

ESNA[®]

Industrial Fastener Catalog 791



**HARVARD
INDUSTRIES**

ELASTIC STOP NUT

3200 Country Club Rd.
Pocahontas, AR 72455
(501) 892-5201



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**HARVARD
INDUSTRIES**



Elastic Stop Nut Division

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ADL 9001 6/91

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FORWARD

The Elastic Stop Nut Division of Harvard Industries, Inc. has been headquartered for more than 50 years in Union, New Jersey. Here in a facility of more than a quarter million square feet, is located the ESNA® Engineering, Test Laboratories, Manufacturing and Sales Groups. The Union complex is totally committed to the Design, Development and Production of the world's most reliable Standard and Special Self-Locking fasteners. An additional plant in Pocahontas, Arkansas specializes in the manufacture of the famous ESNA® red nylon insert self-locking fasteners for use on commercial - industrial applications. The combined production of these plants offers the manufacturing community the most complete and reliable line of self-locking fasteners available today.



As the pioneer manufacturer of self-locking fasteners, ESNA® offers the benefits of more than 50 years experience in the design and manufacture of vibration and impact proof fasteners. The extensive ESNA® line includes standard, high tensile, extra thin high temperature, MIL approved parts, designed for the most difficult fastening applications. ESNA® has also created full lines of miniaturized self-locking parts for the electronic industry such as hex, clinch, and anchor nuts. When specifying for your project - please contact our engineering specialists for an immediate reply and solution to your fastener problem.



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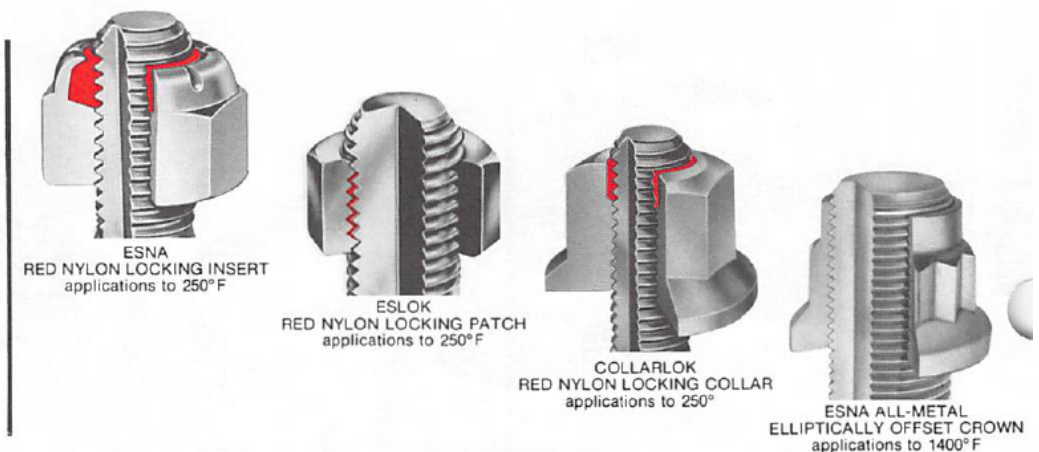
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ESNA® has resolved the ever present problems of variables in fastening requirements. By offering four self-locking devices, each with its own advantages, ESNA® permits the engineer/designer to select the fastener most appropriate to his needs. You may simply select your fastener from the most extensive line of STANDARD types, sizes, finishes and temperature range offered as STANDARD PARTS by any locknut manufacturer. Within the framework of each locking principal are literally thousands of parts. This means that in the majority of applications, even the most difficult fastening problem can be solved by specifying a STANDARD Elastic Stop® nut.

FOR COMPLETE COVERAGE OF YOUR FASTENER DESIGN REQUIREMENTS

ESNA® OFFERS FOUR SUPERIOR LOCKING DEVICES



* EACH OF THESE ESNA® LOCKING DEVICES FULLY MEET THE VIBRATION AND REUSE REQUIREMENTS OF SPECIFICATION MIL-N-25027

* **ESNA® NYLON INSERT TYPE** - The controlled inside diameter of the red nylon insert and the nylon material its-self is the key to the self-locking effectiveness of the fastener. The ESNA® self-locking nut is free spinning until the bolt enters the locking insert. The bolt threads then impress (not cut) mating threads in the nylon. The resulting compression forces metal-to-metal contact between the nut and bolt threads. This friction grip plus the nylon compression grip assures that the nut will stay "put" anywhere on the bolt and maintain the pre set torque-tension relationship. Elastic Stop® nuts may be reused through more than 50 on-off application cycles.

ESLOK® LOCKING PATCH TYPE - A controlled amount of red nylon is permanently bonded to the threads of the standard hex nut. The nylon is bonded to the center threads of the nut to permit either end entry of the bolt for automatic machine assembly. Parts are easily removed with a wrench and may be reused up to 5 times. No metal is removed or distorted insuring the tensile strength and non-galling characteristics of an ESNA® self-locking fastener. An excellent low cost commercial hex nut for all types of heavy duty applications.

* **COLLARLOK® BONDED NYLON LOCKING COLLAR** - The latest ESNA® prevailing torque hex nut design offers the reuse characteristics of the proven ESNA® insert type. A red nylon collar bonded into the head of the nut provides a prevailing torque type nut with the advantage of high speed assembly using automatic assembly tools. The non-galling collar offers superior vibration performance in standard or metric threads. Collarlok® is available in a variety of hex designs including low height flange type for bearing retaining applications.

* **ESNA® ALL-METAL ELLIPTICALLY DEFORMED TYPE** - A reduced height, thin walled, light weight series of Elastic Stop® nuts incorporates an elliptically deformed locking device in the upper portion of the nut body. The carefully controlled degree of deflection in the top of the nut provides the reliable locking grip on the bolt. Assembly and removal are smooth and non-galling after use at elevated temperatures. Depending on the configuration, material and finish the lightweight parts can be used at temperatures of up to 1400°F.



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Wrenchable nuts: Standard, miniature and reduced hex designs with nylon inserts, ESlok and Collarlok hex with bonded locking devices.

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Self-Retaining nuts: Standard and miniature designs both fixed and floating including clinch nuts, inserts, right angle brackets and self-retaining clip-on nuts.

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ENGINEERING REPORTS

As a result of more than fifty years of hands-on experience in solving special fastening problems and developing unique self-locking nut designs, ESNA® engineers have compiled numerous Engineering Reports (ER's) pertinent to the application, installation and performance of Elastic Stop® nuts. These (ER) reports are available from ESNA® Technical Service Department, Union, New Jersey. Please indicate the nature of your application to insure the correct response.
Call 1-(908) 686-6000 - 8 AM to 4 PM Monday thru Friday.



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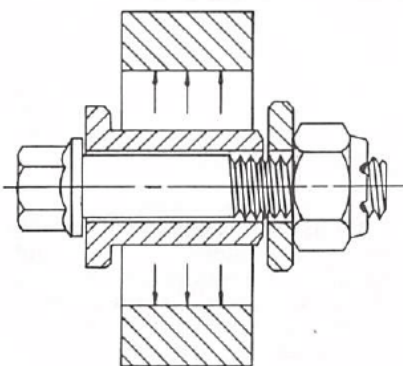
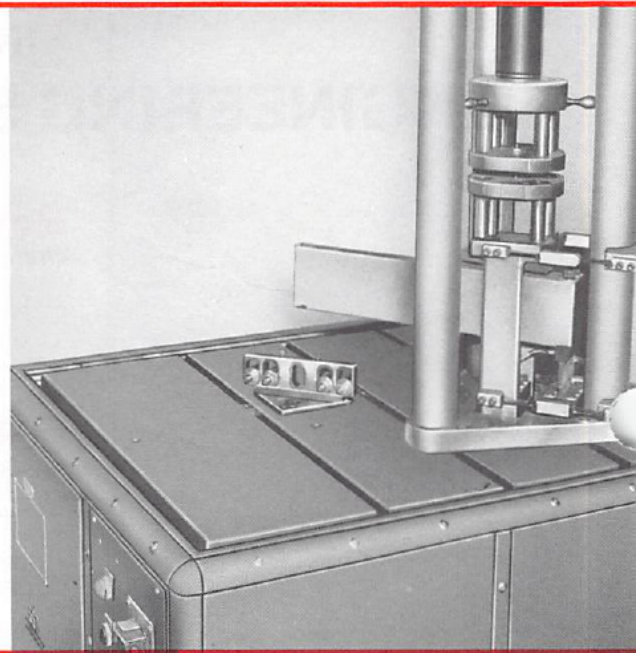
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PRODUCT RELIABILITY

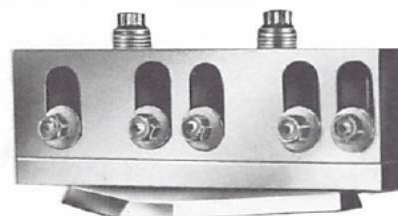
VIBRATION PERFORMANCE

The pursuit of improved standards of reliability and performance are dynamic and continuing assignments at ESNA®. It is a fact that the fiber insert Elastic Stop® nut was the first prevailing torque locknut in the 1930's. ESNA® also manufactured the first fastener to be approved to specification AN-N-5. For twenty years it was the Standard of locknut performance until ESNA® again pioneered the development of Red Nylon as a locking insert - advancing locknut vibration and reuse capabilities a quantum leap.

ESNA® Engineers have devised a readily reproduced vibration test procedure, which has gained widespread recognition as a standard in the industry, for evaluating locknut vibration performance. Test equipment and test fixtures are available for customers who wish to test their fasteners vs Elastic Stop® nuts. Pictured on the right is the Sonntag Universal Fatigue machine on which the vibration tests are conducted.



Fasteners are tightened on spool-like arbors, and their high-frequency vibration is excited by blows against the arbors.



The illustration, above and to the left, shows a "loose connection" test fixture for use on the Sonntag Fatigue machine. Tests may be conducted with sample locknuts "tight" against the unit, or "loose" and free to impact within the arbor slots. The "loose" assembly is the most severe test and a truer measure of locking effectiveness of the nut device, as there is no metal-to-metal seating torque to overcome. If you have interest in evaluating your fastener - you are invited to conduct or witness actual tests at the ESNA® vibration laboratory in Union, NJ. Contact our Technical Service Department for an invitation.

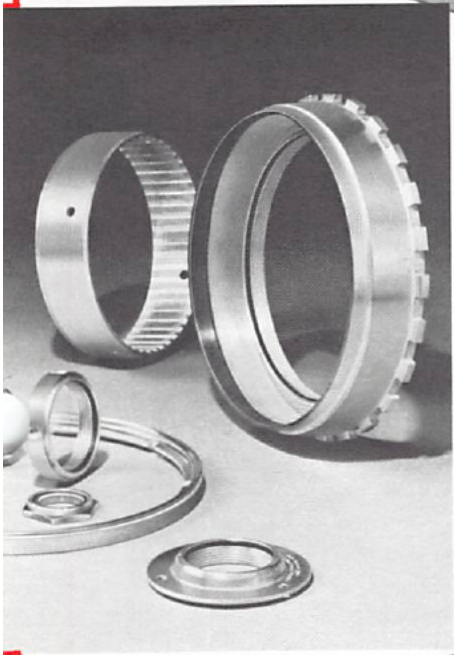


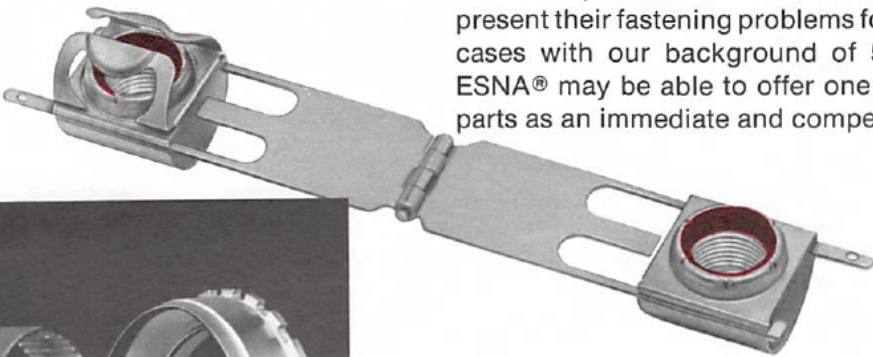


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SPECIAL FASTENERS

Illustrated on this page is a small sampling of "Special Parts" created by ESNA® Engineers as solutions to specific customer fastening needs. The few specials illustrated on this page are but a small part of the thousands we have created for our Industrial and Aerospace customers. ESNA® Engineers invite designers to present their fastening problems for review and solution. In many cases with our background of 50 years service to industry, ESNA® may be able to offer one of our thousands of standard parts as an immediate and competitive solution.


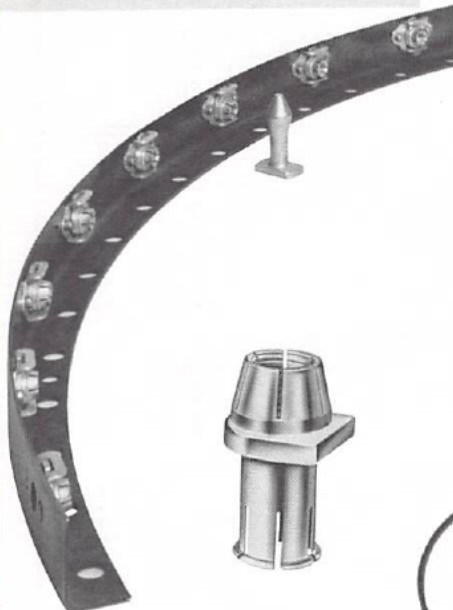


The ESNA® Design and Engineering groups have a standing assignment to apply their considerable experience to the solution of fastener problems arising in the industries we serve.

Should your project present fastening problems resulting from combinations of: Vibration, Tensile Loads, Temperature Extremes or Unusual Environmental Conditions - Contact ESNA®! Our engineering expertise and facilities are at your service.

Your submission of a problem immediately alerts our Technical Service Department to search our files for suitable existing parts. Should none exist, ESNA® engineering will work with your staff to create a specific fastener design to meet your needs.

Write or phone our Technical Service Department in Union, New Jersey - 1-(908) 686-6000



To insure complete and prompt reply to your fastener needs - Write or phone our Technical Service Department in Union, New Jersey with the following data:

- a. Type of application
- b. Maximum temperature
- c. Nut material and finish
- d. Bolt material and finish
- e. Bolt strength and hardness
- f. Estimated annual usage
- g. Number of adjustments or removals in life of equipment



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VISUAL INDEX















SECTION 1

INDUSTRIAL FASTENERS

SELECTING THE CORRECT WRENCHABLE SELF-LOCKING NUTS FOR YOUR APPLICATION

Each Elastic Stop® nut illustrated differs in some significant characteristic such as dimensions, material, finish, strength, weight and temperature limits. Each is a standard part in the ESNA® self-locking fastener line. This wide range of available parts gives the design engineer the advantage of being able to select the exact features most important to his individual requirements. ESNA® also has hundreds of additional standard and special self-locking fasteners which are available through our Technical Service and Product Design Departments in Union, New Jersey. Please submit your fastening problems for prompt analysis and reply. A complete review of additional ESNA® designs may be obtained by requesting a copy of the "Visual Index Book" available through the Sales Department.

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NKM, NKTM		REGULAR HEX, MACHINE SCREW, NYLON CAP 4-40 thru 10-32 to 250° F. Page 43
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SERVICE APPROVALS

ESNA® products approved for use on Military Applications can be found on the following Qualified Products Lists.



QPL-25027
QPL-7873
QPL-8922
QPL-8984
QPL-8985



Understandably, these documents can not be revised and re-issued as often as necessary to cover the very latest approval status of ESNA® products. Thus, interim approval letters are issued by the Military, which remain in effect for recently qualified items until the next reprinting of the applicable qualified products list.



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SECTION 2

ELECTRONIC FASTENERS

SELECTING THE CORRECT SELF-RETAINING, SELF-LOCKING NUTS FOR YOUR APPLICATION

The complex requirements of the Aircraft-Aerospace industry has created multiple lines of self-locking Elastic Stop® nut Anchor type nuts to meet the rigid engineering demands. Characteristics such as shape, material, finish, strength, weight and temperature limits, all within strict dimensional limits, can be provided in the wide range of ESNA® "available" parts. The Aerospace designer has only to select from this listing to resolve a large part of his assembly problems, however, if the part needed is not shown in this catalog, he is invited to contact our Technical Sales Department for assistance. Additional hundreds of special and standard designs (not shown) are readily available for review.

NCFMA 	MINIATURE CLINCH, FLUSH MOUNTING and INSTALLATION TOOLS 2-56 thru 10-32 to 350° F. MIL-N-45938/5 Page 59
NKCFM 	MINIATURE CLINCH, FLUSH MOUNTING, NYLON CAP and INSTALLATION TOOLS 2-56 thru 10-32 to 350° F. Page 61
NC4284 	MINIATURE CLINCH, FLUSH MOUNTING, FLOATING and INSTALLATION TOOLS 4-40 thru 10-32 to 350° F. Page 63
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LHCFM LHCFM2860 	MINIATURE CLINCH, FLUSH MOUNTING and INSTALLATION TOOLS 2-56 thru 1/4-28 to 450° F. to 800° F. MIL-N-45938/6 Page 70
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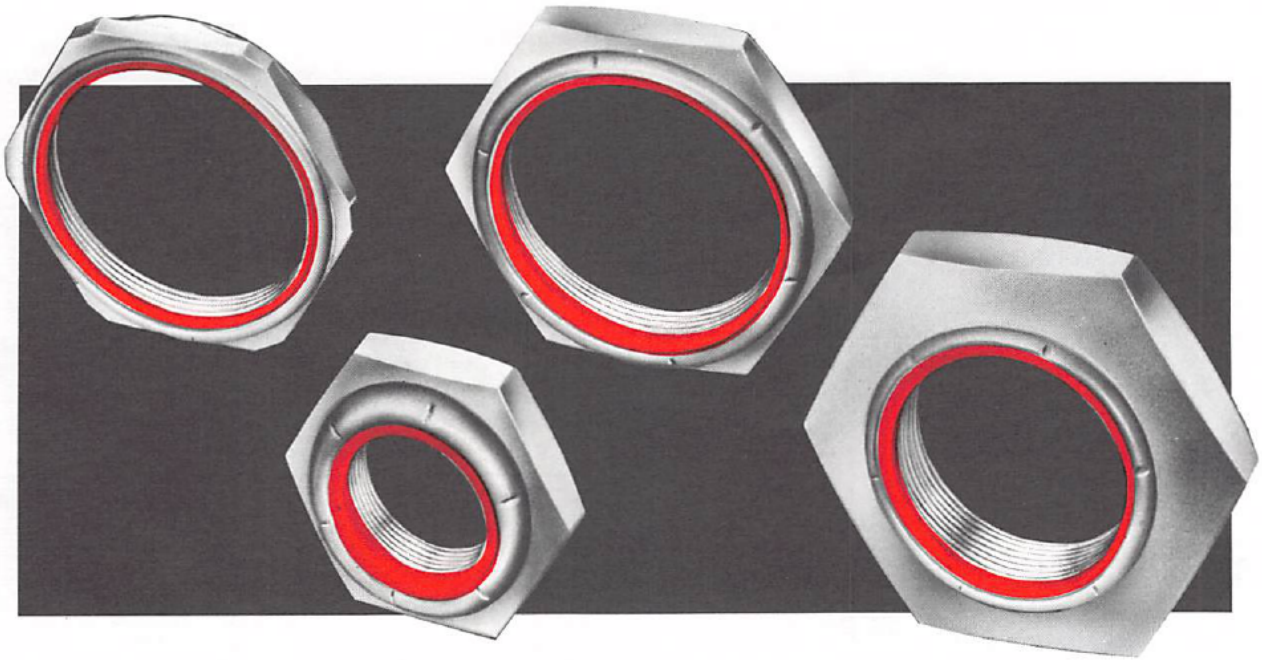
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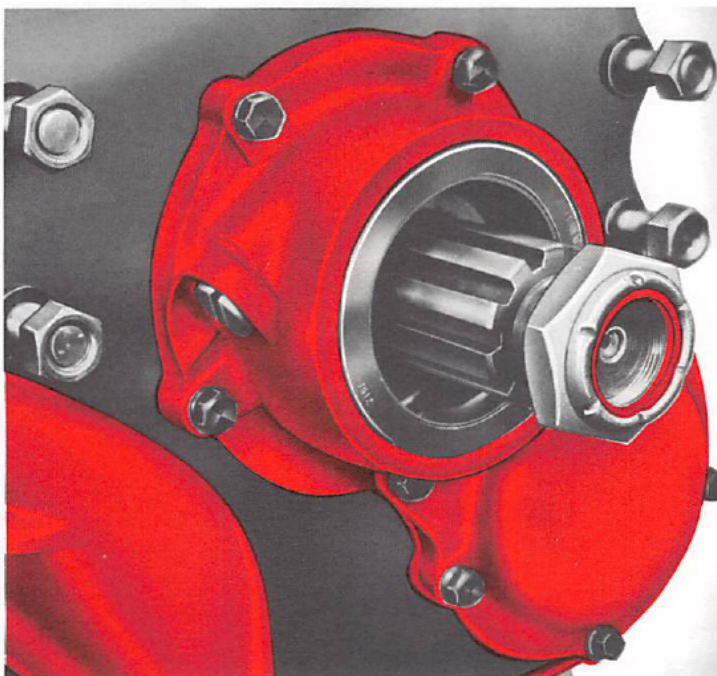
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CONSIDER EXTRA-THIN TYPES OF ELASTIC STOP® NUTS FOR BEARING RETAINING APPLICATIONS



THESE ARE THE BENEFITS AND ECONOMIES ACHIEVED BY USING REGULAR ELASTIC STOP NUTS FOR BEARING RETAINING APPLICATIONS:

1. Lower total manufacturing costs result from tooling and machining standard SAE threads on shaft in place of special extra-fine bearing locknut threads.
2. Lower manufacturing costs result from elimination of cross-drilling of shaft for cotter pin holes or milling a lot in shaft for a tab washer.
3. Easier assembly; a stop nut can be clamped-up as tightly as you specify, in a single operation. Self-locking nut does not require re-adjustment to permit cotter pin location.
4. Nylon insert's non-destructive locking grip does not gall or in any way distort costly shaft threads.
5. Removal and reuse is simple matter of wrenching off-on.
6. There is no safety device for the workman or maintenance worker to forget. The ESNA® "safety" device is built in.
7. The unavoidable "play" in a cotter-pinned adjustment accelerates wearing of the gears, bearings or other fastened members. Service life is extended and bearing wear is minimized as a result of the constant clamping action maintained by the nylon insert.



An ESNA® bearing-type nut applied to the output shaft on a heavy-duty truck transmission. It replaced a castle nut and cotter pin fastening.



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CONVERSION TABLES

The following AN-MS-NAS Standard Parts listing is provided in numerical sequence for ESNA® customers who wish to determine the equivalent ESNA® part number.





AN/MS/NAS Standard Parts	ESNA Nomenclature	AN/MS/NAS Standard Parts	ESNA Nomenclature	AN/MS/NAS Standard Parts	ESNA Nomenclature	AN/MS/NAS Standard Parts	ESNA Nomenclature
AN PART No.							
AN256-6	68NA7-68-62	AN364B1032	99NTM-02	AN365-918C	F1801-098	AN365B1018A	99NE-108
AN256-8	68NA7-68-82	AN364B1032A	99NTM-02	AN365-1018C	F1801-108	AN365B1216	99NE-126
AN256-10	68NA7-68-02	AN364B428	99NTE-048	AN365-1216C	F1801-126	AN365B1216A	99NE-126
AN256F6	F22NA7-68-62	AN364B428A	99NTE-048	AN365-1414C	F1801-144	AN365B1414	99NE-144
AN256F8	F22NA7-68-82	AN364B524	99NTE-054	AN365-1614C	F1801-164	AN365B1414A	99NE-144
AN256F10	F22NA7-68-02	AN364B524A	99NTE-054			AN365B1614	99NE-164
		AN364B624	99NTE-064	AN365-440	F22NM-40	AN365B1812	99NE-182
		AN364B624A	99NTE-064	AN365-440A	F22NM-40	AN365B1812A	99NE-182
AN362C524	70ZA1W-054	AN364B720	99NTE-070	AN365-632	F22NM-62	AN365B2012	99NE-202
AN362C624	70ZA1-064	AN364B720A	99NTE-070	AN365-632A	F22NM-62	AN365B2012A	99NE-202
		AN364B820	99NTE-080	AN365-832	F22NM-82		
AN363-624	F1801-064	AN364B820A	99NTE-080	AN365-832A	F22NM-82	AN365D440	68NM-40
AN363-720	F1801-070	AN364B918	99NTE-098	AN365-1032	F22NM-02	AN365D440A	68NM-40
AN363-820	F1801-080	AN364B918A	99NTE-098	AN365-1032A	F22NM-02	AN365D632	68NM-62
AN363-918	F1801-098	AN364B1216	99NTE-126	AN365-428	F42NE-048	AN365D632A	68NM-62
AN363-1018	F1801-108	AN364B1216A	99NTE-126	AN365-428A	F42NE-048	AN365D832	68NM-82
AN363-1216	F1801-126	AN364B1414	99NTE-144	AN365-524	F42NE-054	AN365D832A	68NM-82
		AN364B1414A	99NTE-144	AN365-524A	F42NE-054	AN365D1032	68NM-02
AN363C632	1803-62	AN364B1614	99NTE-164	AN365-624	F52NE-064	AN365D1032A	68NM-02
AN363C832	1803-82	AN364B1614A	99NTE-164	AN365-624A	F52NE-064	AN365D428	68NE-048
AN363C1032	1803-02	AN364B1812	99NTE-182	AN365-720	F52NE-070	AN365D428A	68NE-048
AN363C428	1803-048	AN364B1812A	99NTE-182	AN365-720A	F52NE-070	AN365D524	68NE-054
AN363C524	1803-054	AN364B2012	99NTE-202	AN365-820	F52NE-080	AN365D524A	68NE-054
AN363C624	1803-064	AN364B2012A	99NTE-202	AN365-820A	F52NE-080	AN365D624	68NE-064
AN363C720	1803-070			AN365-918	F52NE-098	AN365D720	68NE-070
AN363C820	1803-080	AN364D632	68NTM-62	AN365-918A	F52NE-098	AN365D720A	68NE-070
AN363C918	1803-098	AN364D632A	68NTM-62	AN365-1018	F52NE-108	AN365D820	68NE-080
AN363C1018	1803-108	AN364D832	68NTM-82	AN365-1018A	F52NE-108	AN365D820A	68NE-080
		AN364D832A	68NTM-82	AN365-1216	F52NE-126	AN365D918	68NE-098
AN364-632	F22NTM-62	AN364D1032	68NTM-02	AN365-1216A	F52NE-126	AN365D918A	68NE-098
AN364-632A	F22NTM-62	AN364D1032A	68NTM-02	AN365-1414	F52NE-144	AN365D1018	68NE-108
AN364-832	F22NTM-82	AN364D428	68NTE-048	AN365-1414A	F52NE-144	AN365D1018A	68NE-108
AN364-832A	F22NTM-82	AN364D428A	68NTE-048	AN365-1614	F52NE-164	AN365D1216	68NE-126
AN364-1032	F22NTM-02	AN364D524	68NTE-054	AN365-1614A	F52NE-164	AN365D1216A	68NE-126
AN364-1032A	F22NTM-02	AN364D524A	68NTE-054	AN365-1812	F52NE-182	AN365D1414	68NE-144
AN364-428	F52NTE-048	AN364D624	68NTE-064	AN365-1812A	F52NE-182	AN365D1414A	68NE-144
AN364-428A	F52NTE-048	AN364D624A	68NTE-064	AN365-2012	F52NE-202		
AN364-524	F52NTE-054	AN364D720	68NTE-070	AN365-2012A	F52NE-202	AN366-832	22A8-82
AN364-524A	F52NTE-054	AN364D720A	68NTE-070			AN366-1032	22A8-02
AN364-624	F52NTE-064	AN364D820	68NTE-080	AN365B440	99NM-40	AN366-428	52A8-048
AN364-624A	F52NTE-064	AN364D820A	68NTE-080	AN365B632	99NM-62	AN366-524	52A8-054
AN364-720	F52NTE-070	AN364D918	68NTE-098	AN365B632A	99NM-62	AN366-624	52A8-064
AN364-720A	F52NTE-070	AN364D918A	68NTE-098	AN365B832	99NM-82		
AN364-820	F52NTE-080	AN364D1018	68NTE-108	AN365B832A	99NM-82	AN366DF632	68NA1-62
AN364-820A	F52NTE-080	AN364D1018A	68NTE-108	AN365B1032	99NM-02	AN366DF632A	68NA1-62
AN364-918	F52NTE-098	AN364D1216	68NTE-126	AN365B1032A	99NM-02	AN366DF832	68NA1-82
AN364-918A	F52NTE-098	AN364D1216A	68NTE-126	AN365B428	99NE-048	AN366DF832A	68NA1-82
AN364-1018	F52NTE-108	AN364D1414	68NTE-144	AN365B428A	99NE-048	AN366DF1032	68NA1-02
AN364-1018A	F52NTE-108	AN364D1414A	68NTE-144	AN365B524	99NE-054	AN366DF1032A	68NA1-02
AN364-1216	F52NTE-126	AN364D1614	68NTE-164	AN365B524A	99NE-054	AN366DF428	68NA1-048
AN364-1216A	F52NTE-126	AN364D1614A	68NTE-164	AN365B624	99NE-064	AN366DF428A	68NA1-048
AN364-1414	F52NTE-144	AN364D1812	68NTE-182	AN365B624A	99NE-064	AN366DF524	68NA1-054
AN364-1414A	F52NTE-144	AN364D1812A	68NTE-182	AN365B720	99NE-070	AN366DF524A	68NA1-054
AN364-1614	F52NTE-164	AN364D2012	68NTE-202	AN365B720A	99NE-070	AN366DF624	68NA1-064
AN364-1614A	F52NTE-164	AN364D2012A	68NTE-202	AN365B820	99NE-080	AN366DF624A	68NA1-064
AN364-1812	F52NTE-182			AN365B820A	99NE-080		
AN364-1812A	F52NTE-182	AN365-624C	F1801-064	AN365B918	99NE-098	AN366D832	68A8-82
AN364-2012	F52NTE-202	AN365-720C	F1801-070	AN365B918A	99NE-098	AN366D1032	68A8-02
AN364-2012A	F52NTE-202	AN365-820C	F1801-080	AN365B1018	99NE-108	AN366D428	68A8-048

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AN366D524	68A8-054	MS14145-3	TE9868-3	MS14164-16	LH11995-16	MS17828-7C	09NE-074U(MONEL)
AN366D624	68A8-064	MS14145-4	TE9868-4			MS17828-7F	09NE-070U(MONEL)
AN366F632	F22NA1-62	MS14145-5	TE9868-5	MS14179-3	VF12502-3	MS17828-8C	09NE-083(MONEL)
AN366F632A	F22NA1-62	MS14145-6	TE9868-6	MS14179-4	VF12502-4	MS17828-8F	09NE-080(MONEL)
AN366F832A	F22NA1-82	MS14145-7	TE9868-7	MS14179-5	VF12502-5	MS17828-9C	09NE-092(MONEL)
AN366F1032A	F22NA1-02	MS14145-8	TE9868-8			MS17828-9F	09NE-098(MONEL)
AN366F428	F22NA1-048	MS14145-9	TE9868-9	MS14180-3	VA12502-3	MS17828-10C	09NE-101(MONEL)
AN366F428A	F22NA1-048	MS14145-10	TE9868-10	MS14180-4	VA12502-4	MS17828-10F	09NE-108(MONEL)
AN366F524	F22NA1-054	MS14145-12	TE9868-12	MS14180-5	VA12502-5	MS17828-12C	09NE-120(MONEL)
AN366F524A	F22NA1-054	MS14145-14	TE9868-14			MS17828-12F	09NE-126(MONEL)
AN366F624A	F42NA1-064	MS14145-16	TE9868-16	MS16228-4C	79NTU-040	MS17828-14C	09NE-149(MONEL)
		MS14145-18	TE9868-18	MS16228-5C	79NTU-058	MS17828-14F	09NE-144(MONEL)
		MS14145-20	TE9868-20	MS16228-6C	79NTU-066	MS17828-16C	09NE-168(MONEL)
AN373DF832	68NA38-82			MS16228-7C	79NTU-074	MS17828-16F	09NE-162(MONEL)
AN373DF832A	68NA38-82	MS14145L3	RMTE9868-3	MS16228-8C	79NTU-083	MS17828-18C	09NE-187(MONEL)
AN373DF1032	68NA38-02	MS14145L4	RMTE9868-4	MS16228-10C	79NTU-101	MS17828-18F	09NE-182(MONEL)
AN373DF1032A	68NA38-02	MS14145L5	RMTE9868-5	MS16228-12C	79NTU-120	MS17828-20C	09NE-207(MONEL)
AN373DF428	68NA38-048	MS14145L6	RMTE9868-6	MS16228-16C	79NTU-168	MS17828-20F	09NE-202(MONEL)
AN373DF428A	68NA38-048	MS14145L7	RMTE9868-7			MS17828-22C	09NE-226(MONEL)
AN373DF524	68NA38-054	MS14145L8	RMTE9868-8	MS17825-3	F12NE4753-02	MS17828-22F	09NE-222(MONEL)
AN373DF524A	68NA38-054	MS14145L9	RMTE9868-9	MS17825-4	F12NE4753-048	MS17828-24C	09NE-246(MONEL)
		MS14145L10	RMTE9868-10	MS17825-5	F12NE4753-054	MS17828-24F	09NE-242(MONEL)
AN373F832	F22NA38-82	MS14145L12	RMTE9868-12	MS17825-6	F12NE4753-064	MS17828-28C	09NU-285(MONEL)
AN373F832A	F22NA38-82	MS14145L14	RMTE9868-14	MS17825-7	F12NE4753-070	MS17828-32C	09NU-324(MONEL)
AN373F1032	F22NA38-02	MS14145L16	RMTE9868-16	MS17825-8	F12NE4753-080	MS17828-36C	09NU-364(MONEL)
AN373F1032A	F22NA38-02	MS14145L18	RMTE9868-18	MS17825-9	F12NE4753-098	MS17828-40C	09NU-404(MONEL)
AN373F428	F22NA38-048	MS14145L20	RMTE9868-20	MS17825-10	F12NE4753-108		
AN373F428A	F22NA38-048			MS17825-12	F12NE4753-126	MS17829-3C	F52N1610-04
AN373F524	F22NA38-054	MS14146-3	E10361-3	MS17825-14	F12NE4753-144	MS17829-4C	F52N1610-040
AN373F524B	F52ZA38-054	MS14146-4	E10361-4	MS17825-16	F12NE4753-162	MS17829-4F	F52N1610-048
		MS14146-5	E10361-5	MS17825-18	F12NE4753-182	MS17829-5C	F52N1610-058
		MS14146-6	E10361-6	MS17825-20	F12NE4753-202	MS17829-5F	F52N1610-054
		MS14146-7	E10361-7			MS17829-6C	F52N1610-066
		MS14146-8	E10361-8	MS17826-3	F12NE4717-02	MS17829-6F	F52N1610-064
		MS14146-9	E10361-9	MS17826-4	F12NE4717-048	MS17829-7C	F52N1610-074U
		MS14146-10	E10361-10	MS17826-5	F12NE4717-054	MS17829-7F	F52N1610-070U
		MS14146-12	E10361-12	MS17826-6	F12NE4717-064	MS17829-8C	F52N1610-083
		MS14146-14	E10361-14	MS17826-7	F12NE4717-070	MS17829-8F	F52N1610-080
		MS14146-16	E10361-16	MS17826-8	F12NE4717-080	MS17829-9C	F52N1610-092
				MS17826-9	F12NE4717-098	MS17829-9F	F52N1610-098
		MS14156-04	LH11860-4	MS17826-10	F12NE4717-108	MS17829-10C	F52N1610-101
		MS14156-05	LH11860-5	MS17826-12	F12NE4717-126	MS17829-10F	F52N1610-108
		MS14156-06	LH11860-6	MS17826-14	F12NE4717-144	MS17829-12C	F52N1610-120
		MS14156-07	LH11860-7	MS17826-16	F12NE4717-162	MS17829-12F	F52N1610-126
		MS14156-08	LH11860-8	MS17826-18	F12NE4717-182	MS17829-14C	F52N1610-149
		MS14156-09	LH11860-9	MS17826-20	F12NE4717-202	MS17829-14F	F52N1610-144
		MS14156-10	LH11860-10			MS17829-16C	F52N1610-168
		MS14156-12	LH11860-12	MS17828-04C	09NM-40(MONEL)	MS17829-16F	F52N1610-162
		MS14156-14	LH11860-14	MS17828-06C	09NM-62(MONEL)	MS17829-18C	F52N1610-187
		MS14156-16	LH11860-16	MS17828-08C	09NM-82(MONEL)	MS17829-18F	F52N1610-182
				MS17828-3C	09NM-04(MONEL)	MS17829-18N08	F52N1610-1808
		MS14164-04	LH11995-4	MS17828-3F	09NM-02(MONEL)	MS17829-20C	F52N1610-207
		MS14164-05	LH11995-5	MS17828-4C	09NE-040(MONEL)	MS17829-20F	F52N1610-202
		MS14164-06	LH11995-6	MS17828-4F	09NE-048(MONEL)	MS17829-20N08	F52N1610-2008
		MS14164-07	LH11995-7	MS17828-5C	09NE-058(MONEL)	MS17829-22C	F52N1610-226
		MS14164-08	LH11995-8	MS17828-5F	09NE-054(MONEL)	MS17829-22F	F52N1610-222
		MS14164-09	LH11995-9	MS17828-6C	09NE-066(MONEL)	MS17829-22N08	F52N1610-2208
		MS14164-10	LH11995-10	MS17828-6F	09NE-064(MONEL)	MS17829-24C	F52N1610-246
		MS14164-12	LH11995-12			MS17829-24F	F52N1610-242
		MS14164-14	LH11995-14				

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MS14144-3	E9868-3
MS14144-4	E9868-4
MS14144-5	E9868-5
MS14144-6	E9868-6
MS14144-7	E9868-7
MS14144-8	E9868-8
MS14144-9	E9868-9
MS14144-10	E9868-10
MS14144-12	E9868-12
MS14144-14	E9868-14
MS14144-16	E9868-16
MS14144-18	E9868-18
MS14144-20	E9868-20
MS14144L-3	RME9868-3
MS14144L-4	RME9868-4
MS14144L-5	RME9868-5
MS14144L-6	RME9868-6
MS14144L-7	RME9868-7
MS14144L-8	RME9868-8
MS14144L-9	RME9868-9
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MS17829-24N08	F52N1610-2408	MS20364-1614A	F52NTE-164	MS20365-632	F22NM-62	MS20365B1018A	99NE-108
MS17829-28C	F52NU1610-285	MS20364-1812	F52NTE-182	MS20365-632A	F22NM-62	MS20365B1216	99NE-126
MS17829-28N08	F52NU1610-2808	MS20364-1812A	F52NTE-182	MS20365-832	F22NM-82	MS20365B1216A	99NE-126
MS17829-32C	F52NU1610-324	MS20364-2012	F52NTE-202	MS20365-832A	F22NM-82	MS20365B1414	99NE-144
MS17829-32N08	F52NU1610-3208	MS20364-2012A	F52NTE-202	MS20365-1032	F22NM-02	MS20365B1414A	99NE-144
MS17829-36C	F52NU1610-364			MS20365-1032A	F22NM-02	MS20365B1614	99NE-164
MS17829-36N08	F52NU1610-3608	MS20364B1032	99NTM-02	MS20365-428	F42NE-048	MS20365B1614A	99NE-164
MS17829-40C	F52NU1610-404	MS20364B1032A	99NTM-02	MS20365-428A	F42NE-048	MS20365B1812	99NE-182
MS17829-40N08	F52NU1610-4008	MS20364B428	99NTE-048	MS20365-524	F42NE-054	MS20365B1812A	99NE-182
		MS20364B428A	99NTE-048	MS20365-524A	F42NE-054	MS20365B2012	99NE-202
		MS20364B524	99NTE-054	MS20365-624	F52NE-064	MS20365B2012A	99NE-202
		MS20364B524A	99NTE-054	MS20365-624A	F52NE-064		
MS17830-04C	79NM-40	MS20364B624	99NTE-064	MS20365-624C	F1801-064	MS20365D440	68NM-40
MS17830-06C	79NM-62	MS20364B624A	99NTE-064	MS20365-720	F52NE-070	MS20365D440A	68NM-40
MS17830-08C	79NM-82	MS20364B624A	99NTE-064	MS20365-720A	F52NE-070	MS20365D632	68NM-62
MS17830-3C	79NM-04	MS20364B720	99NTE-070	MS20365-720C	F1801-070	MS20365D632A	68NM-62
MS17830-4C	79NE-040	MS20364B720A	99NTE-070	MS20365-820	F52NE-080	MS20365D832	68NM-82
MS17830-5C	79NE-058	MS20364B820	99NTE-080	MS20365-820A	F52NE-080	MS20365D832A	68NM-82
MS17830-6C	79NE-066	MS20364B820A	99NTE-080	MS20365-820C	F1801-080	MS20365D1032	68NM-02
MS17830-7C	79NE-074U	MS20364B918	99NTE-098	MS20365-918	F52NE-098	MS20365D1032A	68NM-02
MS17830-8C	79NE-083	MS20364B918A	99NTE-098	MS20365-918A	F52NE-098	MS20365D428	68NE-048
MS17830-9C	79NE-092	MS20364B1018	99NTE-108	MS20365-918C	F1801-098	MS20365D428A	68NE-048
MS17830-10C	79NE-101	MS20364B1018A	99NTE-108	MS20365-1018	F52NE-108	MS20365D524	68NE-054
MS17830-12C	79NE-120	MS20364B1216	99NTE-126	MS20365-1018A	F52NE-108	MS20365D524A	68NE-054
MS17830-14C	79NE-149	MS20364B1216A	99NTE-126	MS20365-1018B	F1801-108	MS20365D624	68NE-064
MS17830-16C	79NE-168	MS20364B1414	99NTE-144	MS20365-1018C	F52NE-126	MS20365D624A	68NE-064
MS17830-18C	79NE-187	MS20364B1414A	99NTE-144	MS20365-1216	F52NE-126	MS20365D720	68NE-070
MS17830-20C	79NE-207	MS20364B1614	99NTE-164	MS20365-1216A	F1801-126	MS20365D720A	68NE-070
MS17830-22C	79NE-226	MS20364B1614A	99NTE-164	MS20365-1216C	F52NE-144	MS20365D820	68NE-080
MS17830-22F	79NE-222			MS20365-1414	F52NE-144	MS20365D820A	68NE-080
MS17830-24C	79NE-246	MS20364D632	68NTM-62	MS20365-1414A	F1801-144	MS20365D918	68NE-098
MS17830-24F	79NE-242	MS20364D632A	68NTM-62	MS20365-1414C	F52NE-164	MS20365D918A	68NE-098
MS17830-28C	79NU-285	MS20364D832	68NTM-82	MS20365-1614	F52NE-164	MS20365D1018	68NE-108
MS17830-32C	79NU-324	MS20364D832A	68NTM-82	MS20365-1614A	F52NE-182	MS20365D1018A	68NE-108
MS17830-36C	79NU-364	MS20364D1032	68NTM-02	MS20365-1812	F52NE-182	MS20365D1216	68NE-126
MS17830-40C	79NU-404	MS20364D428	68NTE-048	MS20365-1812A	F52NE-182	MS20365D1216A	68NE-126
		MS20364D428A	68NTE-048	MS20365-2012	F52NE-202	MS20365D1414	68NE-144
MS20364-632	F22NTM-62	MS20364D524	68NTE-054	MS20365-2012A	F52NE-202	MS20365D1414A	68NE-144
MS20364-632A	F22NTM-62	MS20364D524A	68NTE-054			MS20365D1614	68NE-164
MS20364-832	F22NTM-82	MS20364D624	68NTE-064	MS20365B440	99NM-40	MS20365D1614A	68NE-164
MS20364-832A	F22NTM-82	MS20364D624A	68NTE-064	MS20365B440A	99NM-40	MS20365D1812	68NE-182
MS20364-1032	F22NTM-02	MS20364D720	68NTE-070	MS20365B632	99NM-62	MS20365D1812A	68NE-182
MS20364-1032A	F22NTM-02	MS20364D720A	68NTE-070	MS20365B632A	99NM-62	MS20365D2012	68NE-202
MS20364-428	F52NTE-048	MS20364D820	68NTE-080	MS20365B832	99NM-82	MS20365D2012A	68NE-202
MS20364-428A	F52NTE-048	MS20364D820A	68NTE-080	MS20365B832A	99NM-82		
MS20364-524A	F52NTE-054	MS20364D918	68NTE-098	MS20365B1032	99NM-02		
MS20364-624	F52NTE-064	MS20364D918A	68NTE-098	MS20365B1032A	99NM-02	MS20500-1032	1802-02
MS20364-624A	F52NTE-064	MS20364D1018	68NTE-108	MS20365B428	99NE-048	MS20500-428	1802-048
MS20364-720	F52NTE-070	MS20364D1018A	68NTE-108	MS20365B428A	99NE-048	MS20500-524	1802-054
MS20364-720A	F52NTE-070	MS20364D1216	68NTE-126	MS20365B524	99NE-054	MS20500-624	1802-064
MS20364-820	F52NTE-080	MS20364D1216A	68NTE-126	MS20365B524A	99NE-054	MS20500-720	1802-070
MS20364-820A	F52NTE-080	MS20364D1414	68NTE-144	MS20365B624	99NE-064	MS20500-720A	1802-070U
MS20364-918	F52NTE-098	MS20364D1414A	68NTE-144	MS20365B624A	99NE-064	MS20500-820	1802-080
MS20364-918A	F52NTE-098	MS20364D1414A	68NTE-144	MS20365B720	99NE-070	MS20500-918	1802-098
MS20364-1018	F52NTE-108	MS20364D1614	68NTE-164	MS20365B720A	99NE-070	MS20500-1018	1802-108
MS20364-1018A	F52NTE-108	MS20364D1614A	68NTE-164	MS20365B820	99NE-080	MS20500-1216	1802-126
MS20364-1216	F52NTE-126	MS20364D1812	68NTE-182	MS20365B820A	99NE-080		
MS20364-1216A	F52NTE-126	MS20364D1812A	68NTE-182	MS20365B918	99NE-098	MS20501-832	ZA1913W-82
MS20364-1414	F52NTE-144			MS20365B918A	99NE-098	MS20501-1032	ZA1913W-02
MS20364-1414A	F52NTE-144	MS20365-440	F22NM-40	MS20365B1018	99NE-108	MS20501-428	ZA1913W-048
MS20364-1614	F52NTE-164	MS20365-440A	F22NM-40				

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MS20501-524	ZA1913W-054	MS21044C7	79NE-070U	MS21045C8	SM1813-080	MS21063L4-*	RM52LHTG51-048-*
MS20501-624	ZA1913W-064	MS21044C8	79NE-080	MS21045C9	SM1813-098	MS21063L5-*	RM52LHTG51-054-*
		MS21044C9	79NE-098	MS21045C10	SM1813-108		
MS20501W832	ZA1913WP-82	MS21044C10	79NE-108			MS21064-08-*	F52LHTG51-82-*
MS20501W1032	ZA1913WP-02	MS21044C12	79NE-126	MS21045L04	RM1801-40	MS21064-3-*	F52LHTG51-02-*
MS20501W428	ZA1913WP-048	MS21044C14	79NE-144	MS21045L06	RM1801-62	MS21064-4-*	F52LHTG51-048-*
MS20501W524	ZA1913WP-054	MS21044C16	79NE-162	MS21045L08	RM1801-82	MS21064-5-*	F52LHTG51-054-*
MS20501W624	ZA1913WP-064	MS21044C18	79NE-182	MS21045L3	RM1801-02		
		MS21044C20	79NE-202	MS21045L4	RM1801-048	MS21065-08-*	LHTG51-2860-82-*
MS21042L02	RM52LH3324-26			MS21045L5	RM1801-054	MS21065-3-*	LHTG51-2860-02-*
MS21042L04	RM52LH3324-40	MS21044D04	NMJ-40	MS21045L6	RM1801-064	MS21065-4-*	LHTG51-2860-048-*
MS21042L06	RM52LH3324-62	MS21044D06	NMJ-62	MS21045L7	RM1801-070U	MS21065-5-*	LHTG51-2860-054-*
MS21042L08	RM52LH3324-82	MS21044D08	NMJ-82	MS21045L8	RM1801-080		
MS21042L3	RM52LH3324-02	MS21044D3	NMJ-02	MS21045L9	RM1801-098	MS21065L3-*	RMLHTG51-2860-02-*
MS21042L4	RM52LH3324-048	MS21044D4	NMJ-048	MS21045L10	RM1801-108	MS21065L4-*	RMLHTG51-2860-048-*
MS21042L5	RM52LH3324-054	MS21044D5	68NE-054	MS21045L12	RM1801-126	MS21065L5-*	RMLHTG51-2860-054-*
MS21042L6	RM52LH3324-064	MS21044D6	68NE-064	MS21045L16	RM1801-162		
		MS21044D7	68NE-070U			MS21066L08-*	RM52LHTG55-82-J-*
MS21042-02	F52LH3324-26	MS21044D8	68NE-080	MS21045-04	F1801-40	MS21066L3-*	RM52LHTG55-02-J-*
MS21042-04	F52LH3324-40	MS21044D9	68NE-098	MS21045-06	F1801-62	MS21066L4-*	RM52LHTG55-048-J-*
MS21042-06	F52LH3324-62	MS21044D10	68NE-108	MS21045-08	F1801-82		
MS21042-08	F52LH3324-82	MS21044D12	68NE-126	MS21045-3	F1801-02	MS21066-08-*	F52LHTG55-82-J-*
MS21042-3	F52LH3324-02	MS21044D14	68NE-144	MS21045-4	F1801-048	MS21066-3-*	F52LHTG55-02-J-*
MS21042-4	F52LH3324-048	MS21044D16	68NE-162	MS21045-5	F1801-054	MS21066-4-*	F52LHTG55-048-J-*
MS21042-5	F52LH3324-054	MS21044D20	68NE-202	MS21045-6	F1801-064		
MS21042-6	F52LH3324-064			MS21045-7	F1801-070U	MS21067L08-*	RM52LHTG55-82-*
		MS21044E08	1804-82	MS21045-8	F1801-080	MS21067L3-*	RM52LHTG55-02-*
MS21043-04	LH3858-40	MS21044E3	1804-02	MS21045-9	F1801-098	MS21067L4-*	RM52LHTG55-048-*
MS21043-06	LH3858-62	MS21044E4	1804-048	MS21045-10	F1801-108		
MS21043-08	LH3858-82	MS21044E5	1804-054	MS21045-12	F1801-126	MS21067-08-*	F52LHTG55-82-*
MS21043-3	LH3858-02	MS21044E6	1804-064	MS21045-14	F1801-144	MS21067-3-*	F52LHTG55-02-*
MS21043-4	LH3858-048	MS21044E7	1804-070U	MS21045-16	F1801-162	MS21067-4-*	F52LHTG55-048-*
MS21043-5	LH3858-054	MS21044E8	1804-080				
MS21043-6	LH3858-064			MS21046C04	1803-40	MS21068L08-*	RMLHTG55-2860-82-*
		MS21044N04	F22NM-40	MS21046C06	1803-62	MS21068L3-*	RMLHTG55-2860-02-*
MS21044B04	Y92NM-40	MS21044N06	F22NM-62	MS21046C08	1803-82	MS21068L4-*	RMLHTG55-2860-048-*
MS21044B06	Y92NM-62	MS21044N08	F22NM-82	MS21046C3	1803-02		
MS21044B08	Y92NM-82	MS21044N3	F22NM-02	MS21046C4	1803-048	MS21068-08-*	LHTG55-2860-82-*
MS21044B3	Y92NM-02	MS21044N4	F42NE-048	MS21046C5	1803-054	MS21068-3-*	LHTG55-2860-02-*
MS21044B4	Y92NE-048	MS21044N5	F42NE-054	MS21046C6	1803-064	MS21068-4-*	LHTG55-2860-048-*
MS21044B5	Y92NE-054	MS21044N6	F52NE-064	MS21046C7	1803-070U		
MS21044B6	Y92NE-064	MS21044N7	F52NE-070U	MS21046C8	1803-080	MS21077-06	FNA401-62
MS21044B7	Y92NE-070U	MS21044N8	F52NE-080	MS21046C9	1803-098	MS21077-06K	FNA401-62BC
MS21044B8	Y92NE-080	MS21044N9	F52NE-098	MS21046C10	1803-108	MS21077-08	FNA401-82
MS21044B9	Y92NE-098	MS21044N10	F52NE-108	MS21046C12	1803-126	MS21077-08K	FNA401-82BC
MS21044B10	Y92NE-108	MS21044N12	F52NE-126	MS21046C14	1803-144	MS21077-3	FNA401-02
MS21044B12	Y92NE-126	MS21044N14	F52NE-144			MS21077-3K	FNA401-02BC
MS21044B14	Y92NE-144	MS21044N16	F52NE-162	MS21063-08-*	F52LHTG51-82-J-*	MS21077-4	FNA401-048
MS21044B16	Y92NE-162	MS21044N18	F52NE-182	MS21063-3-*	F52LHTG51-02-J-*	MS21077-4K	FNA401-048BC
MS21044B18	Y92NE-182	MS21044N20	F52NE-202	MS21063-4-*	F52LHTG51-048-J-*	MS21077-5	FNA401-054
MS21044B20	Y92NE-202			MS21063-5-*	F52LHTG51-054-J-*	MS21077-5K	FNA401-054BC
		MS21045C04	SM1813-40			MS21077-6	FNA401-064
MS21044C04	79NM-40	MS21045C06	SM1813-62	MS21063L08-*	RM52LHTG51-82-J-*	MS21077-6K	FNA401-064BC
MS21044C06	79NM-62	MS21045C08	SM1813-82	MS21063L3-*	RM52LHTG51-02-J-*	MS21077-7	FNA401-070
MS21044C08	79NM-82	MS21045C3	SM1813-02	MS21063L4-*	RM52LHTG51-048-J-*	MS21077-7K	FNA401-070BC
MS21044C3	79NM-02	MS21045C4	SM1813-048	MS21063L5-*	RM52LHTG51-054-J-*	MS21077-8	FNA401-080
MS21044C4	79NE-048	MS21045C5	SM1813-054			MS21077-8K	FNA401-080BC
MS21044C5	79NE-054	MS21045C6	SM1813-064	MS21064L08-*	RM52LHTG51-82-*		
MS21044C6	79NE-064	MS21045C7	SM1813-070U	MS21064L3-*	RM52LHTG51-02-*	MS21078-04	F22NA1-40

* Denotes an additional suffix number to indicate nut spacing.

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MS21078-06	F22NA1-62	MS21083B8	Y92NTE-080	MS21083N10	F52NTE-108	MS21085-09	LH10726-9
MS21078-06K	F22NA1-62BC	MS21083B9	Y92NTE-098	MS21083N12	F52NTE-126	MS21085-10	LH10726-10
MS21078-08	F22NA1-82	MS21083B10	Y92NTE-108	MS21083N14	F52NTE-144	MS21085-12	LH10726-12
MS21078-08K	F22NA1-82BC	MS21083B12	Y92NTE-126	MS21083N16	F52NTE-162	MS21085-14	LH10726-14
MS21078-3	F22NA1-02	MS21083B14	Y92NTE-144	MS21083N18	F52NTE-182	MS21085-16	LH10726-16
MS21078-3K	F22NA1-02BC	MS21083B16	Y92NTE-162	MS21083N20	F52NTE-202		
MS21078-4	F22NA1-048	MS21083B18	Y92NTE-182	MS21083N22	F52NTE-222	MS21133L03	RMLH10718-3
MS21078-4K	F22NA1-048BC	MS21083B20	Y92NTE-202	MS21083N24	F52NTE-242	MS21133L04	RMLH10718-4
MS21078-5	F22NA1-054	MS21083B22	Y92NTE-222			MS21133L05	RMLH10718-5
MS21078-5K	F22NA1-054BC	MS21083B24	Y92NTE-242	MS21084L03	RMLH10722-3	MS21133L06	RMLH10718-6
MS21078-6	F42NA1-064			MS21084L04	RMLH10722-4	MS21133L07	RMLH10718-7
MS21078-6K	F42NA1-064BC	MS21083C04	79NTM-40	MS21084L05	RMLH10722-5	MS21133L08	RMLH10718-8
MS21078-7	F52NA1Q-070	MS21083C06	79NTM-62	MS21084L06	RMLH10722-6	MS21133L09	RMLH10718-9
MS21078-8	F52NA1Q-080	MS21083C08	79NTM-82	MS21084L07	RMLH10722-7	MS21133L10	RMLH10718-10
MS21078-9	F52NA1Q-098	MS21083C3	79NTM-02	MS21084L08	RMLH10722-8	MS21133L12	RMLH10718-12
MS21078-10	F52NA1Q-108	MS21083C4	79NTE-048	MS21084L09	RMLH10722-9	MS21133L14	RMLH10718-14
		MS21083C5	79NTE-054	MS21084L10	RMLH10722-10	MS21133L16	RMLH10718-16
MS21080-06	F22NA17A-62	MS21083C6	79NTE-064	MS21084L12	RMLH10722-12	MS21133L18	RMLH10718-18
MS21080-06K	F22NA17A-62BC	MS21083C7	79NTE-070U	MS21084L14	RMLH10722-14	MS21133L20	RMLH10718-20
MS21080-08	F22NA17A-82	MS21083C8	79NTE-080	MS21084L16	RMLH10722-16	MS21133L22	RMLH10718-22
MS21080-08K	F22NA17A-82BC	MS21083C9	79NTE-098	MS21084L18	RMLH10722-18	MS21133L24	RMLH10718-24
MS21080-3	F22NA17A-02	MS21083C10	79NTE-108	MS21084L20	RMLH10722-20		
MS21080-3K	F22NA17A-02BC	MS21083C12	79NTE-126	MS21084L22	RMLH10722-22	MS21224-3	NE8235-3
MS21080-4	F22NA17A-048	MS21083C14	79NTE-144	MS21084L24	RMLH10722-24	MS21224-4	NE8235-4
MS21080-4K	F22NA17A-048BC	MS21083C16	79NTE-162			MS21224-5	NE8235-5
MS21080-5	F22NA17A-054	MS21083C18	79NTE-182	MS21084-03	LH10722-3	MS21224-6	NE8235-6
MS21080-5K	F22NA17A-054BC	MS21083C20	79NTE-202	MS21084-04	LH10722-4	MS21224-7	NE8235-7
		MS21083C22	79NTE-222	MS21084-05	LH10722-5	MS21224-8	NE8235-8
MS21081-06	F22NA5-62	MS21083C24	79NTE-242	MS21084-06	LH10722-6	MS21224-9	NE8235-9
MS21081-06K	F22NA5-62BC			MS21084-07	LH10722-7	MS21224-10	NE8235-10
MS21081-08	F22NA5-82	MS21083D04	NTMJ-40	MS21084-08	LH10722-8	MS21224-12	NE8235-12
MS21081-08K	F22NA5-82BC	MS21083D06	NTMJ-62	MS21084-09	LH10722-9	MS21224-16	NE8235-16
MS21081-3	F22NA5-02	MS21083D08	NTMJ-82	MS21084-10	LH10722-10		
MS21081-3K	F22NA5-02BC	MS21083D3	NTMJ-02	MS21084-12	LH10722-12	MS21225-3	Z7764-3
MS21081-4	F22NA5-048	MS21083D4	68NTE-048	MS21084-14	LH10722-14	MS21225-4	Z7764-4
MS21081-4K	F22NA5-048BC	MS21083D5	68NTE-054	MS21084-16	LH10722-16	MS21225-5	Z7764-5
MS21081-5	F22NA5-054	MS21083D6	68NTE-064	MS21084-18	LH10722-18	MS21225-6	Z7764-6
MS21081-5K	F22NA5-054BC	MS21083D7	68NTE-070U	MS21084-20	LH10722-20	MS21225-7	Z7764-7
MS21081-6	F42NA5-064	MS21083D8	68NTE-080	MS21084-22	LH10722-22	MS21225-8	Z7764-8
MS21081-6K	F42NA5-064BC	MS21083D9	68NTE-098	MS21084-24	LH10722-24		
MS21081-7	F52NA5Q-070	MS21083D10	68NTE-108			MS21244-3	9770-3
MS21081-8	F52NA5Q-080	MS21083D12	68NTE-126	MS21085L03	RMLH10726-3	MS21244-3C	E11900-3
MS21081-10	F52NA5Q-108	MS21083D14	68NTE-144	MS21085L04	RMLH10726-4	MS21244-4	9770-4
		MS21083D16	68NTE-162	MS21085L05	RMLH10726-5	MS21244-4C	E11900-4
MS21082-08	FNA417-82	MS21083D18	68NTE-182	MS21085L06	RMLH10726-6	MS21244-5	9770-5
MS21082-08K	FNA417-82BC	MS21083D20	68NTE-202	MS21085L07	RMLH10726-7	MS21244-5C	E11900-5
MS21082-3	FNA417-02	MS21083D22	68NTE-222	MS21085L08	RMLH10726-8	MS21244-6	9770-6
MS21082-3K	FNA417-02BC	MS21083D24	68NTE-242	MS21085L09	RMLH10726-9	MS21244-6C	E11900-6
MS21082-4	FNA417-048			MS21085L10	RMLH10726-10	MS21244-7	9770-7
MS21082-4K	FNA417-048BC	MS21083N04	F22NTM-40	MS21085L12	RMLH10726-12	MS21244-7C	E11900-7
		MS21083N06	F22NTM-62	MS21085L14	RMLH10726-14	MS21244-8	9770-8
MS21083B04	Y92NTM-40	MS21083N08	F22NTM-82	MS21085L16	RMLH10726-16	MS21244-8C	E11900-8
MS21083B06	Y92NTM-62	MS21083N3	F22NTM-02			MS21244-9	9770-9
MS21083B08	Y92NTM-82	MS21083N4	F52NTE-048	MS21085-03	LH10726-3	MS21244-9C	E11900-9
MS21083B3	Y92NTM-02	MS21083N5	F52NTE-054	MS21085-04	LH10726-4	MS21244-10	9770-10
MS21083B4	Y92NTE-048	MS21083N6	F52NTE-064	MS21085-05	LH10726-5	MS21244-10C	E11900-10
MS21083B5	Y92NTE-054	MS21083N7	F52NTE-070U	MS21085-06	LH10726-6	MS21244-12	9770-12
MS21083B6	Y92NTE-064	MS21083N8	F52NTE-080	MS21085-07	LH10726-7	MS21244-12C	E11900-12

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MS21244-14C	E11900-14			MS51922-49	10332	NAS1021D3	NMJ-02
MS21244-16	9770-16	MS51866-35	F42ND12-064	MS51922-51	99NE-101	NAS1021D4	NMJ-048
MS21244-16C	E11900-16	MS51866-35B	99ND12-064	MS51922-53	10333	NAS1021D5	68NE-054
		MS51866-35C	79ND12-064	MS51922-54	79NE-108	NAS1021D6	68NE-064
MS21245-8	L55LH7644-080	MS51866-37	F42ND16-064	MS51922-55	99NE-108	NAS1021D7	68NE-070U
MS21245-9	L55LH7644-098	MS51866-37B	99ND16-064	MS51922-56	68NE-108	NAS1021D8	68NE-080
MS21245-10	L55LH7644-108	MS51866-37C	79ND16-064			NAS1021D9	68NE-098
MS21245-12	L55LH7644-126	MS51866-39	F42ND24-064	MS90415-3	LH8099-02	NAS1021D10	68NE-108
MS21245-14	L55LH7644-144	MS51866-39B	99ND24-064	MS90415-4	LH8099-048	NAS1021D12	68NE-126
MS21245-16	L55LH7644-162	MS51866-39C	79ND24-064	MS90415-5	LH8099-054	NAS1021D14	68NE-144
MS21245-18	L55LH7644-182			MS90415-6	LH8099-064	NAS1021D16	68NE-162
MS21245-20	L55LH7644-202	MS51866-43	F42ND22-070	NAS PART No.			
		MS51866-43B	99ND22-070	NAS1021A7	RM1801-070	NAS1021D17	68NE-164
MS21245L8	RMLH7644-080	MS51866-43C	79ND22-070	NAS1021A8	RM1801-080	NAS1021D18	68NE-182
MS21245L9	RMLH7644-098	MS51866-44	F42ND28-070	NAS1021A9	RM1801-098	NAS1021E08	1804-82
MS21245L10	RMLH7644-108	MS51866-44B	99ND28-070	NAS1021A10	RM1801-108	NAS1021N04	F22NM-40
MS21245L12	RMLH7644-126	MS51866-44C	79ND28-070	NAS1021A11	RM1801-108	NAS1021N06	F22NM-62
MS21245L14	RMLH7644-144			NAS1021A12	RM1801-126	NAS1021N08	F22NM-82
MS21245L16	RMLH7644-162	MS51866-47	F42ND24-080	NAS1021A14	RM1801-144	NAS1021N3	F22NM-02
MS21245L18	RMLH7644-182	MS51866-47B	99ND24-080	NAS1021A16	RM1801-162	NAS1021N4	F42NE-048
MS21245L20	RMLH7644-202	MS51866-47C	79ND24-080	NAS1021A17	RM1801-164	NAS1021N5	F42NE-054
MS21245L22	RMLH7644-222	MS51866-48	F42ND28-080			NAS1021N6	F52NE-064
MS21245L24	RMLH7644-242	MS51866-48B	99ND28-080	NAS1021AX8	F1801-080	NAS1021N7	F52NE-070U
		MS51866-48C	79ND28-080	NAS1021AX9	F1801-098	NAS1021N8	F52NE-080
MS51866-1	F22ND8-82			NAS1021AX10	F1801-108	NAS1021N9	F52NE-098
MS51866-1B	99ND8-82	MS51922-1	10320	NAS1021AX12	F1801-126	NAS1021N10	F52NE-108
MS51866-1C	79ND8-82	MS51922-2	79NE-040	NAS1021AX14	F1801-144	NAS1021N12	F52NE-126
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MS51866-3B	99ND12-82	MS51922-5	10321	NAS1021AX17	F1801-164	NAS1021N16	F52NE-162
MS51866-3C	79ND12-82	MS51922-6	79NE-048			NAS1021N17	F52NE-164
		MS51922-7	99NE-048	NAS1021B04	Y92NM-40	NAS1021N18	F52NE-182
MS51866-8	F22ND8-02	MS51922-9	10322	NAS1021B06	Y92NM-62	NAS1021N20	F52NE-202
MS51866-8B	99ND8-02	MS51922-11	99NE-058	NAS1021B08	Y92NM-82		
MS51866-8C	79ND8-02	MS51922-13	10323	NAS1021B3	Y92NM-02		
MS51866-10	F22ND12-02	MS51922-14	79NE-054	NAS1021B4	Y92NE-048	NAS1022A8	RMLH7644-080
MS51866-10B	99ND12-02	MS51922-15	99NE-054	NAS1021B5	Y92NE-054	NAS1022A9	RMLH7644-098
MS51866-10C	79ND12-02	MS51922-16	68NE-054	NAS1021B6	Y92NE-064	NAS1022A10	RMLH7644-108
MS51866-14	F22ND20-02	MS51922-17	10324	NAS1021B7	Y92NE-070U	NAS1022A12	RMLH7644-126
MS51866-14B	99ND20-02	MS51922-18	79NE-066	NAS1021B8	Y92NE-080	NAS1022A14	RMLH7644-144
MS51866-14C	79ND20-02	MS51922-19	99NE-066	NAS1021B9	Y92NE-098	NAS1022A16	RMLH7644-162
MS51866-18	F42ND12-048	MS51922-21	10325	NAS1021B10	Y92NE-108	NAS1022A17	RMLH7644-164
MS51866-18B	99ND12-048	MS51922-22	79NE-064	NAS1021B12	Y92NE-126	NAS1022A18	RMLH7644-182
MS51866-18C	79ND12-048	MS51922-23	99NE-064			NAS1022A20	RMLH7644-202
MS51866-20	F42ND16-048	MS51922-24	68NE-064	NAS1021C04	1803-40		
MS51866-20B	99ND16-048	MS51922-25	10326	NAS1021C06	1803-62	NAS1022AX8	LH7644-080
MS51866-20C	79ND16-048	MS51922-29	10327	NAS1021C08	1803-82	NAS1022AX9	LH7644-098
MS51866-23	F42ND24-048	MS51922-31	99NE-070U	NAS1021C3	1803-02	NAS1022AX10	LH7644-108
MS51866-23B	99ND24-048	MS51922-32	68NE-070U	NAS1021C4	1803-048	NAS1022AX12	LH7644-126
MS51866-23C	79ND24-048	MS51922-33	10328	NAS1021C5	1803-054	NAS1022AX14	LH7644-144
		MS51922-35	99NE-083	NAS1021C6	1803-064	NAS1022AX16	LH7644-162
MS51866-27	F42ND12-054	MS51922-37	10329	NAS1021C7	1803-070U	NAS1022AX17	LH7644-164
MS51866-27B	99ND12-054	MS51922-38	79NE-080	NAS1021C8	1803-080	NAS1022AX18	LH7644-182
MS51866-27C	79ND12-054	MS51922-39	99NE-080	NAS1021C9	1803-098	NAS1022AX20	LH7644-202
MS51866-29	F42ND16-054	MS51922-40	68NE-080	NAS1021C10	1803-108		
MS51866-29B	99ND16-054	MS51922-41	10330	NAS1021C12	1803-126	NAS1022B06	Y92NTM-62
MS51866-29C	79ND16-054	MS51922-45	10331			NAS1022B08	Y92NTM-82
MS51866-32	F42ND24-054	MS51922-46	79NE-098	NAS1021D04	NMJ-40	NAS1022B3	Y92NTM-02
MS51866-32B	99ND24-054	MS51922-47	99NE-098	NAS1021D06	NMJ-62	NAS1022B4	Y92NTE-048

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NAS1022B5	Y92NTE-054	NAS1023C6	70ZA1-064	NAS1025N3K	F22NA17A-02BC	NAS1029N5K	F22NA797-054BC
NAS1022B6	Y92NTE-064	NAS1023C6K	70ZA1-064BC	NAS1025N4	F22NA17A-048	NAS1030N06	F22NA897-62
NAS1022B7	Y92NTE-070U			NAS1025N5	F22NA17A-054	NAS1030N06K	F22NA897-62BC
NAS1022B8	Y92NTE-080	NAS1023D04K	NAJ1-40BC	NAS1025N5K	F22NA17A-054BC	NAS1030N08	F22NA897-82
NAS1022B9	Y92NTE-098	NAS1023D06	NAJ1-62			NAS1030N08K	F22NA897-82BC
NAS1022B10	Y92NTE-108	NAS1023D06K	NAJ1-62BC	NAS1027D06	NAJ5-62	NAS1030N3	F22NA897-02
NAS1022B12	Y92NTE-126	NAS1023D08	NAJ1-82	NAS1027D06K	NAJ5-62BC	NAS1030N3K	F22NA897-02BC
NAS1022B14	Y92NTE-144	NAS1023D08K	NAJ1-82BC	NAS1027D08	NAJ5-82	NAS1030N4	F22NA897-048
NAS1022B16	Y92NTE-162	NAS1023D3	NAJ1-02	NAS1027D08K	NAJ5-82BC	NAS1030N4K	F22NA897-048BC
NAS1022B17	Y92NTE-164	NAS1023D3K	NAJ1-02BC	NAS1027D3	NAJ5-02		
NAS1022B18	Y92NTE-182	NAS1023D4	NAJ1-048	NAS1027D4	NAJ5-048		
NAS1022B20	Y92NTE-202	NAS1023D4K	NAJ1-048BC	NAS1027D4K	NAJ5-048BC	NAS1031D06	NAJ401-62
		NAS1023D5	68NA1-054	NAS1027D5	68NA5-054	NAS1031D06K	NAJ401-62BC
NAS1022C6	LH8647-6	NAS1023D5K	68NA1-054BC	NAS1027D5K	68NA5A-054BC	NAS1031D08	NAJ401-82
NAS1022C7	LH8647-7	NAS1023D6	68NA1-064	NAS1027D6	68NA5-064	NAS1031D08K	NAJ401-82BC
NAS1022C8	101LH9074-8	NAS1023D6K	68NA1-064BC	NAS1027D6K	68NA5-064BC	NAS1031D3	NAJ401-02
NAS1022C9	101LH9074-9	NAS1023D7	68NA1Q-070	NAS1027D7	68NA5Q-070	NAS1031D3K	NAJ401-02BC
NAS1022C10	101LH9074-10	NAS1023D9	68NA1Q-098	NAS1027D8	68NA5Q-080	NAS1031D4	NAJ2674-048
NAS1022C12	101LH9074-12	NAS1023D10	68NA1Q-108	NAS1027D10	68NA5Q-108	NAS1031D4K	NAJ2674-048BC
NAS1022C14	101LH9074-14						
NAS1022C16	101LH9074-16	NAS1023N04	F22NA1-40	NAS1027N06	F22NA5-62	NAS1031N06	FNA401-62
		NAS1023N04K	F22NA1-40BC	NAS1027N06K	F22NA5-62BC	NAS1031N06K	FNA401-62BC
NAS1022D06	NTMJ-62	NAS1023N06	F22NA1-62	NAS1027N08	F22NA5-82	NAS1031N08	FNA401-82
NAS1022D08	NTMJ-82	NAS1023N06K	F22NA1-62BC	NAS1027N08K	F22NA5-82BC	NAS1031N08K	FNA401-82BC
NAS1022D3	NTMJ-02	NAS1023N08	F22NA1-82	NAS1027N3	F22NA5-02	NAS1031N3	FNA401-02
NAS1022D4	68NTE-048	NAS1023N08K	F22NA1-82BC	NAS1027N3K	F22NA5-02BC	NAS1031N3K	FNA401-02BC
NAS1022D5	68NTE-054	NAS1023N3	F22NA1-02	NAS1027N4	F22NA5-048	NAS1031N4	FNA401-048
NAS1022D6	68NTE-064	NAS1023N3K	F22NA1-02BC	NAS1027N4K	F22NA5-048BC	NAS1031N4K	FNA401-048BC
NAS1022D7	68NTE-070U	NAS1023N4	F22NA1-048	NAS1027N5	F22NA5-054	NAS1031N5	FNA401-054
NAS1022D8	68NTE-080	NAS1023N5	F22NA1-054	NAS1027N5K	F22NA5A-054BC	NAS1031N5K	FNA401-054BC
NAS1022D9	68NTE-098	NAS1023N5K	F22NA1-054BC	NAS1027N6	F42NA5-064	NAS1031N6	FNA401-064
NAS1022D10	68NTE-108	NAS1023N6	F42NA1-064	NAS1027N6K	F42NA5-064BC	NAS1031N6K	FNA401-064BC
NAS1022D12	68NTE-126	NAS1023N6K	F42NA1-064BC	NAS1027N7	F52NA5Q-070	NAS1031N7	FNA401Q-070
NAS1022D14	68NTE-144	NAS1023N7	F52NA1Q-070	NAS1027N8	F52NA5Q-080	NAS1031N8	FNA401Q-080
NAS1022D16	68NTE-162	NAS1023N8	F52NA1Q-080	NAS1027N10	F52NA5Q-108		
NAS1022D17	68NTE-164	NAS1023N9	F52NA1Q-098			NAS1032N08	FNA417-82
NAS1022D18	68NTE-182			NAS1028N06	F22NA35-62	NAS1032N08K	FNA417-82BC
NAS1022D20	68NTE-202	NAS1024D08	NAJ38-82	NAS1028N06K	F22NA35-62BC	NAS1032N3	FNA417-02
		NAS1024D08K	NAJ38-82BC	NAS1028N08	F22NA35-82	NAS1032N3K	FNA417-02BC
NAS1022N06	F22NTM-62	NAS1024D3	NAJ38-02	NAS1028N08K	F22NA35-82BC	NAS1032N4	FNA417-048
NAS1022N08	F22NTM-82	NAS1024D3K	NAJ38-02BC	NAS1028N3	F22NA35-02	NAS1032N4K	FNA417-048BC
NAS1022N3	F22NTM-02			NAS1028N3K	F22NA35-02BC		
NAS1022N4	F52NTE-048	NAS1024N06	F22NA38-62	NAS1028N4	F22NA35-048	NAS1033D06	NAJ27-J-62
NAS1022N5	F52NTE-054	NAS1024N06K	F22NA38-62BC	NAS1028N4K	F22NA35-048BC	NAS1033D06K	NAJ27-J-62BC
NAS1022N6	F52NTE-064	NAS1024N08	F22NA38-82	NAS1028N5	F22NA35-054	NAS1033D08	NAJ27-J-82
NAS1022N7	F52NTE-070U	NAS1024N08K	F22NA38-82BC	NAS1028N5K	F22NA35-054BC	NAS1033D08K	NAJ27-J-82BC
NAS1022N8	F52NTE-080	NAS1024N3	F22NA38-02	NAS1028N6	F22NA35-064	NAS1033D3	NAJ27-J-02
NAS1022N9	F52NTE-098	NAS1024N3K	F22NA38-02BC			NAS1033D3K	NAJ27-J-02BC
NAS1022N10	F52NTE-108	NAS1024N4	F22NA38-048	NAS1029D5K	68NA797-054BC		
NAS1022N12	F52NTE-126	NAS1024N4K	F22NA38-048BC			NAS1033N06	F22NA27-22-62
NAS1022N14	F52NTE-144	NAS1024N5	F22NA38-054	NAS1029N06	F22NA797-62	NAS1033N06K	F22NA27-22-62BC
NAS1022N16	F52NTE-162	NAS1024N6	F52NA38-064	NAS1029N06K	F22NA797-62BC	NAS1033N08	F22NA27-22-82
NAS1022N17	F52NTE-164	NAS1024N6K	F52NA38-064BC	NAS1029N08	F22NA797-82	NAS1033N08K	F22NA27-22-82BC
NAS1022N18	F52NTE-182			NAS1029N08K	F22NA797-82BC	NAS1033N3	F22NA27-22-02
NAS1022N20	F52NTE-202	NAS1025N06	F22NA17A-62	NAS1029N3	F22NA797-02	NAS1033N3K	F22NA27-22-02BC
		NAS1025N06K	F22NA17A-62BC	NAS1029N3K	F22NA797-02BC	NAS1033N4	F42NA27-22-048
NAS1023C5	70ZA1W-054	NAS1025N08	F22NA17A-82	NAS1029N4	F22NA797-048	NAS1033N4K	F22NA27-22-048BC
NAS1023C5K	70ZA1W-054BC	NAS1025N08K	F22NA17A-82BC	NAS1029N4K	F22NA797-048BC	NAS1033N5	F42NA27-22-054
NAS1023C5W	70ZA1WP-054	NAS1025N3	F22NA17A-02	NAS1029N5	F22NA797-054	NAS1033N5K	F22NA27-22-054BC

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NAS1034A *	RM52LHTG51-82 *	NAS1291X06	F52LH3324-62	NAS1758L20	LH11848-20	NAS1791A3-1	F14421-1-3
NAS1034C *	LHTG51-2860-82 *	NAS1291X08	F52LH3324-82	NAS1758L22	LH11848-22	NAS1791A3-2	F14421-2-3
NAS1035AX *	F52LHTG51-02 *	NAS1291X3	F52LH3324-02	NAS1758L24	LH11848-24	NAS1791A3-3	F14421-3-3
NAS1035A *	RM52LHTG51-02 *	NAS1291X4	F52LH3324-048	NAS1759-3	L55LH6520-02	NAS1791A3-4	F14421-4-3
NAS1035C *	LHTG51-2860-02 *	NAS1291X5	F52LH3324-054	NAS1759-4	L55LH6520-048	NAS1791A3-5	F14421-5-3
NAS1035N *	F22NG41-02-J *	NAS1291X6	F52LH3324-064	NAS1759-5	L55LH6520-054	NAS1791A3-6	F14421-6-3
NAS1035P *	RM52LHTG51-02-J *	NAS1291X7	F52LH3324-070	NAS1759-6	L55LH6520-064	NAS1791A4-1	F14421-1-4
NAS1036A *	RM52LHTG51-048 *	NAS1291X8	F52LH3324-080	NAS1759-7	L55LH6520-070	NAS1791A4-2	F14421-2-4
NAS1040PX *	F52LHTG55-02-J *	NAS1291X10	F52LH3324-108	NAS1759-8	L55LH6520-080	NAS1791A4-3	F14421-3-4
NAS1041A *	RM52LHTG55-048 *	NAS1473A08	FMA2502-82	NAS1759-9	L55LH6520-098	NAS1791A4-4	F14421-4-4
NAS1041N *	F22NG5-048-J *	NAS1473A3	FMA2502-02	NAS1759-10	L55LH6520-108	NAS1791A4-5	F14421-5-4
NAS1041P *	RM52LHTG55-048-J *	NAS1473A4	FMA2502-048	NAS1759-12	L55LH6520-126	NAS1791A4-6	F14421-6-4
NAS1291-02	RM52LH3324-26	NAS1473A5	FMA2502-054	NAS1759-14	L55LH6520-144	NAS1791A5-1	F14421-1-5
NAS1291-04	RM52LH3324-40	NAS1473C08	A4508-82	NAS1759-16	L55LH6520-162	NAS1791A5-2	F14421-2-5
NAS1291-06	RM52LH3324-62	NAS1473C3	A4508-02	NAS1759-18	L55LH6520-18	NAS1791A5-3	F14421-3-5
NAS1291-08	RM52LH3324-82	NAS1474A3	MA2506-02	NAS1759-20	L55LH6520-20	NAS1791A5-4	F14421-4-5
NAS1291-3	RM52LH3324-02	NAS1474A4	MA2506-048	NAS1759-22	L55LH6520-22	NAS1791A5-5	F14421-5-5
NAS1291-4	RM52LH3324-048	NAS1474C06	A4506-62	NAS1759-24	L55LH6520-24	NAS1791A5-6	F14421-6-5
NAS1291-5	RM52LH3324-054	NAS1474C08	A4506-82	NAS1759L3	RMLH6520-3	NAS1791C3-1	F18421L-1-3
NAS1291-6	RM52LH3324-064	NAS1474C3	A4506-02	NAS1759L4	RMLH6520-4	NAS1791C3-2	F18421L-2-3
NAS1291-7	RM52LH3324-070	NAS1474C4	A4506-048	NAS1759L5	RMLH6520-5	NAS1791C3-3	F18421L-3-3
NAS1291-8	RM52LH3324-080	NAS1474A82	A2506-82	NAS1759L6	RMLH6520-6	NAS1791C3-4	F18421L-4-3
NAS1291-10	RM52LH3324-108	NAS1474X3	F52MA2506-02	NAS1759L7	RMLH6520-7	NAS1791C3-5	F18421L-5-3
NAS1291C02	LH3858-26	NAS1474X3	F52MA2506-02	NAS1759L8	RMLH6520-8	NAS1791C3-6	F18421L-6-3
NAS1291C02M	RMLH3858-26	NAS1757L8	RMLH12284-8	NAS1759L9	RMLH6520-9	NAS1791C4-1	F18421L-1-4
NAS1291C04	LH3858-40	NAS1757L9	RMLH12284-9	NAS1759L10	RMLH6520-10	NAS1791C4-2	F18421L-2-4
NAS1291C04M	RMLH3858-40	NAS1757L10	RMLH12284-10	NAS1759L12	RMLH6520-12	NAS1791C4-3	F18421L-3-4
NAS1291C06	LH3858-62	NAS1757L12	RMLH12284-12	NAS1759L14	RMLH6520-14	NAS1791C4-4	F18421L-4-4
NAS1291C06M	RMLH3858-62	NAS1757L14	RMLH12284-14	NAS1759L16	RMLH6520-16	NAS1791C4-5	F18421L-5-4
NAS1291C08	LH3858-82	NAS1757L16	RMLH12284-16	NAS1759L18	RMLH6520-18	NAS1791C4-6	F18421L-6-4
NAS1291C08M	RMLH3858-82	NAS1757L18	RMLH12284-18	NAS1759L20	RMLH6520-20	NAS1791C5-1	F18421L-1-5
NAS1291C3	LH3858-02	NAS1757L18	RMLH12284-18	NAS1759L22	RMLH6520-22	NAS1791C5-2	F18421L-2-5
NAS1291C3M	RMLH3858-02	NAS1757L20	RMLH12284-20	NAS1759L24	RMLH6520-24	NAS1791C5-3	F18421L-3-5
NAS1291C4	LH3858-048	NAS1757L20	RMLH12284-20	NAS1765-3	RM52LHA3022-02	NAS1791C5-4	F18421L-4-5
NAS1291C4M	RMLH3858-048	NAS1757-8	LH12284-8	NAS1765-3C	101F9224-3	NAS1791C5-5	F18421L-5-5
NAS1291C5	LH3858-054	NAS1757-9	LH12284-9	NAS1765-4	104F9224-3	NAS1791C5-6	F18421L-6-5
NAS1291C5M	RMLH3858-054	NAS1757-10	LH12284-10	NAS1765-4C	RM52LHA3022-048	NAS1792C3-1	F18427L-1-3
NAS1291C6	LH3858-064	NAS1757-12	LH12284-12	NAS1765-4CL	101F9224-4	NAS1792C3-2	F18427L-2-3
NAS1291C6M	RMLH3858-064	NAS1757-14	LH12284-14	NAS1765-5	104F9224-4	NAS1792C3-3	F18427L-3-3
NAS1291C7	LH3858-070	NAS1757-16	LH12284-16	NAS1765-5C	RM52LHA3022-054	NAS1792C3-4	F18427L-4-3
NAS1291C7M	RMLH3858-070	NAS1757-18	LH12284-18	NAS1765-5CL	101F9224-5	NAS1792C3-5	F18427L-5-3
NAS1291C8	LH3858-080	NAS1757-20	LH12284-20	NAS1765-C3	104F9224-5	NAS1792C3-6	F18427L-6-3
NAS1291C8M	RMLH3858-080	NAS1758L3	LH11848-3	NAS1765-C4	101F9224-3	NAS1792C4-1	F18427L-1-4
NAS1291X02	F52LH3324-26	NAS1758L4	LH11848-4	NAS1765-C5	101F9224-4	NAS1792C4-2	F18427L-2-4
NAS1291X04	F52LH3324-40	NAS1758L5	LH11848-5	NAS1765-CL3	109F9224-3	NAS1792C4-3	F18427L-3-4
		NAS1758L6	LH11848-6	NAS1765-CL4	109F9224-4	NAS1792C4-4	F18427L-4-4
		NAS1758L7	LH11848-7	NAS1765-CL5	109F9224-5	NAS1792C4-5	F18427L-5-4
		NAS1758L8	LH11848-8	NAS1766-3	RM52LHTA525-02	NAS1792C4-6	F18427L-6-4
		NAS1758L9	LH11848-9	NAS1766-4	RM52LHTA525-048	NAS1792C5-1	F18427L-1-5
		NAS1758L10	LH11848-10	NAS1766-5	RM52LHTA525-054	NAS1792C5-2	F18427L-2-5
		NAS1758L12	LH11848-12	NAS1766-3CL	F10965-1-3	NAS1792C5-3	F18427L-3-5
		NAS1758L14	LH11848-14	NAS1766-4CL	F10965-1-4		
		NAS1758L16	LH11848-16	NAS1766-5CL	F10965-1-5		
		NAS1758L18	LH11848-18				

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NAS1792C5-4	F18427L4-5	NAS1793C5-1	F18425L1-5	NAS1803-3BAC	F11885-10-02	NAS1804-4N	LH18A-4
NAS1792C5-5	F18427L5-5	NAS1793C5-2	F18425L2-5			NAS1804-5N	LH18A-5
NAS1792C5-6	F18427L6-5	NAS1793C5-3	F18425L3-5	NAS1803-3B1	A6293-9-02	NAS1804-6N	LH18A-6
		NAS1793C5-4	F18425L4-5	NAS1803-3B2	A6293-10-02	NAS1804-7N	LH18A-7
NAS1792A3-1	F14427-1-3	NAS1793C5-5	F18425L5-5	NAS1803-3B3	A6293-11-02	NAS1804-8N	LH18A-8
NAS1792A3-2	F14427-2-3	NAS1793C5-6	F18425L6-5	NAS1803-3B4	A6293-2-02	NAS1804-9N	LH18A-9
NAS1792A3-3	F14427-3-3			NAS1803-3B5	A6293-3-02	NAS1804-10N	LH18A-10
NAS1792A3-4	F14427-4-3	NAS1794A3-1	G14421-1-3	NAS1803-3B6	A6293-12-02	NAS1804-12N	LH18A-12
NAS1792A3-5	F14427-5-3	NAS1794A3-2	G14421-2-3	NAS1803-3B7	A6293-13-02	NAS1804-14N	LH18A-14
NAS1792A3-6	F14427-6-3	NAS1794A3-3	G14421-3-3	NAS1803-3B8	A6293-14-02	NAS1804-16N	LH18A-16
		NAS1794A3-4	G14421-4-3	NAS1803-3B9	A6293-15-02	NAS1804-18N	LH18A-18
NAS1792A4-1	F14427-1-4	NAS1794A3-5	G14421-5-3	NAS1803-3B10	A6293-16-02	NAS1804-20N	LH18A-20
NAS1792A4-2	F14427-2-4	NAS1794A3-6	G14421-6-3	NAS1803-3B11	A6293-17-02	NAS1804-22N	LH18A-22
NAS1792A4-3	F14427-3-4					NAS1804-24N	LH18A-24
NAS1792A4-4	F14427-4-4	NAS1794A4-1	G14421-1-4	NAS1803-3B1C	F11885-9-3	NAS1804-32N	LH18A-32
NAS1792A4-5	F14427-5-4	NAS1794A4-2	G14421-2-4	NAS1803-3B2C	F11885-10-3		
NAS1792A4-6	F14427-6-4	NAS1794A4-3	G14421-3-4	NAS1803-3B3C	F11885-11-3	NAS1805-3	109LH8574A-3
		NAS1794A4-4	G14421-4-4	NAS1803-3B4C	F11885-2-3	NAS1805-4	109LH8574A-4
NAS1792A5-1	F14427-1-5	NAS1794A4-5	G14421-5-4	NAS1803-3B5C	F11885-3-3	NAS1805-5	109LH8574A-5
NAS1792A5-2	F14427-2-5	NAS1794A4-6	G14421-6-4	NAS1803-3B6C	F11885-12-3	NAS1805-6	109LH8574A-6
NAS1792A5-3	F14427-3-5			NAS1803-3B7C	F11885-13-3	NAS1805-7	109LH8574A-7
NAS1792A5-4	F14427-4-5	NAS1794A5-1	G14421-1-5	NAS1803-3B8C	F11885-14-3	NAS1805-8	109LH8574A-8
NAS1792A5-5	F14427-5-5	NAS1794A5-2	G14421-2-5	NAS1803-3B9C	F11885-15-3	NAS1805-9	109LH8574A-9
NAS1792A5-6	F14427-6-5	NAS1794A5-3	G14421-3-5	NAS1803-3B10C	F11885-16-3	NAS1805-10	109LH8574A-10
		NAS1794A5-4	G14421-4-5	NAS1803-3B11C	F11885-17-3	NAS1805-12	109LH8574A-12
NAS1793A3-1	F19425-1-3	NAS1794A5-5	G14421-5-5	NAS1803-3B12C	F11885-18-3	NAS1805-14	109LH8574A-14
NAS1793A3-2	F19425-2-3	NAS1794A5-6	G14421-6-5	NAS1803-3B13C	F11885-19-3	NAS1805-16	109LH8574A-16
NAS1793A3-3	F19425-3-3					NAS1805-18	109LH8574A-18
NAS1793A3-4	F19425-4-3	NAS1802-3A10C	F11886-16-02	NAS1803-4B1	A6293-09-048	NAS1805-20	109LH8574A-20
NAS1793A3-5	F19425-5-3			NAS1803-4B2	A6293-10-048	NAS1805-22	118LH8574A-22
NAS1793A3-6	F19425-6-3	NAS1803B12C	F11885-18-3	NAS1803-4B3	A6293-11-048	NAS1805-24	118LH8574A-24
				NAS1803-4B4	A6293-2-048	NAS1805-28	118LH8574A-28
NAS1793A4-1	F19425-1-4	NAS1803-3A1	A6792-9-02	NAS1803-4B5	A6293-3-048	NAS1805-32	118LH8574A-32
NAS1793A4-2	F19425-2-4	NAS1803-3A2	A6792-10-02	NAS1803-4B6	A6293-12-048		
NAS1793A4-3	F19425-3-4	NAS1803-3A3	A6792-11-02	NAS1803-4B7	A6293-13-048	NAS1805-3N	121LH8574A-3
NAS1793A4-4	F19425-4-4	NAS1803-3A4	A6792-2-02	NAS1803-4B8	A6293-14-048	NAS1805-4N	121LH8574A-4
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NAS1793A4-6	F19425-6-4	NAS1803-3A6	A6792-12-02	NAS1803-4B11	A6293-17-048	NAS1805-6N	121LH8574A-6
		NAS1803-3A7	A6792-13-02	NAS1803-4B12	A6293-18-048	NAS1805-7N	121LH8574A-7
NAS1793A5-1	F19425-1-5	NAS1803-3A8	A6792-14-02	NAS1803-4B13	A6293-19-048	NAS1805-8N	121LH8574A-8
NAS1793A5-2	F19425-2-5	NAS1803-3A9	A6792-15-02			NAS1805-9N	121LH8574A-9
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NAS1793A5-4	F19425-4-5	NAS1803-3A11	A6792-17-02	NAS1804-4	RMLH18A-4	NAS1805-12N	121LH8574A-12
NAS1793A5-5	F19425-5-5	NAS1803-3A12	A6792-18-02	NAS1804-5	RMLH18A-5	NAS1805-14N	121LH8574A-14
NAS1793A5-6	F19425-6-5	NAS1803-3A13	A6792-19-02	NAS1804-6	RMLH18A-6	NAS1805-16N	121LH8574A-16
				NAS1804-7	RMLH18A-7	NAS1805-18N	121LH8574A-18
NAS1793C3-1	F18425L1-3	NAS1803-3A1C	F11886-9-3	NAS1804-8	RMLH18A-8	NAS1805-20N	121LH8574A-20
NAS1793C3-2	F18425L2-3	NAS1803-3A2C	F11886-10-3	NAS1804-9	RMLH18A-9	NAS1805-22N	121LH8574A-22
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NAS1793C3-4	F18425L4-3	NAS1803-3A4C	F11886-2-3	NAS1804-12	RMLH18A-12	NAS1805-28N	121LH8574A-28
NAS1793C3-5	F18425L5-3	NAS1803-3A5C	F11886-3-3	NAS1804-14	RMLH18A-14	NAS1805-32N	121LH8574A-32
NAS1793C3-6	F18425L6-3	NAS1803-3A6C	F11886-12-3	NAS1804-18	RMLH18A-18		
		NAS1803-3A7C	F11886-13-3	NAS1804-20	RMLH18A-20	NAS1805-3P	LH8574A-3
NAS1793C4-1	F18425L1-4	NAS1803-3A8C	F11886-14-3	NAS1804-22	RMLH18A-22	NAS1805-4P	LH8574A-4
NAS1793C4-2	F18425L2-4	NAS1803-3A9C	F11886-15-3	NAS1804-24	RMLH18A-24	NAS1805-5P	LH8574A-5
NAS1793C4-3	F18425L3-4	NAS1803-3A10C	F11886-16-3	NAS1804-28	RMLH18A-28	NAS1805-6P	LH8574A-6
NAS1793C4-4	F18425L4-4	NAS1803-3A12C	F11886-18-3	NAS1804-32	RMLH18A-32	NAS1805-7P	LH8574A-7
NAS1793C4-5	F18425L5-4	NAS1803-3A13C	F11886-19-3			NAS1805-8P	LH8574A-8
NAS1793C4-6	F18425L6-4			NAS1804-3N	LH18A-3	NAS1805-9P	LH8574A-9

AN/MS/NAS/ESNA® CONVERSION TABLES





AN/MS/NAS Standard Parts	ESNA Nomenclature	AN/MS/NAS Standard Parts	ESNA Nomenclature	AN/MS/NAS Standard Parts	ESNA Nomenclature	AN/MS/NAS Standard Parts	ESNA Nomenclature
NAS1805-10P	LH8574A-10	NAS577-10AX	LH2577-108	NAS578-5B	3320-054RET	NAS690P-*	RM52LHTG51-048-J-*
NAS1805-12P	LH8574A-12	NAS577-12AX	LH2577-126	NAS578-6B	3320-064RET	NAS690PX-*	F52LHTG51-048-J-*
NAS1805-14P	LH8574A-14	NAS577-14AX	LH2577-144	NAS578-7B	3320-070RET	NAS691A-*	RM52LHTG51-054-*
NAS1805-16P	LH8574A-16	NAS577-16AX	LH2577-162	NAS578-8B	3320-080RET	NAS691P-*	RM52LHTG51-054-J-*
NAS1805-18P	LH8574A-18	NAS577-17AX	LH2577-164	NAS578-9B	3320-098RET	NAS691PX-*	F52LHTG51-054-J-*
NAS1805-20P	LH8574A-20			NAS578-10B	3320-108RET	NAS693A-*	RM52LHTG55-82-*
NAS1805-22P	117LH8574A-22	NAS577B4A	1MLBF577-4	NAS578-12B	3320-126RET	NAS693P-*	RM52LHTG55-82-J-*
NAS1805-24P	117LH8574A-24	NAS577B5A	1MLBF577-5	NAS578-14B	3320-144RET	NAS693PX-*	F52LHTG55-82-J-*
NAS1805-28P	117LH8574A-28	NAS577B6A	1MLBF577-6	NAS578-16B	3320-162RET	NAS694A-*	RM52LHTG55-02-*
NAS1805-32P	117LH8574A-32	NAS577B7A	1MLBF577-7			NAS694AX-*	F52LHTG55-02-*
		NAS577B8A	1MLBF577-8	NAS688A-*	RM52LHTG51-82-*	NAS694P-*	RM52LHTG55-02-J-*
NAS577-4A	RMLH2577-048	NAS577B9A	1MLBF577-9	NAS688AX-*	F52LHTG51-82-*	NAS694PX-*	F52LHTG55-02-J-*
NAS577-5A	RMLH2577-054	NAS577B10A	1MLBF577-10	NAS688P-*	RM52LHTG51-82-J-*	NAS695A-*	RM52LHTG55-048-*
NAS577-6A	RMLH2577-064	NAS577B12A	1MLBF577-12	NAS688PX-*	F52LHTG51-82-J-*	NAS695P-*	RM52LHTG55-048-J-*
NAS577-7A	RMLH2577-070	NAS577B14A	1MLBF577-14				
NAS577-8A	RMLH2577-080	NAS577B16A	1MLBF577-16	NAS689A-*	RM52LHTG51-02-*		
NAS577-9A	RMLH2577-098			NAS689AX-*	F52LHTG51-02-*		
NAS577-10A	RMLH2577-108	NAS578-4A	2577-048RET	NAS689PX-*	F52LHTG51-02-J-*		
NAS577-12A	RMLH2577-126	NAS578-5A	2577-054RET				
NAS577-14A	RMLH2577-144	NAS578-6A	2577-064RET	NAS689P-*	RM52LHTG51-02-J-*		
NAS577-16A	RMLH2577-162	NAS578-7A	2577-070RET				
NAS577-17A	RMLH2577-164	NAS578-8A	2577-080RET				
		NAS578-9A	2577-098RET				
NAS577-4AX	LH2577-048	NAS578-10A	2577-108RET				
NAS577-5AX	LH2577-054	NAS578-12A	2577-126RET				
NAS577-6AX	LH2577-064	NAS578-14A	2577-144RET				
NAS577-7AX	LH2577-070	NAS578-16A	2577-162RET				
NAS577-8AX	LH2577-080			NAS690A-*	RM52LHTG51-048-*		
NAS577-9AX	LH2577-098	NAS578-4B	3320-048RET	NAS690AX-*	F52LHTG51-048-*		

* Denotes an additional suffix number to indicate nut spacing.

AN/MS/NAS/ESNA® CONVERSION TABLES



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solutions
for
electronic
assemblies**

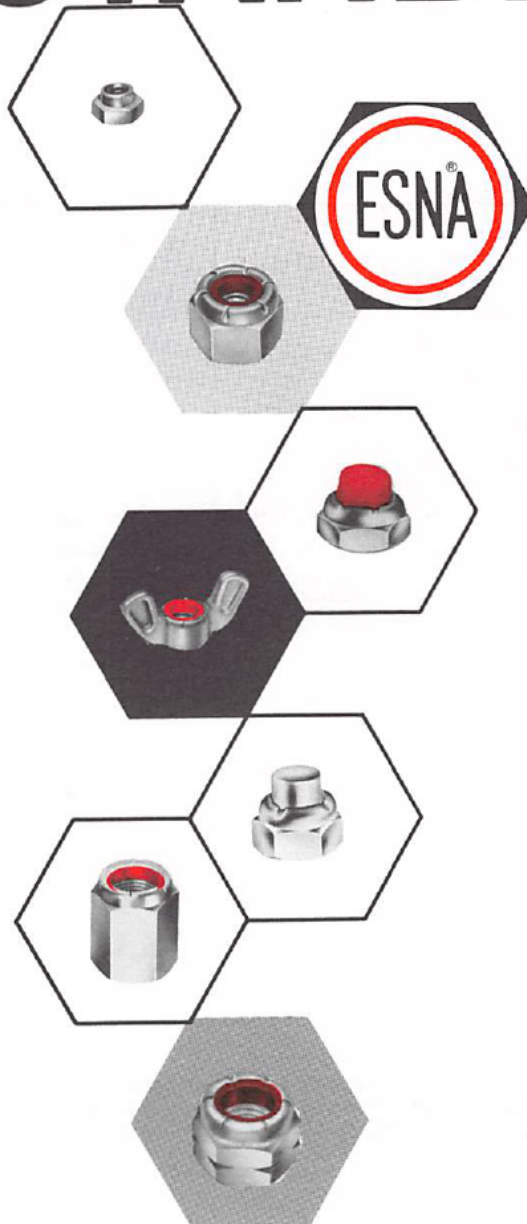
**ESNA
fastener
solutions
for
mechanical
equipment**



For more than 50 years ESNA® has pioneered the design and manufacture of vibration-proof, self-locking fasteners. Parts range from reduced size, weight-saving designs for the electronic and aerospace industry to large high strength hex nuts for machinery and off-highway vehicles. Whether standard or special, ESNA's approved fastener line can save you time and money. Select from hundreds of types, sizes, materials and finishes available. Write on your letterhead for ESNA's VISUAL INDEX of parts and call-out data.

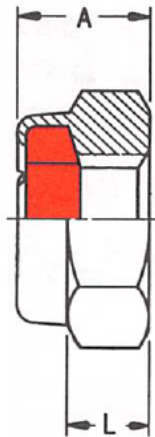
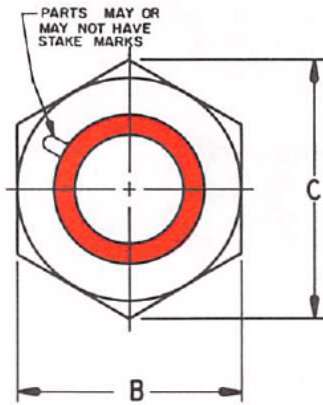


ENGINEERING STANDARDS



SECTION 1 WRENCHABLE NUTS

Part Number	Page Number	Part Number	Page Number
1660	24	N1610	42
LH1660	25	NU1610	42
NM107	26	NKM-NKTM	43
NM408	26	NKE-NKTE	43
NM2234	26	K1, K2, K3	44
NM2297	26	WC	45
TEE2032	26	CE20136	48
NM-NE	27	CE12698	49
NTM-NTE	31	CE12605	50
NU	34	CU	51
NTU	36	CBR32	52
NM-NE (Monel)	38	30000	54
NU	39	31300	55
(Monel)			
N1260	40		
HEX SP(1)	41		



ESNA PART NUMBER						THREAD	A ±.015	B	C REF	L REF
STAINLESS STEEL	APPROX WEIGHT LB/100	ALUMINUM ALLOY	APPROX WEIGHT LB/100	BRASS	APPROX WEIGHT LB/100					
*				92-1660-00	.013	.0600-80UNF-3B	.065	.110 - .104	.119	.045
*		68-1660-12	.006	92-1660-12	.017	.0730-72UNF-3B	.080	.126 - .119	.136	.060
79-1660-26	.036	68-1660-26	.012	92-1660-26	.036	.0860-56UNJC-3B	.095	.157 - .150	.171	.060
*		68-1660-24		92-1660-24		.0860-64UNJF-3B				
*			.021	92-1660-38	.062	.0990-48UNJC-3B	.110	.189 - .181	.207	.070
*				92-1660-36		.0990-56UNJF-3B				
79-1660-40	.060	68-1660-40	.020	92-1660-40	.060	.1120-40UNJC-3B	.110	.189 - .181	.207	.070
*		68-1660-48				.1120-48UNJF-3B				

* CONTACT ESNA FOR AVAILABILITY OF STAINLESS STEEL PARTS IN THESE SIZES.

MATERIAL:

ALUMINUM ALLOY - 2011-T3 OR EQUIV.

BRASS - COMMERCIAL HALF HARD OR EQUIV.

15 STAINLESS STEEL - AISI TYPE 303 OR EQUIV.

FINISH:

ALUMINUM ALLOY - ALODINE, MIL-C-5541.

BRASS-CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 3.

STAINLESS STEEL - UNPLATED.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

THREADS: MIL-S-7742 OR MIL-S-8879.

APPLICATION: TYPE 1660 IS DESIGNED FOR USE ON MANY TYPE OF INSTRUMENTS, ELECTRONIC EQUIPMENT, MISSILES AND RELATED PRODUCTS, WHERE DESIGN FACTORS SUCH AS LIMITED INSTALLATION CLEARANCE, WEIGHT REDUCTION, OR SUB-MINIATURIZATION EFFORTS, REQUIRE A SMALL SELF-LOCKING FASTENER.

PJ- 1800

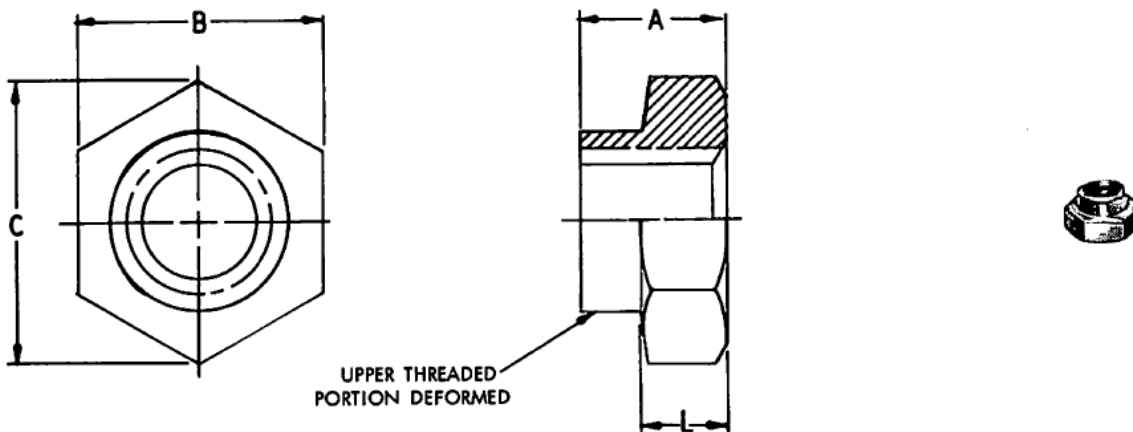
REFERENCE STANDARDS:

NUT-HEX, MINIATURE

1660



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ESNA	PART NUMBERS		THREAD	A ±.005	B	C REF	L REF	APPROX WEIGHT LB/100
	STEEL, 450°F CADMIUM	CRES, 800°F SILVER						
		79LH1660-26	.0860-56UNJC-3B	.095	.157-.150	.171	.051	.028
		79LH1660-40	.1120-40UNJC-3B	.110	.189-.181	.207	.066	.045
F22LH1660-50			.1250-40UNJC-3B	.120	.189-.181	.207	.076	.045
	70LH1660-60		.1380-40UNJF-3B	.140	.220-.212	.233	.085	.088

MATERIAL:

STEEL
CRES, A151 303 OR EQUIV.

FINISH:

F22LH1660-XX CADMIUM PLATE, QQ-P-416, TYPE II, CLASS 2.
70LH1660-XX SILVER PLATE.
79LH1660-XX UNPLATED, PASSIVATED.

THREADS: MIL-S-8879

APPLICATION: TYPE LH1660 NUTS ARE DESIGNED FOR USE ON MANY TYPES OF INSTRUMENTS, ELECTRONIC EQUIPMENT, MISSILES AND RELATED PRODUCTS, WHERE APPLICATION CONDITIONS SUCH AS LIMITED INSTALLATION CLEARANCE, WEIGHT REDUCTION, OR SUB-MINIATURIZATION EFFORTS ON ASSEMBLY DESIGNS, MAKE USE OF AN ALL-METAL, MINIATURE SELF-LOCKING NUT DESIRABLE.

ISSUED: 17 JUNE 59 REVISED: ⑧ 7 MAR 90

PJ-2218-36

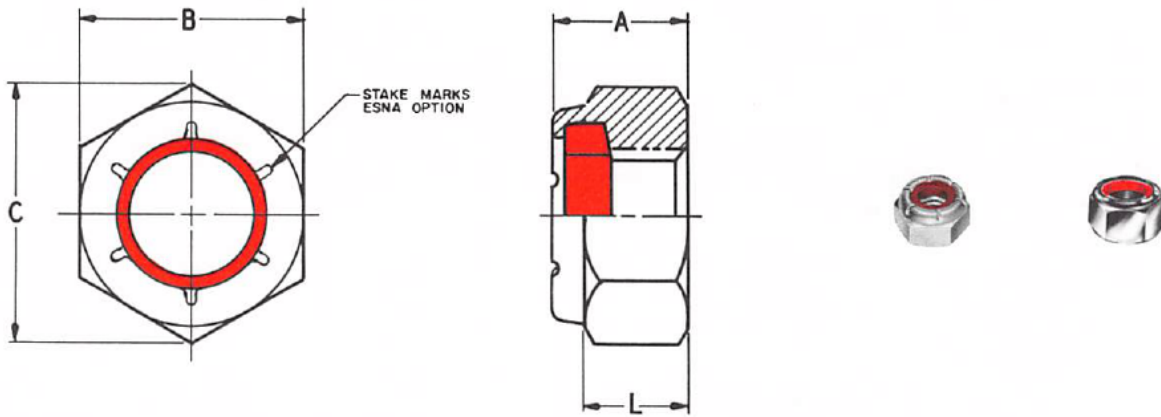
REFERENCE STANDARDS:

NUT-HEX, MINIATURE, ALL METAL,
450°F & 800°F

LH1660



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ESNA PART NUMBER	THREAD	A ±.010	B	C REF	L REF	ULTIMATE TENSILE STRENGTH LB MIN	APPROX. WEIGHT LB/100
22NM107-62	.1380-32UNJC-3B	.143	.251-.243	.268	.081	500	.14
97NM107-62						350	
79NM408-62						560	
22NM408-82	.1640-32UNJC-3B	.180	.313-.305	.339	.103	1,200	.26
79NM408-82						860	
79NM408-02	.1900-32UNJF-3B	.180	.313-.305	.339	.103	1,230	.23
22NM2234-02						1,500	
52M2297-02					.190	.148	1,500
59M2297-02							
79NM408-048	.2500-28UNJF-3B	.239	.376-.367	.410	.190	2,290	.40
52TEE2032-048						.200	

MATERIAL:

- "2" STEEL, UNTREATED.
- "5" STEEL, HEAT TREATED TO ROCKWELL C 29-35.
- "7" STAINLESS STEEL, AISI 303, OR EQUIV.
- "9" BRASS, COMMERCIAL HALF HARD.

FINISH:

- "2" CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 3.
- "7" BRIGHT NICKEL PLATE.
- "9" UNPLATED.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

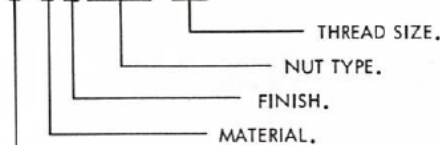
THREADS: MIL-S-8879.

PERFORMANCE: MIL-N-25027, AS APPLICABLE.

APPLICATION: THIS DRAWING LISTS HEXAGONS THAT ARE UNDERSIZE WITH RESPECT TO CONVENTIONAL NUT STANDARDS. THEY ARE OFFERED FOR POSSIBLE USE FOR APPLICATIONS WHERE WRENCH CLEARANCES ARE LIMITED. IN ADDITION TYPE TEE2032-048 HAS BEEN MODIFIED TO PROVIDE AN INCREASED HEX HEIGHT AND IS HEAT TREATED RESULTING IN A PART OF REDUCED ENVELOPE, IMPROVED WRENCHING CHARACTERISTICS AND SUPERIOR TENSILE PERFORMANCE. IT IS ESPECIALLY SUITED FOR USE ON APPLICATIONS LIKE CONNECTING ROD CAP BOLTS.

PART CODING:

F 22 NM107-62



FOR POST PLATE TREATMENT (PER QQ-P-416, TYPE II) ON CADMIUM PLATED PARTS, PREFIX COMPLETE PART NUMBER WITH LETTER "E".

ISSUED: 21 OCT 57 REVISED: (1) 7 MAR 90

REFERENCE STANDARDS:

**NUT—REDUCED HEX,
CONSOLIDATED DRAWING**

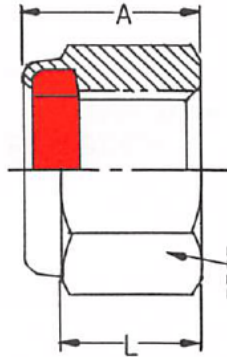
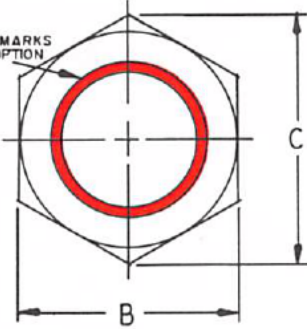
**NM107
NM408 TEE2032
NM2234 M2297**



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STAKE MARKS
ESNA OPTION



MS21044 BRASS PARTS MARKED "B"
MS17830 STAINLESS STEEL PARTS MARKED "B BF"
MARKING ON OTHER BRASS & STAINLESS STEEL
PARTS AT ESNA OPTION.

THREAD SIZE	ESNA PART NUMBER	MATERIAL & FINISH	ULTIMATE TENSILE STRENGTH LB MIN	APPROX WEIGHT LB/100	THREAD	A	B	C REF	L REF
#1	22NM-12	STEEL-CADMIUM		.14	.0730-72UNF-3B	.153 - .133	.251 - .243	.268	.081
#2	22NM-26	STEEL-CADMIUM	440	.14	.0860-56UNJC-3B	.153 - .133	.251 - .243	.268	.081
	68NM-26	ALUMINUM-ANODIZED		.05					
	79NM-26	STAINLESS-UNPLATED	440	.14					
#3	22NM-36	STEEL-CADMIUM		.14	.0990-56UNJF-3B	.153 - .133	.251 - .243	.268	.081
	22NM-38	STEEL-CADMIUM		.14	.0990-48UNJC-3B				
	58NM-38	ALUMINUM-ANODIZED		.05					
	79NM-38	STAINLESS-UNPLATED		.14					
#4	22NM-40	STEEL-CADMIUM	750	.14	.1120-40UNJC-3B	.153 - .133	.251 - .243	.268	.081
	29NM-40	STEEL-UNPLATED			.1120-40UNC-2B				
	68NM-40	ALUMINUM-ANODIZED	350	.05	.1120-40UNJC-3B				
	79NM-40	STAINLESS-UNPLATED	750	.14					
	92NM-40	BRASS-CADMIUM		.15					
	97NM-40	BRASS-BRIGHT NICKEL							
	99NM-40	BRASS-UNPLATED			.1120-48UNJF-3B				
#5	22NM-50	STEEL-CADMIUM	900	.14	.1250-40UNJC-3B	.153 - .133	.251 - .243	.268	.081
	68NM-50	ALUMINUM-ANODIZED	450	.05					
	79NM-50	STAINLESS-UNPLATED	900	.14					
#6	22NM-60	STEEL-CADMIUM	1,250	.26	.1380-40UNJF-3B	.188 - .168	.313 - .305	.339	.103
	29NM-60	STEEL-UNPLATED			.1380-40UNF-2B				
	22NM-62	STEEL-CADMIUM	1,130	.26	.1380-32UNJC-3B				
	29NM-62	STEEL-UNPLATED			.1380-32UNC-2B				
	68NM-62	ALUMINUM-ANODIZED	525	.09	.1380-32UNJC-3B				
	79NM-62	STAINLESS-UNPLATED	1,130	.26					
	97NM-62	BRASS-BRIGHT NICKEL		.28					
99NM-62	BRASS-UNPLATED								
#8	22NM-82	STEEL-CADMIUM	1,720	.42	.1640-32UNJC-3B	.239 - .219	.345 - .336	.374	.140
	29NM-82	STEEL-UNPLATED			.1640-32UNC-2B				
	68NM-82	ALUMINUM-ANODIZED	850	.15	.1640-32UNJC-3B				
	79NM-82	STAINLESS-UNPLATED	1,720	.42					
	92NM-82	BRASS-CADMIUM		.46					
	99NM-82	BRASS-UNPLATED							
	22NM-86	STEEL-CADMIUM	1,850	.42	.1640-36UNJF-3B				

PJ-2400 & 2515

ISSUED: 8 AUG 62 REVISED: (U) I MAY 91

REFERENCE STANDARDS:

AN365 MS51922
MS17830 MS20365
MS21044 NAS1021

NUT-HEX, LIGHT

NM-NE

PAGE 1 OF 4



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THREAD SIZE	ESNA PART NUMBER	MATERIAL & FINISH	ULTIMATE TENSILE STRENGTH LB MIN	APPROX WEIGHT LB/100	THREAD	A	B	C REF	L REF				
#10	22NM-02	STEEL-CADMIUM	2,460	.50	.1900-32UNJF-3B	.249 - .229	.376 - .367	.410	.140				
	29NM-02	STEEL-UNPLATED			.1900-32UNF-2B								
	68NM-02	ALUMINUM-ANODIZED	1,220	.18	.1900-32UNJF-3B								
	79NM-02	STAINLESS-UNPLATED	2,460	.50									
	92NM-02	BRASS-CADMIUM	.55										
	97NM-02	BRASS-BRIGHT NICKEL											
	99NM-02	BRASS-UNPLATED											
	22NM-04	STEEL-CADMIUM		2,100						.50	.1900-24UNJC-3B		
	29NM-04	STEEL-UNPLATED	.1900-24UNC-2B										
	68NM-04	ALUMINUM-ANODIZED	1,000	.18	.1900-24UNJC-3B								
	79NM-04	STAINLESS-UNPLATED	2,010	.50									
	99NM-04	BRASS-UNPLATED	.55										
#12	22NM-124	STEEL-CADMIUM	2,900	.92	.2160-24UNJC-3B	.328 - .298	.439 - .430	.482	.225				
	79NM-124	STAINLESS-UNPLATED			.2160-28UNJF-3B								
	22NM-128	STEEL-CADMIUM	3,100		.2160-28UNJC-3B	.328 - .298	.439 - .430	.482	.225				
1/4	21NE-040	STEEL-ZINC	3,760	.90	.2500-20UNJC-3B								
	29NE-040	STEEL-UNPLATED			.2500-20UNC-2B								
	42NE-040	STEEL-CADMIUM			.98	.2500-20UNJC-3B							
	68NE-040	ALUMINUM-ANODIZED					1,860	.32					
	79NE-040	STAINLESS-UNPLATED					3,760	.90					
	92NE-040	BRASS-CADMIUM					.98						
	99NE-040	BRASS-UNPLATED											
	21NE-048	STEEL-ZINC					.90	.2500-28UNJF-3B					
	29NE-048	STEEL-UNPLATED			.2500-28UNF-2B								
	42NE-048	STEEL-CADMIUM			4,580	.328 - .298			.439 - .430	.482	.225		
	68NE-048	ALUMINUM-ANODIZED			2,270							.32	
	79NE-048	STAINLESS-UNPLATED			4,580							.90	
99NE-048	BRASS-UNPLATED	.98											
5/16	21NE-054	STEEL-ZINC	7,390	1.20	.3125-24UNJF-3B		.359 - .329	.502 - .492				.552	.250
	29NE-054	STEEL-UNPLATED			.3125-24UNF-2B								
	42NE-054	STEEL-CADMIUM			1.20	.3125-24UNJF-3B							
	79NE-054	STAINLESS-UNPLATED							7,390	1.20			
	99NE-054	BRASS-UNPLATED							1.30				
	21NE-058	STEEL-ZINC							1.20	.3125-18UNJC-3B			
	29NE-058	STEEL-UNPLATED									.3125-18UNC-2B		
	42NE-058	STEEL-CADMIUM									6,360		
	68NE-058	ALUMINUM-ANODIZED			3,150	.43							
	79NE-058	STAINLESS-UNPLATED			6,360	1.20							
	99NE-058	BRASS-UNPLATED			1.30								
	3/8	21NE-064			STEEL-ZINC	11,450			1.80	.3750-24UNJF-3B	.468 - .438		
29NE-064		STEEL-UNPLATED	.3750-24UNF-2B										
52NE-064		STEEL-CADMIUM	1.80	.3750-24UNJF-3B									
68NE-064		ALUMINUM-ANODIZED			5,680		.65						
79NE-064		STAINLESS-UNPLATED			11,450		1.80						
99NE-064		BRASS-UNPLATED			2.00								
21NE-066		STEEL-ZINC			1.80		.3750-16UNJC-3B						
29NE-066		STEEL-UNPLATED						.3750-16UNC-2B					
52NE-066		STEEL-CADMIUM	9,540	.3750-16UNJC-3B									
68NE-066		ALUMINUM-ANODIZED	4,730					.65					
79NE-066		STAINLESS-UNPLATED	9,540					1.80					
99NE-066		BRASS-UNPLATED	2.00										
7/16	21NE-070	STEEL-ZINC	15,450		2.30	.4375-20UNJF-3B	.468 - .438	.627 - .616	.698	.324			
	29NE-070	STEEL-UNPLATED				.4375-20UNF-2B							
	52NE-070	STEEL-CADMIUM		2.30		.4375-20UNJF-3B							
	79NE-070	STAINLESS-UNPLATED											

PJ-2400 & 2515

ISSUED: 8 AUG 62 REVISED: ① 1 MAY 91

REFERENCE STANDARDS:

AN365 MS51922
MS17830 MS20365
MS21044 NAS1021

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THREAD SIZE	ESNA PART NUMBER	MATERIAL & FINISH	ULTIMATE TENSILE STRENGTH LB MIN	APPROX WEIGHT LB/100	THREAD	A	B	C REF	L REF	
7/16	52NE-070U	STEEL-CADMIUM	15,450	3.10	.4375-20UNJF-3B	.468 - .438	.690 - .679	.766	.324	
	68NE-070U	ALUMINUM-ANODIZED	7,660	1.10						
	21NE-074	STEEL-ZINC		2.30						.4375-14UNJC-3B
	29NE-074	STEEL-UNPLATED								.4375-14UNC-2B
	52NE-074	STEEL-CADMIUM	13,140		.4375-14UNJC-3B					
	79NE-074	STAINLESS-UNPLATED								
	52NE-074U	STEEL-CADMIUM		3.10	.4375-14UNJC-3B	.468 - .438	.690 - .679	.766	.324	
	79NE-074U	STAINLESS-UNPLATED	13,140							
1/2	21NE-080	STEEL-ZINC		4.30	.5000-20UNJF-3B	.609- .579	.752- .741	.837	.464	
	29NE-080	STEEL-UNPLATED			.5000-20UNF-2B					
	52NE-080	STEEL-CADMIUM	21,110		.5000-20UNJF-3B					
	79NE-080	STAINLESS-UNPLATED	21,110	4.30	.5000-13UNJC-3B					
	99NE-080	BRASS-UNPLATED		4.70						.5000-13UNC-2B
	21NE-083	STEEL-ZINC		4.30	.5000-13UNJC-3B					
	29NE-083	STEEL-UNPLATED			.5000-13UNC-2B					
	52NE-083	STEEL-CADMIUM	17,730		.5000-13UNJC-3B					
	79NE-083	STAINLESS-UNPLATED								
	99NE-083	BRASS-UNPLATED		4.70						
9/16	21NE-098	STEEL-ZINC		7.10	.5625-18UNJF-3B	.656- .626	.877- .865	.978	.469	
	29NE-098	STEEL-UNPLATED			.5625-18UNF-2B					
	52NE-098	STEEL-CADMIUM	26,810	.5625-18UNJF-3B						
	79NE-098	STAINLESS-UNPLATED		.5625-12UNJC-3B						
	21NE-092	STEEL-ZINC								
5/8	21NE-101	STEEL-ZINC		8.30	.6250-11UNJC-3B	.765- .735	.940- .928	1.051	.593	
	29NE-101	STEEL-UNPLATED			.6250-11UNC-2B					
	52NE-101	STEEL-CADMIUM	28,530		.6250-11UNJC-3B					
	79NE-101	STAINLESS-UNPLATED		9.00	.6250-18UNJF-3B					
	99NE-101	BRASS-UNPLATED		8.30						.6250-18UNF-2B
	21NE-108	STEEL-ZINC		8.30	.6250-18UNJF-3B					
	29NE-108	STEEL-UNPLATED			.6250-18UNF-2B					
	52NE-108	STEEL-CADMIUM	34,130		.6250-18UNJF-3B					
	79NE-108	STAINLESS-UNPLATED								
3/4	41NE-120	STEEL-ZINC		12.00	.7500-10UNJC-3B	.890- .860	1.064-1.052	1.191	.742	
	49NE-120	STEEL-UNPLATED			.7500-10UNC-2B					
	79NE-120	STAINLESS-UNPLATED		13.00	.7500-10UNJC-3B					
	99NE-120	BRASS-UNPLATED		12.00	.7500-16UNJF-3B					
	41NE-126	STEEL-ZINC		12.00	.7500-16UNF-2B					
	49NE-126	STEEL-UNPLATED			.7500-16UNF-2B					
	59NE-126	STEEL-UNPLATED	50,020							
7/8	41NE-144	STEEL-ZINC		19.00	.8750-14UNJF-3B	.999- .969	1.252-1.239	1.403	.790	
	49NE-144	STEEL-UNPLATED			.8750-14UNF-2B					
	52NE-144	STEEL-CADMIUM	68,440	.8750-14UNJF-3B						
	41NE-149	STEEL-ZINC		19.00	.8750-9UNJC-3B					
	49NE-149	STEEL-UNPLATED			.8750-9UNC-2B					
1	41NE-164	STEEL-ZINC		27.00	1.0000-14UNJS-3B	1.078-1.016	1.440-1.427	1.615	.825	
	49NE-164	STEEL-UNPLATED			1.0000-14UNS-2B					
	52NE-164	STEEL-CADMIUM	92,180		1.0000-14UNJS-3B					
	41NE-168	STEEL-ZINC		27.00	1.0000-8UNJC-3B					
	49NE-168	STEEL-UNPLATED			1.0000-8UNC-2B					
	52NE-168	STEEL-CADMIUM	79,280		1.0000-8UNJC-3B					

ISSUED: 8 AUG 62 REVISED: 11 MAY 91

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REFERENCE STANDARDS:
 AN365 MS51922
 MS17830 MS20365
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THREAD SIZE	ESNA PART NUMBER	MATERIAL & FINISH	ULTIMATE TENSILE STRENGTH LB MIN	APPROX WEIGHT LB/100	THREAD	A	B	C REF	L REF
1 1/8	41NE-182	STEEL-ZINC	116,700	41.00	1.1250-12UNJF-3B	1.203 - 1.141	1.627 - 1.614	1.826	.930
	49NE-182	STEEL-UNPLATED			1.1250-12UNF-2B				
	52NE-182	STEEL-CADMIUM			1.1250-12UNJF-3B				
1 1/4	41NE-202	STEEL-ZINC	147,940	58.00	1.2500-12UNJF-3B	1.422 - 1.360	1.815 - 1.801	2.038	1.125
	49NE-202	STEEL-UNPLATED			1.2500-12UNF-2B				
	52NE-202	STEEL-CADMIUM			1.2500-12UNJF-3B				
1 3/8	49NE-222	STEEL-UNPLATED		77.00	1.3750-12UNF-2B	1.609 - 1.547	2.008 - 1.973	2.232	1.282
	49NE-226	STEEL-UNPLATED			1.3750-6UNC-2B				
1 1/2	41NE-242	STEEL-ZINC		100.00	1.5000-12UNJF-3B	1.640 - 1.578	2.197 - 2.159	2.444	1.313
	49NE-242	STEEL-UNPLATED			1.5000-12UNF-2B				
	52NE-242	STEEL-CADMIUM			1.5000-12UNJF-3B				
	59NE-242	STEEL-UNPLATED			1.5000-12UNF-2B				

MATERIAL:

- "2" } STEEL
- "4" } STEEL
- "5" } STEEL
- "6" ALUMINUM ALLOY - 2017-T4 OR EQUIV.
- "7" STAINLESS STEEL - AISI 303 OR EQUIV.
- "9" BRASS - COMMERCIAL HALF HARD OR EQUIV.

FINISH:

- "1" ZINC PLATE, QQ-Z-325, TYPE I, CLASS 3.
- "2" CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 3. (SEE PART CODING NOTE)
- "7" BRIGHT NICKEL PLATE. (SEE NOTE 1)
- "8" ANODIZED, MIL-A-8625.
- "9" UNPLATED.

LOCKING INSERT: RED NYLON. (250°F MAX PERFORMANCE).

THREADS: MIL-S-8879 OR MIL-S-7742.

THREAD SQUARENESS: ESNA SPEC 405, GROUP I.

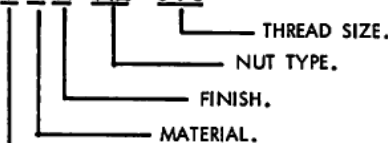
PERFORMANCE/APPROVAL STATUS: MIL-N-25027 AS APPLICABLE.

NOTE: 1. ESNA IS CONVERTING ALL NICKEL PLATE PROCESSING TO BRIGHT ORNAMENTAL, WHEREAS PREVIOUSLY BOTH NON-ORNAMENTAL (DUCTILE) AND ORNAMENTAL WERE AVAILABLE. THE ESNA FINISH CODE FOR NON-ORNAMENTAL NICKEL WAS "6", SUCH AS 96NM-02. THE EQUIVALENT PART NUMBER FOR ORNAMENTAL NICKEL FINISH IS 97NM-02. AT SUCH TIME AS EXISTING STOCK OF NON-ORNAMENTAL "6" FINISH CODE PARTS IS EXHAUSTED, ESNA WILL AUTOMATICALLY SUBSTITUTE BRIGHT ORNAMENTAL NICKEL AT NO INCREASE IN PRICE.

Ⓜ

PART CODING:

F 52 NE-070



POST PLATE TREATMENT - CHROMATE FORTIFICATION ON CADMIUM PLATED PARTS ONLY. ESNA IS CONVERTING THIS DESIGN FROM "TYPE I" CADMIUM PLATE TO "TYPE II" CADMIUM PLATE. PARTS ORDERED UNDER THE ESNA PART NUMBER WILL BE SUPPLIED WITH "TYPE I" PLATING UNTIL PRESENT INVENTORIES ARE EXHAUSTED, AFTER WHICH ALL SHIPMENTS WILL HAVE "TYPE II" PLATING ONLY. ON CADMIUM PLATED BRASS PARTS, THE LETTER "Y" IS USED TO DESIGNATE "TYPE II" PLATING IN LIEU OF THE LETTER "F". AN EXAMPLE WOULD BE: Y92NM-02.

ISSUED: 8 AUG 62 REVISED: Ⓜ I MAY 91

PJ-2400 & 2515

REFERENCE STANDARDS:

- AN365 MS51922
- MS17830 MS20365
- MS21044 NAS1021

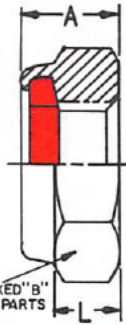
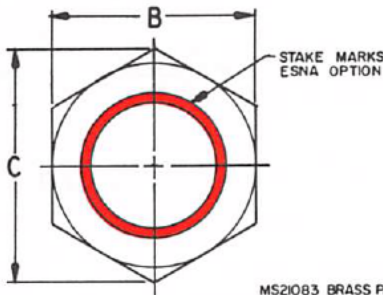
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MS21083 BRASS PARTS MARKED "B"
MARKING ON OTHER BRASS PARTS
AT ESNA OPTION.

THREAD SIZE	ESNA PART NUMBER	MATERIAL & FINISH	ULTIMATE TENSILE STRENGTH LB MIN	APPROX WEIGHT LB/100	THREAD	A	B	C REF	L REF					
#2	22NTM-26	STEEL-CADMIUM		.10	.0860-56UNJC-3B	.094 - .124	.251 - .243	.268	.075					
#3					.0990-48UNJC-3B	.094 - .124	.251 - .243	.268	.075					
	99NTM-38	BRASS-UNPLATED		.11										
#4	22NTM-40	STEEL-CADMIUM	370	.10	.1120-40UNJC-3B	.094 - .124	.251 - .243	.268	.075					
	68NTM-40	ALUMINUM-ANODIZED		.04										
	79NTM-40	STAINLESS-UNPLATED	370	.10										
	92NTM-40	BRASS-CADMIUM												
	97NTM-40	BRASS-BRIGHT NICKEL		.11										
	99NTM-40	BRASS-UNPLATED												
	22NTM-48	STEEL-CADMIUM		.10	.1120-48UNJF-3B									
#5	22NTM-50	STEEL-CADMIUM		.10	.1250-40UNJC-3B	.094 - .124	.251 - .243	.268	.075					
	68NTM-50	ALUMINUM-ANODIZED		.04										
#6	22NTM-62	STEEL-CADMIUM	560	.19	.1380-32UNJC-3B	.110 - .140	.313 - .305	.339	.090					
	68NTM-62	ALUMINUM-ANODIZED		.07										
	79NTM-62	STAINLESS-UNPLATED	560	.19										
	92NTM-62	BRASS-CADMIUM												
	97NTM-62	BRASS-BRIGHT NICKEL		.21										
	99NTM-62	BRASS-UNPLATED												
		22NTM-60	STEEL-CADMIUM							.19	.1380-40UNJF-3B			
	79NTM-60	STAINLESS-UNPLATED		.19										
	99NTM-60	BRASS-UNPLATED		.21										
#8	22NTM-82	STEEL-CADMIUM	860	.30	.1640-32UNJC-3B	.157 - .187	.345 - .336	.374	.110					
	68NTM-82	ALUMINUM-ANODIZED	425	.12										
	79NTM-82	STAINLESS-UNPLATED		.30										
	92NTM-82	BRASS-CADMIUM												
	97NTM-82	BRASS-BRIGHT NICKEL		.33										
	99NTM-82	BRASS-UNPLATED												
	22NTM-86	STEEL-CADMIUM	920	.30	.1640-36UNJF-3B									
	79NTM-86	STAINLESS-UNPLATED		.30										
#10	22NTM-04	STEEL-CADMIUM		.35	.1900-24UNJC-3B	.157 - .187	.376 - .367	.410	.110					
	68NTM-04	ALUMINUM-ANODIZED		.14										
	79NTM-04	STAINLESS-UNPLATED		.35										
	97NTM-04	BRASS-BRIGHT NICKEL		.38										

ISSUED: 2 AUG 62 REVISED: 10 MAY 91

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REFERENCE STANDARDS:
AN364 MS21083
MS20364 NAS1022

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THREAD SIZE	ESNA PART NUMBER	MATERIAL & FINISH	ULTIMATE TENSILE STRENGTH LB MIN	APPROX WEIGHT LB/100	THREAD	A	B	C REF	L REF	
#10	22NTM-02	STEEL-CADMIUM	1,230	.35	.1900-32UNJF-3B	.157 - .187	.376 - .367	.410	.110	
	27NTM-02	STEEL-BRIGHT NICKEL	1,230							
	68NTM-02	ALUMINUM-ANODIZED	610	.14						
	79NTM-02	STAINLESS-UNPLATED	1,230	.35						
	92NTM-02	BRASS-CADMIUM		.38						
	97NTM-02	BRASS-BRIGHT NICKEL								
	99NTM-02	BRASS-UNPLATED								
#12	22NTM-124	STEEL-CADMIUM		.54	.2160-24UNJC-3B	.188 - .218	.439 - .430	.482	.125	
1/4	21NTE-040	STEEL-ZINC		.50	.2500-20UNJC-3B	.188 - .218	.439 - .430	.482	.125	
	29NTE-040	STEEL-UNPLATED			.2500-20UNC-2B					
	79NTE-040	STAINLESS-UNPLATED			.2500-20UNJC-3B					
	21NTE-048	STEEL-ZINC		.50	.2500-28UNJF-3B					
	29NTE-048	STEEL-UNPLATED			.2500-28UNF-2B					
	52NTE-048	STEEL-CADMIUM	2,290	.18	.2500-28UNJF-3B					
	68NTE-048	ALUMINUM-ANODIZED	1,140							
	79NTE-048	STAINLESS-UNPLATED								
	99NTE-048	BRASS-UNPLATED		.59						
5/16	21NTE-058	STEEL-ZINC		.80	.3125-18UNJC-3B	.235 - .265	.502 - .492	.552	.158	
	29NTE-058	STEEL-UNPLATED			.3125-18UNC-2B					
	21NTE-054	STEEL-ZINC		.80	.3125-24UNJF-3B					
	29NTE-054	STEEL-UNPLATED			.3125-24UNF-2B					
	68NTE-054	ALUMINUM-ANODIZED	1,830	.29	.3125-24UNJF-3B					
	79NTE-054	STAINLESS-UNPLATED		.80						
	99NTE-054	BRASS-UNPLATED		.87						
3/8	21NTE-066	STEEL-ZINC		.95	.3750-16UNJC-3B	.251 - .281	.564 - .553	.622	.150	
	29NTE-066	STEEL-UNPLATED			.3750-16UNC-2B					
	52NTE-066	STEEL-CADMIUM			.3750-16UNJC-3B					
	79NTE-066	STAINLESS-UNPLATED		.95	.3750-24UNJF-3B					
	21NTE-064	STEEL-ZINC			.3750-24UNF-2B					
	29NTE-064	STEEL-UNPLATED		.34	.3750-24UNJF-3B					
	52NTE-064	STEEL-CADMIUM	5,700							
	68NTE-064	ALUMINUM-ANODIZED	2,840							
	79NTE-064	STAINLESS-UNPLATED		.95						
99NTE-064	BRASS-UNPLATED		1.00							
7/16	21NTE-070	STEEL-ZINC		1.30	.4375-20UNJF-3B	.298 - .328	.627 - .615	.694	.225	
	29NTE-070	STEEL-UNPLATED			.4375-20UNF-2B					
	52NTE-070	STEEL-CADMIUM	7,720	2.10	.4375-20UNJF-3B					
	79NTE-070	STAINLESS-UNPLATED								
79NTE-070U	STAINLESS-UNPLATED		2.10	.4375-20UNJF-3B						
1/2	21NTE-080	STEEL-ZINC		2.00	.5000-20UNJF-3B	.298 - .328	.741 - .752	.837	.190	
	29NTE-080	STEEL-UNPLATED			.5000-20UNF-2B					
	52NTE-080	STEEL-CADMIUM	10,550	.72	.5000-20UNJF-3B					
	68NTE-080	ALUMINUM-ANODIZED	5,240							
	79NTE-080	STAINLESS-UNPLATED								2.00
	99NTE-080	BRASS-UNPLATED								2.20
9/16	21NTE-098	STEEL-ZINC		3.50	.5625-18UNJF-3B	.344 - .374	.877 - .865	.978	.225	
	29NTE-098	STEEL-UNPLATED			.5625-18UNF-2B					
	52NTE-098	STEEL-CADMIUM	13,400		.5625-18UNJF-3B					

ISSUED: 2 AUG 62 REVISED: 10 MAY 91

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REFERENCE STANDARDS:

AN364 MS21083
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THREAD SIZE	ESNA PART NUMBER	MATERIAL & FINISH	ULTIMATE TENSILE STRENGTH LB MIN	APPROX WEIGHT LB/100	THREAD	A	B	C REF	L REF
5/8	21NTE-108	STEEL-ZINC		3.90	.6250-18UNJF-3B	.376 - .406	.940 - .928	1.051	.265
	29NTE-108	STEEL-UNPLATED			.6250-18UNF-2B				
	52NTE-108	STEEL - CADMIUM	17,060	1.40	.6250-18UNJF-3B				
	68NTE-108	ALUMINUM - ANODIZED	8,460						
3/4	41NTE-126	STEEL - ZINC		5.20	.7500-16UNJF-3B	.391 - .421	1.064 - 1.052	1.191	.288
	49NTE-126	STEEL - UNPLATED			.7500-16UNF-2B				
	52NTE-126	STEEL - CADMIUM	25,010	1.90	.7500-16UNJF-3B				
	68NTE-126	ALUMINUM - ANODIZED	12,400						
7/8	41NTE-144	STEEL - ZINC		8.00	.8750-14UNJF-3B	.454 - .484	1.252 - 1.239	1.403	.340
	49NTE-144	STEEL - UNPLATED			.8750-14UNF-2B				
	52NTE-144	STEEL - CADMIUM	34,220		.8750-14UNJF-3B				
1	41NTE-164	STEEL - ZINC		14.00	1.000-14UNJS-3B	.516 - .578	1.440 - 1.427	1.615	.405
	49NTE-164	STEEL - UNPLATED			1.000-14UNS-2B				
1 1/8	41NTE-182	STEEL - ZINC		19.00	1.1250-12UNJF-3B	.610 - .672	1.627 - 1.614	1.826	.500
	49NTE-182	STEEL - UNPLATED			1.1250-12UNF-2B				
	52NTE-182	STEEL - CADMIUM	58,350		1.1250-12UNJF-3B				
1 1/4	41NTE-202	STEEL - ZINC		27.00	1.2500-12UNJF-3B	.703 - .765	1.815 - 1.801	2.038	.523
	49NTE-202	STEEL - UNPLATED			1.2500-12UNF-2B				
	52NTE-202	STEEL - CADMIUM	73,970		1.2500-12UNJF-3B				
1 3/8	41NTE-222	STEEL - ZINC		33.00	1.3750-12UNJF-3B	.759 - .821	2.008 - 1.973	2.249	.493
	49NTE-222	STEEL - UNPLATED			1.3750-12UNF-2B				
	52NTE-222	STEEL - CADMIUM			1.3750-12UNJF-3B				
1 1/2	41NTE-242	STEEL - ZINC		43.00	1.5000-12UNJF-3B	.766 - .828	2.197 - 2.159	2.416	.565
	49NTE-242	STEEL - UNPLATED			1.5000-12UNF-2B				
	52NTE-242	STEEL - CADMIUM			1.5000-12UNJF-3B				

MATERIAL:

- "2" } STEEL
- "4" } STEEL
- "5" }
- "6" ALUMINUM ALLOY - 2017-T4 OR EQUIV.
- "7" STAINLESS STEEL - AISI 303 OR EQUIV.
- "9" BRASS - COMMERCIAL HALF HARD OR EQUIV.

FINISH:

- "1" ZINC PLATE - QQ-Z-325, TYPE I, CLASS 3.
- "2" CADMIUM PLATE - QQ-P-416, TYPE I, CLASS 3.(SEE NOTE 1).
- "7" BRIGHT NICKEL PLATE, (SEE NOTE 2).
- "8" ANODIZED - MIL-A-8625.
- "9" UNPLATED.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

THREADS: MIL-S-7742 OR MIL-S-8879

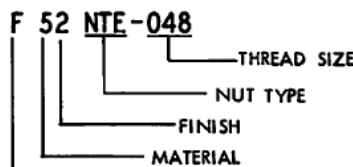
PERFORMANCE/APPROVAL: MIL-N-25027 AS APPLICABLE.

APPLICATION: FOR USE IN STRUCTURAL APPLICATIONS WHERE THE BOLT IS LOADED PRIMARILY IN SHEAR OR IN ANY APPLICATION WHERE THE TENSILE STRENGTH OF A REGULAR HEIGHT NUT IS NOT REQUIRED.

- NOTES: 1. ESNA IS CONVERTING THIS DESIGN FROM "TYPE I" CADMIUM PLATE TO "TYPE II" CADMIUM PLATE. PARTS ORDERED UNDER THE ESNA PART NUMBER WILL BE SUPPLIED WITH "TYPE I" PLATING UNTIL PRESENT INVENTORIES ARE EXHAUSTED, AFTER WHICH ALL SHIPMENTS WILL HAVE "TYPE II" PLATING ONLY. ON CADMIUM PLATED BRASS PARTS THE LETTER "Y" IS USED TO DESIGNATE "TYPE II" PLATING IN LIEU OF THE LETTER "F". AN EXAMPLE WOULD BE Y92NTM-02.
2. ESNA IS CONVERTING ALL NICKEL PLATE PROCESSING TO BRIGHT ORNAMENTAL, WHEREAS PREVIOUSLY BOTH NON-ORNAMENTAL (DUCTILE) AND ORNAMENTAL WERE AVAILABLE. THE ESNA FINISH CODE FOR NON-ORNAMENTAL NICKEL WAS "6", SUCH AS "96NTM-02". THE EQUIVALENT PART NUMBER FOR AN ORNAMENTAL NICKEL FINISH IS "97NTM-02". AT SUCH TIME AS EXISTING STOCK OF NON-ORNAMENTAL "6" FINISH CODE PARTS IS EXHAUSTED, ESNA WILL AUTOMATICALLY SUBSTITUTE BRIGHT ORNAMENTAL NICKEL AT NO INCREASE IN PRICE.



PART CODING:



POST PLATE TREATMENT - (PER QQ-P-416, TYPE II, CLASS 2). ON CADMIUM PLATED PARTS ONLY. (SEE NOTE 1)

ISSUED: 2 AUG 62 REVISED: 10 MAY 91

PJ-2400 & 2515

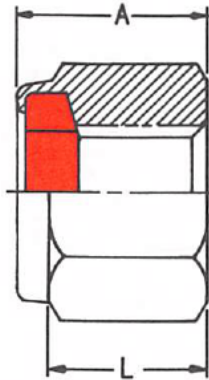
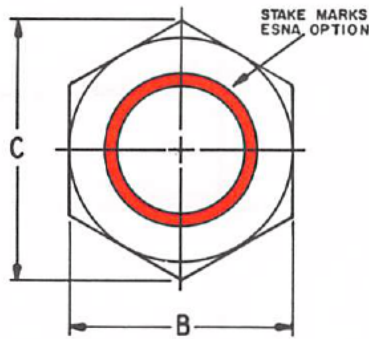
REFERENCE STANDARDS:
AN364 MS21083
MS20364 NAS1022

NUT-HEX, LIGHT, THIN

NTM-NTE
 PAGE 3 OF 3



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THREAD SIZE	ESNA PART NUMBER	MATERIAL & FINISH	APPROX WEIGHT LB/100	THREAD	A	B	C REF	L REF
1/4	21NU-040	STEEL - ZINC	1.50	.2500-20UNJC-3B	.390 - .360	.503 - .489	.556	.290
	29NU-040	STEEL - UNPLATED		.2500-20UNC-2B				
			.2500-20UNJC-3B					
	79NU-040	STAINLESS - UNPLATED	1.50					
	99NU-040	BRASS - UNPLATED	1.60					
5/16	21NU-058	STEEL - ZINC	2.10	.3125-18UNJC-3B	.453 - .423	.566 - .551	.624	.335
	29NU-058	STEEL - UNPLATED		.3125-18UNC-2B				
	79NU-058	STAINLESS - UNPLATED	2.30	.3125-18UNJC-3B				
	99NU-058	BRASS - UNPLATED						
3/8	21NU-066	STEEL - ZINC	3.80	.3750-16UNJC-3B	.562 - .532	.691 - .675	.763	.392
	29NU-066	STEEL - UNPLATED		.3750-16UNC-2B				
	52NU-066	STEEL - CADMIUM	4.10	.3750-16UNJC-3B				
	79NU-066	STAINLESS - UNPLATED						
	99NU-066	BRASS - UNPLATED						
7/16	21NU-074	STEEL - ZINC	4.80	.4375-14UNJC-3B	.609 - .579	.754 - .736	.829	.464
	29NU-074	STEEL - UNPLATED		.4375-14UNC-2B				
1/2	21NU-083	STEEL - ZINC	8.20	.5000-13UNJC-3B	.718 - .688	.879 - .861	.969	.544
	29NU-083	STEEL - UNPLATED		.5000-13UNC-2B				
	52NU-083	STEEL - CADMIUM	8.90	.5000-13UNJC-3B				
	79NU-083	STAINLESS - UNPLATED						
	99NU-083	BRASS - UNPLATED						
9/16	21NU-092	STEEL - ZINC	10.00	.5625-12UNJC-3B	.812 - .782	.942 - .922	1.037	.655
5/8	21NU-101	STEEL - ZINC	14.00	.6250-11UNJC-3B	.874 - .844	1.067 - 1.045	1.175	.677
	29NU-101	STEEL - UNPLATED		.6250-11UNC-2B				
	79NU-101	STAINLESS - UNPLATED	15.00	.6250-11UNJC-3B				
	99NU-101	BRASS - UNPLATED						
3/4	41NU-120	STEEL - ZINC	23.00	.7500-10UNJC-3B	1.015 - .985	1.255 - 1.231	1.382	.790
	49NU-120	STEEL - UNPLATED		.7500-10UNC-2B				
7/8	41NU-149	STEEL - ZINC	34.00	.8750-9UNJC-3B	1.140 - 1.110	1.444 - 1.417	1.589	.883
	49NU-149	STEEL - UNPLATED		.8750-9UNC-2B				

PJ- 2424

REFERENCE STANDARDS:

NUT-HEX, HEAVY

NU

PAGE 1 OF 2

ISSUED: 9 OCT 52 REVISED: (10) 18 JAN 88



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THREAD SIZE	ESNA PART NUMBER	MATERIAL & FINISH	APPROX WEIGHT LB/100	THREAD	A	B	C REF	L REF
1	41NU-168	STEEL - ZINC	48.00	1.0000-8UNJC-3B	1.312 - 1.250	1.632 - 1.602	1.796	1.000
	49NU-168	STEEL - UNPLATED		1.0000-8UNC-2B				
1 1/8	41NU-187	STEEL - ZINC	69.00	1.1250-7UNJC-3B	1.469 - 1.407	1.820 - 1.788	2.002	1.096
	49NU-187	STEEL - UNPLATED		1.1250-7UNC-2B				
1 1/4	41NU-207	STEEL - ZINC	92.00	1.2500-7UNJC-3B	1.672 - 1.610	2.008 - 1.973	2.209	1.250
	49NU-207	STEEL - UNPLATED		1.2500-7UNC-2B				
1 3/8	49NU-226	STEEL - UNPLATED	120.00	1.3750-6UNC-2B	1.828 - 1.766	2.197 - 2.159	2.416	1.376
1 1/2	49NU-246	STEEL - UNPLATED	150.00	1.5000-6UNC-2B	1.953 - 1.891	2.384 - 2.344	2.622	1.413
1 3/4	49NU-285	STEEL - UNPLATED	240.000	1.7500-5UNJC-3B	2.376 - 2.250	2.762 - 2.715	3.035	1.830
	49NU-324	STEEL - UNPLATED		2.0000-4.5UNJC-3B				
2	49NU-3208	STEEL - UNPLATED	310.00	2.0000-8UN-3B	2.469 - 2.343	3.137 - 3.086	3.449	1.750
	49NU-3212	STEEL - UNPLATED		2.0000-12UN-3B				
2 1/2	49NU-4008	STEEL - UNPLATED	682.00	2.5000-8UN-3B	3.204 - 3.078	4.015 - 3.875	4.618	2.475

MATERIAL:

"2"
"4"
"5" } STEEL

"7" STAINLESS STEEL - AISI 303 OR EQUIV.
"9" BRASS - COMMERCIAL HALF HARD OR EQUIV.

FINISH:

"1" ZINC PLATE (.0002 MIN THICKNESS)
"2" CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 3.
"9" UNPLATED.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

THREAD SQUARENESS: ESNA SPEC 405, GROUP 1.

THREADS: MIL-S-7742 OR MIL-S-8879.

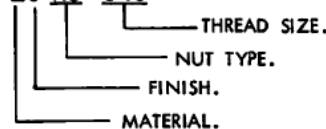
PERFORMANCE: LOCKING TORQUE IN ACCORDANCE WITH MIL-N-25027.

APPROVAL STATUS: ESNA TYPE NU NUTS ARE APPROVED UNDER ARMY ORDNANCE DRAWINGS BBSX2 AND BBSX3.

APPLICATION: TYPE "NU" NUTS ARE CONSIDERED TO BE ALTERNATE SELF-LOCKING DESIGNS FOR THE AMERICAN STANDARD HEAVY HEX SERIES.

PART CODING:

29 NU-040



REFERENCE STANDARDS:

NUT-HEX, HEAVY

PJ- 2424

NU

PAGE 2 OF 2

ISSUED: 9 OCT 52 REVISED: 18 JAN 88

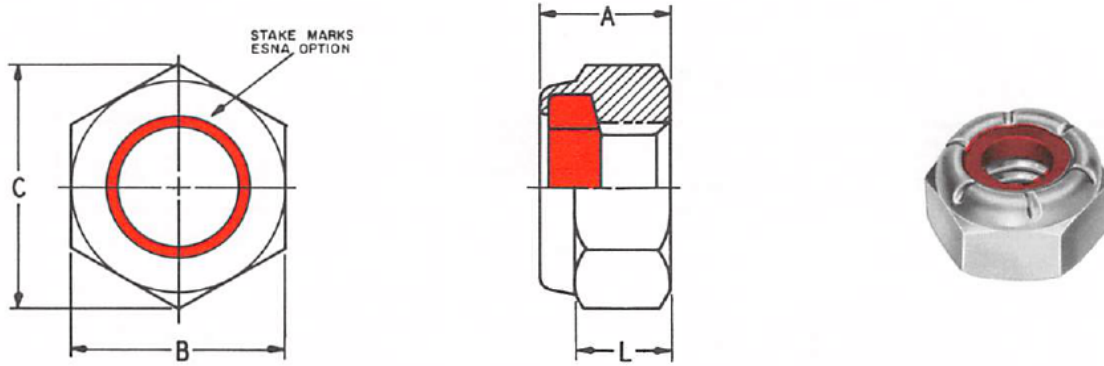


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THREAD SIZE	ESNA PART NUMBER	MATERIAL & FINISH	APPROX WEIGHT LB/100	THREAD	A	B	C REF	L REF
1/4	21NTU-040	STEEL - ZINC	1.00	.2500-20UNJC-3B	.296 - .266	.502 - .492	.552	.194
	29NTU-040	STEEL - UNPLATED		.2500-20UNC-2B				
	79NTU-040	STAINLESS - UNPLATED		.2500-20UNJC-3B				
5/16	21NTU-058	STEEL - ZINC	1.40	.3125-18UNJC-3B	.328 - .298	.564 - .553	.622	.212
	29NTU-058	STEEL - UNPLATED		.3125-18UNC-2B				
	79NTU-058	STAINLESS - UNPLATED		.3125-18UNJC-3B				
3/8	21NTU-066	STEEL - ZINC	2.70	.3750-16UNJC-3B	.421 - .391	.690 - .679	.766	.251
	29NTU-066	STEEL - UNPLATED	.3750-16UNC-2B					
	79NTU-066	STAINLESS - UNPLATED	.3750-16UNJC-3B					
7/16	21NTU-074	STEEL - ZINC	3.30	.4375-14UNJC-3B	.453 - .423	.752 - .741	.837	.316
	29NTU-074	STEEL - UNPLATED		.4375-14UNC-2B				
1/2	21NTU-083	STEEL - ZINC	5.40	.5000-13UNJC-3B	.546 - .516	.877 - .865	.978	.360
	29NTU-083	STEEL - UNPLATED		.5000-13UNC-2B				
	79NTU-083	STAINLESS - UNPLATED		.5000-13UNJC-3B				
5/8	21NTU-101	STEEL - ZINC	9.20	.6250-11UNJC-3B	.624 - .594	1.064 - 1.052	1.191	.428
	29NTU-101	STEEL - UNPLATED		.6250-11UNC-2B				
	79NTU-101	STAINLESS - UNPLATED		.6250-11UNJC-3B				
3/4	41NTU-120	STEEL - ZINC	15.00	.7500-10UNJC-3B	.718 - .688	1.252 - 1.239	1.403	.488
	49NTU-120	STEEL - UNPLATED		.7500-10UNC-2B				
	79NTU-120	STAINLESS - UNPLATED		.7500-10UNJC-3B				
7/8	41NTU-149	STEEL - ZINC	21.00	.8750-9UNJC-3B	.796 - .766	1.440 - 1.427	1.615	.535
	49NTU-149	STEEL - UNPLATED		.8750-9UNC-2B				
1	41NTU-168	STEEL - ZINC	30.00	1.0000-8UNJC-3B	.922 - .860	1.627 - 1.614	1.826	.600
	49NTU-168	STEEL - UNPLATED		1.0000-8UNC-2B				
1 1/8	49NTU-187	STEEL - UNPLATED	43.00	1.1250-7UNC-2B	1.000 - .938	1.814 - 1.801	2.038	.627
1 1/4	49NTU-207	STEEL - UNPLATED	57.00	1.2500-7UNC-2B	1.140 - 1.078	2.008 - 1.973	2.232	.720
1 3/8	49NTU-226	STEEL - UNPLATED	70.00	1.3750-6UNC-2B	1.219 - 1.157	2.197 - 2.159	2.444	.767

PJ- 2424

ISSUED: I APR 53 REVISED: II FEB 88

REFERENCE STANDARDS:

MSI6228

NUT-HEX, HEAVY, THIN

NTU

PAGE 1 OF 2



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THREAD SIZE	ESNA PART NUMBER	MATERIAL & FINISH	APPROX WEIGHT LB/100	THREAD	A	B	C REF	L REF
1 1/2	49NTU-246	STEEL - UNPLATED	95.00	1.5000-6UNC-2B	1.344 - 1.282	2.384 - 2.344	2.622	.810
1 3/4	49NTU-285	STEEL - UNPLATED	140.00	1.7500-5UNJC-3B	1.532 - 1.406	2.762 - 2.715	3.075	.986
2	49NTU-3212	STEEL - UNPLATED	210.00	2.0000-12UN-3B	1.735 - 1.609	3.137 - 3.086	3.497	1.016
2 1/4	49NTU-364	STEEL - UNPLATED	290.00	2.2500-4.5UNC-3B	2.001 - 1.875	3.514 - 3.457	3.918	1.179
2 1/2	49NTU-4012	STEEL - UNPLATED	430.00	2.5000-12UN-3B	2.250 - 2.124	4.015 - 3.875	4.393	1.523

MATERIAL:

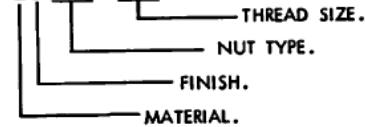
- "2" STEEL
- "4" STEEL
- "7" STAINLESS STEEL - AISI 303 OR EQUIV. (SIZES -040 THRU -120)
- "9" BRASS - COMMERCIAL HALF HARD (SIZES -040 THRU -066)

FINISH:

- "1" ZINC PLATE, .0002 MIN THICKNESS.
- "9" UNPLATED.

PART CODING:

29 NTU-040



LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

THREADS: MIL-5-7742 OR MIL-5-8879.

THREAD SQUARENESS: ESNA SPEC 405, GROUP I.

PERFORMANCE: LOCKING TORQUE IN ACCORDANCE WITH MIL-N-25027.

APPLICATION: TYPE "NTU" NUTS ARE PRIMARILY INTENDED FOR USE IN SHEAR LOAD APPLICATIONS AND ARE CONSIDERED TO BE SELF LOCKING ALTERNATES TO THE AMERICAN STANDARD THIN HEX SERIES.

PJ-2424

ISSUED: 1 APR 53 REVISED: 11 FEB 88

REFERENCE STANDARDS:

MS16228

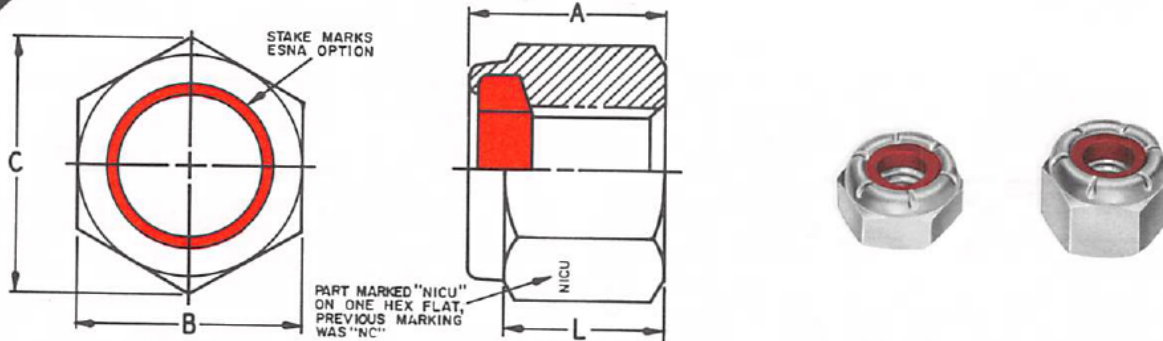
NUT-HEX, HEAVY, THIN

NTU

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ESNA PART NUMBER	THREAD	A	B	C REF	L REF	MAX WEIGHT LB/100
09NM-40(MONEL)	.1120-40UNJC-3B	.153 - .133	.252 - .243	.268	.081	.14
09NM-62(MONEL)	.1380-32UNJC-3B	.188 - .168	.316 - .305	.339	.103	.26
09NM-82(MONEL)	.1640-32UNJC-3B	.239 - .219	.347 - .336	.374	.140	.42
09NM-04(MONEL)	.1900-24UNJC-3B	.249 - .229	.378 - .367	.410	.140	.50
09NM-02(MONEL)	.1900-32UNJF-3B	.249 - .229	.378 - .367	.410	.140	.50
09NE-040(MONEL)	.2500-20UNJC-3B	.328 - .298	.439 - .430	.482	.225	1.13
09NE-048(MONEL)	.2500-28UNJF-3B					
09NE-058(MONEL)	.3125-18UNJC-3B	.359 - .329	.504 - .492	.552	.250	1.51
09NE-054(MONEL)	.3125-24UNJF-3B					
09NE-068(MONEL)	.3750-16UNJC-3B	.468 - .438	.566 - .553	.622	.335	2.26
09NE-064(MONEL)	.3750-24UNJF-3B					
09NE-074U(MONEL)	.4375-14UNJC-3B	.468 - .438	.692 - .679	.766	.324	3.89
09NE-083(MONEL)	.5000-13UNJC-3B					
09NE-080(MONEL)	.5000-20UNJF-3B	.609 - .579	.755 - .741	.837	.464	5.39
09NE-092(MONEL)	.5625-12UNJC-3B					
		.656 - .626	.880 - .865	.978	.469	8.90
09NE-101(MONEL)	.6250-11UNJC-3B					
09NE-108(MONEL)	.6250-18UNJF-3B	.765 - .735	.944 - .928	1.051	.593	10.40
09NE-120(MONEL)	.7500-10UNJC-3B					
09NE-126(MONEL)	.7500-16UNJF-3B	.890 - .860	1.068 - 1.052	1.191	.647	15.03
09NE-149(MONEL)	.8750-9UNJC-3B					
09NE-144(MONEL)	.8750-14UNJF-3B	.999 - .969	1.257 - 1.239	1.403	.790	23.80
09NE-168(MONEL)	1.0000-8UNJC-3B					
		1.078 - 1.016	1.446 - 1.427	1.615	.825	33.82
09NE-187(MONEL)	1.1250-7UNJC-3B					
09NE-182(MONEL)	1.1250-12UNJF-3B	1.203 - 1.141	1.634 - 1.614	1.826	.930	51.36
09NE-207(MONEL)	1.2500-7UNJC-3B					
		1.422 - 1.360	1.822 - 1.801	2.038	1.125	72.66
09NE-226(MONEL)	1.3750-6UNJC-3B					
		1.609 - 1.547	2.011 - 1.973	2.232	1.282	96.46
09NE-246(MONEL)	1.5000-6UNJC-3B					
09NE-242(MONEL)	1.5000-12UNJF-3B	1.640 - 1.578	2.200 - 2.159	2.444	1.313	114.00

MATERIAL:

MONEL, QQ-N-281, CLASS A OR CLASS B.

FINISH:

UNPLATED.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

THREAD SQUARENESS: ESNA SPEC 405, GROUP I.

THREADS: MIL-S-8879

PERFORMANCE: MIL-N-25027 / MS17828

APPLICATION: MONEL HEX NUTS ARE RECOMMENDED FOR APPLICATIONS REQUIRING FASTENERS WITH EXCEPTIONAL CHEMICAL AND/OR CORROSION RESISTANCE. THEY ARE PARTICULARLY SUITABLE FOR USES INVOLVING EXPOSURE TO SALT WATER AND ARE APPROVED BY THE BUREAU OF SHIPS.

PJ-

REFERENCE STANDARDS:

MS17828

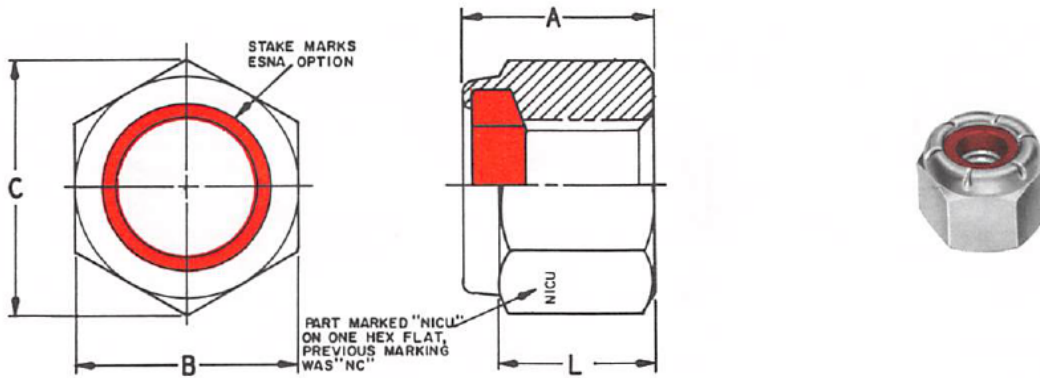
NUT-HEX, MONEL

HEX
NM-NE MONEL

ISSUED: 12 JAN 59 REVISED: 12 7 MAR 90



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ESNA PART NUMBER	THREAD	A	B	C REF	L REF	MAX WEIGHT LB/100
09NU-040(MONEL)	.2500-20UNJC-3B	.390 - .360	.504 - .492	.552	.290	1.75
09NU-058(MONEL)	.3125-18UNJC-3B	.453 - .423	.566 - .553	.622	.335	2.45
09NU-066(MONEL)	.3750-16UNJC-3B	.562 - .532	.692 - .679	.766	.392	4.40
09NU-083(MONEL)	.5000-13UNJC-3B	.718 - .688	.880 - .865	.978	.544	9.50
09NU-101(MONEL)	.6250-11UNJC-3B	.874 - .844	1.068 - 1.052	1.191	.677	16.25
09NU-120(MONEL)	.7500-10UNJC-3B	1.015 - .985	1.257 - 1.239	1.403	.790	26.70
09NU-149(MONEL)	.8750-9UNJC-3B	1.140 - 1.110	1.446 - 1.427	1.615	.883	39.45
09NU-168(MONEL)	1.0000-8UNJC-3B	1.312 - 1.250	1.634 - 1.614	1.826	1.000	55.70
09NU-187(MONEL)	1.1250-7UNJC-3B	1.469 - 1.407	1.822 - 1.801	2.038	1.096	80.00
09NU-207(MONEL)	1.2500-7UNJC-3B	1.672 - 1.610	2.011 - 1.973	2.232	1.250	106.75
09NU-226(MONEL)	1.3750-6UNJC-3B	1.828 - 1.766	2.200 - 2.159	2.444	1.376	139.25
09NU-246(MONEL)	1.5000-6UNJC-3B	1.953 - 1.891	2.388 - 2.344	2.622	1.413	174.00
09NU-285(MONEL)	1.7500-5UNJC-3B	2.376 - 2.250	2.766 - 2.715	3.075	1.830	278.40
09NU-324(MONEL)	2-4 1/2UNC-3B	2.469 - 2.343	3.142 - 3.086	3.497	1.750	359.60

MATERIAL:

MONEL, QQ-N-281, CLASS A OR CLASS B.

FINISH:

UNPLATED.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

THREAD SQUARENESS: ESNA SPEC 405, GROUP I.

THREADS: MIL-S-7742 OR MIL-S-8879.

APPLICATION: MONEL HEX NUTS ARE RECOMMENDED FOR APPLICATIONS REQUIRING FASTENERS WITH EXCEPTIONAL CHEMICAL AND/OR CORROSION RESISTANCE. THEY ARE PARTICULARLY SUITABLE FOR USES INVOLVING EXPOSURE TO SALT WATER AND ARE APPROVED BY THE BUREAU OF SHIPS.

PJ-2424

REFERENCE STANDARDS:

MS17828
MIL-N-25027/1 (SH)

NUT-HEX, MONEL

HEX
NU-MONEL

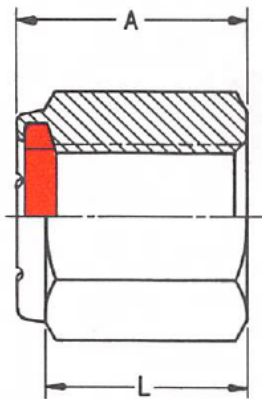
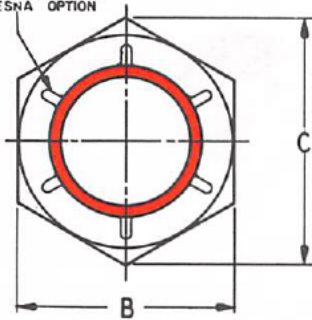
ISSUED: 12 JAN 59 REVISED: 12 MAY 91



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STAKE MARKS
ESNA OPTION



ESNA PART NUMBER		THREAD	A ±.015	B	C REF	L REF	APPROX WEIGHT LB/100
UNPLATED	ZINC PLATED						
59N1260-064	51N1260-064	.3750-24UNJF-3B	.641	.566 - .551	.624	.523	2.6
59N1260-070	51N1260-070	.4375-20UNJF-3B	.765	.628 - .612	.694	.657	3.6
59N1260-080	51N1260-080	.5000-20UNJF-3B	.812	.754 - .736	.829	.683	5.9
59N1260-098		.5625-18UNJF-3B	.922	.879 - .861	.969	.736	9.6
59N1260-108	51N1260-108	.6250-18UNJF-3B	1.000	.942 - .922	1.037	.881	12.0
59N1260-126	51N1260-126	.7500-16UNJF-3B	1.250	1.067 - 1.045	1.175	1.114	18.0
59N1260-144	51N1260-144	.8750-14UNJF-3B	1.438	1.255 - 1.231	1.382	1.299	30.0
59N1260-164	51N1260-164	1.0000-14UNJS-3B	1.672 ±.031	1.444 - 1.417	1.589	1.452	46.0
	51N1260-182	1.1250-12UNJF-3B	1.843 ±.031	1.632 - 1.602	1.796	1.697	65.0
59N1260-202	51N1260-202	1.2500-12UNJF-3B	2.031 ±.031	1.820 - 1.788	2.002	1.841	88.0

MATERIAL: STEEL

LOCKING INSERT: RED NYLON (250°F MAX. PERFORMANCE).

THREAD SQUARENESS: ESNA SPEC. 405, GROUP I.

THREADS: MIL-S-8879

APPLICATION: TYPE N1260 IS DESIGNED FOR APPLICATIONS THAT REQUIRE PRE-STRESSING HIGH STRENGTH BOLTS TO THEIR ELASTIC LIMIT. THE NUT IS PROVIDED WITH EXTRA THREAD LENGTH AND HEX HEIGHT TO ATTAIN UNIFORM THREAD LOADING AND ADEQUATE WRENCHING AREA.

A TYPICAL APPLICATION WOULD BE FOR USE WITH "U" BOLTS IN ATTACHING LEAF-SPRINGS TO COMMERCIAL AND PASSENGER VEHICLE AXLES.

PJ-1191

REFERENCE STANDARDS:

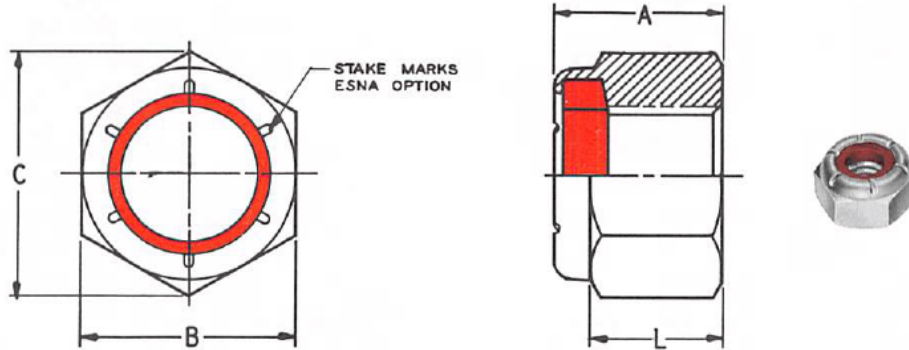
NUT-HEX, THICK

N1260

ISSUED: 6 MAY 53 REVISED: 9 | FEB 88



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ESNA PART NUMBER	FINISH (SEE NOTE 1)	THREAD	A ±.015	B	C REF	L REF	APPROX WEIGHT LB/100
21NE2291-066	ZINC	.3750-16UNJC-3B	.406	.564 - .553	.622	.288	1.60
21N1935-070	ZINC	.4375-20UNJF-3B	.250	.627 - .616	.694	.165	.96
22N183-080	CADMIUM	.5000-20UNJF-3B	.437	.752 - .741	.837	.307	2.70
⑥ 59NE2527-098	UNPLATED	.5625-18UNJF-3B	.516	.815 - .803	.907	.375	3.80
49NE2076-126	UNPLATED	.7500-16UNJF-3B	.688	1.064 - 1.052	1.191	.460	8.60
52NE2120-126	CADMIUM	.7500-16UNJF-3B	.656	1.064 - 1.052	1.191	.430	8.50
49NE2842-126	UNPLATED	.7500-16UNJF-3B	.625	1.064 - 1.052	1.191	.397	8.40
49NTE2798-144	UNPLATED	.8750-14UNJF-3B	.625	1.252 - 1.239	1.405	.496	11.00
49NTE2390-1620	UNPLATED	1.000-20UNEF-3B	.547 ±.031	1.440 - 1.427	1.619	.405	14.00
49NE2694-182	UNPLATED	1.1250-12UNJF-3B	.937 ±.031	1.627 - 1.614	1.833	.686	32.00
49NE1743-202	UNPLATED	1.2500-12UNJF-3B	1.250 ±.031	1.814 - 1.801	2.046	.988	50.00
49NE2254-202	UNPLATED	1.2500-12UNJF-3B	1.094 ±.031	1.814 - 1.801	2.046	.828	42.00
49NE2254-242	UNPLATED	1.5000-12UNJF-3B	1.219 ±.031	2.190 - 2.175	2.473	.923	70.00
49NTU2846-3212	UNPLATED	2.000-12UN-3B	1.469 ±.063	2.752 - 2.737	3.114	.866	120.00

MATERIAL: STEEL

FINISH: ZINC PLATE - QQ-Z-325, TYPE I, CLASS 3.
CADMIUM PLATE - QQ-P-416, TYPE I, CLASS 3.
UNPLATED

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

THREADS: MIL-S-7742 OR MIL-S-8879.

APPLICATION: THIS DRAWING LISTS HEX NUTS HAVING ENVELOPE DIMENSIONS WHICH ARE AT VARIANCE WITH RESPECT TO THOSE OF ESNA STANDARD HEX NUT SERIES. THEY ARE OFFERED FOR POSSIBLE USE IN APPLICATIONS HAVING SPECIAL DIMENSIONAL OR TENSILE REQUIREMENTS AND LIMITED INSTALLATION OR WRENCHING CLEARANCE CONDITIONS.

NOTE: 1. CONSULT ESNA BEFORE ORDERING FOR FINISH VARIATIONS OTHER THAN THE STANDARD COMBINATIONS SHOWN.

ISSUED: 8 JAN 58 REVISED: ⑥ 22 MAR 89

REFERENCE STANDARDS:

NUT-HEX
CONSOLIDATED DRAWING

HEX-SP(I)

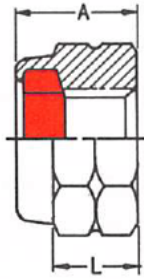
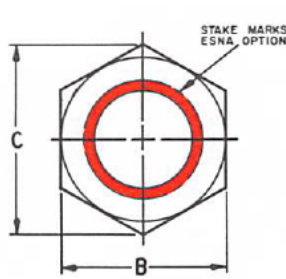


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ESNA PART NUMBERS			THREAD	A		B		C	L	ULTIMATE TENSILE STRENGTH LB. MIN.	APPROX WEIGHT LB/100
CADMIUM PLATE TYPE II, CLASS 2	CADMIUM PLATE TYPE I, CLASS 3	UNPLATED		MAX	MIN	MAX	MIN	REF	REF		
	52N1610-02		1900-32UNJF-3B	.249	.219	.376	.367	.410	.140	3470	.50
				.328	.298	.439	.430	.482	.225	6200	.90
F52N1610-048	52N1610-048		.2500-28UNJF-3B							2210	1.20
F52N1610-058	52N1610-058		.3125-18UNJC-3B	.359	.329	.502	.492	.552	.250	9820	
F52N1610-054	52N1610-054		.3125-24UNJF-3B							11620	1.80
F52N1610-066			.3750-16UNJC-3B	.468	.438	.564	.553	.622	.335	15200	
F52N1610-064	52N1610-064		.3750-24UNJF-3B							15940	3.10
F52N1610-074U			.4375-14UNJC-3B	.468	.438	.690	.679	.766	.324	17800	
F52N1610-070U			.4375-20UNJF-3B							20600	2.30
	52N1610-070	59N1610-070	.4375-20UNJF-3B	.468	.438	.627	.616	.694	.324	21300	
F52N1610-083			.5000-13UNJC-3B	.609	.579	.752	.741	.837	.464	27500	4.30
F52N1610-080	52N1610-080	59N1610-080	.5000-20UNJF-3B							34800	
				.656	.626	.877	.865	.978	.469	33900	8.30
F52N1610-098		59N1610-098	.5625-18UNJF-3B							43600	
F52N1610-101			.6250-11UNJC-3B	.765	.735	.940	.928	1.051	.593	50100	12.00
F52N1610-108	52N1610-108	59N1610-108	.6250-18UNJF-3B							63400	
F52N1610-120			.7500-10UNJC-3B	.890	.860	1.064	1.052	1.191	.742	69300	19.00
F52N1610-126		59N1610-126	.7500-16UNJF-3B							106100	
F52N1610-149			.8750-9UNJC-3B	.999	.969	1.252	1.239	1.403	.790	116900	27.00
			1.000-8UNJC-3B	1.078	1.016	1.440	1.427	1.615	.825	114000	
										128400	41.00
		59N1610-164	1.000-14UNJ5-3B	1.078	1.016	1.440	1.427	1.615	.825	145000	
F52N1610-187			1.1250-7UNJC-3B	1.203	1.141	1.627	1.614	1.826	.930	185400	58.00
F52N1610-182			1.1250-12UNJF-3B							197000	
F52N1610-207			1.2500-7UNJC-3B	1.422	1.360	1.814	1.801	2.038	1.125	211000	100.00
		59N1610-202	1.2500-12UNJF-3B							275400	
				1.609	1.547	2.008	1.973	2.232	1.282	285000	250.00
F52N1610-222			1.3750-12UNJF-3B							375000	
F52N1610-246			1.5000-6UNJC-3B	1.640	1.578	2.197	2.159	2.444	1.313	487500	450.00
	52N1610-242	59N1610-242	1.5000-12UNJF-3B							600000	
F52NUI610-285			1.7500-5UNJC-3B	2.376	2.250	2.762	2.715	3.075	1.830		
F52NUI610-324			2.0000-4.5UNJC-3B	2.469	2.343	3.137	3.086	3.497	1.750		
F52NUI610-364			2.2500-4.5UNJC-3B	2.876	2.750	3.514	3.457	3.918	2.063		
F52NUI610-404			2.5000-4UNJC-3B	3.204	3.078	4.015	3.875	4.393	2.475		

MATERIAL:

STEEL TYPE C1137 OF FED-STD-66 OR CARBON OR ALLOY STEEL MIL-5-1222, C1137 STEEL MAY CONTAIN FROM 0.15 TO 0.35 PERCENT LEAD.

FINISH:

CADMIUM PLATE PER QQ-P-416, TYPE AND CLASS AS NOTED IN TABULATION.
UNPLATED - AS NOTED IN TABULATION.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

HARDNESS: Rc 26-34.

THREAD SQUARENESS: ESNA SPEC 405, GROUP I.

THREADS: MIL-5-8879

PERFORMANCE: MIL-N-25027, EXCEPT FOR TENSILE STRENGTH AS LISTED ABOVE.

- NOTES:**
- TYPE 1610 PARTS CODED WITH A "G" PREFIX WILL BE INDIVIDUALLY MAGNETIC PARTICLE INSPECTED IN ACCORDANCE WITH MIL-I-6868 AND THE DISCONTINUITY REQUIREMENTS OF MIL-N-25027. EXAMPLE: GF52N1610-048. CONSULT ESNA FOR AVAILABILITY AND ADDITIONAL CHARGE.
 - CONSULT ESNA FOR AVAILABILITY STATUS OF PARTS NOT INCLUDED IN TABULATION.
 - PART NUMBERS LISTED IN COLUMN 1 OF THE PART NUMBER TABULATION (TYPE II, CLASS 3 PLATING) ARE EXACT ESNA PART NUMBER CONVERSIONS OF THE FULL RANGE OF MS17829 SIZES.
 - UNPLATED STEEL PARTS HAVE CLASS 2 B THREAD FIT.

PJ-1761

REFERENCE STANDARDS:

MS17829

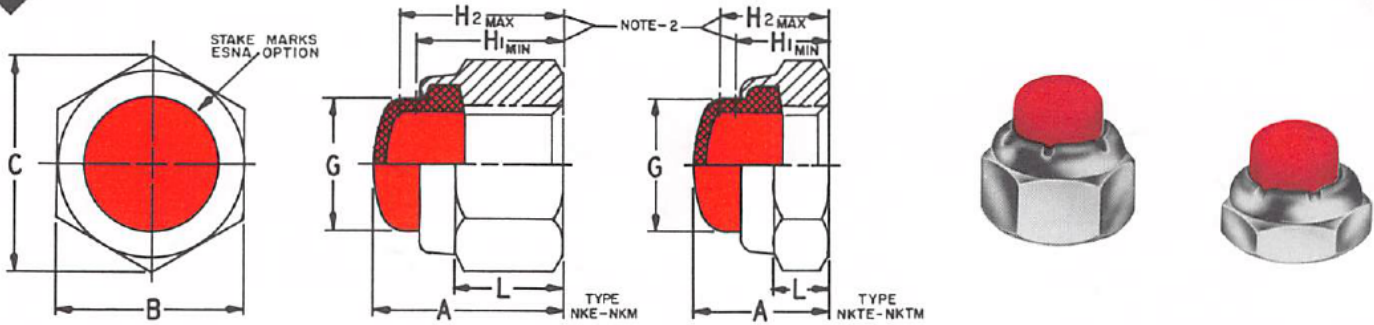
NUT-HEX, HIGH TENSILE

N1610
NUI610

ISSUED: 3 DEC 65 REVISED: 19 AUG 88



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ESNA PART NUMBER	THREAD	A REF.	B	C REF.	G REF.	BOLT END		L REF.	APPROX WEIGHT LB/100
						H1 MIN	H2 MAX		
22NKTM-40	.1120-40UNJC-3B	.210	.251 - .243	.268	.140	.116	.172	.075	.11
22NKM-40		.234				.147	.203	.081	.15
22NKTM-62	.1380-32UNJC-3B	.249	.313 - .305	.339	.200	.131	.191	.090	.20
22NKM-62		.297				.179	.239	.103	.27
22NKM-60	.1380-40UNJF-3B	.297	.345 - .336	.374	.225	.179	.239	.103	.27
22NKTM-82		.308				.191	.250	.110	.31
22NKM-82	.1640-32UNJC-3B	.353				.236	.295	.140	.43
22NKM-04	.1900-24UNJC-3B	.363	.376 - .367	.410	.234	.262	.314	.140	.50
22NKTM-02		.308				.207	.259	.110	.36
22NKM-02	.1900-32UNJF-3B	.363				.262	.314	.140	.50
52NKTE-048	.2500-28UNJF-3B	.380	.439 - .430	.482	.290	.244	.335	.125	.55
42NKE-048		.480				.344	.435	.225	.95
52NKTE-054	.3125-24UNJF-3B	.431	.502 - .492	.552	.343	.308	.386	.158	.86
42NKE-054		.525				.400	.462	.250	1.30
52NKE-064	.3750-24UNJF-3B	.622	.564 - .553	.622	.415	.498	.575	.335	1.90
52NKTE-070	.4375-20UNJF-3B	.519				.375	.466	.225	1.40

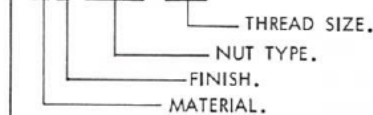
MATERIAL: NUT - STEEL; CAP - RED NYLON.
FINISH: CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 3.
LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).
THREAD SQUARENESS: ESNA SPEC 405, GROUP 1.
THREADS: MIL-S-8879.
PERFORMANCE: MIL-N-25027 AS APPLICABLE.
SEALING - 80 PSI (SEE APPLICATION NOTE).

APPLICATION: TYPE NKM, NKE, NKTM AND NKTE CAP NUTS ARE DESIGNED FOR USE IN PLACE OF STANDARD AND THIN HEIGHT HEX NUTS IN APPLICATIONS WHERE FOR REASONS OF SAFETY OR APPEARANCE, IT IS DESIRABLE TO COVER EXPOSED BOLT ENDS. THEY ARE ALSO SUITABLE FOR SEALING INTERNAL OR EXTERNAL PRESSURES, UP TO 80 PSI PAST THE BOLT THREADS, PROVIDED A PROPER SEAL IS EFFECTED BETWEEN THE NUT SEAT AND ITS MATING SURFACE.

- NOTES:**
1. THE LOCKING INSERT AND CAP ARE AN INTEGRAL PART.
 2. "H2" MAXIMUM DESIGNATES THE MAXIMUM RECOMMENDED BOLT ENTRY TO AVOID CONTACT WITH THE TOP OF THE CAP. "H1" MINIMUM DESIGNATES THE MINIMUM RECOMMENDED BOLT ENTRY TO INSURE SATISFACTORY LOCKING PERFORMANCE.

PART CODING:

F 22 NKTE-048



FOR POST PLATE TREATMENT (PER QQ-P-416, TYPE II) ON CADMIUM PLATED PARTS, PREFIX COMPLETE PART NUMBER WITH LETTER F.

ISSUED: 4 NOV 57 REVISED: 25 JAN 88

PJ- 1181

REFERENCE STANDARDS:

NUT-HEX, NYLON CAP

NKE-NKTE
NKM-NKTM

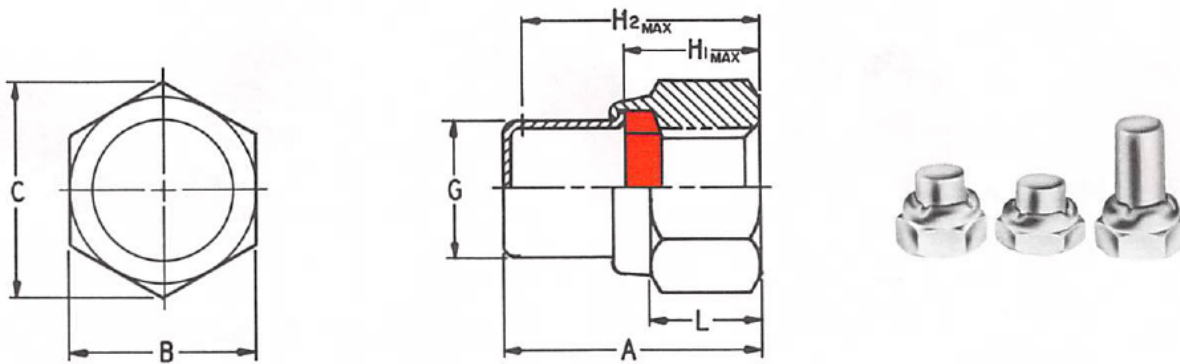


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ESNA PART NUMBER	THREAD	A REF	B	C REF	G REF	H ₁ MAX	H ₂ MAX	L REF	ULTIMATE TENSILE STRENGTH LB MIN	APPROX WEIGHT LB/100
22K1-62	.1380-32UNJC-3B	.346	.377 - .365	.413	.230	.221	.323	.140	1,130	.63
22K2-62		.291				.166	.268	.110	560	.40
22K3-62		.596				.221	.568	.140	1,130	.60
22K1-82	.1640-32UNJC-3B	.346	.377 - .365	.413	.230	.221	.323	.140	1,720	.52
22K2-82		.291				.166	.268	.110	860	.39
22K1-02	.1900-32UNJF-3B	.346	.377 - .365	.413	.230	.221	.323	.140	2,460	.49
22K2-02		.291				.166	.268	.110	1,230	.38
22K3-02		.596				.221	.568	.140	2,460	.56
22K1-048	.2500-28UNJF-3B	.449	.502 - .490	.557	.316	.291	.420	.210	4,100	1.10
22K2-048		.374				.216	.345	.135		.79
42K3-048		.700				.291	.665	.210	4,100	1.30
22K1-054	.3125-24UNJF-3B	.601	.566 - .551	.624	.376	.431	.569	.335	7,390	2.10
22K1-064	.3750-24UNJF-3B	.665	.691 - .675	.763	.445	.466	.632	.350	11,450	3.50

MATERIAL: NUT AND CAP - STEEL

FINISH: NUT AND CAP - CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 3.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

THREAD SQUARENESS: ESNA SPEC 405, GROUP 1.

THREADS: MIL-S-8879.

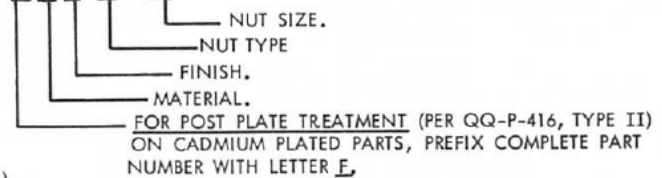
PERFORMANCE: MIL-N-25027. SEALING - 80 PSI (SEE APPLICATION).

APPLICATION: TYPES K1, K2, K3 CAP NUTS ARE DESIGNED FOR USE IN PLACE OF REGULAR HEX NUTS IN APPLICATIONS WHERE FOR REASONS OF SAFETY OR APPEARANCE IT IS DESIRABLE TO COVER EXPOSED BOLT ENDS. THEY ARE ALSO SUITABLE FOR SEALING INTERNAL OR EXTERNAL PRESSURES, UP TO 80 PSI, PAST THE BOLT THREADS, PROVIDED A PROPER SEAL IS EFFECTED BETWEEN THE NUT SEAT AND ITS MATING SURFACE.

NOTES: 1. FOR OTHER TYPES OF HEX CAP NUTS, SEE ESNA STANDARD DRAWINGS OF TYPES NKM, NKT, NKE AND NKTE.
2. "H2" MAXIMUM DESIGNATES THE MAXIMUM RECOMMENDED BOLT ENTRY TO AVOID CONTACT WITH THE CAP.

PART CODING:

F 22 K1-02



ISSUED: 4 NOV 57 REVISED: 25 JAN 88

PJ-1677

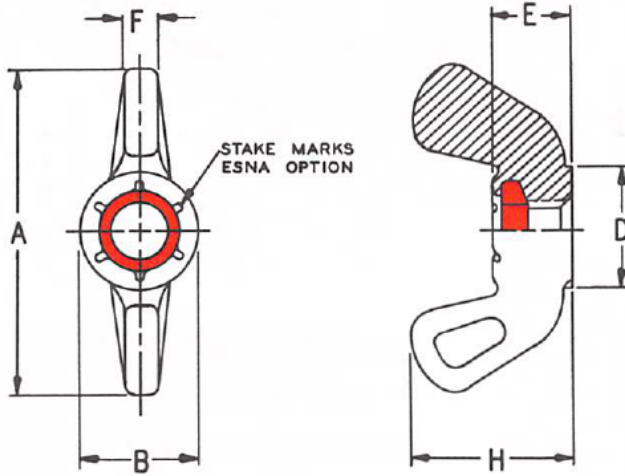
REFERENCE STANDARDS:

NUT-HEX, METAL CAP

K1-K2-K3



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ESNA PART NUMBER	THREAD	A REF	B REF	D REF	E REF	F REF	H REF	APPROX WEIGHT LB/100
WC-82	8-32UNC-2B	1.031	.375	.375	.234	.100	.500	.92
WC-04	10-24UNC-2B							.90
WC-02	10-32UNF-2B							
WC-040	1/4-20UNC-2B	1.250	.438	.438	.304	.125	.594	1.60
WC-048	1/4-28UNF-2B							
WC-058	5/16-18UNC-2B	1.500	.562	.562	.329	.155	.718	2.50
WC-066	3/8-16UNC-2B				.349			2.30

MATERIAL:

DIE-CAST, ZINC ALLOY.

FINISH:

UNPLATED.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

PJ-1293

ISSUED: 1 APR 55 REVISED: 12 B MAR 90

REFERENCE STANDARDS: MS51553 ⁽¹²⁾	NUT — WING	WC
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NEW

Self-Locking, Prevailing Torque INDUSTRIAL **COLLARLOK**[®] HEX NUTS

FUSED-IN-PLACE **RED NYLON COLLAR** OFFERS SUPERIOR
INSTALLED PERFORMANCE —
NON-GALLING — COST SAVING —
HIGH SPEED ASSEMBLY



- Superior Vibration Resistance
- Full Wrench Height Nut Body
- Smooth, Consistent Rundown Torque
- Torques Tailored to Application

ESNA's new COLLARLOK nut is a prevailing torque type self-locking fastener based upon the proven performance and design characteristics of the ESNA nylon insert locking device. Designed for high speed assembly techniques, these unique industrial nuts offer performance advantages not available with other commercial fasteners. Non-galling under high speed run-down, excellent reuse, thread sealing protection and superior vibration resistance are but a few of the built-in features of this new generation industrial fastener line.

COLLARLOK nut, with the fused-in-place collar, offers reliable self-locking assembly for tough industrial applications. It is another "FIRST" in ESNA's long line of superior fastening devices — we call it "FASTENERBILITY".

U.S. Patent 4,282,913

DESIGN FEATURES

SELF-LOCKING — The red nylon collar provides a complete 360° locking grip on the mating bolt threads. The resiliency of the collar offers a torque to application selection by the design engineer. Positive locking action is assured regardless of severe vibration or impact.

PROTECTS THREADS — The red nylon collar at the top of the nut is impressed into the bolt threads forming a liquid tight seal against seepage. The rust and corrosion free bolt threads insure easy removal and reuse of the nut and eliminate galling.

REUSABLE — COLLARLOK parts are reusable because of the non-galling protective nylon collar. The special nylon material is resilient allowing the bolt thread to impress (not cut) the collar. On removal the collar seeks to return to its original configuration and may be reused with complete confidence more than fifteen times.

INTERCHANGEABLE — The nylon collar permits complete interchange between any good commercial grade bolt.

CONTROLLED TORQUE — The COLLARLOK nut is ideal for applications requiring consistent torque values or special situations where high speed assembly

is required. With a COLLARLOK nut, designers may select the torque values desired for the application with uniform tightness and preload.

PRECISE ADJUSTMENT — Once the collar is engaged on the bolt threads the nut becomes self-locking and need not be seated to provide locking torque.

TEMPERATURE RANGE — COLLARLOK nuts offer consistent performance at temperatures from -65°F to 250°F. Automatic high speed assembly techniques have no adverse effect upon the vibration resistance or locking quality of the nylon collar.

APPROVALS — These new products meet or exceed industry requirements for torque, axial tensile strength and vibration resistance. Tests were conducted in accordance with IFI-514, MIL-N-25027, MIL-STD-1312 and GM9092-P.

AVAILABILITY — Designed for rugged applications, COLLARLOK nuts are available in full wrenching hex and flange hex styles. Parts are made with standard inch or metric threads and can be made to meet specific torque requirements of automatic assembly techniques.

COLLARLOK[®] Registered Trademark HARVARD INDUSTRIES



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COLLARLOK® HEX NUTS FOR SAFE, RELIABLE, SELF-LOCKING ASSEMBLY ON TOUGH INDUSTRIAL APPLICATIONS

Field tested for over a year, the new COLLARLOK fastener performed beyond expectations. Designed for industrial, high speed automatic assembly the nylon collar develops gradual torque build up and eliminates galling. As the bolt threads impress themselves into the nylon collar, vibration is dampened preventing reverse rotation of the nut.

COLLARLOK nuts permit a significant advance in industrial assembly techniques. Send us your application problems now for a cost saving solution.



WHICH **COLLARLOK** NUT DESIGN MEETS YOUR APPLICATION REQUIREMENTS?

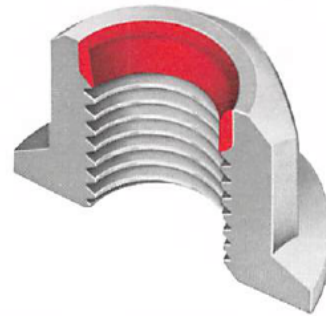
For Drawings — Samples — Prices

Write

Technical Sales Department
Elastic Stop Nut Division
Harvard Industries, Inc.
2330 Vauxhall Road, Union, N.J. 07083

NYLON LOCKING COLLAR

FUSED-IN-PLACE TO UPPER PORTION OF NUT BODY. PRODUCES SELF-LOCKING ACTION — INSURES SMOOTH NON-GALLING HIGH SPEED ASSEMBLY



AVAILABLE IN STANDARD INCH OR METRIC THREADS

HIGH SPEED ASSEMBLY —

COLLARLOK nuts incorporate the full wrenching height nut body design to facilitate high speed assembly line operations. The extra wrench pad height provides easier handling and starting of the nut on the bolt threads.

NON-GALLING

COLLARLOK nuts are well suited for assembly on long bolts at high speeds. The unique carefully sized nylon collar insures smooth run down with minimal heat build up and burnishing normally associated with fast automatic assembly. The elimination of excessive heat prevents the galling normally associated with commercial locknut designs.

CONTROLLED TORQUE

Extensive field and laboratory testing have established the consistency of the COLLARLOK nut prevailing torque and torque tension values. As a result of quality manufacturing techniques and non-metallic collar design, torque scatter is virtually eliminated providing smooth run down assembly and assured locking effectiveness. COLLARLOK parts are available with cadmium and wax or phosphate and oil finishes and meet the requirements of IFI-514 and GM9092-P.

VIBRATION RESISTANCE

COLLARLOK products have exceptionally high resistance to vibration loosening. The 360° nylon collar has tested to 500,000 cycles without failure. Parts meet the requirements of MIL-N-25027 and MIL-STD-1312. Parts may be reused more than fifteen times and retain their locking effectiveness.

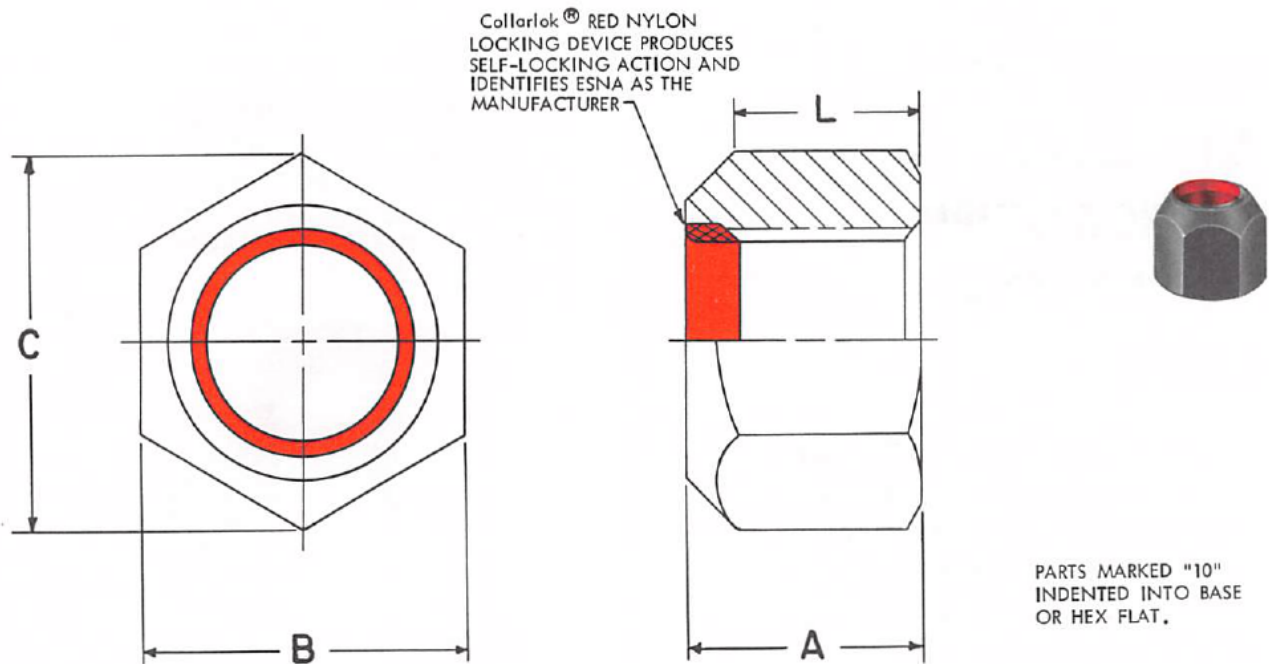


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ESNA PART NUMBER	THREAD SIZE	A		B		C MIN	L MIN	APPROX. WEIGHT kg/100
		MAX	MIN	MAX	MIN			
52CE20136-M6	M6X1-6H	8.0	7.2	10.00	9.78	11.05	3.0	0.32
52CE20136-M8	M8X1.25-6H	9.5	8.5	13.00	12.73	14.38	3.7	0.64
52CE20136-M10	M10X1.5-6H	12.5	11.5	15.00	14.73	16.64	5.6	1.07
52CE20136-M12	M12X1.75-6H	14.9	13.9	18.00	17.73	20.03	6.7	1.78
52CE20136-M16	M16X2-6H	19.1	17.9	24.00	23.67	26.75	9.1	4.00
52CE20136-M20	M20X2.5-6H	22.8	21.5	30.00	29.16	32.95	10.9	7.55

MATERIAL: STEEL
HARDNESS: Rc 26-36
FINISH: CADMIUM PLATE AND WAX
PERFORMANCE: IFI-514 PROPERTY CLASS 10

CODE: FOR A PART WITH CADMIUM PLATE, YELLOW CHROMATE FORTIFICATION AND WAX, PREFIX PART NUMBER WITH "F". EXAMPLE: "F52CE20136-M6".

ALL DIMENSIONS IN MILLIMETRES (DO NOT SCALE)

PJ-0044-IC

ISSUED: 10 FEB 88 REVISED:

REFERENCE STANDARDS:

NUT-HEX, COLLARLOK

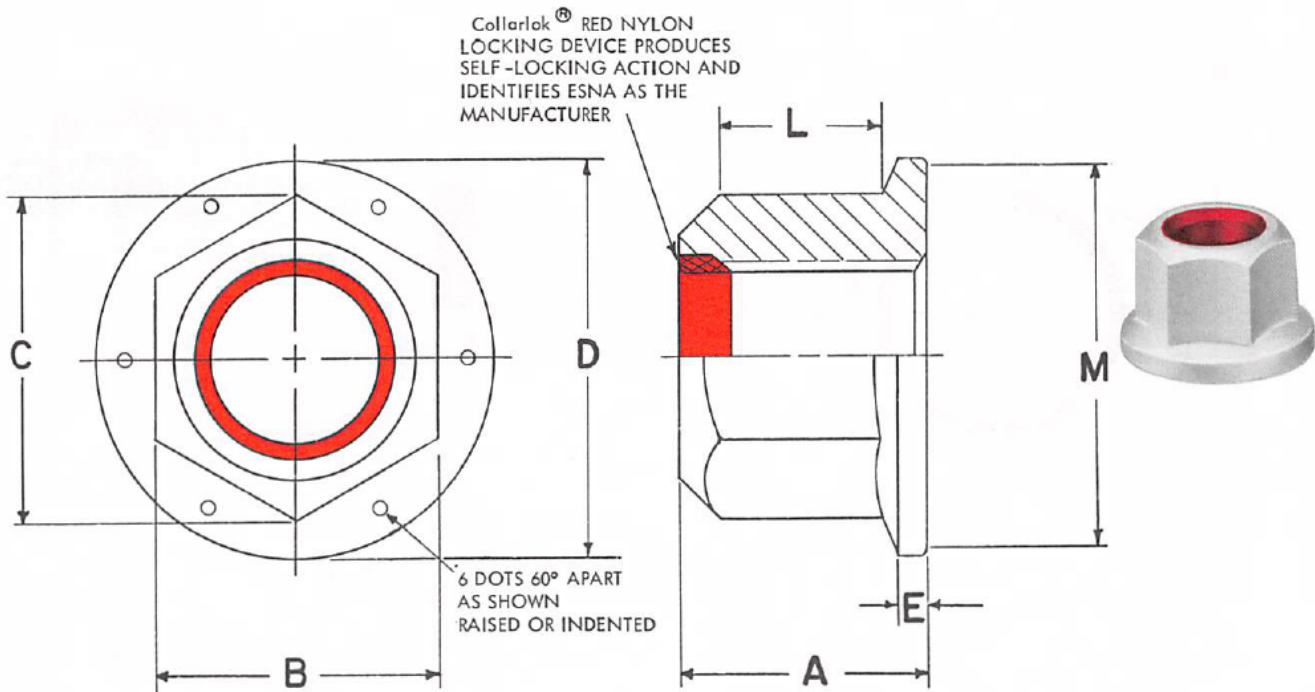
PROPERTY CLASS 10 STYLE I

METRIC

52CE20136



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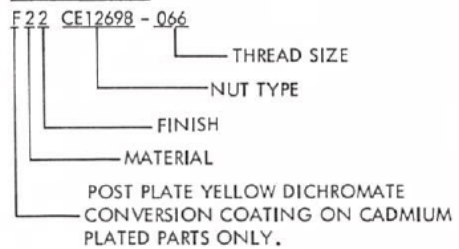
BASIC PART NUMBER	THREAD SIZE	A		B		C	D	E	L	M	APPROX. WEIGHT kg/100
		MAX	MIN	MAX	MIN	MIN	MAX	MIN	MIN	MIN	
CE12698-066	.3750-16UNC-2B	.425	.405	.564	.551	.628	.810	.066	.200	.730	2.7
CE12698-8	.5000-20UNF-2B	.555	.535	.752	.736	.840	1.070	.080	.260	.982	6.0
CE12698-083	.5000-13UNC-2B	.690	.670	.939	.922	1.051	1.330	.100	.320	1.230	11.5
CE12698-101	.6250-11UNC-2B	.825	.805	1.127	1.088	1.240	1.585	.110	.380	1.472	19.2
CE12698-120	.7500-10UNC-2B										

MATERIAL:
STEEL

FINISH:
"22" CADMIUM PLATE AND WAX
"F22" CADMIUM PLATE, DICHROMATE COATING AND WAX
"23" ZINC PHOSPHATE AND OIL

PERFORMANCE:
LOCKING TORQUE AND MINIMUM TENSILE STRENGTH PER IFI-107, GRADE G. (PROOF LOAD STRESS - 150,000 PSI)

PART CODING:



ISSUED: 21 NOV 80 REVISED: ① 4 FEB 88

PJ-0044-3

REFERENCE STANDARDS:

NUT-HEX, FLANGE, COLLARLOK

CE12698

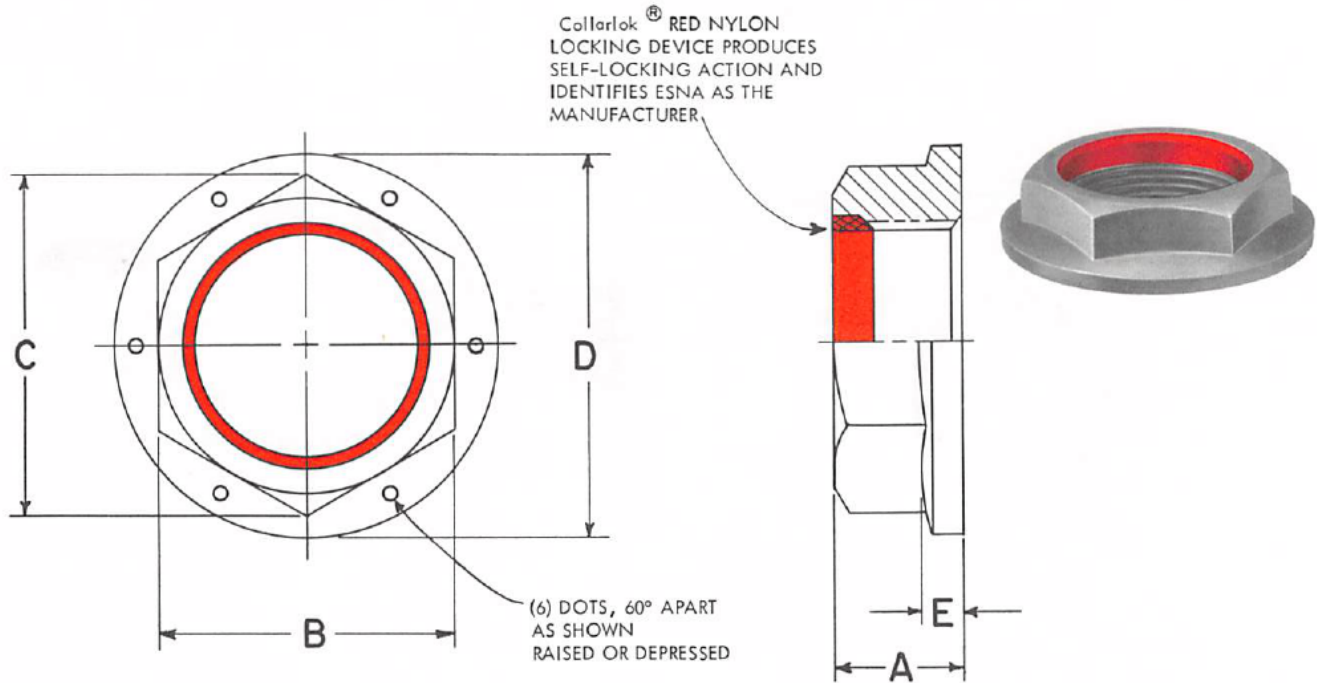


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ESNA PART NUMBER	THREAD SIZE	A		B		C		D	E	X	ULTIMATE TENSILE STRENGTH LB. MIN.	APPROX. WEIGHT LB/100
		MAX	MIN	MAX	MIN	MAX	MIN					
CE12605-20	1.250-12UNF -2B	.630	1.625	1.575	1.876	1.796	2.125	.200	.029	80,000	24.6	
CE12605-2018	1.250-18UNEF-2B	.630	1.625	1.575	1.876	1.796	2.125	.200	.029	80,000	24.3	
CE12605-24	1.500-12UNF -2B	.750	1.875	1.812	2.165	2.066	2.250	.290	.031	90,000	31.3	
CE12605-2418	1.500-18UNEF-2B	.750	1.875	1.812	2.165	2.066	2.250	.290	.031	90,000	30.9	
CE12605-2812	1.750- 12UN -2B	.731	2.250	2.175	2.598	2.480	3.000	.230	.040	90,000	52.0	

MATERIAL:
STEEL, HEAT TREATED TO Rc 26-38

FINISH:
ZINC PHOSPHATE AND OIL, MIL-P-16232 TYPE Z, CLASS 2

THREADS:
AISI B1.1

NOTES:
1. BEARING SURFACE AND THREAD P.D., RUN TRUE TO EACH OTHER WITHIN "X"

ISSUED: 21 NOV 80 REVISED: 2 4 FEB 88

PJ- 0044-2

REFERENCE STANDARDS:

NUT-HEX, FLANGE, COLLARLOK

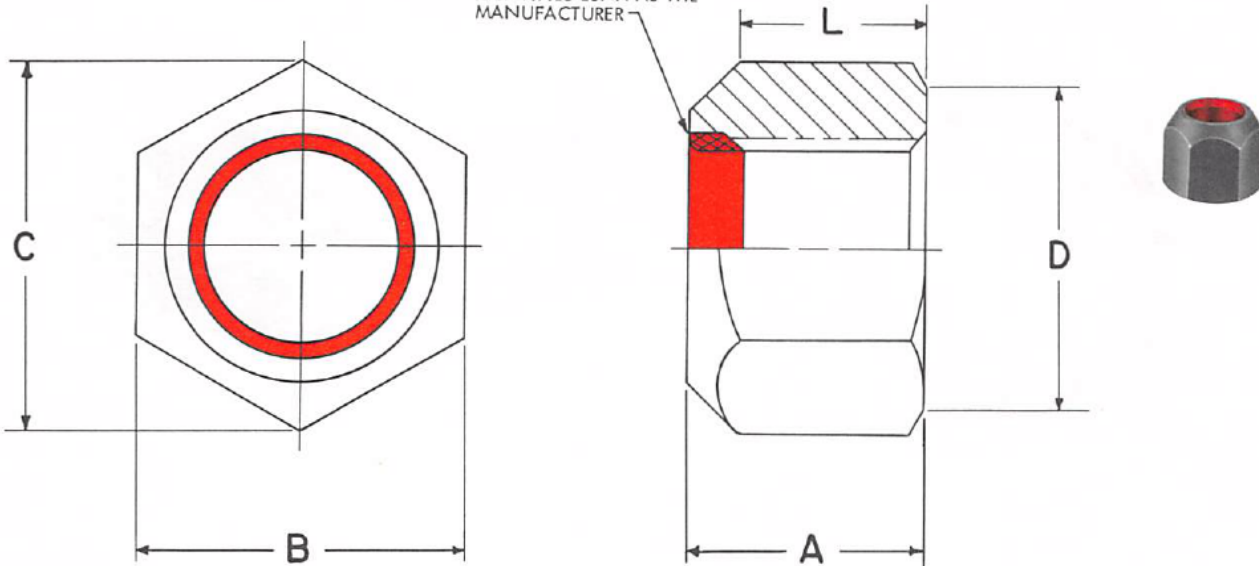
CE 12605



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Collarlok® RED NYLON LOCKING DEVICE PRODUCES SELF-LOCKING ACTION AND IDENTIFIES ESNA AS THE MANUFACTURER



ESNA PART NUMBER		THREAD SIZE	A		B		C	D	L	ULTIMATE TENSILE STRENGTH LB. MIN.	APPROX. WEIGHT LB/100
STEEL UNPLATED	STEEL ZINC PHOSPHATE AND OIL		MAX	MIN	MAX	MIN					
29CU-101	23CU-101	.625-11UNC-2B	.861	.831	1.062	1.031	1.175	1.009	.562	33,900	15.6
49CU-120	43CU-120	.750-10UNC-2B	1.005	.975	1.250	1.212	1.382	1.188	.711	50,100	24.5
49CU-149	43CU-149	.875-9UNC-2B	1.125	1.095	1.438	1.394	1.589	1.366	.780	69,300	35.0
49CU-168	43CU-168	1.000-8UNC-2B	1.265	1.235	1.625	1.575	1.796	1.544	.860	90,900	50.0

MATERIAL:
"2" STEEL
"4" STEEL

FINISH:
"3" ZINC PHOSPHATE AND OIL
"9" UNPLATED

PERFORMANCE:
LOCKING TORQUE PER IFI-100 AND MIL-N-25027

PART CODING:
4 9 CU - 149

— THREAD SIZE
— NUT TYPE
— FINISH
— MATERIAL

PJ-0044-7

REFERENCE STANDARDS:

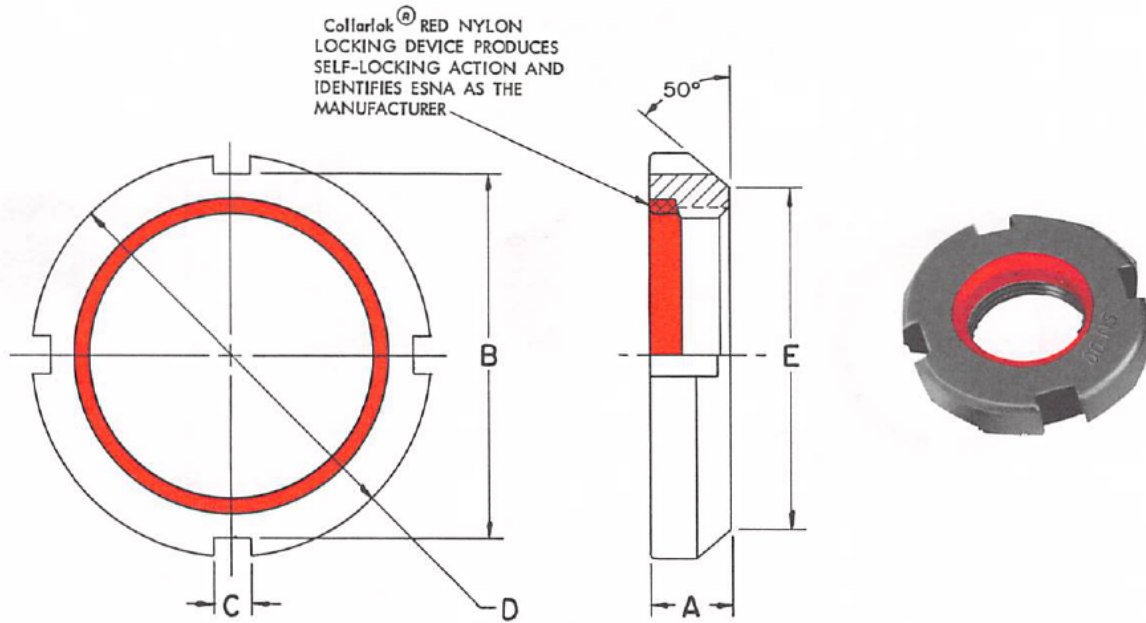
NUT-HEX, HEAVY, COLLARLOK

CU

ISSUED: 21 NOV 80 REVISED: ① 4 FEB 88



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ESNA PART NUMBER	THREAD SIZE	A	B	C	D	E
		MAX	+0.010 -0.020	MIN	+0.005 -0.015	MAX
23CBR32-N00	0.391-32SAE N00	.276	.625	.120	.750	.625
23CBR32-N01	0.469-32SAE N01	.369	.750	.120	.875	.719
23CBR32-N02	0.586-32SAE N02	.369	.812	.120	1.000	.813
23CBR32-N03	0.664-32SAE N03	.401	.937	.120	1.125	.938
23CBR32-N04	0.781-32SAE N04	.432	1.187	.178	1.375	1.125
23CBR32-N05	0.969-32SAE N05	.463	1.375	.178	1.562	1.281
23CBR32-N06	1.173-18SAE N06	.463	1.562	.178	1.750	1.500
23CBR32-N07	1.376-18SAE N07	.494	1.875	.178	2.062	1.813
23CBR32-N08	1.563-18SAE N08	.510	2.062	.240	2.250	2.000
23CBR32-N09	1.767-18SAE N09	.510	2.344	.240	2.531	2.281
23CBR32-N10	1.967-18SAE N10	.573	2.500	.240	2.687	2.438
23CBR32-N11	2.157-18SAE N11	.573	2.718	.240	2.968	2.656
23CBR32-N12	2.360-18SAE N12	.604	2.906	.240	3.156	2.844
23CBR32-N13	2.548-18SAE N13	.635	3.125	.240	3.375	3.063
23CBR32-N14	2.751-18SAE N14	.635	3.375	.240	3.625	3.313

MATERIAL: STEEL

FINISH: ZINC PHOSPHATE AND OIL

THREADS: SAE J505

NOTE: TYPE CBR32 IS NOT AVAILABLE FROM ESNA. IT IS INCLUDED ONLY TO ILLUSTRATE A Collarlok® APPLICATION. PARTS SHOULD BE ORDERED FROM:
 STANDARD LOCKNUT & LOCKWASHER, INC.
 P.O. BOX 1900
 1212 S.RANGELINE ROAD
 CARMEL, INDIANA 46032-4900
 TEL: 1-317-846-4231
 FAX: 1-317-573-5515

PJ-0044-30

ISSUED: 22 FEB 88 REVISED: 1 MAY 91

REFERENCE STANDARDS:

NUT—BEARING RETAINER, COLLARLOK

CBR32



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This is how the ESlok[®] Locking Patch Works...

The Red Nylon Locking Patch is permanently fused to an area of the nut threads which is dimensionally controlled for each thread size to assure pre-determined levels of locking torque. The metal threads of the nut are not affected in any way and the tensile strength of the nut is unchanged.

ESlok[®]

PREVAILING TORQUE LOCKNUT

LOW COST • VIBRATION-PROOF

INTERCHANGEABLE
ESlok nuts may be used interchangeably on any good commercial grade bolt.

SELF-LOCKING
The red nylon locking patch provides a smooth, consistent locking torque that fully meets I.F.I. locknut specification requirements.

REUSEABLE
Elastic recovery of the red nylon patch insures five (5) or more loaded rouses.

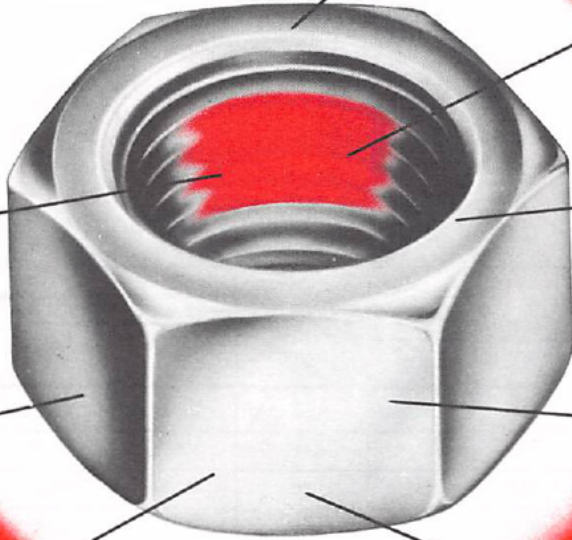
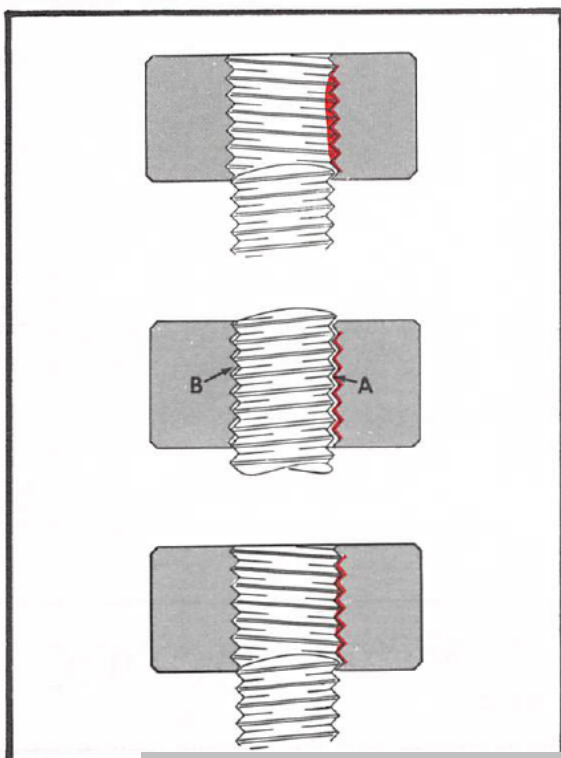
NON-GALLING
Plastic locking grip of the red nylon patch is non-destructive, will not gall threads or remove plating.

PRECISE ADJUSTMENT
Self-locking at any position on the bolt, permits infinitely precise adjustment, accurate positioning.

Slok NYLON PATCH
Red nylon locking patch is impervious to grease, oil, gasoline, common solvents or salt water. Withstands temperatures from -70°F up to 250°F.

APPROVED
The ESlok nut meets all provisions of the I.F.I. spec. pertinent to Grade A and B locknuts.

AVAILABILITY
ESNA maintains an inventory of ESlok nuts in sizes 3/8 thru 2 course or fine thread, plain or zinc plated.

THE RED NYLON LOCKING PATCH

The nylon patch is thickest in the center ... and tends to "feather-out" along the edges. This permits an easy "lead-in" for the bolt, which enters freely into either end of the nut.

As the mating bolt threads fully engage the red locking patch, the nylon is gradually compressed ... building locking torque smoothly ... completely filling in all axial tolerances between the male and female threads (see A). This action forces a strong metal-to-metal contact between the thread flanks opposite to the locking patch (see B). A three-way locking action is completed by the vibration-damping, plastic-smooth, precision grip of the nylon locking patch.

The ESlok Nut is removable ... and re-useable. Nylon's plastic-smooth locking grip never galls or seizes bolt threads, making it easy to wrench off; nylon's "memory" makes it try to return to its original conditions when the bolt is removed, thus assuring renewed locking torque upon re-use.

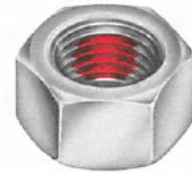
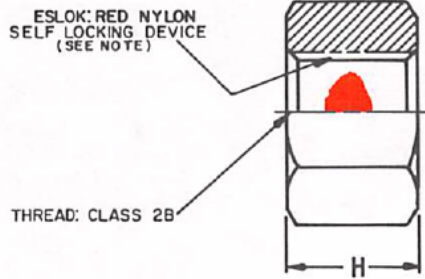
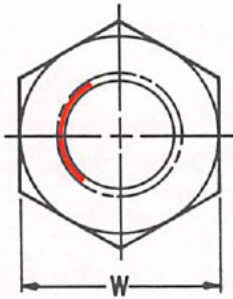


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THREAD SIZE	W		H		APPROX WEIGHT LB/1000	PART NUMBER				
	MAX	MIN	MAX	MIN		FINISH				
						PLAIN	ZINC	CADMIUM	ZINC PLATE - CHROMATE FORTIFIED	CADMIUM PLATE - CHROMATE FORTIFIED
5/8-11	.938	.922	.559	.535	73.3	30012	30032	30052	30072	30092
5/8-18	.938	.922	.559	.535	73.3	30013	30033	30053	30073	30093
3/4-10	1.125	1.088	.665	.617	119.0	30014	30034	30054	30074	30094
3/4-16	1.125	1.088	.665	.617	119.0	30015	30035	30055	30075	30095
7/8-9	1.313	1.269	.776	.724	190.0	30016	30036	30056	30076	30096
7/8-14	1.313	1.269	.776	.724	190.0	30017	30037	30057	30077	30097
1-8	1.500	1.450	.887	.831	283.0	30018	30038	30058	30078	30098
1-14	1.500	1.450	.887	.831	283.0	30019	30039	30059	30079	30099

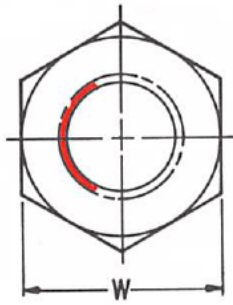
NOTE: LOCKING DEVICE LOCATED TO PERMIT ASSEMBLY OF NUT FROM EITHER END.
MATERIAL: STEEL

ISSUED: 7 JUL 77 REVISED: ② 1 FEB 88

REFERENCE STANDARDS:	ESLOK NUT, FINISHED HEXAGON, SELF-LOCKING, GRADE A	30000 SERIES
----------------------	---	-------------------------



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ESLOK: RED NYLON SELF LOCKING DEVICE (SEE NOTE)

THREAD: CLASS 2B



THREAD SIZE	W		H		APPROX WEIGHT LB/1000	PART NUMBER		
						FINISH		
	MAX	MIN	MAX	MIN		PLAIN	ZINC	CADMIUM PLATE CHROMATE FORTIFIED
5/8-11	.938	.922	.559	.535	73.3	31312	31332	31392
5/8-18	.938	.922	.559	.535	73.3	31313	31333	31393
3/4-10	1.125	1.088	.665	.617	119.0	31314	31334	31394
3/4-16	1.125	1.088	.665	.617	119.0	31315	31335	31395
7/8-9	1.313	1.269	.776	.724	190.0	31316	31336	31396
7/8-14	1.313	1.269	.776	.724	190.0	31317	31337	31397
1-8	1.500	1.450	.887	.831	283.0	31318	31338	31398
1-14	1.500	1.450	.887	.831	283.0	31319	31339	31399

NOTE: LOCKING DEVICE LOCATED TO PERMIT ASSEMBLY OF NUT FROM EITHER END.

MATERIAL: STEEL

1. CADMIUM PLATE, CHROMATE FORTIFIED PARTS 31392 THRU 31399 MEET ORDNANCE CORPS SPECIFICATION MS 51922.
2. HEAVY HEXAGON AND FINISHED HEXAGON THICK ESLOK NUTS ARE MANUFACTURED TO SPECIAL ORDER. PRICES AND AVAILABILITY ON REQUEST.
3. FINISHED HEXAGON ESLOK NUTS IN BRASS, ALUMINUM, AND STAINLESS STEEL ARE MANUFACTURED TO SPECIAL ORDER. PRICES AND AVAILABILITY ON REQUEST.

ISSUED: 6 AUG 80 REVISED: ② 1 FEB 88

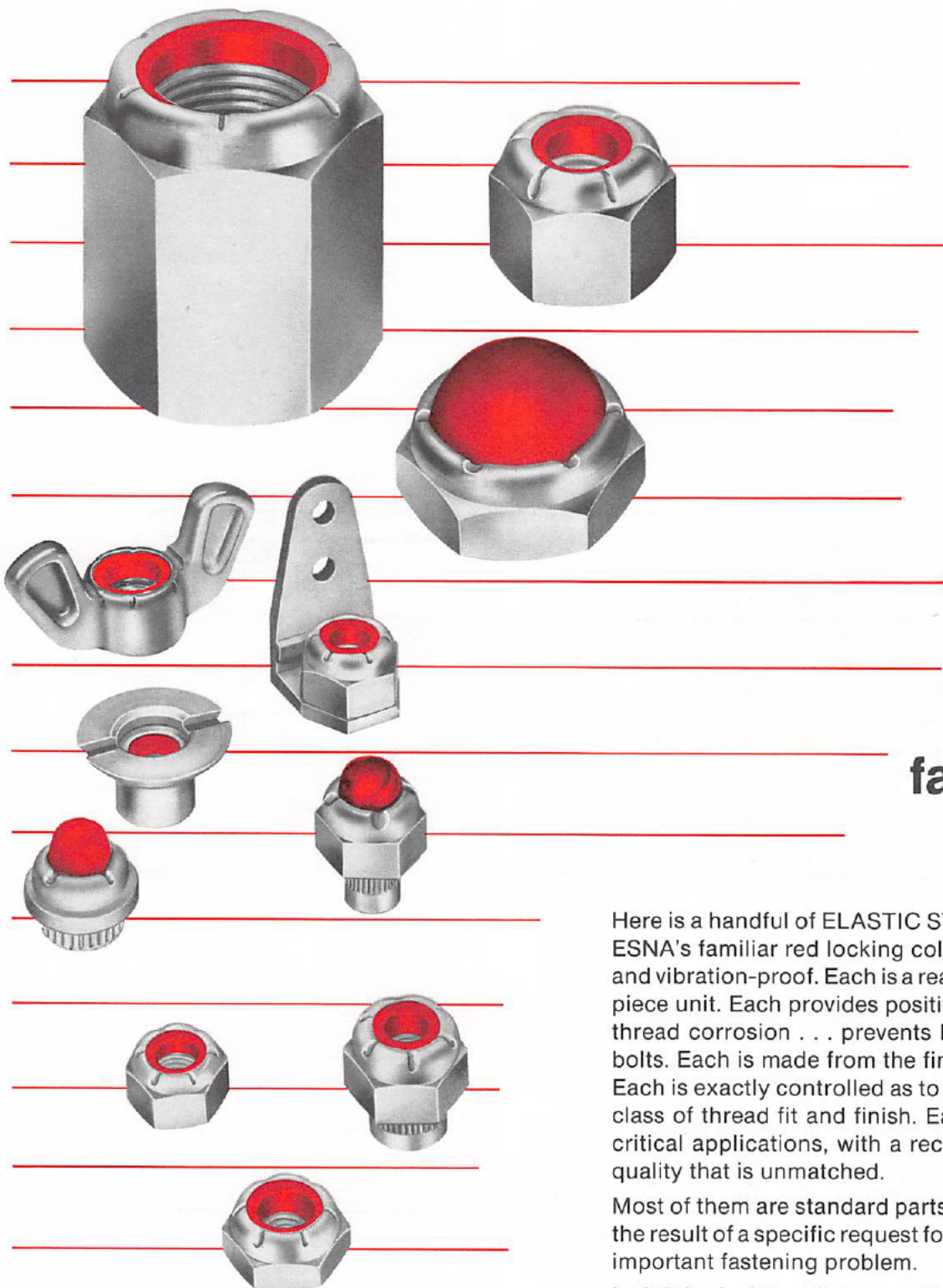
REFERENCE STANDARDS:

**ESLOK NUT, FINISHED HEXAGON,
SELF-LOCKING, GRADE B**

31300
SERIES



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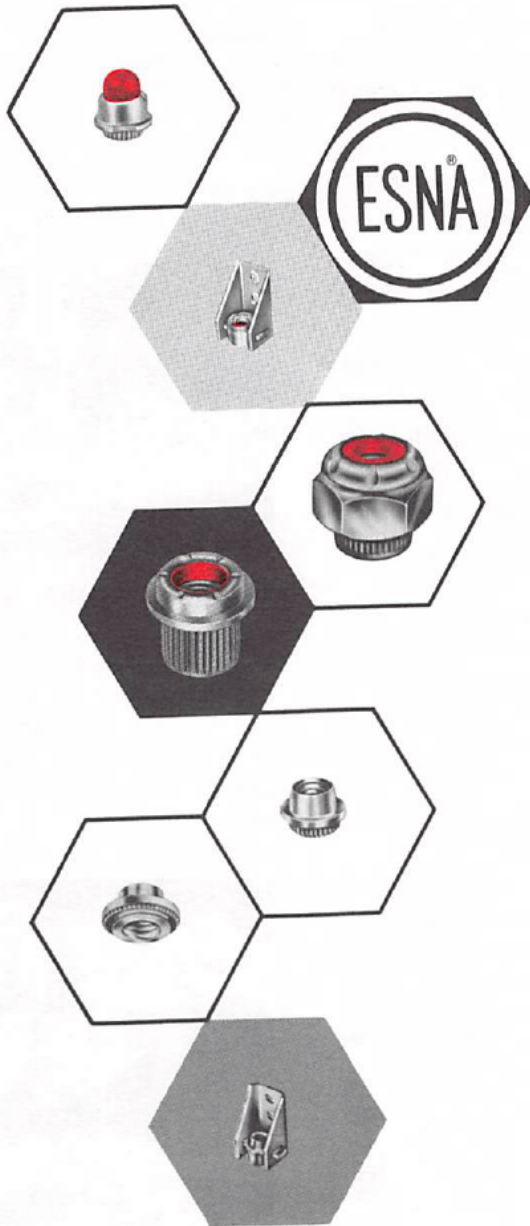


**What
shape
is a
quality
fastener?**

Here is a handful of ELASTIC STOP® nuts. Each has ESNA's familiar red locking collar . . . is self-locking and vibration-proof. Each is a readily assembled, one-piece unit. Each provides positive protection against thread corrosion . . . prevents liquid seepage along bolts. Each is made from the finest of raw materials. Each is exactly controlled as to finished dimensions, class of thread fit and finish. Each is now in use on critical applications, with a record for uniform high quality that is unmatched.

Most of them are standard parts. Some originated as the result of a specific request for ESNA's help with an important fastening problem.

Isn't it logical to call on us with your next fastening problem?

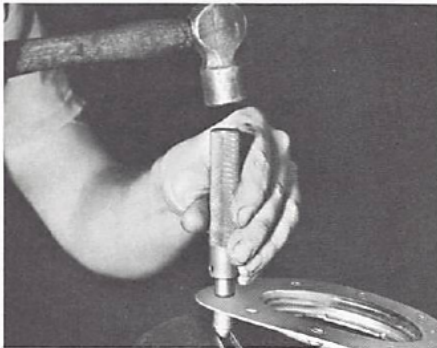


SECTION 2 SELF-RETAINING NUTS

Part Number	Page Number
NCFMA	59
NKCFM	61
NC4284	63
NC	65
INSTALLATION TOOLS	68
LHCFM	70
LHCFM2860	70
LHC3949	73
LHC4256	73
ND	74
A27M	76
NA27	77
LHA27M	78
LHA27M-2860	78
LHA227	79
LHA228	79
LHA4972	80

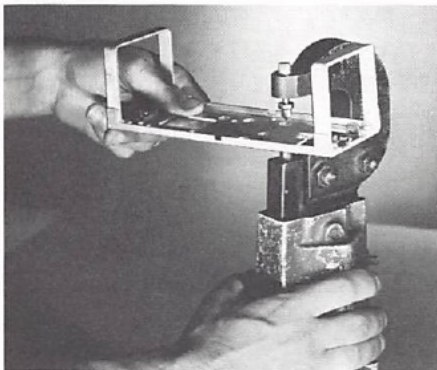
SUGGESTED METHODS FOR HAND OR SEMI-AUTOMATIC INSTALLATION

Simple punch and dolly tools for installing standard, miniature and floating types of clinch nuts may be obtained from ESNA. Detail drawings on these tools are included in this catalog. To insure that clinch nuts will not have any tendency to push out or twist out, recommended installation procedures outlined on chart (page No. 68-69) should be carefully followed.



HAND TOOLS

The hand tools shown above are for short run or prototype assemblies and are not recommended for production.



HAND RIVETER TOOLS

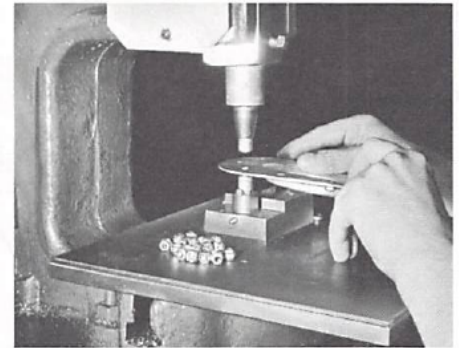
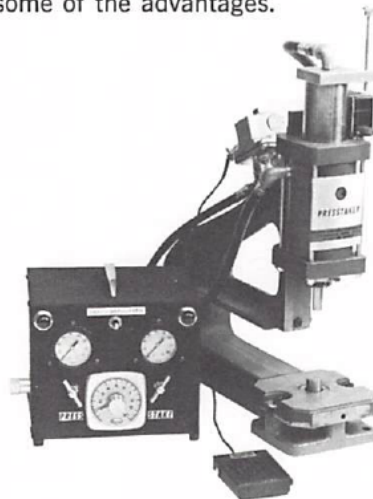
Standard punch and dolly tools can be used in a hand operated squeeze type riveter as illustrated. In this method steady controlled pressure can be exerted and the hand tool can be moved to various positions on larger units to facilitate production. This method is particularly suited to units with narrow flanges or restricted access areas.

INSTALLATION METHODS

There are several types of installation methods possible with ESNA standard and miniature clinch nuts. The preferred method is entirely dependent upon the nature of the assembly, the volume of production and the tools available. The most common methods are illustrated here and will serve as a guide to the method most suitable to your production requirements. It is important that the procedures outlined on the preceding pages be followed to insure trouble free production and superior product performance.

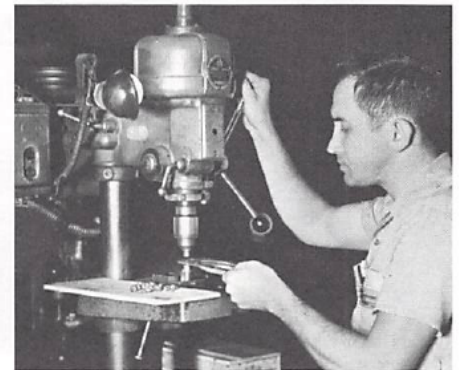
AUTOMATIC PRODUCTION EQUIPMENT

Automatic clinch and press nut installation machines are available to meet the requirements for high volume production. Interchangeable tooling, reduced installation time, flexibility and accuracy are some of the advantages.



ARBOR PRESS INSTALLATION

Use of an arbor or light power press is simple and fast for large or small production runs. Standard or miniature clinch nut tools adapt readily to the press giving the operator full control over position, pressure and speed of production.



DRILL PRESS SPINNING METHOD

Both standard and miniature clinch nuts can be quickly and efficiently installed by the spinning technique using a spin riveter or shop drill press. ESNA punch and dolly tools readily adapt to either machine and give high production installation in large or small components. Spinning automatically centers the punch on the shank insuring equal force against the shank walls.

The typical unit illustrated is suitable to use for inserting standard or miniature clinch nuts or press nuts. The machine inserts, presses and stakes the nuts without requiring that the work be reversed. Other models semi-automatic or automatic, depending on requirements, are available.

PLEASE SEE PAGES 68 - 69 FOR CLINCH NUT PUNCH AND DOLLY TOOLS



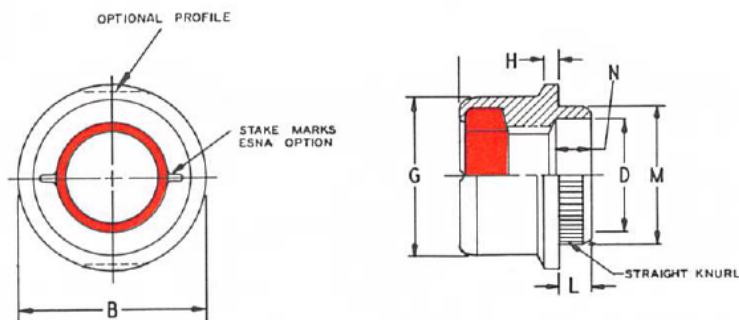
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ESNA PART NUMBER		THREAD	A ±.010	B ±.005	D +.003 -.002	G MAX	H ±.005	L ±.003	M ±.002	N REF	APPROX WEIGHT LB/100
STEEL	STAINLESS STEEL										
22NCFMA1-26	79NCFMA1-26	.0860-56UNJC-3B	.075	.172	.098	.150	.020	.040 .060	.129	.040 .060	.03 .03
22NCFMA2-26	79NCFMA2-26										
22NCFMA1-40	79NCFMA1-40	.1120-40UNJC-3B	.090	.203	.130	.182	.020	.040 .060	.160	.040 .060	.05 .05
22NCFMA2-40	79NCFMA2-40										
12NCFMA1-62	79NCFMA1-62	.1380-32UNJC-3B	.130	.281	.154	.242	.025	.040 .060	.192	.040 .060	.11 .12
12NCFMA2-62	79NCFMA2-62										
12NCFMA1-82	79NCFMA1-82	.1640-32UNJC-3B	.160	.312	.180	.268	.025	.040 .060	.223	.040 .060	.16 .17
12NCFMA2-82	79NCFMA2-82										
12NCFMA1-02	79NCFMA1-02	.1900-32UNJF-3B	.179	.344	.212	.287	.030	.040 .060	.254	.040 .060	.21 .22
12NCFMA2-02	79NCFMA2-02										

MATERIAL:

STEEL.
STAINLESS STEEL, AISI 303 OR EQUIV.

FINISH:

STEEL - CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 3.
STAINLESS STEEL - UNPLATED.

LOCKING INSERT: RED NYLON - HEAT STABILIZED. SUITABLE FOR TEMPERATURES UP TO 350°F.

THREADS: MIL-S-8879

PERFORMANCE: TORQUE PER MIL-N-25027, SIZES -82 AND LARGER.

APPLICATION: TYPE NCFMA PARTS ARE PARTICULARLY SUITED FOR USE IN APPLICATIONS INVOLVING INSTALLATIONS IN THIN ALUMINUM OR SOFT STEEL SHEETS OR PLATES HAVING SMALL MOUNTING AREAS MAKING THE USE OF A MINIATURE FIXED TYPE NUT DESIRABLE. THE ADAPTABILITY OF NCFMA'S TWO SHANK LENGTHS TO MANY SHEET THICKNESSES IS ALSO WORTHY OF NOTE SINCE IT MINIMIZES NUT STOCKING REQUIREMENTS FOR NUMEROUS APPLICATIONS.

PART CODING:

F 1 2 NCFMA 2-02



POST PLATE TREATMENT (PER QQ-P-416, TYPE II). ESNA IS CONVERTING THIS DESIGN FROM "TYPE I" TO "TYPE II" CADMIUM PLATE. PARTS WILL BE SUPPLIED WITH "TYPE I" PLATING UNTIL PRESENT INVENTORIES ARE EXHAUSTED, AFTER WHICH ALL SHIPMENTS WILL HAVE "TYPE II" PLATING ONLY.

SHANK LENGTH SELECTION

NCFMA1 PARTS ARE RECOMMENDED FOR INSTALLATIONS INVOLVING SHEET THICKNESSES UP TO APPROXIMATELY .050 INCH. PRACTICAL FLUSHNESS CAN BE ACHIEVED IN THICKNESSES AS LOW AS .030 INCH.

NCFMA2 PARTS ARE RECOMMENDED FOR USE IN SHEET THICKNESSES OF .050 OR HEAVIER.

FOR OPTIMUM INSTALLATION IT IS RECOMMENDED THAT THE PROPER TOOLS BE USED, AND THAT THE MAXIMUM TABULATED CLINCHING PRESSURES NOT BE EXCEEDED. EXCEEDING THESE VALUES CAN, DEPENDING UPON THE MATERIAL INTO WHICH THE NUT IS INSTALLED, CAUSE DISTORTION OF THE WORK AND/OR THE NUT ITSELF.

THE MOST SATISFACTORY INSTALLATIONS ARE OBTAINED WHEN THE NUT IS PRESSED INTO THE WORK UNTIL ITS SHOULDER RESTS AGAINST THE SURFACE OF THE WORK. THE SHANK SHOULD THEN BE FLARED.

IT IS RECOMMENDED THAT THE ACTING SURFACE OF THE PUNCH FACE BE MAINTAINED. BOTH THE PUNCH AND THE DOLLY SHOULD BE REGULARLY INSPECTED AND CLEANED OF ANY PLATING BUILD-UP IN ORDER TO ASSURE PROPER SEATING OF THE NUT.

FLUSH MOUNTING PUNCHES ARE INTENDED FOR USE WITH NO. 1 SHANK LENGTH PARTS IN .030 TO .040 THICK SHEET AND NO. 2 SHANK LENGTH PARTS IN .050 TO .060 THICK SHEET. FOR SHEET THICKNESSES .040 TO .050 IT IS RECOMMENDED THAT NO. 1 SHANK LENGTH PARTS BE USED WITH INTERNAL FLARING PUNCHES AND FOR THICKNESSES GREATER THAN .060, NO. 2 SHANK LENGTH PARTS BE USED WITH INTERNAL FLARING PUNCHES.

BASIC PART NUMBER	INSTALLATION TOOLS			MAXIMUM RECOMMENDED CLINCHING PRESSURE (LBS)	INSTALLATION HOLE DIAMETERS	
	FLUSH PUNCH	INTERNAL PUNCH	DOLLY		MIN	MAX
NCFMA1-26	CPM1	CPM2	CDMA21	300	.124	.126
NCFMA2-26						
NCFMA1-40	CPM1	CPM4	CDMA41	600	.155	.157
NCFMA2-40						
NCFMA1-62	CPM1	CPM6	CDMA61	750	.187	.189
NCFMA2-62						
NCFMA1-82	CPM2	CPM8	CDMA81	1000	.218	.220
NCFMA2-82						
NCFMA1-02	CPM2	CPM10	CDMA101	1500	.249	.251
NCFMA2-02						

PJ-2518

REFERENCE STANDARDS:

MIL-N-45938/5

**NUT-CLINCH, FLUSH MOUNTING,
MINIATURE,
NYLON INSERT, 350°F.**

NCFMA

PAGE 1 OF 2

ISSUED: 23 NOV 59 REVISED: 8 MAR 90



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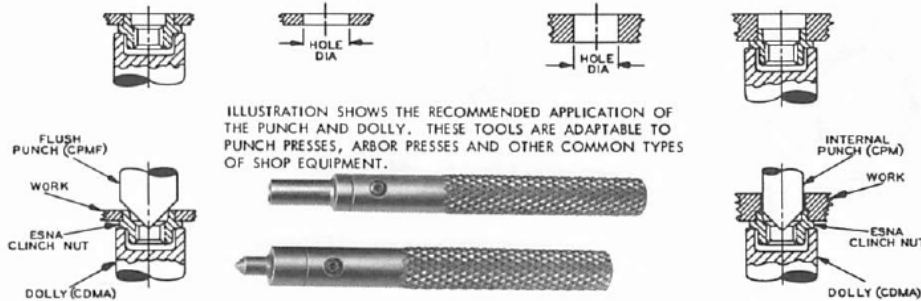
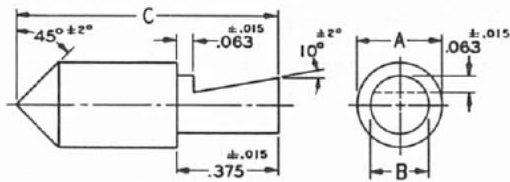


ILLUSTRATION SHOWS THE RECOMMENDED APPLICATION OF THE PUNCH AND DOLLY. THESE TOOLS ARE ADAPTABLE TO PUNCH PRESSES, ARBOR PRESSES AND OTHER COMMON TYPES OF SHOP EQUIPMENT.

FLUSH MOUNTING PUNCH

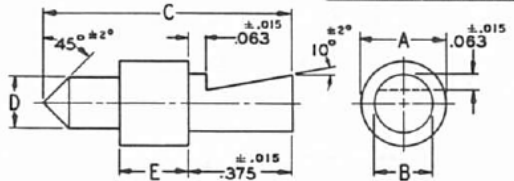


PUNCH PART NUMBER	A	B	C
CPMF1	.307	.200	.966
CPMF2	.419	.300	1.022

MATERIAL: TOOL STEEL, ROCKWELL 60 (REF)

FINISH: UNPLATED

INTERNAL FLARING MOUNTING PUNCH



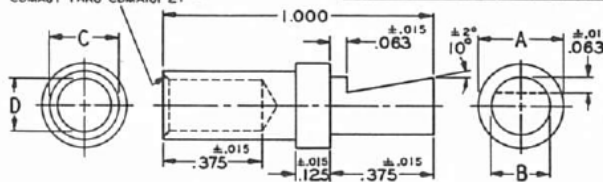
PUNCH PART NUMBER	A	B	C	D	E
CPM2			.873	.120	
CPM4	.307	.200	.888	.151	.250
CPM6			.904	.183	
CPM8			.920	.214	
CPM10	.419	.300	.935	.245	.188

MATERIAL: TOOL STEEL, ROCKWELL 60 (REF)

FINISH: UNPLATED

CDMA21 AND CDMA41 35°±1°
CDMA61 THRU CDMA101 21°±1°

DOLLY - MINIATURE, CLINCH NUT

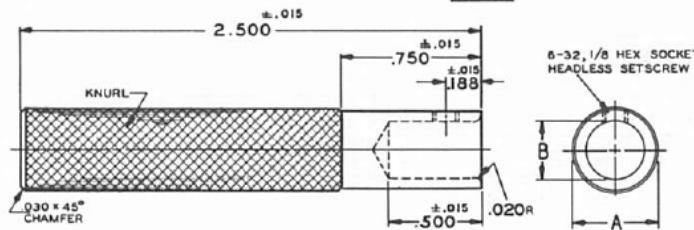


DOLLY PART NUMBER	A	B	C	D
CDMA21			.213	.151
CDMA41	.307	.200	.243	.183
CDMA61			.307	.243
CDMA81			.333	.269
CDMA101	.419	.300	.359	.288

MATERIAL: TOOL STEEL, ROCKWELL 60 (REF)

FINISH: UNPLATED

HANDLE



HANDLE PART NUMBER	A	B
CHM1	.312	.201
CHM2	.437	.301

MATERIAL: STEEL, SURFACE HARDENED.

FINISH: UNPLATED

PJ-2518

REFERENCE STANDARDS:

MIL-N-45938/5

**NUT-CLINCH, FLUSH MOUNTING,
MINIATURE,
NYLON INSERT, 350°F.**

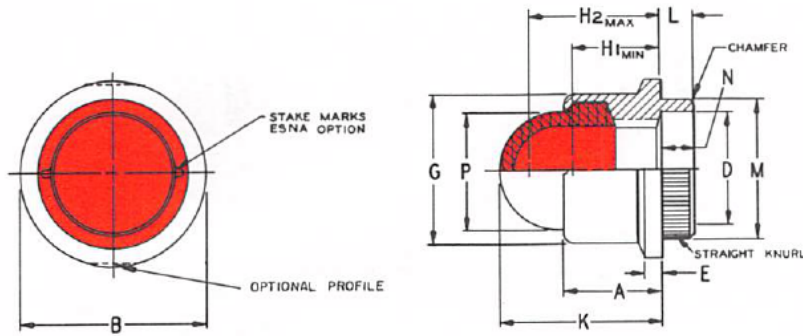
NCFMA

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ISSUED: 23 NOV 59 REVISED: 8 MAR 90



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ESNA PART NUMBER		THREAD	A ±.015	B ±.005	D +.003 -.002	E ±.005	G MAX	H1 MIN	H2 MAX	K ±.015	L ±.003	M ±.002	N REF	P REF	APPROX WEIGHT LB/100
STEEL	STAINLESS STEEL														
22NKCFM1-26	79NKCFM1-26	0860-56UNJC-3B	.075	.172	.098	.020	.150	.072	.119	.143	.040 .060	.129	.040 .060	.106	.03
	79NKCFM2-26														
22NKCFM1-40	79NKCFM1-40	1120-40UNJC-3B	.090	.203	.130	.020	.182	.086	.154	.176	.040 .060	.160	.040 .060	.131	.05
	79NKCFM2-40														
12NKCFM1-62	79NKCFM1-62	1380-32UNJC-3B	.130	.281	.154	.025	.242	.130	.211	.251	.040 .060	.192	.040 .060	.170	.11
	79NKCFM2-62														.12
12NKCFM2-82		1640-32UNJC-3B	.160	.312	.180	.025	.268	.162	.251	.289	.060	.223	.060	.191	.17
		1900-32UNJF-3B	.179	.344	.212	.030	.287	.177	.255	.290	.060	.254	.060	.221	.22
	79NKCFM2-02														

MATERIAL:
STEEL.
STAINLESS STEEL - AISI 303 OR EQUIV.
CAP - RED NYLON.

PART CODING:

F 2 2 NKCFM 2-40



FINISH:
STEEL-CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 3.
STAINLESS STEEL-UNPLATED.

POST PLATE TREATMENT (PER QQ-P-416, TYPE II). ESNA IS CONVERTING THIS DESIGN FROM "TYPE I" TO "TYPE II" CADMIUM PLATE. PARTS WILL BE SUPPLIED WITH "TYPE I" PLATING, UNTIL PRESENT INVENTORIES ARE EXHAUSTED, AFTER WHICH ALL SHIPMENTS WILL HAVE "TYPE II" PLATING ONLY.

THREADS: MIL-S-8879

LOCKING INSERT: RED NYLON - HEAT STABILIZED. SUITABLE FOR TEMPERATURES UP TO 350°F.

PERFORMANCE: TORQUE PER MIL-N-25027, SIZES -82 AND LARGER. SEALING ABILITY: INTERNAL AND EXTERNAL PRESSURES UP TO 80 PSI, PAST THE BOLT THREADS, PROVIDED A SUITABLE SEAL IS EFFECTED BETWEEN THE NUT BASE AND ITS MATING SURFACE.

APPLICATION: TYPE "NKCFM" NUTS FEATURE A NYLON CAP IN MINIATURIZED CLINCH NUT SERIES. THEY ARE PARTICULARLY SUITED FOR USE IN THIN ALUMINUM OR SOFT STEEL SHEETS WHERE CONDITIONS OF THE APPLICATION NECESSITATE SEALING OR COVERING OF SCREW ENDS.

SHANK LENGTH SELECTION

NKCFM1 PARTS ARE RECOMMENDED FOR INSTALLATIONS INVOLVING SHEET THICKNESSES UP TO APPROXIMATELY .050 INCH. PRACTICAL FLUSHNESS CAN BE ACHIEVED IN THICKNESSES AS LOW AS .030 INCH.

NKCFM2 PARTS ARE RECOMMENDED FOR USE IN SHEET THICKNESSES OF .050 OR HEAVIER.

FOR OPTIMUM INSTALLATION IT IS RECOMMENDED THAT THE PROPER TOOL BE USED, AND THAT THE MAXIMUM TABULATED CLINCHING PRESSURES NOT BE EXCEEDED. EXCEEDING THESE VALUES CAN, DEPENDING UPON THE MATERIAL INTO WHICH THE NUT IS INSTALLED, CAUSE DISTORTION OF THE WORK AND/OR THE NUT ITSELF.

THE MOST SATISFACTORY INSTALLATIONS ARE OBTAINED WHEN THE NUT IS PRESSED INTO THE WORK UNTIL ITS SHOULDER RESTS AGAINST THE SURFACE OF THE WORK. THE SHANK SHOULD THEN BE FLARED.

IT IS RECOMMENDED THAT THE ACTING SURFACE OF THE PUNCH FACE BE MAINTAINED. BOTH THE PUNCH AND THE DOLLY SHOULD BE REGULARLY INSPECTED AND CLEANED OF ANY PLATING BUILD-UP IN ORDER TO ASSURE PROPER SEATING OF THE NUT.

FLUSH MOUNTING PUNCHES ARE INTENDED FOR USE WITH NO. 1 SHANK LENGTH PARTS IN .030 TO .040 THICK SHEET AND NO. 2 SHANK LENGTH PARTS IN .050 TO .060 THICK SHEET. FOR SHEET THICKNESSES .040 TO .050 IT IS RECOMMENDED THAT NO. 1 SHANK LENGTH PARTS BE USED WITH INTERNAL FLARING PUNCHES AND FOR THICKNESSES GREATER THAN .060 NO. 2 SHANK LENGTH PARTS BE USED WITH INTERNAL FLARING PUNCHES.

BASIC PART NUMBER	INSTALLATION TOOLS			MAXIMUM RECOMMENDED CLINCHING PRESSURE (LBS)	INSTALLATION HOLE DIAMETERS	
	FLUSH PUNCH	INTERNAL PUNCH	DOLLY		MIN	MAX
NKCFM1-26 NKCFM2-26	CPMF1	CPM2	CDMA21	300	.124	.126
NKCFM1-40 NKCFM2-40	CPMF1	CPM4	CDMA41	600	.155	.157
NKCFM1-62 NKCFM2-62	CPMF1	CPM6	CDMA61	750	.187	.189
NKCFM2-82	CPMF2	CPM8	CDMA81	1000	.218	.220
NKCFM2-02	CPMF2	CPM10	CDMA101	1500	.249	.251

PJ-2518-3

REFERENCE STANDARDS:

**NUT-CLINCH, FLUSH MOUNTING,
MINIATURE,
NYLON CAP, 350° F.**

NKCFM
PAGE 1 OF 2



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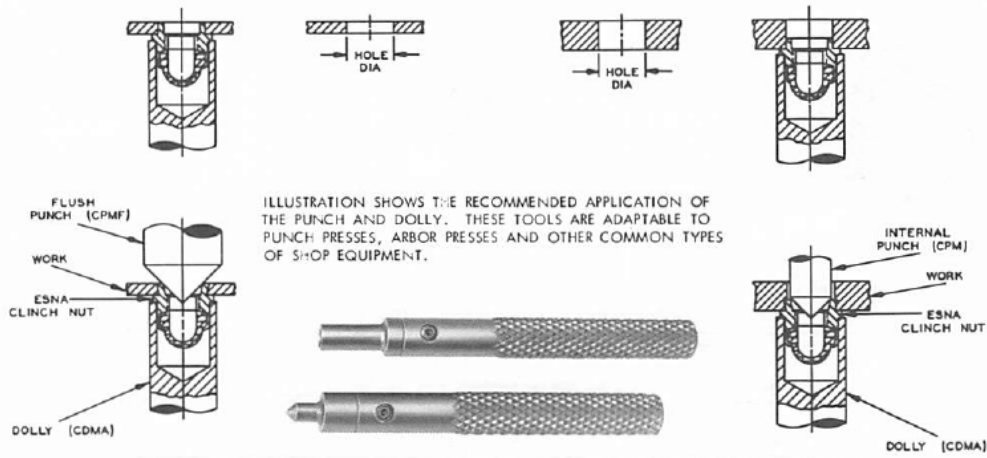
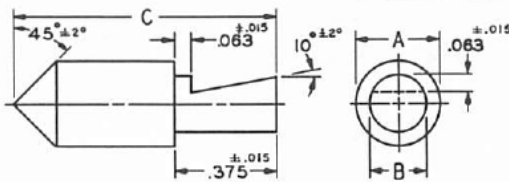


ILLUSTRATION SHOWS THE RECOMMENDED APPLICATION OF THE PUNCH AND DOLLY. THESE TOOLS ARE ADAPTABLE TO PUNCH PRESSES, ARBOR PRESSES AND OTHER COMMON TYPES OF SHOP EQUIPMENT.

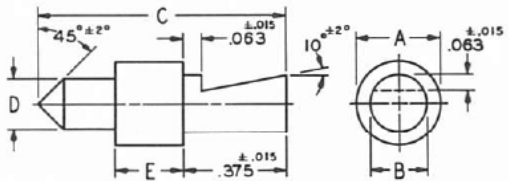
FLUSH MOUNTING PUNCH



PUNCH PART NUMBER	A	B	C
CPMF1	±.015	$\begin{matrix} +.000 \\ -.002 \end{matrix}$	±.015
CPMF2	.419	.300	1.022

MATERIAL: TOOL STEEL, ROCKWELL "C" 60 (REF). FINISH: UNPLATED

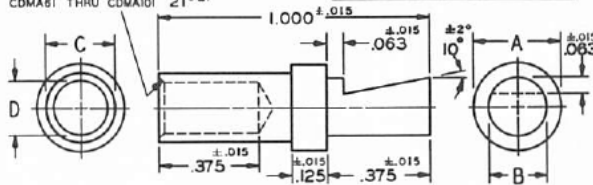
INTERNAL FLARING MOUNTING PUNCH



PUNCH PART NUMBER	A	B	C	D	E
CPM2	±.015	$\begin{matrix} +.000 \\ -.002 \end{matrix}$	±.015	.873	.120
CPM4	.307	.200	.888	.151	.250
CPM6			.904	.183	
CPM8			.920	.214	
CPM10	.419	.300	.935	.245	.188

MATERIAL: TOOL STEEL, ROCKWELL "C" 60 (REF). FINISH: UNPLATED

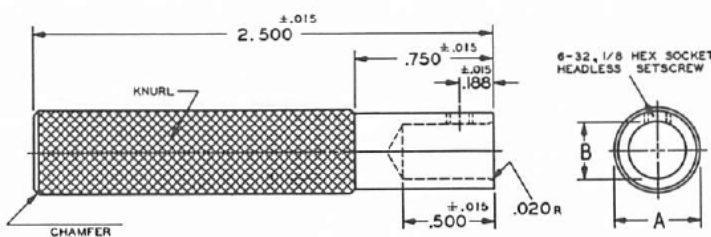
DOLLY-MINIATURE, CLINCH NUT



DOLLY PART NUMBER	A	B	C	D
CDMA21	±.015	$\begin{matrix} +.000 \\ -.002 \end{matrix}$	±.015	$\begin{matrix} +.003 \\ -.000 \end{matrix}$
CDMA41	.307	.200	.243	.183
CDMA61			.307	.243
CDMA81			.333	.269
CDMA101	.419	.300	.359	.288

MATERIAL: TOOL STEEL, ROCKWELL "C" 60 (REF). FINISH: UNPLATED

HANDLE



HANDLE PART NUMBER	A	B
CHM1	±.015	$\begin{matrix} +.003 \\ -.000 \end{matrix}$
CHM2	.437	.301

MATERIAL: STEEL, SURFACE HARDENED. FINISH: UNPLATED

- NOTES: 1. THE LOCKING INSERT AND CAP ARE AN INTEGRAL PART.
 2. "H2" MAX DESIGNATES THE MAXIMUM RECOMMENDED BOLT ENTRY TO AVOID CONTACT WITH THE TOP OF THE CAP.
 "H1" MIN DESIGNATES THE MINIMUM RECOMMENDED BOLT ENTRY TO INSURE SATISFACTORY LOCKING PERFORMANCE.

PJ-2518-3

ISSUED: 26 FEB 62 REVISED: 5 8 MAR 90

REFERENCE STANDARDS:

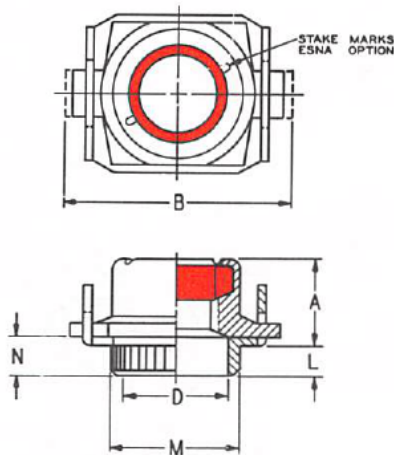
NUT-CLINCH, FLUSH MOUNTING, MINIATURE, NYLON CAP, 350° F.

NKCFM

PAGE 2 OF 2



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ESNA PART NUMBER	THREAD	A MAX	B MAX	C ±.015	D ±.005	L		M ±.003 -.002	N REF	APPROX WEIGHT LB/100
						±.005				
12NC4284-1-40	.1120-40UNJC-3B	.132	.446	.300	.180	.040	.224		.062	.18
12NC4284-2-40 (SEE NOTE 1)						.060				
12NC4284-1-62	.1380-32UNJC-3B	.172	.446	.300	.180	.040	.224		.062	.23
12NC4284-2-62 (SEE NOTE 1)						.060				
12NC4284-2-82	.1640-32UNJC-3B	.202	.498	.350	.232	.060	.275		.082	.30
12NC4284-3-82						.090				
12NC4284-1-02	.1900-32UNJF-3B	.221	.498	.350	.232	.040	.275		.062	.31
12NC4284-2-02						.060				
12NC4284-3-02						.090			.112	.33

MATERIAL:
STEEL.

FINISH:
NUT & BASKET - CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 3.

LOCKING INSERT: RED NYLON - HEAT STABILIZED. (SUITABLE FOR TEMPERATURES UP TO 350°F.)

THREADS: MIL-5-8879.

FLOAT: MINIMUM RADIAL .020 WITHIN LIMITS OF "B" DIMENSION.

PERFORMANCE: TORQUE PER MIL-N-25027; SIZES -82 AND LARGER.

APPLICATION: TYPE NC4284 CLINCH NUTS ARE PARTICULARLY SUITED FOR USE IN APPLICATIONS WHERE LIMITED MOUNTING OR WRENCHING AREAS MAKE USE OF MINIATURE FIXED NUT DESIRABLE. SINCE THE SPLINE ON THE NUT SHANK MUST BROACH INTO THE WORK, INSTALLATIONS ARE USUALLY LIMITED TO USE IN THIN ALUMINUM OR SOFT STEEL SHEETS OR PLATES. THE FLOATING NUT COMPONENT ADDS ADVANTAGE TO THE USE OF NC4284 SINCE IT RELAXES THE USUAL REQUIREMENTS FOR CLOSE BOLT HOLE ALIGNMENTS IN MAKING ASSEMBLY STACK-UPS.

SHANK LENGTH SELECTION

NC4284-1-XX PARTS ARE RECOMMENDED FOR INSTALLATIONS INVOLVING SHEET THICKNESSES UP TO APPROXIMATELY .050 INCH. PRACTICAL FLUSHNESS CAN BE ACHIEVED IN THICKNESSES AS LOW AS .030 INCH.

NC4284-2-XX PARTS ARE RECOMMENDED FOR USE IN SHEET THICKNESSES OF .050 MINIMUM.

NC4284-3-82 & NC4284-3-02 PARTS ARE RECOMMENDED FOR USE IN SHEET THICKNESSES OF .060 MINIMUM.

FOR OPTIMUM INSTALLATION IT IS RECOMMENDED THAT THE PROPER TOOLS BE USED, AND THAT THE MAXIMUM TABULATED CLINCHING PRESSURES NOT BE EXCEEDED. EXCEEDING THESE VALUES CAN, DEPENDING UPON THE MATERIAL INTO WHICH THE NUT IS INSTALLED, CAUSE DISTORTION OF THE WORK AND/OR THE NUT ITSELF.

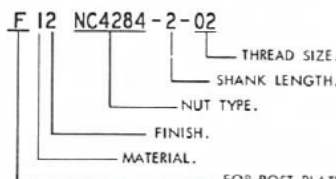
THE MOST SATISFACTORY INSTALLATIONS ARE OBTAINED WHEN THE NUT IS PRESSED INTO THE WORK UNTIL ITS SHOULDER RESTS AGAINST THE SURFACE OF THE WORK. THE SHANK SHOULD THEN BE FLARED.

IT IS RECOMMENDED THAT THE ACTING SURFACE OF THE PUNCH FACE BE MAINTAINED. BOTH THE PUNCH AND THE DOLLY SHOULD BE REGULARLY INSPECTED AND CLEANED OF ANY PLATING "BUILD-UP" IN ORDER TO ASSURE PROPER SEATING OF THE NUT.

NOTES:

1. THREAD SIZES -40 AND -62 ARE NOT AVAILABLE WITH THE -3 (.090) SHANK LENGTH AS OF PRINTING OF THIS CATALOG. CONSULT ESNA FOR AVAILABILITY.

PART CODING:



FOR POST PLATE TREATMENT (PER QQ-P-416, TYPE II) ON CADMIUM PLATED PARTS.

ISSUED: 23 JUN 62 REVISED: (B) 22 AUG 89

NUT - CLINCH, FLOATING, 350°F

NC4284

PAGE 1 OF 2



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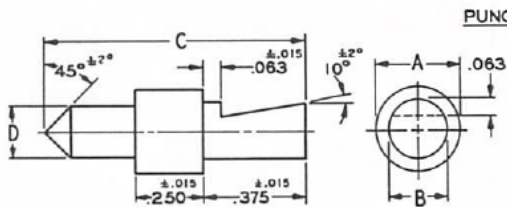
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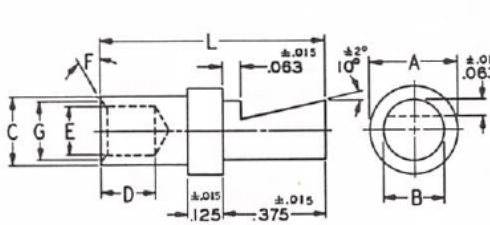
ESNA PART NUMBER	INSTALLATION TOOLS		MAXIMUM RECOMMENDED CLINCHING PRESSURE (LB.)	INSTALLATION HOLE DIAMETERS	
	PUNCH	DOLLY		MIN	MAX
12NC4284-X-40	CPFA6	CDFB4	1,500	.217	.219
12NC4284-X-62		CDFB6			
12NC4284-X-82	CPFA10	CDFB8	2,500	.268	.271
12NC4284-X-02		CDFB10			



PUNCH PART NUMBER	A	B	C	D
CPFA6	±.015	+0.000 -0.002	±.015	+0.000 -0.002
CPFA10	.419	.300	.954	.264

MATERIAL: TOOL STEEL, ROCKWELL "C" 60 (REF)

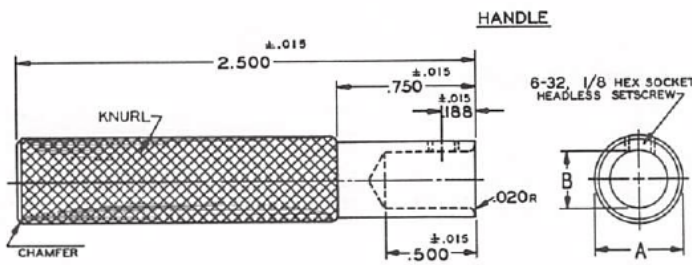
FINISH: UNPLATED.



DOLLY PART NUMBER	A	B	C	D	E	F	G	L
CDFB4	±.015	+0.000 -0.002	±.002	±.015	+0.003 -0.000	±1°	±.003	±.015
CDFB6	.299	.200	.299	.166	.183	35°	.209	.791
CDFB8	.299	.200	.299	.166	.243	21°	.287	.791
CDFB8	.419	.300	.351	.200	.269	21°	.318	.825
CDFB10	.419	.300	.351	.200	.288	21°	-----	.825

MATERIAL: TOOL STEEL, ROCKWELL "C" 60 (REF)

FINISH: UNPLATED.



HANDLE PART NUMBER	A	B
CHM1	±.015	+0.002 -0.000
CHM2	.437	.301

MATERIAL: STEEL, SURFACE HARDENED.

FINISH: UNPLATED.

PJ-2550-2

REFERENCE STANDARDS:

NUT—CLINCH, FLOATING, 350°F

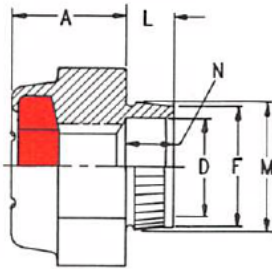
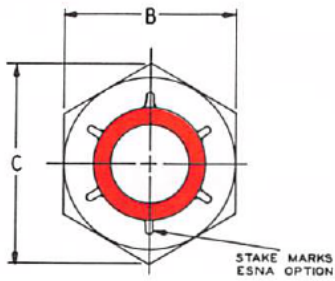
NC4284

PAGE 2 OF 2

ISSUED: 23 JUN 62 REVISED: (8) 22 AUG 89



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ESNA PART NUMBERS							THREAD	A ±.015	B REF	C REF	D REF	F MAX	L ±.006	M ±.002	N REF						
STEEL CADMIUM PLATED	STAINLESS UNPLATED	APPROX WEIGHT LB/100	ALUMINUM ANODIZED	APPROX WEIGHT LB/100	BRASS CADMIUM PLATED	APPROX WEIGHT LB/100															
22NC1-40	79NC1-40	.15	68NC1-40	.06			.1120-40UNJC-3B	.141	.250	.275	.147	.183	.063		.080						
22NC2-40	79NC2-40	.16	68NC2-40	.06									.085		.080						
22NC3-40	79NC3-40	.17	68NC3-40	.07									.105		.105						
22NC4-40	79NC4-40	.18											.135		.135						
22NC5-40	79NC5-40	.19	68NC5-40	.08									.165		.165						
22NC2-48		.16					.1120-48UNJF-3B	.141	.250	.275	.147	.183	.085		.080						
22NC3-48		.17											.105		.105						
22NC1-62	79NC1-62	.28	68NC1-62	.12			.1380-32UNJC-3B	.188	.313	.344	.165	.216	.063		.080						
22NC2-62	79NC2-62	.30	68NC2-62	.12									.085		.080						
22NC3-62	79NC3-62	.32	68NC3-62	.13									.105		.105						
22NC4-62	79NC4-62	.34	68NC4-62	.13									.135		.135						
22NC5-62	79NC5-62	.36											.165		.165						
	79NC6-62	.38					.195		.195												
22NC3-60		.32					.1380-40UNJF-3B	.188	.313	.344	.165	.216	.105	.222	.105						
22NC1-82	79NC1-82	.57	68NC1-82	.22			.1640-32UNJC-3B	.250	.375	.413	.220	.267	.063		.080						
22NC2-82	79NC2-82	.59	68NC2-82	.23									.085		.080						
22NC3-82	79NC3-82	.61	68NC3-82	.24	92NC3-82	.65							.105		.105						
22NC4-82	79NC4-82	.63	68NC4-82	.25									.135		.135						
22NC5-82	79NC5-82	.65											.165		.165						
22NC6-82	79NC6-82	.67	68NC6-82	.27									.195		.195						
22NC1-04		.52					.1900-24UNJC-3B	.250	.375	.413	.220	.267	.063		.080						
22NC2-04	79NC2-04	.54	68NC2-04	.21									.085		.080						
22NC3-04	79NC3-04	.56											.105		.105						
22NC4-04	79NC4-04	.58											.135		.135						
22NC5-04	79NC5-04	.60											.165		.165						
22NC6-04		.62											.195		.195						
22NC1-02	79NC1-02	.52					.1900-32UNJF-3B	.250	.375	.413	.220	.267	.063		.080						
22NC2-02	79NC2-02	.54	68NC2-02	.21	92NC2-02	.59							.085		.080						
22NC3-02	79NC3-02	.56											.105		.105						
22NC4-02	79NC4-02	.58	68NC4-02	.23									.135		.135						
22NC5-02	79NC5-02	.60	68NC5-02	.24									.165		.165						
22NC6-02	79NC6-02	.62											.195		.195						
22NC1-040	79NC1-040	.90	68NC1-040	.35			.2500-20UNJC-3B	.313	.438	.488	.280	.351	.063		.080						
22NC2-040	79NC2-040	.95											.085		.080						
22NC3-040	79NC3-040	1.00											.105		.105						
22NC4-040	79NC4-040	1.05	68NC4-040	.41									.135		.135						
22NC5-040	79NC5-040	1.10											.165		.165						
22NC6-040	79NC6-040	1.15											.195		.195						
22NC3-048		1.00	68NC3-048	.39			.2500-28UNJF-3B	.313	.438	.488	.280	.351	.105		.105						
22NC4-048	79NC4-048	1.05											.135		.135						
22NC5-048		1.10	68NC5-048	.43									.165		.165						
	79NC6-048	1.15											.195		.195						
22NC1-058	79NC1-058	1.25	68NC1-058	.49									.3125-18UNJC-3B	.344	.500	.557	.343	.407	.063		.080
	79NC3-058	1.35																	.105		.105
22NC4-058	79NC4-058	1.40					.135		.135												
22NC4-054		1.40					.135		.135												
22NC5-054		1.45					.165		.165												
22NC6-054		1.50					.195		.195												

PJ- 2390

REFERENCE STANDARDS:

MIL-N-45938/8

NUT - CLINCH

NC

PAGE 1 OF 3

ISSUED: 24 MAR 53 REVISED: 11 25 JAN 88



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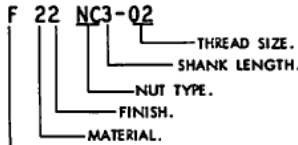
MATERIAL:

STEEL.
ALUMINUM ALLOY - 2017-T4 OR EQUIV.
STAINLESS STEEL - AISI 303.
BRASS - COMMERCIAL HALF HARD.

FINISH:

CADMIUM PLATE, QQ-P-416, TYPE 1, CLASS 3. (SEE SPECIAL NOTE IN PART CODING EXAMPLE AT RIGHT).
ANODIZED, MIL-A-8625.

PART CODING:



POST PLATE TREATMENT - CHROMATE FORTIFICATION ON CADMIUM PLATED PARTS ONLY. ESNA IS CONVERTING THIS DESIGN FROM "TYPE I" CADMIUM PLATE TO "TYPE II" CADMIUM PLATE. PARTS WILL BE SUPPLIED WITH "TYPE I" PLATING UNTIL PRESENT INVENTORIES ARE EXHAUSTED, AFTER WHICH ALL SHIPMENTS WILL HAVE "TYPE II" PLATING ONLY.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

THREADS: MIL-S-8879.

PERFORMANCE: MIL-N-25027 AS APPLICABLE.

APPLICATION: CLINCH NUTS ARE PERMANENTLY SELF-RETAINED, SELF-LOCKING FASTENERS FOR INSTALLATION IN ALUMINUM OR SOFT SHEET STEEL ASSEMBLIES. THEY PROVIDE LOAD-BEARING THREADS IN THIN SHEET METAL AND OFFER A HIGHLY RELIABLE METHOD OF BLIND FASTENING. ONLY FOUR SIMPLE STEPS, OUTLINED ON THIS PAGE, ARE REQUIRED TO INSURE TROUBLE FREE PRODUCTION AND SUPERIOR PRODUCT PERFORMANCE.

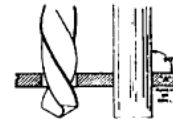
STEP 1. SELECT THE PROPER NUT, MOUNTING HOLE DIAMETER, TOOLS AND FLARING PRESSURES.

THREAD SIZE	INSTALLATION HOLE DIAMETER		PUNCH PART NUMBER	DOLLY PART NUMBER	MAX CLINCHING PRESSURE (POUNDS)				MIN C'BORE DIAMETER (FOR FLUSH MTG ONLY)
					MAX CLINCHING PRESSURE (POUNDS)				
					STEEL NUT	CRES NUT	ALUM NUT	BRASS NUT	
.1120	.184	.186	CP3-4	CD3-4	1400	1900	1400	1000	.501
.1380	.217	.219	CP6	CD6	1900	3000	1900	1800	.501
.1640	.268	.271	CP8-10	CD8	2100	4000	2100	2100	.563
.1900	.268	.271	CP8-10	CD10	2100	4000	2100	2100	.563
.2500	.352	.355	CP416	CD416	4000	4300	4000	3300	.626
.3125	.408	.412	CP516	CD516	4500	4500	4500	3900	.688

NUT TYPE	SHANK LENGTH (REF)	SHEET THICKNESS "A"	
		MIN	MAX
		NC1	.063
NC2	.085	.032	.053
NC3	.105	.054	.073
NC4	.135	.074	.103
NC5	.165	.104	.133
NC6	.195	.134	.163

STEP 2. PREPARE THE HOLE CORRECTLY.

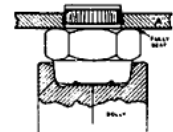
INSTALLATION HOLES MAY BE DRILLED OR PUNCHED BY NORMAL PRODUCTION METHODS BUT MUST BE HELD TO THE TOLERANCES INDICATED IN TABLE ABOVE. CARE SHOULD BE TAKEN TO HAVE THE HOLE CLEAN, PERFECTLY ROUND (NOT OVAL) AND AT 90° TO THE SURFACE OF THE WORK. IT IS RECOMMENDED THAT THE HOLES BE PUNCHED RATHER THAN DRILLED FOR GREATER ACCURACY.



Step 2

STEP 3. INSERT NUT SHANK COMPLETELY INTO THE HOLE.

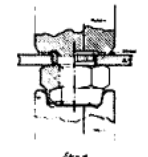
WHEN INSERTING THE NUT IN THE HOLE IT IS IMPORTANT THAT THE NUT BASE BE FULLY AND SQUARELY SEATED AGAINST THE WORK FACE. ACCORDING TO THE CLINCH NUT SIZE, SELECT THE CORRECT DOLLY FROM TABLE ABOVE. PLACE THE DOLLY ON THE CROWN OF THE NUT, FORCING THE NUT INTO THE SEATED POSITION. USE A LIGHT HAMMER BLOW OR SMALL POWER PRESS ON THE DOLLY TO SEAT THE NUT - DO NOT STRIKE OR PRESS DIRECTLY ON THE CROWN OF THE NUT.



Step 3

STEP 4. CLINCH OR SWAGE THE NUT SHANK.

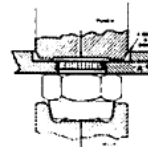
THIS FINAL STEP SECURELY LOCKS THE NUT IN THE HOLE AGAINST TWIST-OUT AND PUSH-OUT FORCES AND MAKES THE NUT AN INTEGRAL PART OF THE ASSEMBLY. PLACE THE DOLLY AGAINST THE HEAD OF THE NUT WITH THE PUNCH CENTERED ON THE EXTENDED SHANK OF THE NUT. THE DOLLY ACTS AS A SUPPORT FOR THE NUT BODY AS THE PRESSURE EXERTED BY THE PUNCH FORCES THE EDGES OF THE SHANK OUTWARD. BEST RESULTS ARE OBTAINED BY EXERTING STEADY CONTROLLED PRESSURE TO THE LIMITS OUTLINED IN TABLE ABOVE.



Step 4

FOR COUNTERBORED INSTALLATIONS.

IN ASSEMBLIES REQUIRING FLUSH MOUNTING SURFACES OR WHERE MATERIAL THICKNESS IS GREATER THAN THE .163 MAXIMUM STANDARD CLINCH NUT GRIP, THE ROLLED-OVER CLINCH SHANK MAY BE RECESSED INTO A COUNTERBORED HOLE. TABLE ON PAGE 2 OF 3 GIVES THE MINIMUM COUNTERBORE DIAMETERS ALLOWING ACCESS OF THE PUNCH TOOL TO PROPERLY ROLL OVER THE SHANK.



PJ-2390

ISSUED: 24 MAR 53 REVISED: 11 25 JAN 88

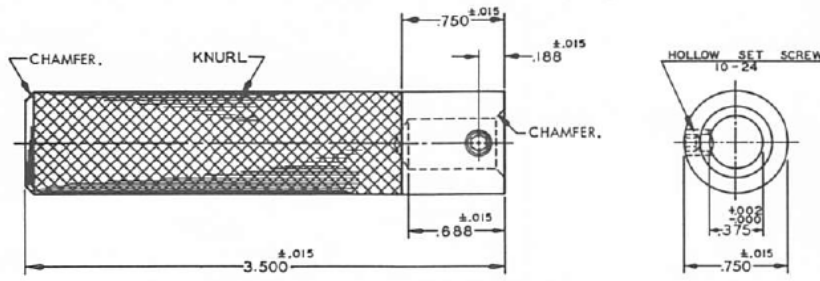
REFERENCE STANDARDS: MIL-N-45938/8	NUT - CLINCH	NC PAGE 2 OF 3
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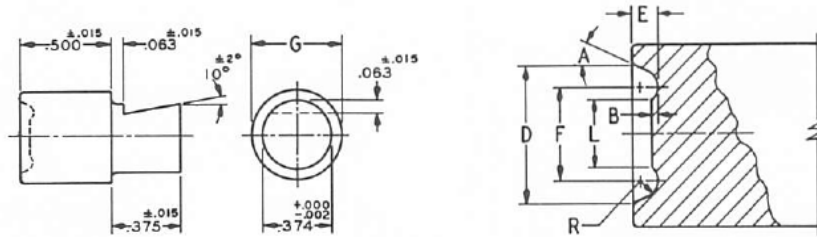
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INSTALLATION TOOL DATA:



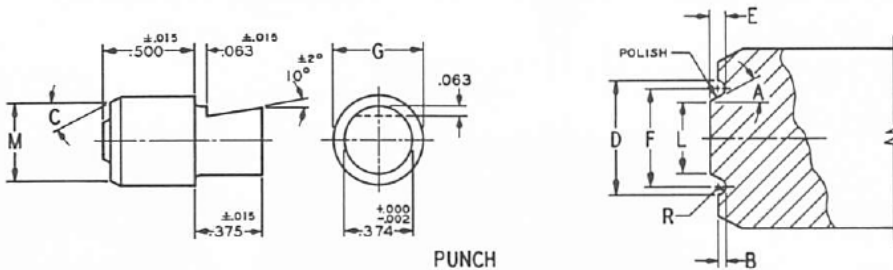
HANDLE PART NUMBER -A12165
MATERIAL: STEEL, SURFACE HARDENED. FINISH: UNPLATED.



DOLLY

CLINCH NUT THREAD SIZE	DOLLY PART NUMBER	A ± 2°	B ±.002	D +.002 -.000	E ±.002	F REF	G D 1A	L ±.002	R ±.001
.1120	CD3-4	25°	.006	.245	.045	.173	.438	.141	.024
.1380	CD6	25°	.010	.310	.040	.222	.438	.169	.040
.1640	CD8	23° 20'	.011	.380	.070	.247	.500	.179	.055
.1900	CD10	15°	.008	.376	.070	.267	.500	.213	.048
.2500	CD416	25°	.010	.451	.080	.326	.563	.273	.040
.3125	CD516	20°	.012	.515	.075	.398	.625	.337	.045

MATERIAL: TOOL STEEL, ROCKWELL °C*60 (REF) FINISH: UNPLATED.



PUNCH

CLINCH NUT THREAD SIZE	PUNCH PART NUMBER	A ± 2°	B ±.002	C ± 2°	D ±.002	E ±.002	F REF	G D 1A	L ±.002	M ±.015	R ±.001
.1120	CP3-4	25°	.008	30°	.210	.040	.182	.438	.125	.344	.015
.1380	CP6	25°	.012	30°	.258	.040	.210	.438	.136	.406	.030
.1640	CP8-10	25°	.014	30°	.318	.038	.266	.500	.200	.453	.023
.1900	CP8-10	25°	.014	30°	.318	.038	.266	.500	.200	.453	.023
.2500	CP416	30°	.012		.403	.043	.350	.563	.260	.563	.035
.3125	CP516	25°	.015		.460	.050	.406	.625	.319	.625	.032

MATERIAL: TOOL STEEL, ROCKWELL °C*60 (REF) FINISH: UNPLATED.

PJ-2390

ISSUED: 24 MAR 53 REVISED: II 25 JAN 88

REFERENCE STANDARDS:

MIL-N-45938/8

NUT-CLINCH

NC

PAGE 3 OF 3



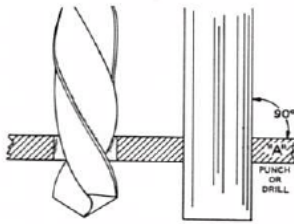
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IMPORTANT... *How to install*

Clinch nuts are permanently self-retained, self-locking fasteners for installation in aluminum or soft sheet steel assemblies. They provide load-bearing threads in thin sheet metal and offer a highly reliable method of blind fastening. A major advantage of the ESNA

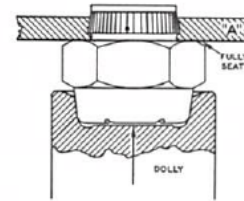
STEP 1



PREPARE THE HOLE CORRECTLY

Installation holes may be drilled or punched by normal production methods but **must** be held to the tolerances indicated in TABLE 1 below. Care should be taken to have the hole clean, perfectly round (not oval) and at 90° to the surface of the work. It is recommended that the holes be punched rather than drilled for greater accuracy.

STEP 2



INSERT NUT SHANK COMPLETELY INTO THE HOLE

When inserting the nut in the hole it is important that the nut base be fully and squarely seated against the work face. According to the clinch nut size, select the correct dolly from TABLE 3 below. Place the dolly on the crown of the nut, forcing the nut into the seated position. Use a light hammer blow or small power press on the dolly to seat the nut — **DO NOT** strike or press directly on the crown of the nut.

STANDARD HOLE DIAMETERS

Thread Size	Installation Hole Diameter	
	Min.	Max.
4	.184	.186
6	.217	.219
8	.268	.271
10	.268	.271
1/4	.352	.355
5/16	.408	.412

TABLE 1

STANDARD SHANK LENGTHS

Clinch Nut Type Symbol	Shank Length (Ref)	SHEET THICKNESS "A"	
		Min.	Max.
NC1	.063	.020	.031
NC2	.085	.032	.053
NC3	.105	.054	.073
NC4	.135	.074	.103
NC5	.165	.104	.133
NC6	.195	.134	.163

TABLE 2

Use this chart as a "check list" for correct nut selection and assembly procedure.



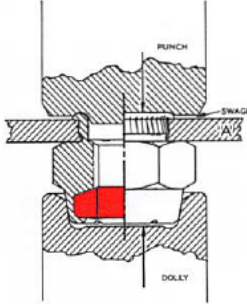
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ESNA® self-locking clinch nuts

clinch nut series is its ease of installation. Only three simple installation steps, outlined on this page, are required to insure trouble free production and superior product performance.

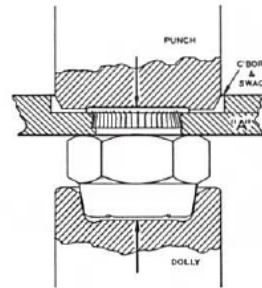


STEP 3



CLINCH OR SWAGE THE NUT SHANK

This final step securely locks the nut in the hole against twist-out and push-out forces and makes the nut an integral part of the assembly. Place the dolly against the head of the nut with the punch centered on the extended shank of the nut. The dolly acts as a support for the nut body as the pressure exerted by the punch forces the edges of the shank outward. Best results are obtained by exerting steady controlled pressure to the limits outlined in TABLE 4 below.



For Counterbored Installations

In assemblies requiring flush mounting surfaces or where material thickness is greater than the .163 maximum standard clinch nut grip, the rolled-over clinch shank may be recessed into a counterbored hole. TABLE 5 gives the minimum counterbore diameters allowing access of the punch tool to properly roll over the shank.

STANDARD CLINCH TOOLS

Clinch Nut Thread Size	Punch Part Number (See Note 2)	Dolly Part Number (See Note 2)
4	CP3-4	CD3-4
6	CP6	CD6
8	CP8-10	CD8
10	CP8-10	CD10
1/4	CP416	CD416
5/16	CP516	CD516

TABLE 3

STANDARD CLINCHING PRESSURES

Clinch Nut Thread Size	Maximum Clinching Pressure (Pounds)		
	Steel Nut	Alum Alloy Nut	Brass Nut
4	1400	1400	1000
6	1900	1900	1800
8	2100	2100	2100
10	2100	2100	2100
1/4	4000	4000	3300
5/16	4500	4500	3900

TABLE 4

STANDARD COUNTERBORE DIA

Thread Size	Minimum Counterbore Diameter
4	.501
6	.501
8	.563
10	.563
1/4	.626
5/16	.688

TABLE 5

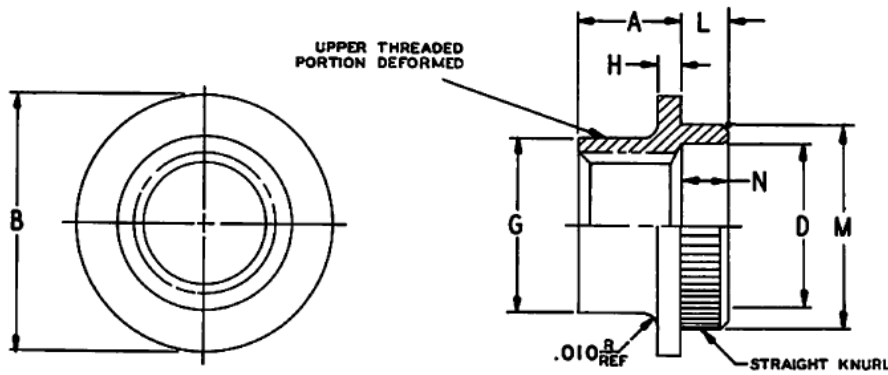


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ESNA PART NUMBERS				THREAD	A MAX	B ±.010	D +.003 -.002	G REF	H ±.005	L ±.003	M ±.002	N REF	APPROX WEIGHT LB/100
STEEL, 450°F CAD PLUS LUBE	STEEL, 450°F CADMIUM	CRES, 450°F DRY FILM LUBE	CRES, 800°F SILVER										
RM22LHCM1-26	F22LHCM1-26	RMLHCM1-2860-26	LHCM1-2860-26	.0860-56UNJC-3B	.095	.156	.098	.109	.020	.040	.129	.040	.02
RM22LHCM2-26	F22LHCM2-26		LHCM2-2860-26							.060		.060	
RM22LHCM1-40	F22LHCM1-40		LHCM1-2860-40	.1120-40UNJC-3B	.122	.203	.130	.143	.020	.040	.160	.040	.04
RM22LHCM2-40	F22LHCM2-40	RMLHCM2-2860-40	LHCM2-2860-40							.060		.060	.05
RM12LHCM1-62	F12LHCM1-62	RMLHCM1-2860-62	LHCM1-2860-62	.1380-32UNJC-3B	.130	.234	.154	.173	.025	.040	.192	.040	.06
RM12LHCM2-62	F12LHCM2-62	RMLHCM2-2860-62	LHCM2-2860-62							.060		.060	.07
			LHCM1-2860-82							.040		.040	.08
RM12LHCM2-82	F12LHCM2-82	RMLHCM2-2860-82	LHCM2-2860-82	.1640-32UNJC-3B	.130	.281	.180	.198	.025	.040	.223	.060	.09
										.060			
RM12LHCM2-02	F12LHCM2-02	RMLHCM2-2860-02	LHCM2-2860-02	.1900-32UNJF-3B	.130	.328	.212	.222	.030		.254		
										.060		.060	.11
	F12LHCM1-048			.2500-28UNJC-3B	.224	.391	.257	.297	.040	.040	.316	.040	.23
	F12LHCM2-048									.060		.060	.25

MATERIAL: STEEL
CRES, A286

FINISH:
RM22LHCM1-XXX CADMIUM PLATE PLUS DRY FILM LUBRICANT, MEETS SALT SPRAY REQUIREMENTS OF QQ-P-416 TYPE II.
F22LHCM1-XXX CADMIUM PLATE, QQ-P-416, TYPE II, CLASS 3.
RMLHCM1-2860-XXX DRY FILM LUBRICANT IN LIEU OF SILVER PLATE.
LHCM1-2860-XXX SILVER PLATE, AMS2410.

THREADS: MIL-S-8879 (PRIOR TO ADDITION OF DRY FILM LUBRICANT).

PERFORMANCE: TORQUE PER MIL-N-25027

APPLICATION: TYPE LHCM PARTS ARE PARTICULARLY SUITED FOR USE IN APPLICATIONS INVOLVING INSTALLATIONS IN THIN ALUMINUM OR SOFT STEEL SHEETS OR PLATES HAVING SMALL MOUNTING AREAS MARKING THE USE OF A MININATURE FIXED TYPE NUT DESIRABLE. THE ADAPTABILITY OF LHCM'S TWOSHANK LENGTHS TO MANY SHEET THICKNESSES IS ALSO WORTHY OF NOTE SINCE IT MINIMIZES NUT STOCKING REQUIREMENTS FOR NUMEROUS APPLICATIONS.

ISSUED: 27 NOV 59 REVISED: 7 4 FEB 88

PJ-2218-67

REFERENCE STANDARDS:
MIL-N-45938/6

**NUT-CLINCH, FLUSH MOUNTING,
MINIATURE,
450°F & NON-MAGNETIC 800°F**

**LHCM
LHCM-2860**
PAGE 1 OF 3



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SHANK LENGTH SELECTION

LHCFM1 PARTS ARE RECOMMENDED FOR INSTALLATIONS INVOLVING SHEET THICKNESSES UP TO APPROXIMATELY .050 INCH. PRACTICAL FLUSHNESS CAN BE ACHIEVED IN THICKNESSES AS LOW AS .030 INCH.

LHCFM2 PARTS ARE RECOMMENDED FOR USE IN SHEET THICKNESSES OF .050 OR HEAVIER.

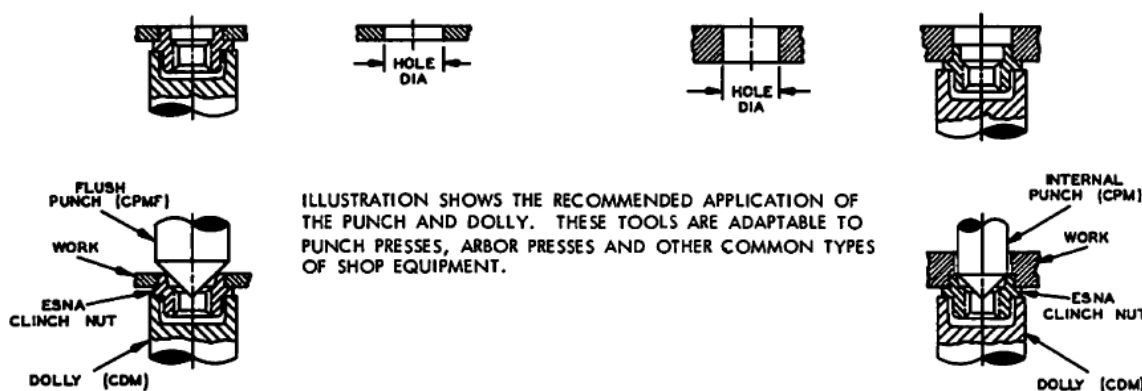
FOR OPTIMUM INSTALLATION IT IS RECOMMENDED THAT THE PROPER TOOLS BE USED, AND THAT THE MAXIMUM TABULATED CLINCHING PRESSURES NOT BE EXCEEDED. EXCEEDING THESE VALUES CAN, DEPENDING UPON THE MATERIAL INTO WHICH THE NUT IS INSTALLED, CAUSE DISTORTION OF THE WORK AND/OR THE NUT ITSELF.

THE MOST SATISFACTORY INSTALLATIONS ARE OBTAINED WHEN THE NUT IS PRESSED INTO THE WORK UNTIL ITS SHOULDER RESTS AGAINST THE SURFACE OF THE WORK. THE SHANK SHOULD THEN BE FLARED.

IT IS RECOMMENDED THAT THE ACTING SURFACE OF THE PUNCH FACE BE MAINTAINED. BOTH THE PUNCH AND THE DOLLY SHOULD BE REGULARLY INSPECTED AND CLEANED OF ANY PLATING BUILD-UP IN ORDER TO ASSURE PROPER SEATING OF THE NUT.

FLUSH MOUNTING PUNCHES ARE INTENDED FOR USE WITH NO.1 SHANK LENGTH PARTS IN .030 TO .040 THICK SHEET AND NO. 2 SHANK LENGTH PARTS IN .050 TO .060 THICK SHEET. FOR SHEET THICKNESSES .040 TO .050 IT IS RECOMMENDED THAT NO. 1 SHANK LENGTH PARTS BE USED WITH INTERNAL FLARING PUNCHES.

ESNA PART NUMBERS				INSTALLATION TOOLS			MAXIMUM RECOMMENDED CLINCHING PRESSURE (LB.)	INSTALLATION HOLE DIAMETERS	
STEEL, 450°F CAD PLUS LUBE	STEEL, 450°F CADMIUM	CRES, 450°F DRY FILM LUBE	CRES, 800°F SILVER	FLUSH PUNCH	INTERNAL PUNCH	DOLLY		MIN	MAX
RM22LHCFM1-26	F22LHCFM1-26	RMLHCFM1-2860-26	LHCFM1-2860-26	CPMF1	CPM2	CDM2	500	.124	.126
RM22LHCFM2-26	F22LHCFM2-26		LHCFM2-2860-26						
RM22LHCFM1-40	F22LHCFM1-40		LHCFM1-2860-40	CPMF1	CPM4	CDM4	750	.155	.157
RM22LHCFM2-40	F22LHCFM2-40	RMLHCFM2-2860-40	LHCFM2-2860-40						
RM12LHCFM1-62	F12LHCFM1-62	RMLHCFM1-2860-62	LHCFM1-2860-62	CPMF1	CPM6	CDM6	1000	.187	.189
RM12LHCFM2-62	F12LHCFM2-62	RMLHCFM2-2860-62	LHCFM2-2860-62						
	F12LHCFM1-82		LHCFM1-2860-82	CPMF2	CPM8	CDM8	1500	.218	.220
RM12LHCFM2-82	F12LHCFM2-82	RMLHCFM2-2860-82	LHCFM2-2860-82						
				CPMF2	CPM10	CDM10	2500	.249	.251
RM12LHCFM2-02	F12LHCFM2-02	RMLHCFM2-2860-02	LHCFM2-2860-02						
	F12LHCFM1-048			CPMF2	CPM04	CDM04	3000	.311	.313
	F12LHCFM2-048								



PJ-2218-67

ISSUED: 27 NOV 59 REVISED: 7 4 FEB 88

REFERENCE STANDARDS:
MIL-N-45938/6

NUT-CLINCH, FLUSH MOUNTING, MINIATURE, 450°F & NON-MAGNETIC 800°F

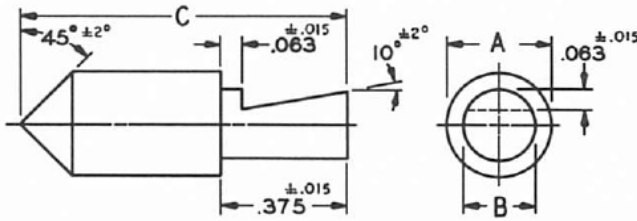
LHCFM LHCFM-2860
PAGE 2 OF 3



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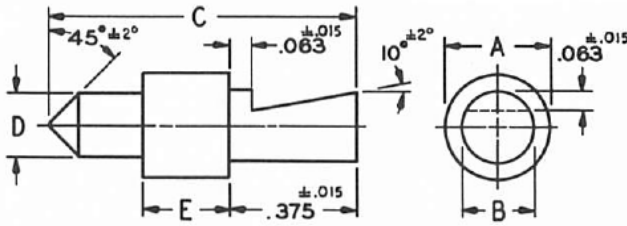
FLUSH MOUNTING PUNCH



PUNCH PART NUMBER	A ±.015	B +.000 -.002	C ±.015
CPMF1	.307	.200	.966
CPMF2	.419	.300	1.022

MATERIAL: TOOL STEEL, ROCKWELL "C" 60 (REF) FINISH: UNPLATED.

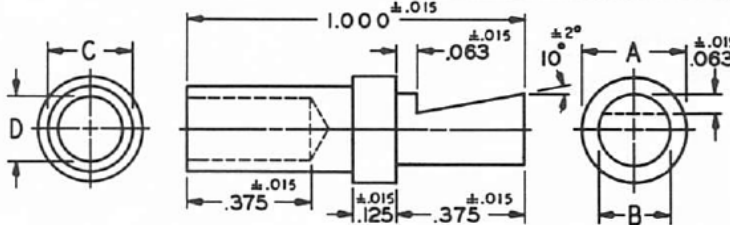
INTERNAL FLARING MOUNTING PUNCH



PUNCH PART NUMBER	A ±.015	B +.000 -.002	C ±.015	D +.000 -.002	E ±.015
CPM2	.307	.200	.873	.120	.250
CPM4			.888	.151	
CPM6			.904	.183	
CPM8	.419	.300	.920	.214	.188
CPM10			.935	.245	
CPM04			.967	.308	

MATERIAL: TOOL STEEL, ROCKWELL "C" 60 (REF) FINISH: UNPLATED.

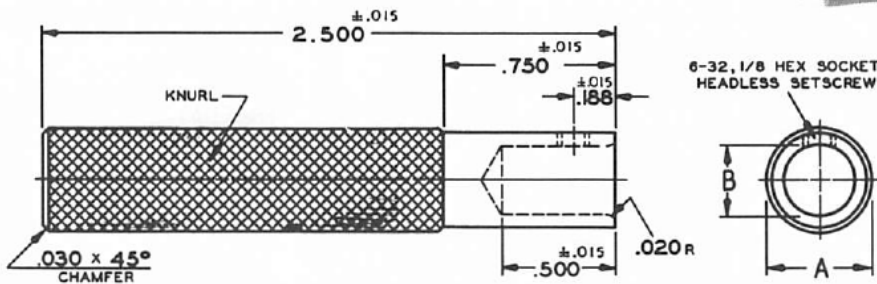
DOLLY-MINIATURE, CLINCH NUT



DOLLY PART NUMBER	A ±.015	B +.000 -.002	C ±.015	D +.003 -.008		
CDM2	.307	.200	.179	.119		
CDM4					.213	.155
CDM6					.243	.183
CDM8	.419	.300	.281	.208		
CDM10			.328	.232		
CDM04			.391	.307		

MATERIAL: TOOL STEEL, ROCKWELL "C" 60 (REF) FINISH: UNPLATED.

HANDLE



HANDLE PART NUMBER	A ±.015	B +.002 -.005
CHM1	.312	.201
CHM2	.437	.301

MATERIAL: STEEL, SURFACE HARDENED. FINISH: UNPLATED.



PJ-2218-67

REFERENCE STANDARDS:

MIL-N-45938/6

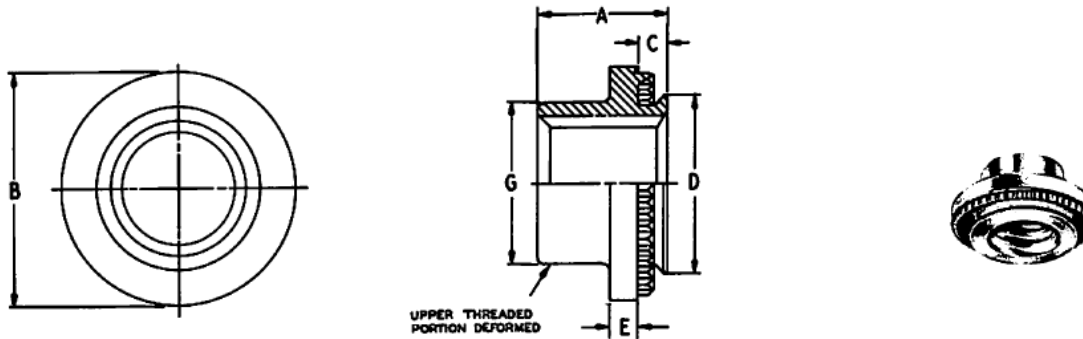
**NUT-CLINCH, FLUSH MOUNTING,
MINIATURE,
450°F & NON-MAGNETIC 800°F**

**LHCFM
LHCFM-2860**
PAGE 3 OF 3

ISSUED: 27 NOV 59 REVISED: 7 4 FEB 88



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ESNA PART NUMBERS				THREAD	A MAX	B MAX	C MAX	D MAX	E REF	G REF	APPROX WEIGHT LB/100
STEEL, 450°F CAD PLUS LUBE	STEEL, 450°F CADMIUM	CRES, 450°F DRY FILM LUBE	CRES, 800°F SILVER								
	F12LHC3949-40			.1120-40UNJC-38	.158	.234	.035	.154	.040	.143	.05
RM12LHC3949-62	F12LHC3949-62			.1380-32UNJC-38	.178	.265	.035	.186	.040	.173	.07
	F12LHC3949-82	RMLHC4256-82		.1640-32UNJC-38	.190	.296	.040	.217	.040	.198	.10
RM12LHC3949-02		RMLHC4256-02	LHC4256-02	.1900-32UNJF-38	.190	.327	.040	.248	.040	.222	.13

MATERIAL:
STEEL
CRES, A286

FINISH:

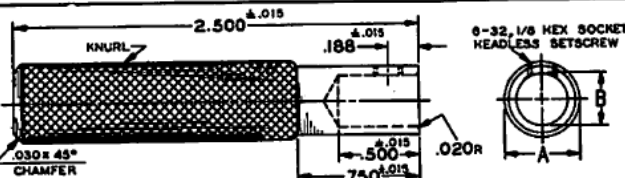
RM12LHC3949-XX CADMIUM PLATE PLUS DRY FILM LUBRICANT, MEETS SALT SPRAY REQUIREMENTS OF QQ-P-416, TYPE II.
F12LHC3949-XX CADMIUM PLATE, QQ-P-416, TYPE II, CLASS 3.
RMLHC4256-XX DRY FILM LUBRICANT IN LIEU OF SILVER PLATE.
LHC4256-XX SILVER PLATE, AMS2410.

THREADS: MIL-S-8879, (PRIOR TO ADDITION OF DRY FILM LUBRICANT).

PERFORMANCE: TORQUE PER MIL-N-25027.

NOTE: 1. PREVIOUS DESIGNATION 12LHC3949, COVERING CADMIUM PLATE QQ-P-416, TYPE I, CLASS 3, HAS BEEN DISCONTINUED, BUT WILL BE SUPPLIED UNTIL ESNA INVENTORY IS DEPLETED, AFTER WHICH F12LHC3949 WILL BE AUTOMATICALLY SUBSTITUTED.

HANDLE

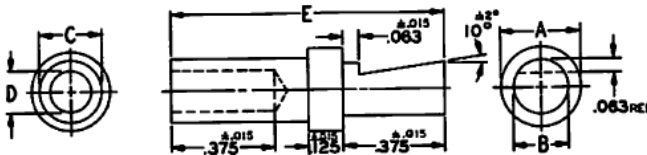


HANDLE PART NUMBER	A	B
CHM1	.312	.201
CHM2	.437	.301

MATERIAL: STEEL, SURFACE HARDENED.

FINISH: UNPLATED.

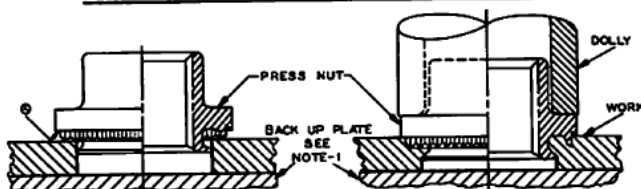
DOLLY



DOLLY PART NUMBER	A	B	C	D	E
CDMB4	.307	.200	.234	.155	1.000
CDMB6	.307	.200	.265	.183	1.000
CDMB8	.419	.300	.296	.208	1.000
CDM10	.419	.300	.328	.232	1.000

MATERIAL: TOOL STEEL, ROCKWELL "C" 60 (REF)

FINISH: UNPLATED.



DRILL OR PUNCH HOLE IN MATERIAL TO THE RECOMMENDED DIAMETER
INSERT NUT INTO THE HOLE USING NUT SHANK AS A PILOT.

APPLY RECOMMENDED PRESSURE USING "A"CDM" INSTALLATION DOLLY OR EQUIVALENT TOOL UNTIL SURFACE Ø IS FLUSH WITH MATING SHEET.

NUT THREAD SIZE	INSTALLATION HOLE DIA.		INSTALLATION TOOLS		MAXIMUM RECOMMENDED INSTALLATION PRESSURE (LB)
	MIN.	MAX.	HANDLE	DOLLY	
.1120-40UNJC-38	.155	.160	CHM1	CDMB4	2,500
.1380-32UNJC-38	.187	.192	CHM1	CDMB6	3,000
.1640-32UNJC-38	.218	.223	CHM2	CDMB8	3,500
.1900-32UNJF-38	.249	.254	CHM2	CDM10	4,000

NOTES:

- 1 - PROVISION SHOULD BE MADE TO RESIST INSERTION PRESSURE AT INSTALLATION.
- 2 - THESE PARTS MAY BE INSTALLED IN EITHER ALUMINUM OR SOFT STEEL SHEET.

PJ-2553

REFERENCE STANDARDS:

NUT-PRESS, MINIATURE,
450°F & 800°F

LHC3949
LHC4256



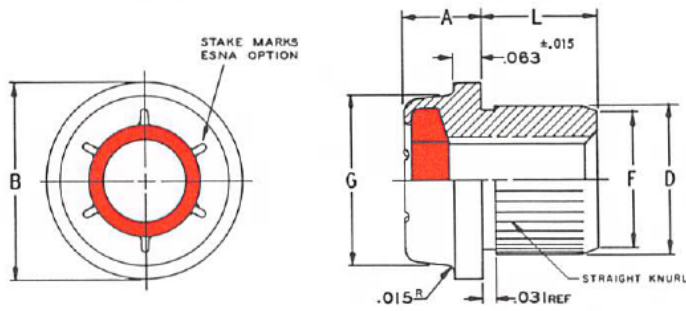
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ISSUED: 10 DEC 64 REVISED: 5 4 FEB 88



ESNA PART NUMBER	THREAD	A ±.015	B ±.015	D		F REF	G REF	RECOMMENDED INSTALLATION HOLE SIZE		L ±.015	MINIMUM AXIAL STRENGTH POUNDS	APPROX WEIGHT LB/100
				MIN	MAX			MIN	MAX			
22ND8-82	.1640-32UNJC-3B	.172	.438	.321	.325	.287	.370	.312	.316	.125	1,720	.57
22ND10-82										.156		.62
22ND12-82										.188		.67
22ND14-82										.219		.72
22ND16-82										.250		.77
22ND20-82										.313		.87
22ND8-02	.1900-32UNJF-3B	.172	.438	.321	.325	.287	.370	.312	.316	.125	2,460	.53
22ND10-02										.156		.58
22ND12-02										.188		.63
22ND14-02										.219		.68
22ND16-02										.250		.73
22ND18-02										.281		.78
22ND20-02	.313	.83										
42ND8-048	.2500-28UNJF-3B	.188	.563	.384	.388	.350	.438	.375	.379	.125	3,750	.70
42ND10-048										.156		.80
42ND12-048										.188		.90
42ND14-048										.219		1.00
42ND16-048										.250		1.10
42ND20-048										.313		1.30
42ND24-048	.376	1.50										
42ND28-048	.438	1.70										
42ND8-054	.3125-24UNJF-3B	.234	.625	.446	.450	.412	.500	.437	.441	.125	6,500	1.00
42ND10-054										.156		1.10
42ND12-054										.188		1.20
42ND14-054										.219		1.30
42ND16-054										.250		1.40
42ND20-054										.313		1.60
42ND24-054	.376	1.80										
42ND10-064	.3750-24UNJF-3B	.281	.688	.509	.512	.475	.570	.500	.504	.156	11,000	1.30
42ND12-064										.188		1.40
42ND14-064										.219		1.50
42ND16-064										.250		1.60
42ND20-064										.313		1.80
42ND24-064										.376		2.00
42ND32-064	.500	2.40										
42ND28-070	.4375-20UNJF-3B	.359	.750	.571	.575	.537	.660	.562	.566	.438	12,000	2.60
42ND22-080	.5000-20UNJF-3B	.375	.875	.696	.700	.662	.770	.687	.691	.344	12,000	3.90
42ND28-080										.438		4.20

PJ- 1294

ISSUED: 25 JAN 51 REVISED: (1) 2 APR 91

REFERENCE STANDARDS:

MS51866

NUT-SPLINE

ND

PAGE 1 OF 2

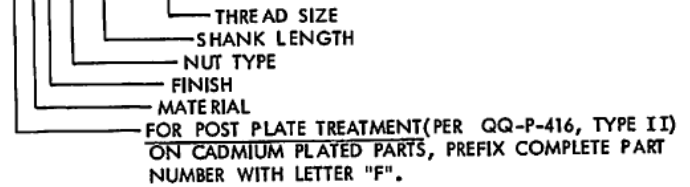


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PART CODING

F42ND10-054



MATERIAL: STEEL

FINISH: CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 3.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

THREADS: MIL-S-8879

CONCENTRICITY: SHANK O.D. CONCENTRIC WITH P.D. OF THREADS WITHIN .007 F.I.R.

PERFORMANCE: TORQUE MIL-N-25027 AXIAL TENSILE STRENGTH AS LISTED.

APPLICATION: TYPE "ND" SPLINE NUT IS A SELF WRENCHING FASTENER DESIGNED FOR USE IN EITHER BLIND MOUNTED APPLICATIONS OR IN APPLICATIONS WHERE MAINTENANCE CAN BE FACILITATED BY THE USE OF AN ATTACHED NUT. TYPE "ND" SPLINE NUTS ARE DESIGNED PRIMARILY FOR INSTALLATION IN RELATIVELY SOFT MATERIALS, SUCH AS ALUMINUM AND MAGNESIUM ALLOYS, WHICH CAN BE EFFECTIVELY BROACHED BY THE SPLINES OF THE NUT SHANK. ESNA SPLINE NUTS CAN ALSO BE INSTALLED IN CERTAIN TYPES OF STEEL, HOWEVER, IT IS SUGGESTED THAT SUCH APPLICATIONS BE SUBMITTED FOR ENGINEERING RECOMMENDATIONS.

- NOTES:
1. ESNA SPLINE NUTS ARE NOT NORMALLY AVAILABLE IN THE NUMBER 6 THREAD SIZE. ESNA TYPE "NC" CLINCH NUTS ARE BETTER ADAPTED FOR THE THIN SHEET METAL GENERALLY USED IN APPLICATIONS UTILIZING NUMBER 6 SCREWS.
 2. IF PARTIALLY THREADED BOLTS ARE USED THE ASSEMBLED DIMENSIONS SHOULD BE CAREFULLY CHECKED TO MAKE CERTAIN THAT THE BOLT WILL NOT "BOTTOM" IN THE THREADS OF THE NUT SHANK. ESNA TYPE ND2398 SPLINE NUT IS RECOMMENDED AS A REPLACEMENT FOR TYPE "ND" IN APPLICATIONS IN WHICH "BOTTOMING" IS A POSSIBILITY. TYPE ND2398 IS A HEAT TREATED SPLINE NUT, THE SHANK OF WHICH IS COUNTERBORED FOR CLEARANCE. THE ND2398 REDUCED THREAD LENGTHS CONFORM TO THE THREAD LENGTHS OF ESNA TYPE "E" AND "M" HEX NUTS, WHICH ARE APPROVED AS MS21044.
 3. IT IS RECOMMENDED THAT AN ARBOR PRESS, OR EQUIVALENT, BE USED TO PRESS THE SPLINE NUT INTO THE MATING MEMBER. PRESSURE SHOULD NOT BE APPLIED TO THE CROWN OF THE NUT.
 4. SLIGHT DISTORTION OF THE SHANK MIGHT RESULT FROM INSERTION IN CERTAIN MATERIALS AND PREVENT ENTRY OF THE THREAD GO -GAGE. IT IS IMPORTANT TO NOT INSTALL "ND" SPLINE NUTS IN MATERIALS WHICH WILL DEFLECT THE SHANK INWARD TO A POINT WHICH WILL PREVENT ENTRY OF THE MATING BOLT.

PJ-1294

ISSUED: 25 JAN 51 REVISED: ① 2 APR 91

REFERENCE STANDARDS:

MS51866

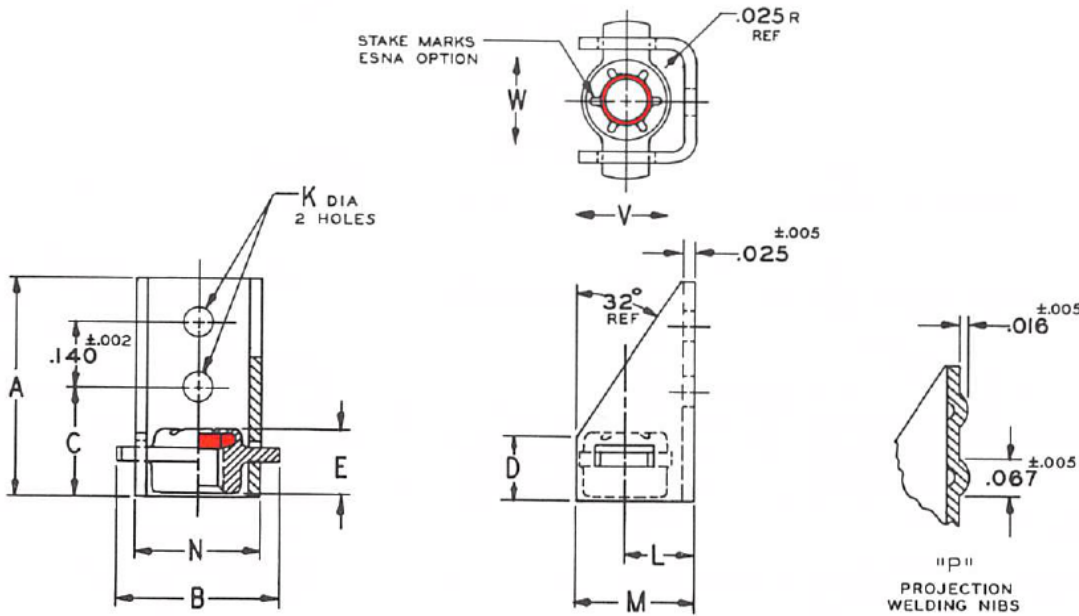
NUT-SPLINE

ND

PAGE 2 OF 2



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ESNA PART NUMBER	THREAD	A ±.015	B ±.015	C ±.015	D REF	E ±.015	K +.003 -.000	L ±.015	M MAX	N ±.015	MINIMUM TOTAL FLOAT		APPROX. WEIGHT LB/100
											V	W	
22A27M-22-40	.1120-40UNJC-3B	.455	.344	.230	.147	.141	.066	.156	.270	.266	.018	.033	.24

MATERIAL: NUT AND BASKET - STEEL.

FINISH: (SEE NOTE 2)

NUT - STEEL - CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 2.
BASKET - STEEL-CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 2.

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

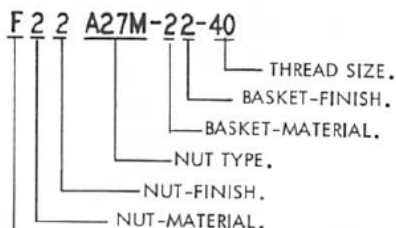
THREADS: MIL-S-8879.

APPLICATION: TYPE A27M IS DESIGNED FOR USE IN BLIND MOUNTED APPLICATIONS WHERE SPACE LIMITATIONS REQUIRE THE USE OF A MINIATURIZED RIGHT ANGLE FLOATING ANCHOR NUT. A TYPICAL APPLICATION WOULD BE THE ATTACHMENT OF COVERS ON ELECTRICAL JUNCTION BOXES. THE FLOAT THAT HAS BEEN BUILT INTO THIS TYPE PERMITS IT TO BE "SELF-LOCATING" TO ALLOW FOR A REASONABLE AMOUNT OF MISALIGNMENT OF THE NUT AND SCREW.

NOTES: 1. STANDARD SIZE VERSIONS OF THIS PART IN NON-FLOATING AND FLOATING CONFIGURATIONS ARE ALSO AVAILABLE. SEE ESNA STANDARD DRAWINGS NA7, NA27.

2. ESNA IS CONVERTING THIS DESIGN FROM "TYPE I" CADMIUM PLATE TO "TYPE II" CADMIUM PLATE. PARTS WILL BE SUPPLIED WITH "TYPE I" PLATING UNTIL PRESENT INVENTORIES ARE EXHAUSTED, AFTER WHICH ALL SHIPMENTS WILL HAVE "TYPE II" PLATING ONLY.

PART CODING:



POST PLATE TREATMENT:(PER QQ-P-416, TYPE II) (SEE NOTE 2).

ADD SUFFIX LETTER "P" TO NUT TYPE NUMBER, TO SPECIFY RIVET HOLES REPLACED BY PROJECTION WELDING NIBS.
(EX: 22A27MP-22-40).

ISSUED: 31 JUL 56 REVISED: 8 6 JUN 87

PJ- 2145

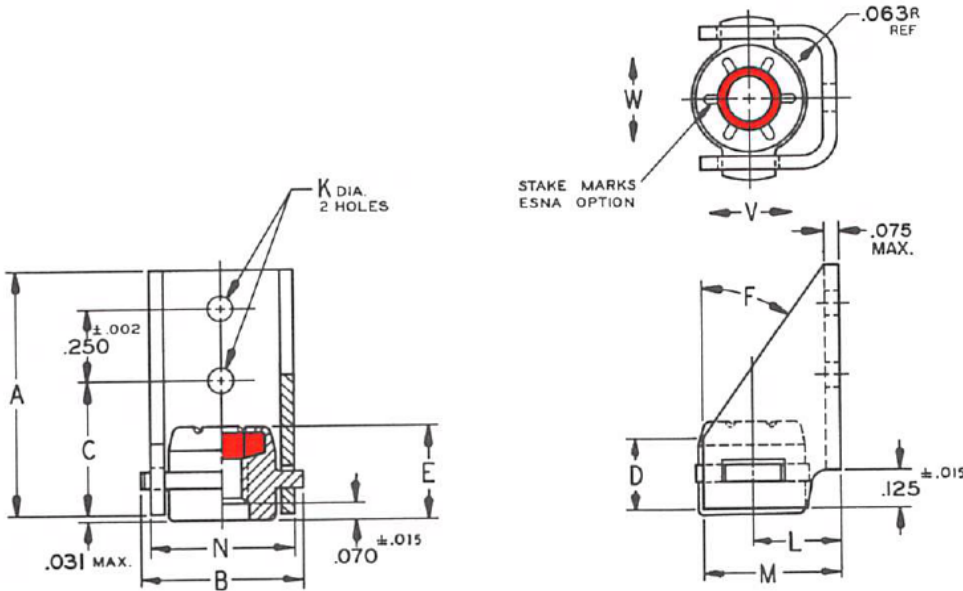
REFERENCE STANDARDS:

NUT-ANCHOR, MINIATURE,
RIGHT ANGLE, FLOATING, 250°F

A27M



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ESNA PART NUMBER STEEL NUT STEEL BASKET	THREAD	A	B	C	D	E	F	K	L	M	N	APPROX WEIGHT LB/100
22NA27-22-62	.1380-32UNJC-3B	±.015	±.015	±.015	±.015	±.015	REF	+ .005 - .000	±.015	±.015	±.015	1.90
22NA27-22-82	.1640-32UNJC-3B	.859	.578	.469	.250	.328	30°	.098	.281	.484	.506	1.80
22NA27-22-02	.1900-32UNJF-3B	.859	.578	.469	.250	.328	30°	.098	.281	.484	.506	1.70
42NA27-22-048	.2500-28UNJF-3B	.859	.641	.469	.296	.359	35°	.098	.313	.531	.568	2.50
42NA27-22-054	.3125-24UNJF-3B	.953	.703	.563	.296	.422	34°	.130	.344	.563	.631	3.00

MATERIAL: NUT AND BASKET - STEEL.

FINISH: CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 2. (SEE NOTE 2).

LOCKING INSERT: RED NYLON (250°F MAX PERFORMANCE).

MINIMUM TOTAL FLOAT:
 V = .017, W = .026 SIZES -62 THRU -02
 V = .016, W = .023 SIZES -048 AND -054.

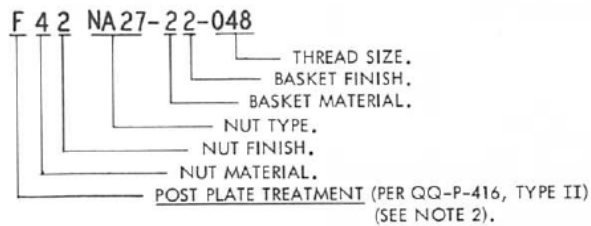
THREADS: MIL-S-8879.

PERFORMANCE: NUT - MIL-N-25027.

APPLICATION: TYPE NA27 PARTS ARE PRIMARILY DESIGNED FOR USE IN APPLICATIONS REQUIRING RIGHT ANGLE ATTACHMENT OF SUB-ASSEMBLIES OR COMPONENT PARTS OF ASSEMBLIES. FOR EXAMPLE, ATTACHMENT OF COVERS TO INSTRUMENT OR ELECTRICAL EQUIPMENT BOXES. THE FLOATING NUT ACCEPTS MINOR MISALIGNMENT OF MATING ASSEMBLIES.

- NOTES:**
- SEE ESNA STANDARD DRAWING A27M FOR MINIATURE VERSION OF NA27.
 - ESNA IS CONVERTING THIS DESIGN FROM "TYPE I" CADMIUM PLATE TO "TYPE II" CADMIUM PLATE. PARTS ORDERED UNDER THE ESNA PART NUMBER WILL BE SUPPLIED WITH "TYPE I" PLATING UNTIL PRESENT INVENTORIES ARE EXHAUSTED, AFTER WHICH ALL SHIPMENTS WILL HAVE "TYPE II" PLATING ONLY.
 - PART NUMBERS 42NA27-22-048, AND 42NA27-22-054 WERE PREVIOUSLY KNOWN ON THIS STANDARD AS 22NA27-22-048 AND 22NA27-22-054. THE "22" AND "42" PREFIX PARTS ARE IDENTICAL AND THE CHANGE HAS BEEN MADE TO STANDARDIZE AND CORRECT THE PART NUMBER CALL-OUT. PARTS ORDERED UNDER THE FORMER PREFIX DESIGNATORS WILL BE SUPPLIED UNDER THE REVISED PART NUMBERS SHOWN ABOVE.

PART CODING:



PJ-2411

ISSUED: 13 MAR 52 REVISED: 9 6 JUN 87

REFERENCE STANDARDS:

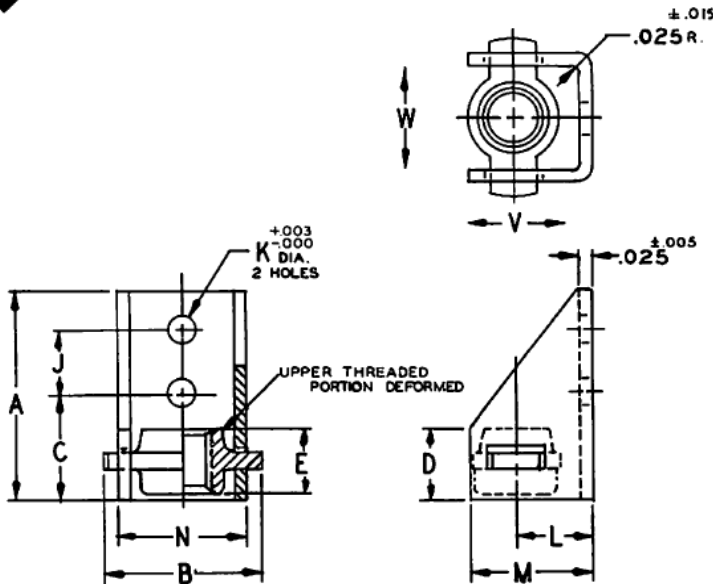
NAS1033

NUT-ANCHOR, RIGHT ANGLE, FLOATING, 250°F.

NA27



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ESNA PART NUMBERS				THREAD	A	B	C	D	E	J	K	L	M	N	APPROX WEIGHT LB/100
STEEL, 450°F CAD PLUS LUBE	STEEL, 450°F CADMIUM	CRES, 450°F DRY FILM LUBE	CRES, 800°F SILVER		$\pm .015$	$\pm .015$	$\pm .015$	REF	$\pm .015$	$\pm .002$	$\pm .015$	$\pm .015$	MAX	$\pm .015$	
RM22LHA27M-22-40	F22LHA27M-22-40	RMLHA27M2860-40	LHA27M2860-40	.1120-40UNJC-3B	.455	.344	.230	.147	.143	.140	.066	.156	.270	.266	.25
RM22LHA27M-22-62	F22LHA27M-22-62	RMLHA27M2860-62	LHA27M2860-62	.1380-32UNJC-3B	.455	.344	.230	.147	.143	.140	.066	.156	.270	.266	.23

MATERIAL:
 STEEL, HEAT TREATED
 CRES, A286

FINISH:

RM22LHA27M-22-XX CADMIUM PLATE, QQ-P-416, CLASS 2 PLUS DRY FILM LUBRICANT, MEETS SALT SPRAY REQUIREMENTS OF QQ-P-416, TYPE II.

F22LHA27M-22-XX CADMIUM PLATE, QQ-P-416, TYPE II, CLASS 2.

RMLHA27M2860-XX DRY FILM LUBRICANT IN LIEU OF SILVER PLATE. (NUT ELEMENT ONLY)

⑥ LHA27M2860-XX SILVER PLATE, AMS2410. (NUT ELEMENT ONLY)

THREADS: MIL-5-8879 (PRIOR TO ADDITION OF DRY FILM LUBRICANT).

PERFORMANCE: TORQUE PER MIL-N-25027.

FLOAT: MINIMUM TOTAL FLOAT, V-.018, W-.033.

APPLICATION: TYPE LHA27M IS DESIGNED FOR USE IN APPLICATIONS WHERE MOUNTING AREAS ARE VERY LIMITED AND THE SCREW IS ASSEMBLED IN A DIRECTION PARALLEL TO THE SURFACE ON WHICH THE NUT IS MOUNTED. FOR EXAMPLE, THE ATTACHMENT OF ELECTRICAL JUNCTION BOX COVERS, THE FLOAT THAT HAS BEEN BUILT INTO THIS TYPE PERMITS IT TO BE "SELF-LOCATING" TO ALLOW FOR A REASONABLE AMOUNT OF MISALIGNMENT OF THE NUT AND SCREW. THE USE OF A286 CRES IN THE LHA27M2860 VERSIONS PROVIDES ADDED ADVANTAGES OF BEING NON-MAGNETIC AND CORROSION RESISTANT.

NOTE: 1. PREVIOUS DESIGNATION 22LHA27M-22 COVERING CADMIUM PLATE QQ-P-416, TYPE I, CLASS 3, HAS BEEN DISCONTINUED, BUT WILL BE SUPPLIED UNTIL ESNA INVENTORY IS DEPLETED, AFTER WHICH F22LHA27M-22 WILL BE AUTOMATICALLY SUBSTITUTED.

ISSUED: 19 MAR 62 REVISED: ⑥ 17 MAR 90

PJ-2218-64

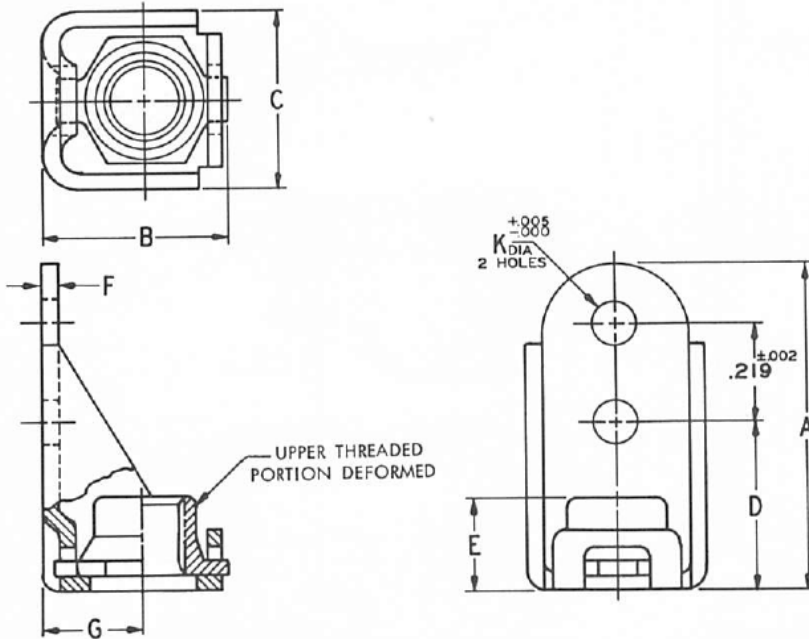
REFERENCE STANDARDS:

NUT-ANCHOR, RIGHT ANGLE, FLOATING,
 MINIATURE, 450°F & 800°F

LHA27M
 LHA27M2860



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ESNA	PART NUMBERS			THREAD	A ±.015	B MAX	C ±.015	D ±.005	E ±.015	F REF	G ±.005	K	APPROX WEIGHT LB/100
	STEEL, 450°F CAD PLUS LUBE	STEEL, 450°F CADMIUM	CRES, 450°F DRY FILM LUBE										
RM52LHA227-40	F52LHA227-40	RMLHA228-40	LHA228-40	.1120-40UNJC-3B	.674	.347	.310	.325	.142	.025	.170	.098	.30
RM52LHA227-62	F52LHA227-62	RMLHA228-62	LHA228-62	.1380-32UNJC-3B	.674	.347	.310	.325	.158	.025	.170	.098	.32

MATERIAL:
 STEEL, HEAT TREATED
 CRES, A286

FINISH:

RM52LHA227-XX CADMIUM PLATE PLUS DRY FILM LUBRICANT, MEETS SALT SPRAY REQUIREMENTS OF QQ-P-416, TYPE II.
 F52LHA227-XX CADMIUM PLATE, QQ-P-416, TYPE II, CLASS 2.
 RMLHA228-XX DRY FILM LUBRICANT IN LIEU OF SILVER PLATE.
 LHA228-XX SILVER PLATE, AMS 2410 ON NUT ELEMENT (OPTIONAL ON BASKET).

THREADS: MIL-S-8879, (PRIOR TO ADDITION OF DRY FILM LUBRICANT)

PERFORMANCE: MIL-N-25027.

FLOAT: MINIMUM RADIAL FLOAT OF .020 IS OBTAINED WITHIN DIMENSION "B" MAXIMUM.

APPLICATION: TYPE LHA227/LHA228 PARTS REPRESENT A COMPROMISE OF DESIGN BETWEEN FULL SIZE AND MINIATURE RIGHT ANGLE ANCHOR NUTS TO PROVIDE A MINIMUM ENVELOPE DESIGN AND YET ONE THAT WILL MAINTAIN PERFORMANCE ABILITIES OF THE FULL SIZE PARTS. THEY ARE PRIMARILY DESIGNED FOR USE IN APPLICATIONS WHERE THE SCREW MUST BE INSTALLED IN A DIRECTION PARALLEL TO THE SURFACE ON WHICH THE NUT IS MOUNTED. FOR EXAMPLE, THE ATTACHMENT OF ELECTRICAL JUNCTION BOX COVERS. THE FLOAT THAT HAS BEEN BUILT INTO THIS TYPE PERMITS IT TO BE "SELF-LOCATING" TO ALLOW FOR A REASONABLE AMOUNT OF MISALIGNMENT OF THE NUT AND SCREW. THE USE OF A286 CRES IN THE LHA228 VERSIONS PROVIDES ADDED ADVANTAGE OF BEING NON-MAGNETIC AND CORROSION RESISTANT.

NOTE: 1. PREVIOUS DESIGNATION 52LHA227, COVERING CADMIUM PLATE QQ-P-416, TYPE I, CLASS 2, HAS BEEN DISCONTINUED, BUT WILL BE SUPPLIED UNTIL ESNA INVENTORY IS DEPLETED, AFTER WHICH F52LHA227 WILL BE AUTOMATICALLY SUBSTITUTED.

PJ- 2218-64

ISSUED: 20 AUG 62 REVISED: 5 18 MAY 87

REFERENCE STANDARDS:

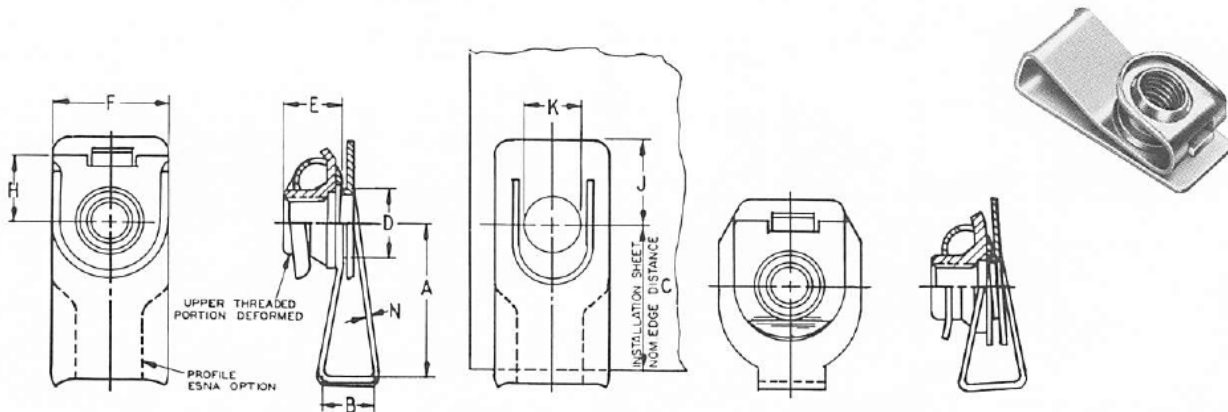
MS 51552

NUT ANCHOR, RIGHT ANGLE, FLOATING,
 450°F & 800°F

LHA227
 LHA228



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ESNA PART NUMBER	OPTIONAL REDUCED ESNA PART NUMBER	THREAD	A	B	C	D	E	F	H	J	K	N	RECOMMENDED INSTALLATION HOLE DIA (SEE FLOAT NOTE)	MOUNTING SHEET THICKNESS	APPROX WEIGHT LB/100
			±.010	REF	NOMINAL EDGE DISTANCE	MAX	REF	MAX	REF	MAX	REF	MAX			
RM52LHA4972-5-62	A4972-5-62	.1380-32UNJC-3B	.300	.090	.281	.162	.155	.260	.183	.223	.141	.018	.163-.173	.030-.062	.21
RM52LHA4972-4A-82	A4972-4A-82		.265	.180	.250			.500							
RM52LHA4972-5A-82	A4972-5A-82		.300	.130	.281										
RM52LHA4972-6-82	A4972-6-82		.395	.163	.375										
RM52LHA4972-8-82	A4972-8-82	.1640-32UNJC-3B	.520	.190	.500	.191	.202	.406	.225	.285	.170	.023	.192-.202	.020-.120	.37
RM52LHA4972-10-82	A4972-10-82	.665	.625		.51										
RM52LHA4972-4-3	A4972-4-3	.265	.180		.250										
RM52LHA4972-5-3	A4972-5-3	.300	.130	.281											
RM52LHA4972-6-02	A4972-6-02	.395	.163	.375											
RM52LHA4972-8-02	A4972-8-02	.1900-32UNJF-3B	.520	.190	.500	.218	.202	.406	.225	.285	.193	.023	.220-.230	.020-.090	.35
RM52LHA4972-10-02	A4972-10-02	.665	.625		.47										
RM52LHA4972-11-02	A4972-11-02	.749	.280		.705										.52

MATERIAL: NUT & CLIP - STEEL, HEAT TREATED.

FINISH: NUT - CADMIUM PLATE, QQ-P-416, CLASS 2, PLUS MOLYBDENUM DISULFIDE DRY FILM LUBRICANT, MEETS SALT SPRAY REQUIREMENTS OF QQ-P-416, TYPE II.
CLIP - CADMIUM PLATE, QQ-P-416, TYPE II, CLASS 2.

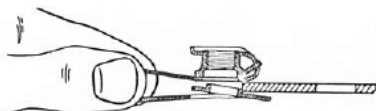
THREADS: MIL-S-8879 (PRIOR TO ADDITION OF DRY FILM LUBRICANT).

PERFORMANCE: MIL-N-25027 UP TO 450°F TEMPERATURE. BECAUSE DESIGN IS NOT RIVETED FOR ATTACHMENT, EXCEPTION MUST BE MADE TO REQUIREMENTS FOR PUSH-OUT PERFORMANCE.

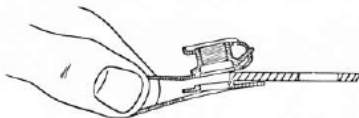
FLOAT: WHEN INSTALLED IN THE RECOMMENDED INSTALLATION HOLE, THE CLIP WILL FLOAT APPROXIMATELY .011. ADDITIONAL RADIAL FLOAT CAN BE OBTAINED BY USING LARGER HOLE SIZES. THESE PARTS ARE DESIGNED FOR A MAXIMUM INSTALLATION HOLE DIA .032 OVER THE MAXIMUM RECOMMENDED VALUES.

APPLICATION: TYPE LHA4972 CLIP NUTS FEATURE SIMPLICITY OF INSTALLATION AND REMOVAL AS ANCHOR NUTS IN SECONDARY STRUCTURAL APPLICATIONS WHERE BOLT HOLES ARE POSITIONED REASONABLY CLOSE TO SHEET EDGE AREAS. THE USUAL COSTS INVOLVED FOR ATTACHMENTS VIA RIVETING OR WELDING ARE ELIMINATED. THE FOLLOWING SERIES OF ILLUSTRATIONS GRAPHICALLY DEMONSTRATE THE EASE OF NUT INSTALLATION AND REMOVAL PROVIDED BY THIS DESIGN.

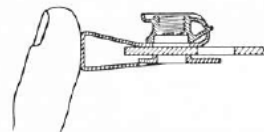
NOTE: ALL PARTS EXCEPT FOR SIZE -62 HAVE AN EFFECTIVE THREAD RELIEF OF .062.



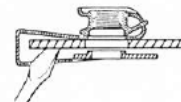
1. Holding nut in your fingers, force the clip against the work thus separating the edges of the clip.



2. Press down and push forward till locating eyelet clears lead edge of work and clip is fully opened over sheet.



3. A light press with finger slides clip over sheet surface allowing locating eyelet to engage the hole (with an audible snap).



4. Removal of the LHA4972 Clip-On is simple and easy. Place a thin screwdriver or knife blade between the work and the bottom clip. Turning the blade opens the clip, releasing the eyelet from the hole. Clip-On is then free and can be pulled off.

PJ-2614

REFERENCE STANDARDS:

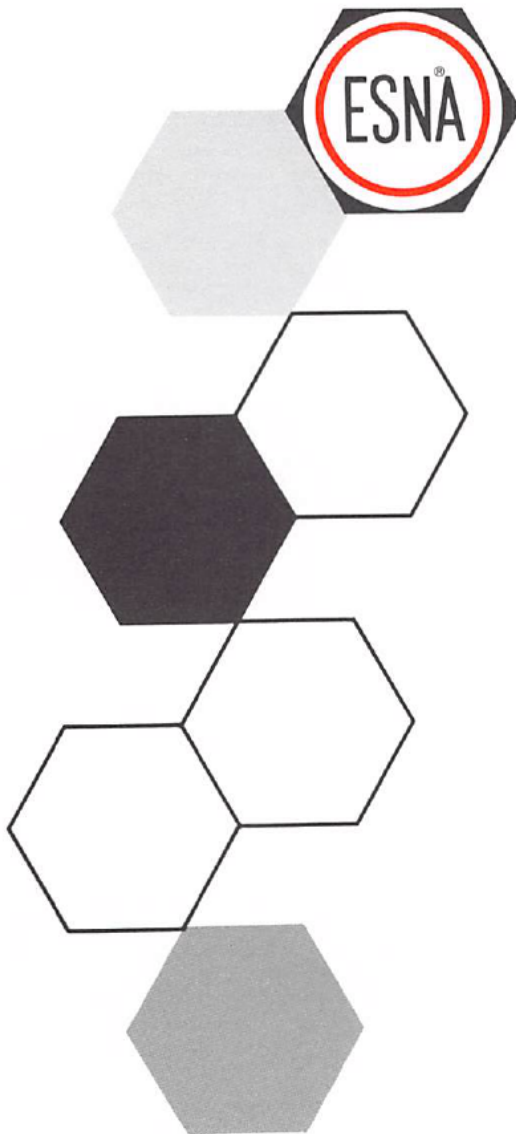
NUT-CLIP, FLOATING
450°F.

LHA4972

ISSUED: 22 AUG 62 REVISED: (17) 16 FEB 88

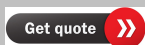


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SECTION 3 ENGINEERING DATA

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ANGULARITY OF THREAD AXIS	86





GAGING OF INTERNAL SCREW-THREADS

The National Bureau of Standards Handbook H28 presents complete dimensional data upon which specifications for threaded products may be based. Compliance with these provisions will fulfill Government requirements including those listed in Spec MIL-S-7742 and Spec MIL-S-8879. Certain information concerning internal threads as employed in self-locking nuts is of particular significance. The following paragraphs explain the content of H28 in relation to the manufacture and inspection of Elastic Stop Nuts.

ADOPTION OF UNIFIED THREADS AND CONVERSION TO SPECIFICATION MIL-S-8879 THREADS:

Esna self-locking nuts covered by Military Standard (MS) drawings or National Aircraft Standards Committee (NASC) drawings have been converted from MIL-S-7742 thread dimensions to MIL-S-8879 thread dimensions. This change was made well in advance of the prescribed cut-off date of 31 December 1969 to assure a smooth transition.

For standardization purposes, we have also converted much of our industrial product line to the MIL-S-8879 thread dimensions. Nuts so converted will function properly with either UNC, UNF, UNJC, or UNJF externally threaded fasteners. The MIL-S-8879 thread form only affects the minor diameter on internally threaded parts and existing "GO" and "NOT-GO" pitch diameter thread gages can still be used.

Prior to this conversion Esna had standardized on Unified Class 3B threads in lieu of Classes 2 or 3 except in cases where special threads or those of a lower class are required.

GAGE TYPES

The object of gaging is to secure interchangeability of mating parts without selection or fitting and to insure that the product conforms to specified dimensions. The applicable gage and thread dimensions are included in the attached table. ESNA employs two types of gages for the inspection of nuts in conformance with Table 13 of Handbook H28 (1944). During manufacturing process inspection, "working gages" are used which are constructed so that they are within the limits of the final inspection gages. This is done so that during processing of parts, the more severe tolerance requirements of the working gage will serve as an advance warning that tooling requires adjustment, thus preventing the further processing of parts which might ultimately fail to meet the requirements of the final gage. Accordingly, "not go" working gages have pitch diameters between the mean and minimum limits, while the final "not go" gages are between the mean and maximum limits. Since working gages are of primary concern only to the threaded product manufacturer, these values are not included in the attached table.

GAGE USE

Paragraph 2 of Section 3 on Gages, page 29 of Handbook H28 (1944) as amended on page 3 of the 1950 supplement relates to the utilization of "go" and "not go" gages. The essence of this information is as follows. When measuring internal threads, entry of the "go" gage insures that the minimum pitch diameter has been achieved. Similarly the maximum pitch diameter has not been exceeded and the parts shall be acceptable if an approved "not go" gage does not enter. H28 defines "not go" gage performance to mean that on or before the third turn, a definite drag must be obtained, although the gage may be further inserted provided the snug fit is maintained. This is equivalent to a finger tight condition and the gage may not be "hand wrenching" or forced.

ACCEPTABILITY OF PRODUCT

An examination of the tabulated nut and gage pitch diameter tolerances reveals that dimensional combinations are possible which will prevent the "go" gage from entering or permit the "not go" gage to enter the nut. If the maximum "go" gage pitch diameter is greater than the minimum nut pitch diameter, interference will result. Similarly, if the minimum "not go" gage pitch diameter is smaller than the maximum nut pitch diameter, gage entry is possible. To exclude the possibility of such occurrence, ESNA uses final inspection gages with dimensions to the extremes of the tolerance range, i.e., "go" gages close to the lower and "not go" gages close to the upper limits of the gage maker's tolerances. This practice conforms to the acceptability of product stipulation in the Federal Screw Thread Standard H28. It states that should a question arise between manufacturer and purchaser of threaded products with regard to their size, and the manufacturer produces limit gages which do not measure outside the specified limits for threaded components and pass the parts in question, they shall be accepted as meeting the specification for size.

GAGING REJECTIONS

When parts are rejected for thread dimensional reasons, and ESNA subsequently finds the nuts to gage satisfactorily, the purchaser may maintain that his gage works on one lot of parts and consequently should be accurate for others as well. This contention is not necessarily correct since different lots of the same nut type may have somewhat different prevailing thread dimensions. The dimensions of gages are controlled to four decimal places or ten thousandths (.0001). Any new gage will have dimensions within the gage maker's tolerances. ESNA, however, selects gages to the extremes of the tolerance range for final inspection purposes.

As previously pointed out the purchaser's "go" gage, for example, may be to a diameter near the middle of the gage tolerance range of .2856 for the 5/16 thread size. The first lot of nuts, by circumstance, may have a thread pitch diameter near the maximum of the nut tolerance range, or .2876. The purchaser's "go" gage would enter satisfactorily. However, should the second lot of nuts have been near the minimum of the nut tolerance of .2855, the pieces, although dimensionally satisfactory, would not accept the purchaser's "go" gage which is larger. In both cases the ESNA final inspection "go" gage, which could be at the lower limit of .2854, would have entered satisfactorily since it is smaller than the purchaser's "go" gage. Under these conditions the rejection would not be valid. The use of a minimum "go" gage and a maximum "not go" gage is recommended to simulate ESNA gaging procedures for a re-examination before parts are rejected.

BEARING SURFACE SQUARENESS

The last paragraph of Section 4 on page 187 of H28 (1944) states that:

"The bearing surface shall be at right angles to the axis of the threaded hole within a tolerance of 2° for 5/8-in. nuts or smaller, and 1° for nuts larger than 5/8-in."

ESNA fulfills these requirements. For further details see ESNA Specification 405.

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ENGINEERING
DATA

GAGING OF INTERNAL SCREW-THREADS

PAGE

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FINE

Table with columns: THREAD SIZE AND CLASS, ESNA DASH NUMBER, PITCH DIAMETER (MAX, MIN), MINOR DIAMETER (MAX, MIN), and ALLOWABLE PITCH DIAMETER LIMITS FOR GAGES (NOT GO THREAD GAGE, GO GAGE).

COARSE

Table with columns: THREAD SIZE AND CLASS, ESNA DASH NUMBER, PITCH DIAMETER (MAX, MIN), MINOR DIAMETER (MAX, MIN), and ALLOWABLE PITCH DIAMETER LIMITS FOR GAGES (NOT GO THREAD GAGE, GO GAGE).

ISSUED: 10 SEPT 53 REVISED: 26 MAY 87

ENGINEERING DATA

GAGING OF INTERNAL SCREW - THREADS

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NYLON LOCKING INSERTS

The types of nylon which ESNA employs in the locking elements of its insert nuts are "Zytel" 101 and "Zytel" 103 made by DuPont and supplied as a molding powder. Both types in final form have a red color and a shiny appearance.

Both "Zytel" 101 and 103 fulfill the requirements of ASTM D4066. They have substantially the same properties which are listed below, except that when used as a locking insert, "Zytel" 101 is fully effective to 250°F and "Zytel" 103 to 350°F. In many applications these temperature limitations have been exceeded and sufficient locking torque remained to resist loosening in operation.

Specific Gravity		1.14
Tensile Strength		
	-70°F	15,700 psi
	73°F	10,500 psi
	170°F	7,600 psi
Elongation		
	-70°F	1.6
	73°F	90%
	170°F	320%
Modulus of Elasticity	73°F	400,000 psi
Flexural Strength	73°F	13,800 psi
Stiffness	73°F	200,000 psi
Impact Strength (Izod)	-70°F	0.42 ft-lb
	77°F	0.94 ft-lb
	170°F	0.97 ft-lb
Rockwell Hardness		R118
Flow Temperature		480°F
Heat Distortion Temperature for 264 psi		150°F
Heat Distortion Temperature for 66 psi		360°F
Coefficient of Expansion; linear per deg fahr		5.5 x 10 ⁻⁵
Thermal Conductivity BTU/hr/sq ft/°F/in		1.7
Dielectric Strength, short time, volt/mil.		385 (0.125 in.)
Volume Resistivity, ohm. cm		4.5 x 10 ¹³
Water Absorption		1.5%
Flammability		Self-extinguishing

PHYSICAL CHARACTERISTICS

Nylon locking inserts exhibit the following characteristics, which assure outstanding performance of the self-locking nuts in which they are installed.

1. Mechanical Strength

- a. Nylon exhibits relatively high hardness, tensile, compressive, and impact strength. Stiffness and rigidity are high also.
- b. The high tensile and tear strength of nylon, in conjunction with its comparatively low frictional properties, produce excellent abrasion resistance.

2. Thermal Properties

- a. Nylon is one of the most resistant of the thermoplastic resins. It will not soften gradually as the temperature rises, but has a sharp melting point below which it remains fairly rigid. Thus, nylon inserts maintain their locking effectiveness throughout the applicable temperature range.
- b. The tensile strength of nylon increases with a decrease in temperature. With excellent low temperature flexibility nylon insert locking performance is not affected by sub-zero conditions.

3. Resistance to Chemicals

Nylon is unaffected by common solvents, alkalies, dilute mineral acids, and most organic acids. It is impervious to oils and greases, and in turn will have no contaminating affect on such lubricants. Nylon is not subject to fungus attack and will withstand continuous salt or fresh water immersion and repeated steam sterilization. The following is a tabulation of some of the chemicals and solvents to which nylon is inert or highly resistant:

Organic Acids

Conc. citric acid
10% lactic acid
Oleic acid
Acetic acid

Caustics

10% sodium carbonate
12% sodium hydroxide
0.5% ammonium hydroxide
Soaps and detergents

Oils

Mineral oils
Lubricating oils
Hydrogenated vegetable oils
Furfural
Varnish oil
Peanut oil
Castor oil
Corn oil
Soy bean oil
Fish oil

Mineral Salt Solutions

Sodium sulphite
Lithium sulphate
Ferric chloride
Sat. sodium chloride
Ferric arsenate
Sodium fluoride
Sodium chromate
Sodium arsenate
Sodium stannate
Sodium tungstate
Thiosulphates

Organic Salt Solutions

Potassium cyanide
Sodium cyanide
Sodium acetate
Lead acetate

Solvents (aromatic)

Benzol
Toluol
Xylol
Chlorobenzol
Benzaldehyde
Nitrobenzol

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Solvents (Aliphatic)

Acetone	Cyclohexanol
Ethyl alcohol	Carbon tetrachloride
Butyl alcohol	Carbon bi-sulphide
Mineral spirits	Chloroform
Methyl ethyl ketone	Turpentine
Propane	Gasoline
Heptane	Kerosene
Isopropyl alcohol	Trichlorethylene
Butyl acetate	Aldehydes
Aniline	Freons
Ethyl propionate	Glycols

4. Elastic Recovery

Nylon has the unique property of recovery after deformation. As an insert material, it will tend to return to its original shape after an impression has been made by the mating bolt thread. A definite increase in locking torque can be noted when the nut is allowed to remain locked on the bolt, even after numerous installation cycles. In any application the ultimate number of re-use cycles which can be accomplished will depend on factors such as bolt thread roughness, the minimum breakaway torque acceptable, and other service conditions. Nylon insert equipped nuts have fulfilled performance requirements even after several hundred successive applications.

5. Durability

Nylon became available as a molding powder in 1944, at which time ESNA realized the potentiality of the material and utilized it as the insert of self-locking fasteners.

Aging tests involving outdoor atmospheric exposure have been performed for extended periods with entirely satisfactory results. Parts assembled in 1944 are still in excellent condition and functionally sound.

Based on data developed to date, nylon inserts should perform satisfactorily as a locking element for at least forty (40) years provided that the conditions to which the parts are subjected are consistent with the properties of the material as outlined in the preceding paragraphs.

LOCKING EFFECTIVENESS

The basic function of the locking device in a self-locking nut is to resist loosening when the bolted joint is subjected to impact and vibratory loads in service. Self-locking nuts develop "torque", a measure of gripping action, when installed on the mating bolt and this is often the sole factor considered in evaluating performance. Exhaustive analyses by ESNA utilizing test equipment and methods which reproduced actual operating conditions demonstrated that other factors must be accounted for in appraising locking effectiveness. Of concern are the mechanical means by which the locking device creates torque; the flexibility of the locking element in maintaining compatibility with the normal range of bolt dimensional and quality variations; the capability of providing renewed locking action after removal and reinstallation on the same or other bolts; and others as well.

Some locking devices that depend on areas in high pressure metal to metal contact with the mating bolt will develop excessive initial torque due to interference. They may rapidly lose their effectiveness during vibration or upon reinstallation as the contact points yield or are worn away.

The nylon locking element in ESNA's insert type fasteners is designed to engage the thread of the mating bolt so that the nylon will be compressed between adjacent flanks and exert sufficient force to resist loosening. When contact is made between the nut insert and the mating bolt, the nylon flows into the void between thread flanks until uniform pressure is exerted against these surfaces as well as against the thread crests. This pressure effectively resists any induced tendency of the nut to rotate while at the same time nylon's physical characteristics provide a vibration damping action.

ESNA nylon equipped parts have demonstrated superior resistance to loosening over all other types of self-locking nuts and locking devices. Upon request, ESNA's Engineering Report ER115-1745 which outlines relative test results, will be furnished; ER 272-2177 describing an improved vibration test for thread locking devices is also available.

APPLICATION ADVANTAGES

The excellent re-usability of Elastic Stop Nuts, resulting from the elastic recovery and abrasion resistance of the nylon inserts, makes them ideally suited for such applications as the following:

1. The mating screw is used repeatedly for making adjustments.
2. Maintenance requirements result in frequent removal of the mating screw. Also, where fixed type fasteners, such as clinch and anchor nuts, must retain their locking effectiveness during the life of the equipment.
3. When adequate locking action must persist after unusually lengthy travel of the nut on bolts which vary considerably in class, finish or other thread irregularities.
4. In large thread sizes (3/4" - 4") or very thin nut types where metallic locking devices are not feasible or are prone to develop excessive torques and to gall or damage the mating bolt threads.
5. For fine and extra fine thread engagements where the locking torque and resistance to galling of metallic locking elements are more difficult to control.
6. For electronic units where the flaking of bolt plating must be held to a minimum.
7. The fastening combination is subjected to extreme vibration or impact loading.
8. Where consistent locking torque values between nuts in the same lot are needed to provide uniform tightness or preload in the mating bolts.
9. Materials are required such as brass or soft aluminum which do not lend themselves to the formation of reliable locking devices.

The resilient nature of nylon and its physical characteristics make insert equipped parts highly satisfactory for the following applications:

1. Where the nut may be immersed continuously or intermittently in hot oils or other liquids.
2. When resistance to fungus growth is necessary as on electronic equipment intended for use in the tropics.
3. Where sealing between the nut and bolt threads is required to limit fluid leakage or prevent thread corrosion with incident difficulty in dis-assembly.

ISSUED: 31 JAN 56 REVISED: (G) 1 MAY 91

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ANGULARITY OF THREAD AXIS

1. SCOPE AND CLASSIFICATION

1.1 SCOPE - THIS SPECIFICATION RELATES TO THE CLASSIFICATION AND MEASUREMENT OF THE ANGULARITY OF THE SEATING SURFACE OF THE NUT WITH RESPECT TO THE AXIS OF THE PITCH DIAMETER OF THE THREADS. IT IS TO BE APPLIED TO PARTS MANUFACTURED BY THE ELASTIC STOP NUT CORPORATION OF AMERICA WHEN SPECIFIED ON THE APPLICABLE STANDARD DRAWING.

1.2 CLASSIFICATION - ESNA THREAD SQUARENESS REQUIREMENTS WILL BE CLASSIFIED INTO TWO GROUPS, AS FOLLOWS:

GROUP I - STANDARD SQUARENESS.

GROUP II - SPECIAL SQUARENESS, SUPPLIED ONLY WHEN SPECIFICALLY CALLED OUT ON THE ESNA DRAWING.

2. REQUIREMENTS

2.1 THE SEATING SURFACE OF THE NUT MUST BE SQUARE WITH THE AXIS OF THE PITCH DIAMETER OF THE NUT THREAD WITHIN THE LIMITS SPECIFIED IN TABLE I.

2.2 ALL NUTS ARE TO BE MEASURED FOR ANGULARITY OF THREAD AXIS BY MEANS OF A TABLE SQUARENESS GAGE CONSISTING OF A TABLE AND THREADED MANDREL.

2.2.1 TABLE - THE TABLE OF THE GAGE IS MADE AS SHOWN IN FIGURE 1.

FIGURE 1
ASSEMBLED TABLE GAGE

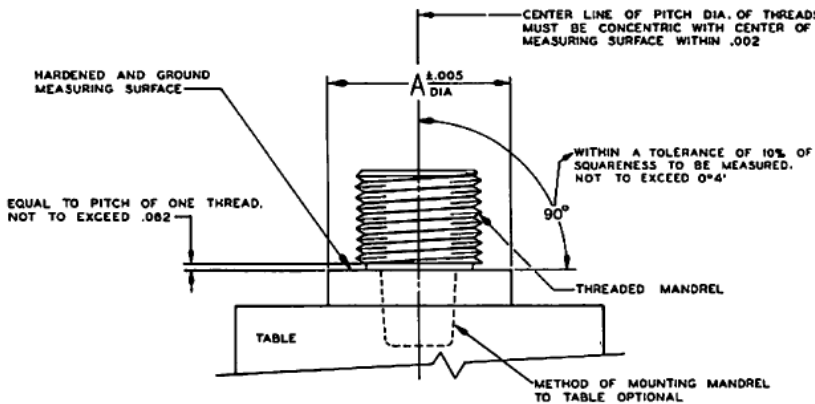


TABLE I
MAXIMUM LIMIT OF ANGULARITY OF THREAD AXIS

THREAD SIZE	GROUP I		GROUP II	
	DECIMAL	MAX PERMISSIBLE ANGLE	DECIMAL	MAX PERMISSIBLE ANGLE
1 THRU 5	.004	0° 55'		
6	.005	0° 55'		
8	.006	1° 00'	.005	0° 50'
10	.006	0° 55'	.005	0° 46'
1/4	.007	0° 55'	.005	0° 39'
5/16	.007	0° 48'	.005	0° 34'
3/8	.008	0° 49'	.005	0° 31'
7/16	.008	0° 42'	.005	0° 28'
1/2	.009	0° 41'	.006	0° 28'
9/16	.010	0° 39'		
5/8	.010	0° 37'		
3/4	.010	0° 32'		
7/8	.011	0° 31'		
1	.012	0° 29'		
1 1/8	.013	0° 28'		
1 1/4	.014	0° 27'		
1 3/8	.015	0° 26'		
1 1/2	.016	0° 25'		
1 3/4	.018	0° 22'		
2	.020	0° 22'		

NOTE: THESE LIMITS APPLY TO THE BOLT SIZE LISTED, REGARDLESS OF THE PITCH OF THE THREADS.

2.2.2 MANDREL - THE THREADED MANDREL OF THE GAGE IS MADE IN ACCORDANCE WITH THE PITCH DIAMETERS AND MAJOR DIAMETERS LISTED IN TABLES III AND IV.

2.2.2.1 SQUARENESS OF MANDREL AND TABLE - THE METHOD OF MOUNTING THE MANDREL IN THE TABLE IS OPTIONAL. THE MANDREL IS MOUNTED IN THE CENTER OF THE MEASURING SURFACE WITHIN .002 OF THE TRUE CENTER. WHEN MOUNTED, THE CENTER OF THE PITCH DIAMETER OF THE THREADS MUST BE AT 90° TO THE MEASURING SURFACE OF THE TABLE WITHIN A TOLERANCE OF 10% OF THE LIMITS SPECIFIED IN TABLE I OR 0° 4' WHICHEVER IS THE SMALLER.

2.2.2.2 LENGTH OF MANDREL - THE MANDREL MUST NOT CONTACT THE LOCKING ELEMENT OF THE NUT WHEN THE NUT IS INSPECTED. THE LENGTH OF THREAD ON THE MANDREL SHALL NOT BE SHORTER THAN 75% OF THE EFFECTIVE THREADS IN THE NUT. THIS MINIMUM NEED NOT BE HELD WHEN IT EXCEEDS THE THREAD LENGTH OF A STANDARD "GO" GAGE.

2.2.2.3 MANDREL MOUNTING - THE MANDREL IS MOUNTED SO THAT THE FIRST FULL THREAD ABOVE THE MEASURING SURFACE IS LESS THAN .062 OR THE PITCH OF ONE THREAD, WHICHEVER IS THE SMALLER, FROM THE MEASURING SURFACE.

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ESNA SPECIFICATION

ANGULARITY OF THREAD AXIS

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TABLE II
DIAMETER OF MEASURING SURFACE

THREAD SIZE	DIMENSION A ±.005 DIA
1	.250
2	.250
3	.250
4	.250
5	.250
6	.312
8	.344
10	.375
1/4	.438
5/16	.500
3/8	.563
7/16	.625
1/2	.750
9/16	.875
5/8	.938
3/4	1.063
7/8	1.250
1	1.438
1 1/8	1.625
1 1/4	1.813
1 3/8	2.000
1 1/2	2.188
1 3/4	2.750
2	3.125

TABLE III
MANDREL DIAMETERS (FINE THREAD)

THREAD SIZE	MAJOR DIAMETER		PITCH DIAMETER	
	MIN	MAX	MIN	MAX
1-72UNF-3B	.0730	-.0733	.0640	-.0642
2-64UNF-3B	.0860	-.0864	.0759	-.0761
3-56UNF-3B	.0990	-.0994	.0874	-.0876
4-48UNF-3B	.1120	-.1124	.0985	-.0987
5-44UNF-3B	.1250	-.1254	.1102	-.1104
6-40UNF-3B	.1380	-.1384	.1218	-.1220
8-36UNF-3B	.1640	-.1644	.1460	-.1462
10-32UNF-3B	.1900	-.1905	.1697	-.1700
1/4-28UNF-3B	.2500	-.2505	.2268	-.2271
5/16-24UNF-3B	.3125	-.3130	.2854	-.2857
3/8-24UNF-3B	.3750	-.3755	.3479	-.3482
7/16-20UNF-3B	.4375	-.4380	.4050	-.4053
1/2-20UNF-3B	.5000	-.5005	.4675	-.4678
9/16-18UNF-3B	.5625	-.5630	.5264	-.5267
5/8-18UNF-3B	.6250	-.6255	.5889	-.5892
3/4-16UNF-3B	.7500	-.7506	.7094	-.7097
7/8-14UNF-3B	.8750	-.8756	.8286	-.8289
1-14UNF-3B	1.0000	-.1.0006	.9536	-.9539
1 1/8-12UNF-3B	1.1250	-.1.1256	1.0709	-.1.0712
1 1/4-12UNF-3B	1.2500	-.1.2506	1.1959	-.1.1962
1 3/8-12UNF-3B	1.3750	-.1.3756	1.3209	-.1.3212
1 1/2-12UNF-3B	1.5000	-.1.5006	1.4559	-.1.4462

TABLE IV
MANDREL DIAMETERS (COARSE THREAD)

THREAD SIZE	MAJOR DIAMETER		PITCH DIAMETER	
	MIN	MAX	MIN	MAX
1-64UNC-3B	.0730	-.0734	.0629	-.0631
2-56UNC-3B	.0860	-.0864	.0744	-.0746
3-48UNC-3B	.0990	-.0994	.0855	-.0857
4-40UNC-3B	.1120	-.1124	.0958	-.0960
5-40UNC-3B	.1250	-.1254	.1088	-.1090
6-32UNC-3B	.1380	-.1385	.1177	-.1180
8-32UNC-3B	.1640	-.1645	.1437	-.1440
10-24UNC-3B	.1900	-.1905	.1629	-.1632
1/4-20UNC-3B	.2500	-.2505	.2175	-.2178
5/16-18UNC-3B	.3125	-.3130	.2764	-.2767
3/8-16UNC-3B	.3750	-.3756	.3344	-.3347
7/16-14UNC-3B	.4375	-.4381	.3911	-.3914
1/2-13UNC-3B	.5000	-.5006	.4500	-.4503
9/16-12UNC-3B	.5625	-.5631	.5084	-.5087
5/8-11UNC-3B	.6250	-.6256	.5660	-.5663
3/4-10UNC-3B	.7500	-.7506	.6850	-.6853
7/8-9UNC-3B	.8750	-.8757	.8028	-.8031
1-8UNC-3B	1.0000	-.1.0007	.9188	-.9192
1 1/8-7UNC-3B	1.1250	-.1.1257	1.0322	-.1.0326
1 1/4-7UNC-3B	1.2500	-.1.2507	1.1572	-.1.1576
1 3/8-6UNC-3B	1.3750	-.1.3758	1.2667	-.1.2671
1 1/2-6UNC-3B	1.5000	-.1.5008	1.3917	-.1.3921
1 3/4-5UNC-3B	1.7500	-.1.7508	1.6201	-.1.6206
2-4 1/2UNC-3B	2.0000	-.2.0008	1.8557	-.1.8562

3. METHOD OF MEASUREMENT

- 3.1 GAGING - PRIOR TO THE MEASUREMENT FOR SQUARENESS OF THREAD, ALL INSPECTION SAMPLES ARE TO BE MEASURED FOR PROPER THREAD FIT BY MEANS OF THE APPROPRIATE THREAD GAGES.
- 3.2 INSTALLATION - THE NUT IS INSTALLED ON THE THREADED MANDREL UNTIL THE SEATING SURFACE OF THE NUT MAKES CONTACT WITH THE MEASURING SURFACE OF THE TABLE, AS SHOWN IN FIGURE 2. THE NUT IS TIGHTENED FINGER-TIGHT ONLY.
- 3.3 MEASUREMENT - AFTER INSTALLATION, THE ASSEMBLY IS EXAMINED FOR ANGULARITY OF THREAD AXIS. THE MAXIMUM PERMISSIBLE SPACE BETWEEN THE SEATING SURFACE OF THE NUT AND THE MEASURING SURFACE OF THE GAGE SHALL NOT EXCEED THE LIMIT LISTED IN TABLE I.

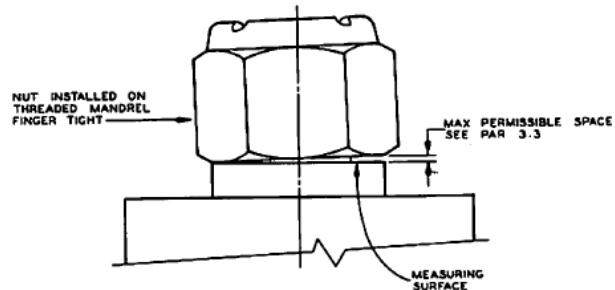
4. NOTES

- 4.1 THE SPECIFICATIONS APPLICABLE TO SELF-LOCKING NUTS WHICH HAVE REQUIREMENTS FOR ANGULARITY OF THREAD AXIS WITH RESPECT TO THE SEAT OF THE NUT, GENERALLY REFERRED TO AS "SEAT SQUARENESS", ARE:

ANA SPEC AN-N-5
ANA SPEC AN-N-10
HANDBOOK H2B
MIL SPEC MIL-N-25027

- 4.2 THESE REQUIREMENTS ARE SPECIFIED IN DEGREES AND FOR COMPARATIVE PURPOSES THEY HAVE BEEN CONVERTED TO INCHES AS MEASURED AT DIMENSION "A" (FIG 1) AND TABULATED TOGETHER WITH ESNA GROUP I REQUIREMENTS. ESNA GROUP I REQUIREMENTS ARE APPLICABLE TO AIRFRAME AND COMMERCIAL DESIGN.
- 4.3 ESNA ANGULARITY TOLERANCES ARE MAINTAINED BY CLOSE PROCESS CONTROL, WITH REGULAR PRODUCTION FACILITIES. INSPECTION IS BASED ON A SAMPLING BASIS OF 2% AVERAGE QUALITY LEVEL IN ACCORDANCE WITH MIL-STD-105.
- 4.4. FOR NUTS THAT ARE DEEP COUNTERSUNK, WHERE THE COUNTERSINK DIAMETER EXCEEDS THE DIMENSION "A" GIVEN IN TABLE II, THE MEASURING TABLE DIAMETER AND THE PERMISSIBLE MAXIMUM DECIMAL LIMIT OF ANGULARITY MAY BE INCREASED PROVIDED THE MAXIMUM PERMISSIBLE ANGLE IS NOT EXCEEDED (SEE TABLE I).

FIGURE 2
METHOD OF MEASUREMENT



THREAD SIZE	ESNA STANDARD GROUP I	AN-N-5 AN-N-10 HANDBOOK H2B	MIL-N-25027
	INCHES	INCHES	INCHES
1 THRU 5	.004	.008	.005
6	.005	.010	.006
8	.006	.012	.006
10	.006	.013	.006
1/4	.007	.015	.007
5/16	.007	.017	.007
3/8	.008	.020	.008
7/16	.008	.022	.008
1/2	.009	.026	.009
9/16	.010	.030	.010
5/8	.010	.033	.011
3/4	.010	.019	.012
7/8	.011	.022	.013
1	.012	.025	.015
1 1/8	.013	.028	.016
1 1/4	.014	.032	.018
1 3/8	.015	.035	
1 1/2	.016	.038	
1 3/4	.018	.048	
2	.020	.054	

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ESNA SPECIFICATION

ANGULARITY OF THREAD AXIS

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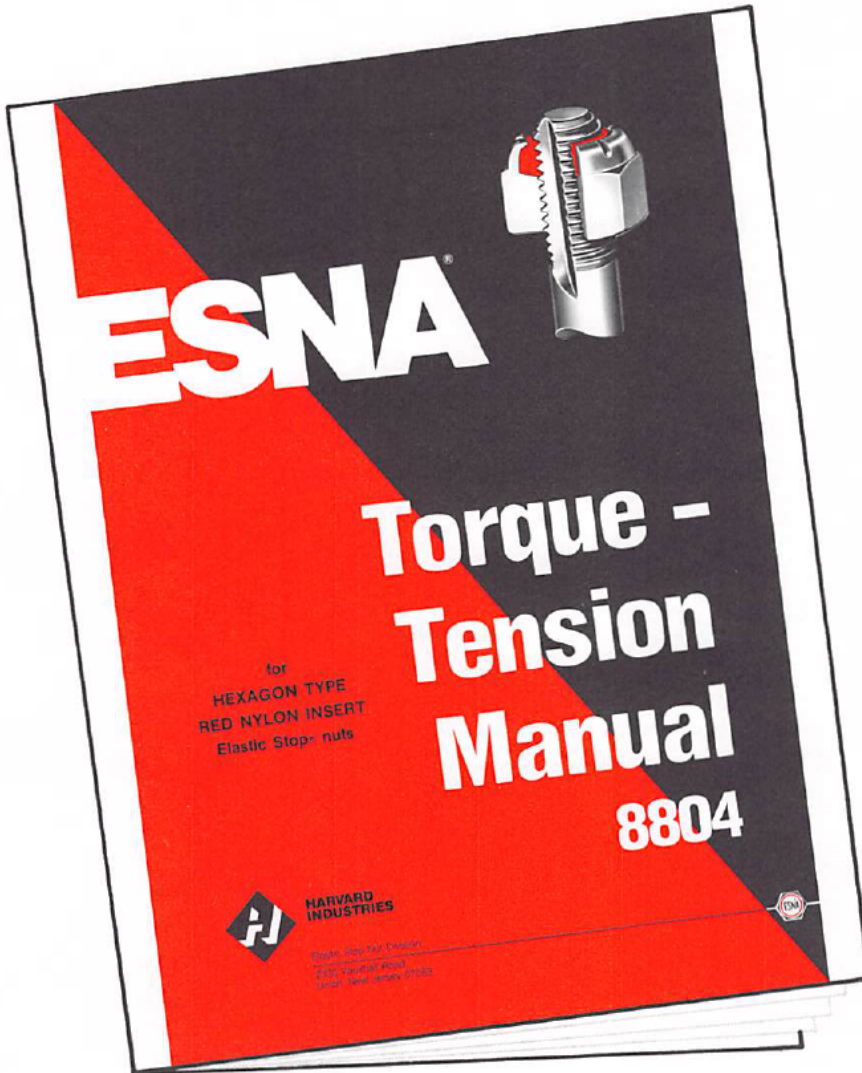
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FSCM 72962

TORQUE TENSION MANUAL

No. 8804



The information offered in ESNA[®]'s Torque Tension Manual will help you obtain full performance values from Elastic Stop[®] nut hex fasteners by installing them correctly. These **recommended** values have been derived from thousands of torque/tension tests run in our laboratories. They are intentionally **conservative** averages deliberately selected to avoid the possibility of overstressing the nut or bolt. It is quite possible, depending on a particular nut/bolt combination, that higher values may be used after specific testing proves it to be a reliable combination.

**Suggested torque Values
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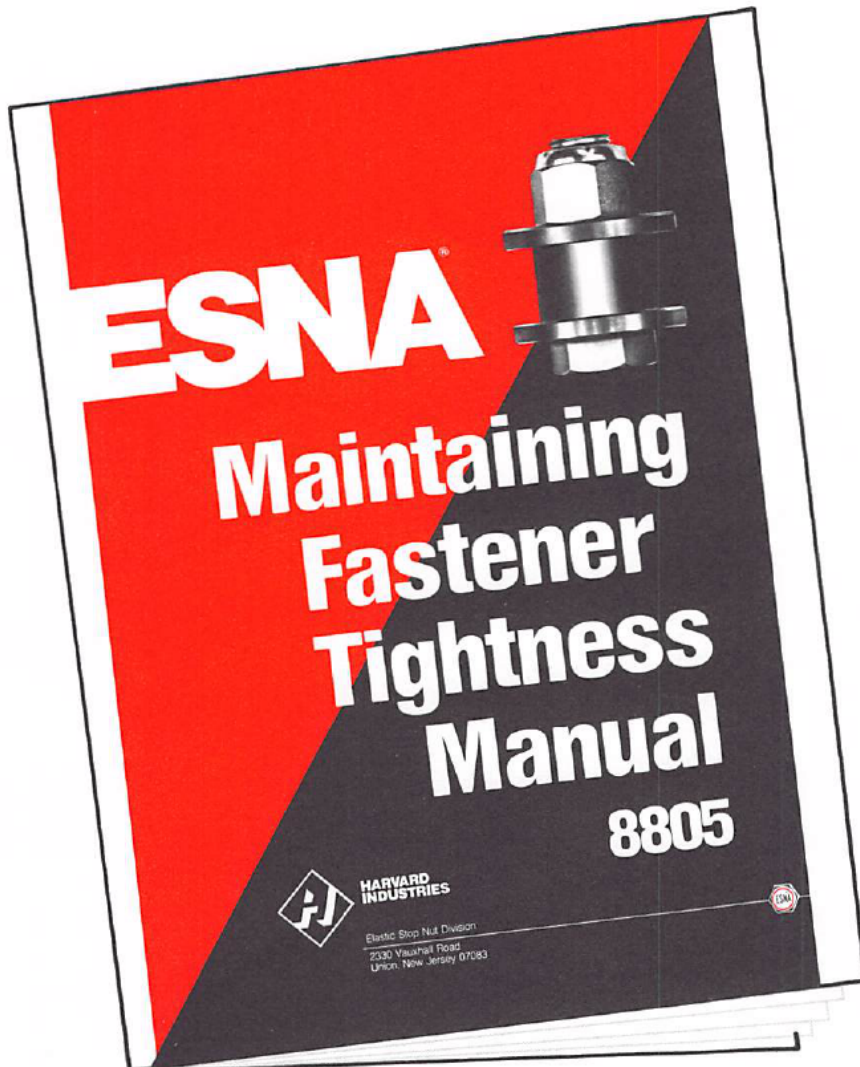
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FSCM 72962

MAINTAINING TIGHTNESS OF THREADED FASTENERS MANUAL

No. 8805



"Maintaining Tightness of Threaded Fasteners" is available for the asking. This bulletin is an expansion of ER 272-2177 on how and why threaded fasteners loosen.

The headings of the main sections of the report will give you a fair idea of its content. They are:

- What the designer wants of a threaded fastener system.
- Why do threaded fasteners loosen?
- Fasteners first loosen WITHOUT TURNING!
- Vibration testing
- Mechanical impacts set up resonance.
- ENERGY ABSORPTION IS THE KEY FACTOR.
- NYLON — most practical and effective energy absorber
- SUMMARY . . . A new theory of fastener loosening.

The third section of this bulletin deals with a verified but relatively unrecognized fact. Even under static conditions a newly tightened nut and bolt lose some amount of prestress during the first few hours. Clearer understanding is given to another relatively unrecognized detail: a fastener subjected to intense vibration always loosens before the nut actually rotates on the bolt. And for the first time that we know of — the real significance of damping in thread interface areas is spotlighted.

We believe that this HOW and WHY of fastener Technology is a "must" for designers and engineers concerned with fastening systems, long term reliability, product warranties and related quality assurance factors.

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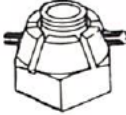

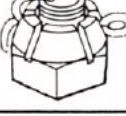
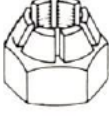


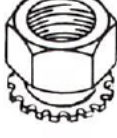

chart will help you avoid fastener failures

Tightened fasteners loosen for a variety of reasons — shock, vibration, inadequate installation torque, wear between parts, they stretch and the ever present human error.

The Elastic Stop® nut with its integral nylon locking collar, has proven in both laboratory and extensive field tests, to be the highest standard of locknut performance. The ESNA® red nylon collar can withstand extreme vibration and shock loads, remaining locked in place under the most severe conditions.

With ESNA®'s relative vibration performance at 100 (see chart) the vibration resistance of alternative locking devices should be clearly evaluated.

Using this chart, the result of thousands of vibration tests under controlled laboratory conditions helps you select the nut locking

FASTENER TYPE	LOCKING DEVICE	RELATIVE PERFORMANCE
DAMPING, SELF-LOCKING	 ESNA Nylon® ring	100
	 ESlok® patch	25
ALL-METAL SELF-LOCKING, AIRCRAFT	 Beam type	53
	 Distorted thread	19
CASTELLATED NUT	 Spring Pin	38
	 Lockwire	18
	 Cotter key	8
ALL-METAL SELF-LOCKING, COMMERCIAL	 Beam type	4 to 17
	 Distorted thread	1 to 10
PLAIN NUT	 Spring-type lockwasher	5
	 Tooth-type lockwasher	1
	 None	1

device that will meet your requirements. When cost is a factor, consider the expense of stocking and handling of secondary locking elements (lockwashers, lockwires and cotter pins) and human error. Elastic Stop® nuts clearly become the most efficient choice.



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