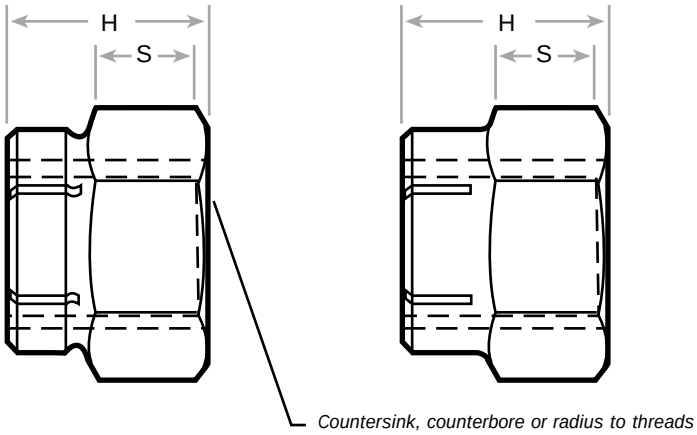
Standards & Specifications

NASM25027 except as noted

FLEXLOC® Full Height Light Hex



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.



Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note 5	C Ref	H Max	S Min	W Max	W Min	Axial Strength Lbs Min Steel & Cres	Aluminum	Brass
FC	1216	.750-16 UNJF-3B	1.191	.884	.505	1.064	1.052	52,300	26,100	23,700
FAF	1409	.875-9 UNC-2B	1.403	1.009	.570	1.252	1.239	64,600	34,100	29,200
FC	1414	.875-14 UNJF-3B	1.403	1.009	.570	1.252	1.239	71,400	37,700	32,400
FAF	1608	1.000-8 UNC-2B	1.615	1.134	.635	1.440	1.427	85,000	42,400	37,900
FC	1612	1.000-12 UNJF-3B	1.615	1.134	.635	1.440	1.427	90,500	44,200	40,800
FC	1614	1.000-14 UNJS-3B	1.615	1.134	.635	1.440	1.427	92,500	46,200	41,400
FC	1812	1.125-12 UNJF-3B	1.826	1.259	.710	1.627	1.614	119,000	59,500	52,400
FC	2012	1.250-12 UNJF-3B	2.038	1.446	.795	1.814	1.801	148,000	75,000	65,200
FC	2212	1.375-12 UNJF-3B	2.269	1.509	.815	2.002	1.988	170,000	85,000	72,800
FC	2412	1.500-12 UNJF-3B	2.484	1.759	.970	2.190	2.176	206,000	103,000	88,300
FC	2812	1.750-12 UNJ-3B	3.124	2.010	1.124	2.752	2.737	273,000	136,500	117,000
FC	3012	1.875-12 UNJ-3B	3.338	2.140	1.190	2.940	2.925	316,000	158,000	135,400
FC	3212	2.000-12 UNJ-3B	3.552	2.260	1.260	3.127	3.112	362,000	181,000	155,000

Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts.

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FA = FLEXLOC standard nut, coarse thread, light hex.
FC = FLEXLOC standard nut, fine thread, light hex.
FAF = FLEXLOC standard nut, coarse thread, light hex.

Standards & Specifications
NASM25027 except as noted

FLEXLOC® Full Height Light Hex

1. Materials
Steel, Carbon
Steel, Corrosion resistant austenitic
Brass, Naval half hard
Aluminum, 2024-T4 or 2024-T351

2. Finish
Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Silver plate per AMS 2410
Zinc plate per ASTM B633, Type II
Anodize per MIL-A-8625

3. Lubricant
Unless otherwise specified, parts shall be supplied with a non-dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

4. Locking torque per NASM25027 as applicable. Sizes above those listed in NASM25027 shall meet the locking torque requirements of the largest size listed. Reusability for unplated corrosion resistant nuts not required per NASM25027.

5. Threads, before lubrication, are per MIL-S-8879 for Class 3B threads, and MIL-S-7742 for Class 2B threads.

6. Surface Texture
ANSI B46.1 unless otherwise specified, the surface texture shall not exceed 125 microinches.

7. Part Numbers
SPS part numbers consist of the following, plus the "type", plus applicable dash number.
20-Steel, sizes #2 thru 1/2
30-Steel, sizes 9/16 thru 2
21-Steel, cadmium plated, Type I, sizes #2 thru 1/2
31-Steel, cadmium plated, Type I, sizes 9/16 thru 2
23-Steel, zinc plated, sizes #2 thru 1/2
33-Steel, zinc plated, sizes 9/16 thru 2
27-Steel, cadmium plated, Type II, sizes #2 thru 1/2
37-Steel, cadmium plated, Type II, sizes 9/16 thru 2
28-Steel, cadmium plated, Type 1 plus molybdenum disulfide dry film lubricant, sizes #2 thru 1/2
38-Steel, cadmium plated, Type 1, plus molybdenum disulfide dry film lubricant, sizes 9/16 thru 2
50-Steel, corrosion resistant, passivated
59-Steel, corrosion resistant, silver plated
60-Brass
62-Brass, cadmium plated, Type I
70-Aluminum
75-Aluminum, anodized

Examples: 31 FAF-1210 = .7500-10 UNC-2B, Type I, cadmium plated steel nut

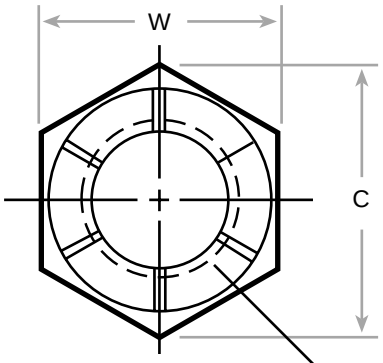
8. Part numbers other than listed on this drawing shall not be used.

**Type*
FA = FLEXLOC standard nut, coarse thread, light hex.
FC = FLEXLOC standard nut, fine thread, light hex.
FAF = FLEXLOC standard nut, coarse thread, light hex.

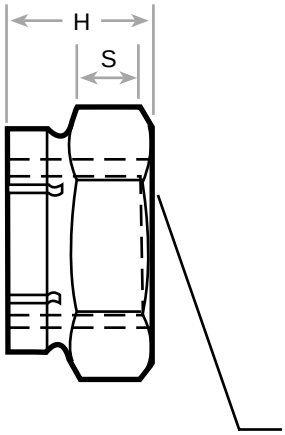
Standards & Specifications

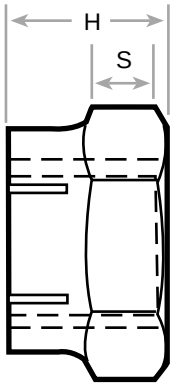
NASM25027 except as noted

FLEXLOC® Thin Height Heavy Duty Hex



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.





Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note 5	C Ref	H Max	S Min	W Max	W Min	Axial Strength Lbs Min Steel & Cres	Aluminum	Brass
FKC	420	.250-20 UNC-2B	.552	.219	.053	.502	.492	4,450	2,290	1,960
FK	518	.312-18 UNC-2B	.622	.266	.087	.564	.553	4,980	3,030	2,590
FK	616	.375-16 UNC-2B	.696	.282	.085	.627	.616	7,360	3,890	3,330
FK	714	.437-14 UNC-2B	.837	.328	.101	.752	.741	10,100	5,290	4,530
FK	813	.500-13 UNC-2B	.907	.328	.101	.814	.803	11,400	6,480	5,550
FKC	912	.562-12 UNC-2B	1.051	.368	.104	.940	.928	14,600	10,060	8,620
FK	1011	.625-11 UNC-2B	1.119	.399	.116	1.002	.990	18,100	10,700	9,170
FK	1210	.750-10 UNC-2B	1.260	.415	.121	1.127	1.115	26,800	13,100	11,200
FK	1409	.875-9 UNC-2B	1.470	.477	.163	1.314	1.301	36,940	20,400	17,500
FK	1608	1.000-8 UNC-2B	1.682	.571	.207	1.502	1.489	48,500	26,800	22,970
FK	1807	1.125-7 UNC-2B	2.038	.634	.202	1.814	1.801	61,100	27,100	23,200
FK	2007	1.250-7 UNC-2B	2.250	.759	.287	2.002	1.988	77,600	34,500	29,600
FK	2206	1.375-6 UNC-2B	2.484	.818	.300	2.190	2.176	79,700	35,400	30,300
FK	2406	1.500-6 UNC-2B	2.697	.884	.326	2.377	2.363	96,900	43,000	36,800

Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts.

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FK = FLEXLOC nut, thin height, coarse thread.
FKC = FLEXLOC nut, thin height, coarse thread, heavy hex.

Standards & Specifications
NASM25027 except as noted

FLEXLOC® Thin Height Heavy Duty Hex

1. Material
Steel, Carbon
Steel, Corrosion resistant austenitic
Brass, Naval half hard
Aluminum, 2024-T4 or 2024-T351

2. Finish
Cadmium plate per QQ P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Silver plate per AMS 2410
Zinc plate per ASTM B633, Type II
Anodize per MIL-A-8625

3. Lubricant
Unless otherwise specified, parts shall be supplied with a non-dry lubricant (wax type) soluble in the cleaner specified in NASM25027. Dry film lubricant per NASM25027 when specified.

4. Locking torque per NASM25027 as applicable. Reusability for unplated corrosion resistant nuts not required per NASM25027.

5. Threads Class 2B are per NASM25027 prior to lubrication per MIL-S-7742.

6. Surface Texture
USAS B46.1 unless otherwise specified, the surface texture shall not exceed 125 microinches.

7. Part Numbers
SPS part numbers consist of the following, plus the "type", plus applicable dash number.

20-Steel, sizes 1/4 thru 7/16
30-Steel, sizes 1/2 thru 1-1/2
21-Steel, cadmium plated, Type I, sizes 1/4 thru 7/16
31-Steel, cadmium plated, Type I, sizes 1/2 thru 1-1/2
23-Steel, zinc plated, sizes 1/4 thru 7/16
33-Steel, zinc plated, sizes 1/2 thru 1-1/2
27-Steel, cadmium plated, Type II, sizes 1/4 thru 7/16
37-Steel, cadmium plated, Type II, sizes 1/2 thru 1-1/2
28-Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, sizes 1/4 thru 7/16
38-Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, sizes 1/2 thru 1-1/2
50-Steel, corrosion resistant, passivated
59-Steel, corrosion resistant, silver plated
60-Brass
62-Brass, cadmium plated, Type I
70-Aluminum
75-Aluminum, anodized

Examples: 31 FK-1210 = .7500-10 UNC-2B, Type I, cadmium plated steel nut

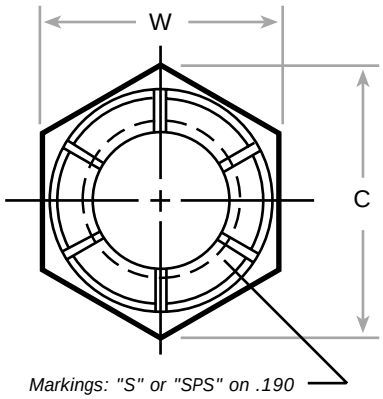
8. Part numbers other than listed on this drawing shall not be used.

**Type*
FK = FLEXLOC nut, thin height, coarse thread.
FKC = FLEXLOC nut, thin height, coarse thread, heavy hex.

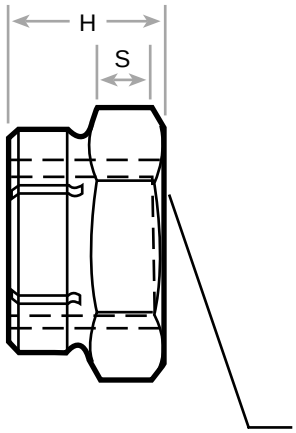
Standards & Specifications

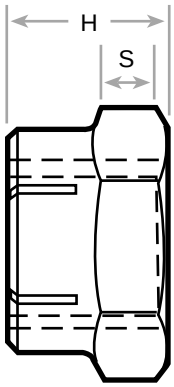
NASM25027 except as noted

FLEXLOC® Thin Height Light Hex



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.





Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note 5	C REF	H Max	S Min	W Max	W Min	Axial Strength Lbs Min Steel & Cres	Aluminum	Brass
FK	632	.138-32 UNJC-3B	.339	.141	.036	.313	.305	1,270	650	560
FK	640	.138-40 UNJF-3B	.339	.141	.036	.313	.305	1,420	730	625
FK	832	.164-32 UNJC-3B	.374	.188	.070	.345	.336	1,960	1,010	865
FK	836	.164-36 UNJF-3B	.374	.188	.070	.345	.336	2,060	1,060	908
FK	1024	.190-24 UNJC-3B	.410	.188	.065	.376	.367	2,450	1,270	1,090
FK	1032	.190-32 UNJF-3B	.410	.188	.065	.376	.367	2,800	1,450	1,240
FK	1224	.216-24 UNJC-3B	.482	.209	.071	.439	.430	3,380	1,740	1,490
FK	1228	.216-28 UNJF-3B	.482	.209	.071	.439	.430	3,610	1,860	1,590
FK	420	.250-20 UNC-2B	.482	.219	.075	.439	.430	4,450	2,290	1,960
FK	428	.250-28 UNJF-3B	.482	.219	.075	.439	.430	5,090	2,620	2,240
FKF	518	.312-18 UNC-2B	.552	.266	.097	.502	.492	4,980	3,030	2,590
FK	524	.312-24 UNJF-3B	.552	.266	.097	.502	.492	5,510	3,350	2,870

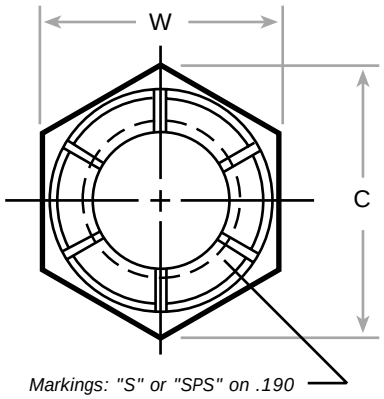
Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts.

**Type*
FK = FLEXLOC nut, thin height, coarse thread and fine thread, light hex.
FKF = FLEXLOC nut, thin height, coarse thread, light hex.

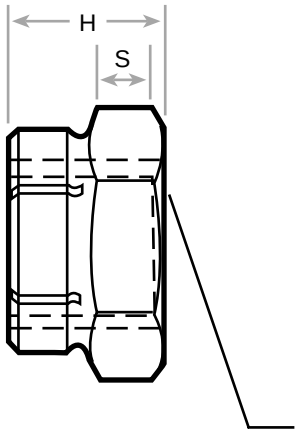
Standards & Specifications

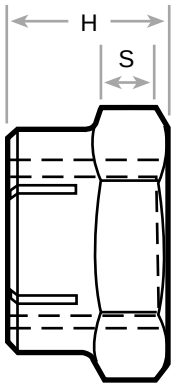
NASM25027 except as noted

FLEXLOC® Thin Height Light Hex



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.





Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

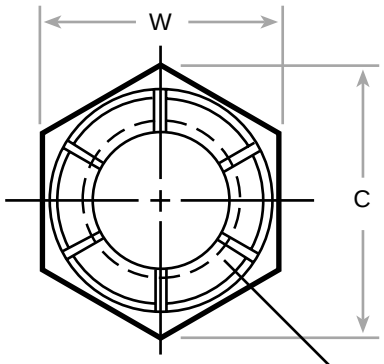
Type*	Dash No	Threads See Note 5	C Ref	H Max	S Min	W Max	W Min	Axial Strength Lbs Min Steel & Cres	Aluminum	Brass
FKF	616	.375-16 UNC-2B	.622	.282	.108	.564	.553	7,360	3,890	3,330
FK	624	.375-24 UNJF-3B	.622	.282	.108	.564	.553	8,340	4,390	3,760
FKF	714	.437-14 UNC-2B	.696	.328	.138	.627	.616	10,100	5,290	4,530
FK	720	.437-20 UNJF-3B	.696	.328	.138	.627	.616	11,300	5,900	5,060
FK	720 UN	.437-20 UNJF-3B	.766	.328	.120	.690	.679	11,300	5,900	6,170
FKF	813	.500-13 UNC-2B	.837	.328	.121	.752	.741	11,400	6,480	5,550
FK	820	.500-20 UNJF-3B	.837	.328	.121	.752	.741	12,800	7,250	6,210
FK	912	.562-12 UNC-2B	.978	.368	.135	.877	.865	14,600	10,060	8,620
FK	918	.562-18 UNJF-3B	.978	.368	.135	.877	.865	16,200	11,100	9,510
FKF	1011	.625-11 UNC-2B	1.051	.399	.147	.940	.928	18,100	10,700	9,170
FK	1018	.625-18 UNJF-3B	1.051	.399	.147	.940	.928	20,500	12,100	10,370
FKF	1210	.750-10 UNC-2B	1.191	.415	.155	1.064	1.052	26,800	13,100	11,200

*Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts. **UN following dash number signifies unified hex.*

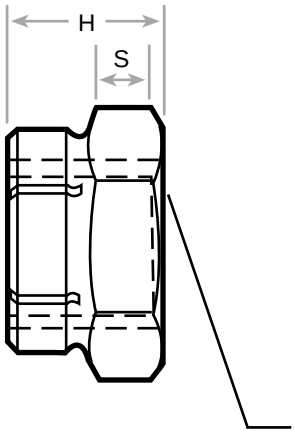
SPS TECHNOLOGIES
Aerospace Fasteners Group

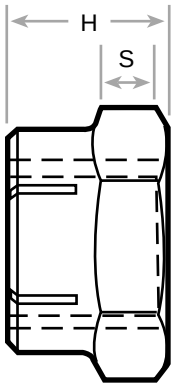
**Type*
FK = FLEXLOC nut, thin height, coarse thread and fine thread, light hex.
FKF = FLEXLOC nut, thin height, coarse thread, light hex.

FLEXLOC® Thin Height Light Hex



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.





Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note 5	C Ref	H Max	S Min	W Max	W Min	Axial Strength Lbs Min Steel & Cres	Aluminum	Brass
FK	1216	.750-16 UNJF-3B	1.191	.415	.155	1.064	1.052	29,800	14,600	12,510
FKF	1409	.875-9 UNC-2B	1.403	.477	.166	1.252	1.239	36,940	20,400	17,500
FK	1414	.875-14 UNJF-3B	1.403	.477	.166	1.252	1.239	40,800	22,500	19,280
FKF	1608	1.000-8 UNC-2B	1.615	.571	.218	1.440	1.427	48,500	26,800	22,970
FK	1612	1.000-12 UNJF-3B	1.615	.571	.218	1.440	1.427	53,000	28,000	24,000
FK	1614	1.000-14 UNJS-3B	1.615	.571	.218	1.440	1.427	54,400	28,200	24,170
FK	1812	1.125-12 UNJF-3B	1.826	.634	.238	1.627	1.614	68,500	29,900	25,620
FK	2012	1.250-12 UNJF-3B	2.038	.759	.311	1.814	1.801	85,800	37,500	32,140
FK	2212	1.375-12 UNJF-3B	2.269	.821	.325	2.002	1.988	90,700	40,300	34,540
FK	2412	1.500-12 UNJF-3B	2.484	.884	.350	2.190	2.176	109,000	48,400	41,480

Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts.

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FK = FLEXLOC nut, thin height, coarse thread and fine thread, light hex.
FKF = FLEXLOC nut, thin height, coarse thread, light hex.

Standards & Specifications
NASM25027 except as noted

FLEXLOC® Thin Height Light Hex

1. Material
Steel, Carbon
Steel, Corrosion resistant austenitic
Brass, Naval half hard
Aluminum, 2024-T4 or 2024-T351

2. Finish
Cadmium plate per QQ P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Silver plate per AMS 2410
Zinc plate per ASTM B633, Type II
Anodize per MIL-A-8625

3. Lubricant
Unless otherwise specified, parts shall be supplied with a non-dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

4. Locking torque per NASM25027 as applicable. Sizes above those listed in NASM25027 shall meet the locking torque requirements of the largest size listed. Reusability for unplated corrosion resistant nuts not required per NASM25027.

5. Threads are before lubrication per MIL-S-8879 for Class 3B and MIL-S-7742 for Class 2B thread.

6. Surface Texture
USAS B46.1 unless otherwise specified, the surface texture shall not exceed 125 microinches.

7. Part Numbers
SPS part numbers consist of the following, plus the "type" plus applicable dash number.
20-Steel, sizes #6 thru 1/2
30-Steel, sizes 9/16 thru 1-1/2
21-Steel, cadmium plated, Type I, sizes #6 thru 1/2
31-Steel, cadmium plated, Type I, sizes 9/16 thru 1-1/2
23-Steel, zinc plated, sizes #6 thru 1/2
33-Steel, zinc plated, sizes 9/16 thru 1-1/2
27-Steel, cadmium plated, Type II, sizes #6 thru 1/2
37-Steel, cadmium plated, Type II, sizes 9/16 thru 1-1/2
28-Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, sizes #6 thru 1/2
38-Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, sizes 9/16 thru 1-1/2
50-Steel, corrosion resistant, passivated
59-Steel, corrosion resistant, silver plated
60-Brass
62-Brass, cadmium plated, Type I
70-Aluminum
75-Aluminum, anodized

Examples: 31 FK-1216 = .7500-16 UNJF-3B, Type I, cadmium plated steel nut

8. Part numbers other than listed on this drawing shall not be used.

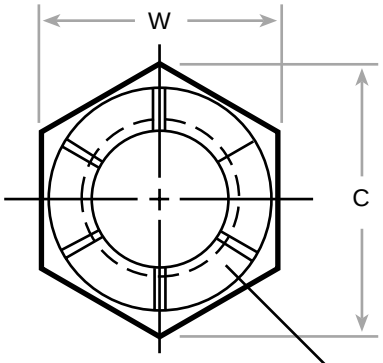
**Type*
FK = FLEXLOC nut, thin height, coarse thread and fine thread, light hex.
FKF = FLEXLOC nut, thin height, coarse thread, light hex.

Standards & Specifications

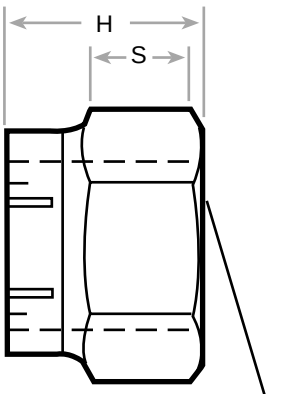
NASM25027 except as noted

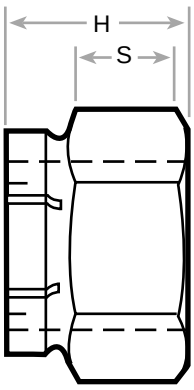
Ref. Boeing Standard

FLEXLOC® Giant Size Full Height



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.





Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Part No	Thread See Note 4	C Ref	H Max	H Min	S Ref	W Max	W Min	Tensile Strength Ref
54250	3604	2-1/4-4.5 UNC-2B	3.934	2.223	2.193	1.319	3.502	3.487	406,000
54250	3612	2-1/4-12 UNJ-3B	3.934	2.223	2.193	1.319	3.502	3.487	461,000
54250	4004	2-1/2-4 UNC-2B	4.367	2.468	2.438	1.466	3.877	3.782	500,000
54250	4012	2-1/2-12 UNJ-3B	4.367	2.468	2.438	1.466	3.877	3.782	575,000
54250	4404	2-3/4-4 UNC-2B	4.800	2.718	2.688	1.616	4.252	4.157	616,000
54250	4412	2-3/4-12 UNJ-3B	4.800	2.718	2.688	1.616	4.252	4.157	698,000
54250	4804	3-4 UNC-2B	5.233	2.968	2.938	1.766	4.627	4.532	746,000
54250	4812	3-12 UNJ-3B	5.233	2.968	2.938	1.766	4.627	4.532	836,000
54250	5204	3-1/4-4 UNC-2B	5.666	3.202	3.172	1.907	5.002	4.907	887,000
54250	5212	3-1/4-12 UNJ-3B	5.666	3.202	3.172	1.907	5.002	4.907	986,000
54250	5604	3-1/2-4 UNC-2B	6.099	3.452	3.422	2.057	5.377	5.282	1,041,000
54250	5612	3-1/2-12 UNJ-3B	6.099	3.452	3.422	2.057	5.377	5.282	1,147,000
54250	6004	3-3/4-4 UNC-2B	6.532	3.702	3.672	2.207	5.752	5.657	1,207,000
54250	6012	3-3/4-12 UNJ-3B	6.532	3.702	3.672	2.207	5.752	5.657	1,321,000
54250	6404	4-4 UNC-2B	6.965	3.952	3.867	2.357	6.127	6.032	1,385,000
54250	6412	4-12 UNJ-3B	6.965	3.952	3.867	2.357	6.127	6.032	1,507,000

Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts.

**Type*
54250 = FLEXLOC nut, full height, coarse and fine threads, heavy hex.

Standards & Specifications

NASM25027 except as noted

FLEXLOC® Giant Size Full Height

1. Material — Steel, .15 carbon minimum

2. Finish — Cadmium plate per QQ-P-416, Type I, Class 2.
Zinc plate per ASTM B633, Type II.

Add "A" to basic part number to designate Cadmium plate per QQ-P-416, Type I, Class 2
Add "B" to basic part number to designate Cadmium plate per QQ-P-416, Type II, Class 2
Add "Z" to basic part number to designate Zinc plate.
No letter designates Plain finish.

3. Locking torque per NASM25027 for coarse threads. For sizes larger than 2.500 diameter, use the 2.500 size values. Reusability - 5 cycles.

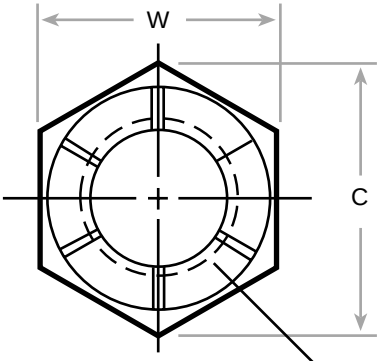
4. Threads — UNC-2B per MIL-S-7742.
UNJ-3B per MIL-S-8879.

Standards & Specifications

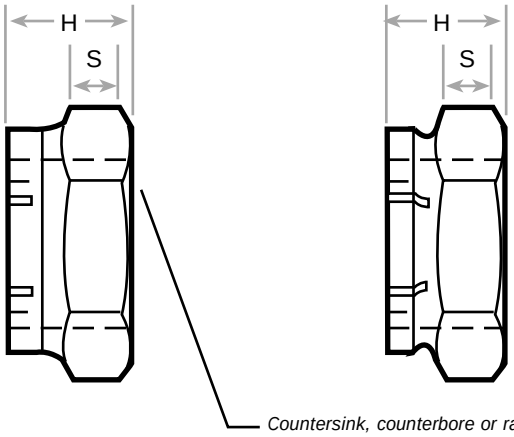
NASM25027 except as noted

Ref. Boeing BACN10 Standard

FLEXLOC® Giant Size Thin Height



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.



Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

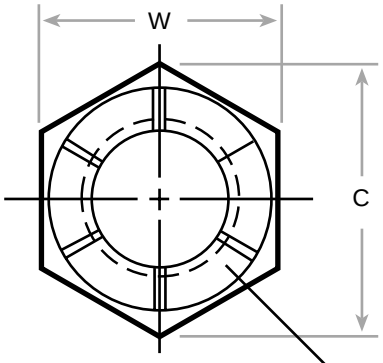
Type*	Part No	Thread See Note 4	C Ref	H Max	H Min	S Ref	W Max	W Min	Tensile Strength Ref
54254	2605	1-5/8-5.5 NS-2B	2.909	.947	.927	.595	2.564	2.549	92,000
54254	2612	1-5/8-12 UNJ-3B	2.909	.947	.927	.595	2.564	2.549	117,000
54254	2805	1-3/4-5 UNC-2B	3.124	.994	.974	.638	2.752	2.737	110,000
54254	2812	1-3/4-12 UNJ-3B	3.124	.994	.974	.638	2.752	2.737	137,000
54254	3005	1-7/8-5 NS-2B	3.338	1.073	1.053	.695	2.940	2.925	135,000
54254	3012	1-7/8-12 UNC-3B	3.338	1.073	1.053	.695	2.940	2.925	158,000
54254	3204	2-4.5 UNC-2B	3.552	1.140	1.110	.745	3.127	3.112	156,000
54254	3212	2-12 UNJ-3B	3.552	1.140	1.110	.745	3.127	3.112	180,000
54254	3604	2-1/4-4.5 UNC-2B	3.934	1.265	1.235	.820	3.502	3.487	203,000
54254	3612	2-1/4-12 UNJ-3B	3.934	1.265	1.235	.820	3.502	3.487	230,000
54254	4004	2-1/2-4 UNC-2B	4.367	1.390	1.360	.940	3.877	3.782	250,000
54254	4012	2-1/2-12 UNJ-3B	4.367	1.390	1.360	.940	3.877	3.782	287,000
54254	4404	2-3/4-4 UNC-2B	4.800	1.515	1.485	1.040	4.252	4.157	308,000
54254	4412	2-3/4-12 UNJ-3B	4.800	1.515	1.485	1.040	4.252	4.157	349,000
54254	4804	3-4 UNC-2B	5.233	1.640	1.610	1.140	4.627	4.532	373,000
54254	4812	3-12 UNJ-3B	5.233	1.640	1.610	1.140	4.627	4.532	418,000
54254	5204	3-1/4-4 UNC-2B	5.666	1.775	1.745	1.238	5.002	4.907	443,000
54254	5212	3-1/4-12 UNJ-3B	5.666	1.775	1.745	1.238	5.002	4.907	493,000

Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts.

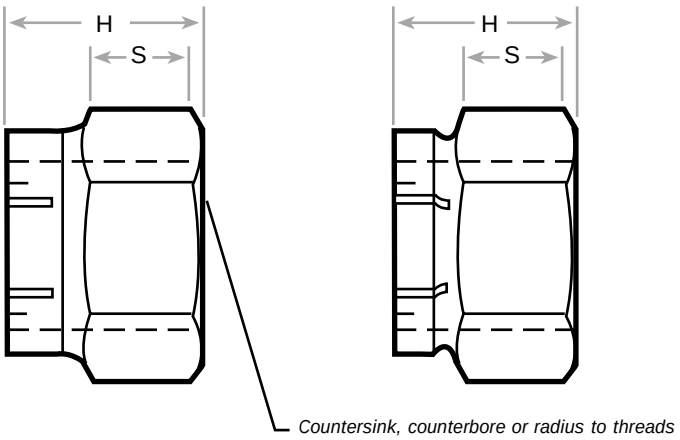
SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
54254 = FLEXLOC nut, thin height, coarse and fine threads.

FLEXLOC® Giant Size Thin Height



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.



Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Part No	Threads See Note 4	C Ref	H Max	H Min	S Ref	W Max	W Min	Tensile Strength Ref
54254	5604	3-1/2-4 UNC-2B	6.099	1.890	1.870	1.340	5.377	5.282	520,000
54254	5612	3-1/2-12 UNJ-3B	6.099	1.890	1.870	1.340	5.377	5.282	573,000
54254	6004	3-3/4-4 UNC-2B	6.532	2.030	2.000	1.430	5.752	5.657	603,000
54254	6012	3-3/4-12 UNJ-3B	6.532	2.030	2.000	1.430	5.752	5.657	661,000
54254	6404	4-4 UNC-2B	6.965	2.140	2.110	1.530	6.127	6.032	693,000
54254	6412	4-12 UNJ-3B	6.965	2.140	2.110	1.530	6.127	6.032	754,000

Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts.

1. Material — Steel, .15 carbon minimum

2. Finish — Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Zinc plate per ASTM B633, Type II
Plain

Add "A" to basic part number to designate Cadmium plate, Type I
Add "B" to basic part number to designate Cadmium, plate, Type II
Add "Z" to basic part number to designate Zinc plate
No letter designates Plain finish

3. Locking torque per MIL-DTL-25027 for coarse and fine threads. For sizes larger than 2.500 diameter, use the 2.500 size values. Reusability - 5 cycles.

4. Threads — UNC-2B and NS-2B per MIL-S-7742.
UNJ-3B per MIL-S-8879.

SPS TECHNOLOGIES
Aerospace Fasteners Group

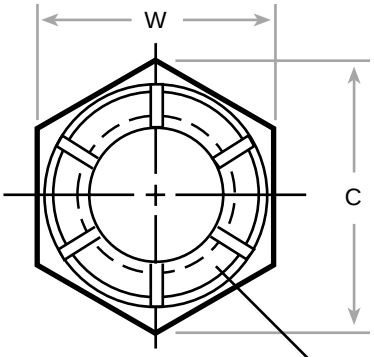
**Type*
54254 = FLEXLOC nut, thin height, coarse and fine threads.

Standards and Specifications

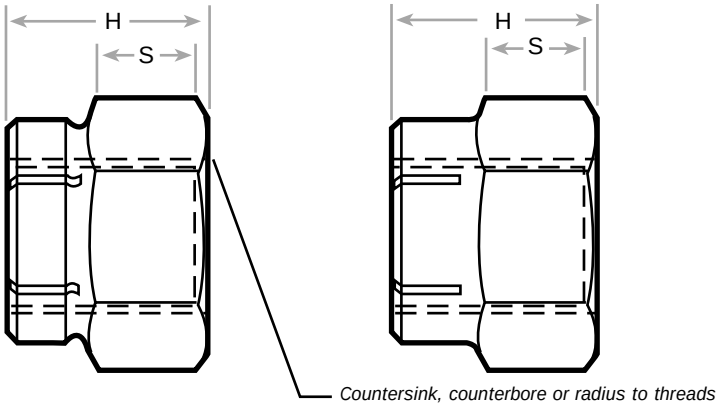
NASM25027 except as noted

Ref. MS21045, MS21046, NAS1021

FLEXLOC® Full Height Military Locknut



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.



Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note 5	C Ref	H Max	S Min	W Max	W Min	X	Axial Strength Lbs Min Steel / Cres
FH	440	.112-40 UNJC-3B	.268	.155	.050	.251	.243	.004	1,080
FH	540	.125-40 UNJC-3B	.268	.155	.052	.251	.243	.004	1,400
FH	632	.138-32 UNJC-3B	.339	.180	.075	.313	.305	.004	1,620
FH	832	.164-32 UNJC-3B	.374	.243	.105	.345	.336	.004	2,510
FH	1032	.190-32 UNJF-3B	.410	.243	.085	.376	.367	.004	3,590
FH	428	.250-28 UNJF-3B	.482	.320	.135	.439	.430	.005	6,550
FH	524	.312-24 UNJF-3B	.552	.353	.150	.502	.492	.006	9,600
FH	624	.375-24 UNJF-3B	.622	.462	.210	.564	.553	.006	14,500
FH	720	.437-20 UNJF-3B	.696	.462	.210	.627	.616	.007	15,500
FH	720 UN	.437-20 UNJF-3B	.766	.462	.210	.690	.679	.007	18,300
FH	820	.500-20 UNJF-3B	.837	.602	.285	.752	.741	.007	23,800
FH	918	.562-18 UNJF-3B	.978	.692	.385	.877	.865	.008	30,400
FH	1018	.625-18 UNJF-3B	1.051	.759	.410	.940	.928	.008	38,400
FH	1216	.750-16 UNJF-3B	1.191	.884	.505	1.064	1.052	.009	52,300
FH	1414	.875-14 UNJF-3B	1.403	1.009	.570	1.252	1.239	.010	71,400
FH	1614	1.000-14 UNJS-3B	1.615	1.134	.635	1.440	1.427	.011	92,500
FH	1612	1.000-12 UNJF-3B	1.615	1.134	.635	1.440	1.427	.011	92,500
FH	1812	1.125-12 UNJF-3B	1.826	1.259	.710	1.627	1.614	.012	119,000
FH	2012	1.250-12 UNJF-3B	2.038	1.446	.795	1.814	1.801	.013	148,000

*Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts. **UN following dash number signifies unified hex.*

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FH = FLEXLOC military standards, full height.

Standards and Specifications
NASM25027 except as noted

FLEXLOC® Full Height Military Locknut

1. Material — Carbon Steel, 450˚F
Steel, Corrosion resistant austenitic, 450˚F, 800˚F

2. Finish — Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Cadmium plate per QQ-P-416, Type I, Class 2, plus molybdenum disulfide dry film lubricant
Corrosion resistant austenitic, plus molybdenum disulfide
Corrosion resistant austenitic, silver plate per AMS 2410, thickness .0002 minimum on exterior surface

3. Lubricant — Dry film lubricant per MIL-L-46010, Type I, non dry lubricant. Unless otherwise specified parts, except dry film lubricated, shall be supplied with a non dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

4. Locking torque performance per NASM25027 except reusability not required for unplated corrosion resistant nuts. Reusability of dry film lubricated nuts limited to 5 cycles.

5. Threads are before lubrication per MIL-S-8879.

6. Part Number — Consists of a basic part number plus dash number.
22-Carbon Steel, cadmium plated, Type I, size #4 thru 1/2
27-Carbon Steel, cadmium plated, Type II, size #4 thru 1/2
28-Carbon Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, size #4 thru 1/2
32-Carbon Steel, cadmium plated, Type I, size 9/16 thru 1-1/4
37-Carbon Steel, cadmium plated, Type II, size 9/16 thru 1-1/4
38-Carbon Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, size 9/16 thru 1-1/4
50-Carbon Steel, corrosion resistant
58-Carbon Steel, corrosion resistant, plus molybdenum disulfide
59-Carbon Steel, corrosion resistant, silver plated per AMS 2410

Examples: 27FH-428 = .2500-28 UNJF-3B, cadmium plated, Type II, FLEXLOC nut.

7. Part numbers other than listed on this drawing shall not be used.

8. Design and Usage Limitations — These nuts are designed to be used on 3A external threads within the limitations of MS33588.

9. Surface Texture — USAS B46.1 U.O.S. The surface texture shall not exceed 125 microinches.

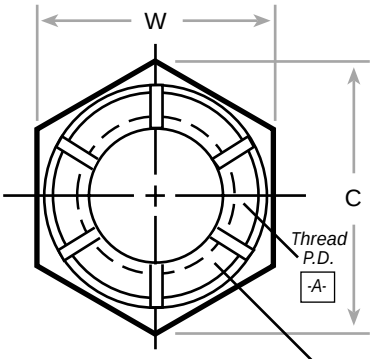
SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FH = FLEXLOC military standards, full height.

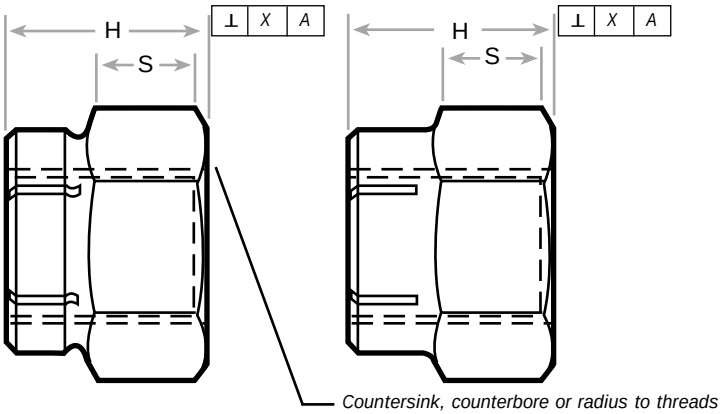
Standards and Specifications

NASM25027 except as noted

FLEXLOC® Full Height Military Locknut



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.



Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note 4	C Ref	H Max	S Min	W Max	W Min	X	Axial Strength Lbs Min Alum	Axial Strength Lbs Min Brass
FS	440	.112-40 UNJC-3B	.268	.155	.050	.251	.243	.004	750	414
FS	632	.138-32 UNJC-3B	.339	.180	.075	.313	.305	.004	1,130	624
FS	832	.164-32 UNJC-3B	.374	.243	.105	.345	.336	.004	1,720	936
FS	1032	.190-32 UNJF-3B	.410	.243	.085	.376	.367	.004	2,460	1,300
FS	428	.250-28 UNJF-3B	.482	.320	.135	.439	.430	.005	4,580	2,330
FS	524	.312-24 UNJF-3B	.552	.353	.150	.502	.492	.006	6,390	3,680
FS	624	.375-24 UNJF-3B	.622	.462	.210	.564	.553	.006	7,250	5,700
FS	720	.437-20 UNJF-3B	.696	.462	.210	.627	.616	.007	7,750	7,730
FS	720 UN	.437-20 UNJF-3B	.766	.462	.210	.690	.679	.007	9,150	8,520
FS	820	.500-20 UNJF-3B	.837	.602	.285	.752	.741	.007	11,900	10,300
FS	918	.562-18 UNJF-3B	.978	.692	.385	.877	.865	.008	15,200	13,000
FS	1018	.625-18 UNJF-3B	1.051	.759	.410	.940	.928	.008	19,200	16,300
FS	1216	.750-16 UNJF-3B	1.191	.884	.505	1.064	1.052	.009	26,100	23,700
FS	1414	.875-14 UNJF-3B	1.403	1.009	.570	1.252	1.239	.010	37,700	32,400
FS	1614	1.000-14 UNJS-3B	1.615	1.134	.635	1.440	1.427	.011	46,200	41,400
FS	1612	1.000-12 UNJF-3B	1.615	1.134	.635	1.440	1.427	.011	46,200	40,800
FS	1812	1.125-12 UNJF-3B	1.826	1.259	.710	1.627	1.614	.012	59,500	52,400
FS	2012	1.250-12 UNJF-3B	2.038	1.446	.795	1.814	1.801	.013	75,000	65,200

*Dimensions are in inches. Dimensions: Prior to lubrication. **UN following dash number signifies unified hex.*

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*

FS = FLEXLOC full height, coarse and fine threads, light hex.

Standards and Specifications
NASM25027 except as noted

FLEXLOC® Full Height Military Locknut

1. Materials — Naval Brass, half hard, 250°F
Aluminum, 2024-T4 or Aluminum, 2024-T351, 250°F

2. Finish — Brass
60-Plain
67-Cadmium plate per QQ-P-416, Type II, Class 2
Aluminum
70-Plain
75-Anodize per MIL-A-8625, Type I (75FS-832 thru 75FS-428 to be dyed blue)

3. Lubricant — Non dry lubricant. Unless otherwise specified, parts shall be supplied with a non dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

4. Thread Dimensions are before lubrication per MIL-S-8879.

5. Part Number — SPS part number consists of a basic part number plus dash number.

Example: 67FS-428 = .2500-28 UNJF-3B, brass, Type II, cadmium plate.

6. Part numbers other than listed on this drawing shall not be used.

7. Design and Usage Limitations — These nuts are designed to be used on 3A external threads within the limitations of MS33588.

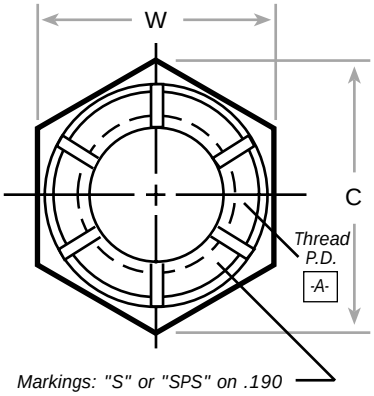
8. Surface Texture — USAS B46.1 U.O.S. unless otherwise specified. The surface texture shall not exceed 125 microinches.

Standards and Specifications

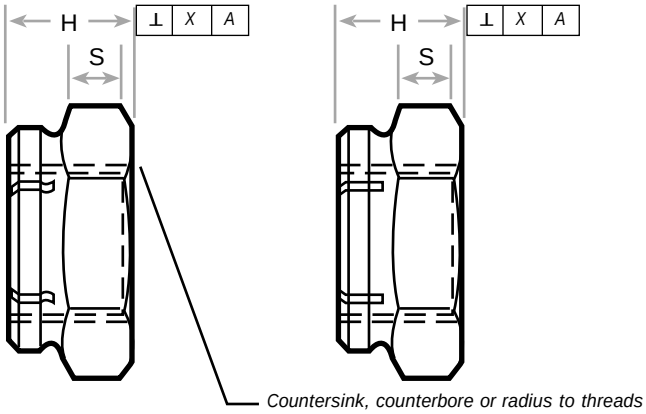
NASM25027 except as noted

Ref. NAS1022

FLEXLOC® Thin Height Military



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.



Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Thread size See Note 6	C Ref	H Max	S Min	W Max	W Min	X	Z In. Lbs. Minimum Steel	Cres	Brass	Alum.	Axial Strength Lbs. Minimum Steel	Cres	Brass	Alum.
FT	632	.138-32 UNJC-3B	.339	.141	.036	.313	.305	.006	11	11	6	6	1,270	1,270	560	650
FT	640†	.138-40 UNJC-3B	.339	.141	.036	.313	.305	.006	11	–	–	–	1,420	–	–	–
FT	832	.164-32 UNJC-3B	.374	.188	.070	.345	.336	.006	17	17	9	9	1,960	1,980	865	1,010
FT	836†	.164-36 UNJC-3B	.374	.188	.070	.345	.336	.006	17	–	–	–	2,060	–	–	–
FT	1032	.190-32 UNJF-3B	.410	.188	.065	.376	.367	.006	34	34	17	18	2,800	2,900	1,240	1,450
FT	428	.250-28 UNJF-3B	.482	.219	.075	.439	.430	.007	86	86	43	44	5,090	5,090	2,240	2,620
FT	524	.312-24 UNJF-3B	.552	.266	.097	.502	.492	.007	190	190	95	115	5,510	5,510	2,870	3,350
FT	624	.375-24 UNJF-3B	.622	.282	.108	.564	.553	.008	310	310	155	165	8,340	8,340	3,760	4,390
FT	720	.437-20 UNJF-3B	.696	.328	.138	.627	.616	.008	485	485	240	255	11,300	11,300	5,060	5,900
FT	720 UN	.437-20 UNJF-3B	.766	.328	.120	.690	.679	.009	485	485	240	255	11,300	11,300	6,170	7,200
FT	820	.500-20 UNJF-3B	.837	.328	.121	.752	.741	.009	710	710	355	400	12,800	12,800	6,210	7,250
FT	918	.562-18 UNJF-3B	.978	.368	.135	.877	.865	.010	900	900	450	615	16,200	16,200	9,510	11,100
FT	1018	.625-18 UNJF-3B	1.051	.399	.147	.940	.928	.011	1,190	1,160	580	685	20,500	20,500	10,370	12,100
FT	1216	.750-16 UNJF-3B	1.191	.415	.155	1.064	1.052	.012	1,870	1,870	935	915	29,800	29,800	12,510	14,600
FT	1414	.875-14 UNJF-3B	1.403	.477	.166	1.252	1.239	.013	2,700	2700	1,350	1,490	40,800	40,800	19,280	22,500
FT	1614	1.000-14 UNJS-3B	1.615	.571	.218	1.440	1.427	.015	3,800	3,800	1,900	2,000	54,400	54,400	24,170	28,200
FT	1612	1.000-12 UNJF-3B	1.615	.571	.218	1.440	1.427	.015	3,800	3,800	1,900	2,000	53,000	53,000	24,000	28,000
FT	1812	1.125-12 UNJF-3B	1.826	.634	.238	1.627	1.614	.016	4,900	4,900	2,450	2,140	68,500	68,500	25,620	29,900
FT	2012	1.250-12 UNJF-3B	2.038	.759	.311	1.814	1.801	.018	6,300	6,300	3,150	2,750	85,800	85,800	32,140	37,500

*Dimensions are in inches. Dimensions: Prior to lubrication. **UN following dash number signifies unified hex. †Carbon steel only.*

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FT = FLEXLOC nut Military, thin height, light hex.

FLEXLOC® Thin Height Military

1. Materials

Carbon Steel
Naval Brass, half hard, 250˚F
Steel, Corrosion resistant austenitic, 800˚F
Aluminum, 2024-T4
or Aluminum, 2024-T351, 250˚F

2. Finish

Carbon Steel
Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Cadmium plate per QQ-P-416, Type I, Class 2 plus molybdenum disulfide dry film lubricant

Naval Brass
Cadmium plate per QQ-P-416, Type II, Class 2

Cres
Molybdenum disulfide
Silver plate per AMS 2410, thickness .0002 minimum on exterior surfaces

Aluminum
Anodized per MIL-A-8625, Type I

3. Lubricant — Dry film lubricant per NASM25027, Type I, non dry lubricant. Unless otherwise specified parts, except dry film lubricated, shall be supplied with a non dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

4. Strength of the wrenching surface to be sufficient to withstand wrench torque per column "Z" when tested with NASM25027.

5. For corrosion resistant austenitic steel nuts, locking torque is per NASM25027 except reusability not required for plain finish nuts and limited to 5 cycles for molybdenum disulfide coated parts

6. Threads are before lubrication per MIL-S-8879.

7. Part Number — SPS part number consists of the following basic part number plus “type” plus dash number.

22-Steel, cadmium plated, Type I, size #6 thru 1/2
27-Steel, cadmium plated, Type II, size #6 thru 1/2
28-Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, size #6 thru 1/2
32-Steel, cadmium plated, Type I, size 9/16 thru 1-1/4
37-Steel, cadmium plated, Type II, size 9/16 thru 1-1/4
38-Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, size 9/16 thru 1-1/4
50-Cres, plain
58-Cres, plus molybdenum disulfide
59-Cres, silver plated per AMS 2410
60-Naval Brass, plain
67-Naval Brass, cadmium plated, Type II
70-Aluminum, plain
75-Aluminum, anodized per MIL-A-8625, Type I

Examples: 27FT-428 = .2500-28 UNJF-3B, steel, cadmium plated, Type II, FLEXLOC nut.

8. Part numbers other than listed on this drawing shall not be used.

9. Design and Usage Limitations — These nuts are designed to be used on 3A external threads within the limitations of MS33588.

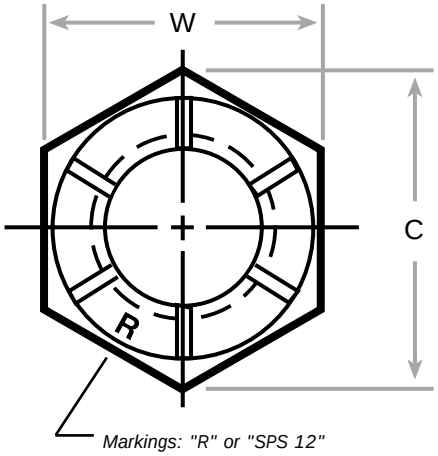
10. Surface Texture — USAS B46.1 U.O.S unless otherwise specified. The surface texture shall not exceed 125 microinches.

Standards and Specifications

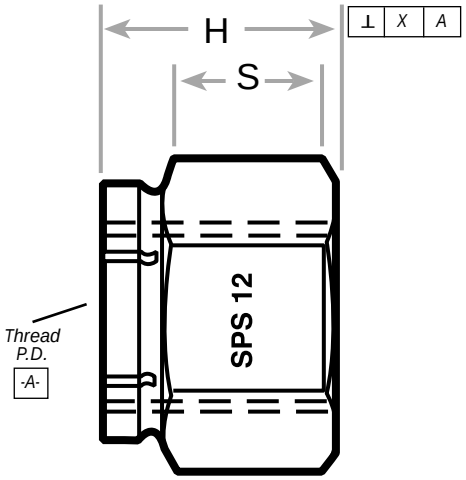
MIL-N-7873 except as noted

Ref. MS20500

FLEXLOC® High Temperature



Markings: "R" or "SPS 12"



Type*	Dash No	Thread Size MIL-S-8879	C Ref	H Max	S Min	W Max	W Min	X	Tensile Strength Lbs Min
99F12	832	.1640-32 UNJC-3B	.378	.243	.105	.345	.336	.003	1,850
99F12	1032	.1900-32 UNJF-3B	.418	.248	.092	.376	.367	.003	2,460
99F12	428	.2500-28 UNJF-3B	.486	.325	.143	.439	.430	.003	4,580
99F12	524	.3125-24 UNJF-3B	.557	.356	.143	.502	.492	.003	7,390
99F12	624	.3750-24 UNJF-3B	.628	.460	.216	.564	.553	.003	11,450
99F12	720	.4375-20 UNJF-3B	.698	.464	.215	.627	.616	.003	15,450
99F12	720 UN	.4375-20 UNJF-3B	.773	.464	.215	.690	.679	.003	15,450
99F12	820	.5000-20 UNJF-3B	.840	.603	.318	.752	.741	.003	21,110
99F12	918	.5625-18 UNJF-3B	.982	.704	.423	.877	.865	.005	26,810
99F12	1018	.6250-18 UNJF-3B	1.051	.766	.481	.940	.928	.005	34,130
99F12	1216	.7500-16 UNJF-3B	1.191	.891	.569	1.064	1.052	.005	50,020
99F12	1414	.8750-14 UNJF-3B	1.403	1.061	.632	1.252	1.239	.005	68,440
99F12	1614	1.0000-14 UNJS-3B	1.615	1.141	.732	1.440	1.427	.005	92,180
99F12	1612	1.0000-12 UNJF-3B	1.615	1.141	.732	1.440	1.427	.005	90,000

*Dimensions are in inches. Dimensions are prior to lubrication on nuts with dry film lubrication. **UN following dash number signifies unified hex.*

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
99F12 = FLEXLOC nut, high temperature austenitic stainless steel material, silver finish.

FLEXLOC® High Temperature

1. Material — Steel, Corrosion resistant.
AMS 5642, AMS 5646, AMS 5732 or AMS 5737

2. Finish — Silver plate per AMS 2410, .0003 - .0005 thickness

3. Lubricant — Non dry lubricant. Unless otherwise specified, parts shall be supplied with a non dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

4. Part Number — SPS part number consists of a basic part number plus a dash number.
Add "R" to basic part number to designate nut for use with .003 reduced pitch diameter bolt.
Add "A" after basic part number to designate A286 material.

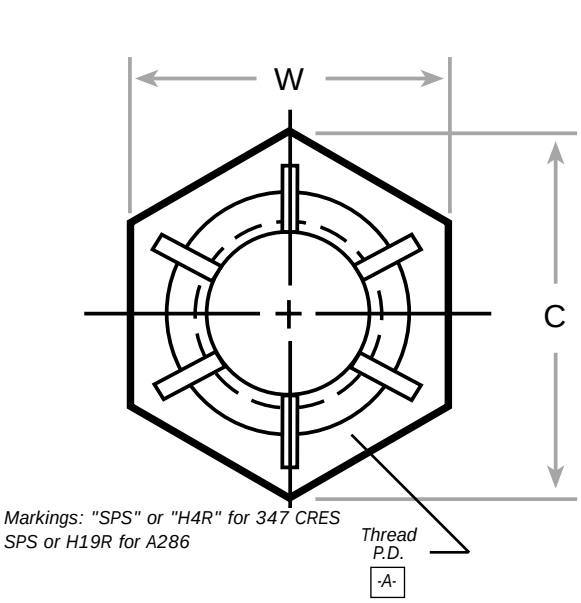
Examples: 99F12-428 = .2500-28 nut, silver plated
99FR12-428 = .2500-28 nut, silver plated for use with .003 reduced pitch diameter bolt
99F12A-428 = .2500-28 nut, A286 silver plated

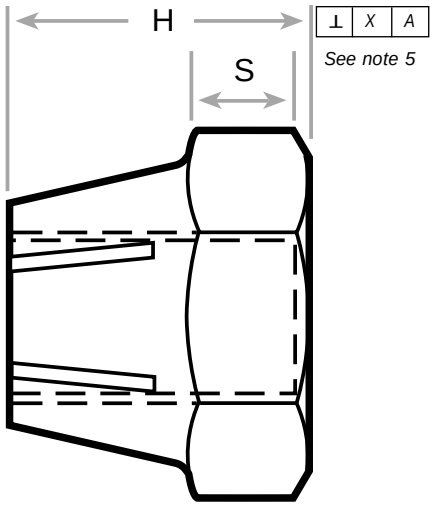
**Type*
99F12 = FLEXLOC nut, high temperature austenitic stainless steel material, silver finish.

Standards and Specifications

MIL-N-7873 except as noted

FLEXLOC® High Temperature High Beam Engine Nut





Type*	Dash No	Thread Size	C Ref	H +.005 -.010	S Ref	W Max	W Min	X	Axial Strength Lbs Min
990FR12	832	.1640-32 UNJC-3B	.378	.297	.125	.345	.336	.005	1,914
990FR12	1032	.1900-32 UNJF-3B	.413	.350	.125	.376	.367	.005	2,805
990FR12	428	.2500-28 UNJF-3B	.488	.406	.156	.439	.430	.005	5,210
990FR12	524	.3125-24 UNJF-3B	.557	.469	.203	.502	.492	.005	8,389
990FR12	624	.3750-24 UNJF-3B	.628	.500	.234	.564	.553	.005	12,940
990FR12	720	.4375-20 UNJF-3B	.698	.570	.242	.627	.615	.005	17,440
990FR12	820	.5000-20 UNJF-3B	.840	.604	.266	.752	.741	.006	23,780

Dimensions are in inches.

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
990FR12 = FLEXLOC nut, high temperature austenitic stainless steel, silver finish, for use on reduced P. D. bolts.

Standards and Specifications

MIL-N-7873 except as noted

FLEXLOC® High Temperature High Beam Engine Nut

1. Material — Type 347 Cres per AMS 5642, AMS 5646 or equivalent.
A286 per AMS 5732 or AMS 5737

2. Finish — Silver plate per AMS 2410, .0002 - .0006 thick on P. D. disregarding first thread at each end.

3. Locking torque per MIL-N-7873 when tested on bolts or studs with threads per MIL-S-7742 or MIL-S-8879 as follows:
a) -832, Class 2A
b) All others - dimensions reduced .003 from Class 3A

4. Fluorescent Penetrant — Inspect per ASTM E 1417 except omit identification. Acceptance criteria per SPS-I-700, Level 1.

5. Squareness when checked in accordance with NASM25027.

6. Part numbers other than listed on this drawing shall not be used.

7. Design and Usage Limitations — The nuts are designed to be used on external threads as listed in note 3 within the limitations of MS33588.

8. Part Number — Add "A" to basic part number to designate A286 material.
No letter after basic part number designates 347 cres material.

Examples: 990FR12-428 = .2500-28 UNJF-3B hexagon nut, 347 cres material.
990FR12A-428 = .2500-28 UNJF-3B hexagon nut, A286 material.

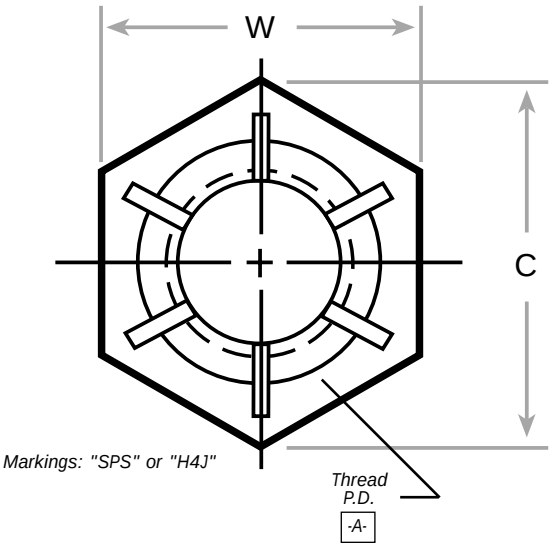
**Type*
990FR12 = FLEXLOC nut, high temperature austenitic stainless steel material, silver finish, for use on reduced P.D. bolts.

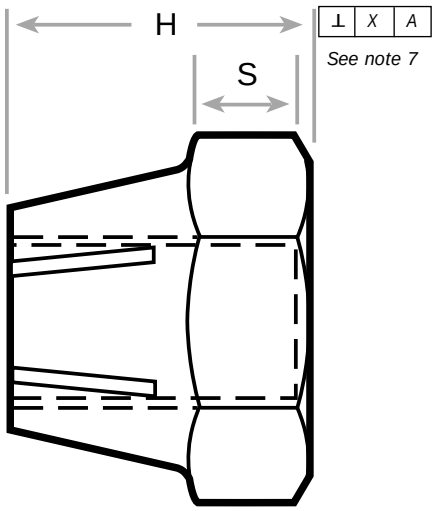
Standards and Specifications

MIL-N-7873 except as noted

FLEXLOC® High Temperature High Beam Engine Nut

Application to 1200°F





Type	Dash No	Thread Size	C REF	H +.005 -.010	S Ref	W Max	W Min	X	Axial Strength Lbs Min
72412	632	.1380-32 UNJC-3B	.339	.257	.125	.313	.305	.005	1,190
72412	832	.1640-32 UNJC-3B	.375	.297	.125	.345	.336	.005	1,914
72412	1032	.1900-32 UNJF-3B	.410	.350	.125	.376	.367	.005	2,805
72412	1024	.1900-24 UNJC-3B	.410	.350	.125	.376	.367	.005	2,320
72412	428	.2500-28 UNJF-3B	.481	.406	.156	.439	.430	.005	5,210
72412	420	.2500-20 UNJC-3B	.481	.406	.156	.439	.430	.005	4,305
72412	524	.3125-24 UNJF-3B	.552	.469	.203	.502	.492	.005	8,389
72412	518	.3125-18 UNJC-3B	.552	.469	.203	.502	.492	.005	7,260
72412	624	.3750-24 UNJF-3B	.623	.500	.234	.564	.553	.005	12,940
72412	616	.3750-16 UNJC-3B	.623	.500	.234	.564	.553	.005	10,850
72412	720	.4375-20 UNJF-3B	.694	.570	.242	.627	.615	.005	17,440
72412	714	.4375-14 UNJC-3B	.694	.570	.242	.627	.615	.005	14,930
72412	820	.5000-20 UNJF-3B	.836	.604	.266	.752	.741	.006	23,780
72412	813	.5000-13 UNJC-3B	.836	.604	.266	.752	.741	.006	20,110

Dimensions are in inches.

SPS TECHNOLOGIES
Aerospace Fasteners Group

** Type*
72412 = FLEXLOC nut, high beam, high temperature austenitic stainless steel, silver finish. For use on reduced P.D. bolts

Standards and Specifications

MIL-N-7873 except as noted

FLEXLOC® High Temperature High Beam Engine Nut

1.	Material	Type 347 Cres per AMS 5642, AMS 5646 or equivalent, 1200˚F
2.	Finish	Silver plate per AMS 2411, .0002 - .0006 thick on P. D. disregarding first thread at each end.
3.	Lubricant	Cetyl alcohol
4.	Locking torque per MIL-N-7873	Coarse thread nuts to meet equivalent size fine thread values.
5.	Fluorescent Penetrant	Inspect per ASTM E 1417 except omit identification. Acceptance criteria per SPS-I-700, Level 1.

6. Squareness when checked in accordance with NASM25027.

7. Part numbers other than listed on this drawing shall not be used.

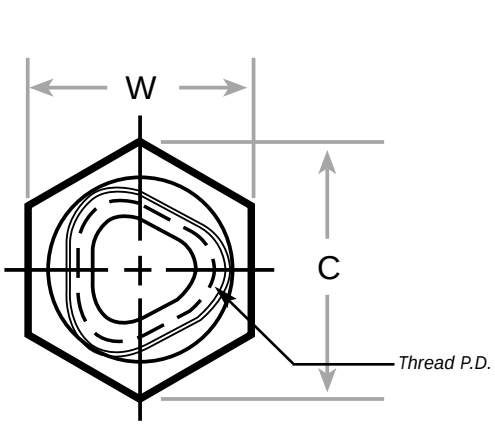
8. Design and Usage Limitations — The nuts are designed to be used on 3A external threads within the limitations of MS33588.

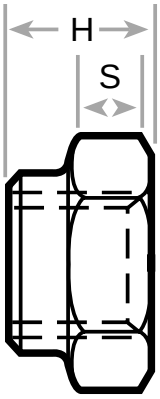
9. Part Number — Add "LH" to basic part number to designate left hand threads.

Example: 72412LH-428 = .2500-28 UNJF-3B hexagon nut, left hand threads

** Type*
72412 = FLEXLOC nut, high beam, high temperature austenitic stainless steel, silver finish. For use on reduced P.D. bolts

FLEXLOC® Inch Microsize Nut





Type*	Dash No	Thread Size	C Min	H Max	S Min	W Max	W Min	X	Axial Strength Lbs Min Steel CRES	Brass	Alum.
FM	080	.060-80 UNJF-3B	.118	.077	.023	.110	.103	.003	220	120	110
FM	164	.073-64 UNJC-3B	.136	.092	.025	.126	.119	.003	330	180	165
FM	172	.073-72 UNJF-3B	.136	.092	.025	.126	.119	.003	350	186	175
FM	256	.086-56 UNJC-3B	.171	.107	.034	.157	.150	.004	460	252	230
FM	264	.086-64 UNJF-3B	.171	.107	.034	.157	.150	.004	490	258	245
FM	348	.099-48 UNJC-3B	.207	.122	.040	.189	.181	.004	600	330	300
FM	356	.099-56 UNJF-3B	.207	.122	.040	.189	.181	.004	650	348	325
FM	440	.112-40 UNJC-3B	.207	.122	.040	.189	.181	.004	750	414	375
FM	448	.112-48 UNJF-3B	.207	.122	.040	.189	.181	.004	820	438	410

Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts.

**Type*
FM = FLEXLOC microsize hex nut.

FLEXLOC® Inch Microsize Nut

1. Materials

Carbon Steel - 35 carbon minimum -n 450°F
Naval Brass, Half hard - 250°F
Steel, Corrosion resistant austenitic, 450°F-800°F
Aluminum, 2024-T4 or 2024-T351 - 250°F

2. Finish

Carbon Steel
- Plain
- Cadmium plate per QQ-P-416, Type I, Class 2
- Cadmium plate per QQ-P-416, Type II, Class 2
- Cadmium plate per QQ-P-416, Type I, Class 2 plus molybdenum disulfide dry film lubricant

Naval Brass
- Plain
- Cadmium plate per QQ-P-416, Type I, Class 2
- Cadmium plate per QQ-P-416, Type II, Class 2

Steel, Corrosion resistant austenitic
- Plain
- Molybdenum disulfide dry film lubricant, 450°F
- Silver plate per AMS 2410, thickness .0002 minimum on exterior surfaces

Aluminum
- Plain
- Alodine coat per MIL-C-5541, Class 1A

3. Lubricant — Dry film lubricant, approved per NASM25027. Unless otherwise specified, all parts except dry film coated shall be supplied with a non-dry lubricant soluble in the cleaner specified in NASM25027.

4. Magnetic particle inspect per NASM25027.

5. Bearing Squareness when measured in accordance with NASM25027.

6. Threads are before lubrication per MIL-S-8879.

7. Part Number — The part number consists of a basic part number plus dash number. See plating note for designation of basic part number.

- 30-Steel
- 32-Steel, cadmium plated, Type I
- 37-Steel, cadmium plated, Type II
- 38-Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant
- 50-Steel, corrosion resistant
- 58-Steel, corrosion resistant, plus molybdenum disulfide dry film lubricant
- 59-Steel, corrosion resistant, silver plated
- 60-Brass
- 62-Brass, cadmium plated, Type I
- 67-Brass, cadmium plated, Type II
- 100-Aluminum
- 105-Aluminum, alodine coated

Examples: 37FM-440 = .112-40 UNJC-3B, cadmium plated, Type II

8. Part numbers other than listed on this drawing shall not be used.

9. Surface Texture — USAS B46.1 U.O.S. shall not exceed 125 microinches.

10. Design and Usage Limitations — The nuts are designed to be used on 3A external threads within the limitations of MS33588.

11. Reusability not required for plain finish CRES nuts.

12. Performance per SPS-N-111

13. Reference

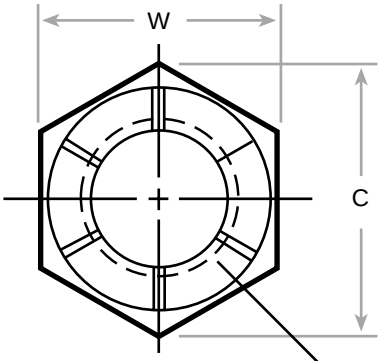
SPS-N-39929 for steel microsize nut.
SPS-N-57573 for corrosion resistant steel microsize nut.
SPS-N-57574 for brass micro size nut.

**Type*
FM = FLEXLOC microsize hex nut.

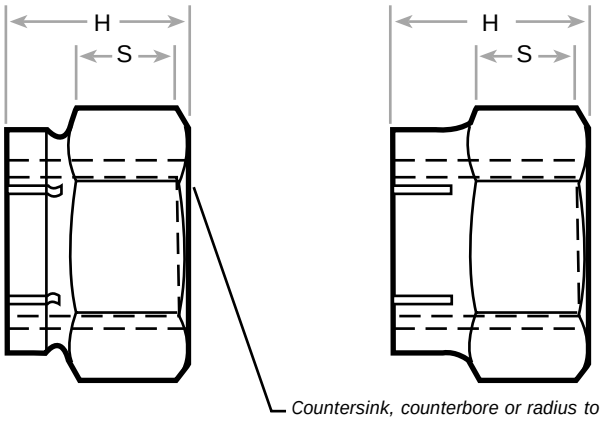
Standards and Specifications

ISO 2320 except as noted

FLEXLOC® Metric Full Height



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.



Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note A	C Ref	H Max	S Min	W Max	W Min	Proof Load - kN Steel Class 8	Steel Class 10	Cres
MFA	M3050	M3.0 x 0.50	6.08	4.5	1.44	5.5	5.38	4.0	5.0	4.0
MFC	M3035	M3.0 x 0.35	6.08	4.5	1.44	5.5	5.38	4.0	5.0	4.0
MFA	M407	M4 x 0.70	7.74	6.0	2.52	7.0	6.85	7.0	8.8	7.0
MFC	M405	M4 x 0.50	7.74	6.0	2.52	7.0	6.85	7.0	8.8	7.0
MFA	M508	M5 x 0.80	8.87	7.5	3.15	8.0	7.85	11.4	14.2	11.4
MFC	M505	M5 x 0.50	8.87	7.5	3.15	8.0	7.85	11.4	14.2	11.4
MFA	M610	M6 x 1.00	11.05	7.8	3.27	10.0	9.78	16.0	20.0	16.0
MFC	M6075	M6 x 0.75	11.05	7.8	3.27	10.0	9.78	16.0	20.0	16.0
MFA	M8125	M8 x 1.25	14.38	10.4	4.37	13.0	12.73	29.0	36.5	29.0
MFC	M810	M8 x 1.00	14.38	10.4	4.37	13.0	12.73	31.0	39.0	31.0
MFA	M1015	M10 x 1.50	18.90	13.0	5.46	17.0	16.73	46.0	58.0	46.0
MFC	M1012	M10 x 1.25	18.90	13.0	5.46	17.0	16.73	49.0	61.0	49.0

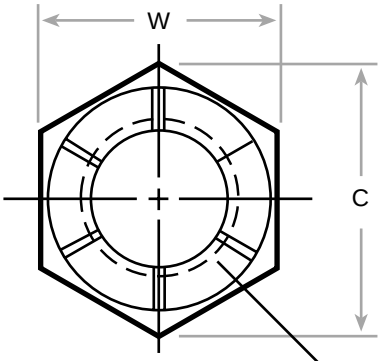
Dimensions are in millimeters. *Dimensions are prior to lubrication.* *A. Threads before lubrication per ISO R 965/II, Class 6H.*

SPS TECHNOLOGIES
Aerospace Fasteners Group

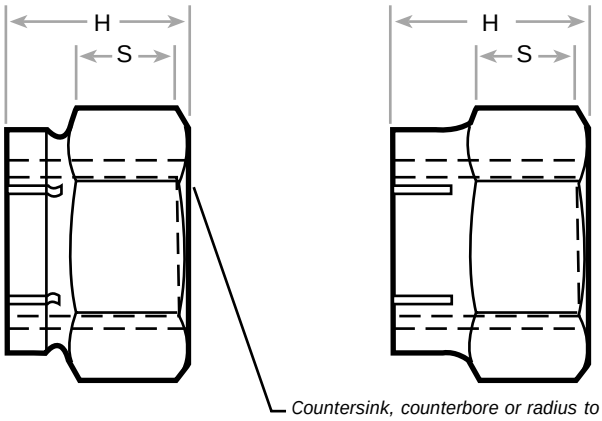
**Type*
MFA = Metric FLEXLOC full height, coarse thread.
MFC = Metric FLEXLOC full height, fine thread.

Standards and Specifications
ISO 2320 except as noted

FLEXLOC® Metric Full Height



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.



Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note A	C Ref	H Max	S Min	W Max	W Min	Proof Load - kN Steel Class 8	Steel Class 10	Cres
MFA	M1217	M12 x 1.75	21.10	15.6	6.55	19.0	18.67	67.0	84.0	67.0
MFC	M1212	M12 x 1.25	21.10	15.6	6.55	19.0	18.67	74.0	92.0	74.0
MFA	M1420	M14 x 2.0	24.49	18.2	9.82	22.0	21.67	92.0	115	92.0
MFC	M1415	M14 x 1.5	24.49	18.2	9.82	22.0	21.67	100	125	100
MFA	M1620	M16 x 2.0	26.75	20.8	11.23	24.0	23.67	126	157	126
MFC	M1615	M16 x 1.5	26.75	20.8	11.23	24.0	23.67	134	167	134
MFA	M1825	M18 x 2.5	30.14	23.4	12.64	27.0	26.67	154	192	154
MFC	M1815	M18 x 1.5	30.14	23.4	12.64	27.0	26.67	172	216	172
MFA	M2025	M20 x 2.5	33.53	26.0	14.04	30.0	29.67	196	245	196
MFC	M2015	M20 x 1.5	33.53	26.0	14.04	30.0	29.67	218	272	218
MFA	M2225	M22 x 2.5	35.72	28.6	15.44	32.0	31.61	242	303	242
MFC	M2215	M22 x 1.5	35.72	28.6	15.44	32.0	31.61	266	333	266

Dimensions are in millimeters. *Dimensions are prior to lubrication.* *A. Threads before lubrication per ISO R 965/II, Class 6H.*

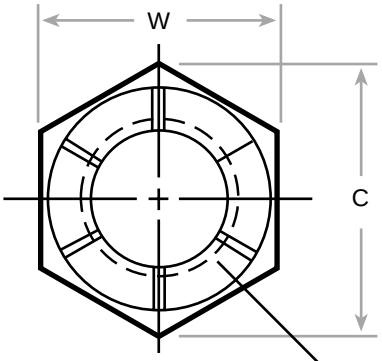
SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
MFA = Metric FLEXLOC full height, coarse thread.
MFC = Metric FLEXLOC full height, fine thread.

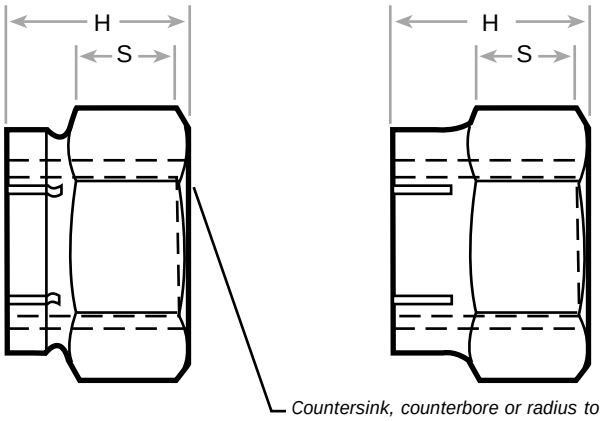
Standards and Specifications

ISO 2320 except as noted

FLEXLOC® Metric Full Height



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.



Countersink, counterbore or radius to threads

Style A ***Style B***

Either style to be supplied at manufacturer's option.

Type*	Dash No	Threads See Note A	C Ref	H Max	S Min	W Max	W Min	Proof Load - kN Steel Class 8	Steel Class 10	Cres
MFA	M2430	M24 x 3.0	39.98	31.2	16.84	36.0	35.38	282	353	282
MFC	M2420	M24 x 2.0	39.98	31.2	16.84	36.0	35.38	307	384	307
MFA	M2730	M27 x 3.0	45.63	32.4	17.50	41.0	40.38	367	459	367
MFC	M2720	M27 x 2.0	45.63	32.4	17.50	41.0	40.38	397	496	397
MFA	M3035	M30 x 3.5	51.28	36.0	19.44	46.0	45.38	448	561	448
MFC	M3020	M30 x 2.0	51.28	36.0	19.44	46.0	45.38	497	621	497
MFA	M3335	M33 x 3.5	55.80	39.6	21.38	50.0	49.38	555	694	555
MFC	M3320	M33 x 2.0	55.80	39.6	21.38	50.0	49.38	608	761	608
MFA	M3640	M36 x 4.0	61.31	43.2	23.33	55.0	54.26	653	817	653
MFC	M3630	M36 x 3.0	61.31	43.2	23.33	55.0	54.26	692	865	692
MFA	M3940	M39 x 4.0	66.96	46.8	25.27	60.0	59.26	780	976	780
MFC	M3930	M39 x 3.0	66.96	46.8	25.27	60.0	59.26	825	1030	825

Dimensions are in millimeters. *Dimensions are prior to lubrication.* *A. Threads before lubrication per ISO R 965/II, Class 6H.*

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
MFA = Metric FLEXLOC, full height, coarse thread.
MFC = Metric FLEXLOC, full height, fine thread.

Standards and Specifications
ISO 2320 except as noted

FLEXLOC® Metric Full Height

1. Materials — Steel, Carbon or alloy
Steel, Corrosion resistant, austenitic

2. Hardness — Steel only - Class 8, C30 max.; Class 10, C26-36

3. Finish — Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Silver plate per AMS 2410
Zinc plate per ASTM B633, Type II

4. Lubricant — Unless otherwise specified, parts shall be supplied with a non-dry lubricant (wax type), dry film lubricant when specified.

5. Locking torque per ISO 2320 except reusability not required on unplated corrosion resistant steel nuts.

6. Surface Texture — Per ANSI B46.1, unless otherwise specified. The surface texture shall not exceed 3.2 microns.

7. Part Numbers — The part number consists of groups of digits and letters designating the material, finish, type, class and size.

The first group of digits designates the material and finish:

20 - Steel, sizes 3 thru 16
30 - Steel, sizes 18 and larger
21 - Steel, cadmium plated, Type I, sizes 3 thru 16
31 - Steel, cadmium plated, Type I, sizes 18 and larger
23 - Steel, zinc plated, sizes 3 thru 16
33 - Steel, zinc plated, sizes 18 and larger
27 - Steel, cadmium plated, Type II, sizes 3 thru 16
37 - Steel, cadmium plated, Type II, sizes 18 and larger
28 - Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, sizes 3 thru 16
38 - Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, sizes 18 and larger
50 - Steel, passivated, corrosion resistant
59 - Steel, silver plated, corrosion resistant

The first group of letters designates the type as listed in the table. The first group of letters is followed by a digit designating the class of steel.

Nuts, 8 for Class 8, 10 for Class 10.
For cres nuts, the class digit is replaced by a dash.
The last group of digits designates the diameter and pitch of the thread and is preceded by an “M”.

Examples: 21MFA8M1620 = 16 mm diameter x 2.0 mm pitch, self-locking metric nut, steel, Type I, cadmium plate, Class 8
59MFC-M1212 = 12 mm diameter x 1.25 mm pitch, self-locking metric nut, cres, silver plate.

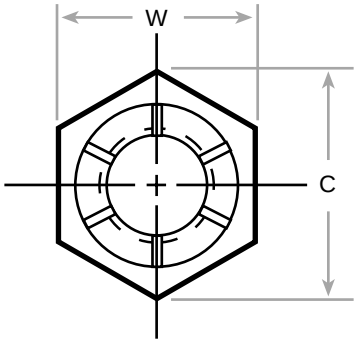
8. Part numbers other than on this drawing shall not be used.

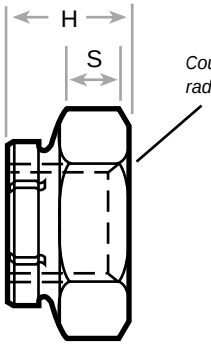
9. Design and Usage Limitations — These nuts are designed to be used on external threads within the limitations of MS33588.

SPS TECHNOLOGIES
Aerospace Fasteners Group

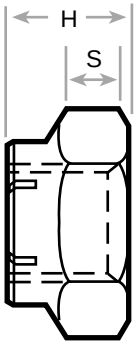
**Type*
MFA = Metric FLEXLOC standard nut, full height, coarse thread.
MFC = Metric FLEXLOC standard nut, full height, fine thread.

FLEXLOC® Metric Thin Height





Style A



Style B

Either style to be supplied at manufacturer's option.

Mark "S-M" or "SPS-M". Add "C" for cres material. Location optional. Multiple stamping permissible. Marking on M5 diameter and smaller may be omitted at manufacturer's option.

Type*	Dash No	Threads See Note A	C Ref	H Max	S Min	W Max	W Min	Proof Load - kN Steel Class 8 See Note B	Steel Class 10 See Note B	Cres
MFK	M3560	M3.5 x 0.60	6.64	4.2	1.94	6.0	5.88	4.51	5.21	4.51
MFK	M3535	M3.5 x 0.35	6.64	4.2	1.94	6.0	5.88	5.29	6.11	5.29
MFK	M407	M4 x 0.70	7.74	4.7	2.00	7.0	6.85	5.84	6.74	5.84
MFK	M405	M4 x 0.50	7.74	4.7	2.00	7.0	6.85	6.54	7.56	6.54
MFK	M508	M5 x 0.80	8.87	5.6	2.66	8.0	7.85	10.4	10.9	10.4
MFK	M505	M5 x 0.50	8.87	5.6	2.66	8.0	7.85	11.9	12.5	11.9
MFK	M610	M6 x 1.00	11.05	5.7	2.17	10.0	9.78	14.7	15.5	14.7
MFK	M6075	M6 x 0.75	11.05	5.7	2.17	10.0	9.78	16.2	17.0	16.2
MFK	M8125	M8 x 1.25	14.38	7.2	2.58	13.0	12.73	19.3	20.3	19.3
MFK	M810	M8 x 1.00	14.38	7.2	2.58	13.0	12.73	20.7	21.8	20.7
MFK	M1015	M10 x 1.50	18.90	8.7	3.41	17.0	16.73	30.6	32.2	30.6
MFK	M1012	M10 x 1.25	18.90	8.7	3.41	17.0	16.73	32.4	34.0	32.4

Dimensions are in millimeters. *Dimensions are prior to lubrication.*

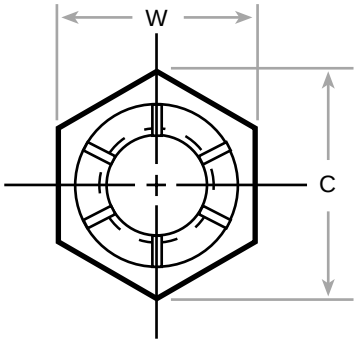
A. Threads before lubrication per ISO R 965/II, Class 6H.
B. Class refers to heat treat not ultimate tensile strength level.

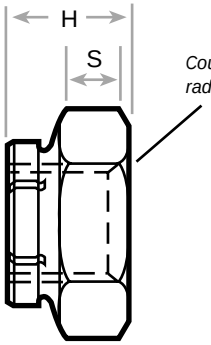
SPS TECHNOLOGIES
Aerospace Fasteners Group

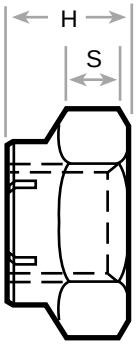
**Type*
MFK = Metric FLEXLOC thin.

Standards and Specifications
ISO 2320 except as noted

FLEXLOC® Metric Thin Height







Style A ***Style B***

Either style to be supplied at manufacturer's option.

Mark "S-M" or "SPS-M". Add "C" for cres material. Location optional. Multiple stamping permissible. Marking on M5 diameter and smaller may be omitted at manufacturer's option.

Type*	Dash No	Threads See Note A	C Ref	H Max	S Min	W Max	W Min	Proof Load - kN Steel Class 8 See Note B	Steel Class 10 See Note B	Cres
MFK	M1217	M12 x 1.75	21.10	10.1	3.93	19.0	18.67	47.4	49.8	47.4
MFK	M1212	M12 x 1.25	21.10	10.1	3.93	19.0	18.67	48.8	51.3	48.8
MFK	M1420	M14 x 2.0	24.49	11.5	4.44	22.0	21.67	61.0	64.1	61.0
MFK	M1415	M14 x 1.5	24.49	11.5	4.44	22.0	21.67	66.1	69.4	66.1
MFK	M1620	M16 x 2.0	26.75	12.8	5.31	24.0	23.67	83.0	87.1	83.0
MFK	M1615	M16 x 1.5	26.75	12.8	5.31	24.0	23.67	88.8	93.3	88.8
MFK	M1825	M18 x 2.5	30.14	14.2	5.40	27.0	26.67	98.4	112	98.4
MFK	M1815	M18 x 1.5	30.14	14.2	5.40	27.0	26.67	105	121	105
MFK	M2025	M20 x 2.5	33.53	15.5	6.25	30.0	29.67	125	143	125
MFK	M2015	M20 x 1.5	33.53	15.5	6.25	30.0	29.67	132	152	132
MFK	M2225	M22 x 2.5	35.72	16.7	6.73	32.0	31.61	154	176	154
MFK	M2215	M22 x 1.5	35.72	16.7	6.73	32.0	31.61	163	186	163

Dimensions are in millimeters. *Dimensions are prior to lubrication.*

A. Threads before lubrication per ISO R 965/II, Class 6H.
B. Class refers to heat treat not ultimate tensile strength level.

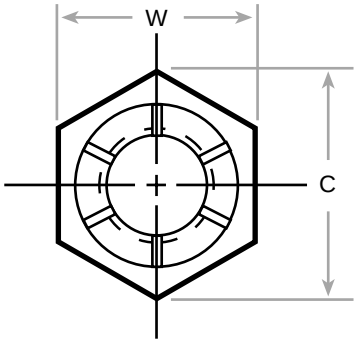
SPS TECHNOLOGIES
Aerospace Fasteners Group

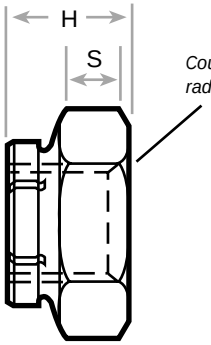
**Type*
MFK = Metric FLEXLOC thin.*

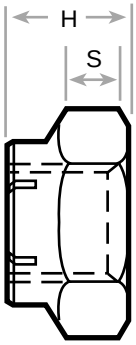
Standards and Specifications

ISO 2320 except as noted

FLEXLOC® Metric Thin Height







Style A ***Style B***

Either style to be supplied at manufacturer's option.

Mark "S-M" or "SPS-M". Add "C" for cres material. Location optional. Multiple stamping permissible. Marking on M5 diameter and smaller may be omitted at manufacturer's option.

Type*	Dash No	Threads See Note A	C Ref	H Max	S Min	W Max	W Min	Proof Load - kN Steel Class 8 See Note B	Steel Class 10 See Note B	Cres
MFK	M2430	M24 x 3.0	39.98	18.0	6.93	36.0	35.38	171	196	171
MFK	M2420	M24 x 2.0	39.98	18.0	6.93	36.0	35.38	188	215	188
MFK	M2730	M27 x 3.0	45.63	18.3	6.65	41.0	40.38	224	256	224
MFK	M2720	M27 x 2.0	45.63	18.3	6.65	41.0	40.38	242	277	242
MFK	M3035	M30 x 3.5	51.28	20.0	6.45	46.0	45.38	273	312	273
MFK	M3020	M30 x 2.0	51.28	20.0	6.45	46.0	45.38	303	347	303
MFK	M3335	M33 x 3.5	55.80	21.7	7.72	50.0	49.38	338	386	338
MFK	M3320	M33 x 2.0	55.80	21.7	7.72	50.0	49.38	372	426	372
MFK	M3640	M36 x 4.0	61.31	23.3	7.61	55.0	54.26	397	455	397
MFK	M3630	M36 x 3.0	61.31	23.3	7.61	55.0	54.26	422	483	422
MFK	M3940	M39 x 4.0	66.96	24.9	8.40	60.0	59.26	475	544	475
MFK	M3930	M39 x 3.0	66.96	24.9	8.40	60.0	59.26	502	574	502

Dimensions are in millimeters *Dimensions are prior to lubrication.*

A. Threads before lubrication per ISO R 965/II, Class 6H.
B. Class refers to heat treat not ultimate tensile strength level.

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
MFK = Metric FLEXLOC thin.

Standards and Specifications
ISO 2320 except as noted

FLEXLOC® Metric Thin Height

1. Materials — Steel, Carbon or alloy
Steel, Corrosion resistant, austenitic

2. Hardness — Steel only - Class 8, HRC30 max.; Class 10, HRC26-36

3. Finish — Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Silver plate per AMS 2410
Zinc plate per ASTM B633, Type II

4. Lubricant — Unless otherwise specified, parts shall be supplied with a non-dry lubricant (wax type), dry film lubricant when specified.

5. Locking torque per ISO 2320 except clamp loads proportioned to the proof loads listed in the tabulation. Reusability not required for unplated corrosion resistant steel nuts.

6. Dimensions shall be met prior to lubrication on dry film lubricated nuts.

7. Surface Texture — Per ANSI B46.1, unless otherwise specified. The surface texture shall not exceed 3.2 microns.

8. Part Numbers — The part number consists of groups of digits and letters designating the material, finish, type, class and size.

The first group of digits designates the material and finish:

20 - Steel, sizes 3.5 thru 16
30 - Steel, sizes 18 and larger
21 - Steel, cadmium plated, Type I, sizes 3.5 thru 16
31 - Steel, cadmium plated, Type I, sizes 18 and larger
23 - Steel, zinc plated, sizes 3.5 thru 16
33 - Steel, zinc plated, sizes 18 and larger
27 - Steel, cadmium plated, Type II, sizes 3.5 thru 16
37 - Steel, cadmium plated, Type II, sizes 18 and larger
28 - Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, sizes 3.5 thru 16
38 - Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant, sizes 18 and larger
50 - Steel, passivated, corrosion resistant
59 - Steel, silver plated, corrosion resistant

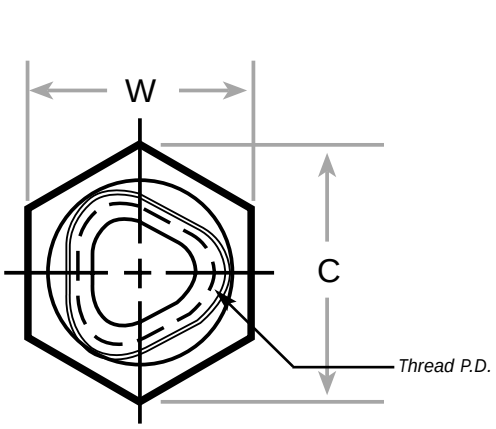
The first group of letters designates the type as listed in the table. The first group of letters is followed by a digit designating the class of steel.

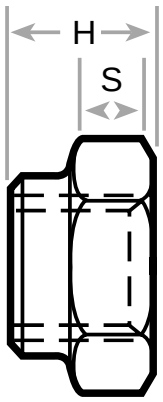
Nuts, 8 for Class 8, 10 for Class 10.
For cres nuts, the class digit is replaced by a dash.
The last group of digits designates the diameter and pitch of the thread and is preceded by an “M”.

Examples: 31FMK8M1620 = 16 mm diameter x 2.0 mm pitch, self-locking metric nut, steel, Type I, cadmium plate, Class 8
59FMK–M1212 = 12 mm diameter x 1.25 mm pitch, self-locking metric nut, cres, silver plate.

9. Part numbers other than on this drawing shall not be used.

FLEXLOC® Metric Microsize Nut





Type*	Dash No	Thread Size	C Ref	H Max	S Min	W Max	W Min	Axial Strength kN Min
MF	M1635	M1.6 x 0.35	3.41	1.96	0.84	3.20	3.02	1.02
MF	M2040	M2.0 x 0.4	4.32	2.33	1.08	4.00	3.82	1.66
MF	M2545	M2.5 x 0.45	5.45	2.78	1.40	5.00	4.82	2.71

Dimensions are in millimeters.

**Type*
MFM = Metric FLEXLOC microsize hex nut.

FLEXLOC® Metric Microsize Nut

1. Material — Steel, Carbon or Alloy
Steel, Corrosion resistant, austenitic

2. Finish — Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Silver plate per AMS 2410
Zinc plate per ASTM B633, Type II, Fe/Zn 5
Passivate per QQ-P-35

3. Lubricant — Unless otherwise specified, parts shall be supplied with a non dry lubricant (wax type).

4. Locking torque per SPS-N-684, paragraph 3.8.3

Nut Type	Stud Material	Stud Finish	Cycles Required
30 MFM	Alloy Steel	Plain	1
31 MFM	Alloy Steel	Cadmium Plate per QQ-P-416, Type II, Class 2	15
33 MFM	Alloy Steel	Zinc Phosphate and Oil	15
37 MFM	Alloy Steel	Cadmium Plate per QQ-P-416, Type II, Class 2	15
50 MFM	Cres	Passivate	1
59 MFM	Cres	Passivate	15

5. Surface Texture — Per ANSI B46.1. Unless otherwise specified, the surface texture shall not exceed 3.2 microns.

6. Part Number — SPS part numbers consist of the following plus type plus applicable dash number.
30 - Steel, plain
31 - Steel, cadmium plated, Type I
33 - Steel, zinc plated
37 - Steel, cadmium plated, Type II
50 - Steel, passivated, corrosion resistant
59 - Steel, silver plated, corrosion resistant

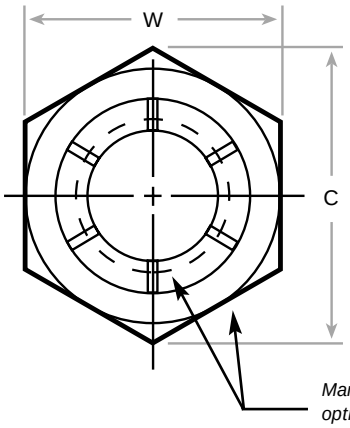
The first group of letters designates the type. The last group of letters designates the diameters and pitch of the thread and is preceded by an "M".

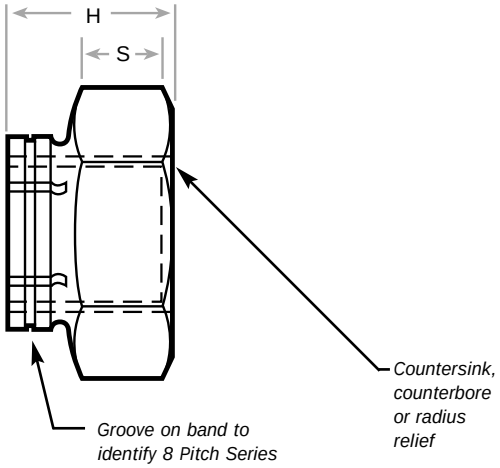
Examples: 31MFM-M2040 = 2 mm diameter x 0.4 mm pitch, self-locking metric nut, steel, Type I cadmium, Class 2

7. Part numbers other than listed on this drawing shall not be used.

8. Usage Limitations — These nuts are designed to be used on external threads within the limitations of MS33588.

FLEXLOC® 8 Pitch Series





Type*	Dash No	Threads per MIL-S-7742	C Ref	H Max	S Min	W Max	W Min	Axial Strength Lbs Min
FO	1608	1.0000-8 UNC-2B	1.826	1.010	.479	1.627	1.614	84,800
FO	1808	1.1250-8 UN-2B	2.038	1.135	.549	1.814	1.801	111,000
FO	2008	1.2500-8 UN-2B	2.250	1.260	.616	2.002	1.988	130,000
FO	2208	1.3750-8 UN-2B	2.484	1.385	.684	2.190	2.176	160,000
FO	2408	1.5000-8 UN-2B	2.697	1.510	.748	2.377	2.363	194,000
FO	2608	1.6250-8 UN-2B	2.909	1.635	.814	2.564	2.549	231,000
FO	2808	1.7500-8 UN-2B	3.124	1.760	.882	2.752	2.737	270,000
FO	3008	1.8750-8 UN-2B	3.338	1.885	.950	2.940	2.925	313,000
FO	3208	2.0000-8 UN-2B	3.552	2.010	1.018	3.127	3.112	360,000
FO	3608	2.2500-8 UN-2B	3.934	2.260	1.170	3.502	3.487	427,000
FO	4008	2.5000-8 UN-2B	4.367	2.510	1.250	3.877	3.782	600,000

Dimensions are in inches.

FLEXLOC 8-Pitch Series locknuts are steel (minimum .15 carbon) and perform in temperatures up to 550˚F. The design provides vibration-resistant locking without the excessive wrenching torques needed to tighten nuts with more threads per inch. The inherent strength of this locknut allows it to perform under the severe conditions required of heavy drilling and pumping equipment.

**Type*
FO = FLEXLOC 8-pitch hex nut.

FLEXLOC® 8 Pitch Series

1. Material — Carbon steel or corrosion resistant steel, austenitic

2. Finish — Carbon steel, cadmium plate per QQ-P-416, Type I, Class 2
Cres, silver plate per AMS 2410

3. Lubricant — Unless otherwise specified, parts shall be supplied with a non-dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

4. Locking torque per NASM25027 as applicable to coarse thread nuts. Reusability not required for unplated corrosion resistant nuts.

5. Surface Texture — USAS B46.1 unless otherwise specified. The surface texture shall not exceed 125 microinches.

6. Part Number — Part number consists of the basic part number plus the applicable dash number.

30-Steel, plain
32-Steel, cadmium plated, Type I
50-Cres, plain
59-Cres, silver plated

Examples: 30FO2408 = 1.5000-8 UN-2B carbon steel nut, plain finish

7. Part numbers other than listed on this drawing shall not be used.

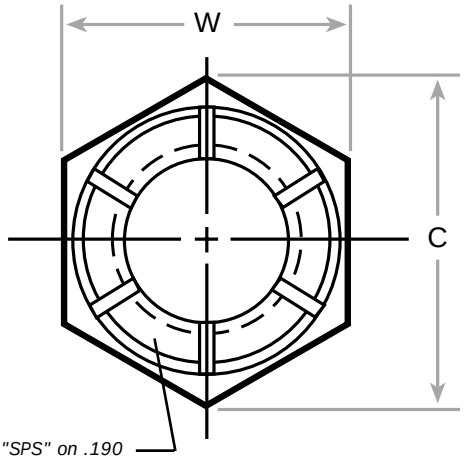
8. Design and Usage Limitations — These nuts are designed to be used on 2A external threads within the limitations of MS33588.

Standards and Specifications

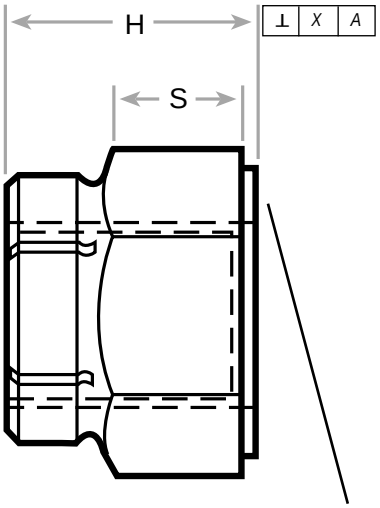
NASM25027 except as noted

Ref. ABS Standard

FLEXLOC® Engine, Wheel and Brake



Markings: "S" or "SPS" on .190 and larger. "C" designates cres material.



Countersink, counterbore or radius to threads

Type*	Dash No	Thread Size	C Ref	H Max	S Min	W Max	W Min	X	Axial Strength Lbs Min
FE	1032	.190-32 UNJF-3B	.410	.237	.120	.376	.367	.005	3,800
FE	428	.250-28 UNJF-3B	.482	.315	.156	.439	.430	.005	7,000
FE	524	.312-24 UNJF-3B	.552	.347	.160	.502	.492	.005	10,000
FE	624	.375-24 UNJF-3B	.622	.456	.240	.564	.553	.005	16,000
FE	720	.437-20 UNJF-3B	.696	.456	.237	.627	.616	.005	18,000
FE	720 UN	.437-20 UNJF-3B	.766	.456	.234	.690	.679	.005	19,000
FE	820	.500-20 UNJF-3B	.837	.596	.344	.752	.741	.006	28,000

Dimensions are in inches. **UN following dash number signifies unified hex.*

**Type*
FE = FLEXLOC full height, fine threads.

SPS TECHNOLOGIES
Aerospace Fasteners Group

FLEXLOC® Engine, Wheel and Brake

1. Material — AMS 5024 Steel

2. Hardness — Rockwell C25 maximum

3. Finish — Cadmium plate per QQ-P-416, Type I, Class 2 and AMS 2400
Cadmium plate per QQ-P-416, Type II, Class 2

4. Lubricant — Non-dry lubricant. Unless otherwise specified, parts shall be supplied with a non-dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

5. Dimensions to be met prior to lubricant.

6. Threads are before lubrication per MIL-S-8879.

7. Part Number — Part number consists of basic part number plus dash number. See plating note for designation of basic part number.

32-Steel, cadmium plated, Type I
37-Steel, cadmium plated, Type II

Example: 32FE-428 = .250-28 UNJF-3B, cadmium plated, Type I

8. Part numbers other than listed on this drawing shall not be used.

9. Surface Texture — USAS B46.1 U.O.S. The surface texture shall not exceed 125 microinches.

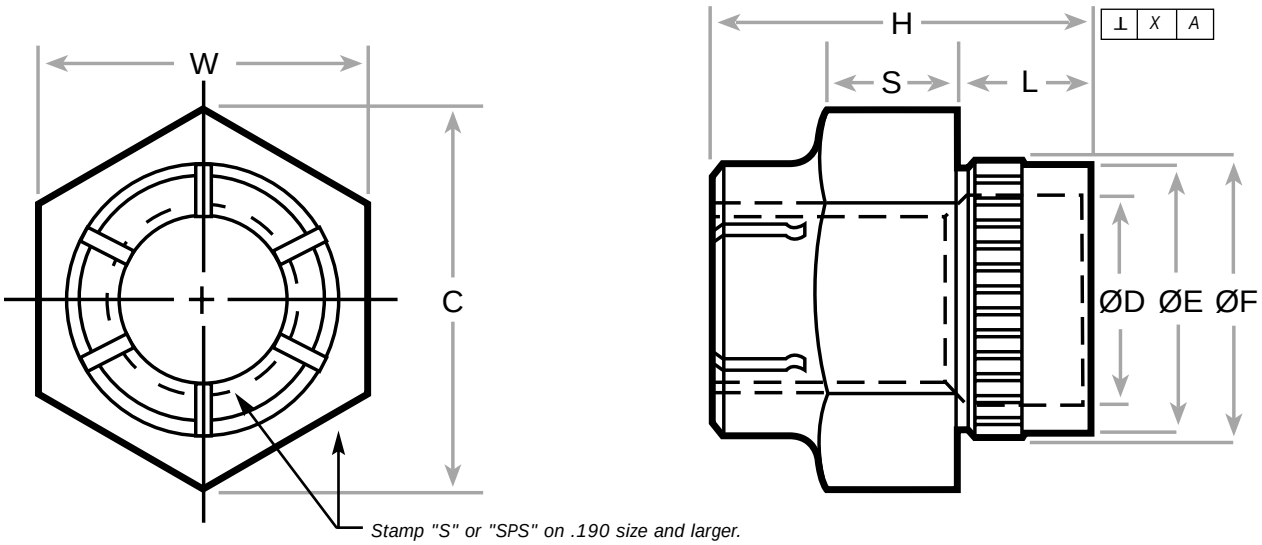
10. Design and Usage Limitations — These nuts are designed to be used on 3A external threads within the limitations of MS33588.

Standards and Specifications

NASM25027 except as noted

Ref. Boeing BACN10 Standard
Lockheed "C" Standard

FLEXLOC® Clinch Nuts



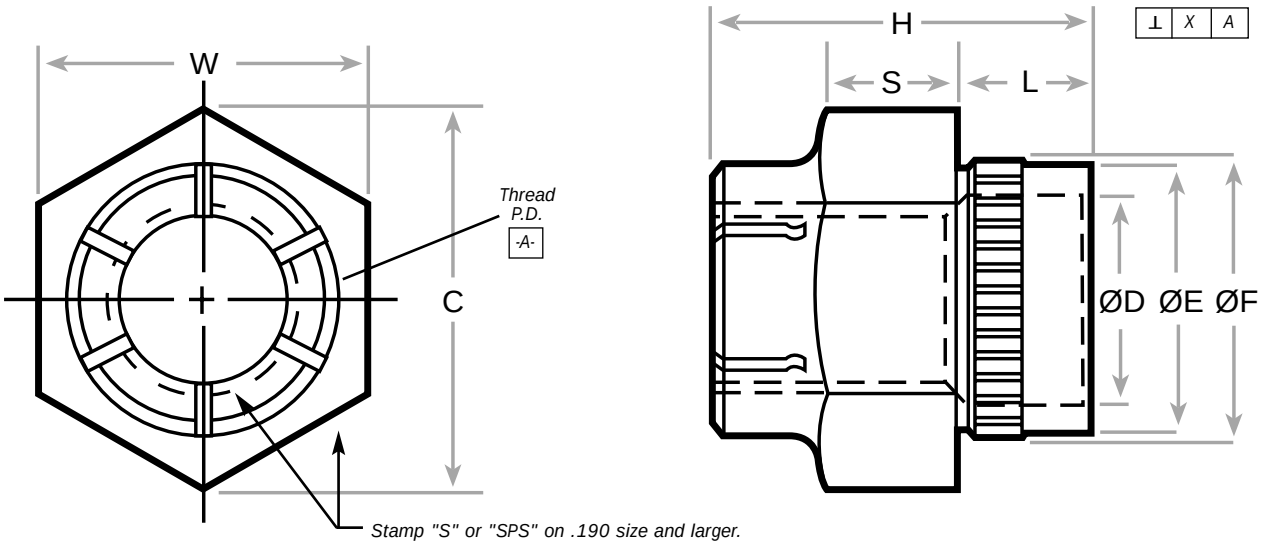
Type*	Dash No	Thread Size	C Ref	ØD +.005 -.000	ØE +.000 -.003	ØF +.000 -.004	H +.005 -.015	S Min	W Max	W Min	X	Axial Strength Lbs Min Steel Cres	Brass	Alum.
FP	440	.112-40 UNJC-3B	.277	.139	.183	.191	.150	.070	.251	.243	.005	1,080	414	750
FP	448	.112-48 UNJF-3B	.277	.139	.183	.191	.150	.070	.251	.243	.005	1,080	414	750
FP	632	.138-32 UNJC-3B	.347	.165	.216	.224	.175	.095	.313	.305	.006	1,620	624	1,130
FP	640	.138-40 UNJF-3B	.347	.165	.216	.224	.175	.095	.313	.305	.006	1,620	624	1,130
FP	832	.164-32 UNJC-3B	.419	.220	.267	.277	.238	.122	.376	.367	.006	2,510	936	1,720
FP	836	.164-36 UNJF-3B	.419	.220	.267	.277	.238	.122	.376	.367	.006	2,510	936	1,720
FP	1024	.190-24 UNJC-3B	.419	.220	.267	.277	.238	.114	.376	.367	.006	3,590	1,302	2,460
FP	1032	.190-32 UNJF-3B	.419	.220	.267	.277	.238	.114	.376	.367	.006	3,590	1,302	2,460
FP	420	.250-20 UNC-2B	.491	.280	.351	.361	.316	.168	.439	.430	.007	6,550	2,328	4,580
FP	428	.250-28 UNJF-3B	.491	.280	.351	.361	.316	.168	.439	.430	.007	6,550	2,328	4,580

Dimensions are in inches.

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FP = FLEXLOC clinch nut.

FLEXLOC® Clinch Nuts

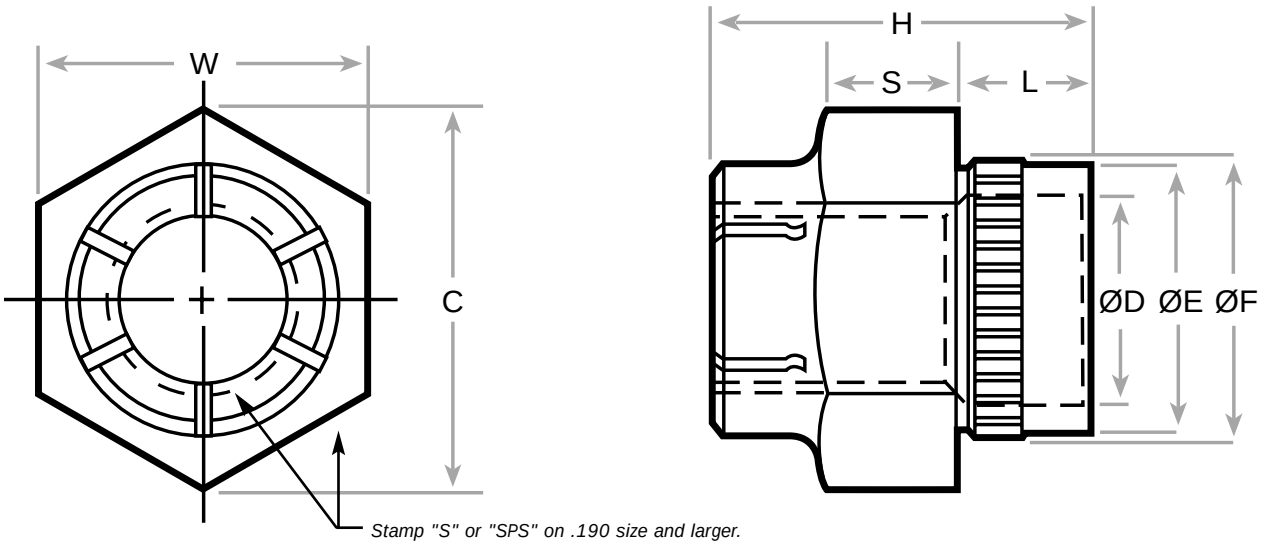


Type*	Dash No	Thread Size	C Ref	ØD +.005 -.000	ØE +.000 -.003	ØF +.000 -.004	H +.005 -.015	S Min	W Max	W Min	Axial Strength Lbs Min X	Steel Cres	Brass	Alum.
FP	518	.312-18 UNC-2B	.561	.341	.407	.417	.348	.184	.502	.492	.007	9,600	3,684	6,390
FP	524	.312-24 UNJF-3B	.561	.341	.407	.417	.348	.184	.502	.492	.007	9,600	3,684	6,390
FP	616	.375-16 UNC-2B	.631	.405	.471	.487	.457	.250	.564	.553	.008	14,500	5,700	7,250
FP	624	.375-24 UNJF-3B	.631	.405	.471	.487	.457	.250	.564	.553	.008	14,500	5,700	7,250
FP	714	.437-14 UNC-2B	.775	.467	.530	.546	.457	.243	.690	.679	.009	15,500	7,728	7,750
FP	720	.437-20 UNJF-3B	.775	.467	.530	.546	.457	.243	.690	.679	.009	15,500	7,728	7,750
FP	813	.500-13 UNC-2B	.846	.531	.608	.624	.597	.336	.752	.741	.009	23,800	10,302	11,900
FP	820	.500-20 UNJF-3B	.846	.531	.608	.624	.597	.336	.752	.741	.009	23,800	10,302	11,900

Dimensions are in inches.

**Type*
FP = FLEXLOC clinch nut.

FLEXLOC® Clinch Nuts



Shank Code	L ±.005	M +.000 -.010	N ±.005	Material Thickness Range Max	Min
1	.063	.048	.053	.032	.020
2	.085	.060	.075	.053	.032
3	.105	.085	.095	.073	.053
4	.135	.085	.125	.103	.073

Shank Code	L ±.005	M +.000 -.010	N ±.005	Material Thickness Range Max	Min
5	.165	.085	.155	.133	.103
7	.195	.085	.185	.163	.133
6	.225	.085	.215	.193	.163

Installation Details

Nut Size	Recommended Hole Size Max	Min	Clinching Pressure Lbs. Steel CRES	Alum. Brass
.112	.186	.184	2,000	1,400
.138	.219	.217	3,000	1,900
.164	.271	.268	4,000	2,100
.190	.271	.268	4,000	2,100

Nut Size	Recommended Hole Size Max	Min	Clinching Pressure Lbs. Steel CRES	Alum. Brass
.250	.355	.352	5,000	4,000
.312	.411	.408	5,500	4,500
.375	.475	.472	6,500	5,200
.437	.534	.531	7,500	6,000
.500	.612	.609	9,000	7,000

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FP = FLEXLOC clinch nut.

Standards and Specifications
NASM25027 except as noted

FLEXLOC® Clinch Nuts

1. Materials

Carbon Steel - 450°F
Steel, Corrosion resistant austenitic - 800°F
Naval Brass, half hard - 250°F
Aluminum, 2024-T4 or 2024-7351 - 250°F

2. Finish

Carbon Steel	Steel, Corrosion resistant austenitic
Plain	Plain
Cadmium Plate per QQ-P-416, Type I, Class 2	Silver plate plus molybdenum disulfide dry film lubricant
Cadmium plate per QQ-P-416, Type II, Class 2	Silver plate per AMS 2410, thickness .0002 min. on exterior surfaces
Cadmium plate per QQ-P-416, Type I, Class 2 plus molybdenum disulfide lubricant	
Naval Brass	**Aluminum**
Plain	Plain
Cadmium plate per QQ-P-416, Type II, Class 2	Anodized per MIL-A-8625, Type I

3. Lubricant — Dry film lubricant approved per NASM25027. Non-dry lubricant. Unless otherwise specified parts, except dry film lubricated, shall be supplied with a non-dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

4. Locking torque per NASM25027 except reusability not required on cres plain finish nuts and reusability of dry film lubricated parts limited to 5 cycles.

5. Steel and cres parts to meet push out and torque out requirements of NASM25027 when tested in sheets of RC20 maximum hardness.

6. Threads per MIL-S-8879 for Class 3B thread and MIL-S-7742 for Class 2B thread.

7. Part Number — Part number consists of basic part number plus shank code plus dash number. See Note 2 (Finish) for designation of basic part number.

20-Steel, plain
22-Steel, cadmium Plate per QQ-P-416, Type I
23-Steel, zinc plate per ASTM B633, Type II
27-Steel, cadmium plate per QQ-P-416, Type II
28-Steel, cadmium plate per QQ-P-416, Type I, plus molybdenum disulfide lubricant
50-Steel, corrosion resistant, plain
58-Steel, corrosion resistant, silver plated plus molybdenum disulfide dry film lubricant
59-Steel, corrosion resistant, silver plated
60-Naval Brass, plain
67-Naval Brass, cadmium plated, Type II
70-Aluminum, plain
75-Aluminum, anodized, Type I

Examples: 22FP4-524 = .3125-24 UNJF-3B carbon steel, cadmium plated, Type I, Class 2 clinch nut, .135 shank length

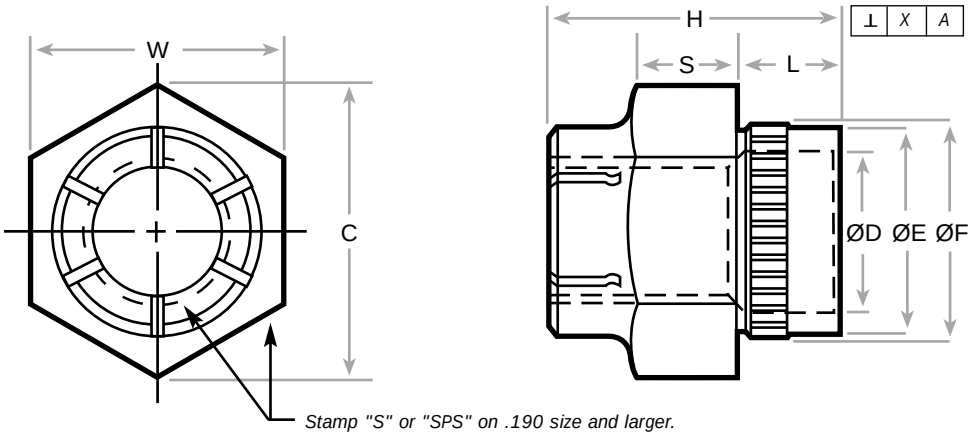
8. Design and Usage Limitations — These nuts are designed to be used on 3A external threads within the limitations of MS33588.

9. Part numbers other than listed on this drawing shall not be used.

10. Surface Texture — USAS B46.1 unless otherwise specified. The surface texture shall not exceed 125 microinches.

**Type*
FP = FLEXLOC clinch nut.

FLEXLOC® Microsize Clinch Nuts



Type*	Dash No	Thread Size	C Ref	ØD +.005 -.000	ØE +.000 -.003	ØF +.000 -.004	H Max	S Min	W Max	W Min	X	Axial Strength Lbs Min Steel Cres	Brass	Alum.
FMP	080	.060-80 UNJF-3B	.118	.067	.091	.097	.077	.039	.110	.103	.004	220	120	110
FMP	164	.073-64 UNJC-3B	.136	.081	.107	.113	.092	.049	.126	.119	.004	330	180	165
FMP	172	.073-72 UNJF-3B	.136	.081	.107	.113	.092	.049	.126	.119	.004	350	186	175
FMP	256	.086-56 UNJC-3B	.171	.108	.132	.138	.107	.060	.157	.150	.004	460	252	230
FMP	264	.086-64 UNJF-3B	.171	.108	.132	.138	.107	.060	.157	.150	.004	490	258	245
FMP	348	.099-48 UNJC-3B	.207	.133	.164	.171	.122	.063	.189	.181	.004	600	330	300
FMP	356	.099-56 UNJF-3B	.207	.133	.164	.171	.122	.063	.189	.181	.004	650	348	325
FMP	440	.112-40 UNJC-3B	.207	.133	.164	.171	.122	.063	.189	.181	.004	750	414	375
FMP	448	.112-48 UNJF-3B	.207	.133	.164	.171	.122	.063	.189	.181	.004	820	438	410

Dimensions are in inches. Dimensions are prior to lubrication on dry film lubricated nuts.

Shank Code	L ±.005	M +.000 -.010	N ±.005	Material Thickness Range Max	Material Thickness Range Min
-10	.057	.038	.047	.032	.020
-20	.087	.060	.077	.063	.033

Installation Details

Nut Size	Recommended Hole Size Max	Recommended Hole Size Min	Clinching Pressure Pounds Steel / Cres	Brass / Aluminum
.060	.094	.092	900	500
.073	.110	.108	1,100	600
.086	.135	.133	1,500	800
.099	.167	.165	1,800	1,000
.112	.167	.165	2,000	1,200

For installation tool, refer to SPS-N-24033.

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
FMP = Metric FLEXLOC microsize clinch nut.

FLEXLOC® Microsize Clinch Nuts

1. Materials

Steel
Steel, Corrosion resistant, austenitic
Naval Brass, Half hard
Aluminum, 2024-T4 or 2024-T351

2. Finish

Steel
Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Cadmium plate per QQ-P-416, Type I, Class 2 plus molybdenum disulfide dry film lubricant

Cres
Corrosion resistant steel, molybdenum disulfide dry film lubricant
Silver plate per AMS 2410, thickness .0002 minimum on exterior surfaces

Naval Brass
Cadmium plate per QQ-P-416, Type II, Class 2

Aluminum
Anodize per MIL-A-8625, Type 1

3. Lubricant

Unless otherwise specified, parts except dry film coated shall be supplied with a non-dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

4. Threads are before lubrication per MIL-S-8879.

5. Part Number

The part number consists of a basic part number plus shank number plus dash number. See plating note for designation of basic part number.

30-Steel, plain
32-Steel, cadmium plated, Type I
37-Steel, cadmium plated, Type II
38-Steel, cadmium plated, Type I, plus molybdenum disulfide dry film lubricant
50-Cres, plain
58-Cres, corrosion resistant steel, molybdenum disulfide dry film lubricant
59-Cres, silver plated
60-Naval Brass, plain
67-Naval Brass, cadmium plated, Type II
100-Aluminum, plain
105-Aluminum, anodize coated, Type 1

Examples: 32FMP 10-440 = .112-40 UNJC-3B, cadmium plated, microsize clinch nut with .057 shank length.

6. Surface Texture

USAS-B46.1. Unless otherwise specified, the surface texture shall not exceed 125 microinches.

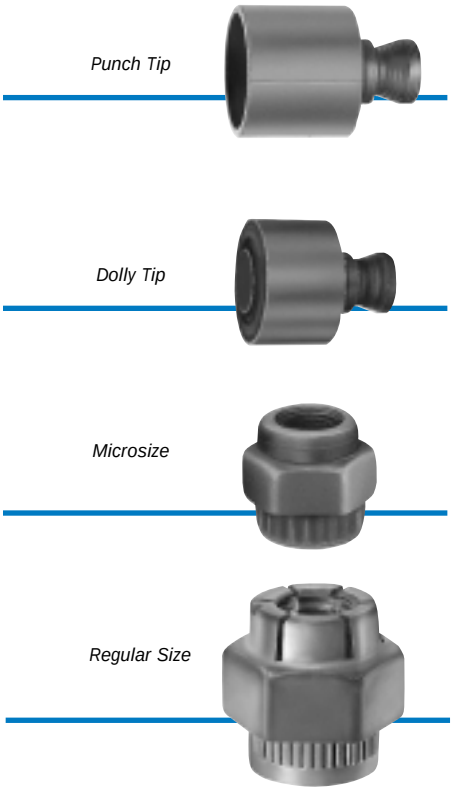
7. Design and Usage Limitations

The nuts are designed to be used on 3A external threads within the limitations of MS33588.

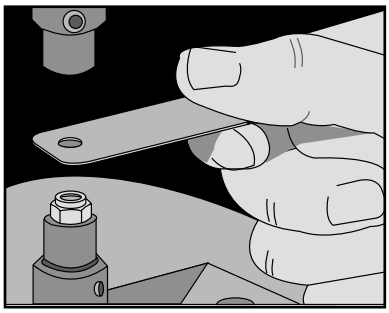
8. Part numbers other than listed on this drawing shall not be used.

**Type*
FMP = Metric FLEXLOC microsize clinch nut.

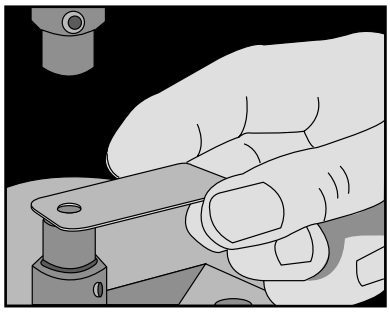
FLEXLOC® Clinch Nuts



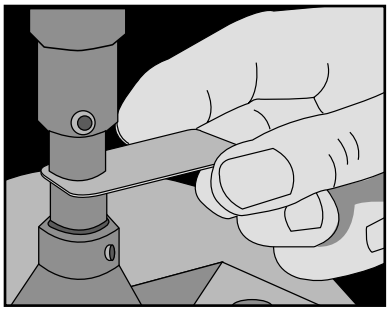
FLEXLOC clinch nuts are special purpose self-locking nuts used for blind mountings in thin section materials. They can be used in aluminum, brass or soft steel material of varying thicknesses. FLEXLOC clinch nuts are especially useful where equipment must be taken apart and reassembled or where nuts are difficult to reach.



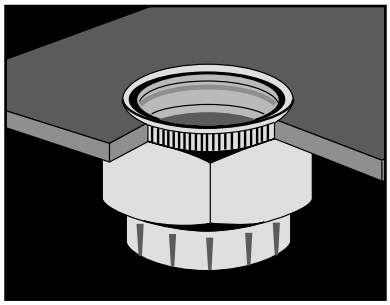
1. Place the Clinch Nut in the Dolly tip by putting the locking section of the nut into the hole of the Dolly tip.



2. Place the hole in the sheet over he pilot of the shank of the nut.



3. Pressure is applied from above through the punch tip.



4. As the shank of the Clinch Nut is forced through the sheet the shank is peened over.

Nut Size	Part Nos. Punch Tip	Dolly Tip	Recommended Hole Size Max.	Min.	Clinching Pressure, lb. Steel & Stainless	Brass & Alum.
MICROSIZE						
#0	PFP-0M	DFP-0M	.094	.092	900	500
#1	PFP-1M	DFP-1M	.110	.108	1100	600
#2	PFP-2M	DFP-2M	.135	.133	1500	800
#3	PFP-3M	DFP-3M	.167	.165	1800	1000
#4	PFP-4M	DFP-4M	.167	.165	2000	1200
REGULAR SIZE						
#4	PFP-4	DFP-4	.186	.184	2000	1400
#6	PFP-6	DFP-6	.219	.217	3000	1900
#8	PFP-8	DFP-8	.271	.268	4000	2100
#10	PFP-10	DFP-10	.271	.268	4000	2100
1/4	PFP-14	DFP-14	.355	.352	5000	4000
5/16	PFP-16	DFP-16	.411	.408	5500	4500
3/8	PFP-18	DFP-18	.475	.472	6500	5200
7/16	PFP-20	DFP-20	.534	.531	7500	6000
1/2	PFP-22	DFP-22	.612	.609	9000	7000

FLEXLOC® Clinch Nuts

Installation

DESCRIPTION:

Knurled hollow shank is forced into the hole in the material and protruding end is peened, rolled or swaged over. The knurled section is imbedded in the material, securely anchoring nut.

SIZE SELECTION:

For regular size clinch nuts, shank of the nut should be 1/32" longer than the thickness of the material in which it is inserted; for microsize installations, shank should be .025" longer.

HOLE TOLERANCES (see table):

Must be observed to insure knurled section of clinch nut shank fully engages the sheet material.

CLINCHING PRESSURES:

Vary according to size of nut and type of material in which the nut is used. Recommended installation pressures are shown in the table. Exceeding recommended pressures may affect locking torque of nut.

TOOLS:

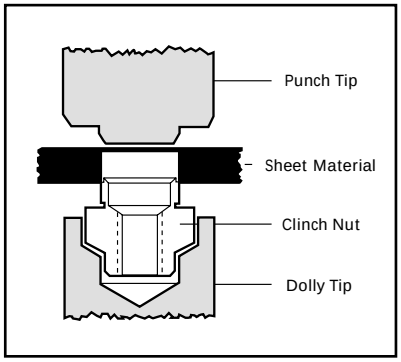
To insure even swaging, tools must be squarely mounted in the press or clamp. Dolly should rest on the top of the hex to avoid damage to locking section. Pressure on locking section will cause excessive locking torque.

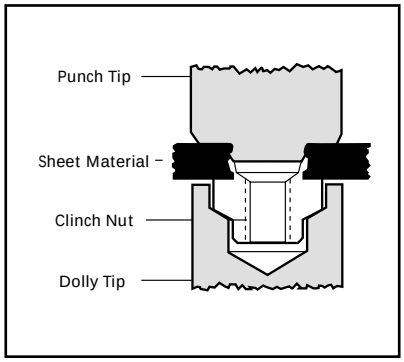
		Dash Number for Punch Tool			
Sheet Thickness	Nut Shank Length	Sz.: #4—40 Hole Sz.: .184-.186 Dolly Tip: DFP-4 Install. Pres. 4,000 -4,500 lbs.	Sz.: #6—32 Hole Sz.: .217-.219 Dolly Tip: DFP-6 Install. Pres. 4,200 - 4,700 lbs.	Sz.: #8—32 Hole Sz. .269-.271 Dolly Tip: DFP-8 Install. Pres. 4,500 - 4,700 lbs.	Sz.: #10—32 Hole Sz.: .269-.271 Dolly Tip: DFP-8 Install. Pres. 4,500 - 4,700 lbs.
.035-.050	.030*	53428-4-1	53428-6-1	53428-8-1	53428-8-1
.045-.060	.043*	53428-4-1	53428-6-1	53428-8-1	53428-8-1
.055-.070	.043*	53428-4-2	53428-6-2	53428-8-2	53428-8-2
.065-.080	.043*	53428-4-3	53428-6-3	53428-8-3	53428-8-3
.075-.090	.063	53428-4-2	53428-6-2	53428-8-2	53428-8-2
.085-.102	.063	53428-4-3	53428-6-3	53428-8-3	53428-8-3
.097-.112	.085	53428-4-2	53428-6-2	53428-8-2	53428-8-2
.107-.122	.085	53428-4-3	53428-6-3	53428-8-3	53428-8-3
.117-.132	.105	53428-4-2	53428-6-2	53428-8-2	53428-8-2
.127-.142	.105	53428-4-3	53428-6-3	53428-8-3	53428-8-3

**Nuts with those shorter shank lengths are available on special order only.*

FLUSH MOUNTING:

To obtain a flush mounting surface, different type punch tips are used for the clinch nut installation. Recommended hole sizes are the same as for peened over installations. Flush mounting is possible in .035" to .142" thick materials. Only one punch stroke is required for full installation, saving time and increasing productivity.





STEP 1 Clinch nut is placed in dolly tip as previously described. The hole in the sheet is placed over the shank end of the nut.

STEP 2 Shank of nut is pressed into material by punch tip. Angle of punch tip displaces shank outward into surrounding material. Clinch is fully formed when sheet is seated against nut bearing face.

FLEXITHRED™ Swage Nuts

FLEXITHRED Swage Nut Non-Locking Type

FLEXITHRED Swage Nut Self-Locking Type

FLEXITHRED self-swaging fasteners permit installation of permanent threads in thin section materials. Installation does not distort or discolor the mounting surface and requires only a punched or drilled hole, two parallel surfaces and a squeezing operation. Application of pressure on the fastener displaces metal around the edge of the hole, flowing the metal into a retaining ring or grooves in the FLEXITHRED fastener. The displaced metal anchors the fastener securely, and provides high resistance to torque-out and push-out.

FLEXITHRED Swage Nuts

FLEXITHRED swage nuts are available in self-locking and non-locking types in carbon and stainless steel. They are ideal for blind applications where ordinary nuts may be inaccessible.

Specifications

Minimum Tensile Strength
Self-Locking FLEXITHRED Nuts (SWXL) - 160 ksi
Non-Locking FLEXITHRED Nuts (SWX) - 125 ksi

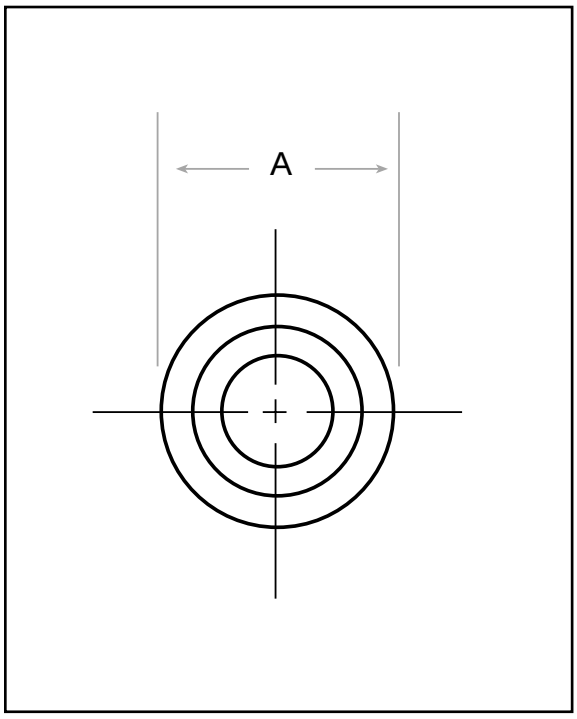
Threads per MIL-S-7742
Push-Out/Torque-Out Values meet NASM25027

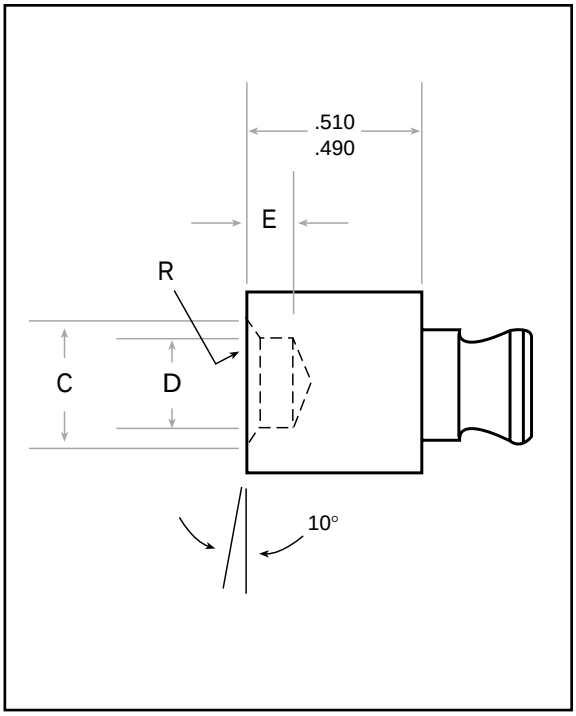
Installation

Carbon steel FLEXITHRED nuts can be used in thin section metals from .032" thick and up, with hardness to 85 HRB, stainless steel nuts in materials of 70 HRB hardness or less. Self-locking nuts require a tool for installation. Installation involves application of pressure on the nut and the back of the sheet. Installation holes may be drilled or punched, but correct tolerances are essential for optimum anchoring. The fixture or tooling must be parallel and hardened to at least Rockwell HR C-40. Maximum installation pressures are in the technical section. (pages 58–59)

Ordinary hydraulic or pneumatic presses, including portable rivet setters, may be used for installation if they have controls for regulating the applied pressure within prescribed limits. Limits are shown on pages 58 and 59.

Tooling





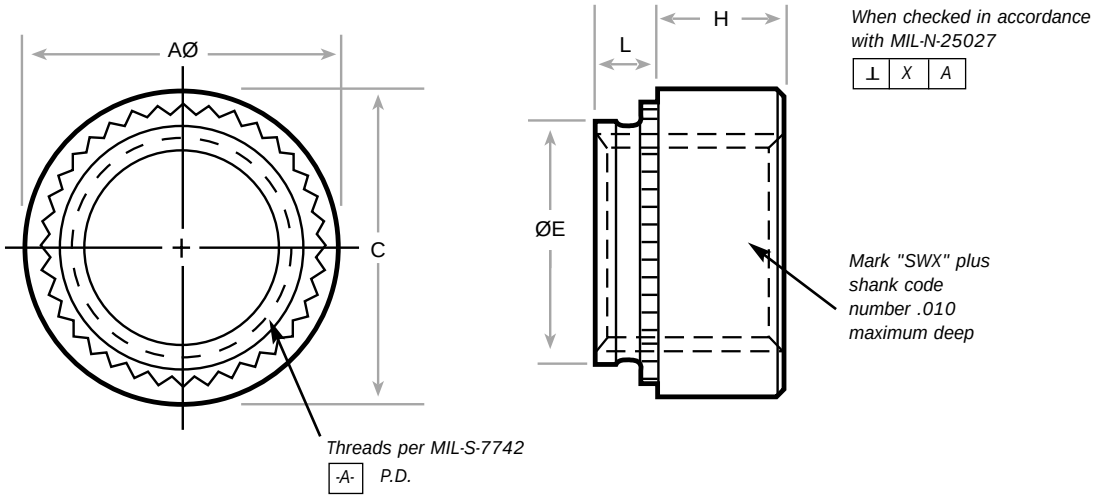
FLEXITHRED Swage Nuts

Notes:

1. Material: S–1 Tool Steel
2. Heat : RC 54-56
3. All diameters to be concentric within .010 T.I.R.

size	part number	A ±.010	C +.010 –.000	D +.003 –.000	E +.010 –.000	R ±.004
#2	54682–2	.437	.210	.116	.080	.020
#4	54682–4	.437	.256	.147	.090	.020
#6	54682–6	.437	.305	.179	.105	.020
#8	54682–8	.437	.335	.210	.120	.020
#10	54682–10	.437	.336	.241	.130	.020
1/4	54682–14	.500	.460	.313	.160	.020
5/16	54682–16	.562	.554	.387	.195	.020
3/8	54682–18	.750	.648	.463	.230	.020
1/2	54682–20	.875	.836	.613	.285	.020

FLEXITHRED® Swage Nuts Non-Locking Type



Type*	Dash No	Thread Size	Recommended Hole Size Max	Min	A Ø Max	Min	E Max	H + .004 -.003	X**	Shank Code	L Max	Plate Thick. Min	Max Install. PresLbs
SWX	256	.0860-56 UNC-2B	.169	.166	.266	.234	.164	.062	.004	2	.030	.032	3,500
SWX	256	.0860-56 UNC-2B	.169	.166	.266	.234	.164	.062	.004	4	.054	.056	3,500
SWX	440	.1120-40 UNC-2B	.169	.166	.266	.234	.164	.062	.005	2	.030	.032	3,500
SWX	440	.1120-40 UNC-2B	.169	.166	.266	.234	.164	.062	.005	4	.054	.056	3,500
SWX	632	.1380-32 UNC-2B	.191	.188	.297	.265	.185	.062	.006	2	.030	.032	6,000
SWX	632	.1380-32 UNC-2B	.191	.188	.297	.265	.185	.062	.006	4	.054	.056	6,000
SWX	832	.1640-32 UNC-2B	.216	.213	.328	.296	.210	.094	.006	2	.030	.032	6,000
SWX	832	.1640-32 UNC-2B	.216	.213	.328	.296	.210	.094	.006	4	.054	.056	6,000
SWX	1024	.1900-24 UNC-2B	.253	.250	.360	.328	.247	.094	.006	2	.030	.032	8,500
SWX	1032	.1900-32 UNF-2B	.253	.250	.360	.328	.247	.094	.006	4	.054	.056	8,500
SWX	420	.2500-20 UNC-2B	.347	.344	.453	.421	.342	.172	.007	4	.054	.056	8,000
SWX	428	.2500-28 UNF-2B	.347	.344	.453	.421	.342	.172	.007	6	.120	.123	8,000
SWX	518	.3125-18 UNC-2B	.416	.413	.516	.484	.411	.234	.008	4	.054	.056	8,000
SWX	524	.3125-24 UNF-2B	.416	.413	.516	.484	.411	.234	.008	6	.120	.123	8,000
SWX	616	.3750-16 UNC-2B	.503	.500	.578	.546	.498	.266	.008	5	.087	.091	11,000
SWX	624	.3750-24 UNF-2B	.503	.500	.578	.546	.498	.266	.008	8	.235	.240	11,000
SWX	813	.5000-13 UNC-2B	.659	.656	.828	.796	.654	.359	.009	6	.120	.123	15,000
SWX	820	.5000-20 UNF-2B	.659	.656	.828	.796	.654	.359	.009	8	.235	.240	15,000

Dimensions are in inches. Dimensions to be met prior to lubrication. *** Bearing squareness: Bearing surface square with pitch diameter within "X" when measured in accordance with MIL-N-25027.*

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
SWX = Swage, external wrenching, no lubricant nut.

FLEXITHRED® Swage Nuts Non-Locking Type

1. Materials — Carbon steel
Steel, Corrosion resistant, 18-8

2. Finish — Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Silver plate per AMS 2410

3. Threads — Before lubrication per MIL-S-7742

4. Hardness — Carbon Steel: Rockwell C42 maximum

6. Surface Texture — ANSI B46.1. Unless otherwise specified, the surface texture shall not exceed 125 microinches.

7. Part Number — The part number consists of basic part number, plus type, applicable dash number, plus shank code.
20SWX - Carbon steel, plain finish
21SWX - Carbon steel, cadmium plate per QQ-P-416, Type I, Class 2
27SWX - Carbon steel, cadmium plate per QQ-P-416, Type II, Class 2
58SWX - Corrosion resistant steel, passivated
59SWX - Corrosion resistant steel, silver plate AMS 2410

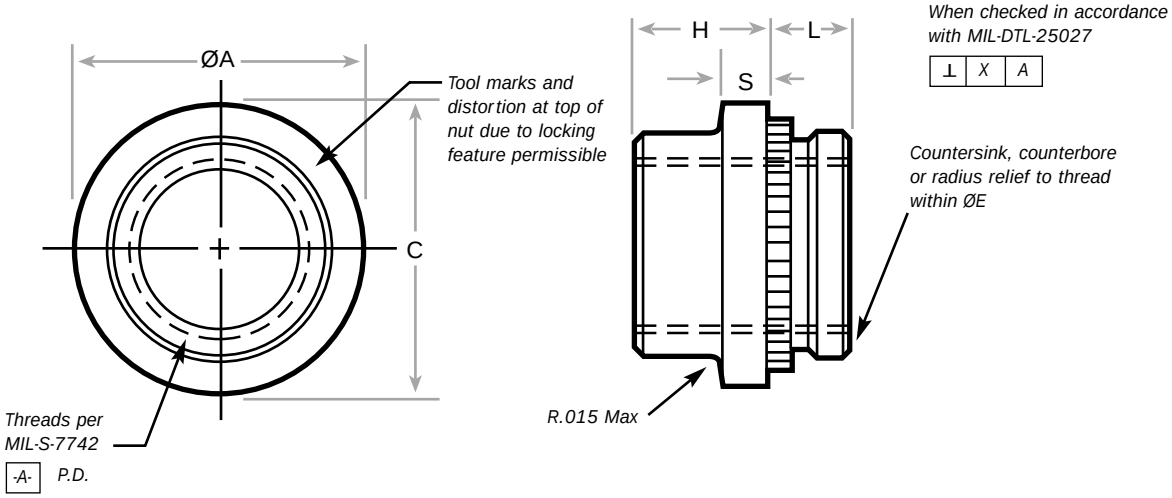
Example: 21SWX-1032-4 = .1900-32 UNF-2B, #10-32 carbon steel, cadmium plated, Type I, Class 2 nut, .04 shank length

8. Design and Usage Limitations — Carbon steel nuts to be used in material of hardness RB 85 or less. Corrosion resistant nuts to be used in material of hardness RB 70 or less.

9. Part numbers other than listed on this drawing shall not be used.

**Type*
SWX = Swage, external wrenching, no lubricant nut.

FLEXITHRED® Swage Nuts Self-Locking Type



Type*	Dash No	Thread Size	Recommended Hole Size Max	Recommended Hole Size Min	A Max	Ø Min	E Max	H Max	X	Shank Code	L Max	Plate Thick. Min	Max Install. Pres Lbs	Axial Tensile Strength Lbs. Min**
SWXL	256	.0860-56 UNC-2B	.169	.166	.228	.222	.164	.068	.004	2	.030	.032	3,000	591
SWXL	256	.0860-56 UNC-2B	.169	.166	.228	.222	.164	.068	.004	4	.054	.056	3,000	591
SWXL	440	.1120-40 UNC-2B	.169	.166	.252	.245	.164	.087	.005	2	.030	.032	3,000	966
SWXL	440	.1120-40 UNC-2B	.169	.166	.252	.245	.164	.087	.005	4	.054	.056	3,000	966
SWXL	632	.1380-32 UNC-2B	.191	.188	.315	.307	.185	.107	.006	2	.030	.032	3,500	1,450
SWXL	632	.1380-32 UNC-2B	.191	.188	.315	.307	.185	.107	.006	4	.054	.056	3,500	1,450
SWXL	832	.1640-32 UNC-2B	.216	.213	.345	.336	.210	.126	.006	2	.030	.032	5,000	2,240
SWXL	832	.1640-32 UNC-2B	.216	.213	.345	.336	.210	.126	.006	4	.054	.056	5,000	2,240
SWXL	1024	.1900-24 UNC-2B	.253	.250	.346	.338	.247	.146	.006	2	.030	.032	5,000	2,800
SWXL	1032	.1900-32 UNF-2B	.253	.250	.346	.338	.247	.146	.006	4	.054	.056	5,000	3,200
SWXL	420	.2500-20 UNC-2B	.347	.344	.440	.431	.342	.191	.007	4	.054	.056	6,500	5,090
SWXL	428	.2500-28 UNF-2B	.347	.344	.440	.431	.342	.191	.007	6	.120	.123	6,500	5,820
SWXL	518	.3125-18 UNC-2B	.416	.413	.534	.525	.411	.237	.008	4	.054	.056	7,500	8,390
SWXL	524	.3125-24 UNF-2B	.416	.413	.534	.525	.411	.237	.008	6	.120	.123	7,500	9,390
SWXL	616	.3750-16 UNC-2B	.503	.500	.627	.618	.498	.292	.008	5	.087	.091	8,500	12,400
SWXL	624	.3750-24 UNF-2B	.503	.500	.627	.618	.498	.292	.008	8	.235	.240	8,500	14,000
SWXL	813	.5000-13 UNC-2B	.659	.656	.815	.806	.654	.378	.009	6	.120	.123	12,000	22,700
SWXL	820	.5000-20 UNF-2B	.659	.656	.815	.806	.654	.378	.009	8	.235	.240	12,000	25,600

*Dimensions are in inches. Dimensions to be met prior to lubrication. ** Tensile strength values listed are for carbon steel nuts when tested on Class 3A 180 KSI minimum external thread.*

**Type*
SWXL = Swage, external wrenching, no lubricant self-locking nut.

Standards and Specifications
NASM25027 except as noted

FLEXITHRED® Swage Nuts Self-Locking Type

1. Materials — Carbon steel
Steel, Corrosion resistant, austenitic

2. Finish — Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2 plus molybdenum disulfide dry film lubricant
Silver plate per AMS 2410

3. Threads — Before lubrication per MIL-S-7742

4. Hardness — Carbon steel, Rockwell C46 maximum

5. Locking torque per NASM25027 except reusability not required on cres plain finish nuts and dry film lubricated parts limited to 5 cycles.

6. Surface Texture — USAS B46.1. Unless otherwise specified, the surface texture shall not exceed 125 microinches.

7. Part Number — The part number consists of basic part number, plus type, applicable dash number, plus shank code.
20SWXL - Carbon steel, plain finish
21SWXL - Carbon steel, cadmium plate, Type I, Class 2
27SWXL - Carbon steel, cadmium plate, Type II, Class 2
28SWXL - Carbon steel, cadmium plate, Type II, Class 2 plus molybdenum disulfide dry film lubricant
58SWXL - Corrosion resistant steel, passivated plus molybdenum disulfide, dry film lubricant
59SWXL - Corrosion resistant steel, silver plate

Example: 21SWXL-832-2 = Carbon steel, .1640-32 UNC-2B, cadmium plated, Type I, Class 2, 2 shank code

8. Design and Usage Limitations — Carbon steel nuts to be used in material of hardness RB 85 or less.
Corrosion resistant nuts to be used in material of hardness RB 70 or less.

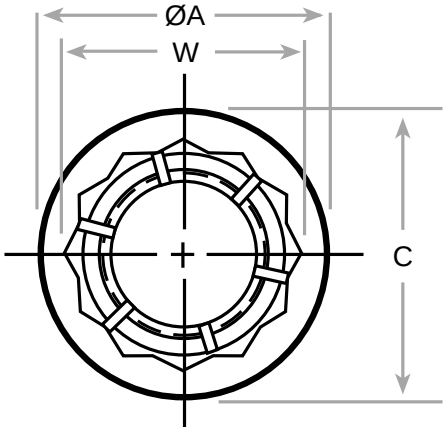
9. Part numbers other than listed on this drawing shall not be used.

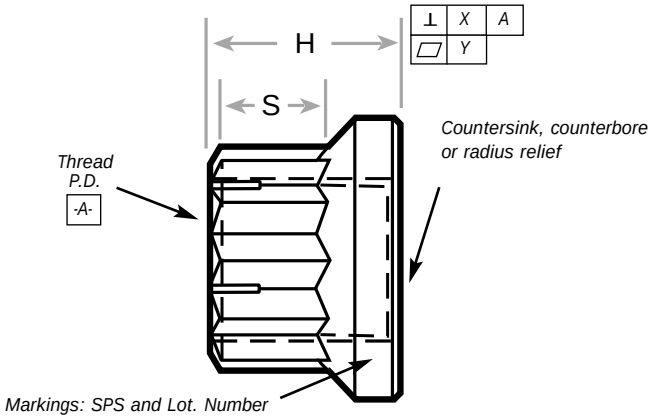
10. For installation, use tool shown on SPS-N-54682.

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
SWXL = Swage, external wrenching, no lubricant self-locking nut.

FLEXLOC® Double Hexagon Self-Locking Nut





Type*	Dash No	Thread Size MIL-S-8879	ØA Max	C Ref	H Max	S Min	V Min	W Max	W Min	X	Y	Tensile Strength Lbs Min
FW	428	.2500-28 UNJF-3B	.531	.419	.349	.172	.094	.376	.367	.005	.002	7,270
FW	524	.3125-24 UNJF-3B	.594	.491	.411	.236	.094	.439	.430	.005	.002	11,500
FW	624	.3750-24 UNJF-3B	.688	.561	.458	.260	.103	.502	.492	.005	.002	17,100
FW	720	.4375-20 UNJF-3B	.781	.631	.521	.301	.111	.564	.553	.005	.003	23,200
FW	820	.5000-20 UNJF-3B	.875	.703	.568	.308	.136	.627	.616	.006	.003	30,900
FW	918	.5625-18 UNJF-3B	.969	.775	.630	.346	.146	.690	.679	.010	.003	39,200
FW	1018	.6250-18 UNJF-3B	1.062	.881	.677	.390	.154	.783	.772	.010	.003	49,000
FW	1216	.7500-16 UNJF-3B	1.250	1.059	.786	.457	.183	.940	.928	.010	.003	71,200
FW	1414	.8750-14 UNJF-3B	1.438	1.200	.958	.568	.219	1.064	1.052	.011	.004	97,100
FW	1612	1.0000-12 UNJF-3B	1.625	1.344	1.130	.657	.265	1.190	1.178	.012	.004	126,500
FW	1614	1.0000-14 UNJS-3B	1.625	1.344	1.130	.657	.265	1.190	1.178	.012	.004	128,700
FW	1812	1.1250-12 UNJF-3B	1.875	1.557	1.301	.762	.305	1.377	1.364	.013	.005	162,100
FW	2012	1.2500-12 UNJF-3B	2.125	1.699	1.380	.767	.319	1.502	1.489	.014	.006	202,300
FW	2212	1.3750-12 UNJF-3B	2.313	1.842	1.505	.834	.354	1.627	1.614	.015	.006	246,600
FW	2412	1.5000-12 UNJF-3B	2.500	2.056	1.630	.941	.374	1.814	1.801	.016	.007	295,600

Dimensions are in inches. *Dimensions are prior to lubrication.*

** Type*
FW = FLEXLOC external wrenching nut, double hexagon.

Standards and Specifications
NASM25027 except as noted

FLEXLOC® Double Hexagon Self-Locking Nut

1. Materials — Alloy steel per AMS 6280, AMS 6300 or AMS 6322.

2. Hardness — HRC 38 maximum

3. Finish — Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Cadmium plate per QQ-P-416, Type and Class at manufacturer's option, plus molybdenum disulfide dry film lubricant. Nuts must meet QQ-P-416, Type II, salt spray requirements.
Zinc plate per ASTM B633, Type II
Silver plate per AMS 2410, .0002 - .0004 thick

4. Magnetic particle inspect 100% ASTM E 1444 except identify with blue dye only those parts with "G" code in the part number. No "G" code designates no identification. Acceptance criteria per SPS-I-700, Level II.

5. Lubricant — Unless otherwise specified, parts shall be supplied with a non-dry lubricant (wax type) soluble in the cleaner specified in NASM25027.

6. Perpendicularity when measured in accordance with NASM25027.

7. Flat to concave when within "Y" measured in accordance with SPS-G-1013.

8. Locking torque per NASM25027.

9. Threads before lubrication per MIL-S-8879.

10. Part Number — The part number consists of a basic part number plus an applicable dash number:
42 - Alloy steel, cadmium plate, Type I, Class 2
43 - Alloy steel, zinc plate
47 - Alloy steel, cadmium plate, Type II, Class 2
48 - Alloy steel, cadmium plate plus molybdenum disulfide dry film lubricant
Nuts must meet QQ-P-416, Type II salt spray requirements
49 - Alloy steel, silver plate

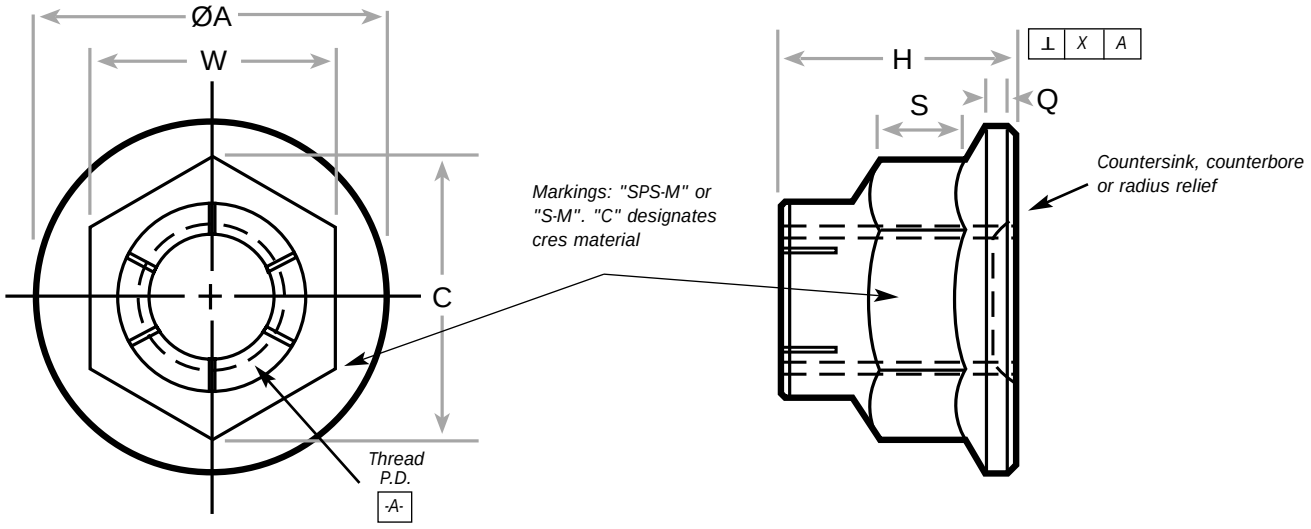
Examples: 42FWG-428 = .2500-28 UNJF-3B thread, cadmium plated, Type I, Class 2.

11. Design and Usage Limitations — The ultimate tensile strength is based on 180 KSI and the cross sectional area at pitch diameter of the thread. These nuts are designed to be used on 3A external threads within the limitations of MS33588.

SPS TECHNOLOGIES
Aerospace Fasteners Group

** Type*
FW = FLEXLOC external wrenching nut, double hexagon.

FLEXLOC® Flanged Metric

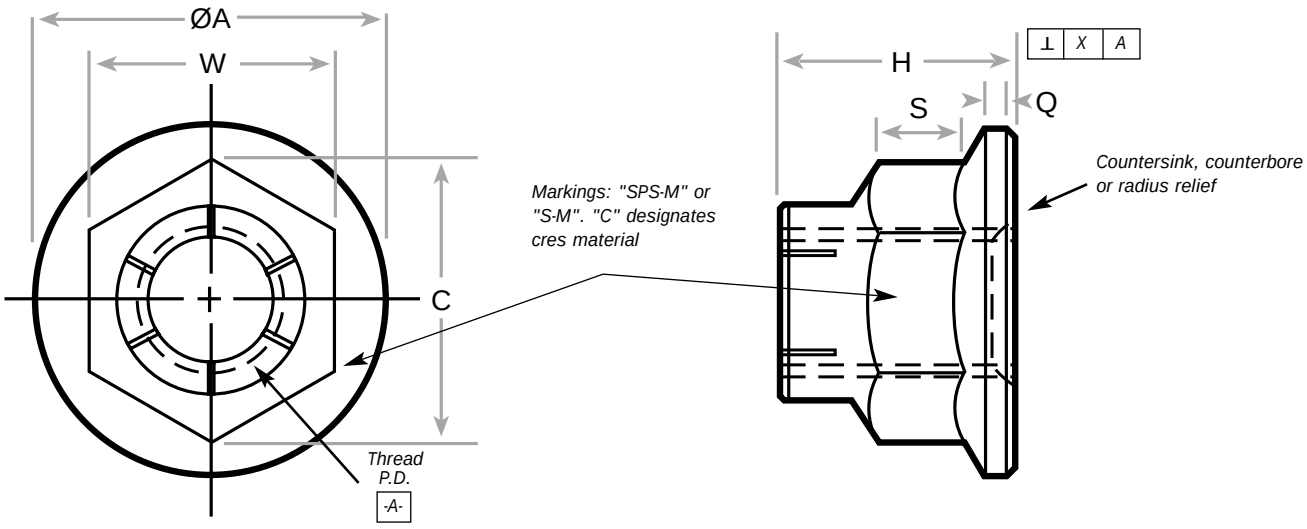


Type*	Dash No.	Threads See Note 5	A Max	C Ref	H Max	Q Ref	S Min	W Max	W Min	X	Proof Load - kN Steel	Proof Load - kN Cres
MFFA	M407	M4 x 0.7	9.2	7.74	7.0	1.0	2.8	7.0	6.85	0.15	10.5	8.8
MFFC	M405	M4 x 0.5	9.2	7.74	7.0	1.0	2.8	7.0	6.85	0.15	11.7	9.8
MFFA	M508	M5 x 0.80	11.2	8.87	8.0	1.0	3.0	8.0	7.85	0.18	17.0	14.2
MFFC	M505	M5 x 0.50	11.2	8.87	8.0	1.0	3.0	8.0	7.85	0.18	19.3	16.1
MFFA	M610	M6 x 1.00	14.2	11.05	9.3	1.1	3.1	10.0	9.78	0.21	24.0	20.0
MFFC	M6075	M6 x 0.75	14.2	11.05	9.3	1.1	3.1	10.0	9.78	0.21	26.4	22.0
MFFA	M8125	M8 x 1.25	17.9	14.38	11.2	1.2	4.5	13.0	12.73	0.28	43.0	36.5
MFFC	M810	M8 x 1.00	17.9	14.38	11.2	1.2	4.5	13.0	12.73	0.28	47.0	39.0
MFFA	M1015	M10 x 1.50	21.8	18.90	14.0	1.5	5.5	17.0	16.73	0.34	69.5	58.0
MFFC	M1012	M10 x 1.25	21.8	18.90	14.0	1.5	5.5	17.0	16.73	0.34	73.0	61.0

Dimensions are in millimeters. *Dimensions shall be met prior to lubrication on dry film lubricated nuts.*

**Type*
MFFA = Metric FLEXLOC flanged standard nut, coarse thread, light and heavy hex.
MFFC = Metric FLEXLOC flanged standard nut, fine thread, light hex.

FLEXLOC® Flanged Metric



Type*	Dash No.	Threads See Note 5	A Max	C Ref	H Max	Q Ref	S Min	W Max	W Min	X	Proof Load - kN Steel	Proof Load - kN Cres
MFFA	M1217	M12 x 1.75	26.0	21.10	16.6	1.8	6.7	19.0	18.67	0.39	100.0	84.0
MFFC	M1212	M12 x 1.25	26.0	21.10	16.6	1.8	6.7	19.0	18.67	0.39	110.0	92.0
MFFA	M1420	M14 x 2.0	29.9	24.49	19.2	2.1	7.8	22.0	21.67	0.42	138.0	115.0
MFFC	M1415	M14 x 1.5	29.9	24.49	19.2	2.1	7.8	22.0	21.67	0.42	150.0	125.0
MFFA	M1620	M16 x 2.0	34.5	26.75	21.5	2.4	9.0	24.0	23.67	0.49	188.0	157.0
MFFC	M1615	M16 x 1.5	34.5	26.75	21.5	2.4	9.0	24.0	23.67	0.49	200.0	167.0
MFFA	M2025	M20 x 2.5	40.0	33.53	26.0	3.0	11.1	30.0	29.67	0.50	294.0	245.0
MFFC	M2015	M20 x 1.5	40.0	33.53	26.0	3.0	11.1	30.0	29.67	0.50	326.0	272.0
MFFA	M2430	M24 x 3.0	47.6	39.98	33.0	3.6	15.0	36.0	35.38	0.60	423.0	353.0
MFFC	M2420	M24 x 2.0	47.6	39.98	33.0	3.6	15.0	36.0	35.38	0.60	460.0	384.0

Dimensions are in millimeters. *Dimensions shall be met prior to lubrication on dry film lubricated nuts.*

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*
MFFA = Metric FLEXLOC flanged standard nut, coarse thread, light and heavy hex.
MFFC = Metric FLEXLOC flanged standard nut, fine thread, light hex.

FLEXLOC® Flanged Metric

1. Materials — Steel, Carbon or alloy
Steel, Stainless, austenitic
Steel, 316 stainless

2. Hardness — Steel only - C30 maximum.

3. Finish — Cadmium plate per QQ-P-416, Type I, Class 2
Silver plate per AMS 2410
Zinc plate per ASTM B633
Dull nickel per AMS 2403
Plain: Carbon steel/rust preventative
Carbon steel/passivate

4. Lubricant — Unless otherwise specified, plated parts shall be supplied with a non-dry lubricant (wax type), and when specified, molybdenum disulfide dry film lubricant. Reusability for unplated corrosion resistant nuts not required.

5. Thread dimensions are prior to lubrication per ISO R 965/II, Class 6H.

6. Locking torque per SPS-N-684. Discontinuities per SPS-N-684, paragraph 3.9.1.

7. Surface Texture — Per ANSI B46.1. Unless otherwise specified, the surface texture shall not exceed 3.2 microns.

8. Part Numbers — The part number consists of groups of digits and letters designating the material, finish, type and size. The first group of digits designates the material and finish:
20 - Steel, unplated
21 - Steel, cadmium plated, Type I, Class 2
23 - Steel, zinc plated
50 - Steel, passivated, corrosion resistant
59 - Steel, silver plated, corrosion resistant
90 - High temperature, cres, passivated

The first group of letters designates the type as MFFA for coarse threads or MFFC for fine threads. The last group of digits designates the diameter and pitch of the thread and is preceded by an “M”.

Example: 21MFFA-M1620 = 16 mm diameter x 2.0 mm pitch, self-locking metric nut, steel, Type I cadmium plate.
59MFFC-M1212 = 12 mm diameter x 1.25 mm pitch, self-locking metric nut, cres, silver plate.

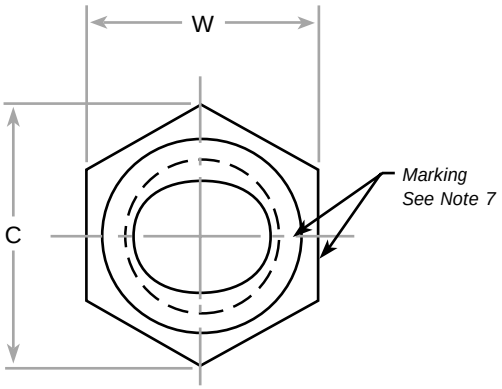
9. Part numbers other than listed on this drawing shall not be used.

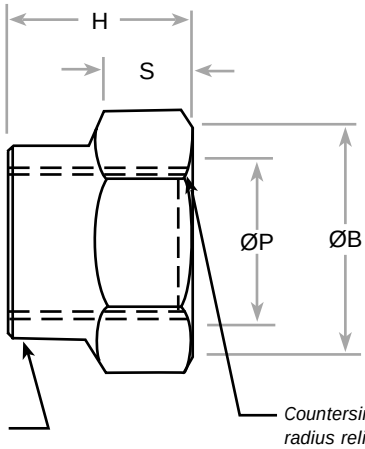
10. Design and Usage Limitations — These nuts are designed to be used on external threads.
For non-aerospace applications.

Standards & Specifications

NASM25027 except as noted

FLEXLOC® Non-Slotted Self-Locking Nut





Type*	Dash No	Thread Size	ØB Min	C Min	H Max	ØP Max	S Min	W Max	W Min	Axial Strength Lbs. Min**
GH	440	.112-40 UNJC-3B	.243	.268	.155	.155	.050	.251	.243	1,080
GH	448	.112-48 UNJF-3B								1,190
GH	540	.125-40 UNJC-3B	.243	.268	.155	.168	.052	.251	.243	1,400
GH	544	.125-44 UNJF-3B								1,450
GH	632	.138-32 UNJC-3B	.305	.339	.180	.181	.075	.313	.305	1,620
GH	640	.138-40 UNJF-3B								1,890
GH	832	.164-32 UNJC-3B	.336	.375	.243	.208	.105	.345	.336	2,510
GH	836	.164-36 UNJF-3B								2,620
GH	1024	.190-24 UNJC-3B	.367	.410	.243	.230	.085	.376	.367	3,120
GH	1032	.190-32 UNJF-3B								3,590
GH	1224	.216-24 UNJC-3B	.430	.481	.290	.258	.122	.439	.430	4,350
GH	1228	.216-28 UNJF-3B								4,630
GH	420	.250-20 UNJC-2B	.430	.481	.290	.293	.122	.439	.430	5,730
GH	428	.250-28 UNJF-3B			.320		.135			6,550
GH	518	.312-18 UNJC-2B	.492	.552	.353	.356	.150	.502	.492	9,600
GH	524	.312-24 UNJF-3B								9,950
GH	616	.375-16 UNJC-2B	.553	.623	.462	.418	.210	.564	.553	13,800
GH	624	.375-24 UNJF-3B								13,500

Dimensions are in inches. Dimensions to be met prior to lubrication. UN following Dash Number signifies unified hex.

***Tensile strength values listed are for carbon steel nuts when tested on Class 3A 180 KSI minimum external thread.*

SPS TECHNOLOGIES
Aerospace Fasteners Group

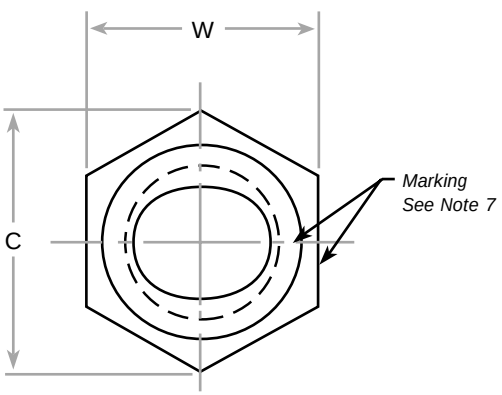
**Type*

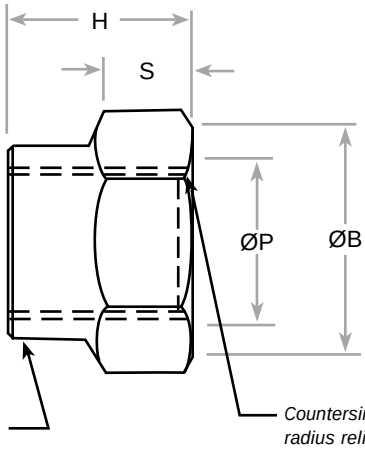
GH = Non-slotted, full height. Coarse and fine threads locknut.

Standards & Specifications

NASM25027 except as noted

FLEXLOC® Non-Slotted Self-Locking Nut





Tool marks and distortion due to locking feature at top of nut permissible

Countersink, counterbore or radius relief to thread within ØP

Type*	Dash No	Thread Size	ØB Min	C Min	H Max	ØP Max	S Min	W Max	W Min	Axial Strength Lbs. Min**
GH	714	.437-14 UNJC-2B	.616	.694	.462	.487	.210	.627	.616	14,900
GH	720	.437-20 UNJF-3B	.616	.694				.627	.616	15,450
	720 UN	.437-20 UNJF-3B	.679	.765				.690	.679	18,300
GH	813	.500-13 UNJC-2B	.741	.836	.602	.551	.285	.752	.741	22,000
GH	820	.500-20 UNJF-3B								23,800
GH	912	.562-12 UNJC-2B	.865	.978	.696	.614	.385	.877	.865	27,000
GH	918	.562-18 UNJF-3B								30,000
GH	1011	.625-11 UNJC-2B	.928	1.049	.759	.676	.410	.940	.928	34,000
GH	1018	.625-18 UNJF-3B								38,400
GH	1210	.750-10 UNJC-2B	1.052	1.192	.884	.807	.505	1.064	1.052	50,000
GH	1216	.750-16 UNJF-3B								52,300
GH	1409	.875-9 UNJC-2B	1.239	1.405	1.009	.938	.570	1.252	1.239	64,600
GH	1414	.875-14 UNJF-3B								71,400
GH	1608	1.000-8 UNJC-2B	1.427	1.619	1.134	1.064	.635	1.440	1.427	85,000
GH	1612	1.000-12 UNJF-3B								90,500
GH	1812	1.125-12 UNJF-3B	1.614	1.832	1.259	1.191	.710	1.627	1.614	119,000
GH	2012	1.250-12 UNJF-3B	1.801	2.046	1.446	1.315	.795	1.814	1.801	148,000

Dimensions are in inches. Dimensions to be met prior to lubrication. UN following Dash Number signifies unified hex.
***Tensile strength values listed are for carbon steel nuts when tested on Class 3A 180 KSI minimum external thread.*

SPS TECHNOLOGIES
Aerospace Fasteners Group

**Type*

GH = Non-slotted, full height. Coarse and fine threads locknut.

Standards & Specifications
NASM25027 except as noted

FLEXLOC® Non-Slotted Self-Locking Nut

1. Materials — Carbon steel
Steel, Corrosion resistant, austenitic
Type 316 Corrosion Resistant Steel, austenitic

2. Finish — Plain (no plate, steel), Note: Plain carbon steel nuts are supplied with a rust preventative oil
Plain, passivated per AMS-QQ-P-35 (no plate, corrosion resistant steel)
Passivated per AMS-QQ-P-35 plus dry film lubricant (corrosion resistant steel)
Cadmium plate per QQ-P-416, Type I, Class 2
Cadmium plate per QQ-P-416, Type II, Class 2
Silver plate per AMS 2410, .0002 minimum thickness on exterior surface
Zinc plate per ASTM B633, Type II

3. Lubricant — Plain carbon steel nuts will be supplied with a rust preventative oil
Plain corrosion resistant steel and all plated nuts will be supplied with a non-dry lubricant (wax type), soluble in the cleaner specified in NASM25027
Molybdenum disulfide dry film lubricant per AS5272, Type I
Note: Dry film lubricated carbon steel nuts include cadmium plate Type I as a pre-treatment

4. Locking Torque — Per NASM25027 except reusability limited to 5 cycles for molybdenum disulfide dry film lubricated corrosion resistant nuts, and reusability not required for unplated corrosion resistant nuts.

5. Break sharp edges.

6. Dimensions, including threads, are in inches and are to be met prior to application of lubricants.

7. Mark "S" or "SPS" on steel nuts and mark "S" or "SPS" and "C" on corrosion resistant steel nuts: location optional as shown.

8. Part Number — SPS part number consists of a basic part number plus the applicable dash number.
20-Steel, plain
21-Steel, cadmium plate per QQ-P-416, Type I
23-Steel, zinc plate per ASTM B633, Type II
27-Steel, cadmium per QQ-P-416, Type II
28-Steel, cadmium plate per QQ-P-416, Type I, plus molybdenum disulfide lubricant
59-Steel, silver plate

9. Design and Usage Limitations — The nuts are designed to be used on external threads within the limitations of MS33588.

10. Part numbers other than listed on this drawing shall not be used.

Product Design

SPS Technologies is committed to a high quality standard for all its fastener products. The FLEXLOC self-locking nuts were designed by SPS to give you maximum reliability for your most critical applications.

SPS developed slotted locknuts and has improved and perfected the design. All locknut products represented in this catalog are manufactured in the SPS Jenkintown, PA facility using equipment which was designed and developed by SPS.

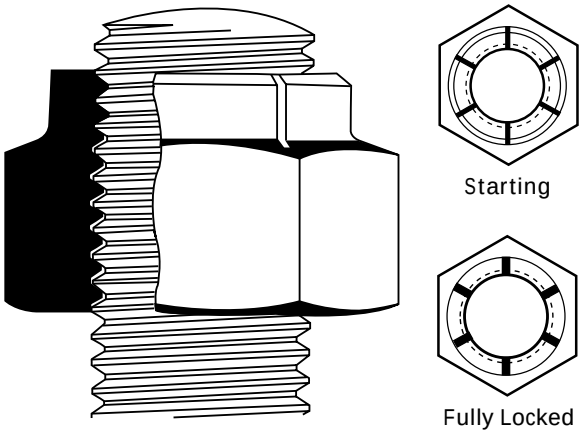
Also, SPS FLEXLOC self-locking nuts are subjected to a strict process control regimen designed to provide controlled tolerance for the products. In other words, SPS takes the extra steps required to ensure you receive a product you can count on.

Originally, the FLEXLOC nut was easily identified by the slotting on the corners. Over the years, other manufacturers have attempted to imitate the FLEXLOC design. Now, the only reliable way to identify the genuine FLEXLOC design is to look for the S or SPS on the nut.

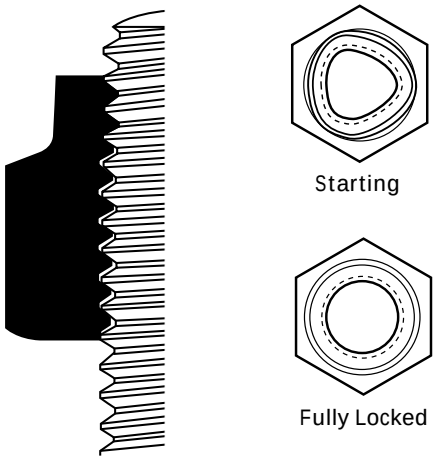
Material Quality

SPS orders raw materials to their own strict specifications. Our metallurgists work closely with the mills in the development of materials to optimize the metallurgical and mechanical properties of the FLEXLOC design. By controlling the material quality, SPS gains optimal performance and offers greater value to FLEXLOC nut end users.

Due to the all-metal design, the application temperature range for FLEXLOC locknuts is based on the limits of the base material or the fastener finish. Many standard FLEXLOC nuts can be used in applications from -70°F to 1200°F.



FLEXLOC Operation
Starts like any standard nut. As the bolt enters the locking area, the slotted section expands and the nut starts to lock. When 1½ threads of a standard bolt pass the top of the nut, the resiliency of the segmented section has fully locked the nut. Does not require seating to lock.



FLEXLOC Microsize Locknut Operation
FLEXLOC microsize locknuts use triangular displacement of the threads for positive locking. These microsize locknuts start like any standard nut. As the bolt enters the locking area, the out-of-roundness is displaced to a more circular form and the nut starts to lock. When 1½ threads of a standard bolt or stud pass the top of the nut, the resistance of the three-way displacement engages the bolt threads to fully lock. It does not have to seat to lock and thus may be used as a stop nut.

Manufacturing

The production machinery dedicated to FLEXLOC locknut manufacturing was custom designed and built by SPS Technologies in our Jenkintown, PA plant. This special manufacturing environment permits statistical monitoring and control of every phase of the production process to insure the dimensional integrity and uniformity in locking ability from part to part.

Quality Assurance

SPS Technologies believes in building quality into every FLEXLOC nut. The first production piece is taken to the lab where a micro is made and examined under a microscope assuring proper grain flow within the nut. At timed intervals during the manufacturing process, parts are again taken to the lab where they are etched in acid to ascertain that nuts are free of seams, cracks or discontinuities. Thread fit is continually checked on single and functional gages. And torque is tested at timed intervals.

Through the use of Lean Manufacturing strategies and Continuous Improvement techniques, SPS Technologies continually refines their process control methods to achieve manufacturing efficiencies and increase the velocity of work in process.

Processed certification is assured through the SPS Technologies Advanced Quality Management system.

Final Inspection

Double the number of pieces required by the ANSI specification are inspected for dimensional accuracy.

Metallurgical inspection to NASM25027 assures that every FLEXLOC self-locking nut meets or exceeds the requirements for torque, tensile strength, hardness, corrosion resistance, stress durability and vibration resistance.

Traceability

SPS Technologies offers complete traceability on each lot of FLEXLOC nuts, beginning with the raw material through final.

The following chart illustrates how FLEXLOC nuts compare with requirements of NASM25027.

Strength Comparison:

FLEXLOC® Full Height Nut Compared to NASM25027 Requirements

Size	FLEXLOC Heavy Hex UTS	FLEXLOC Light Hex UTS	NASM25027 UTS
0.112		1080	750
0.138		1620	1130
0.164		2510	1720
0.190		3120	2010
0.250	5730	5730	3760
0.312	9600	9600	6360
0.375	13800	13800	9540
0.437	14900	14900	13140
0.500	22000	22000	17730
0.562	27000	27000	22890
0.625	34000	34000	28530
0.750	50000	50000	42770
0.875	64600	64600	60330
1.000	85000	85000	79280

Plating

SPS Technologies maintains a unique, on-site state-of-the-art plating facility to ensure complete control of this critical process for FLEXLOC self-locking nuts.

Designed by SPS Technologies, this plating facility uses computer-controlled equipment to assure uniform quality from part-to-part and lot-to-lot. Computer control also provides the ability to maintain exact plating thicknesses and tolerances to preserve precision thread fit. What's more, repeatability is enhanced with the capability to store part history and formula for subsequent orders.

The SPS Technologies plating facility can produce four different type platings at once and can perform rack and barrel plating.

All plated FLEXLOC self-locking nuts are routinely supplied with non-dry lubricant, unless otherwise specified. Before any FLEXLOC self-locking nut leaves the plating department, it is submitted to the Materials Control Laboratory for testing of plating thickness, adhesion and appearance. If the parts are passivated, they are also tested in high humidity and salt spray.

All FLEXLOC self-locking nuts represented in this catalog are manufactured at the SPS Aerospace Fasteners Group facility in Jenkintown, PA, USA.

Plating Capabilities

Cadmium Plating

Materials: Alloy Steel
Corrosion Resistant Materials

Specifications: QQ-P-416
AMS-2400
AMS-2401
NAS-672

Silver Plating

Materials: Alloy Steel

Specifications: AMS-2400
AMS-2411

Nickel–Cad Diffused Plating

Materials: Alloy Steel
Corrosion Resistant Materials

Specifications: AMS-2416

Zinc Plating

Materials: Alloy Steel
Corrosion Resistant Materials

Specifications: ASTM B633

Molybdenum Disulfide

Materials: Alloy Steel
Corrosion Resistant Materials

Specifications: MIL-L-46010
AS 5272

Anodize

Materials: Aluminum

Specifications: MIL-A-8625

Reusability

All FLEXLOC locknuts, except those made of unplated stainless steel, meet the locking torque requirements of NASM25027.

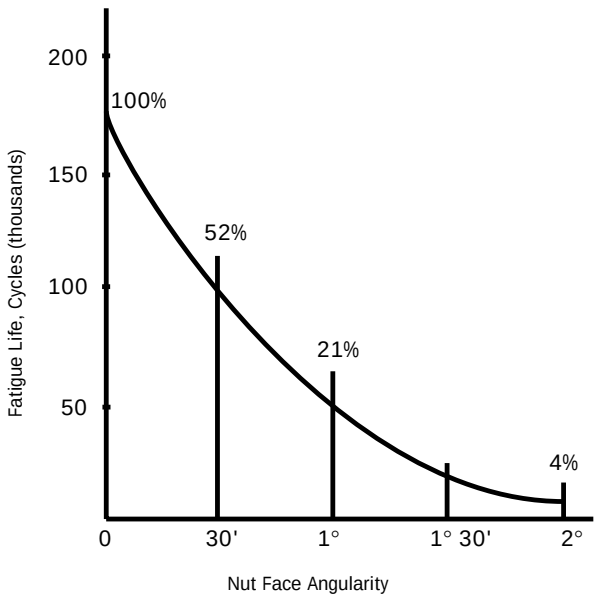
Tests required by NASM25027 include 15 unseated installation/removal cycles with the bolt fully engaging the locking area on each cycle.

NOTE: Unplated stainless steel FLEXLOC locknuts are not recommended for applications requiring reusability.

Controlled Angularity

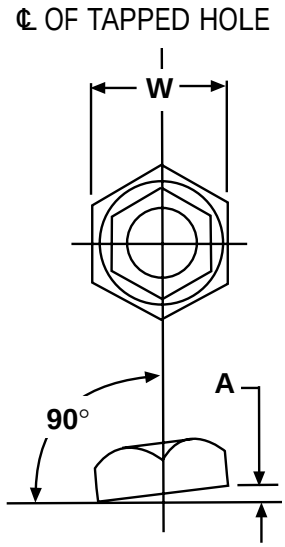
The squareness of the nut face has a considerable effect on the fatigue resistance of the bolt, as shown in the graph. Generally speaking, the more critical the application, the tighter the squareness tolerances should be.

Bolt Fatigue Life vs. Nut Angularity



Life of bolt under fatigue loading is dramatically reduced by only slight angularity between nut face and joined material.

SPS closely controls the angularity, or squareness, of the nut bearing surface as it relates to the threads. This contributes significantly to the fatigue life of the joint.



Dimensions for measuring relationship of bearing surface with respect to the axis of the pitch diameter of the threads.

W Width or Base Ring Bearing (to Nearest .0625-inch)	A Max. (Inch)	W Width or Base Ring Bearing (to Nearest .0625-inch)	A Max. (Inch)
<.188	.004	2.063, 2.125	.020
.188, .250	.005	2.188, 2.250	.021
.313, .375	.006	2,313, 2.375	.022
.438, .500	.007	2.438, 2.500	.023
.563, .625	.008	2.563, 2.625	.024
.688, .750	.009	2.688, 2.750	.025
.813, .875	.010	2.813, 2.875	.026
.938, 1.000	.011	2.938, 3.000	.027
1.063, 1.125	.012	3.063, 3.125	.028
1.188, 1.250	.013	3.188, 3.250	.029
1.313, 1.375	.014	3.313, 3.375	.030
1.438, 1.500	.015	3.438, 3.500	.031
1.563, 1.625	.016	3.563, 3.625	.032
1.688, 1.750	.017	3.688, 3.750	.033
1.813, 1.875	.018	3.813, 3.875	.034
1.938, 2000	.019	3.938, 7.000	.035

Use the Proper Torque for a Given Nut

To answer the question "What torque should I use to tighten my FLEXLOC nuts?" use the following chart. To determine tightening torques for stresses other than those shown, you can use the formula provided at the bottom of the chart.

The accepted engineering formula shown was used to obtain the values in the chart. **WARNING: Every bolted joint is unique and the optimum tightening torque should be determined for each application after careful consideration.**

Typical Tightening Torques for Cadmium Plated Steel FLEXLOC Nuts on Cadmium Plated or Unplated Bolts based on SPS lab results

Size	Threads per in.	40,000 psi* Preload Tightening Torque (inch-lb.)	Load Pounds	90,000 psi* Preload Tightening Torque (inch-lb.)	Load (Lbs.)
1/4	20	50	1,270	115	2,860
	28	60	1,450	130	3,275
5/16	18	100	2,100	230	4,720
	24	110	2,300	250	5,200
3/8	16	170	3,100	385	7,000
	24	190	3,500	425	7,900
7/16	14	260	4,270	575	9,600
	20	280	4,760	630	10,700
1/2	13	375	5,700	840	12,800
	20	420	6,400	940	14,400
9/16	12	510	7,300	1,150	16,400
	18	580	8,100	1,300	18,300
5/8	11	690	9,000	1,550	20,300
	18	780	10,200	1,750	23,000
3/4	10	1,100	13,400	2,400	30,100
	16	1,200	14,900	2,650	33,600
7/8	9	1,500	18,500	3,300	41,600
	14	1,600	20,200	3,650	45,900
1	8	2,000	24,200	4,400	54,500
	12	2,150	26,500	4,800	59,700
	14	2,200	26,700	4,850	60,200
1-1/8	7	2,500	30,500	5,700	68,700
	12	2,800	34,200	6,300	77,000
1-1/4	7	3,400	38,800	7,600	87,300
	12	3,700	42,900	8,300	96,600
1-3/8	6	4,200	46,200	9,500	103,900
	12	4,800	52,500	10,800	118,300
1-1/2	6	5,600	55,700	12,600	126,500
	12	6,300	63,100	14,200	142,300
1-5/8	5-1/2	7,200	63,000	16,200	141,700
1-3/4	5	10,000	76,000	22,400	171,000
1-7/8	5	13,200	88,700	29,600	199,300
2	4-1/2	17,300	100,000	39,000	225,000

Tightening torques - To determine tightening torques for stresses other than shown, calculate as follows:

$$\text{torque} = \frac{\text{stress desired}}{90{,}000\ \text{psi}} \times \text{torque for } 90{,}000\ \text{psi}$$

Example: 65000 psi stress (2065 lb. load) for .250-20 nut and bolt.

$$\text{torque} = \frac{65{,}000}{90{,}000} \times 115 = 83\ \text{in.-lbs.}$$

* *Preloads - Unless limited by strength of screw, 40,000 psi applies to thin height; 90,000 psi applies to full height FLEXLOC nuts.*

FLEXLOC Special Locknuts

Whether your application requires a slight modification of a standard FLEXLOC locknut or a completely different configuration, SPS Technologies can meet your requirements. The broad range of capabilities available through the Aerospace Fasteners Group allow for applications requiring special material, sizes and finishes that can be supplied to your specifications.

Our product engineers, supported by an experienced technical staff, are ready to help you solve your fastening problems. Fax a description of your application and special needs for prompt assistance.
Telephone: 215-572-3000
Fax: 215-572-3193

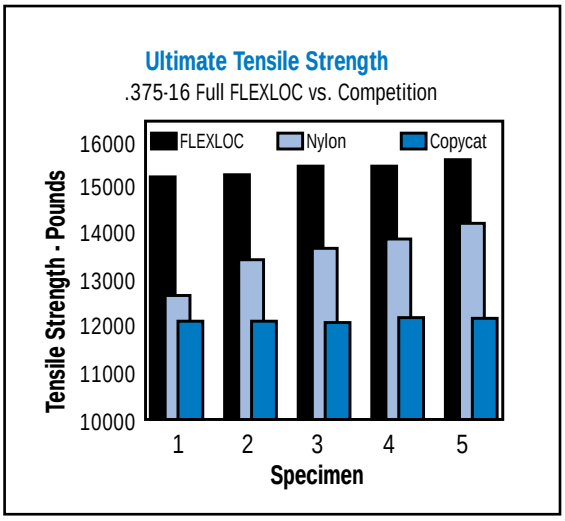
The SPS Advantage

SPS Technologies has the experience and resources to meet your most critical requirements for the application of self-locking nuts...

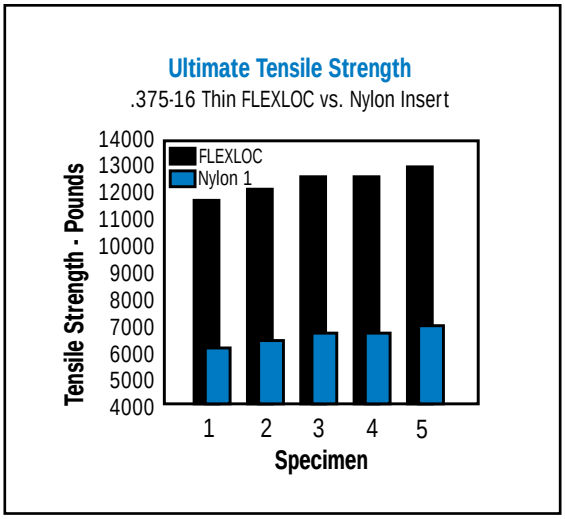
Design/Engineering Service
SPS Technologies maintains a full staff of mechanical and metallurgical engineers with the experience to assist you with your locknut problems. .From initial design stage, material recommendations, product development to customized manufacturing methods. SPS engineers are dedicated to producing locknuts to satisfy your requirements.

- Nearly a century of experience manufacturing high quality fasteners for critical applications
- Unique FLEXLOC locknut design manufactured only by SPS Technologies, Jenkintown, PA
- Comprehensive in-house facilities govern the complete manufacturing cycle
- Dedicated manufacturing cells increase velocity of work in process
- Expertise with special materials, close tolerances and critical dimensions
- Electronically monitored in-process inspections for documented quality assurance
- Design and engineering services
- Comprehensive testing facilities
- Traceability from raw material to finished locknuts

At SPS we understand that our locknuts are often used in applications of a critical nature. We are committed to providing the finest parts for the most demanding applications. You can rely on the uncompromising dedication to quality that is the hallmark of SPS Technologies Aerospace Fasteners Group.



The full height FLEXLOC nut far outperformed low quality copycat locknuts in random competitive tensile tests; the thin height FLEXLOC nut exhibits as much as double the tensile strength of competitive insert locknuts. These comparative tensile tests show conclusively that the threads in the FLEXLOC nut's unique locking section are fully utilized to carry an important part of the tensile load.



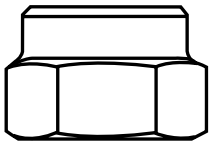
Load Carrying Capacity

The tests shown below were conducted on 1/4-28 UNF full height and thin height nuts. The results reveal that the threads in the slotted portion of the FLEXLOC nut account for 20% to 30% of the total tensile strength of the nut. Since all threads in the FLEXLOC nut carry a portion of the induced load, the load is distributed over a greater number of threads.

This advantage is illustrated in the graphs at the left comparing FLEXLOC nuts with a nylon insert locknut of equivalent size. The nylon locking element is incapable of carrying its share of the induced load; consequently the load is distributed over fewer threads, reducing the tensile strength of the nylon insert nut.

Test No. 1

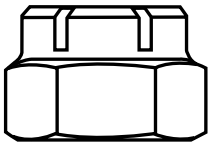
The FLEXLOC blanks were not slotted, but otherwise were standard.



Full Height Nut	Stripped Stud At	Thin Nut	Stripped Stud At
A	8650 lbs.	a	6400 lbs.
B	8270 lbs.	b	6700 lbs.
C	8260 lbs.	c	6500 lbs.

Test No. 2

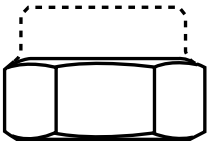
Identical FLEXLOC blanks were used, but this time they were slotted according to standard FLEXLOC nut practice. Segments were not processed for locking.



Full Height Nut	Stripped Stud At	Thin Nut	Stripped Stud At
D	8600 lbs.	d	6160 lbs.
E	8430 lbs.	e	6150 lbs.
F	8380 lbs.	f	6290 lbs.

Test No. 3

Standard FLEXLOC blanks were used, identical with those used in previous test, but with tops or locking portions cut off.



Full Height Nut	Stripped Stud At	Thin Nut	Stripped Stud At
G	6560 lbs.	g	4150 lbs.
H	6320 lbs.	h	4350 lbs.
I	6410 lbs.	i	4010 lbs.

SPS FLEXLOC Self-Locking Nut Part Number Cross Reference Guide to AN, MS, NAS Numbers

AN PART #	ACTIVE SPS PART #
***AN 363 (CANCELED - SEE MS 21045, MS 21046)**	
-632	22FH-632
-832	22FH-832
-1024	22FH-1024
-1032	22FH-1032
-428	22FH-428
-524	22FH-524
-624	22FH-624
-720	22FH-720
-820	22FH-820
-918	32FH-918
-1018	32FH-1018
-1216	32FH-1216
***AN 363C (CANCELED - SEE MS 21045, MS 21046)**	
632	59FH-632
832	59FH-832
1024	59FH-1024
1032	59FH-1032
428	59FH-428
524	59FH-524
624	59FH-624
720	59FH-720
820	59FH-820
918	59FH-918
1018	59FH-1018
1216	59FH-1216
***AN 364 (CANCELED - SEE MS 21042, MS 21045)**	
-632	22FT-632
-632C	22FT-632
-832	22FT-832
-832C	22FT-832
-1032	22FT-1032
-1032C	22FT-1032
-428	22FT-428
-428C	22FT-428
-524	22FT-524
-524C	22FT-524
-624	22FT-624
-624C	22FT-624
-720	22FT-720
-720C	22FT-720
-820	22FT-820
-820C	22FT-820
-918	32FT-918
-918C	32FT-918
-1018	32FT-1018
-1018C	32FT-1018
-1216	32FT-1216
-1216C	32FT-1216
-1414	32FT-1414
-1414C	32FT-1414
-1614	32FT-1614
-1614C	32FT-1614
-1812	32FT-1812
-1812C	32FT-1812
-2012	32FT-2012
-2012C	32FT-2012
***AN 364B (CANCELED - SEE MS 21045)**	
632	60FT-632
632C	60FT-632
832	60FT-832
832C	60FT-832
1032	60FT-1032
1032C	60FT-1032
428	60FT-428
428C	60FT-428
524	60FT-524
524C	60FT-524
624	60FT-624
624C	60FT-624
720	60FT-720
720C	60FT-720
820	60FT-820
820C	60FT-820
918	60FT-918
918C	60FT-918
1018	60FT-1018
1018C	60FT-1018
1216	60FT-1216
1216C	60FT-1216
1414	60FT-1414
1414C	60FT-1414
1614	60FT-1614
1614C	60FT-1614
1812	60FT-1812
1812C	60FT-1812
2012	60FT-2012
2012C	60FT-2012
***AN 364D (CANCELED - SEE MS 21045)**	
632	75FT-632
632C	75FT-632
832	75FT-832
832C	75FT-832
1032	75FT-1032
1032C	75FT-1032
428	75FT-428
428C	75FT-428
524	75FT-524
524C	75FT-524
624	75FT-624
624C	75FT-624
720	75FT-720
720C	75FT-720
820	75FT-820
820C	75FT-820
918	75FT-918
918C	75FT-918
1018	75FT-1018
1018C	75FT-1018
1216	75FT-1216
1216C	75FT-1216
1414	75FT-1414
1414C	75FT-1414
1614	75FT-1614
1614C	75FT-1614
1812	75FT-1812
1812C	75FT-1812
2012	75FT-2012
2012C	75FT-2012
***AN 365 (CANCELED - SEE MS 21042)**	
-440	22FH-440
-440C	22FH-440
-632	22FH-632
-632C	22FH-632
-640	22FH-640
-640C	22FH-640
-832	22FH-832
-832C	22FH-832
-1032	22FH-1032
-1032C	22FH-1032
-428	22FH-428
-428C	22FH-428
-524	22FH-524
-524C	22FH-524
-624	22FH-624
-624C	22FH-624
-720	22FH-720
-720C	22FH-720
-820	22FH-820
-820C	22FH-820
-918	32FH-918
-918C	32FH-918
-1018	32FH-1018
-1018C	32FH-1018
-1216	32FH-1216
-1216C	32FH-1216
-1414	32FH-1414
-1414C	32FH-1414
-1614	32FH-1614
-1614C	32FH-1614
-1812	32FH-1812
-1812C	32FH-1812
-2012	32FH-2012
-2012C	32FH-2012
***AN 365B (CANCELED - SEE MS 21042)**	
440	60FS-440
440C	60FS-440
632	60FS-632
632C	60FS-632
832	60FS-832
832C	60FS-832
1032	60FS-1032
1032C	60FS-1032
428	60FS-428
428C	60FS-428
524	60FS-524
524C	60FS-524
624	60FS-624
624C	60FS-624
720	60FS-720
720C	60FS-720
820	60FS-820
820C	60FS-820
918	60FS-918
918C	60FS-918
1018	60FS-1018
1018C	60FS-1018
1216	60FS-1216
1216C	60FS-1216
1414	60FS-1414
1414C	60FS-1414
1614	60FS-1614
1812	60FS-1812
1812C	60FS-1812
2012	60FS-2012
2012C	60FS-2012
***AN 365D (CANCELED - SEE MS 21042)**	
440	75FS-440
440C	75FS-440
632	75FS-632
632C	75FS-632
640	75FS-640
640C	75FS-640
832	75FS-832
832C	75FS-832
1032	75FS-1032
1032C	75FS-1032
428	75FS-428
428C	75FS-428
524	75FS-524
524C	75FS-524
624	75FS-624
624C	75FS-624
720	75FS-720
720C	75FS-720
820	75FS-820
820C	75FS-820
918	75FS-918
918C	75FS-918
1018	75FS-1018
1018C	75FS-1018
1216	75FS-1216

AN PART #	ACTIVE SPS PART #
1216C	75FS-1216
1414	75FS-1414
1414C	75FS-1414
1614	75FS-1614
1614C	75FS-1614
1812	75FS-1812
1812C	75FS-1812
2012	75FS-2012
2012C	75FS-2012
***MS 20364 (CANCELED - SEE MS 21245)**	
-632	22FT-632
-632C	22FT-632
-832	22FT-832
-832C	22FT-832
-1032	22FT-1032
-1032C	22FT-1032
-428	22FT-428
-428C	22FT-428
-524	22FT-524
-524C	22FT-524
-624	22FT-624
-624C	22FT-624
-720	22FT-720
-720C	22FT-720
-820	22FT-820
-820C	22FT-820
-918	32FT-918
-918C	32FT-918
-1018	32FT-1018
-1018C	32FT-1018
-1216	32FT-1216
-1216C	32FT-1216
-1414	32FT-1414
-1414C	32FT-1414
-1614	32FT-1614
-1614C	32FT-1614
-1812	32FT-1812
-1812C	32FT-1812
-2012	32FT-2012
-2012C	32FT-2012
***MS 20364B (CANCELED - SEE MS 21245)**	
632	60FT-632
632C	60FT-632
832	60FT-832
832C	60FT-832
1032	60FT-1032
1032C	60FT-1032
428	60FT-428
428C	60FT-428
524	60FT-524
524C	60FT-524
624	60FT-624
624C	60FT-624
720	60FT-720
720C	60FT-720
820	60FT-820
820C	60FT-820
918	60FT-918
918C	60FT-918
1018	60FT-1018
1018C	60FT-1018
1216	60FT-1216
1216C	60FT-1216
1414	60FT-1414
1414C	60FT-1414
1614	60FT-1614
1614C	60FT-1614
1812	60FT-1812
1812C	60FT-1812
2012	60FT-2012
2012C	60FT-2012
***MS 20364D (CANCELED - SEE MS 21245)**	
632	75FT-632
632C	75FT-632
832	75FT-832
832C	75FT-832
1032	75FT-1032
1032C	75FT-1032
428	75FT-428
428C	75FT-428
524	75FT-524
524C	75FT-524
624	75FT-624
624C	75FT-624
720	75FT-720
720C	75FT-720
820	75FT-820
820C	75FT-820
918	75FT-918
918C	75FT-918
1018	75FT-1018
1018C	75FT-1018
1216	75FT-1216
1216C	75FT-1216
1414	75FT-1414
1414C	75FT-1414
1614	75FT-1614
1614C	75FT-1614
1812	75FT-1812
1812C	75FT-1812
2012	75FT-2012
2012C	75FT-2012
***MS 20365 (CANCELED - SEE MS 21042)**	
-440	22FH-440
-440C	22FH-440
-632	22FH-632
-632C	22FH-632
-832	22FH-832
-832C	22FH-832
-1032	22FH-1032
-1032C	22FH-1032
-428	22FH-428
-428C	22FH-428
-524	22FH-524
-524C	22FH-524
-624	22FH-624
-624C	22FH-624
-720	22FH-720
-720C	22FH-720
-820	22FH-820
-820C	22FH-820
-918	32FH-918
-918C	32FH-918
-1018	32FH-1018
-1018C	32FH-1018
-1216	32FH-1216
-1216C	32FH-1216
-1414	32FH-1414
-1414C	32FH-1414
-1614	32FH-1614
-1614C	32FH-1614
-1812	32FH-1812
-1812C	32FH-1812
-2012	32FH-2012
-2012C	32FH-2012
***MS 20365B (CANCELED - SEE MS 21042)**	
-440	60FS-440
-440C	60FS-440
-632	60FS-632
-632C	60FS-632
-832	60FS-832
-832C	60FS-832
-1032	60FS-1032
-1032C	60FS-1032
-428	60FS-428
-428C	60FS-428
-524	60FS-524
-524C	60FS-524
-624	60FS-624
-624C	60FS-624
-720	60FS-720
-720C	60FS-720
-820	60FS-820
-820C	60FS-820
-918	60FS-918
-918C	60FS-918
-1018	60FS-1018
-1018C	60FS-1018
-1216	60FS-1216
-1216C	60FS-1216
-1414	60FS-1414
-1414C	60FS-1414
-1614	60FS-1614
-1614C	60FS-1614
-1812	60FS-1812
-1812C	60FS-1812
-2012	60FS-2012
-2012C	60FS-2012
***MS 20365D (CANCELED - SEE MS 21042)**	
440	75FS-440
440C	75FS-440
632	75FS-632
632C	75FS-632
832	75FS-832
832C	75FS-832
1032	75FS-1032
1032C	75FS-1032
428	75FS-428
428C	75FS-428
524	75FS-524
524C	75FS-524
624	75FS-624
624C	75FS-624
720	75FS-720
720C	75FS-720
820	75FS-820
820C	75FS-820
918	75FS-918
918C	75FS-918
1018	75FS-1018
1018C	75FS-1018
1216	75FS-1216
1216C	75FS-1216
1414	75FS-1414
1414C	75FS-1414
1614	75FS-1614
1614C	75FS-1614
1812	75FS-1812
1812C	75FS-1812
2012	75FS-2012
2012C	75FS-2012
MS 20500	
-1032	99F12-1032
-428	99F12-428
-524	99F12-524
-624	99F12-624
-720	99F12-720
-720A	99F12-720UN
-820	99F12-820
-918	99F12-918
-1018	99F12-1018
-1216	99F12-1216
-1414	99F12-1414
-1614	99F12-1614
MS 21045	
-04	27FH-440
-06	27FH-632
-08	27FH-832
-3	27FH-1032
-4	27FH-428
-5	27FH-524
-6	27FH-624
-7	27FH-720UN
-8	27FH-820
-9	37FH-918
-10	37FH-1018
-12	37FH-1216
-14	37FH-1414
-16	37FH-1612
-18	37FH-1812
-20	37FH-2012
MS 21045C	
04	58FH-440
06	58FH-632
08	58FH-832
3	58FH-1032

AN PART #	ACTIVE SPS PART #
4	58FH-428
5	58FH-524
6	58FH-624
7	58FH-720UN
8	58FH-820
9	58FH-918
10	58FH-1018
12	58FH-1216
14	58FH-1414
16	58FH-1612
18	58FH-1812
20	58FH-2012
MS 21045L	
04	28FH-440
06	28FH-632
08	28FH-832
3	28FH-1032
4	28FH-428
5	28FH-524
6	28FH-624
7	28FH-720UN
8	28FH-820
9	38FH-918
10	38FH-1018
12	38FH-1216
14	38FH-1414
16	38FH-1612
18	38FH-1812
20	38FH-2012
MS 21046C	
04	59FH-440
06	59FH-632
08	59FH-832
3	59FH-1032
4	59FH-428
5	59FH-524
6	59FH-624
7	59FH-720UN
8	59FH-820
9	59FH-918
10	59FH-1018
12	59FH-1216
14	59FH-1414
16	59FH-1612
18	59FH-1812
20	59FH-2012
MS 21245	
-7	47FT-720UN
-8	47FT-820
-9	47FT-918
-10	47FT-1018
-12	47FT-1216
-14	47FT-1414
-16	47FT-1612
-18	47FT-1812
-20	47FT-2012
-22	47FT-2212
-24	47FT-2412
MS 21245L	
7	48FT-720UN
8	48FT-820
9	48FT-918
10	48FT-1018
12	48FT-1216
14	48FT-1414
16	48FT-1612
18	48FT-1812
20	48FT-2012
22	48FT-2212
24	48FT-2412
NAS 1021A	
04	27FH-440
06	27FH-632
08	27FH-832
3	27FH-1032
4	27FH-428
5	27FH-524
6	27FH-624
7	27FH-720UN
8	27FH-820
9	37FH-918
10	37FH-1018
12	37FH-1216
14	37FH-1414
16	37FH-1612
17	37FH-1614
18	37FH-1812
20	37FH-2012
NAS 1021AM	
04	28FH-440
06	28FH-632
08	28FH-832
3	28FH-1032
4	28FH-428
5	28FH-524
6	28FH-624
7	28FH-720
8	28FH-820
9	38FH-918
10	38FH-1018
12	38FH-1216
14	38FH-1414
16	38FH-1612
17	38FH-1614
18	38FH-1812
20	38FH-2012
NAS 1021C	
04	59FH-440
06	59FH-632
08	59FH-832
3	59FH-1032
4	59FH-428
5	59FH-524
6	59FH-624
7	59FH-720UN
8	59FH-820
9	59FH-918
10	59FH-1018
12	59FH-1216
14	59FH-1414
16	59FH-1612
17	59FH-1614
18	59FH-1812
20	59FH-2012
NAS 1021E	
04	67FS-440
06	67FS-632
08	67FS-832
3	67FS-1032
4	67FS-428
5	67FS-524
6	67FS-624
7	67FS-720UN
8	67FS-820
9	67FS-918
10	67FS-1018
12	67FS-1216
14	67FS-1414
16	67FS-1612
17	67FS-1614
18	67FS-1812
20	67FS-2012
NAS 1021H	
04	75FS-440
06	75FS-632
08	75FS-832*
3	75FS-1032*
4	75FS-428*
5	75FS-524
6	75FS-624
7	75FS-720UN
8	75FS-820
9	75FS-918
10	75FS-1018
12	75FS-1216
14	75FS-1414
16	75FS-1612
17	75FS-1614
18	75FS-1812
20	75FS-2012
NAS 1022A	
06	27FT-632
08	27FT-832
3	27FT-1032
4	27FT-428
5	27FT-524
6	27FT-624
7	27FT-720UN
8	27FT-820
9	37FT-918
10	37FT-1018
12	37FT-1216
14	37FT-1414
16	37FT-1612
17	37FT-1614
18	37FT-1812
20	37FT-2012
NAS 1022AM	
04	28FT-440
06	28FT-632
08	28FT-832
3	28FT-1032
4	28FT-428
5	28FT-524
6	28FT-624
7	28FT-720UN
8	28FT-820
9	38FT-918
10	38FT-1018
12	38FT-1216
14	38FT-1414
16	38FT-1612
17	38FT-1614
18	38FT-1812
20	38FT-2012
NAS 1022C	
06	59FT-632
08	59FT-832
3	59FT-1032
4	59FT-428
5	59FT-524
6	59FT-624
7	59FT-720UN
8	59FT-820
9	59FT-918
10	59FT-1018
12	59FT-1216
14	59FT-1414
16	59FT-1612
17	59FT-1614
18	59FT-1812
20	59FT-2012
NAS 1022E	
06	67FT-632
08	67FT-832
3	67FT-1032
4	67FT-428
5	67FT-524
6	67FT-624
7	67FT-720UN
8	67FT-820
9	67FT-918
10	67FT-1018
12	67FT-1216
14	67FT-1414
16	67FT-1612
17	67FT-1614
18	67FT-1812
20	67FT-2012
NAS 1022H	
06	75FT-632
08	75FT-832*
3	75FT-1032*
4	75FT-428*
5	75FT-524
6	75FT-624
7	75FT-720UN
8	75FT-820
9	75FT-918
10	75FT-1018
12	75FT-1216
14	75FT-1414
16	75FT-1612
17	75FT-1614
18	75FT-1812
20	75FT-2012

* Cancelled “AN” drawings designate “MS” drawings which may be substituted.
NOTE: These MS parts may not be of the same material or strength level.

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