

MACLEAN-ESNA

Precision Fasteners

Catalog 996



611 Country Club Road
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FAX: 1-(501)-892-8938
E-mail: Fastener@MacLean-Fogg.com

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The ESNA® Story

The ESNA® story began in 1927, when a young engineer named Carl Arthur Swanstrom came to this country from Sweden. He brought with him a license to manufacture and sell a unique new self-locking fastener. The Inventor called the new fastener an "Elastic Stop® nut" because the nut remained "stopped" anywhere along the bolt threads. A non-damaging insert, fitted into the top of the nut, gripped the bolt threads firmly, holding the nut in position without seating against the work or using secondary locking devices

The only problem with the new nut was the inability to mass produce them. The next few years were spent perfecting an automatic assembly machine to insert the locking device into the top of the nut. Swanstrom perfected the machine in the early 1930's and only four years later the Elastic Stop® Nut Corporation of America was founded.

A threaded fastener, able to positively resist the loosening effect of vibration, had long been sought by manufacturers of every type of equipment. The Elastic Stop® nut proved to be the answer - totally reliable, able to reduce maintenance costs and prevent equipment failure.

The outstanding performance of the Elastic Stop® nut was further substantiated in 1943 when the Air Force tested and issued the first approval letter to use ESNA® fasteners on military aircraft, both fuselage and engines. During WWII billions of Elastic Stop® nuts were produced for every branch of the armed services. A staggering number of applications followed on ground support and electronic equipment.

In the years that followed, the ESNA® line of standard products expanded to over 25,000 parts. New types of self-locking fasteners were introduced to the product line . . . The Eslok®, self-locking hex nuts for low cost commercial grade applications and the COLLARLOK®, a hex nut with a 360° bonded nylon collar for high speed automatic assembly techniques. All metal locknuts were developed for applications with high heat or weight reduction requirements.

This diversified line of reliable fastener products has provided Elastic Stop® nut with a solid foundation for long term stability and future growth.

The ESNA® product line may be found in farm, automotive, mining, aerospace, marine and electrical assemblies of all types.

In 1995, Elastic Stop® nut became a part of MacLean-Fogg® and MacLean-ESNA® was created. The following pages describe many of the products produced in a 120,000 square foot facility in Pocahontas, Arkansas. MacLean-Fogg/MacLean-ESNA represent a company with capabilities unparalleled in the fastener industry.



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MACLEAN-ESNA FASTENERS FOR VARIOUS APPLICATIONS

MacLean-Esna is committed to the Design, Development and Production of the world's most reliable Standard and Special Self-Locking fasteners.

ESNA® Engineering, Test Laboratories, Manufacturing and Sales Groups are located in Pocahontas, Arkansas specializing in the manufacture of the famous ESNA® red nylon insert self-locking fasteners for use on commercial - industrial applications. This plant offers the manufacturing community the most complete and reliable line of self-locking fasteners available today.

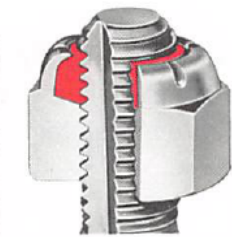
As the pioneer manufacturer of self-locking fasteners, ESNA® offers the benefits of more than 60 years experience in the design and manufacture of vibration and impact proof fasteners. The extensive ESNA® line includes standard and high tensile, extra thin, MIL approved parts, designed for the most difficult fastening applications. ESNA® has also created

full lines of miniaturized self-locking parts for the electronic industry such as hex and clinch nuts. When specifying for your project – please contact our engineering specialist for an immediate reply and solution to your fastener problem.

The complex requirements of industry has created multiple lines of self-locking Elastic Stop® 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. If the part needed is not shown, contact our Technical Sales Department for assistance. Additional hundreds of special and standard designs (not shown) are readily available for review. Because of our manufacturing capabilities, ESNA® has the ability to provide precision screw machine products to your specifications.

FOR COMPLETE COVERAGE OF YOUR FASTENER DESIGN REQUIREMENTS

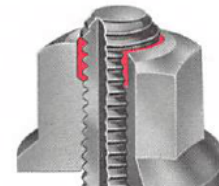
**ESNA® OFFERS
FOUR SUPERIOR
LOCKING DEVICES**



ESNA
RED NYLON LOCKING INSERT
applications to 250°F



ESLOK
RED NYLON LOCKING PATCH
applications to 250°F



COLLARLOK
RED NYLON LOCKING COLLAR
applications to 250°



ESNA ALL-METAL
ELLIPTICALLY OFFSET CROWN
applications to 1400°F

*** 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 itself 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 grip forces metal-to-metal contact between the nut and bolt threads. This friction grip plus the nylon compression 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 or flange 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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CONTENTS

| | |
|---|-------|
| Forward | 1 |
| Elastic Stop® nut Locking Devices | 2 |
| Indexes to Engineering Standards and Drawings | 3 |
| Product Reliability | 4 |
| Special Fasteners | 5 |
| Alphabetical - Numerical Index | 6 |
| Visual Index | 7-8-9 |
| Visual Index - Section 1 Wrenchable Fasteners | 23 |
| Section 2 Self-Retaining Fasteners | 57 |
| Section 3 Engineering Data | 81 |
| AN-NAS-MS Table | 11 |

INDEXES TO ENGINEERING STANDARD DRAWINGS

SECTION 1 - INDUSTRIAL FASTENERS 23

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

SECTION 2 - ELECTRONIC FASTENERS 57

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

ENGINEERING DATA

SECTION 3

| | |
|--|----|
| Military Service Approvals | 8 |
| Gaging of Internal Screw Threads | 82 |
| Nylon Locking Inserts | 84 |
| Angularity of Thread Axis | 86 |

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, Pocahontas, Arkansas. Please indicate the nature of your application to insure the correct response.

Call 1-800-331-6469 - 8 AM to 4 PM Monday thru Friday.



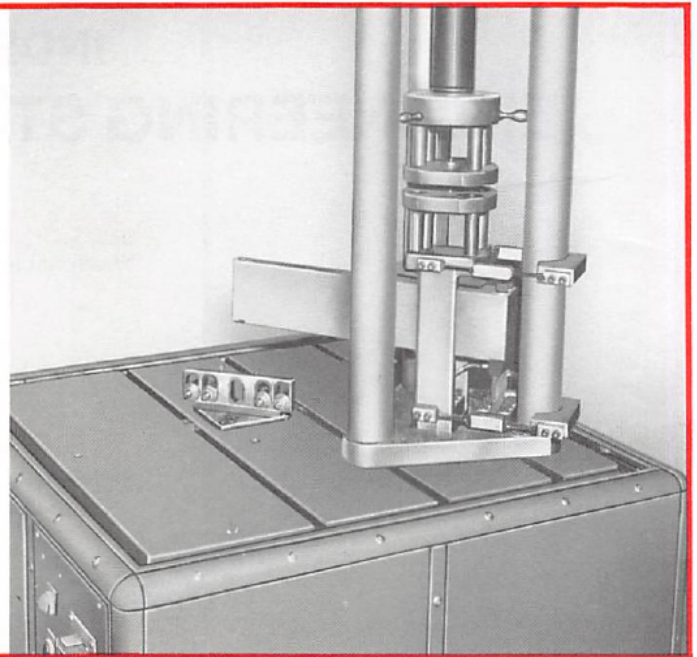
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PRODUCT RELIABILITY

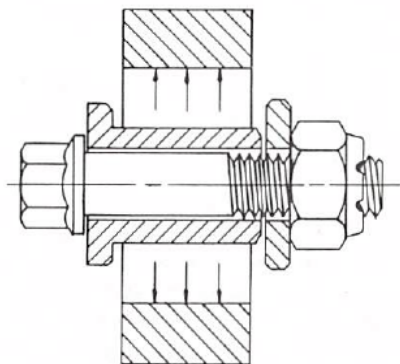
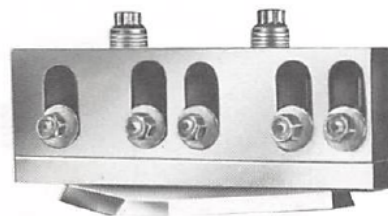
VIBRATION PERFORMANCE

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 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.



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MACLEAN-ESNA NATIONAL HEADQUARTERS



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ALPHABETICAL- NUMERICAL INDEX

| | Page |
|---|------|
| A27M | 76* |
| Castellated - Hex (NE4717) (NE4753) | 46 |
| COLLARLOK - Hex, Flange Base (CE12698 Series) | 49 |
| COLLARLOK - Hex, Metric (CE20136 Series) | 48 |
| GOLLARLOK - Hex, Flange Base, Thin (CE12605 Series) | 50 |
| COLLARLOK- Hex, Heavy (CU Series) | 51 |
| COLLARLOK - Hex, Heavy (CBR32 Series) | 52 |
| Double Hex - High Tensile (NH) | 47 |
| ESlok 30000 Series - Grade A | 54 |
| ESlok 31300 Series - Grade B | 55 |
| Hex - Light (ZE1801) (ZE1802) (ZE1803) (ZE1813) | 45 |
| Hex SP(1) Hex, Consolidated | 41 |
| KI-K2-K3 Hex, Metal Cap | 44 |
| LH1660 Hex, Miniature - All Metal | 25* |
| LHA27M/LHA27M2860 Anchor, Miniature, Floating | 78* |
| LHA227/LHA228 Anchor. Riagt Angle, Floating | 79* |
| LHA4972 Clip Nut, Floating | 80* |
| LHCFM/LHCFM2860 Clinch Nut, Miniature | 70* |
| LHC3949/LHC4256 Press Nut, Miniature | 73* |
| MONEL (NM) Hex, Standard | 38 |
| MONEL (NE) Hex, Standard | 38 |
| MONEL (NU) Hex, Heavy, (NU 13841) and (VU 13841) | 39 |
| M2297 Hex, Reduced | 26 |
| NA27 Anchor, Right Angle, Floating | 77* |
| NC Clinch, Standard | 65 |
| NCFMA Clinch, Flush Mounting, Miniature | 59 |
| NC4284 Clinch, Floating | 63 |
| ND Nut, Spline | 74 |
| NE Hex, Light | 27 |
| NKCFM Clinch, Miniature, Nylon Cap | 61 |
| NKE Hex, Light, Nylon Cap | 43 |
| NKM Hex, Light, Nylon Cap | 43 |
| NKTE Hex, Light, Nylon Cap, Thin | 43 |
| NKTM Hex, Light, Nylon Cap, Thin | 43 |
| NM Hex, Light | 27 |
| NM107 Hex, Reduced | 26 |
| NM408 Hex, Reduced | 26 |
| NM2234 Hex, Reduced | 26 |
| NTE Hex, Light, Thin | 31 |
| NTM Hex, Light, Thin | 31 |
| NU Hex, Heavy | 34 |
| NTU Hex, Heavy, Thin | 36 |
| N1260 Hex, Thick | 40 |
| N1610 Hex, High Tensile | 42 |
| TEE2032 Hex, Reduced | 26 |
| 1660 Hex, Miniature | 24 |

*Temporarily Discontinued



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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, including metric designs which are available through our Technical Service and Product Design Departments in Pocahontas, Arkansas. Please submit your fastening problems for prompt analysis and reply.

| | | | |
|---|---|---|---------|
| 1660 |  | MINIATURE HEX 0-80 thru 4-48 to 250° F. | Page 24 |
| LH1660 |  | MINIATURE HEX, HIGH TEMPERATURE 2-56 thru 6-40 to 450° F. to 800° F. | Page 25 |
| NM107, NM408, TEE2032, NM2234, M2297 |  | REDUCED DIMENSION HEX 6-32 thru 1/4-28 to 250° F. | Page 26 |
| NM, NE |  | REGULAR HEX, LIGHT 1-72 thru 1 1/2-12 to 250° F. MS20365, MS21044, NAS1021, MS17830, MS51922 | Page 27 |
| NTM, NTE |  | REGULAR HEX, LIGHT, THIN 2-56 thru 1 1/2-12 to 250° F. MS20364, NAS1022, MS21083, AN364 | Page 31 |
| NU |  | HEAVY HEX 1/4-20 thru 2 1/2-8 to 250° F. | Page 34 |
| NTU |  | HEAVY HEX, THIN 1/4-20 thru 2 1/2-12 to 250° F. MS16228 | Page 36 |
| HEX, MONEL (NM), (NE) |  | REGULAR HEX, MONEL 4-40 thru 1 1/2-12 to 250° F. MS17828 | Page 38 |
| HEX MONEL NU13841 VU13841 |  | HEAVY HEX 1/4-20 thru 2 1/2 - 4 1/2 to 250°F, 450°F MIL-N-25027/1 | Page 39 |
| HEX SP (1) |  | SPECIAL HEX, CONSOLIDATION 3/8-16 thru 2-12 to 250° F. | Page 41 |
| N1260 |  | REGULAR HEX, HIGH TENSILE EXTRA THREAD LENGTH 3/8-24 thru 1 1/4-12 to 250° F. | Page 40 |
| N1610 NU1610 |  | REGULAR HEX, HIGH TENSILE 10-32 thru 2 1/2-4 to 250° F. MS17829 | Page 42 |



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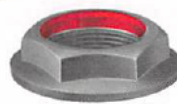


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| | | |
|---------------------------------------|---|--|
| NKM, NKTM |  | REGULAR HEX, MACHINE SCREW, NYLON CAP 4-40 thru 10-32 to 250° F. Page 43 |
| NKE, NKTE |  | REGULAR HEX, NYLON CAP 1/4-28 thru 7/16-20 to 250° F. Page 43 |
| K1, K2, K3 |  | REGULAR HEX, METAL CAP (Nylon Insert) 6-32 thru 3/8-24 to 250° F. Page 44 |
| ESlok® RED NYLON LOCKING PATCH | | |
| ESlok 30000 GRADE A |  | NUT, FINISHED HEXAGON SELF LOCKING 5/8-11 thru 1"-14 to 250° F. Page 54 |
| ESlok 31300 GRADE B |  | NUT, HEXAGON, THICK SELF LOCKING 5/8-11 thru 1"-14 to 250° F. Page 55 |

| | | |
|--|---|---|
| COLLARLOK® RED NYLON LOCKING COLLAR | | |
| CE20136 |  | COLLARLOK, HEX, FLANGE METRIC M6 x 1.0 thru M20 x 2.5 to 250° F. Page 48 |
| CE12698 |  | COLLARLOK, HEX, FLANGE 3/8-16 thru 3/4-10 to 250° F. Page 49 |
| CE12605 |  | COLLARLOK, HEX, FLANGE 1 1/4-12 thru 1 3/4-12 to 250° F. Page 50 |
| CU |  | COLLARLOK, HEX, HEAVY 5/8-11 thru 1-8 to 250° F. Page 51 |
| CBR32 |  | COLLARLOK, BEARING RETAINER N00 thru N14 to 250° F. Page 52 |

| | | |
|--------------------------|---|--|
| ZE1801 ZE1813 |  | HEX, LIGHT, HIGH TEMPERATURE 4-40 thru 3/4-16 to 450° F. and 800° F. AN363, MS20365, MS21045, MS21046, NAS1021 Page 45 |
| ZE1802 |  | HEX, LIGHT, HIGH TEMPERATURE 8-32 thru 1/2-20 to 1200° F. MS20500 Page 45 |
| ZE1803 |  | HEX, LIGHT, HIGH TEMPERATURE 4-40 thru 5/8-18 to 450° F. and 800° F. AN363, MS20365, MS21045, MS21046, NAS1021 Page 45 |
| NE4717 NE4753 |  | HEX, CASTELLATED SELF-LOCKING 10-32 thru 1-12 to 250° F. MS17825, MS17826 Page 46 |
| NH |  | DOUBLE HEX, HIGH TENSILE (180,000 PSI) 1/4-28 thru 1 1/2-12 to 250° F. Page 47 |



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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VISUAL INDEX



SECTION 2

ELECTRONIC FASTENERS

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

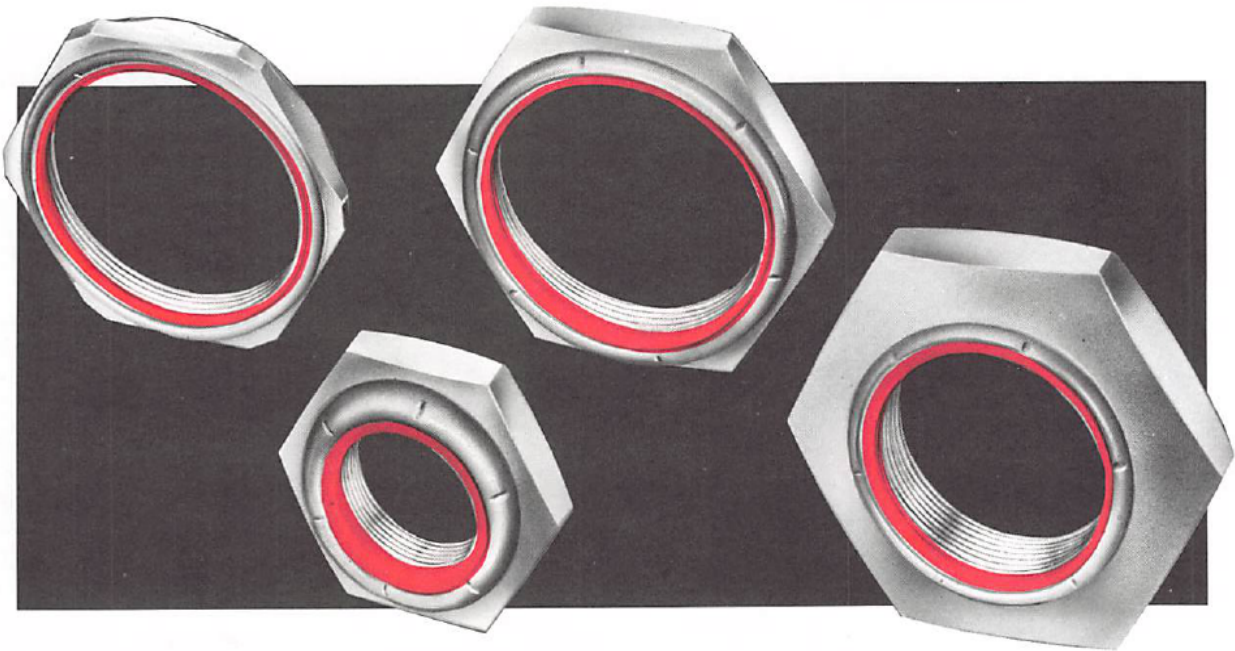
The complex requirements of the Aircraft-Aerospace industry has created multiple lines of self-locking Elastic Stop® nut Anchor type nuts to meet the rigid engineering demands. Characteristics such as shape, material, finish, strength, weight and temperature limits, all within strict dimensional limits, 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 |
| NC  | STANDARD CLINCH, and INSTALLATION TOOLS 4-40 thru 5/16-24 to 250° F. MIL-N-45938/8 Page 65 |
| 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 |
| LHC3949, LHC4256  | MINIATURE PRESS NUT, FLUSH MOUNTING, and INSTALLATION TOOLS 4-40 thru 10-32 to 450° F. to 800° F. Page 73 |
| ND  | SPLINE 8-32 thru 1/2-20 to 250° F. MS51866 Page 74 |
| A27M  | MINIATURE, ANCHOR, RIGHT ANGLE, FLOATING 4-40 to 250° F. Page 76 |
| NA27  | ANCHOR, RIGHT ANGLE, FLOATING 6-32 thru 5/16-24 to 250° F. NAS1033 Page 77 |
| LHA27M, LHA27M2860  | MINIATURE ANCHOR, RIGHT ANGLE, FLOATING 4-40 thru 6-32 Page 78 |
| LHA227, LHA228  | REDUCED, ANCHOR, RIGHT ANGLE, FLOATING 4-40 thru 6-32 Page 79 |
| LHA4972  | ANCHOR, FLOATING, CLIP-ON 6-32 thru 10-32 to 450° F. Page 80 |



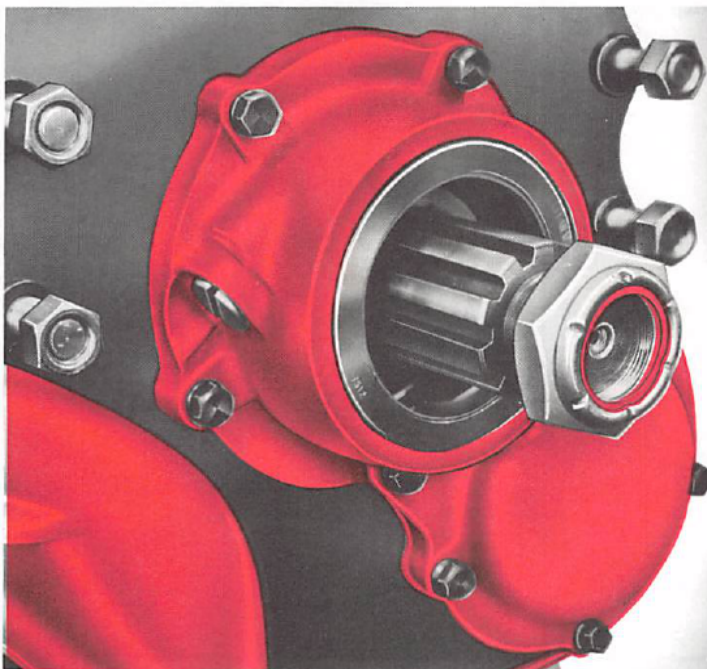
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CONSIDER EXTRA-THIN TYPES OF ELASTIC STOP® NUTS FOR BEARING RETAINING APPLICATIONS



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.



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| 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 |
| | | AN364B1614 | 99NTE-164 | AN365-624 | F52NE-064 | AN365D1032A | 68NM-02 |
| AN363C632 | 1803-62 | AN364B1614A | 99NTE-164 | AN365-624A | F52NE-064 | AN365D428 | 68NE-048 |
| AN363C832 | 1803-82 | AN364B1812 | 99NTE-182 | AN365-720 | F52NE-070 | AN365D428A | 68NE-048 |
| AN363C1032 | 1803-02 | AN364B1812A | 99NTE-182 | AN365-720A | F52NE-070 | AN365D524 | 68NE-054 |
| AN363C428 | 1803-048 | AN364B2012 | 99NTE-202 | AN365-820 | F52NE-080 | AN365D524A | 68NE-054 |
| AN363C524 | 1803-054 | AN364B2012A | 99NTE-202 | AN365-820A | F52NE-080 | AN365D624 | 68NE-064 |
| AN363C624 | 1803-064 | | | AN365-918 | F52NE-098 | AN365D720 | 68NE-070 |
| AN363C720 | 1803-070 | AN364D632 | 68NTM-62 | AN365-918A | F52NE-098 | AN365D720A | 68NE-070 |
| AN363C820 | 1803-080 | AN364D632A | 68NTM-62 | AN365-1018 | F52NE-108 | AN365D820 | 68NE-080 |
| AN363C918 | 1803-098 | AN364D832 | 68NTM-82 | AN365-1018A | F52NE-108 | AN365D820A | 68NE-080 |
| AN363C1018 | 1803-108 | AN364D832A | 68NTM-82 | AN365-1216 | F52NE-126 | AN365D918 | 68NE-098 |
| | | AN364D1032 | 68NTM-02 | AN365-1216A | F52NE-126 | AN365D918A | 68NE-098 |
| AN364-632 | F22NTM-62 | AN364D1032A | 68NTM-02 | AN365-1414 | F52NE-144 | AN365D1018 | 68NE-108 |
| AN364-632A | F22NTM-62 | AN364D428 | 68NTE-048 | AN365-1414A | F52NE-144 | AN365D1018A | 68NE-108 |
| AN364-832 | F22NTM-82 | AN364D428A | 68NTE-048 | AN365-1614 | F52NE-164 | AN365D1216 | 68NE-126 |
| AN364-832A | F22NTM-82 | AN364D524 | 68NTE-054 | AN365-1614A | F52NE-164 | AN365D1216A | 68NE-126 |
| AN364-1032 | F22NTM-02 | AN364D524A | 68NTE-054 | AN365-1812 | F52NE-182 | AN365D1414 | 68NE-144 |
| AN364-1032A | F22NTM-02 | AN364D624 | 68NTE-064 | AN365-1812A | F52NE-182 | AN365D1414A | 68NE-144 |
| AN364-428 | F52NTE-048 | AN364D624A | 68NTE-064 | AN365-2012 | F52NE-202 | | |
| AN364-428A | F52NTE-048 | AN364D720 | 68NTE-070 | AN365-2012A | F52NE-202 | | |
| AN364-524 | F52NTE-054 | AN364D720A | 68NTE-070 | | | AN366-832 | 22A8-82 |
| AN364-524A | F52NTE-054 | AN364D820 | 68NTE-080 | | | AN366-1032 | 22A8-02 |
| AN364-624 | F52NTE-064 | AN364D820A | 68NTE-080 | AN365B440 | 99NM-40 | AN366-428 | 52A8-048 |
| AN364-624A | F52NTE-064 | AN364D918 | 68NTE-098 | AN365B632 | 99NM-62 | AN366-524 | 52A8-054 |
| AN364-720 | F52NTE-070 | AN364D918A | 68NTE-098 | AN365B632A | 99NM-62 | AN366-624 | 52A8-064 |
| AN364-720A | F52NTE-070 | AN364D1018 | 68NTE-108 | AN365B832 | 99NM-82 | | |
| AN364-820 | F52NTE-080 | AN364D1018A | 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 |

AN/MS/NAS/ESNA® CONVERSION TABLES



Get quote >>



| 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 |
|--------------------------|-------------------|--------------------------|-------------------|--------------------------|-------------------|--------------------------|-------------------|
| 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) |
| | | MS14145-5 | TE9868-5 | MS14179-3 | VF12502-3 | MS17828-8C | 09NE-083(MONEL) |
| AN366F632 | F22NA1-62 | MS14145-6 | TE9868-6 | MS14179-4 | VF12502-4 | MS17828-8F | 09NE-080(MONEL) |
| AN366F632A | F22NA1-62 | MS14145-7 | TE9868-7 | MS14179-5 | VF12502-5 | MS17828-9C | 09NE-092(MONEL) |
| AN366F832A | F22NA1-82 | MS14145-8 | TE9868-8 | | | MS17828-9F | 09NE-098(MONEL) |
| AN366F1032A | F22NA1-02 | MS14145-9 | TE9868-9 | MS14180-3 | VA12502-3 | MS17828-10C | 09NE-101(MONEL) |
| AN366F428 | F22NA1-048 | MS14145-10 | TE9868-10 | MS14180-4 | VA12502-4 | MS17828-10F | 09NE-108(MONEL) |
| AN366F428A | F22NA1-048 | MS14145-12 | TE9868-12 | MS14180-5 | VA12502-5 | MS17828-12C | 09NE-120(MONEL) |
| AN366F524 | F22NA1-054 | MS14145-14 | TE9868-14 | | | MS17828-12F | 09NE-126(MONEL) |
| AN366F524A | F22NA1-054 | MS14145-16 | TE9868-16 | MS16228-4C | 79NTU-040 | MS17828-14C | 09NE-149(MONEL) |
| AN366F624A | F42NA1-064 | 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) |
| | | | | MS16228-7C | 79NTU-074 | MS17828-16F | 09NE-162(MONEL) |
| AN373DF832 | 68NA38-82 | | | MS16228-8C | 79NTU-083 | MS17828-18C | 09NE-187(MONEL) |
| AN373DF832A | 68NA38-82 | MS14145L3 | RMTE9868-3 | MS16228-10C | 79NTU-101 | MS17828-18F | 09NE-182(MONEL) |
| AN373DF1032 | 68NA38-02 | MS14145L4 | RMTE9868-4 | MS16228-12C | 79NTU-120 | MS17828-20C | 09NE-207(MONEL) |
| AN373DF1032A | 68NA38-02 | MS14145L5 | RMTE9868-5 | MS16228-16C | 79NTU-168 | MS17828-20F | 09NE-202(MONEL) |
| AN373DF428 | 68NA38-048 | MS14145L6 | RMTE9868-6 | | | MS17828-22C | 09NE-226(MONEL) |
| AN373DF428A | 68NA38-048 | MS14145L7 | RMTE9868-7 | MS17825-3 | F12NE4753-02 | MS17828-22F | 09NE-222(MONEL) |
| AN373DF524 | 68NA38-054 | MS14145L8 | RMTE9868-8 | MS17825-4 | F12NE4753-048 | MS17828-24C | 09NE-246(MONEL) |
| AN373DF524A | 68NA38-054 | MS14145L9 | RMTE9868-9 | MS17825-5 | F12NE4753-054 | MS17828-24F | 09NE-242(MONEL) |
| | | MS14145L10 | RMTE9868-10 | MS17825-6 | F12NE4753-064 | MS17828-28C | 09NU-285(MONEL) |
| AN373F832 | F22NA38-82 | MS14145L12 | RMTE9868-12 | MS17825-7 | F12NE4753-070 | MS17828-32C | 09NU-324(MONEL) |
| AN373F832A | F22NA38-82 | MS14145L14 | RMTE9868-14 | MS17825-8 | F12NE4753-080 | MS17828-36C | 09NU-364(MONEL) |
| AN373F1032 | F22NA38-02 | MS14145L16 | RMTE9868-16 | MS17825-9 | F12NE4753-098 | MS17828-40C | 09NU-404(MONEL) |
| AN373F1032A | F22NA38-02 | MS14145L18 | RMTE9868-18 | MS17825-10 | F12NE4753-108 | | |
| AN373F428 | F22NA38-048 | MS14145L20 | RMTE9868-20 | MS17825-12 | F12NE4753-126 | | |
| AN373F428A | F22NA38-048 | | | MS17825-14 | F12NE4753-144 | | |
| AN373F524 | F22NA38-054 | MS14146-3 | E10361-3 | MS17825-16 | F12NE4753-162 | | |
| AN373F524B | F52ZA38-054 | MS14146-4 | E10361-4 | MS17825-18 | F12NE4753-182 | | |
| | | MS14146-5 | E10361-5 | MS17825-20 | F12NE4753-202 | | |
| | | MS14146-6 | E10361-6 | | | | |
| | | MS14146-7 | E10361-7 | MS17826-3 | F12NE4717-02 | | |
| | | MS14146-8 | E10361-8 | MS17826-4 | F12NE4717-048 | | |
| | | MS14146-9 | E10361-9 | MS17826-5 | F12NE4717-054 | | |
| | | MS14146-10 | E10361-10 | MS17826-6 | F12NE4717-064 | | |
| | | MS14146-12 | E10361-12 | MS17826-7 | F12NE4717-070 | | |
| | | MS14146-14 | E10361-14 | MS17826-8 | F12NE4717-080 | | |
| | | MS14146-16 | E10361-16 | MS17826-9 | F12NE4717-098 | | |
| | | | | MS17826-10 | F12NE4717-108 | | |
| | | MS14156-04 | LH11860-4 | MS17826-12 | F12NE4717-126 | | |
| | | MS14156-05 | LH11860-5 | MS17826-14 | F12NE4717-144 | | |
| | | MS14156-06 | LH11860-6 | MS17826-16 | F12NE4717-162 | | |
| | | MS14156-07 | LH11860-7 | MS17826-18 | F12NE4717-182 | | |
| | | MS14156-08 | LH11860-8 | MS17826-20 | F12NE4717-202 | | |
| | | MS14156-09 | LH11860-9 | | | | |
| | | MS14156-10 | LH11860-10 | MS17828-04C | 09NM-40(MONEL) | | |
| | | MS14156-12 | LH11860-12 | MS17828-06C | 09NM-62(MONEL) | | |
| | | MS14156-14 | LH11860-14 | MS17828-08C | 09NM-82(MONEL) | | |
| | | MS14156-16 | LH11860-16 | MS17828-3C | 09NM-04(MONEL) | | |
| MS14144L-3 | RME9868-3 | MS14164-04 | LH11995-4 | MS17828-3F | 09NM-02(MONEL) | | |
| MS14144L-4 | RME9868-4 | MS14164-05 | LH11995-5 | MS17828-4C | 09NE-040(MONEL) | | |
| MS14144L-5 | RME9868-5 | MS14164-06 | LH11995-6 | MS17828-4F | 09NE-048(MONEL) | | |
| MS14144L-6 | RME9868-6 | MS14164-07 | LH11995-7 | MS17828-5C | 09NE-058(MONEL) | | |
| MS14144L-7 | RME9868-7 | MS14164-08 | LH11995-8 | MS17828-5F | 09NE-054(MONEL) | | |
| MS14144L-8 | RME9868-8 | MS14164-09 | LH11995-9 | MS17828-6C | 09NE-066(MONEL) | | |
| MS14144L-9 | RME9868-9 | MS14164-10 | LH11995-10 | MS17828-6F | 09NE-064(MONEL) | | |
| MS14144L-10 | RME9868-10 | MS14164-12 | LH11995-12 | | | | |
| MS14144L-12 | RME9868-12 | MS14164-14 | LH11995-14 | | | | |
| MS14144L-14 | RME9868-14 | | | | | | |
| MS14144L-16 | RME9868-16 | | | | | | |
| MS14144L-18 | RME9868-18 | | | | | | |
| MS14144L-20 | RME9868-20 | | | | | | |

MS PART No.

AN/MS/NAS/ESNA® CONVERSION TABLES



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

**AN/MS/NAS/ESNA®
CONVERSION TABLES**



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

* Denotes an additional suffix number to indicate nut spacing.

AN/MS/NAS/ESNA® CONVERSION TABLES



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| 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 |
|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|
| MS21078-04K | F22NA1-40BC | MS21083B7 | Y92NTE-070U | MS21083N9 | F52NTE-098 | MS21085-08 | LH10726-8 |
| 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 |
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| MS21083B04 | Y92NTM-40 | MS21083N08 | F22NTM-82 | MS21085L16 | RMLH10726-16 | MS21244-8C | E11900-8 |
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| 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 |

AN/MS/NAS/ESNA® CONVERSION TABLES



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Table with 8 columns: 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. Includes a red 'NAS PART No.' header.

AN/MS/NAS/ESNA* CONVERSION TABLES



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| 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 |
|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|
| 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 | NAS1030N08K | F22NA897-82BC |
| NAS1022B12 | Y92NTE-126 | NAS1023D08 | NAJ1-82 | NAS1027D06K | NAJ5-62BC | NAS1030N3 | F22NA897-02 |
| NAS1022B14 | Y92NTE-144 | NAS1023D08K | NAJ1-82BC | NAS1027D08 | NAJ5-82 | NAS1030N3K | F22NA897-02BC |
| NAS1022B16 | Y92NTE-162 | NAS1023D3 | NAJ1-02 | NAS1027D08K | NAJ5-82BC | NAS1030N4 | F22NA897-048 |
| NAS1022B17 | Y92NTE-164 | NAS1023D3K | NAJ1-02BC | NAS1027D3 | NAJ5-02 | NAS1030N4K | F22NA897-048BC |
| 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 |
| NAS1035A * | RM52LHTG51-02- * | NAS1291X5 | F52LH3324-054 | NAS1759-4 | L55LH6520-048 | NAS1791A3-5 | F14421-5-3 |
| NAS1035C * | LHTG51-2860-02- * | NAS1291X6 | F52LH3324-064 | NAS1759-5 | L55LH6520-054 | NAS1791A3-6 | F14421-6-3 |
| NAS1035N * | F22NG41-02-J- * | NAS1291X7 | F52LH3324-070 | NAS1759-6 | L55LH6520-064 | NAS1791A4-1 | F14421-1-4 |
| NAS1035P * | RM52LHTG51-02-J- * | NAS1291X8 | F52LH3324-080 | NAS1759-7 | L55LH6520-070 | NAS1791A4-2 | F14421-2-4 |
| NAS1036A * | RM52LHTG51-048- * | NAS1291X10 | F52LH3324-108 | NAS1759-8 | L55LH6520-080 | NAS1791A4-3 | F14421-3-4 |
| NAS1040PX * | F52LHTG55-02-J- * | NAS1473A08 | FMA2502-82 | NAS1759-9 | L55LH6520-098 | NAS1791A4-4 | F14421-4-4 |
| NAS1041A * | RM52LHTG55-048- * | NAS1473A3 | FMA2502-02 | NAS1759-10 | L55LH6520-108 | NAS1791A4-5 | F14421-5-4 |
| NAS1041N * | F22NG5-048-J- * | NAS1473A4 | FMA2502-048 | NAS1759-12 | L55LH6520-126 | NAS1791A4-6 | F14421-6-4 |
| NAS1041P * | RM52LHTG55-048-J- * | NAS1473A5 | FMA2502-054 | NAS1759-14 | L55LH6520-144 | NAS1791A5-1 | F14421-1-5 |
| NAS1291-02 | RM52LH3324-26 | NAS1473C08 | A4508-82 | NAS1759-16 | L55LH6520-162 | NAS1791A5-2 | F14421-2-5 |
| NAS1291-04 | RM52LH3324-40 | NAS1473C3 | A4508-02 | NAS1759-18 | L55LH6520-18 | NAS1791A5-3 | F14421-3-5 |
| NAS1291-06 | RM52LH3324-62 | NAS1474A3 | MA2506-02 | NAS1759-20 | L55LH6520-20 | NAS1791A5-4 | F14421-4-5 |
| NAS1291-08 | RM52LH3324-82 | NAS1474A4 | MA2506-048 | NAS1759-22 | L55LH6520-22 | NAS1791A5-5 | F14421-5-5 |
| NAS1291-3 | RM52LH3324-02 | NAS1474A4 | MA2506-048 | NAS1759-24 | L55LH6520-24 | NAS1791A5-6 | F14421-6-5 |
| NAS1291-4 | RM52LH3324-048 | NAS1474C06 | A4506-62 | NAS1759L3 | RMLH6520-3 | NAS1791C3-1 | F18421L-1-3 |
| NAS1291-5 | RM52LH3324-054 | NAS1474C08 | A4506-82 | NAS1759L4 | RMLH6520-4 | NAS1791C3-2 | F18421L-2-3 |
| NAS1291-6 | RM52LH3324-064 | NAS1474C3 | A4506-02 | NAS1759L5 | RMLH6520-5 | NAS1791C3-3 | F18421L-3-3 |
| NAS1291-7 | RM52LH3324-070 | NAS1474C4 | A4506-048 | NAS1759L6 | RMLH6520-6 | NAS1791C3-4 | F18421L-4-3 |
| NAS1291-8 | RM52LH3324-080 | NAS1474C4 | A4506-048 | NAS1759L7 | RMLH6520-7 | NAS1791C3-5 | F18421L-5-3 |
| NAS1291-10 | RM52LH3324-108 | NAS1474A82 | A2506-82 | NAS1759L8 | RMLH6520-8 | NAS1791C3-6 | F18421L-6-3 |
| NAS1291C02 | LH3858-26 | NAS1474X3 | F52MA2506-02 | NAS1759L9 | RMLH6520-9 | NAS1791C4-1 | F18421L-1-4 |
| NAS1291C02M | RMLH3858-26 | NAS1757L8 | RMLH12284-8 | NAS1759L10 | RMLH6520-10 | NAS1791C4-2 | F18421L-2-4 |
| NAS1291C04 | LH3858-40 | NAS1757L9 | RMLH12284-9 | NAS1759L12 | RMLH6520-12 | NAS1791C4-3 | F18421L-3-4 |
| NAS1291C04M | RMLH3858-40 | NAS1757L10 | RMLH12284-10 | NAS1759L14 | RMLH6520-14 | NAS1791C4-4 | F18421L-4-4 |
| NAS1291C06 | LH3858-62 | NAS1757L12 | RMLH12284-12 | NAS1759L16 | RMLH6520-16 | NAS1791C4-5 | F18421L-5-4 |
| NAS1291C06M | RMLH3858-62 | NAS1757L14 | RMLH12284-14 | NAS1759L18 | RMLH6520-18 | NAS1791C4-6 | F18421L-6-4 |
| NAS1291C08 | LH3858-82 | NAS1757L16 | RMLH12284-16 | NAS1759L20 | RMLH6520-20 | NAS1791C5-1 | F18421L-1-5 |
| NAS1291C08M | RMLH3858-82 | NAS1757L18 | RMLH12284-18 | NAS1759L22 | RMLH6520-22 | NAS1791C5-2 | F18421L-2-5 |
| NAS1291C3 | LH3858-02 | NAS1757L18 | RMLH12284-18 | NAS1759L24 | RMLH6520-24 | NAS1791C5-3 | F18421L-3-5 |
| NAS1291C3M | RMLH3858-02 | NAS1757L20 | RMLH12284-20 | NAS1765-3 | RM52LHA3022-02 | NAS1791C5-4 | F18421L-4-5 |
| NAS1291C4 | LH3858-048 | NAS1757-8 | LH12284-8 | NAS1765-3C | 101F9224-3 | NAS1791C5-5 | F18421L-5-5 |
| NAS1291C4M | RMLH3858-048 | NAS1757-9 | LH12284-9 | NAS1765-3CL | 104F9224-3 | NAS1791C5-6 | F18421L-6-5 |
| NAS1291C5 | LH3858-054 | NAS1757-10 | LH12284-10 | NAS1765-4C | 101F9224-4 | NAS1792C3-1 | F18427L1-3 |
| NAS1291C5M | RMLH3858-054 | NAS1757-12 | LH12284-12 | NAS1765-4CL | 104F9224-4 | NAS1792C3-2 | F18427L2-3 |
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| NAS1291C7 | LH3858-070 | NAS1757-18 | LH12284-18 | NAS1765-5CL | 104F9224-5 | NAS1792C3-5 | F18427L5-3 |
| NAS1291C7M | RMLH3858-070 | NAS1757-20 | LH12284-20 | NAS1765-C3 | 101F9224-3 | NAS1792C3-6 | F18427L6-3 |
| NAS1291C8 | LH3858-080 | NAS1758L3 | LH11848-3 | NAS1765-C4 | 101F9224-4 | NAS1792C4-1 | F18427L1-4 |
| NAS1291C8M | RMLH3858-080 | NAS1758L4 | LH11848-4 | NAS1765-C5 | 101F9224-5 | NAS1792C4-2 | F18427L2-4 |
| NAS1291X02 | F52LH3324-26 | NAS1758L5 | LH11848-5 | NAS1765-CL3 | 109F9224-3 | NAS1792C4-3 | F18427L3-4 |
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| | | NAS1758L7 | LH11848-7 | NAS1765-CL5 | 109F9224-5 | NAS1792C4-5 | F18427L5-4 |
| | | NAS1758L8 | LH11848-8 | NAS1766-3 | RM52LHTA525-02 | NAS1792C4-6 | F18427L6-4 |
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| | | NAS1758L12 | LH11848-12 | NAS1766-3CL | F10965-1-3 | NAS1792C5-3 | F18427L3-5 |
| | | 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 |
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| NAS1792C5-6 | F18427L6-5 | NAS1793C5-3 | F18425L3-5 | NAS1803-3B2 | A6293-10-02 | NAS1804-6N | LH18A-6 |
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| NAS1792A3-2 | F14427-2-3 | NAS1793C5-5 | F18425L5-5 | NAS1803-3B4 | A6293-2-02 | NAS1804-8N | LH18A-8 |
| NAS1792A3-3 | F14427-3-3 | NAS1793C5-6 | F18425L6-5 | NAS1803-3B5 | A6293-3-02 | NAS1804-9N | LH18A-9 |
| NAS1792A3-4 | F14427-4-3 | NAS1794A3-1 | G14421-1-3 | NAS1803-3B6 | A6293-12-02 | NAS1804-10N | LH18A-10 |
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| NAS1792A4-6 | F14427-6-4 | NAS1794A4-4 | G14421-4-4 | NAS1803-3B4C | F11885-2-3 | NAS1805-3 | 109LH8574A-3 |
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| NAS1793C3-6 | F18425L6-3 | NAS1803-3A6C | F11886-12-3 | NAS1804-18 | RMLH18A-18 | NAS1805-24N | 121LH8574A-24 |
| NAS1793C4-1 | F18425L1-4 | NAS1803-3A7C | F11886-13-3 | NAS1804-20 | RMLH18A-20 | NAS1805-28N | 121LH8574A-28 |
| NAS1793C4-2 | F18425L2-4 | NAS1803-3A8C | F11886-14-3 | NAS1804-22 | RMLH18A-22 | NAS1805-32N | 121LH8574A-32 |
| NAS1793C4-3 | F18425L3-4 | NAS1803-3A9C | F11886-15-3 | NAS1804-24 | RMLH18A-24 | NAS1805-3P | LH8574A-3 |
| NAS1793C4-4 | F18425L4-4 | NAS1803-3A10C | F11886-16-3 | NAS1804-28 | RMLH18A-28 | NAS1805-4P | LH8574A-4 |
| NAS1793C4-5 | F18425L5-4 | NAS1803-3A12C | F11886-18-3 | NAS1804-32 | RMLH18A-32 | NAS1805-5P | LH8574A-5 |
| NAS1793C4-6 | F18425L6-4 | NAS1803-3A13C | F11886-19-3 | NAS1804-3N | LH18A-3 | NAS1805-6P | LH8574A-6 |
| | | | | | | NAS1805-7P | LH8574A-7 |
| | | | | | | NAS1805-8P | LH8574A-8 |
| | | | | | | NAS1805-9P | LH8574A-9 |

AN/MS/NAS/ESNA® CONVERSION TABLES



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| 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 | NAS688A-* | RM52LHTG51-82-* | NAS694AX-* | F52LHTG55-02-* |
| NAS577-4A | RMLH2577-048 | NAS577B8A | 1MLBF577-8 | NAS688AX-* | F52LHTG51-82-* | NAS694P-* | RM52LHTG55-02-J-* |
| NAS577-5A | RMLH2577-054 | NAS577B9A | 1MLBF577-9 | NAS689A-* | RM52LHTG51-02-* | NAS694PX-* | F52LHTG55-02-J-* |
| NAS577-6A | RMLH2577-064 | NAS577B10A | 1MLBF577-10 | NAS689AX-* | F52LHTG51-02-* | NAS695A-* | RM52LHTG55-048-* |
| NAS577-7A | RMLH2577-070 | NAS577B12A | 1MLBF577-12 | NAS690A-* | RM52LHTG51-048-* | NAS695P-* | RM52LHTG55-048-J-* |
| NAS577-8A | RMLH2577-080 | NAS577B14A | 1MLBF577-14 | NAS690AX-* | F52LHTG51-048-* | | |
| NAS577-9A | RMLH2577-098 | NAS577B16A | 1MLBF577-16 | | | | |
| NAS577-10A | RMLH2577-108 | NAS578-4A | 2577-048RET | | | | |
| NAS577-12A | RMLH2577-126 | NAS578-5A | 2577-054RET | | | | |
| NAS577-14A | RMLH2577-144 | NAS578-6A | 2577-064RET | | | | |
| NAS577-16A | RMLH2577-162 | NAS578-7A | 2577-070RET | | | | |
| NAS577-17A | RMLH2577-164 | NAS578-8A | 2577-080RET | | | | |
| NAS577-4AX | LH2577-048 | NAS578-9A | 2577-098RET | | | | |
| NAS577-5AX | LH2577-054 | NAS578-10A | 2577-108RET | | | | |
| NAS577-6AX | LH2577-064 | NAS578-12A | 2577-126RET | | | | |
| NAS577-7AX | LH2577-070 | NAS578-14A | 2577-144RET | | | | |
| NAS577-8AX | LH2577-080 | NAS578-16A | 2577-162RET | | | | |
| NAS577-9AX | LH2577-098 | NAS578-4B | 3320-048RET | | | | |

* Denotes an additional suffix number to indicate nut spacing.

AN/MS/NAS/ESNA® CONVERSION TABLES



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electronic
assemblies**

**ESNA
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For more than 60 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.

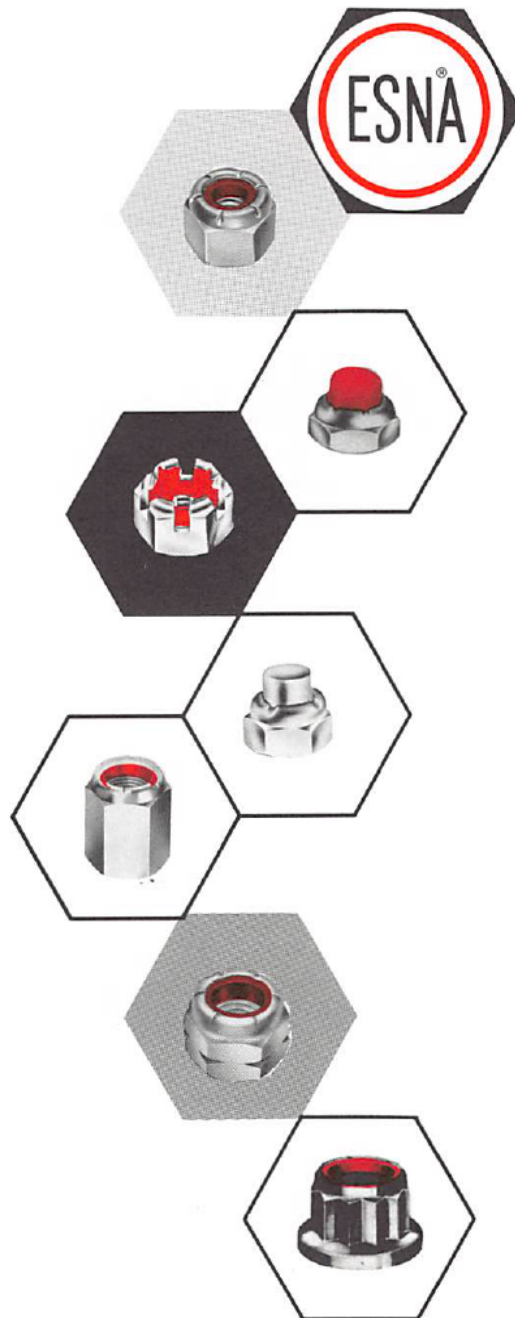


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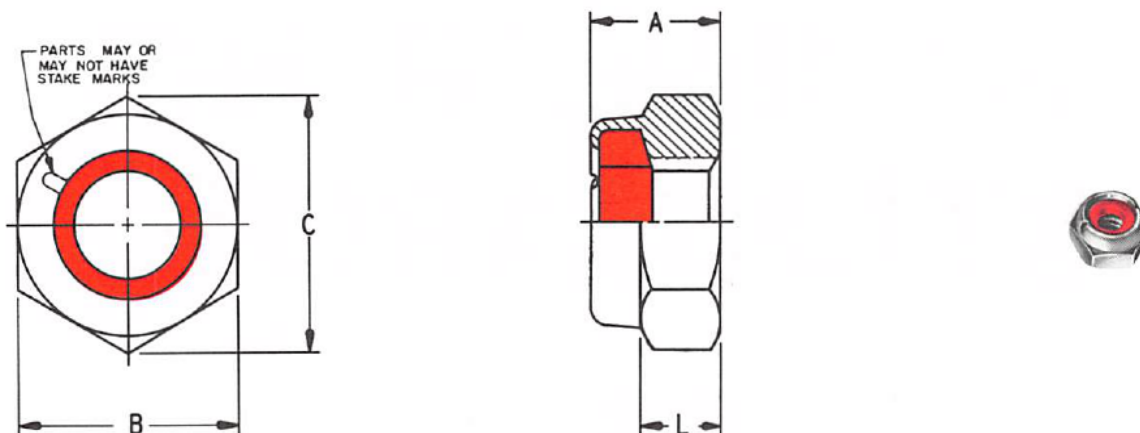
ENGINEERING STANDARDS

SECTION 1 WRENCHABLE NUTS



| Part Number | Page Number | Part Number | Page Number |
|----------------|-------------|-------------|-------------|
| 1660 | 24 | N1610 | 42 |
| NM107 | 26 | NU1610 | 42 |
| NM408 | 26 | NKM-NKTM | 43 |
| NM2234 | 26 | NKE-NKTE | 43 |
| NM2297 | 26 | K1, K2, K3 | 44 |
| TEE2032 | 26 | ZE1801 | 45 |
| NM-NE | 27 | ZE1813 | 45 |
| NTM-NTE | 31 | ZE1802 | 45 |
| NU | 34 | ZE1803 | 45 |
| NTU | 36 | NE4717 | 46 |
| NM-NE (Monel) | 38 | NE4753 | 46 |
| NU | 39 | NH | 47 |
| U13841 | | CE20136 | 48 |
| V13841 (Monel) | | CE12698 | 49 |
| N1260 | 40 | CE12605 | 50 |
| HEX SP(1) | 41 | CU | 51 |
| | | CBR32 | 52 |
| | | 30000 | 54 |
| | | 31300 | 55 |





| 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.

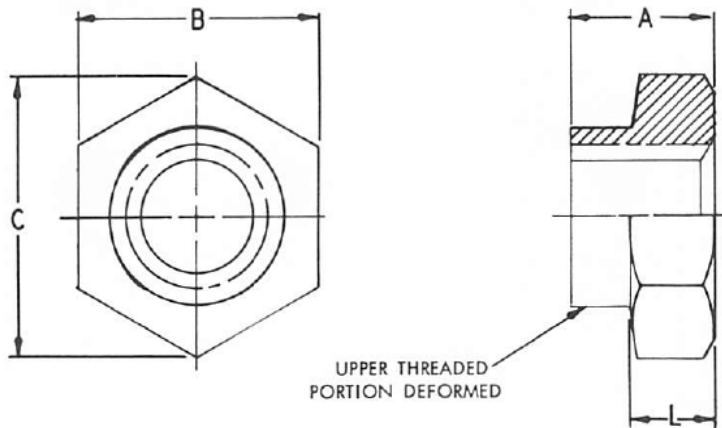
PJ- 1800

ISSUED: 6 AUG 52 REVISED: ⑮ 7 MAR 90

| | | |
|----------------------|--------------------|------|
| 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, AISI 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

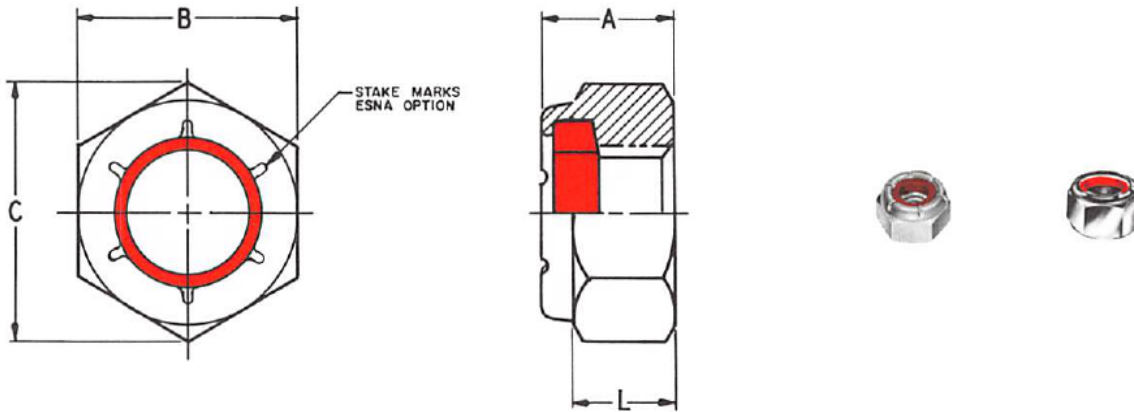
REFERENCE STANDARDS:

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 | | .071 | | | 560 | .13 | | |
| 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 | | | | | | | | |
| 52M2297-02 | | .190 | | | | .148 | 1,500 | .30 |
| 59M2297-02 | | | | | | | | |
| 79NM408-048 | .2500-28UNJF-3B | .239 | .376-.367 | .410 | | 2,290 | .40 | |
| 52TEE2032-048 | | | | | | .200 | | 5,379 |

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).

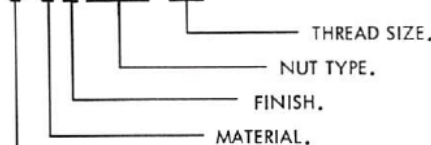
THREADS: MIL-S-8879.

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 "F".

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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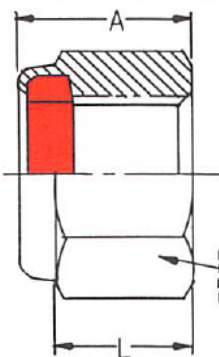
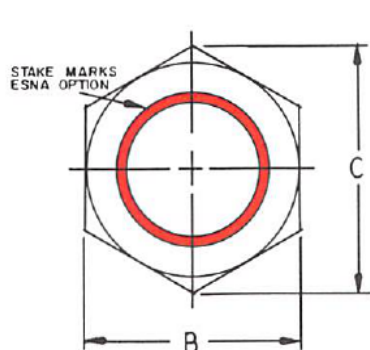


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MS21044 BRASS PARTS MARKED "B"
MS17830 STAINLESS STEEL PARTS MARKED "B & F"
MARKING ON OTHER BRASS & STAINLESS STEEL
PARTS AT ESNA OPTION.

| 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 | | | | | |
| | 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 | | | | | | | |
| 22NM-48 | STEEL-CADMIUM | 820 | .14 | .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 | | | | | |

ISSUED: 8 AUG 62 REVISED: 11 MAY 91

PJ-2400 & 2515

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 | 2,100 | .55 | .1900-24UNJC-3B | | | | | | |
| | 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 | | | | | | |
| 1/4 | 22NM-128 | STEEL-CADMIUM | 3,100 | .90 | .2500-20UNJC-3B | .328 - .298 | .439 - .430 | .482 | .225 | | |
| | 21NE-040 | STEEL-ZINC | | | .2500-20UNC-2B | | | | | | |
| | 29NE-040 | STEEL-UNPLATED | 3,760 | .32 | .2500-20UNJC-3B | | | | | | |
| | 42NE-040 | STEEL-CADMIUM | | | | | | | | | |
| | 68NE-040 | ALUMINUM-ANODIZED | 1,860 | .90 | .2500-28UNJF-3B | | | | | | |
| | 79NE-040 | STAINLESS-UNPLATED | 3,760 | .90 | | | | | | | |
| | 92NE-040 | BRASS-CADMIUM | 2,270 | .32 | .2500-28UNJF-3B | | | | | | |
| | 99NE-040 | BRASS-UNPLATED | | | | | | | | | |
| | 21NE-048 | STEEL-ZINC | 4,580 | .90 | .2500-28UNF-2B | | | | | | |
| | 29NE-048 | STEEL-UNPLATED | | | | | | | | | |
| | 42NE-048 | STEEL-CADMIUM | 2,270 | .90 | .2500-28UNJF-3B | | | | | | |
| | 68NE-048 | ALUMINUM-ANODIZED | 4,580 | .90 | | | | | | | |
| | 79NE-048 | STAINLESS-UNPLATED | 4,580 | .98 | .3125-24UNJF-3B | | | | | | |
| | 99NE-048 | BRASS-UNPLATED | | .98 | | | | | | | |
| 5/16 | 21NE-054 | STEEL-ZINC | 7,390 | 1.20 | .3125-24UNF-2B | .359 - .329 | .502 - .492 | .552 | .250 | | |
| | 29NE-054 | STEEL-UNPLATED | | | .3125-24UNJC-3B | | | | | | |
| | 42NE-054 | STEEL-CADMIUM | | | .3125-18UNJC-3B | | | | | | |
| | | | | | | | | | | | |
| | 79NE-054 | STAINLESS-UNPLATED | 7,390 | 1.20 | .3125-18UNC-2B | | | | | | |
| | 99NE-054 | BRASS-UNPLATED | | 1.30 | | | | | | | |
| | 21NE-058 | STEEL-ZINC | 6,360 | .43 | .3125-18UNJC-3B | | | | | | |
| | 29NE-058 | STEEL-UNPLATED | | | | | | | | | |
| | 42NE-058 | STEEL-CADMIUM | 3,150 | 1.20 | .3750-24UNJF-3B | | | | | | |
| | 68NE-058 | ALUMINUM-ANODIZED | 6,360 | 1.20 | | | | | | | |
| | 79NE-058 | STAINLESS-UNPLATED | | 1.30 | | | | | | | |
| 99NE-058 | BRASS-UNPLATED | | | .3750-24UNF-2B | | | | | | | |
| | | | | | | | | | | | |
| 3/8 | 21NE-064 | STEEL-ZINC | 11,450 | 1.80 | .3750-24UNJC-3B | .468 - .438 | .564 - .553 | .622 | .335 | | |
| | 29NE-064 | STEEL-UNPLATED | | | .3750-24UNF-2B | | | | | | |
| | 52NE-064 | STEEL-CADMIUM | 5,680 | .65 | .3750-16UNJC-3B | | | | | | |
| | 68NE-064 | ALUMINUM-ANODIZED | 11,450 | 1.80 | | | | | | | |
| | 79NE-064 | STAINLESS-UNPLATED | | 2.00 | .3750-16UNC-2B | | | | | | |
| | 99NE-064 | BRASS-UNPLATED | | | | | | | | | |
| | 21NE-066 | STEEL-ZINC | 9,540 | 1.80 | .3750-16UNJC-3B | | | | | | |
| | 29NE-066 | STEEL-UNPLATED | | | | | | | | | |
| | 52NE-066 | STEEL-CADMIUM | 4,730 | .65 | .4375-20UNJF-3B | | | | | | |
| | 68NE-066 | ALUMINUM-ANODIZED | 9,540 | 1.80 | | | | | | | |
| 79NE-066 | STAINLESS-UNPLATED | | 2.00 | | | | | | | | |
| 99NE-066 | BRASS-UNPLATED | | | .4375-20UNF-2B | | | | | | | |
| | | | | | | | | | | | |
| 7/16 | 21NE-070 | STEEL-ZINC | 15,450 | 2.30 | .4375-20UNJC-3B | .468 - .438 | .627 - .616 | .698 | .324 | | |
| | 29NE-070 | STEEL-UNPLATED | | | .4375-20UNF-2B | | | | | | |
| | 52NE-070 | STEEL-CADMIUM | | | .4375-20UNJF-3B | | | | | | |
| | 79NE-070 | STAINLESS-UNPLATED | | 2.30 | | | | | | | |

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REFERENCE STANDARDS:

AN365 MS51922
MS17830 MS20365
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FSCM-019L2

Pocahontas, Arkansas 72455 • FAX 1-501-892-8938

| 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 | 13,140 | 2.30 | .4375-14UNJC-3B | .468 - .438 | .627- .616 | .698 | .324 | | | | | |
| | 29NE-074 | STEEL-UNPLATED | | | .4375-14UNC-2B | | | | | | | | | |
| | 52NE-074 | STEEL-CADMIUM | | | .4375-14UNJC-3B | | | | | | | | | |
| | 79NE-074 | STAINLESS-UNPLATED | | | .4375-14UNJC-3B | | | | | | | | | |
| | 52NE-074U | STEEL-CADMIUM | 13,140 | 3.10 | | | .690- .679 | .766 | | | | | | |
| | 79NE-074U | STAINLESS-UNPLATED | | | | | | | | | | | | |
| 1/2 | 21NE-080 | STEEL-ZINC | 21,110 | 4.30 | .5000-20UNJF-3B | .609- .579 | .752- .741 | .837 | .464 | | | | | |
| | 29NE-080 | STEEL-UNPLATED | | | .5000-20UNF-2B | | | | | | | | | |
| | 52NE-080 | STEEL-CADMIUM | | | .5000-20UNJF-3B | | | | | | | | | |
| | 79NE-080 | STAINLESS-UNPLATED | 21,110 | 4.30 | .5000-20UNJF-3B | | | | | | | | | |
| | 99NE-080 | BRASS-UNPLATED | | 4.70 | | | | | | | | | | |
| | 21NE-083 | STEEL-ZINC | 17,730 | 4.30 | .5000-13UNJC-3B | | | | | | | | | |
| | 29NE-083 | STEEL-UNPLATED | | | .5000-13UNC-2B | | | | | | | | | |
| | 52NE-083 | STEEL-CADMIUM | | | .5000-13UNJC-3B | | | | | | | | | |
| | 79NE-083 | STAINLESS-UNPLATED | | | .5000-13UNJC-3B | | | | | | | | | |
| | 99NE-083 | BRASS-UNPLATED | | 4.70 | | | | | | | | | | |
| 9/16 | 21NE-098 | STEEL-ZINC | 26,810 | 7.10 | .5625-18UNJF-3B | .656- .626 | .877- .865 | .978 | .469 | | | | | |
| | 29NE-098 | STEEL-UNPLATED | | | .5625-18UNF-2B | | | | | | | | | |
| | 52NE-098 | STEEL-CADMIUM | | | .5625-18UNJF-3B | | | | | | | | | |
| | 79NE-098 | STAINLESS-UNPLATED | | | .5625-18UNJF-3B | | | | | | | | | |
| | 21NE-092 | STEEL-ZINC | | | .5625-12UNJC-3B | | | | | | | | | |
| 5/8 | 21NE-101 | STEEL-ZINC | 28,530 | 8.30 | .6250-11UNJC-3B | .765- .735 | .940- .928 | 1.051 | .593 | | | | | |
| | 29NE-101 | STEEL-UNPLATED | | | .6250-11UNC-2B | | | | | | | | | |
| | 52NE-101 | STEEL-CADMIUM | | | .6250-11UNJC-3B | | | | | | | | | |
| | 79NE-101 | STAINLESS-UNPLATED | | | .6250-11UNJC-3B | | | | | | | | | |
| | 99NE-101 | BRASS-UNPLATED | | 9.00 | | | | | | | | | | |
| | 21NE-108 | STEEL-ZINC | 34,130 | 8.30 | .6250-18UNJF-3B | | | | | | | | | |
| | 29NE-108 | STEEL-UNPLATED | | | .6250-18UNF-2B | | | | | | | | | |
| | 52NE-108 | STEEL-CADMIUM | | | .6250-18UNJF-3B | | | | | | | | | |
| 79NE-108 | STAINLESS-UNPLATED | .6250-18UNJF-3B | | | | | | | | | | | | |
| 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 | | 13.00 | | | | | | | | | | |
| | 41NE-126 | STEEL-ZINC | 50,020 | 12.00 | .7500-16UNJF-3B | | | | | | | | | |
| | 49NE-126 | STEEL-UNPLATED | | | .7500-16UNF-2B | | | | | | | | | |
| | 59NE-126 | STEEL-UNPLATED | | | .7500-16UNF-2B | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | 7/8 | 41NE-144 | STEEL-ZINC | 68,440 | 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 | .8750-14UNJF-3B | | | | | | | | | | | |
| 41NE-149 | | STEEL-ZINC | .8750-9UNJC-3B | | | | | | | | | | | |
| 49NE-149 | | STEEL-UNPLATED | .8750-9UNC-2B | | | | | | | | | | | |
| 1 | 41NE-164 | STEEL-ZINC | 92,180 | 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 | | | 1.0000-14UNJS-3B | | | | | | | | | |
| | 41NE-168 | STEEL-ZINC | 79,280 | 27.00 | 1.0000-8UNJC-3B | | | | | | | | | |
| | 49NE-168 | STEEL-UNPLATED | | | 1.0000-8UNC-2B | | | | | | | | | |
| | 52NE-168 | STEEL-CADMIUM | | | 1.0000-8UNJC-3B | | | | | | | | | |

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ISSUED: 8 AUG 62 REVISED: ① 1 MAY 91

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|----------------------|---------|
| REFERENCE STANDARDS: | |
| AN365 | MS51922 |
| MS17830 | MS20365 |
| MS21044 | NAS1021 |

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PAGE 3 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 |
|-------------|------------------|-------------------|----------------------------------|----------------------|------------------|---------------|---------------|-------|-------|
| 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 | | | | |
| | 41NE-242 | STEEL-ZINC | | | 1.5000-12UNJF-3B | | | | |
| 1 1/2 | 49NE-242 | STEEL-UNPLATED | | 100.00 | 1.5000-12UNF-2B | 1.640 - 1.578 | 2.197 - 2.159 | 2.444 | 1.313 |
| | 52NE-242 | STEEL-CADMIUM | | | 1.5000-12UNJF-3B | | | | |
| | 59NE-242 | STEEL-UNPLATED | | | 1.5000-12UNF-2B | | | | |
| | | | | | | | | | |

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 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.

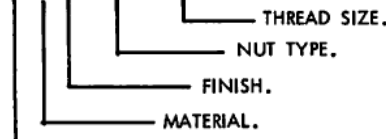
THREAD SQUARENESS: ESNA SPEC 405, GROUP I.

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: (U) 1 MAY 91

PJ-2400 & 2515

REFERENCE STANDARDS:

| | |
|---------|---------|
| AN365 | MS51922 |
| MS17830 | MS20365 |
| MS21044 | NAS1021 |

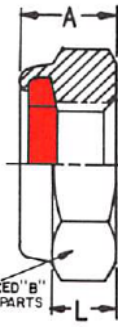
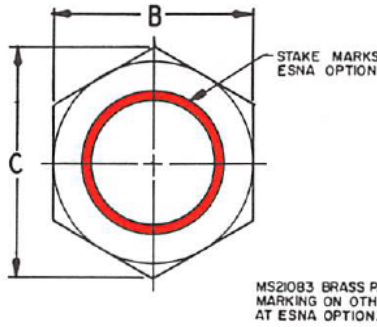
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| THREAD SIZE | ESNA PART NUMBER | MATERIAL & FINISH | ULTIMATE TENSILE STRENGTH LB MIN | APPROX WEIGHT LB/100 | THREAD | A | B | C REF | L REF |
|-------------|--------------------|---------------------|----------------------------------|----------------------|-----------------|-------------|-------------|-------|-------|
| #2 | 22NTM-26 | STEEL-CADMIUM | | .10 | .0860-56UNJC-3B | .094 - .124 | .251 - .243 | .268 | .075 |
| | 99NTM-38 | BRASS-UNPLATED | | .11 | .0990-48UNJC-3B | .094 - .124 | .251 - .243 | .268 | .075 |
| #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 | | | | | | | |
| #5 | 22NTM-48 | STEEL-CADMIUM | | .10 | .1120-48UNJF-3B | | | | |
| | 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 | | | | | |
| | 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 | | | | | |
| 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: 1 MAY 91

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REFERENCE STANDARDS:
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PAGE 1 OF 3



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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 | 1.30 | .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: 1 MAY 91

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REFERENCE STANDARDS:
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 PAGE 2 OF 3



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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

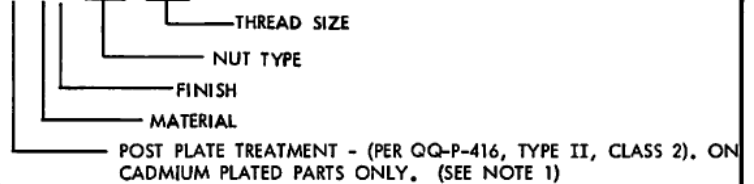
PERFORMANCE/APPROVAL: MIL-N-25027 AS APPLICABLE.

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:

F 52 NTE-048



ISSUED: 2 AUG 62 REVISED: 10 MAY 91

PJ-2400 & 2515

REFERENCE STANDARDS:

AN364 MS21083
MS20364 NAS1022

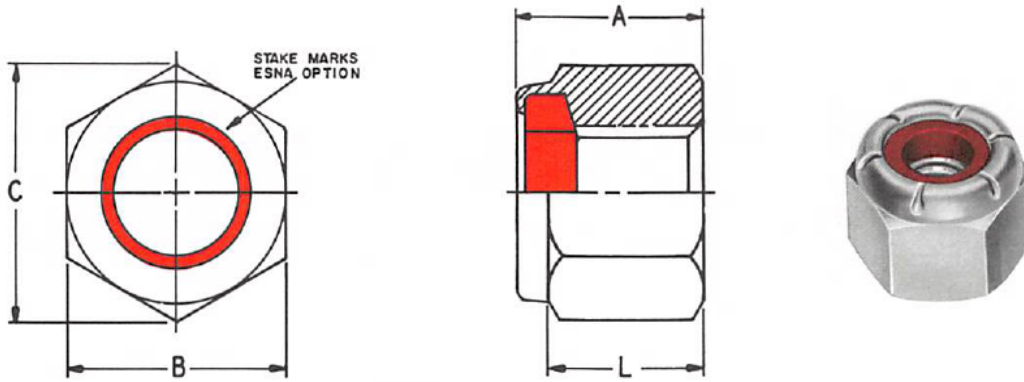
NUT-HEX, LIGHT, THIN

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 | | | | |
| | | | | | | | | |
| | 79NU-040 | STAINLESS - UNPLATED | 1.50 | .2500-20UNJC-3B | | | | |
| | 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 | | .3125-18UNJC-3B | | | | |
| | 99NU-058 | BRASS - UNPLATED | 2.30 | | | | | |
| 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 | | | | | | |
| | 79NU-066 | STAINLESS - UNPLATED | | | | | | |
| | 99NU-066 | BRASS - UNPLATED | 4.10 | | | | | |
| 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 | | | | | | |
| | 79NU-083 | STAINLESS - UNPLATED | | | | | | |
| | 99NU-083 | BRASS - UNPLATED | 8.90 | | | | | |
| 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 | | | | | | |
| | 99NU-101 | BRASS - UNPLATED | 15.00 | .6250-11UNJC-3B | | | | |
| 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

ISSUED: 9 OCT 52 REVISED: 10 18 JAN 88

REFERENCE STANDARDS:

NUT-HEX, HEAVY

NU

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 | 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 |
| 2 | 49NU-324 | STEEL - UNPLATED | 310.00 | 2.0000-4.5UNJC-3B | 2.469 - 2.343 | 3.137 - 3.086 | 3.449 | 1.750 |
| 2 | 49NU-3208 | STEEL - UNPLATED | 310.00 | 2.0000-8UN-3B | 2.469 - 2.343 | 3.137 - 3.086 | 3.449 | 1.750 |
| 2 | 49NU-3212 | STEEL - UNPLATED | 310.00 | 2.0000-12UN-3B | 2.469 - .2343 | 3.137 - 3.086 | 3.449 | 1.750 |
| 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" } STEEL
- "4" } STEEL
- "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.

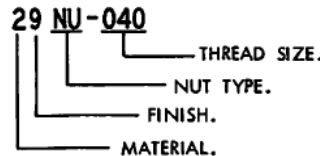
THREADS: MIL-S-7742 OR MIL-S-8879.

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:



PJ- 2424

ISSUED: 9 OCT 52 REVISED: 18 JAN 88

REFERENCE STANDARDS:

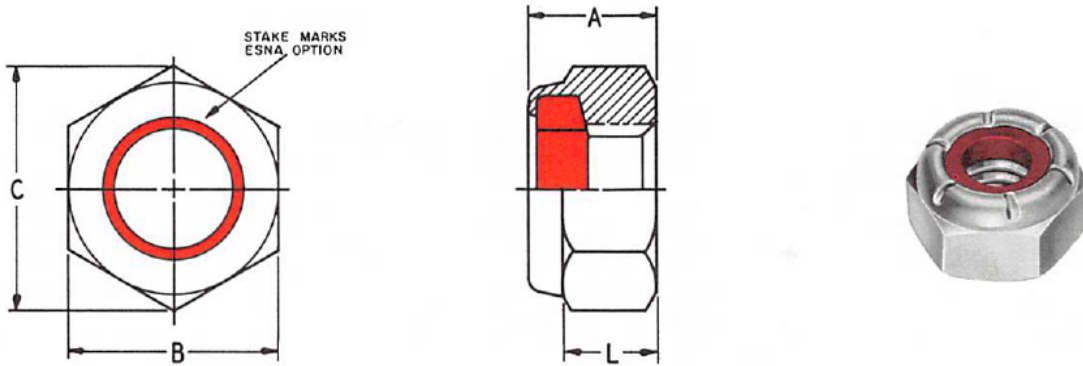
NUT-HEX, HEAVY

NU

PAGE 2 OF 2



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| THREAD SIZE | ESNA PART NUMBER | MATERIAL & FINISH | APPROX WEIGHT LB/100 | THREAD | A | B | C REF | L REF |
|-------------|------------------|----------------------|----------------------|-----------------|---------------|---------------|-------|-------|
| 1/4 | 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 | 2.90 | .3750-16UNC-2B | | | | |
| | 79NTU-066 | STAINLESS - UNPLATED | | .3750-16UNJC-3B | | | | |
| | 99NTU-066 | BRASS - UNPLATED | | | | | | |
| 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: 1 APR 53 REVISED: 11 FEB 88

REFERENCE STANDARDS:

MS16228

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:

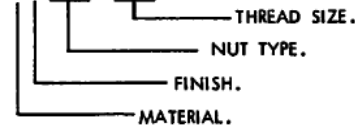
- "2" STEEL
- "4" STAINLESS STEEL - AISI 303 OR EQUIV. (SIZES -040 THRU -120)
- "7" BRASS - COMMERCIAL HALF HARD (SIZES -040 THRU -066)

FINISH:

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

PART CODING:

29 NTU-040



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

THREADS: MIL-S-7742 OR MIL-S-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: ① 1 FEB 88

REFERENCE STANDARDS:

MS16228

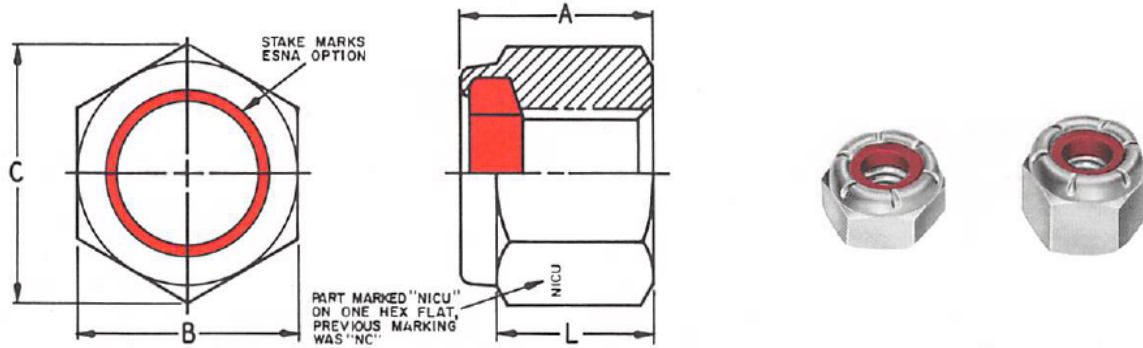
NUT-HEX, HEAVY, THIN

NTU

PAGE 2 OF 2



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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 | .328 - .298 | .439 - .430 | .482 | .225 | 1.13 |
| 09NE-058(MONEL) | .3125-18UNJC-3B | .359 - .329 | .504 - .492 | .552 | .250 | 1.51 |
| 09NE-054(MONEL) | .3125-24UNJF-3B | .359 - .329 | .504 - .492 | .552 | .250 | 1.51 |
| 09NE-066(MONEL) | .3750-16UNJC-3B | .468 - .438 | .566 - .553 | .622 | .335 | 2.26 |
| 09NE-064(MONEL) | .3750-24UNJF-3B | .468 - .438 | .566 - .553 | .622 | .335 | 2.26 |
| 09NE-074U(MONEL) | .4375-14UNJC-3B | .468 - .438 | .692 - .679 | .766 | .324 | 3.89 |
| 09NE-083(MONEL) | .5000-13UNJC-3B | .609 - .579 | .755 - .741 | .837 | .464 | 5.39 |
| 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 | .765 - .735 | .944 - .928 | 1.051 | .593 | 10.40 |
| 09NE-108(MONEL) | .6250-18UNJF-3B | .765 - .735 | .944 - .928 | 1.051 | .593 | 10.40 |
| 09NE-120(MONEL) | .7500-10UNJC-3B | .890 - .860 | 1.068 - 1.052 | 1.191 | .647 | 15.03 |
| 09NE-126(MONEL) | .7500-16UNJF-3B | .890 - .860 | 1.068 - 1.052 | 1.191 | .647 | 15.03 |
| 09NE-149(MONEL) | .8750-9UNJC-3B | .999 - .969 | 1.257 - 1.239 | 1.403 | .790 | 23.80 |
| 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 | 1.203 - 1.141 | 1.634 - 1.614 | 1.826 | .930 | 51.36 |
| 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 | 1.640 - 1.578 | 2.200 - 2.159 | 2.444 | 1.313 | 114.00 |
| 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:

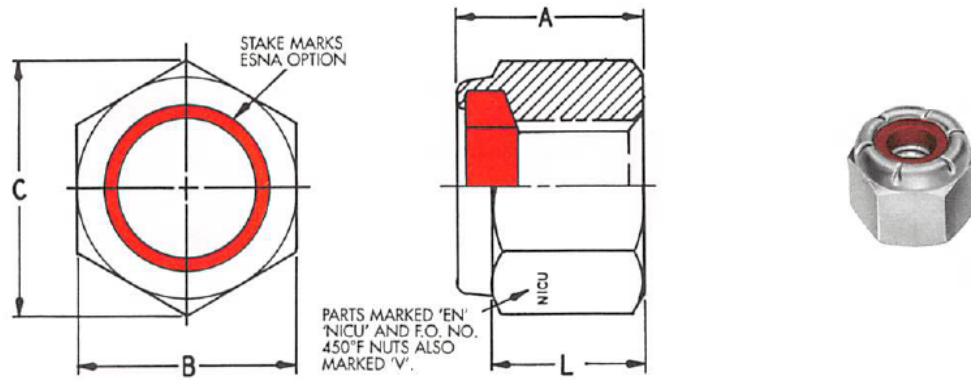
MS17828

NUT-HEX, MONEL

HEX
NM-NE MONEL



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| ESNA PART NUMBERS | | THREAD | A | B | C REF | L REF | MAX WEIGHT LB/100 | MIN. TENSILE STRENGTH LB. |
|-------------------|---------------|-------------------|---------------|---------------|----------|----------|-------------------------|---------------------------------|
| 250°F | 450°F | | | | | | | |
| NU13841 - 040 | VU13841 - 040 | .2500-20UNJC-3B | .390 - .360 | .504 - .492 | .552 | .290 | 1.75 | 6,000 |
| NU13841 - 058 | VU13841 - 058 | .3125-18UNJC-3B | .453 - .423 | .566 - .553 | .622 | .335 | 2.45 | 8,600 |
| NU13841 - 066 | VU13841 - 066 | .3750-16UNJC-3B | .562 - .532 | .692 - .679 | .766 | .392 | 4.40 | 12,700 |
| NU13841 - 083 | VU13841 - 083 | .5000-13UNJC-3B | .718 - .688 | .880 - .865 | .978 | .544 | 9.50 | 24,800 |
| NU13841 - 101 | VU13841 - 101 | .6250-11UNJC-3B | .874 - .844 | 1.068 - 1.052 | 1.191 | .677 | 16.25 | 38,300 |
| NU13841 - 120 | VU13841 - 120 | .7500-10UNJC-3B | 1.015 - .985 | 1.257 - 1.239 | 1.403 | .790 | 26.70 | 54,000 |
| NU13841 - 149 | VU13841 - 149 | .8750-9UNJC-3B | 1.140 - 1.110 | 1.446 - 1.427 | 1.615 | .883 | 39.45 | 73,000 |
| NU13841 - 168 | VU13841 - 168 | 1.0000-8UNJC-3B | 1.312 - 1.250 | 1.634 - 1.614 | 1.826 | 1.000 | 55.70 | 95,800 |
| NU13841 - 187 | VU13841 - 187 | 1.1250-7UNJC-3B | 1.469 - 1.407 | 1.822 - 1.801 | 2.038 | 1.096 | 80.00 | 121,100 |
| NU13841 - 207 | VU13841 - 207 | 1.2500-7UNJC-3B | 1.672 - 1.610 | 2.011 - 1.973 | 2.232 | 1.250 | 106.75 | 146,600 |
| NU13841 - 226 | VU13841 - 226 | 1.3750-6UNJC-3B | 1.828 - 1.766 | 2.200 - 2.159 | 2.444 | 1.376 | 139.25 | 186,000 |
| NU13841 - 246 | VU13841 - 246 | 1.5000-6UNJC-3B | 1.953 - 1.891 | 2.388 - 2.344 | 2.622 | 1.413 | 174.00 | 200,000 |
| NU13841 - 285 | VU13841 - 285 | 1.7500-5UNJC-3B | 2.376 - 2.250 | 2.766 - 2.715 | 3.075 | 1.830 | 278.40 | 205,000 |
| NU13841 - 324 | VU13841 - 324 | 2.0000-4.5UNJC-3B | 2.469 - 2.343 | 3.142 - 3.086 | 3.497 | 1.750 | 359.60 | 233,000 |
| NU13841 - 364 | VU13841 - 364 | 2.2500-4.5UNJC-3B | 2.876 - 2.780 | 3.518 - 3.457 | 3.918 | 2.063 | 550.00 | 390,000 |
| NU13841 - 404 | VU13841 - 404 | 2.5000-4.5UNJC-3B | 3.204 - 3.078 | 4.020 - 3.875 | 4.393 | 2.475 | 850.00 | 500,000 |

MATERIAL:

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

FINISH:

UNPLATED.

LOCKING INSERT: RED NYLON, ASTM D 4066 GROUP 1, CLASS 1 OR 2 (250°F MAX PERFORMANCE)
VESPEL, MIL-R-46198 TYPE 1 (450°F MAX PERFORMANCE)

THREAD SQUARENESS: MIL-N-25027/1

THREADS: MIL-N-8879

PERFORMANCE: MIL-N-25027/1

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.

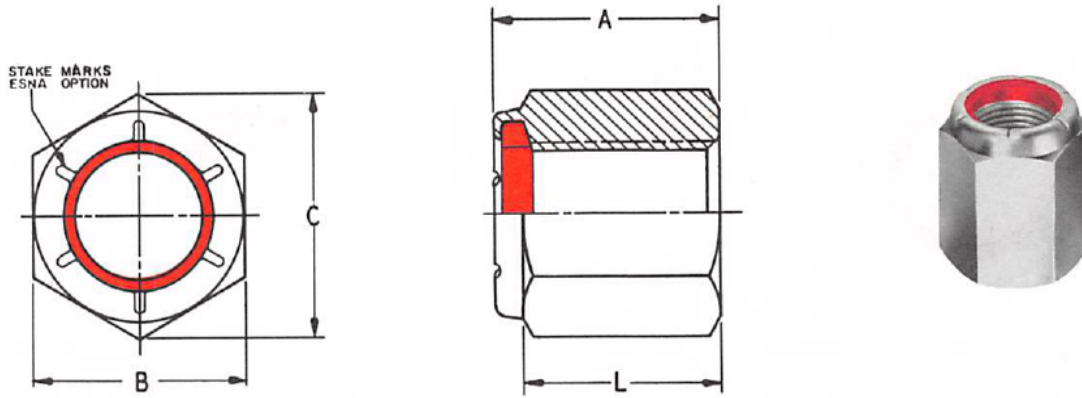
PJ-2424-114

ISSUED: 5-5-95 REVISED:

| | | |
|---|--------------------------------|--------------------|
| REFERENCE STANDARDS: MIL-N-25027/1 | NUT-HEX, MONEL 250°F, 450°F | NU13841 VU13841 |
|---|--------------------------------|--------------------|



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| 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

ISSUED: 6 MAY 53 REVISED: 9 | FEB 88

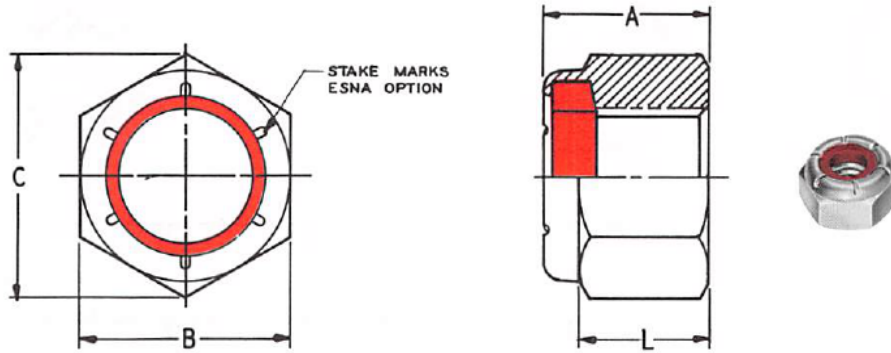
REFERENCE STANDARDS:

NUT-HEX, THICK

N1260



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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-5-7742 OR MIL-5-8879.

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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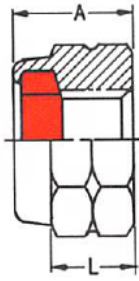
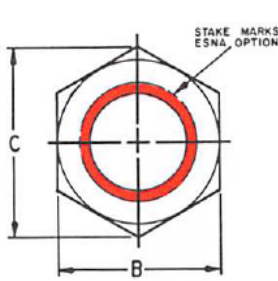


Table with columns: ESNA PART NUMBERS (Cadmium Plate Type II, Class 2; Cadmium Plate Type I, Class 3; Unplated), THREAD, A (MAX, MIN), B (MAX, MIN), C (REF), L (REF), ULTIMATE TENSILE STRENGTH LB. MIN., APPROX WEIGHT LB/100. Rows include various part numbers like 52N1610-02, F52N1610-048, etc.

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: 1. TYPE 1610 PARTS CODED WITH A "G" PREFIX WILL BE INDIVIDUALLY MAGNETIC PARTICLE INSPECTED... 2. CONSULT ESNA FOR AVAILABILITY STATUS OF PARTS NOT INCLUDED IN TABULATION. 3. PART NUMBERS LISTED IN COLUMN 1 OF THE PART NUMBER TABULATION (TYPE II, CLASS 3 PLATING) ARE EXACT ESNA PART NUMBER CONVERSIONS... 4. UNPLATED STEEL PARTS HAVE CLASS 2 B THREAD FIT.

PJ- 1761

ISSUED: 3 DEC 65 REVISED: 11 19 AUG 88

REFERENCE STANDARDS:

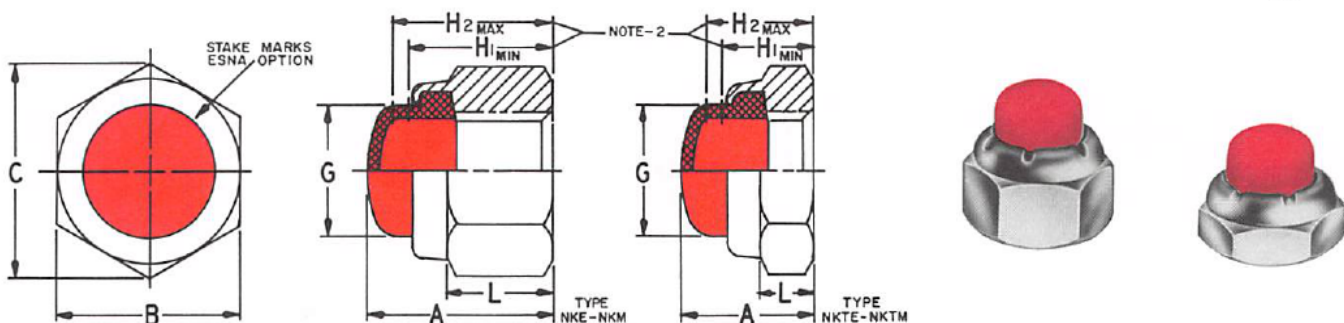
MS17829

NUT-HEX, HIGH TENSILE

N1610 NUI610



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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

- FINISH.
- NUT TYPE.
- THREAD SIZE.
- MATERIAL.

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: 10 25 JAN 88

PJ-1181

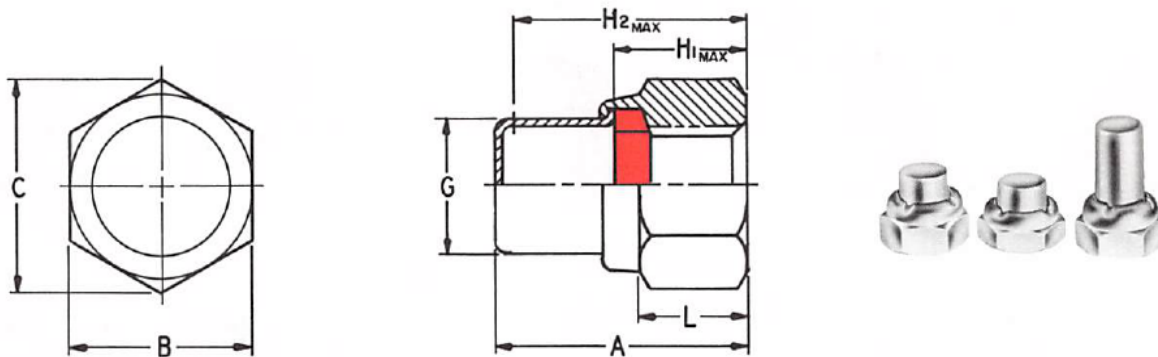
REFERENCE STANDARDS:

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.

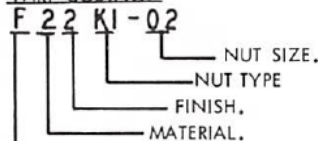
THREADS: MIL-S-8879.

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, NKTm, NKE AND NKTE.
2. "H2" MAXIMUM DESIGNATES THE MAXIMUM RECOMMENDED BOLT ENTRY TO AVOID CONTACT WITH THE CAP.

PART CODING:



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- 1677

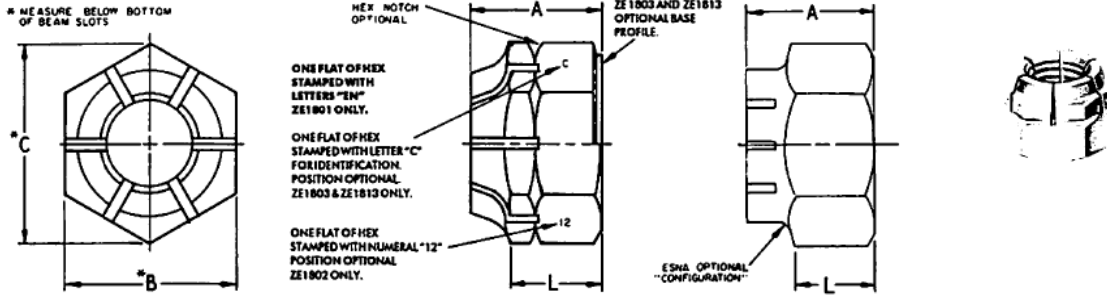
REFERENCE STANDARDS:

NUT-HEX, METAL CAP

K1-K2-K3



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| ESNA PART NUMBER | | APPROX WEIGHT LB/100 | | THREAD | A MAX | B | C REF | L REF | |
|------------------|-------------------------------|-----------------------------|-----------------------------|--------|-----------------|------|---------------|----------|------|
| CAD PLATED STEEL | SILVER PLATED STAINLESS 347FM | SILVER PLATED STAINLESS 303 | DRY FILM LUBE STAINLESS 303 | | | | | | |
| ZE1801-4 | | ZE1803-40 | ZE1813-40 | .12 | .1120-40UNJC-3B | .157 | .251 - .243 | .258 | .079 |
| ZE1801-62 | | ZE1803-62 | ZE1813-62 | .27 | .1380-32UNJC-3B | .188 | .313 - .305 | .339 | .125 |
| ZE1801-82 | ZE1802-82 | ZE1803-82 | ZE1813-82 | .46 | .1640-32UNJC-3B | .250 | .345 - .336 | .374 | .167 |
| ZE1801-3 | ZE1802-3 | ZE1803-3 | ZE1813-3 | .53 | .1900-32UNJF-3B | .250 | .376 - .367 | .410 | .166 |
| ZE1801-04 | | | | | .1900-24UNJC-3B | | | | |
| ZE1801-4 | ZE1802-4 | ZE1803-4 | ZE1813-4 | .90 | .2500-28UNJF-3B | .328 | .439 - .430 | .482 | .229 |
| ZE1801-040 | | ZE1803-040 | ZE1813-040 | | .2500-20UNJC-3B | | | | |
| ZE1801-5 | ZE1802-5 | ZE1803-5 | ZE1813-5 | 1.30 | .3125-24UNJF-3B | .360 | .502 - .492 | .552 | .270 |
| ZE1801-058 | | | | | .3125-18UNJC-3B | | | | |
| ZE1801-6 | ZE1802-6 | ZE1803-6 | ZE1813-6 | 1.90 | .3750-24UNJF-3B | .469 | .564 - .553 | .622 | .350 |
| ZE1801-066 | | | | | .3750-16UNJC-3B | | | | |
| ZE1801-7 | ZE1802-7 | ZE1803-7 | ZE1813-7 | 2.10 | .4375-20UNJF-3B | .469 | .627 - .616 | .694 | .349 |
| ZE1801-7U | ZE1802-7U | ZE1803-7U | ZE1813-7U | 2.90 | .690 - .679 | .766 | | | |
| ZE1801-8 | ZE1802-8 | ZE1803-8 | ZE1813-8 | 4.10 | .5000-20UNJF-3B | .610 | .752 - .741 | .837 | .458 |
| ZE1801-9 | | ZE1803-9 | ZE1813-9 | 6.40 | .5625-18UNJF-3B | .704 | .877 - .865 | .978 | .505 |
| ZE1801-10 | | ZE1803-10 | ZE1813-10 | 7.90 | .6250-18UNJF-3B | .766 | .940 - .928 | 1.051 | .572 |
| ZE1801-12 | | | | 11.00 | .7500-16UNJF-3B | .891 | 1.064 - 1.052 | 1.191 | .657 |

MATERIAL:

ZE1801 - STEEL
 ZE1802 - STAINLESS STEEL, AISI 347FM OR EQUIVALENT AMS 5642
 ZE1803 - STAINLESS STEEL, AISI 303 OR EQUIVALENT, AMS 5640
 ZE1813 - STAINLESS STEEL, AISI 303 OR EQUIVALENT, AMS 5640

FINISH:

ZE1801 - CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 2. (SEE NOTE 2)
 ZE1802 & ZE1803 - SILVER PLATE, AMS 2410
 ZE1813 - DRY FILM LUBRICANT, ESNA LUBE 382.

THREAD : MIL-S-8879, MINIMUM "GO GAGE" ENTRY IS FROM THE BOTTOM OF THE NUTTO ONE AND ONE HALF THREADS BELOW THE BOTTOM OF THE SLOTS.
 (PRIOR TO ADDITION OF DRY FILM LUBRICANT).

THREAD SQUARENESS: ESNA SPEC 405, GROUP II, (SIZES -.02 THRU -.080).
 MIL-N-25027 (ALL OTHER SIZES)

PERFORMANCE: ZE1801, ZE1803 AND ZE1813, MIL-N-25027 FOR TEMPERATURE 450° AND 800°F.
 ZE1802, MIL-N-7873 FOR TEMPERATURE 1200°F.

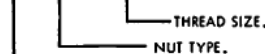
APPLICATION: THE ABOVE DESIGNS ARE PARTICULARLY SUITED FOR USE IN APPLICATIONS INVOLVING PROLONGED SERVICE AT HIGH TEMPERATURES. TYPE ZE1802, ZE1803 AND ZE1813 BEING MADE OF STAINLESS STEEL OFFER THE ADDED ADVANTAGE OF BEING CORROSION RESISTANT AND NON-MAGNETIC.

NOTES: 1. TYPES ZE1801, ZE1803 AND ZE1813 CONFORM TO THE REQUIREMENTS OF MS20365, MS21045 AND MS21046 AS APPLICABLE, TYPE ZE1802 PARTS CONFORM TO THE REQUIREMENTS OF MS20500.

2. TYPE ZE1801 ONLY, IS ALSO AVAILABLE WITH MOLYBDENUM DISULPHIDE FINISH OVER CADMIUM PLATE, SPECIFIED BY ADDING PREFIX LETTERS "RM" TO PART NUMBER SUCH AS "RMZE1801-048". SUCH PARTS MEET SALT SPRAY REQUIREMENTS OF QQ-P-416, TYPE II.

PART CODING:

F ZE1801 - 4



FOR POST PLATE TREATMENT (PER QQ-P-416, TYPE II) ON CADMIUM PLATED PARTS, PREFIX COMPLETE PART NUMBER WITH LETTER "F". (SEE NOTE 2.)

PJ-1324

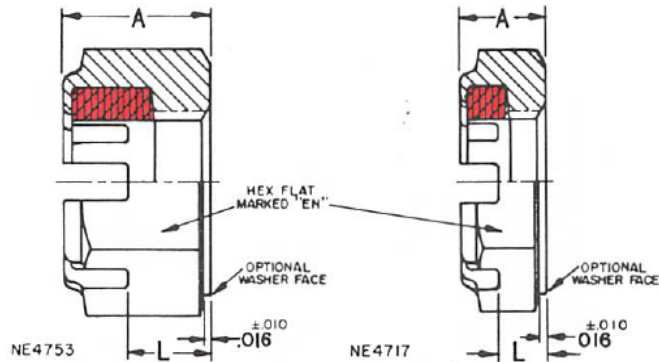
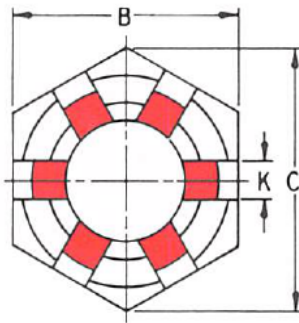
ISSUED: 2 NOV 95 REVISED:

REFERENCE STANDARDS:

AN363 MS20365
 MS20500 MS21045
 MS21046 NAS1021

**NUT-HEX, LIGHT,
 450°F, 800°F, & 1200°F**

**ZE1801-ZE1802
 ZE1803-ZE1813**



| ESNA PART NUMBER | | THREAD | A ±.015 | B | C MIN | K ±.015 | L ±.010 | ULTIMATE TENSILE STRENGTH LB. MIN. | MAX INSTL. TORQUE IN. LB. | APPROX WEIGHT LB/100 |
|------------------|----------------|------------------|------------|---------------|----------|------------|------------|------------------------------------|---------------------------|----------------------|
| REGULAR HEIGHT | REDUCED HEIGHT | | | | | | | | | |
| F12NE4753-02 | F12NE4717-02 | .1900-32UNJF-3B | .188 | .376 - .367 | .410 | .093 | .104 | 1,000 | 20 | .28 |
| | | | .250 | | | | | | | |
| F12NE4753-048 | F12NE4717-048 | .2500-28UNJF-3B | .188 | .439 - .430 | .482 | .093 | .104 | 1,800 | 45 | .35 |
| | | | .281 | | | | | | | |
| F12NE4753-5 | F12NE4717-5 | .3125-24UNJF-3B | .188 | .502 - .492 | .552 | .093 | .104 | 2,900 | 90 | .46 |
| | | | .328 | | | | | | | |
| F12NE4753-6 | F12NE4717-6 | .3750-24UNJF-3B | .219 | .564 - .553 | .622 | .140 | .120 | 4,100 | 125 | .60 |
| | | | .406 | | | | | | | |
| F12NE4753-7 | F12NE4717-7 | .4375-20UNJF-3B | .219 | .690 - .679 | .766 | .140 | .120 | 5,000 | 225 | 1.10 |
| | | | .453 | | | | | | | |
| F12NE4753-8 | F12NE4717-8 | .5000-20UNJF-3B | .250 | .752 - .741 | .837 | .140 | .151 | 5,600 | 300 | 1.31 |
| | | | .563 | | | | | | | |
| F12NE4753-9 | F12NE4717-9 | .5625-18UNJF-3B | .313 | .877 - .865 | .978 | .172 | .198 | 7,800 | 400 | 2.44 |
| | | | .609 | | | | | | | |
| F12NE4753-10 | F12NE4717-10 | .6250-18UNJF-3B | .313 | .940 - .928 | 1.051 | .172 | .198 | 10,000 | 600 | 2.50 |
| | | | .719 | | | | | | | |
| F12NE4753-12 | F12NE4717-12 | .7500-16UNJF-3B | .375 | 1.064 - 1.052 | 1.191 | .172 | .261 | 15,500 | 1,100 | 3.90 |
| | | | .813 | | | | | | | |
| F12NE4753-14 | F12NE4717-14 | .8750-14UNJF-3B | .438 | 1.252 - 1.239 | 1.403 | .172 | .323 | 22,800 | 1,900 | 6.90 |
| | | | .906 | | | | | | | |
| | F12NE4717-16 | 1.0000-12UNJF-3B | .500 | 1.440 - 1.427 | 1.615 | .172 | .386 | 35,500 | 3,000 | 8.20 |

MATERIAL: STEEL - HEAT TREATED.

FINISH: CADMIUM PLATE, QQ-P-416, TYPE II, CLASS 2.

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

THREADS: MIL-S-8879.

THREAD SQUARENESS: MIL-N-25027

PERFORMANCE: MIL-N-25027 EXCEPT LOCKING TORQUE, VIBRATION TIME AND TENSILE IN ACCORDANCE WITH DRAWINGS MS17825 AND MS17826.

APPLICATION: TYPES NE4717 AND NE4753 WERE DESIGNED TO SATISFY A RECOGNIZED NEED FOR AN EXTRA "FAIL SAFE" FEATURE IN THOSE CRITICAL APPLICATIONS SPECIFYING THE USE OF COTTERPINNED AN310 AND AN320 CASTELLATED NUTS. TYPICAL CASES ARE JOINTS IN AIRCRAFT CONTROL SYSTEMS WHERE AN EXTERNALLY THREADED PART WOULD SERVE AS AN AXLE OR AXIS OF ROTATION FOR ANOTHER PART. FOR EXAMPLE, THE INSTALLATION OF BEARINGS, BUSHINGS, PULLEYS, CRANKS, LINKAGES, CAM FOLLOWERS, ETC. BEING FUNCTIONALLY INTERCHANGEABLE WITH AN320 AND AN310, TYPE NE4717 AND NE4753 CAN BE READILY ADAPTED TO RETROFIT PROGRAMS WITHOUT NEED FOR MODIFICATION OR CHANGE IN OTHER ASSEMBLY.

ISSUED: 2 NOV 95 REVISED:

PJ- 2756 . PJ-2761

REFERENCE STANDARDS:

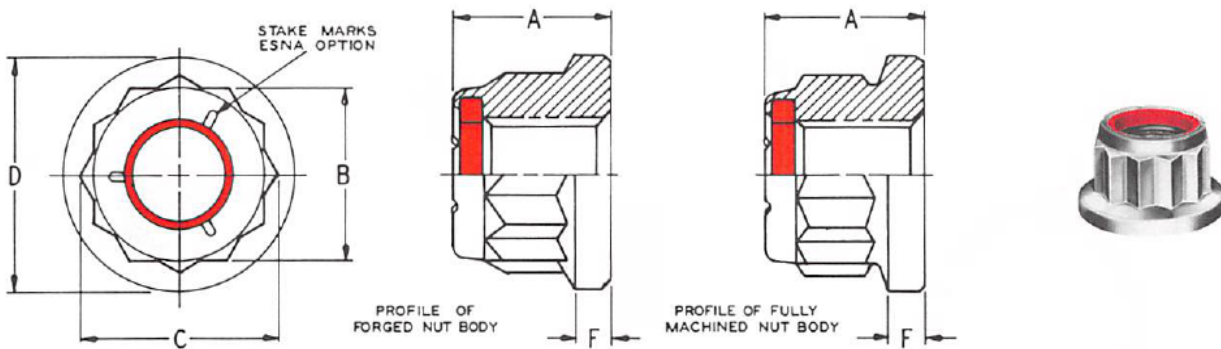
MS17825
MS17826

NUT-HEX, CASTELLATED,
SELF-LOCKING, 250°F

NE4717
NE4753



Get quote »



| ESNA PART NUMBER | THREAD | A ±.015 | B | C REF | D MAX | F REF | ULTIMATE TENSILE STRENGTH LB. MIN. | APPROX WEIGHT LB/100 |
|------------------|------------------|-------------|---------------|----------|----------|----------|------------------------------------|----------------------|
| 12NH-4 | .2500-28UNJF-3B | .334 | .376 - .367 | .420 | .531 | .090 | 6,980 | 1.0 |
| 12NH-5 | .3125-24UNJF-3B | .396 | .439 - .430 | .491 | .593 | .090 | 11,100 | 1.4 |
| 12NH-6 | .3750-24UNJF-3B | .453 | .502 - .492 | .562 | .687 | .099 | 17,100 | 2.0 |
| 12NH-7 | .4375-20UNJF-3B | .516 | .564 - .553 | .633 | .781 | .107 | 23,200 | 2.8 |
| 12NH-8 | .5000-20UNJF-3B | .563 | .627 - .616 | .704 | .875 | .118 | 30,900 | 3.5 |
| 12NH-9 | .5625-18UNJF-3B | .625 | .690 - .679 | .774 | .968 | .127 | 39,200 | 4.5 |
| 12NH-10 | .6250-18UNJF-3B | .672 | .783 - .772 | .882 | 1.062 | .136 | 49,000 | 6.4 |
| 12NH-12 | .7500-16UNJF-3B | .781 | .940 - .928 | 1.059 | 1.250 | .185 | 71,200 | 11.0 |
| 12NH-14 | .8750-14UNJF-3B | .953 | 1.064 - 1.052 | 1.200 | 1.438 | .219 | 97,100 | 15.0 |
| 12NH-16 | 1.0000-14UNJ5-3B | 1.125 ±.031 | 1.190 - 1.177 | 1.343 | 1.625 | .328 | 128,700 | 25.0 |
| 12NH-18 | 1.1250-12UNJF-3B | 1.296 ±.031 | 1.377 - 1.364 | 1.556 | 1.875 | .438 | 162,100 | 36.0 |
| 12NH-20 | 1.2500-12UNJF-3B | 1.406 ±.031 | 1.502 - 1.489 | 1.698 | 2.125 | .500 | 202,300 | 50.0 |
| 12NH-22 | 1.3750-12UNJF-3B | 1.531 ±.031 | 1.627 - 1.614 | 1.842 | 2.313 | .562 | 246,600 | 62.0 |
| 12NH-24 | 1.5000-12UNJF-3B | 1.656 ±.031 | 1.814 - 1.801 | 2.055 | 2.500 | .656 | 295,600 | 85.0 |

PART CODING:

F 12NH-4

THREAD SIZE.

NUT TYPE.

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

MATERIAL: ALLOY STEEL - AISI 4130, 4340, 8740 OR EQUIVALENT.

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

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

MAGNETIC PARTICLE INSPECTION: PARTS INDIVIDUALLY INSPECTED IN ACCORDANCE WITH MIL-STD-1949

THREAD SQUARENESS: ESNA SPEC 405, GROUP II, SIZES -048 THRU -080.
ESNA SPEC 405, GROUP I, SIZES -098 AND LARGER.

THREADS: MIL-S-8879.

PERFORMANCE: MIL-N-25027, EXCEPT MIN TENSILE STRENGTH EQUIVALENT TO 180,000 PSI AT 98% OF THE BASIC PITCH DIAMETER, FOR SIZES -4, -5 AND THE BASIC PITCH DIAMETER FOR SIZES -6 AND LARGER. THE VALUES TABULATED ABOVE WILL BE OBTAINED WHEN TENSILE TESTED ON A BOLT HAVING A MINIMUM TENSILE STRENGTH OF 200,000 PSI.

APPLICATION: THIS DESIGN IS SUITED FOR APPLICATION INVOLVING HIGH STRENGTH BOLTS SUCH AS MS21250 AND THE MS20004 SERIES.

PJ- 1419

ISSUED: 2 NOV 95 REVISED:

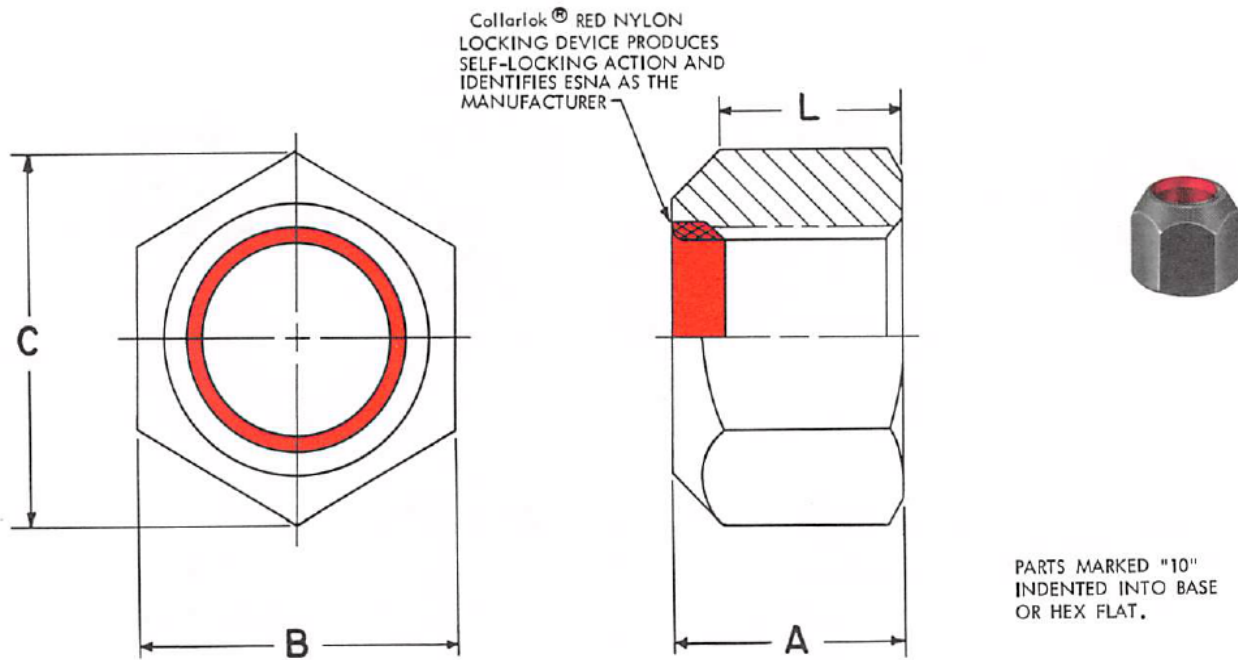
REFERENCE STANDARDS:

NUT-DOUBLE HEX,
HIGH TENSILE, 180,000 PSI, 250°F

NH



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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 | 23.57 | 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)

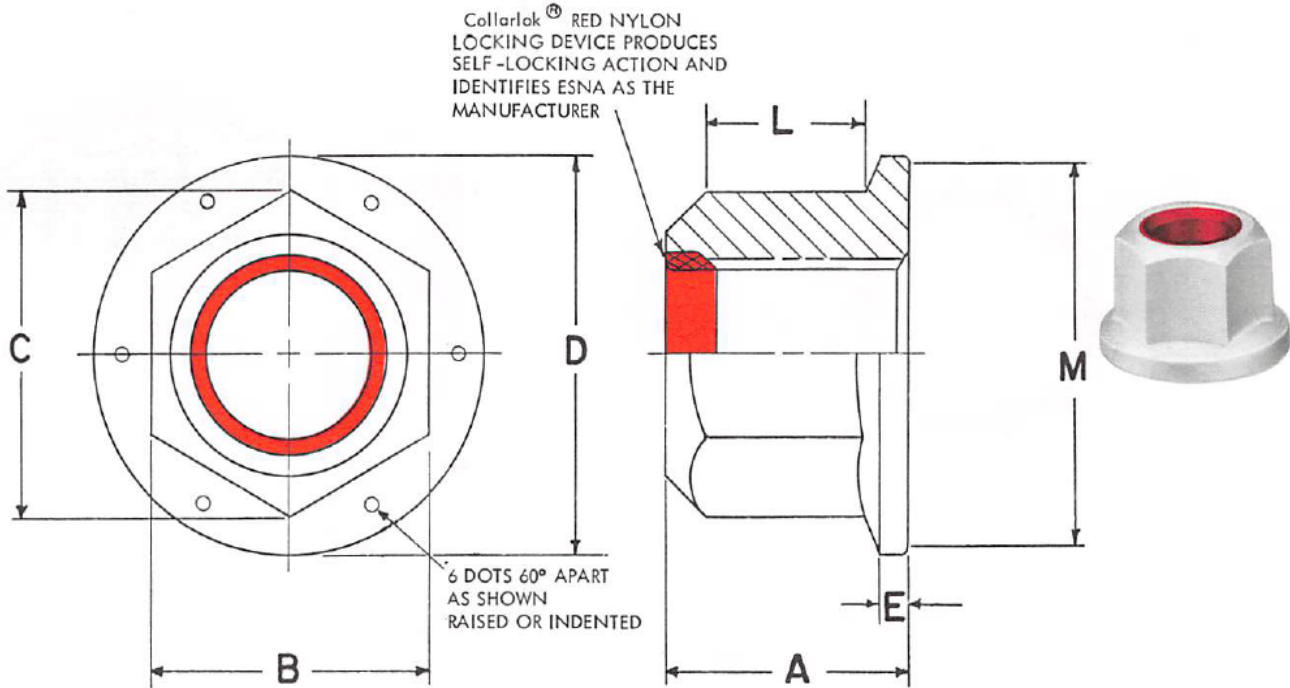
PJ- 0044-IC

ISSUED: 10 FEB 88 REVISED:

| | | |
|----------------------|--|------------------|
| REFERENCE STANDARDS: | NUT-HEX, COLLARLOK METRIC PROPERTY CLASS 10 STYLE I | 52CE20136 |
|----------------------|--|------------------|



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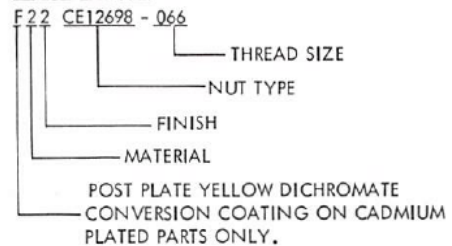
| BASIC PART NUMBER | THREAD SIZE | A | | B | | C | D | E | L | M | APPROX. WEIGHT kg/100 |
|-------------------|----------------|------|------|-------|-------|-------|-------|------|------|-------|-----------------------|
| | | MAX | MIN | MAX | MIN | | | | | | |
| CE12698-066 | .3750-16UNC-2B | .425 | .405 | .564 | .551 | .628 | .810 | .060 | .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 | | | | | | | | | | |
| CE12698-10 | .6250-18UNF-2B | .690 | .670 | .939 | .922 | 1.051 | 1.330 | .100 | .320 | 1.230 | 11.5 |
| CE12698-101 | .6250-11UNC-2B | | | | | | | | | | |
| CE12698-12 | .7500-16UNF-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

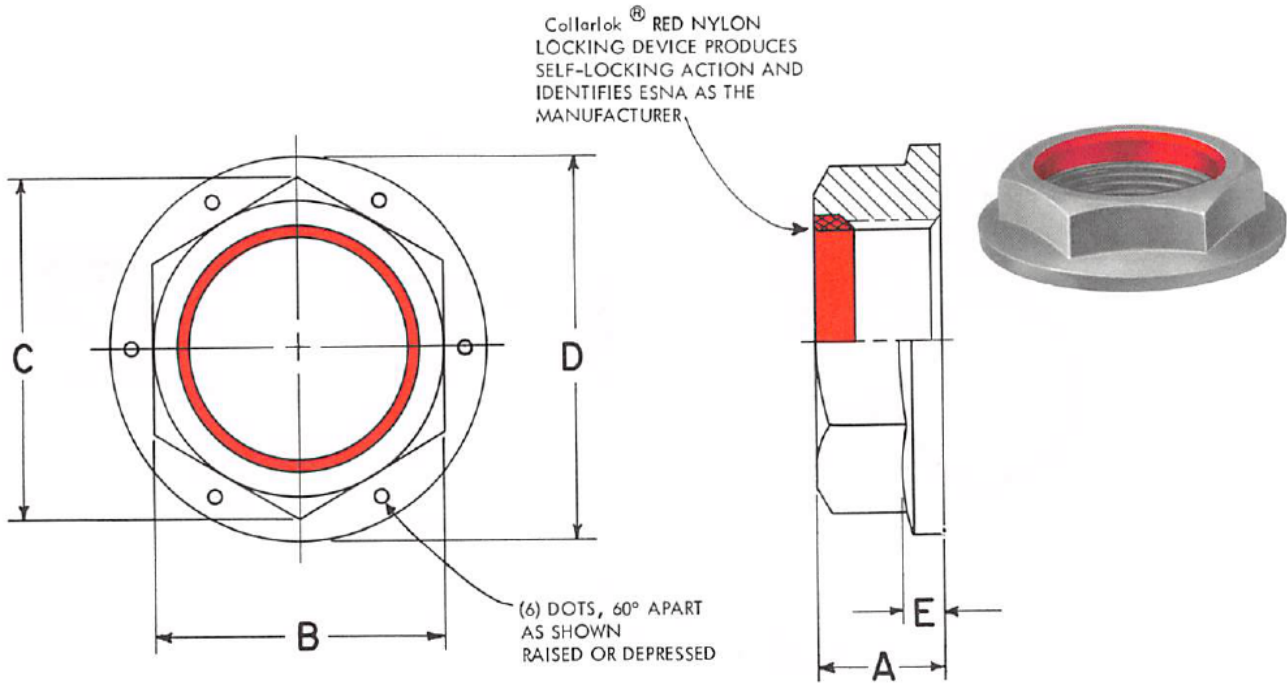
REFERENCE STANDARDS:

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 | MAX | MAX | | | |
| 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"

PJ- 0044-2

ISSUED: 21 NOV 80 REVISED: ② 4 FEB 88

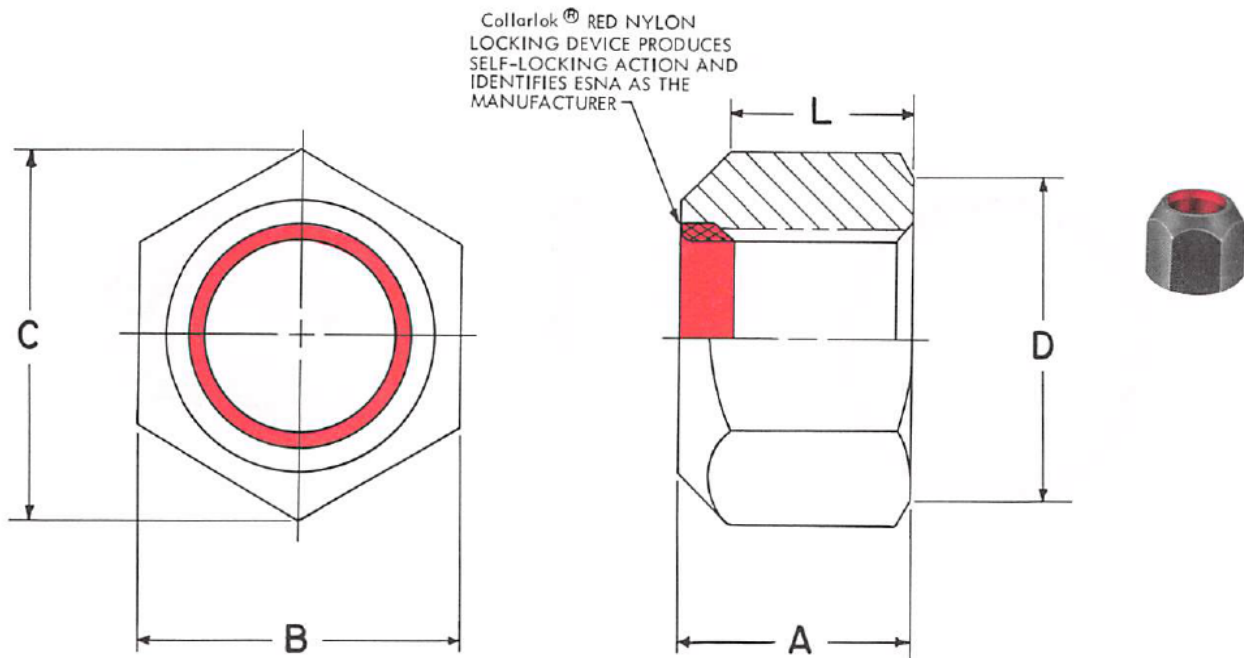
REFERENCE STANDARDS:

NUT-HEX, FLANGE, COLLARLOK

CE 12605



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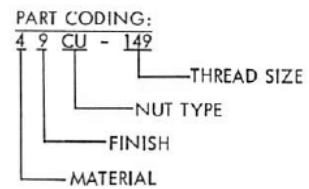


| ESNA PART NUMBER | | THREAD SIZE | A | | B | | C | D | L | ULTIMATE TENSILE STRENGTH LB. MIN. | APPROX. WEIGHT LB/100 |
|------------------|------------------------------|---------------|-------|-------|-------|-------|-------|-------|------|------------------------------------|-----------------------|
| STEEL UNPLATED | STEEL ZINC PHOSPHATE AND OIL | | MAX | MIN | MAX | MIN | MIN | MIN | REF | | |
| 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



ISSUED: 21 NOV 80 REVISED: ① 4 FEB 88

PJ-0044-7

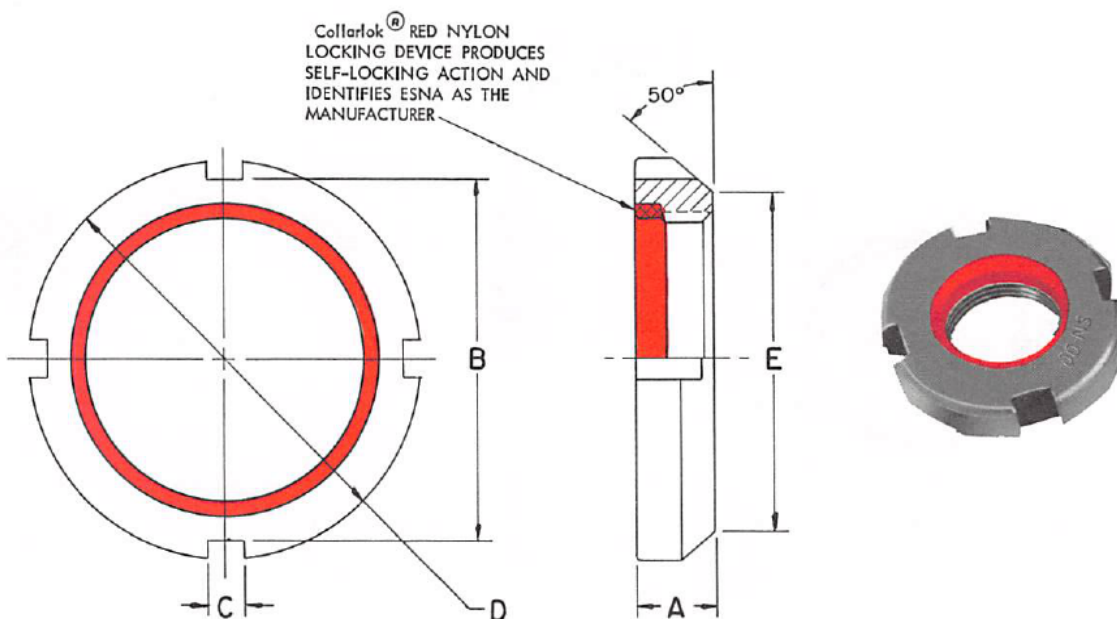
REFERENCE STANDARDS:

NUT-HEX, HEAVY, COLLARLOK

CU



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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

ESlok 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 coarse or fine thread, plain or zinc plated.

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

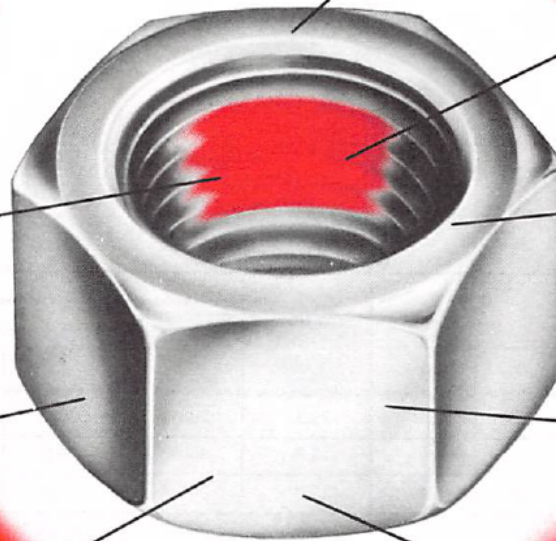
Elastic recovery of the red nylon patch insures five (5) or more loaded reuses.

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.

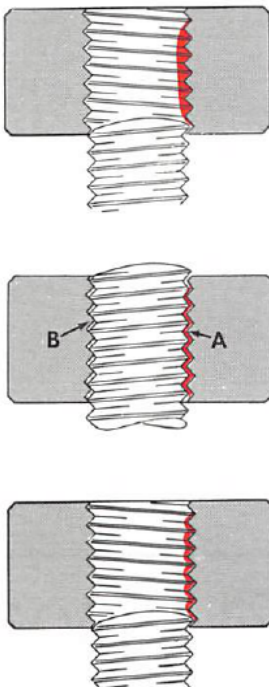


THE RED NYLON LOCKING PATCH

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.



Get quote >>

3

Angic Global Solutions

1-888-872-0690

<https://www.AngicGlobal.com> Sales@AngicGlobal.com



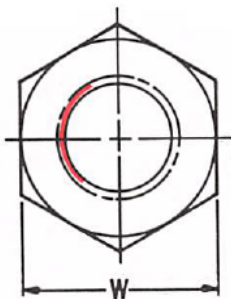
MACLEAN-ESNA

611 Country Club Road • 1-800-331-6469

FSCM-019L2

Pocahontas, Arkansas 72455 • FAX 1-501-892-8938

②



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 | 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 | FEB 88

REFERENCE STANDARDS:

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

30000
SERIES



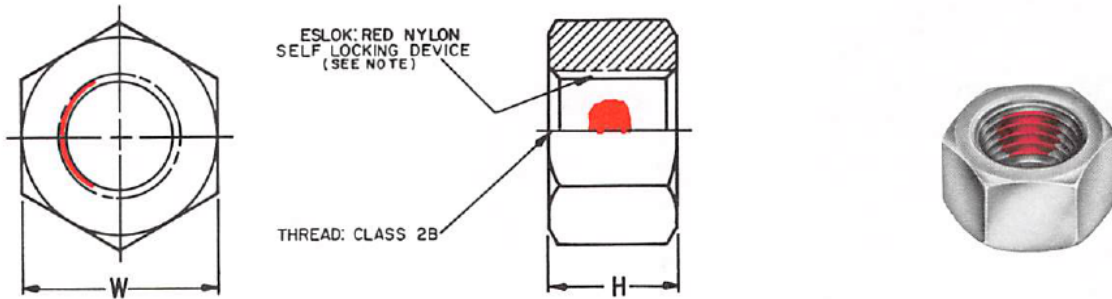
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54

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| 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

- CADMIUM PLATE, CHROMATE FORTIFIED PARTS 31392 THRU 31399 MEET ORDNANCE CORPS SPECIFICATION MS 51922.
- HEAVY HEXAGON AND FINISHED HEXAGON THICK ESLOK NUTS ARE MANUFACTURED TO SPECIAL ORDER. PRICES AND AVAILABILITY ON REQUEST.
- 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

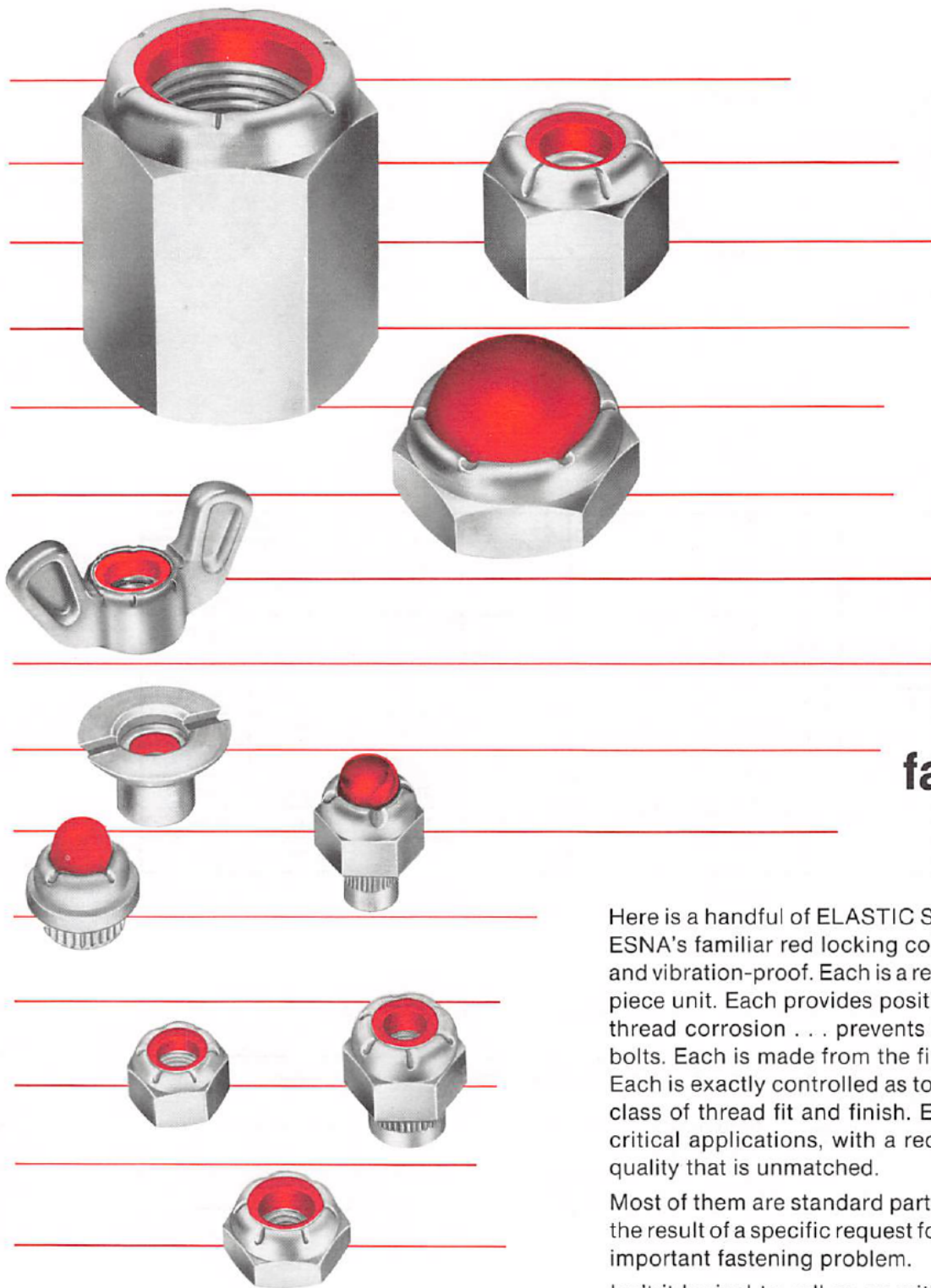
REFERENCE STANDARDS:

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

31300
SERIES



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**What
shape
is a
quality
fastener?**

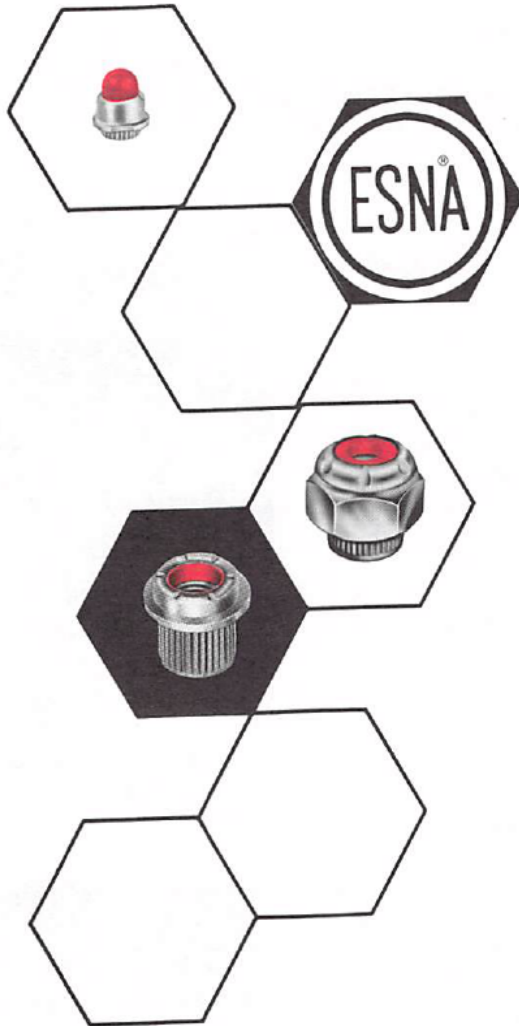
Here is a handful of ELASTIC STOP® nuts. Each has ESNA's familiar red locking collar . . . is self-locking and vibration-proof. Each is a readily assembled, one-piece unit. Each provides positive protection against thread corrosion . . . prevents liquid seepage along bolts. Each is made from the finest 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?



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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* |

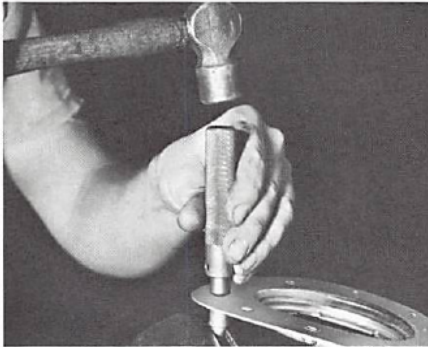
* Temporarily Discontinued.



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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 of 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 in this catalog should be carefully followed.

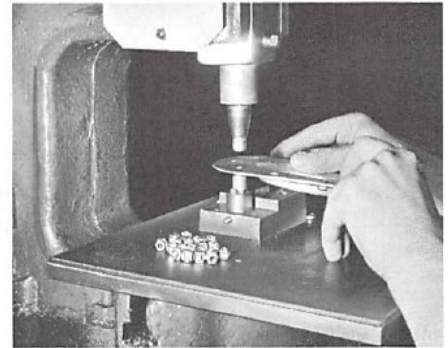


HAND TOOLS

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

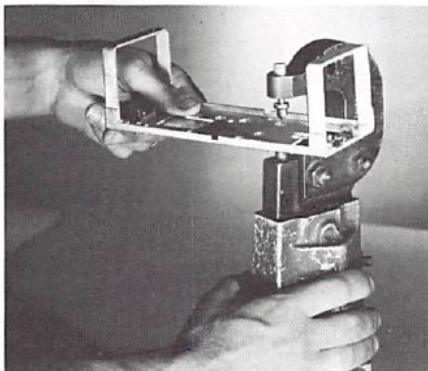
INSTALLATION METHODS

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 in this catalog be followed to insure trouble free production and superior product performance.



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.

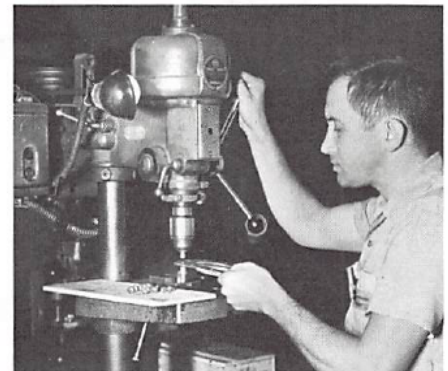
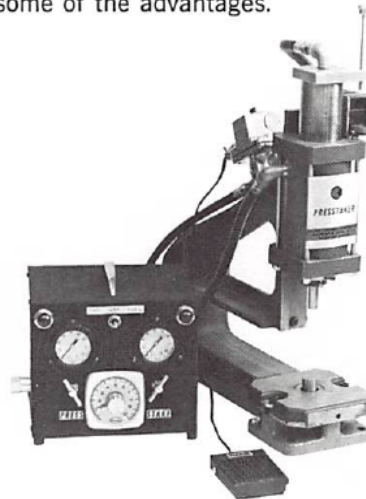


HAND RIVETER TOOLS

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.

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.



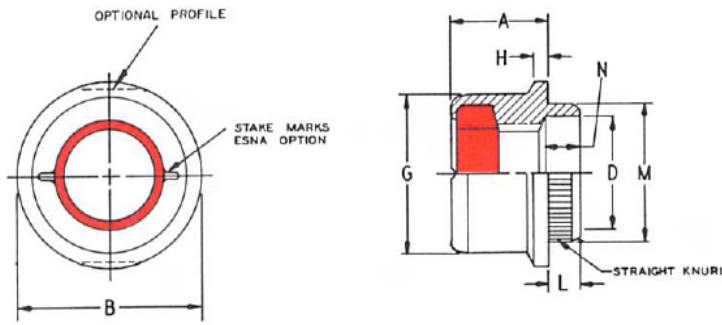
DRILL PRESS SPINNING METHOD

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.



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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 | .254 | .040 | .21 |
| 12NCFMA2-02 | 79NCFMA2-02 | | | | | | | .060 | | .060 | .22 |

MATERIAL:
STEEL.
STAINLESS STEEL, AISI 303 OR EQUIV.

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

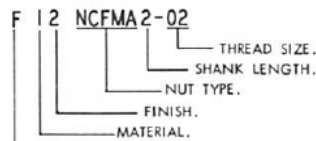
LOCKING INSERT: RED NYLON - HEAT STABILIZED. SUITABLE FOR TEMPERATURES UP TO 350°F.

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:



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 | CPMF1 | CPM2 | CDMA21 | 300 | .124 | .126 |
| NCFMA2-26 | | | | | | |
| NCFMA1-40 | CPMF1 | CPM4 | CDMA41 | 600 | .155 | .157 |
| NCFMA2-40 | | | | | | |
| NCFMA1-62 | CPMF1 | CPM6 | CDMA61 | 750 | .187 | .189 |
| NCFMA2-62 | | | | | | |
| NCFMA1-82 | CPMF2 | CPM8 | CDMA81 | 1000 | .218 | .220 |
| NCFMA2-82 | | | | | | |
| NCFMA1-02 | CPMF2 | 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



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ISSUED: 23 NOV 59 REVISED: Ⓑ 8 MAR 90

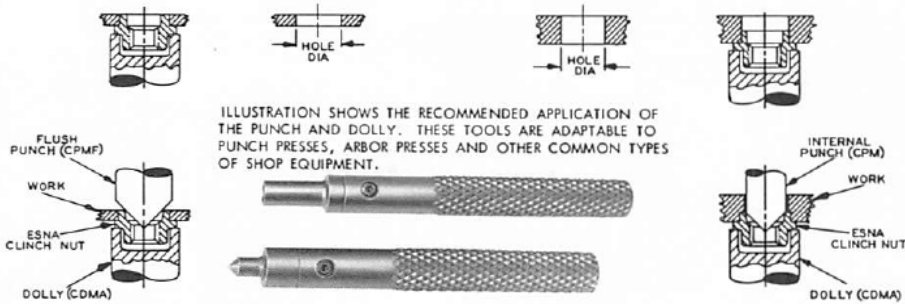
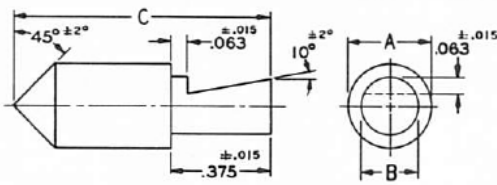


ILLUSTRATION SHOWS THE RECOMMENDED APPLICATION OF THE PUNCH AND DOLLY. THESE TOOLS ARE ADAPTABLE TO PUNCH PRESSES, ARBOR PRESSES AND OTHER COMMON TYPES OF SHOP EQUIPMENT.

FLUSH MOUNTING PUNCH

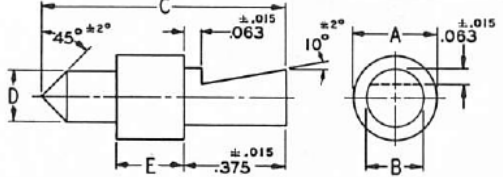


| PUNCH PART NUMBER | A | B | C |
|-------------------|------|------|-------|
| CPMF1 | .307 | .200 | .966 |
| CPMF2 | .419 | .300 | 1.022 |

MATERIAL: TOOL STEEL, ROCKWELL 60 (REF)

FINISH: UNPLATED

INTERNAL FLARING MOUNTING PUNCH



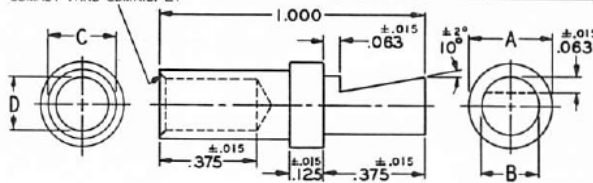
| PUNCH PART NUMBER | A | B | C | D | E |
|-------------------|------|------|------|------|------|
| CPM2 | .307 | .200 | .873 | .120 | .250 |
| CPM4 | | | .888 | .151 | |
| CPM6 | | | .904 | .183 | |
| CPM8 | | | .920 | .214 | |
| CPM10 | .419 | .300 | .935 | .245 | .188 |

MATERIAL: TOOL STEEL, ROCKWELL 60 (REF)

FINISH: UNPLATED

CDMA21 AND CDMA41 35°±1°
CDMA51 THRU CDMA101 21°±1°

DOLLY - MINIATURE, CLINCH NUT

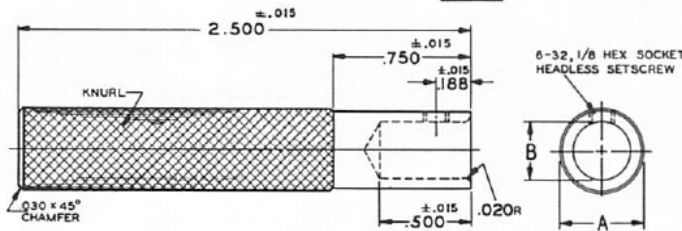


| DOLLY PART NUMBER | A | B | C | D |
|-------------------|------|------|------|------|
| CDMA21 | | | .213 | .151 |
| CDMA41 | .307 | .200 | .243 | .183 |
| CDMA61 | | | .307 | .243 |
| CDMA81 | | | .333 | .269 |
| CDMA101 | .419 | .300 | .359 | .288 |

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

PAGE 2 OF 2



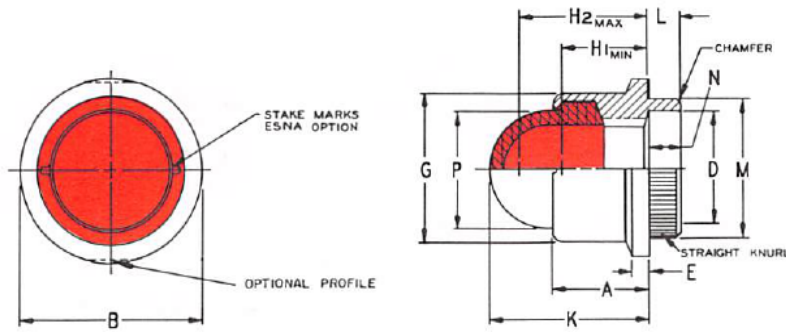
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Pocahontas, Arkansas 72455 • FAX 1-501-892-8938

⑤



| ESNA PART NUMBER | | THREAD | A | B | D | E | G | H ₁ | H ₂ | K | L | M | N | P | APPROX WEIGHT Lb/100 |
|------------------|-----------------|-----------------|-------|-------|------|----------------|-------|----------------|----------------|------|--------------|-------|--------------|-------|----------------------|
| STEEL | STAINLESS STEEL | | ±.015 | ±.005 | | ±.003 -.002 | ±.005 | MAX | MIN | | MAX | ±.015 | ±.003 | ±.002 | |
| 22NKCfM1-26 | 79NKCfM1-26 | .0860-56UNJC-3B | .075 | .172 | .096 | .020 | .150 | .072 | .119 | .143 | .040 .060 | .129 | .040 .060 | .106 | .03 |
| 22NKCfM1-40 | 79NKCfM1-40 | 1120-40UNJC-3B | .090 | .203 | .130 | .020 | .182 | .086 | .154 | .176 | .040 .060 | .160 | .040 .060 | .131 | .05 |
| 22NKCfM2-40 | 79NKCfM2-40 | | | | | | | | | | | | | | |
| 12NKCfM1-62 | 79NKCfM1-62 | .1380-32UNJC-3B | .130 | .281 | .154 | .025 | .242 | .130 | .211 | .251 | .040 .060 | .192 | .040 .060 | .170 | .11 .12 |
| 12NKCfM2-62 | 79NKCfM2-62 | | | | | | | | | | | | | | |
| 12NKCfM2-82 | | .1640-32UNJC-3B | .160 | .312 | .180 | .025 | .266 | .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 - A151 303 OR EQUIV.
CAP - RED NYLON.

PART CODING:

F 2 2 NKCfM2-40



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-5-8879

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 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 |
| NKCfM1-26 | CPM1 | CPM2 | CDMA21 | 300 | .124 | .126 |
| NKCfM2-26 | | | | | | |
| NKCfM1-40 | CPM1 | CPM4 | CDMA41 | 600 | .155 | .157 |
| NKCfM2-40 | | | | | | |
| NKCfM1-62 | CPM1 | CPM6 | CDMA61 | 750 | .187 | .189 |
| NKCfM2-62 | | | | | | |
| NKCfM2-82 | CPM2 | CPM8 | CDMA81 | 1000 | .218 | .220 |
| NKCfM2-02 | CPM2 | CPM10 | CDMA101 | 1500 | .249 | .251 |

PJ-2518-3

REFERENCE STANDARDS:

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

NKCfM

PAGE 1 OF 2

ISSUED: 26 FEB 62 REVISED: ⑤ 8 MAR 90



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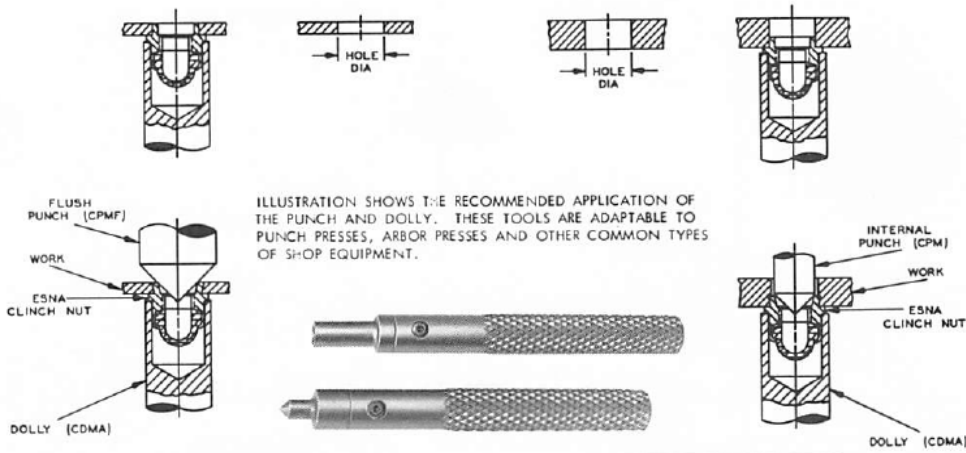
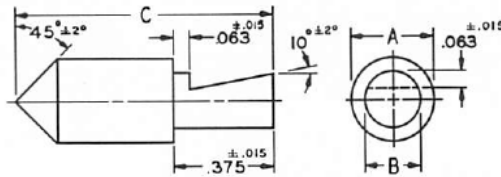


ILLUSTRATION SHOWS THE RECOMMENDED APPLICATION OF THE PUNCH AND DOLLY. THESE TOOLS ARE ADAPTABLE TO PUNCH PRESSES, ARBOR PRESSES AND OTHER COMMON TYPES OF SHOP EQUIPMENT.

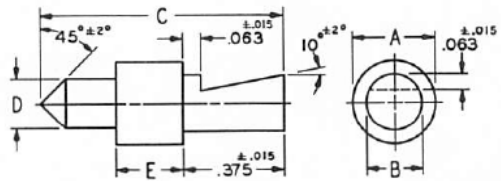
FLUSH MOUNTING PUNCH



| PUNCH PART NUMBER | A | B | C |
|-------------------|-------|--------------------------------------|-------|
| CPMF1 | ±.015 | + ^{.000} / _{-.002} | ±.015 |
| CPMF2 | .419 | .300 | 1.022 |

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

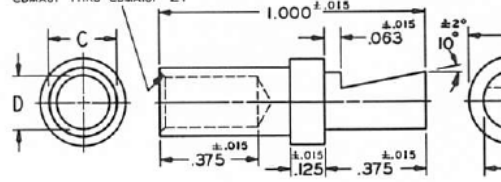
INTERNAL FLARING MOUNTING PUNCH



| PUNCH PART NUMBER | A | B | C | D | E |
|-------------------|-------|--------------------------------------|-------|--------------------------------------|-------|
| CPM2 | ±.015 | + ^{.000} / _{-.002} | ±.015 | + ^{.000} / _{-.002} | ±.015 |
| CPM4 | .307 | .200 | .888 | .120 | .250 |
| CPM6 | | | .904 | .183 | |
| CPM8 | | | .920 | .214 | |
| CPM10 | .419 | .300 | .935 | .245 | .188 |

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

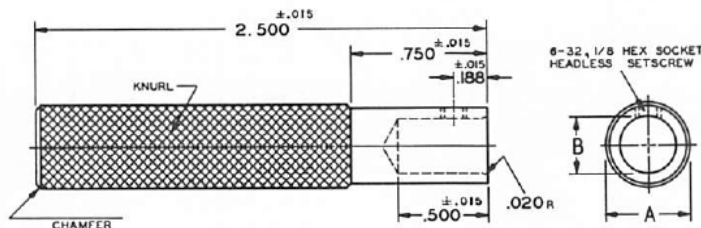
DOLLY-MINIATURE, CLINCH NUT



| DOLLY PART NUMBER | A | B | C | D |
|-------------------|-------|--------------------------------------|-------|--------------------------------------|
| CDMA21 | ±.015 | + ^{.000} / _{-.002} | ±.015 | + ^{.003} / _{-.000} |
| CDMA41 | .307 | .200 | .213 | .151 |
| CDMA61 | | | .243 | .163 |
| CDMA81 | | | .307 | .243 |
| CDMA101 | .419 | .300 | .333 | .269 |
| | | | .359 | .288 |

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

HANDLE



| HANDLE PART NUMBER | A | B |
|--------------------|-------|--------------------------------------|
| CHM1 | ±.015 | + ^{.003} / _{-.000} |
| CHM2 | .312 | .201 |
| | .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

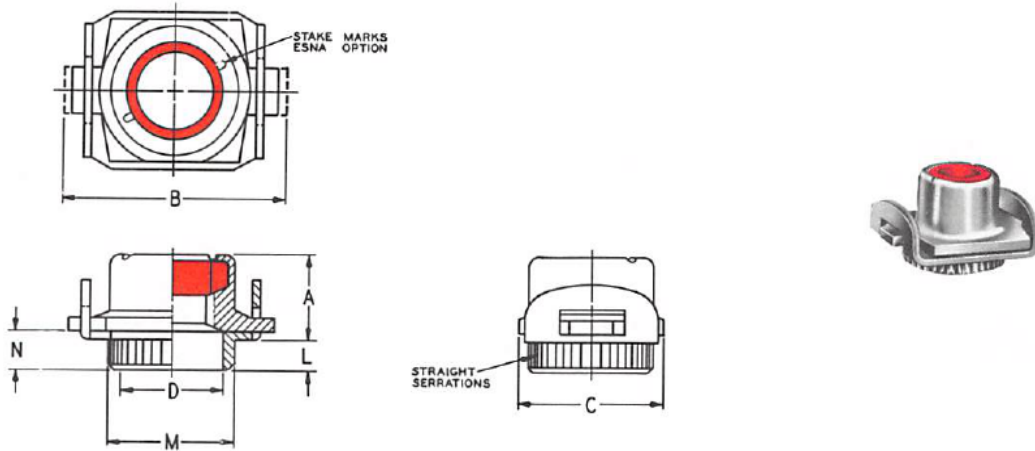
ISSUED: 26 FEB 62 REVISED: 5 8 MAR 90

REFERENCE STANDARDS:

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

NKCFM

PAGE 2 OF 2



| ESNA PART NUMBER | THREAD | A MAX | B MAX | C ±.015 | D ±.005 | L ±.005 | M +.003 -.002 | N REF | APPROX WEIGHT Lb/100 |
|------------------|-----------------|----------|----------|------------|------------|------------|---------------------|----------|-------------------------|
| 12NC4284-1-40 | .1120-40UNJC-3B | .132 | .446 | .300 | .180 | .040 | .224 | .062 | .18 |
| 12NC4284-2-40 | | | | | | .060 | | .082 | .19 |
| (SEE NOTE 1) | | | | | | | | | |
| 12NC4284-1-62 | .1380-32UNJC-3B | .172 | .446 | .300 | .180 | .040 | .224 | .062 | .23 |
| 12NC4284-2-62 | | | | | | .060 | | .082 | .24 |
| (SEE NOTE 1) | | | | | | | | | |
| 12NC4284-2-82 | .1640-32UNJC-3B | .202 | .498 | .350 | .232 | .060 | .275 | .082 | .30 |
| 12NC4284-3-82 | | | | | | .090 | | .112 | .31 |
| 12NC4284-1-02 | .1900-32UNJF-3B | .221 | .498 | .350 | .232 | .040 | .275 | .062 | .31 |
| 12NC4284-2-02 | | | | | | .060 | | .082 | .32 |
| 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-S-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.

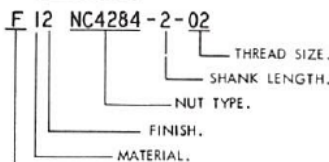
THE MOST SATISFACTORY INSTALLATIONS ARE OBTAINED WHEN THE NUT IS PRESSED INTO THE WORK UNTIL ITS SHOULDER RESTS AGAINST THE SURFACE OF THE WORK. THE SHANK SHOULD THEN BE FLARED.

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: (8) 22 AUG 89

NUT-CLINCH, FLOATING, 350°F

NC4284

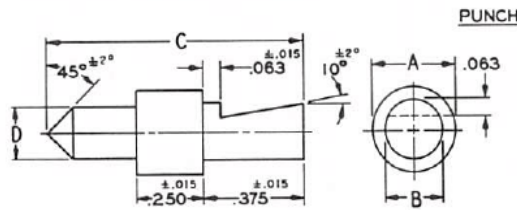
PAGE 1 OF 2



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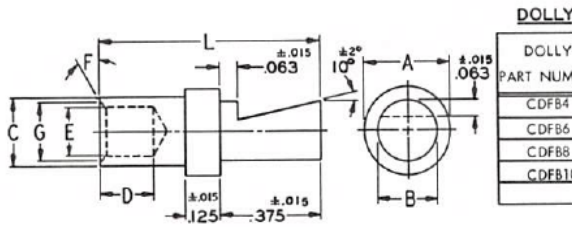
| ESNA PART NUMBER | INSTALLATION TOOLS | | MAXIMUM RECOMMENDED CLINCHING PRESSURE (LB.) | INSTALLATION HOLE DIAMETERS | |
|---------------------|-----------------------|--------|---|--------------------------------|------|
| | PUNCH | DOLLY | | MIN | MAX |
| 12NC4284-X-40 | CPFA6 | CDFB4 | 1,500 | .217 | .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 | +0.00 -0.02 | ±.015 | +0.00 -0.02 |
| CPFA10 | .307 | .200 | .919 | .213 |
| | | | | |

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

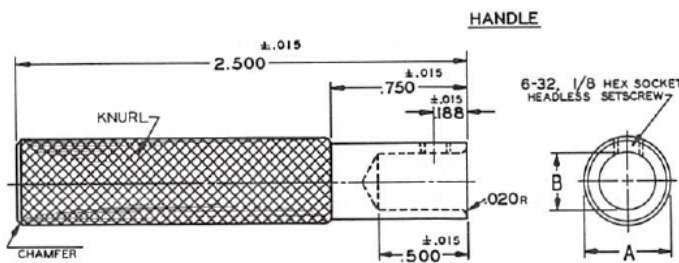
FINISH: UNPLATED.



| DOLLY PART NUMBER | A | B | C | D | E | F | G | L |
|----------------------|------|------|------|------|------|-----|------|------|
| CDFB4 | .299 | .200 | .299 | .166 | .183 | 35° | .209 | .791 |
| CDFB6 | .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 | +0.02 -0.00 |
| CHM2 | .437 | .301 |

MATERIAL: STEEL, SURFACE HARDENED.

FINISH: UNPLATED.

PJ-2550-2

REFERENCE STANDARDS:

NUT-CLINCH, FLOATING, 350°F

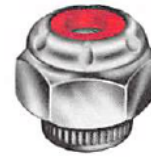
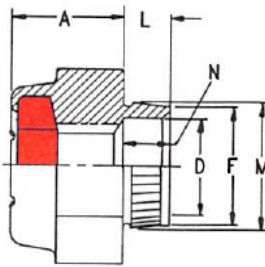
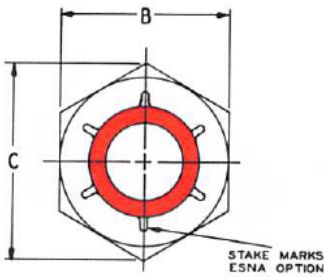
NC4284

PAGE 2 OF 2

ISSUED: 23 JUN 62 REVISED: 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 | .169 | .189 | .063 | .080 |
| 22NC2-40 | 79NC2-40 | .16 | 68NC2-40 | .06 | | | | | | | | | | | .085 | .105 |
| 22NC3-40 | 79NC3-40 | .17 | 68NC3-40 | .07 | | | | | | | | | | | .105 | .135 |
| 22NC4-40 | 79NC4-40 | .18 | | | | | | | | | | | | | .135 | .165 |
| 22NC5-40 | 79NC5-40 | .19 | 68NC5-40 | .08 | | | | | | | | | | | | |
| 22NC2-48 | | .16 | | | | | .1120-48UNJF-3B | .141 | .250 | .275 | .147 | .183 | .189 | .189 | .085 | .080 |
| 22NC3-48 | | .17 | | | | | | | | | | | | | .105 | .105 |
| 22NC1-62 | 79NC1-62 | .28 | 68NC1-62 | .12 | | | .1380-32UNJC-3B | .180 | .313 | .344 | .165 | .216 | .222 | .222 | .063 | .080 |
| 22NC2-62 | 79NC2-62 | .30 | 68NC2-62 | .12 | | | | | | | | | | | .085 | .105 |
| 22NC3-62 | 79NC3-62 | .32 | 68NC3-62 | .13 | | | | | | | | | | | .105 | .135 |
| 22NC4-62 | 79NC4-62 | .34 | 68NC4-62 | .13 | | | | | | | | | | | .135 | .165 |
| 22NC5-62 | 79NC5-62 | .36 | | | | | | | | | | | | | .165 | .195 |
| | 79NC6-62 | .38 | | | | | | | | | | | | | | |
| 22NC3-60 | | .32 | | | | | .1380-40UNJF-3B | .188 | .313 | .344 | .165 | .216 | .222 | .222 | .105 | .105 |
| 22NC1-82 | 79NC1-82 | .57 | 68NC1-82 | .22 | | | | | | | | | | | .063 | .080 |
| 22NC2-82 | 79NC2-82 | .59 | 68NC2-82 | .23 | | | .1640-32UNJC-3B | .250 | .375 | .413 | .220 | .267 | .275 | .275 | .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 | .275 | .275 | .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 | .275 | .275 | .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 | .359 | .359 | .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 | .359 | .359 | .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 |
| | 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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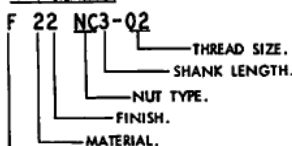
MATERIAL:

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.

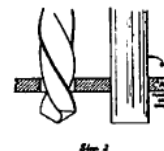
STEP 1. SELECT THE PROPER NUT, MOUNTING HOLE DIAMETER, TOOLS AND FLARING PRESSURES.

| THREAD SIZE | INSTALLATION HOLE DIAMETER | | PUNCH PART NUMBER | DOLLY PART NUMBER | MAX CLINCHING PRESSURE (POUNDS) | | | | MIN C'BORE DIAMETER (FOR FLUSH MTG ONLY) |
|-------------|----------------------------|------|-------------------|-------------------|---------------------------------|----------|----------|-----------|--|
| | | | | | STEEL NUT | CRES NUT | ALUM NUT | BRASS NUT | |
| | MIN | MAX | | | | | | | |
| .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 |

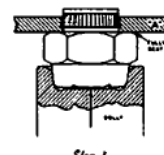
STEP 2. PREPARE THE HOLE CORRECTLY.

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 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.



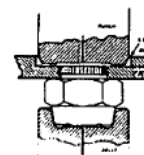
STEP 4. CLINCH OR SWAGE THE NUT SHANK.

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.



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: 25 JAN 88

REFERENCE STANDARDS:

MIL-N-45938/8

NUT - CLINCH

NC

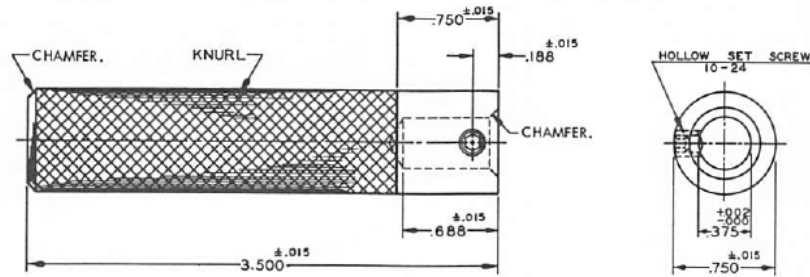
PAGE 2 OF 3



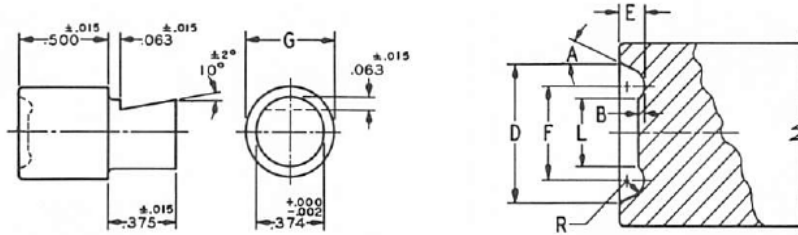
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INSTALLATION TOOL DATA:



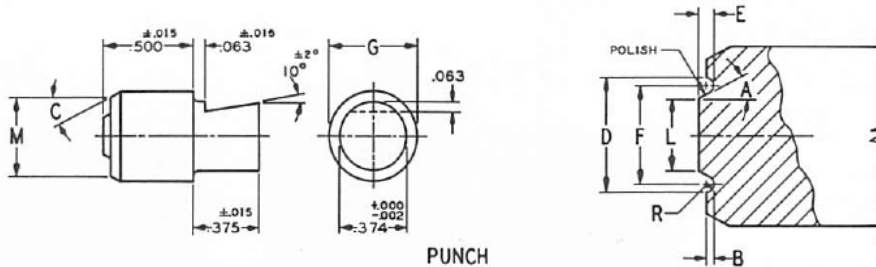
HANDLE PART NUMBER -A12165
MATERIAL: STEEL, SURFACE HARDENED. FINISH: UNPLATED.



DOLLY

| CLINCH NUT THREAD SIZE | DOLLY PART NUMBER | A ± 2° | B ± .002 | D + .002 - .000 | E ± .002 | F REF | G DIA | 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 DIA | 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: 11 25 JAN 88

REFERENCE STANDARDS:

MIL-N-45938/8

NUT - CLINCH

NC

PAGE 3 OF 3



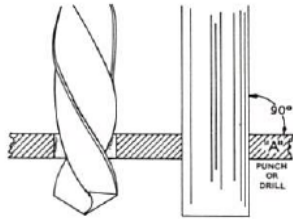
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IMPORTANT... *How to install*

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

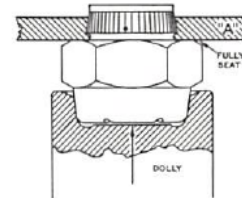
STEP 1



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.



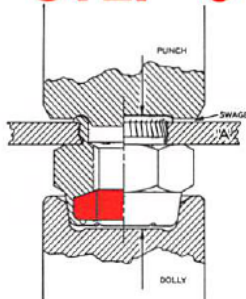
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ESNA® self-locking clinch nuts

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.

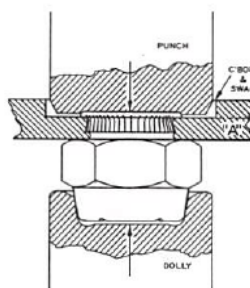


STEP 3



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 |
| ¼ | CP416 | CD416 |
| ⅝ | 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 |
| ¼ | 4000 | 4000 | 3300 |
| ⅝ | 4500 | 4500 | 3900 |

TABLE 4

STANDARD COUNTERBORE DIA

| Thread Size | Minimum Counterbore Diameter |
|-------------|------------------------------|
| 4 | .501 |
| 6 | .501 |
| 8 | .563 |
| 10 | .563 |
| ¼ | .626 |
| ⅝ | .688 |

TABLE 5



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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.

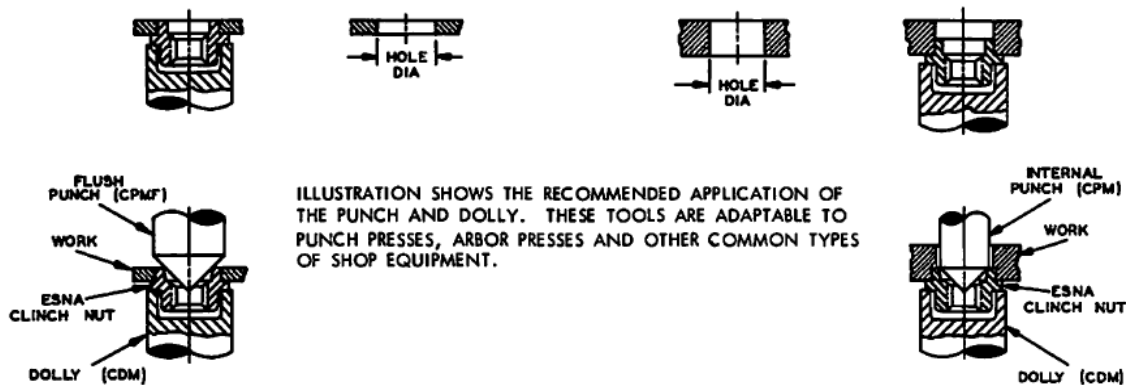
THE MOST SATISFACTORY INSTALLATIONS ARE OBTAINED WHEN THE NUT IS PRESSED INTO THE WORK UNTIL ITS SHOULDER RESTS AGAINST THE SURFACE OF THE WORK. THE SHANK SHOULD THEN BE FLARED.

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 | | | | | | | | |

TEMPORARILY OBTAINED



PJ-2218-67

REFERENCE STANDARDS:
MIL-N-45938/6

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

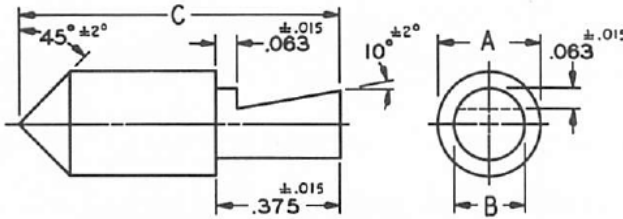
**LHCFM
LHCFM-2860**
PAGE 2 OF 3

ISSUED: 27 NOV 59 REVISED: 7 4 FEB 88



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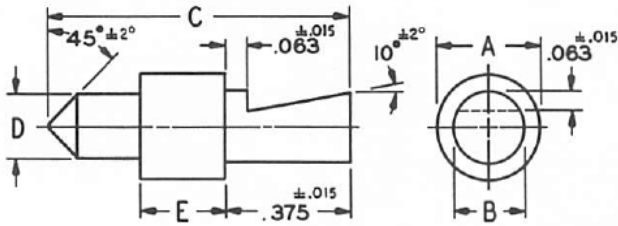
FLUSH MOUNTING PUNCH



| 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.

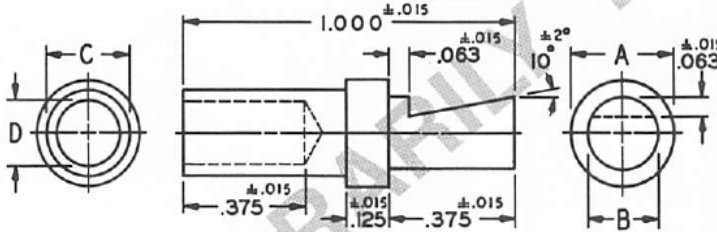
INTERNAL FLARING MOUNTING PUNCH



| 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.

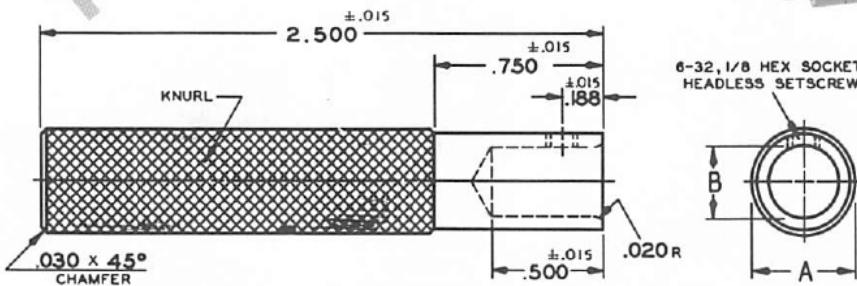
DOLLY-MINIATURE, CLINCH NUT



| DOLLY PART NUMBER | A ±.015 | B +.000 -.002 | C ±.015 | D +.000 -.002 |
|-------------------|------------|---------------------|------------|---------------------|
| 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 +.000 -.002 |
|--------------------|------------|---------------------|
| 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**

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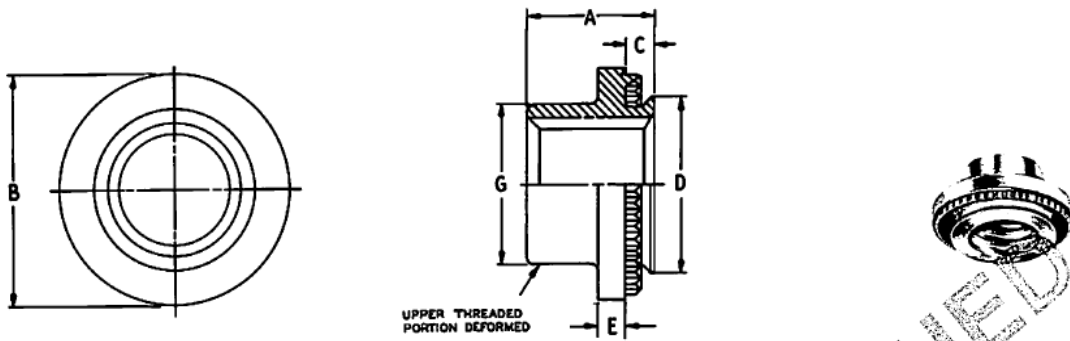
MACLEAN-ESNA

611 Country Club Road • 1-800-331-6469

FSCM-019L2

Pocahontas, Arkansas 72455 • FAX 1-501-892-8938

5



| 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 | | | | | | | | |
| RM12LHC3949-40 | F12LHC3949-40 | | | .1120-40UNJC-3B | .158 | .234 | .035 | .154 | .040 | .143 | .05 |
| RM12LHC3949-62 | F12LHC3949-62 | | | .1380-32UNJC-3B | .178 | .265 | .035 | .186 | .040 | .173 | .07 |
| | F12LHC3949-82 | RMLHC4256-82 | | .1640-32UNJC-3B | .190 | .296 | .040 | .217 | .040 | .198 | .10 |
| RM12LHC3949-02 | | RMLHC4256-02 | LHC4256-02 | .1900-32UNJF-3B | .190 | .327 | .040 | .248 | .040 | .222 | .13 |

MATERIAL:
STEEL
CRES, A286

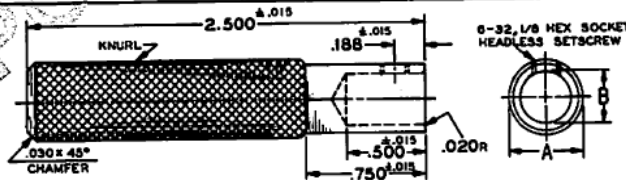
FINISH:
RM12LHC3949-XX CADMIUM PLATE PLUS DRY FILM LUBRICANT, MEETS SALT SPRAY REQUIREMENTS OF QQ-P-416, TYPE II.
F12LHC3949-XX CADMIUM PLATE, QQ-P-416, TYPE II, CLASS 3.
RMLHC4256-XX DRY FILM LUBRICANT IN LIEU OF SILVER PLATE.
LHC4256-XX SILVER PLATE, AMS2410.

THREADS: MIL-5-8879, (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

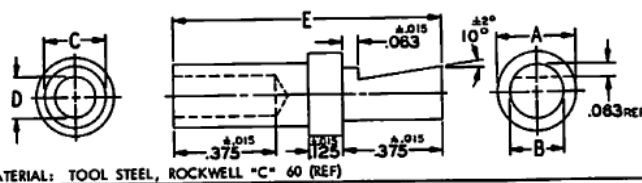


| HANDLE PART NUMBER | A ±.015 | B ±.008 |
|--------------------------|------------|------------|
| CHM1 | .312 | .201 |
| CHM2 | .437 | .301 |

MATERIAL: STEEL, SURFACE HARDENED.

FINISH: UNPLATED.

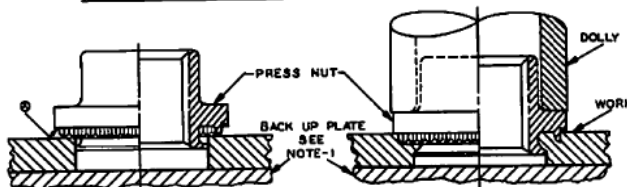
DOLLY



| DOLLY PART NUMBER | A ±.010 | B ±0.005 -0.002 | C ±.005 | D ±0.003 -0.002 | E ±.015 |
|-------------------------|------------|-----------------------|------------|-----------------------|------------|
| 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.



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

ISSUED: 10 DEC 64 REVISED: 5 4 FEB 88

REFERENCE STANDARDS:

NUT-PRESS, MINIATURE,
450°F & 800°F

LHC3949
LHC4256



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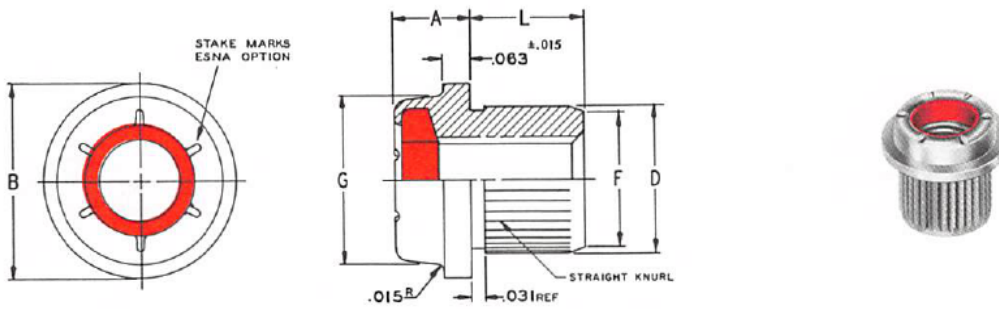


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Pocahontas, Arkansas 72455 • FAX 1-501-892-8938



| 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: (II) 2 APR 91

| | | |
|--|-------------------|--------------------------|
| REFERENCE STANDARDS: MS51866 | NUT-SPLINE | ND PAGE 1 OF 2 |
|--|-------------------|--------------------------|



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MATERIAL: STEEL

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

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

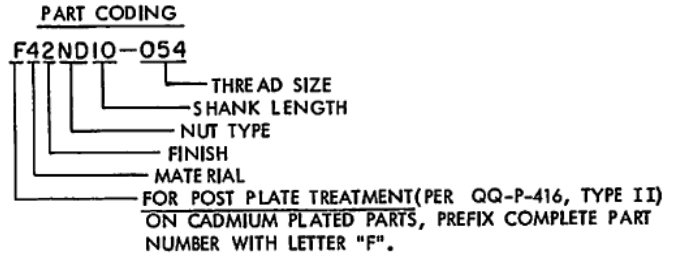
THREADS: MIL-S-8879

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.



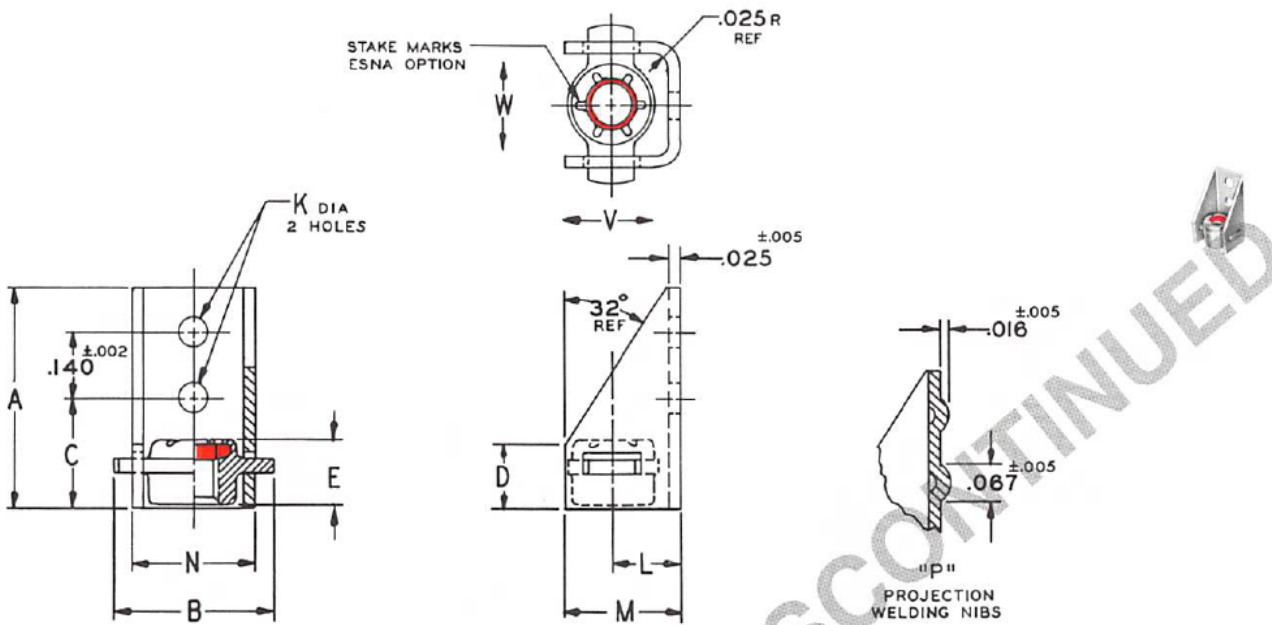
PJ- 1294

ISSUED: 25 JAN 51 REVISED: ① 2 APR 91

| | | |
|--|-------------------|------------------------------|
| <p>REFERENCE STANDARDS:</p> <p>MS51866</p> | <p>NUT-SPLINE</p> | <p>ND</p> <p>PAGE 2 OF 2</p> |
|--|-------------------|------------------------------|



(B)



| 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)

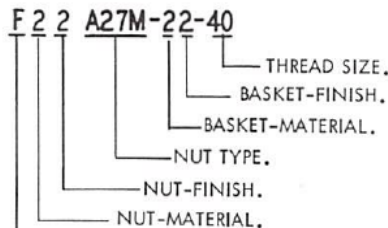
NUT - STEEL - CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 2.
BASKET - STEEL-CADMIUM PLATE, QQ-P-416, TYPE I, CLASS 2.

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.

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).

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.

PJ-2145

ISSUED: 31 JUL 56 REVISED: (B) 6 JUN 87

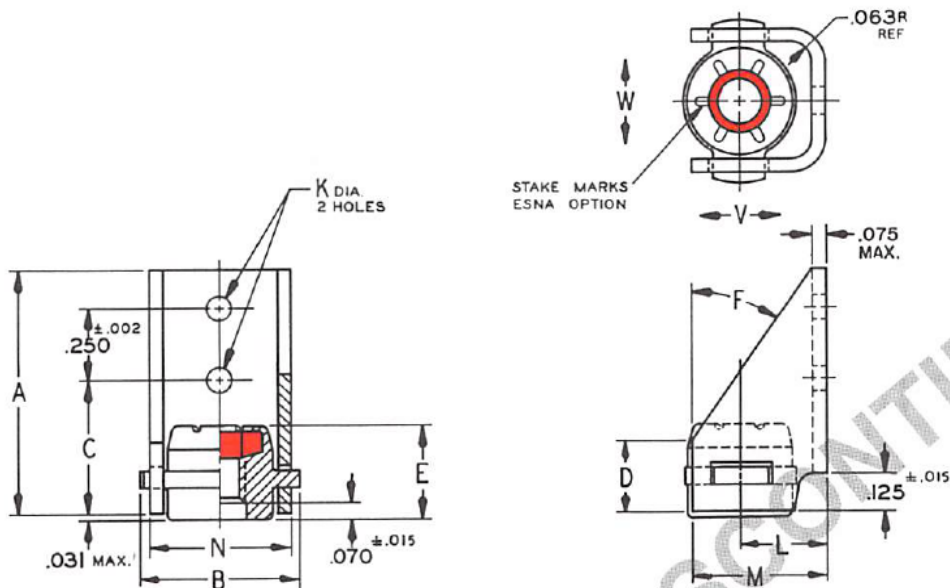
REFERENCE STANDARDS:

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

A27M



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| ESNA PART NUMBER | THREAD | A | B | C | D | E | F | K | L | M | N | APPROX WEIGHT LB/100 |
|------------------|-----------------|-------|-------|-------|-------|-------|-----|----------------|-------|-------|-------|----------------------|
| STEEL NUT | | ±.015 | ±.015 | ±.015 | ±.015 | ±.015 | REF | +.005 -.000 | ±.015 | ±.015 | ±.015 | |
| STEEL BASKET | | | | | | | | | | | | |
| 22NA27-22-62 | .1380-32UNJC-3B | .859 | .578 | .469 | .250 | .328 | 30° | .098 | .281 | .484 | .506 | 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.

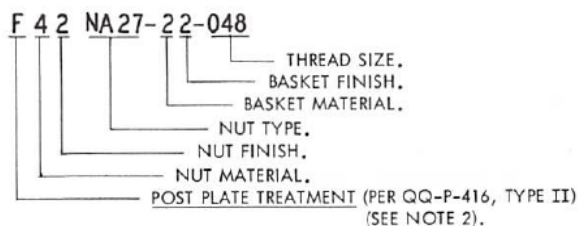
APPLICATION: TYPE NA27 PARTS ARE PRIMARILY DESIGNED FOR USE IN APPLICATIONS REQUIRING RIGHT ANGLE ATTACHMENT OF SUB-ASSEMBLIES OR COMPONENT PARTS OF ASSEMBLIES. FOR EXAMPLE, ATTACHMENT OF COVERS TO INSTRUMENT OR ELECTRICAL EQUIPMENT BOXES. THE FLOATING NUT ACCEPTS MINOR MISALIGNMENT OF MATING ASSEMBLIES.

NOTES: 1. SEE ESNA STANDARD DRAWING A27M FOR MINIATURE VERSION OF NA27.

2. 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.

3. 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.

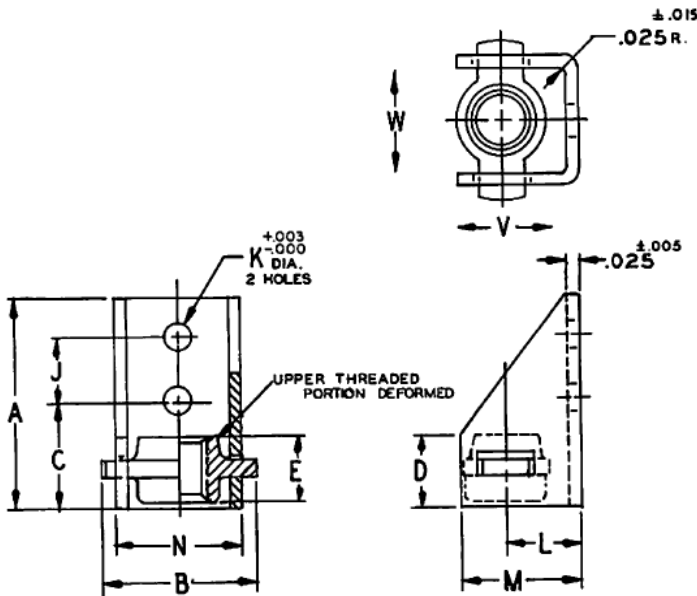
PART CODING:



PJ- 2411

ISSUED: 13 MAR 52 REVISED: 9 6 JUN 87

| | | |
|----------------------------------|--|------|
| REFERENCE STANDARDS: NAS 1033 | NUT-ANCHOR, RIGHT ANGLE, FLOATING, 250°F. | NA27 |
|----------------------------------|--|------|



TEMPORARILY DISCONTINUED

| STEEL, 450°F CAD PLUS LUBE | ESNA PART STEEL, 450°F CADMIUM | PART NUMBERS | | THREAD | A | B | C | D | E | J | K | L | M | N | APPROX WEIGHT LB/100 |
|-------------------------------|--------------------------------------|------------------------------|-----------------------|-----------------|-------|-------|-------|------|-------|------|-------|-------|------|-------|----------------------------|
| | | CRES, 450°F DRY FILM LUBE | CRES, 800°F SILVER | | ±.015 | ±.015 | ±.015 | REF | ±.015 | LOC | ±.015 | ±.015 | MAX | ±.015 | |
| RM22LHA27M-22-40 | F22LHA27M-22-40 | RMLHA27M2860-40 | LHA27M2860-40 | .120-40UNJC-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)
- LHA27M2860-XX SILVER PLATE, AMS2410. (NUT ELEMENT ONLY)

THREADS: MIL-S-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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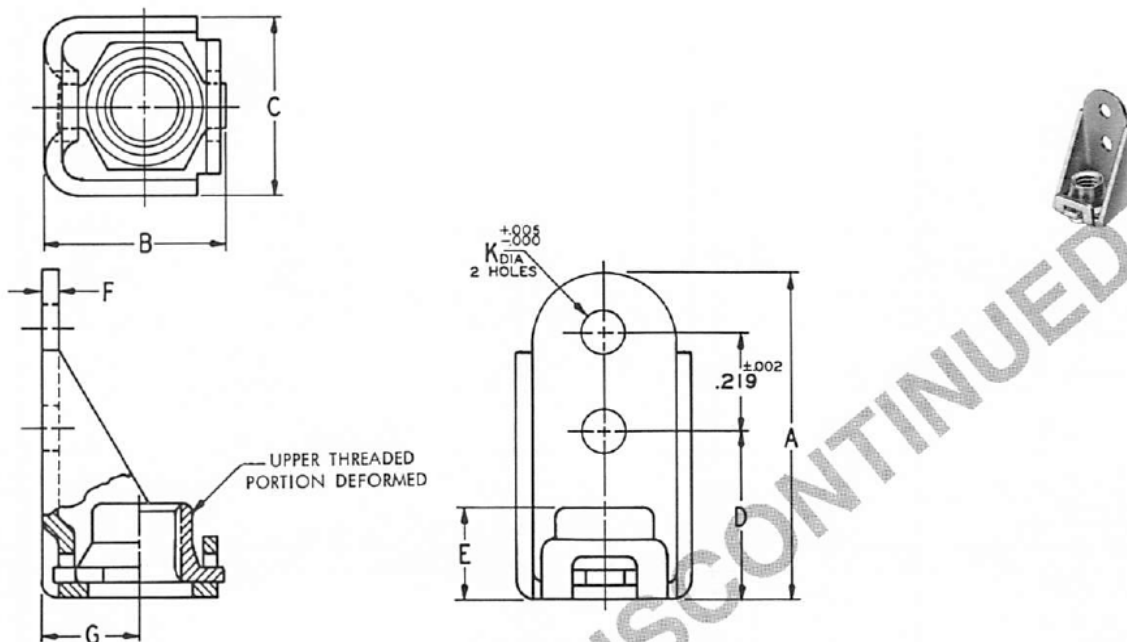
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FSCM-019L2

Pocahontas, Arkansas 72455 • FAX 1-501-892-8938

5



| ESNA | PART NUMBERS | | | THREAD | A | B | C | D | E | F | G | 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 IB MAY 87

REFERENCE STANDARDS:

MS 51552

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

LHA227
LHA228



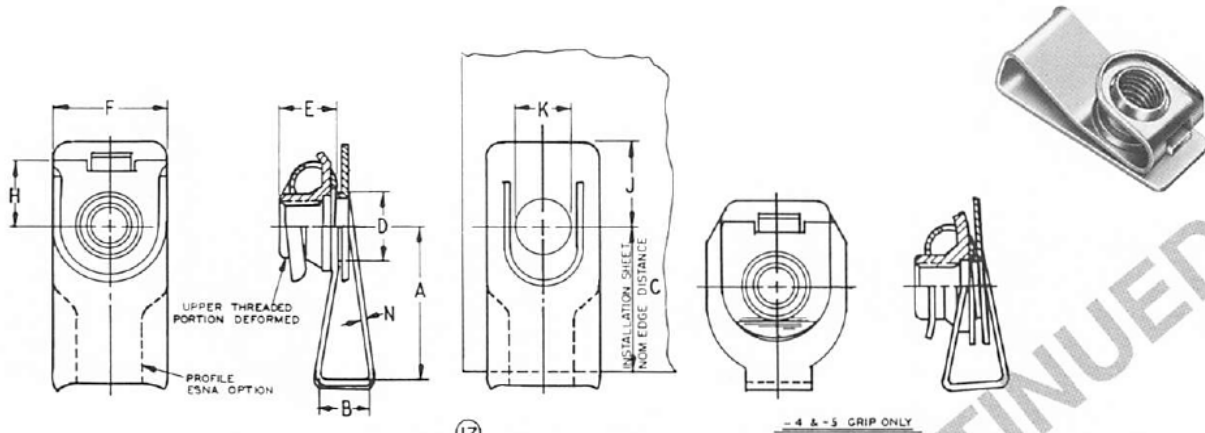
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79

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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 | MIN | REF | | | |
| RM52LHA4972-5-62 | A4972-5-62 | .1380-32UNJC-3B | .300 | .090 | .281 | .162 | .155 | .280 | .183 | .223 | .141 | .018 | .163-.173 | .030-.062 | .21 |
| RM52LHA4972-4A-82 | A4972-4A-82 | .1640-32UNJC-3B | .265 | .180 | .250 | .191 | .202 | .500 | .406 | .225 | .285 | .170 | .023 | .192-.202 | .020-.120 |
| RM52LHA4972-5A-82 | A4972-5A-82 | | .300 | .130 | .281 | | | | | | | | | | |
| RM52LHA4972-6-82 | A4972-6-82 | | .395 | .163 | .375 | | | | | | | | | | |
| RM52LHA4972-8-82 | A4972-8-82 | | .520 | .190 | .500 | | | | | | | | | | |
| RM52LHA4972-10-82 | A4972-10-82 | | .665 | .190 | .625 | | | | | | | | | | |
| RM52LHA4972-4-3 | A4972-4-3 | .1900-32UNJF-3B | .265 | .180 | .250 | .218 | .202 | .500 | .225 | .285 | .193 | .023 | .220-.230 | .020-.120 | .41 |
| RM52LHA4972-5-3 | A4972-5-3 | | .300 | .130 | .281 | | | | | | | | | | |
| RM52LHA4972-6-02 | A4972-6-02 | | .395 | .163 | .375 | | | | | | | | | | |
| RM52LHA4972-8-02 | A4972-8-02 | | .520 | .190 | .500 | | | | | | | | | | |
| RM52LHA4972-10-02 | A4972-10-02 | | .665 | .190 | .625 | | | | | | | | | | |
| RM52LHA4972-11-02 | A4972-11-02 | | .749 | .280 | .703 | | | | | | | | .140-.250 | .71 | |

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.

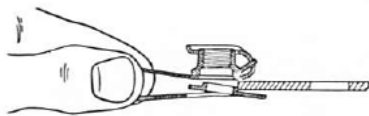
THREADS: MIL-S-8879 (PRIOR TO ADDITION OF DRY FILM LUBRICANT).

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.

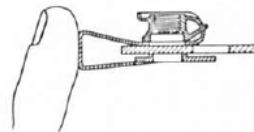
FLOAT: WHEN INSTALLED IN THE RECOMMENDED INSTALLATION HOLE, THE CLIP WILL FLOAT APPROXIMATELY .011. ADDITIONAL RADIAL FLOAT CAN BE OBTAINED BY USING LARGER HOLE SIZES. THESE PARTS ARE DESIGNED FOR A MAXIMUM INSTALLATION HOLE DIA .032 OVER THE MAXIMUM RECOMMENDED VALUES.

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.

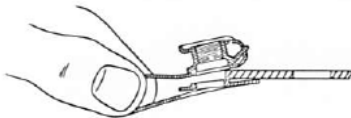
NOTE: ALL PARTS EXCEPT FOR SIZE -62 HAVE AN EFFECTIVE THREAD RELIEF OF .062.



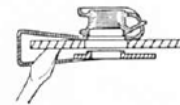
1. Holding nut in your fingers, force the clip against the work thus separating the edges of the clip.



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



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



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

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

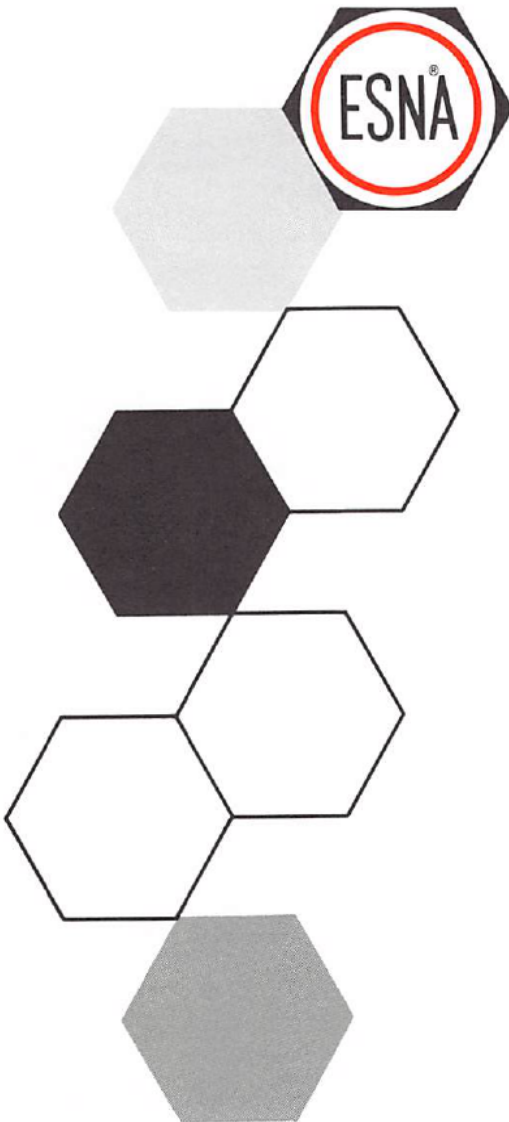
REFERENCE STANDARDS:

NUT-CLIP, FLOATING
450°F.

LHA4972



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SECTION 3 ENGINEERING DATA

| | Page Number |
|-------------------------------------|----------------|
| GAGING OF INTERNAL SCREW THREADS | 82 |
| NYLON LOCKING INSERTS | 84 |
| 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

For standardization purposes, we manufacture much of our industrial product line to the MIL-S-8879 thread dimensions. Nuts so manufactured 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.

Esna has 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 three types of gages for the inspection of nuts in conformance with Table 13 of Handbook H28 (1944). During manufacturing process inspection, variable data gages and working gages (constructed so that they are within the limits of the final inspection gages) are used. 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, using "go" and "not go" gages, 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. Variable data gages give direct readings of pitch diameter as well as functional readings.

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.

ISSUED: 10 SEPT 53 REVISED: (F) 26 MAY 87

ENGINEERING DATA

GAGING OF INTERNAL SCREW-THREADS

PAGE

48



Get quote >>



FINE

| THREAD SIZE AND CLASS | ESNA DASH NUMBER | PITCH DIAMETER | | MINOR DIAMETER | | ALLOWABLE PITCH DIAMETER LIMITS FOR GAGES | | | |
|-----------------------|------------------|----------------|--------|----------------|--------|---|--------|----------------|--------|
| | | MAX | MIN | MAX | MIN | NOT GO THREAD GAGE | | GO THREAD GAGE | |
| | | | | | | MAX | MIN | MAX | MIN |
| .0600-80UNF-3B | 00 | .0536 | .0519 | .0514 | .0465 | .0536 | .0534 | .0521 | .0519 |
| .0730-72UNF-3B | 12 | .0659 | .0640 | .0635 | .0580 | .0659 | .0657 | .0642 | .0640 |
| .0860-64UNJF-3B | 24 | .0779 | .0759 | .0749 | .0708 | .0779 | .0777 | .0761 | .0759 |
| .0990-56UNJF-3B | 36 | .0895 | .0874 | .0862 | .0816 | .0895 | .0893 | .0876 | .0874 |
| .1120-48UNJF-3B | 48 | .1008 | .0985 | .0971 | .0917 | .1008 | .1006 | .0987 | .0985 |
| .1250-44UNJF-3B | 54 | .1126 | .1102 | .1088 | .1029 | .1126 | .1124 | .1104 | .1102 |
| .1380-40UNJF-3B | 60 | .1243 | .1218 | .1202 | .1137 | .1243 | .1241 | .1220 | .1218 |
| .1640-36UNJF-3B | 86 | .1487 | .1460 | .1442 | .1370 | .1487 | .1485 | .1462 | .1460 |
| .1900-32UNJF-3B | 02 OR 3 | .1726 | .1697 | .1675 | .1596 | .1726 | .1723 | .1700 | .1697 |
| .2160-28UNJF-3B | 128 | .1959 | .1928 | .1896 | .1812 | .1959 | .1956 | .1931 | .1928 |
| .2500-28UNJF-3B | 048 OR 4 | .2300 | .2268 | .2229 | .2152 | .2300 | .2297 | .2271 | .2268 |
| .3125-24UNJF-3B | 054 OR 5 | .2890 | .2854 | .2799 | .2719 | .2890 | .2887 | .2857 | .2854 |
| .3750-24UNJF-3B | 064 OR 6 | .3516 | .3479 | .3418 | .3344 | .3516 | .3513 | .3482 | .3479 |
| .4375-20UNJF-3B | 070 OR 7 | .4091 | .4050 | .3970 | .3888 | .4091 | .4088 | .4053 | .4050 |
| .5000-20UNJF-3B | 080 OR 8 | .4717 | .4675 | .4591 | .4513 | .4717 | .4714 | .4678 | .4675 |
| .5625-18UNJF-3B | 098 OR 9 | .5308 | .5264 | .5166 | .5084 | .5308 | .5305 | .5267 | .5264 |
| .6250-18UNJF-3B | 108 OR 10 | .5934 | .5889 | .5788 | .5709 | .5934 | .5931 | .5892 | .5889 |
| .7500-16UNJF-3B | 126 OR 12 | .7143 | .7094 | .6977 | .6892 | .7143 | .7140 | .7097 | .7094 |
| .8750-14UNJF-3B | 144 OR 14 | .8339 | .8286 | .8152 | .8055 | .8339 | .8336 | .8289 | .8286 |
| 1.0000-14UNJF-3B | 164 | .9590 | .9536 | .9402 | .9305 | .9590 | .9587 | .9539 | .9536 |
| 1.0000-12UNJF-3B | 162 OR 16 | .9516 | .9459 | .9293 | .9189 | .9516 | .9513 | .9462 | .9459 |
| 1.1250-12UNJF-3B | 182 OR 18 | 1.0768 | 1.0709 | 1.0539 | 1.0439 | 1.0768 | 1.0765 | 1.0712 | 1.0709 |
| 1.2500-12UNJF-3B | 202 OR 20 | 1.2019 | 1.1959 | 1.1789 | 1.1689 | 1.2019 | 1.2016 | 1.1962 | 1.1959 |
| 1.3750-12UNJF-3B | 222 OR 22 | 1.3270 | 1.3209 | 1.3039 | 1.2939 | 1.3270 | 1.3267 | 1.3212 | 1.3209 |
| 1.5000-12UNJF-3B | 242 OR 24 | 1.4522 | 1.4459 | 1.4289 | 1.4189 | 1.4522 | 1.4519 | 1.4462 | 1.4459 |

COARSE

| | | | | | | | | | |
|------------------|-----|--------|--------|--------|--------|--------|--------|--------|--------|
| .0730-64UNC-3B | 14 | .0648 | .0629 | .0623 | .0561 | .0648 | .0646 | .0631 | .0629 |
| .0860-56UNC-3B | 26 | .0765 | .0744 | .0732 | .0686 | .0765 | .0763 | .0746 | .0744 |
| .0990-49UNC-3B | 38 | .0877 | .0855 | .0841 | .0787 | .0877 | .0875 | .0857 | .0855 |
| .1120-40UNC-3B | 40 | .0982 | .0958 | .0942 | .0877 | .0982 | .0980 | .0960 | .0958 |
| .1250-40UNC-3B | 50 | .1113 | .1088 | .1072 | .1007 | .1113 | .1111 | .1090 | .1088 |
| .1380-32UNC-3B | 62 | .1204 | .1177 | .1157 | .1076 | .1204 | .1201 | .1180 | .1177 |
| .1640-32UNC-3B | 82 | .1465 | .1437 | .1417 | .1336 | .1465 | .1462 | .1440 | .1437 |
| .1900-24UNC-3B | 04 | .1661 | .1629 | .1600 | .1494 | .1661 | .1658 | .1632 | .1629 |
| .2160-24UNC-3B | 124 | .1922 | .1889 | .1852 | .1754 | .1922 | .1919 | .1892 | .1889 |
| .2500-20UNC-3B | 040 | .2211 | .2175 | .2121 | .2013 | .2211 | .2208 | .2178 | .2175 |
| .3125-18UNC-3B | 058 | .2803 | .2764 | .2690 | .2584 | .2803 | .2800 | .2767 | .2764 |
| .3750-16UNC-3B | 066 | .3387 | .3344 | .3251 | .3142 | .3387 | .3384 | .3347 | .3344 |
| .4375-14UNC-3B | 074 | .3957 | .3911 | .3795 | .3680 | .3957 | .3954 | .3914 | .3911 |
| .5000-13UNC-3B | 083 | .4548 | .4500 | .4368 | .4251 | .4548 | .4545 | .4503 | .4500 |
| .5625-12UNC-3B | 092 | .5135 | .5084 | .4914 | .4814 | .5135 | .5132 | .5087 | .5084 |
| .6250-11UNC-3B | 101 | .5714 | .5660 | .5474 | .5365 | .5714 | .5711 | .5663 | .5660 |
| .7500-10UNC-3B | 120 | .6907 | .6850 | .6646 | .6526 | .6907 | .6904 | .6853 | .6850 |
| .8750-9UNC-3B | 149 | .8089 | .8028 | .7801 | .7668 | .8089 | .8086 | .8031 | .8028 |
| 1.000-8UNC-3B | 168 | .9254 | .9188 | .8933 | .8783 | .9254 | .9250 | .9192 | .9188 |
| 1.1250-7UNC-3B | 187 | 1.0393 | 1.0322 | 1.0030 | .9859 | 1.0393 | 1.0389 | 1.0326 | 1.0322 |
| 1.2500-7UNC-3B | 207 | 1.1644 | 1.1572 | 1.1280 | 1.1109 | 1.1644 | 1.1640 | 1.1576 | 1.1572 |
| 1.3750-6UNC-3B | 226 | 1.2745 | 1.2667 | 1.2327 | 1.2127 | 1.2745 | 1.2741 | 1.2671 | 1.2667 |
| 1.500-6UNC-3B | 246 | 1.3996 | 1.3917 | 1.3577 | 1.3377 | 1.3996 | 1.3992 | 1.3921 | 1.3917 |
| 1.7500-5UNC-3B | 285 | 1.6288 | 1.6201 | 1.5792 | 1.5552 | 1.6288 | 1.6283 | 1.6206 | 1.6201 |
| 2.0000-4.5UNC-3B | 324 | 1.8650 | 1.8557 | 1.8102 | 1.7835 | 1.8650 | 1.8645 | 1.8562 | 1.8557 |
| 2.2500-4.5UNC-3B | 364 | 2.1152 | 2.1057 | 2.0602 | 2.0335 | 2.1152 | 2.1147 | 2.1062 | 2.1057 |

ISSUED: 10 SEPT 53 REVISED: (F) 26 MAY 87

ENGINEERING DATA

GAGING OF INTERNAL SCREW-THREADS

PAGE

48.1



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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, alkalis, dilute mineral acids, and most organic acids. It is impervious to oils and greases, and in turn will have no contaminating effect 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:

| | |
|-------------------------------|-------------------------------|
| <u>Organic Acids</u> | <u>Caustics</u> |
| Conc. citric acid | 10% sodium carbonate |
| 10% lactic acid | 12% sodium hydroxide |
| Oleic acid | 0.5% ammonium hydroxide |
| Acetic acid | Soaps and detergents |
| <u>Oils</u> | <u>Mineral Salt Solutions</u> |
| Mineral oils | Sodium sulphite |
| Lubricating oils | Lithium sulphate |
| Hydrogenated vegetable oils | Ferric chloride |
| Furfural | Sat. sodium chloride |
| Varnish oil | Ferric arsenate |
| Peanut oil | Sodium fluoride |
| Castor oil | Sodium chromate |
| Corn oil | Sodium arsenate |
| Soy bean oil | Sodium stannate |
| Fish oil | Sodium tungstate |
| | Thiosulphates |
| <u>Organic Salt Solutions</u> | <u>Solvents (aromatic)</u> |
| Potassium cyanide | Benzol |
| Sodium cyanide | Toluol |
| Sodium acetate | Xylol |
| Lead acetate | Chlorobenzol |
| | Benzaldehyde |
| | Nitrobenzol |

ISSUED: 31 JAN 56 REVISED: (F) 26 MAY 87





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; ER272-2177 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





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

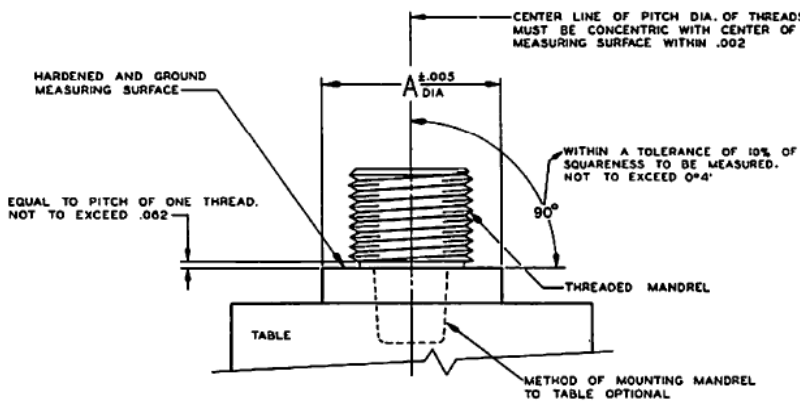


TABLE I
MAXIMUM LIMIT OF ANGULARITY OF THREAD AXIS

| 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.

ISSUED: 5 NOV 51 REVISED: (B) 26 MAY 87



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 |
| 3/4-18UNF-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.

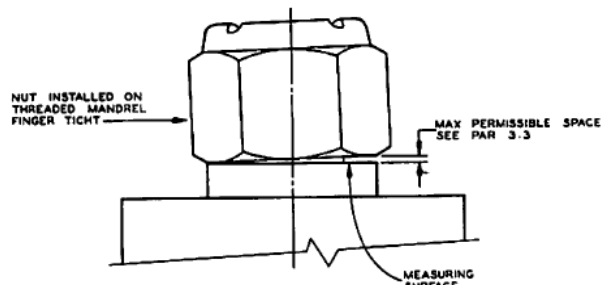
4. NOTES

- 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 H28
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 H28 | 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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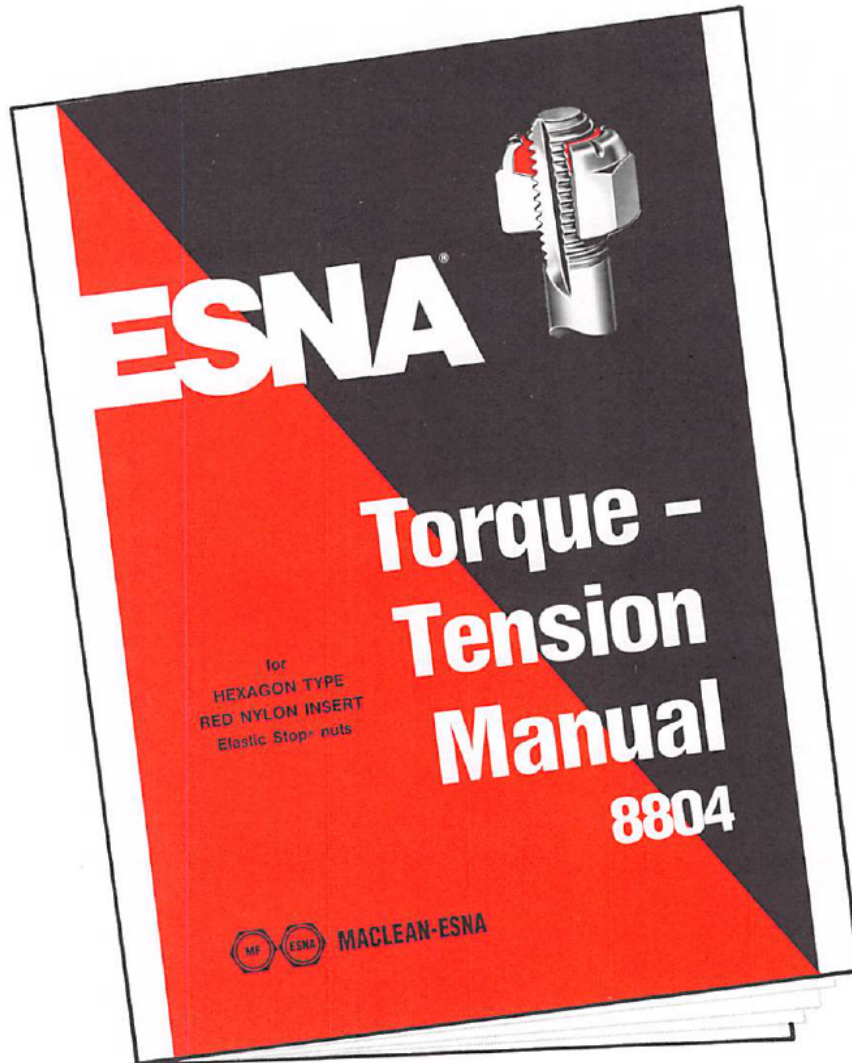
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No. 8804



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.

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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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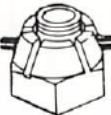
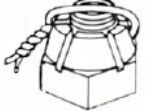






chart will help you avoid fastener failures

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

The Elastic Stop® nut with its integral red 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 take extreme vibration and shock loads, remaining locked in place under the severest conditions.

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

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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Flange Nuts and Flange Lock Nuts in Grades F and G. Our Flange Lock Nuts will have a Mac-Lock or Uni-Torque deflection.

Advantages of Flange Nuts

- Increases volume under compression.
- Reduces stress concentrations of joined materials.
- Eliminates thread dilation in nuts.
- Reduces imbedment on joined materials.
- Reduces brinnelling on joined materials.
- Improves fatigue life of the joined materials.
- Provides more uniform stress pattern in nuts.
- Increases fatigue life of nuts.
- Eliminates extra parts.
- Spans and gaps oversize and elongated holes.
- Provides greater load distribution.
- Increases bearing stress area.

Advantages of Uni-Torque and Mac-Lock

- Lock on Top — allows nut to be threaded almost all the way on the bolt before wrenching is required.
- Lock in Middle — allows locking effectiveness even when bolt does not protrude through top of nut.
- Fully Reusable — many times without galling or seizing and without appreciable loss in locking torque.
- Low Torque Scatter — provides uniform bolt loading.
- Rugged — all metal, one piece construction withstands severe vibration and shock loads.
- Precision Manufactured — on cold forming equipment to assure uniform bearing area, thus giving repeated consistent torque tension results.
- Spring Action — of lock permits locking efficiency over the entire range of bolt thread tolerances.
- Special Low or High — locking torques can be supplied for specific applications.
- Fits — standard hand or power socket wrenches.

With Uni-Torque Lock

The top thread section of the Uni-Torque Lock Nut is scientifically displaced at two 180° opposing areas. This displacement or deflection ovalizes the top threads of the nut and deflects these threads out of their helical configuration. The nature of this locking element is such that it remains spring-like through repeated applications and severe shock loads. The locking element firmly grips the flank, root and crest of the mating bolt threads.

The Uni-Torque Lock Nut starts freely on a bolt or stud like a common nut until the deflected thread portion is reached; then, it requires wrenching to final position anywhere on the mating part. The pronounced chamfer on the top of the nut makes it automatable by sight, feel or selective devices and makes it obvious that the end product is safe-guarded by a lock nut.

With Mac-Lock

The threads of a Mac-Lock Nut have been scientifically deflected at two 180° opposing areas. The semi-circular shape of this deflection together with its tapered penetration (a deflection sloping inward with maximum deflection near the top of the nut) provides a Flange Lock Nut with excellent vibration resistance and reusability of 15 times or more on most applications. The Mac-Lock concept provides gripping surfaces on the flank, root and crest of mating part threads and a spring-back effect of a body deflection through repeated shock loads. In addition, the Mac-Lock Nut locks adequately even when the bolt threads only reach the top of the nut.



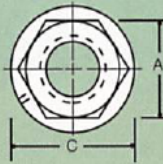
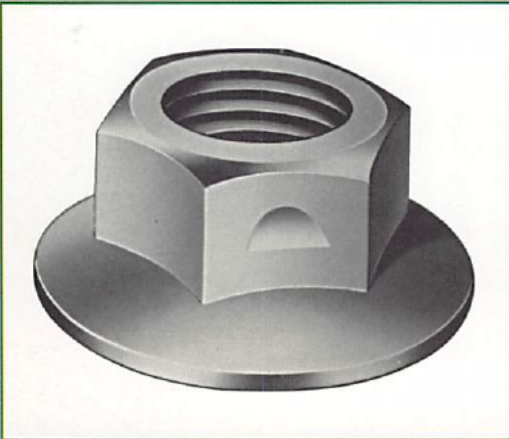
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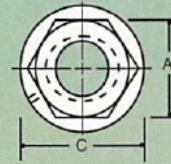
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WITHOUT LOCK



WITH MAC-LOCK
(SIDE LOCK)

SFF= Small Flange Nut Grade F

SFG= Small Flange Nut Grade G.

SFFL= Small Flange Nut Grade F with Mac-Lock (side lock)

SFGL= Small Flange Nut Grade G with Mac-Lock (side lock)

SFF

| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | C FLANGE DIA. | | CARTON QUANTITY | WEIGHT PER PC. |
|-----------|-------------------------|------|----------------|------|------------------|-------|--------------------|-------------------|
| | Max. | Min. | Max | Min. | Max. | Min. | | |
| 8-32 | .344 | .332 | .203 | .187 | .469 | .452 | 8M | .004 |
| 10-24 | .375 | .362 | .219 | .203 | .500 | .480 | 6M | .005 |
| 10-32 | .375 | .362 | .219 | .203 | .500 | .480 | 6M | .005 |
| .250-20 | .437 | .428 | .236 | .222 | .594 | .574 | 4M | .009 |
| .250-28 | .437 | .428 | .236 | .222 | .594 | .574 | 4M | .009 |
| .312-18 | .500 | .489 | .283 | .268 | .680 | .660 | 3M | .013 |
| .312-24 | .500 | .489 | .283 | .268 | .680 | .660 | 3M | .013 |
| * .375-16 | .562 | .551 | .347 | .330 | .750 | .728 | 2.2M | .018 |
| * .375-24 | .562 | .551 | .347 | .330 | .750 | .728 | 2.2M | .018 |
| .438-14 | .687 | .675 | .395 | .375 | .937 | .910 | 1M | .034 |
| .438-20 | .687 | .675 | .395 | .375 | .937 | .910 | 1M | .034 |
| * .500-13 | .750 | .736 | .458 | .437 | 1.031 | 1.000 | 800 | .044 |
| * .500-20 | .750 | .736 | .458 | .437 | 1.031 | 1.000 | 800 | .044 |

* These diameters are available in Grade G.

NOTES:

- 1) Larger diameter fasteners, 3/4" and up, are available from MacLean-Fogg's Metform Division.
- 2) Sizes and thread pitches depicted **are not necessarily available** from stock at all times.
- 3) Sizes and thread pitches **not depicted** may be available pending your volume requirements.



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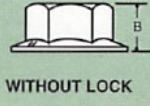
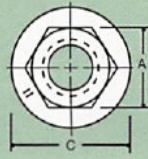
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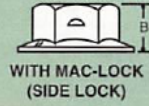
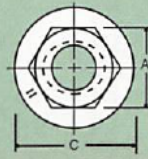
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M-F Flange Nut/Flange Lock Nut



WITHOUT LOCK



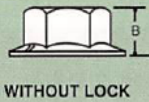
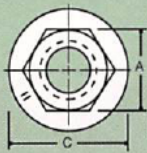
WITH MAC-LOCK
(SIDE LOCK)

LF= Large Flange Nut, Grade F

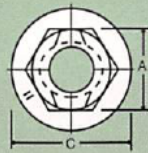
LFL= Large Flange Nut, Grade F with Mac-Lock (side lock)

LF

| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | C FLANGE DIA. | | CARTON QUANTITY | WEIGHT PER PC. |
|---------|-------------------------|------|----------------|------|------------------|-------|-----------------|----------------|
| | Max. | Min. | Max. | Min. | Max. | Min. | | |
| .250-20 | .437 | .428 | .312 | .281 | .728 | .700 | 3M | .012 |
| .250-28 | .437 | .428 | .312 | .281 | .728 | .700 | 3M | .012 |
| .313-18 | .500 | .489 | .375 | .343 | .820 | .790 | 2M | .022 |
| .313-24 | .500 | .489 | .375 | .343 | .820 | .790 | 2M | .022 |
| .375-16 | .562 | .551 | .406 | .390 | .915 | .885 | 1.2M | .028 |
| .375-24 | .562 | .551 | .406 | .390 | .915 | .885 | 1.2M | .028 |
| .438-14 | .687 | .675 | .468 | .437 | 1.131 | 1.100 | 800 | .05 |
| .438-20 | .687 | .675 | .468 | .437 | 1.131 | 1.100 | 800 | .05 |
| .500-13 | .750 | .736 | .515 | .485 | 1.205 | 1.171 | 600 | .055 |
| .500-20 | .750 | .736 | .515 | .485 | 1.205 | 1.171 | 600 | .055 |



WITHOUT LOCK



WITH UNI-TORQUE

LFH= Super Flange Nut, Grade F

LFHU= Super Flange Nut, Grade F with Uni-Torque (top lock)

LFH

| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | C FLANGE DIA. | | CARTON QUANTITY | WEIGHT PER PC. |
|---------|-------------------------|------|----------------|------|------------------|-------|-----------------|----------------|
| | Max. | Min. | Max. | Min. | Max. | Min. | | |
| .250-20 | .500 | .488 | .312 | .281 | .906 | .812 | 2M | .019 |
| .250-28 | .500 | .488 | .312 | .281 | .906 | .812 | 2M | .019 |
| .313-18 | .562 | .546 | .375 | .343 | .968 | .875 | 1.6M | .028 |
| .313-24 | .562 | .546 | .375 | .343 | .968 | .875 | 1.6M | .028 |
| .375-16 | .687 | .669 | .406 | .390 | 1.093 | 1.000 | 1M | .046 |
| .375-24 | .687 | .669 | .406 | .390 | 1.093 | 1.000 | 1M | .046 |

NOTES:

- 1) Larger diameter fasteners, 3/4" and up, are available from MacLean-Fogg's Metform Division.
- 2) Sizes and thread pitches depicted **are not necessarily available** from stock at all times.
- 3) Sizes and thread pitches **not depicted** may be available pending your volume requirements.



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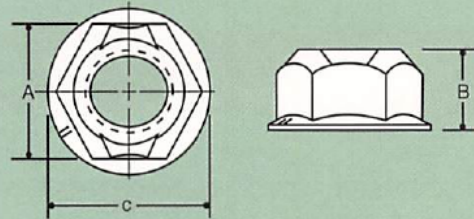
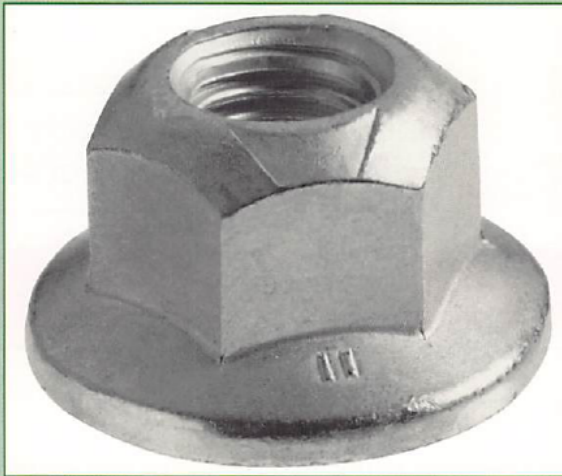
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Uni-Torque grade F & G Flange Lock Nuts are prevailing torque lock nuts with a scientifically deflected thread locking element at the top of the nut.



ASFFU= Chamfered Top Small Flange Nut, Grade F with Uni-Torque

ASFGU= Chamfered Small Flange Nut, Grade G with Uni-Torque

ASFFU

| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | C FLANGE DIA. | | CARTON QUANTITY | WEIGHT PER PC. |
|---------|-------------------------|------|----------------|------|------------------|-------|--------------------|-------------------|
| | Max. | Min. | Max. | Min. | Max. | Min. | | |
| .250-20 | .438 | .428 | .291 | .271 | .594 | .574 | 5M | .01 |
| .250-28 | .438 | .428 | .291 | .271 | .594 | .574 | 5M | .01 |
| .313-18 | .502 | .489 | .338 | .318 | .680 | .660 | 4M | .014 |
| .313-24 | .502 | .489 | .338 | .318 | .680 | .660 | 4M | .014 |
| .375-16 | .564 | .551 | .385 | .365 | .750 | .728 | 2.5M | .022 |
| .375-24 | .564 | .551 | .385 | .365 | .750 | .728 | 2.5M | .022 |
| .438-14 | .689 | .675 | .450 | .430 | .937 | .910 | 1.5M | .04 |
| .438-20 | .689 | .675 | .450 | .430 | .937 | .910 | 1.5M | .04 |
| .500-13 | .752 | .736 | .510 | .490 | 1.031 | 1.000 | 1M | .05 |
| .500-20 | .752 | .736 | .510 | .490 | 1.031 | 1.000 | 1M | .05 |

NOTES:

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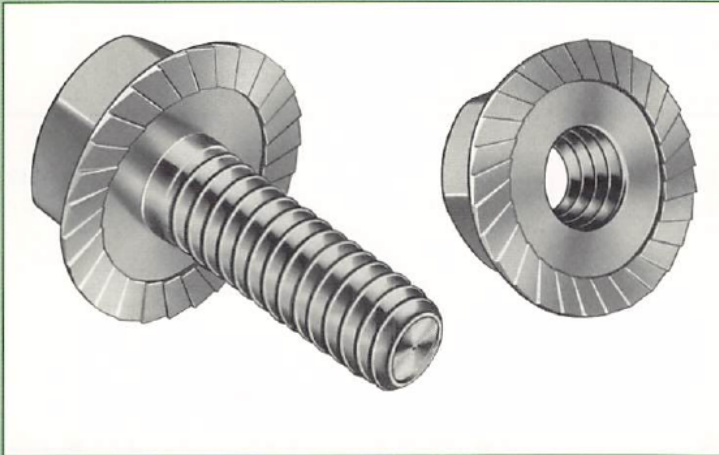
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A time-tested system for fastening products faster and better. One-piece, all metal, free spinning nuts and screws that spin on...lock when seated.

HOW IT WORKS

The underside or bearing surface side of a Whiz-Lock Fastener has a series of spiraling serrations or teeth. The number, shape, height and curve of the teeth are important features in producing the high breakloose (off) torque in comparison to application (on) torque.

All Whiz-Lock products are case hardened to a surface hardness of Rockwell C40 to insure infinite reliability and higher strength.

The convex angle of the base further improves the locking effectiveness of the teeth. This feature permits first contact of the base of the Whiz-Lock Nut or Screw nearest the hole in the bearing surface and produces a better contact—particularly when the bearing surface is not flat or where the Whiz-Lock is being applied to the depressed side of punched holes.

Whiz-Locks are designed so that they do not grip or oppose rotation as the Whiz-Lock is wrenched down on a bearing surface; but when vibration, shock, load, or other loosening forces are applied, the teeth grip the bearing surface with unequalled locking power. It actually takes over 30% more torque to remove a Whiz-Lock than to apply it.

The unique Whiz-Lock design—the teeth and the convex base—is verified by patents in major countries throughout the world. Simply, no other combination of teeth and base design can even approach the performance of Whiz-Lock fasteners.

The Flange type Whiz-Lock is recommended particularly for spanning large and elongated holes and spreading the bolt load over a larger area; the Twin Hex type Whiz-Lock is suitable for most other applications.

ADVANTAGES

One-Piece Construction

- Eliminates lock washers and multiple fastener assemblies.
- Improves product reliability and eliminates inspection rejects due to lock washer omission.
- Eliminates extra motions for assembly line personnel.
- Simplifies inventory — one part instead of two or three.

Flange Base

- Provides more strength than standard fasteners.
- Gaps oversize and elongated holes.
- Allows for and covers up extra tolerances in hole sizes for more efficient production assemblies.
- Distributes bolt load over greater area.
- Provides non-distortion bearing area on soft light metals and wood.

Excellent Lock

- Takes more torque to remove than to apply.
- The Whiz-Lock has a breakloose torque that averages 30% higher than application torque when joint clamp load is 70/75% of bolt proof load. It takes 30% more energy to remove a Whiz-Lock than to apply it. No other free spinning fastener can equal this. Whiz-Lock is as easy to apply as a common nut or screw, yet it locks *better than* lock washer and nut and screw combinations.

Fully Reusable

- Teeth and surface case hardened to Rockwell C40 minimum; never get dull; can be reapplied 15 times or more.



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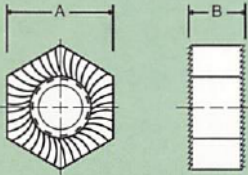
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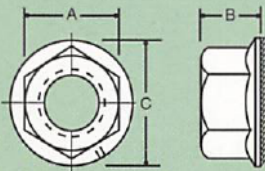
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WLT= Twin Whiz-Lock Hex Nut

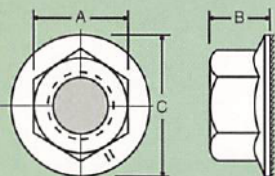


| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | CARTON QUANTITY | WEIGHT PER PC. |
|---------|-------------------------|------|----------------|------|--------------------|-------------------|
| | Max. | Min. | Max. | Min. | | |
| 8-32 | .344 | .332 | .160 | .150 | 20M | .004 |
| 10-24 | .375 | .362 | .203 | .187 | 10M | .005 |
| 10-32 | .375 | .362 | .203 | .187 | 10M | .005 |
| .250-20 | .437 | .428 | .226 | .212 | 8M | .006 |
| .250-28 | .437 | .428 | .226 | .212 | 8M | .006 |
| .313-18 | .500 | .489 | .273 | .258 | 5M | .009 |
| .313-24 | .500 | .489 | .273 | .258 | 5M | .009 |
| .375-16 | .562 | .551 | .337 | .320 | 4M | .015 |
| .375-24 | .562 | .551 | .337 | .320 | 4M | .015 |



WLF= Whiz-Lock Flange Nut

| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | C FLANGE DIA. | | CARTON QUANTITY | WEIGHT PER PC. |
|---------|----------------------------|------|----------------|------|------------------|-------|--------------------|-------------------|
| | Max. | Min. | Max. | Min. | Max. | Min. | | |
| 6-32 | .312 | .302 | .200 | .179 | .447 | .401 | 15M | .003 |
| 8-32 | .344 | .332 | .232 | .200 | .500 | .453 | 10M | .005 |
| 10-24 | .375 | .362 | .240 | .200 | .531 | .484 | 10M | .007 |
| 10-32 | .375 | .362 | .240 | .200 | .531 | .484 | 10M | .007 |
| .250-20 | .437 | .428 | .255 | .230 | .609 | .562 | 5M | .009 |
| .250-28 | .437 | .428 | .255 | .230 | .609 | .562 | 5M | .009 |
| .313-18 | .500 | .489 | .297 | .268 | .687 | .641 | 4M | .012 |
| .313-24 | .500 | .489 | .297 | .268 | .687 | .641 | 4M | .012 |
| .375-16 | .562 | .551 | .359 | .330 | .750 | .703 | 3M | .018 |
| .375-24 | .562 | .551 | .359 | .330 | .750 | .703 | 3M | .018 |
| .438-14 | .687 | .675 | .395 | .375 | .937 | .910 | 1.5M | .033 |
| .438-20 | .687 | .675 | .395 | .375 | .937 | .910 | 1.5M | .033 |
| .500-13 | .750 | .736 | .459 | .437 | 1.062 | 1.000 | 1M | .044 |
| .500-20 | .750 | .736 | .459 | .437 | 1.062 | 1.000 | 1M | .044 |

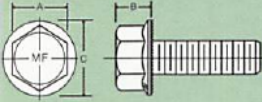


WLB= Whiz-Lock Large Flange Nut

| | | | | | | | | |
|---------|------|------|------|------|------|------|------|------|
| .250-20 | .437 | .428 | .312 | .281 | .728 | .687 | 4M | .012 |
| .250-28 | .437 | .428 | .312 | .281 | .728 | .687 | 4M | .012 |
| .313-18 | .500 | .489 | .375 | .343 | .823 | .790 | 3M | .022 |
| .313-24 | .500 | .489 | .375 | .343 | .823 | .790 | 3M | .022 |
| .375-16 | .562 | .551 | .406 | .390 | .915 | .884 | 1.5M | .028 |
| .375-24 | .562 | .551 | .406 | .390 | .915 | .884 | 1.5M | .028 |

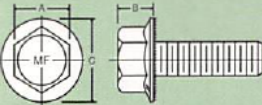


WLFS= Whiz-Lock Flange Screw



| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | C FLANGE DIA. | | L RANGE OF THREAD LENGTHS |
|---------|----------------------------|------|----------------|------|------------------|-------|------------------------------------|
| | Max. | Min. | Max. | Min. | Max. | Min. | |
| 6-32 | .187 | .181 | .157 | .132 | .266 | .254 | 1/4 to 1" |
| 8-32 | .250 | .244 | .186 | .161 | .355 | .341 | 1/4 to 1" |
| 10-24 | .312 | .305 | .210 | .185 | .441 | .425 | 1/4 to 1" |
| 10-32 | .312 | .305 | .210 | .185 | .441 | .425 | 1/4 to 1" |
| .250-20 | .375 | .367 | .240 | .216 | .531 | .513 | 3/8 to 2" |
| .250-28 | .375 | .367 | .240 | .216 | .531 | .513 | 3/8 to 2" |
| .313-18 | .500 | .491 | .298 | .274 | .706 | .686 | 1/2 to 2" |
| .313-24 | .500 | .491 | .298 | .274 | .706 | .686 | 1/2 to 2" |
| .375-16 | .562 | .552 | .331 | .307 | .793 | .771 | 3/4 to 2" |
| .375-24 | .562 | .552 | .331 | .307 | .793 | .771 | 3/4 to 2" |
| .438-14 | .625 | .612 | .385 | .365 | .884 | .856 | 3/4 to 2" |
| .438-20 | .625 | .612 | .385 | .365 | .884 | .856 | 3/4 to 2" |
| .500-13 | .750 | .736 | .460 | .430 | 1.062 | 1.027 | 3/4 to 2" |
| .500-20 | .750 | .736 | .460 | .430 | 1.062 | 1.027 | 3/4 to 2" |

WLLF= Whiz-Lock Large Flange Screw



| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | C FLANGE DIA. | | L RANGE OF THREAD LENGTHS |
|---------|----------------------------|------|----------------|------|------------------|------|------------------------------------|
| | Max. | Min. | Max. | Min. | Max. | Min. | |
| .250-20 | .375 | .367 | .244 | .230 | .625 | .607 | 3/8 to 2" |
| .250-28 | .375 | .367 | .244 | .230 | .625 | .607 | 3/8 to 2" |
| .313-18 | .500 | .489 | .308 | .293 | .820 | .800 | 1/2 to 2" |
| .313-24 | .500 | .489 | .308 | .293 | .820 | .800 | 1/2 to 2" |
| .375-16 | .562 | .551 | .349 | .332 | .915 | .890 | 3/4 to 2" |
| .375-24 | .562 | .551 | .349 | .332 | .915 | .890 | 3/4 to 2" |

NOTES:

- 1) Length ranges depicted are **not necessarily available** from stock at all times.
- 2) Other lengths **not depicted** may be available pending your volume requirements.





The Two-Way Lock Nut is a one piece, all metal, prevailing torque lock nut with a deflected thread locking element in the center of the nut.



ADVANTAGES

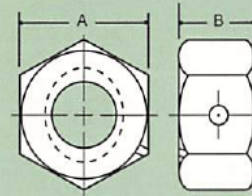
Always Right Side Up — Double Chamfered — top and bottom alike — can be applied from either direction.

Automatable — applicable on automatic assembly lines without use of selective devices.

Simple, one piece, all metal construction; fits standard socket wrenches.

Lock in Center — permits use of shorter bolt. The bolt threads need not protrude from top of nut for lock to work properly — saves on length and cost of bolt and in weight of completed product.

Reusable 5 times or more under normal conditions. Satisfactory locking torque maintained through repeated applications.



TWA= Two-Way Grade A Locknut

TWA

| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | CARTON QUANTITY | WEIGHT PER PC. |
|---------|-------------------------|------|----------------|------|--------------------|-------------------|
| | Max. | Min. | Max. | Min. | | |
| 8-32 | .343 | .332 | .187 | .171 | 13M | .004 |
| 10-24 | .375 | .362 | .203 | .187 | 10M | .005 |
| 10-32 | .375 | .362 | .203 | .187 | 10M | .005 |
| .250-20 | .437 | .428 | .226 | .212 | 7M | .007 |
| .313-18 | .500 | .489 | .273 | .258 | 4M | .010 |
| .313-24 | .500 | .489 | .273 | .258 | 4M | .011 |
| .375-16 | .562 | .551 | .337 | .320 | 3M | .015 |
| .375-24 | .562 | .551 | .337 | .320 | 3M | .016 |
| .438-20 | .687 | .675 | .385 | .365 | 1.5M | .028 |
| .500-13 | .750 | .736 | .448 | .427 | 1.2M | .035 |
| .500-20 | .750 | .736 | .448 | .427 | 1.2M | .036 |
| .625-11 | .937 | .922 | .559 | .535 | 600 | .071 |

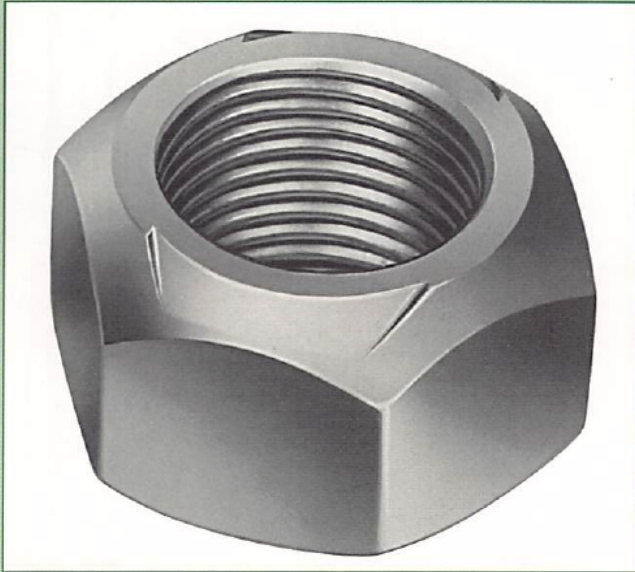
NOTES:

- 1) Larger diameter fasteners, 3/4" and up, are available from MacLean-Fogg's Metform Division.
- 2) Sizes and thread pitches depicted are not necessarily available from stock at all times.
- 3) Sizes and thread pitches not depicted may be available pending your volume requirements.





The Uni-Torque Lock Nut is an all metal, one piece prevailing torque lock nut with a scientifically deflected thread locking element at the top of the nut.



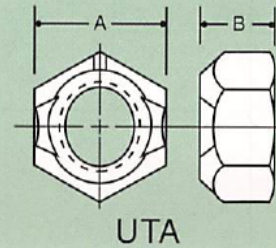
ADVANTAGES

- Lock on Top** — allows nut to be threaded almost all the way on the bolt before wrenching is required.
- Fully Reusable** — many times without galling or seizing and without appreciable loss in locking torque.
- Low Torque Scatter** — provides uniform bolt loading.
- Rugged** — all metal one piece construction with-stands severe vibration and shock loads.
- Chamfered Top** — in most sizes, shape identifies top and enables automatic feeding.
- Spring Action** — of lock permits locking efficiency over the entire range of bolt thread tolerances.
- Special Low or High** — locking torques can be supplied for specific applications.

UTA= Uni-Torque Grade A Lock Nut

UTB= Uni-Torque Grade B Lock Nut

UTC= Uni-Torque Grade C Lock Nut



UTA

| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | CARTON . QUANTITY | WEIGHT PER PC. |
|---------|-------------------------|------|----------------|------|----------------------|-------------------|
| | Max. | Min. | Max. | Min. | | |
| 10-24 | .375 | .362 | .130 | .117 | 15M | .003 |
| 10-32 | .375 | .362 | .130 | .117 | 15M | .003 |
| .250-20 | .437 | .428 | .226 | .212 | 7M | .007 |
| .313-18 | .500 | .489 | .273 | .258 | 4.5M | .01 |
| .313-24 | .500 | .489 | .273 | .258 | 4.5M | .01 |
| .375-16 | .562 | .551 | .337 | .320 | 3M | .014 |
| .375-24 | .562 | .551 | .337 | .320 | 3M | .014 |
| .438-14 | .687 | .675 | .385 | .365 | 1.5M | .025 |
| .438-20 | .687 | .675 | .385 | .365 | 1.5M | .025 |
| .500-13 | .750 | .736 | .448 | .427 | 1.2M | .035 |
| .500-20 | .750 | .736 | .448 | .427 | 1.2M | .035 |
| .625-11 | .937 | .922 | .559 | .535 | 600 | .07 |

NOTE: Grade A Numbered Sizes = UTX

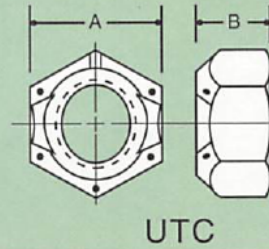
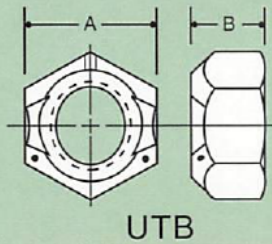


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UTB

| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | CARTON QUANTITY | WEIGHT PER PC. |
|---------|-------------------------|------|----------------|------|--------------------|-------------------|
| | Max. | Min. | Max. | Min. | | |
| .250-20 | .437 | .428 | .257 | .243 | 5.5M | .008 |
| .250-28 | .437 | .428 | .257 | .243 | 5.5M | .008 |
| .313-18 | .500 | .489 | .302 | .292 | 3.5M | .011 |
| .313-24 | .500 | .489 | .302 | .292 | 3.5M | .011 |
| .375-16 | .562 | .551 | .377 | .360 | 2.5M | .016 |
| .375-24 | .562 | .551 | .377 | .360 | 2.5M | .016 |
| .500-13 | .750 | .736 | .510 | .490 | 1M | .038 |
| .500-20 | .750 | .736 | .510 | .490 | 1M | .038 |
| .625-11 | .937 | .922 | .645 | .621 | 500 | .079 |
| .625-18 | .937 | .922 | .645 | .621 | 500 | .079 |

UTC

| SIZE | A WIDTH ACROSS FLATS | | B THICKNESS | | CARTON QUANTITY | WEIGHT PER PC. |
|---------|-------------------------|------|----------------|------|--------------------|-------------------|
| | Max. | Min. | Max. | Min. | | |
| .250-20 | .437 | .428 | .226 | .212 | 7M | .006 |
| .250-28 | .437 | .428 | .226 | .212 | 7M | .006 |
| .313-18 | .500 | .489 | .273 | .258 | 4.5M | .01 |
| .313-24 | .500 | .489 | .273 | .258 | 4.5M | .01 |
| .375-16 | .562 | .551 | .337 | .320 | 3M | .014 |
| .375-24 | .562 | .551 | .337 | .320 | 3M | .014 |
| .438-14 | .687 | .675 | .385 | .365 | 1.5M | .025 |
| .438-20 | .687 | .675 | .385 | .365 | 1.5M | .025 |
| .500-13 | .750 | .736 | .448 | .427 | 1.2M | .034 |
| .500-20 | .750 | .736 | .448 | .427 | 1.2M | .034 |
| .563-12 | .875 | .861 | .496 | .473 | 800 | .054 |
| .563-18 | .875 | .861 | .496 | .473 | 800 | .054 |
| .625-11 | .937 | .922 | .559 | .535 | 600 | .066 |
| .625-18 | .937 | .922 | .559 | .535 | 600 | .066 |

NOTES:

- 1) Larger diameter fasteners, 3/4" and up, are available from MacLean-Fogg's Metform Division.
- 2) Sizes and thread pitches depicted **are not necessarily available** from stock at all times.
- 3) Sizes and thread pitches **not depicted** may be available pending your volume requirements.



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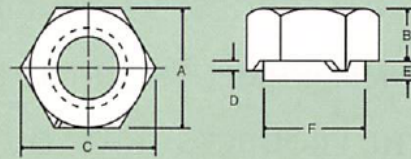
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M-F Hex Weld Nut Short Pilot and Long Pilot



SPH= Short Pilot Hex Weld Nut

LPH= Long Pilot Hex Weld Nut

SPH & LPH

| Size | A Width Across Flats | | B Thickness | | C Width Across Corners Min. | D | | E | | F Pilot Dia. +.000 -.012 | Clear. Hole Size | Carton Quant. |
|---------|-------------------------------|------|----------------|------|---|--|---|--|---|--------------------------------------|------------------------|------------------|
| | Max. | Min. | Max. | Min. | | Proj. Height Short Pilot ±.003 | Proj. Height Long Pilot ±.003 | Pilot Height Short Pilot ±.005 | Pilot Height Long Pilot ±.005 | | | |
| .250-20 | .500 | .489 | .197 | .177 | .556 | .025 | .040 | .040 | .085 | .406 | 27/64 | 5M |
| .313-18 | .562 | .551 | .229 | .209 | .624 | .025 | .040 | .040 | .085 | .469 | 31/64 | 4M |
| .313-24 | .562 | .551 | .229 | .209 | .624 | .025 | .040 | .040 | .085 | .469 | 31/64 | 4M |
| .375-16 | .625 | .612 | .260 | .240 | .691 | .030 | .040 | .050 | .085 | .531 | 35/64 | 3M |
| .438-14 | .750 | .736 | .322 | .302 | .830 | .035 | .040 | .050 | .085 | .656 | 43/64 | 1.5M |
| .500-13 | .813 | .781 | .385 | .365 | .898 | .035 | .040 | .060 | .085 | .719 | 47/64 | 1M |

NOTES: 1) Other styles available based on volume
2) Teflon thread coating available on our weld nuts (based on volume)



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MACLEAN-FOGG HAS BEEN A LEADING INNOVATOR IN FASTENER DESIGN AND MANUFACTURING DISCIPLINES FOR OVER 70 YEARS. WE COMBINE COLD FORMING, HOT FORMING, STAMPING, MACHINING, ASSEMBLY AND INSERT MOLDING TECHNOLOGIES TO PROVIDE DESIGN SOLUTIONS TO ENGINEERING CHALLENGES. WE HAVE PHOTOGRAPHICALLY DEPICTED MANY OF OUR ACCOMPLISHMENTS ON THE FOLLOWING PAGES. LISTED BELOW ARE SOME OF THE PRODUCTS THAT YOU WILL SEE.

- METRIC FREE SPINNING AND PREVAILING TORQUE LOCK NUTS - SIZES M5-M22 IN PROPERTY CLASSES 9 & 10. THESE METRIC FASTENERS ARE AVAILABLE IN A WIDE VARIETY OF STYLES.
- THREAD CLEAR NUTS - INCH AND METRIC
- "PRIVATE LABEL" FASTENERS
- TEFLON COATING OF WELD NUTS
- LOCKING ADHESIVES ON MALE AND FEMALE THREADED FASTENERS
- NYLON INSERT NUTS AND NYLON INSERT FLANGE LOCK NUTS - 1/4" - 3/4" IN GRADES 2, 5 & 8 AND METRIC NUTS - M5 - M22 IN PROPERTY CLASSES 9 & 10
- MALE THREADED FASTENERS
- NUT AND WASHER ASSEMBLIES
- NUT AND BRACKET ASSEMBLIES
- SPECIAL COLD FORMED COMPONENTS
- INSERT MOLDED FASTENING DEVICES
- MACLEAN-ESNA SPECIAL SCREW MACHINE PRODUCTS





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MACLEAN-FOGG HAS BEEN SUCCESSFUL IN THE DESIGN AND MANUFACTURE OF A WIDE VARIETY OF ENGINEERED AND PATENT DIFFERENTIATED PRODUCTS. WE COMBINE COLD & HOT FORMING, MACHINING, STAMPING AND OTHER TECHNOLOGIES TO PROVIDE DESIGN SOLUTIONS TO ENGINEERING CHALLENGES.

ON THE PREVIOUS PAGE, YOU WILL SEE EXAMPLES OF THE FOLLOWING:

- METRIC FASTENERS OF ALL GRADES AND STYLES
- THREAD CLEAR NUTS DESIGNED TO REMOVE PAINT AND WELD SPATTER
- PRIVATE LABEL FASTENERS FOR DISTRIBUTORS WHO WANT THEIR OWN PRODUCT IDENTITY
- TEFLON THREAD COATINGS
- THREAD ADHESIVES OF ALL TYPES
- NYLON INSERT LOCK NUTS AND FLANGED NYLON INSERT LOCK NUTS
- SKIRT NUTS FOR USE WITH TAPERED BALL STUDS
- MALE THREADED "SPECIAL USE" FASTENERS
- NUTS FORMED FROM NON-FERROUS MATERIALS
- PRE-POSITIONED FASTENERS
- AXILOK® WHEEL BEARING LOCK NUT





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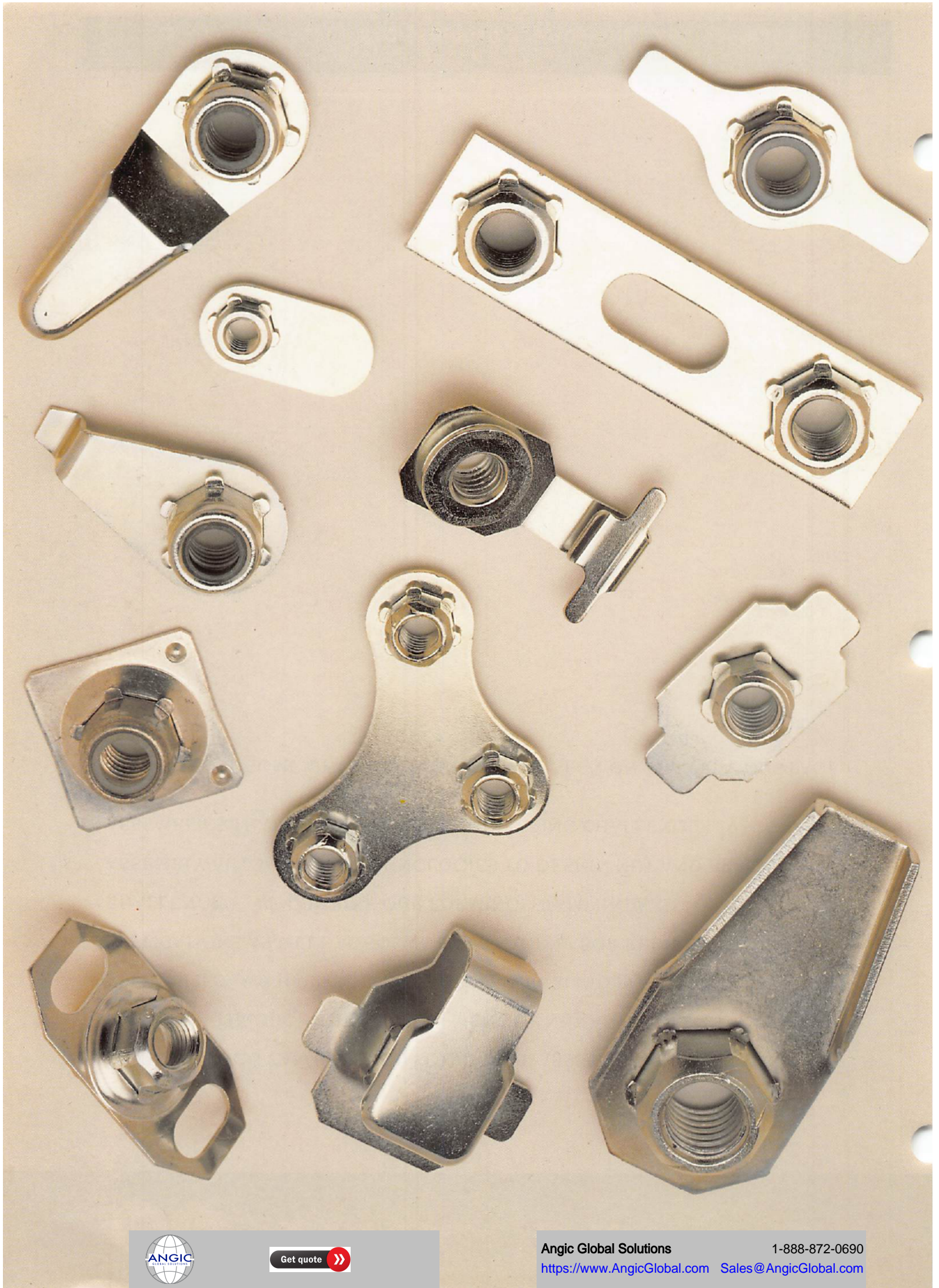
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Nut and Washer Assemblies

MACLEAN-FOGG HAS REALIZED TREMENDOUS GROWTH IN THIS PRODUCT FAMILY BY COMBINING OUR FORMING, MACHINING, ASSEMBLY AND AUTOMATION TECHNOLOGIES TO DESIGN NUT AND WASHER ASSEMBLIES. WE CAN PROVIDE INCH AND METRIC TWO PIECE AND THREE PIECE ASSEMBLIES TO MEET YOUR ENGINEERING REQUIREMENTS. OUR TYPICAL SIZE RANGE IN METRICS IS M5 - M22 AND IN INCHES FROM 1/4" - 3/4". THE DIAMETER OF THE WASHER IS RARELY A CONCERN. WE HAVE ALSO SUCCESSFULLY COLD FORMED WASHERS FOR HEAVY DUTY APPLICATIONS. YOU CAN SEE A BROAD SAMPLING OF OUR CURRENT PRODUCTS ON THE PRECEDING PAGE. NUT AND WASHER ASSEMBLIES CAN BE PRODUCED FROM MANY DIFFERENT RAW MATERIALS AND IN VARIOUS GRADES AND PROPERTY CLASSES.





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Nut and Bracket Assemblies

MACLEAN-FOGG CAN HELP YOU SOLVE YOUR ASSEMBLY AND DESIGN PROBLEMS THROUGH THE DEVELOPMENT OF NUT AND BRACKET ASSEMBLIES. WE HAVE SOLVED PROBLEMS IN BLIND FASTENING APPLICATIONS AS WELL AS SOLVING PART AND LABOR REDUCTION CHALLENGES. WE COMBINE OUR FORMING, STAMPING AND ASSEMBLY/AUTOMATION TECHNOLOGIES TO DESIGN NUT AND BRACKET ASSEMBLIES THAT ADDRESS YOUR ENGINEERING CHALLENGES

EXAMPLES OF SOME OF OUR DESIGNS CAN BE SEEN ON THE PREVIOUS PAGE.





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Engineered Products Cold Formed Components

MACLEAN-FOGG IS ALSO A LEADER IN COLD FORMING TECHNOLOGIES. ON THE PRECEDING PAGE, YOU WILL SEE SAMPLES OF SOME OUR ACCOMPLISHMENTS IN THE ART OF COLD FORMING. THIS PHOTOGRAPH DISPLAYS THE FOLLOWING:

- HYDRAULIC HOSE SHELLS OF VARIOUS TYPES
- HYDRAULIC FLARE NUTS
- ALLOY STEEL CHAIN ROLLERS
- A WIDE VARIETY OF ROLLERS AND SPACERS
- FUEL LINE HOSE COUPLING
- HYDRAULIC (VALVE TRAIN) ENGINE COMPONENTS
- A UNIQUE METRIC BALL STUD

WE HAVE SUCCEEDED IN REPLACING PRODUCTS THAT ARE TRADITIONALLY MANUFACTURED ON SCREW MACHINES RESULTING IN HIGHER PRODUCTION EFFICIENCIES AND SUBSEQUENTLY LOWER COSTS. THE COLD FORMING PROCESS GENERATES LESS SCRAP AND TYPICALLY RESULTS IN HIGHER STRENGTH CHARACTERISTICS. WE CAN PROVIDE ENGINEERING DESIGN ASSISTANCE, SOPHISTICATED COLD FORMING EXPERTISE AND SECONDARY MACHINING TECHNOLOGIES ON YOUR NEXT PROJECT.





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MACLEAN-FOGG HAS BEEN A GROWING INNOVATOR IN THE FIELD OF INSERT MOLDING TECHNOLOGIES. AS WITH OUR OTHER ENGINEERED PRODUCTS, WE COMBINE FORMING, MACHINING, STAMPING, AUTOMATION AND MOLDING TECHNOLOGIES TO PROVIDE DESIGN SOLUTIONS TO A WIDE VARIETY OF APPLICATION CHALLENGES. ON THE PRECEDING PAGE, YOU CAN SEE SOME OF OUR DESIGN ACCOMPLISHMENTS THAT WERE DEVELOPED TO PROVIDE SOLUTIONS TO REQUIREMENTS IN THE FOLLOWING AREAS:

- PIECE PART AND LABOR REDUCTION
- ENHANCED CORROSION RESISTANCE
- WEIGHT REDUCTION
- COSMETIC REQUIREMENTS
- FUEL TANK IMPACT PROTECTION
- PRICE REDUCTION



Precision Hot Forming

Metform utilizes automatic, multi-station Hatebur forming presses to convert hot rolled bar stock into a wide variety of configurations at rates of up to 180 parts per minute.

Metform is capable of hot forming medium carbon and alloy steels into precision parts ranging in weight from 50 to 750 grams, with diameters up to 70mm, and widths across hexagonal flats to 65mm. For critical fastener applications such as pinion, wheel bearing or steering adjustment nuts, squareness tolerances as close as .05mm T.I.R. are held on a regular basis.

These capabilities allow Metform to produce a broad product line that includes application-engineered fasteners, standard and locking fasteners as well as suspension and drive train components.

Finishing Operations

The Metform Finishing Department provides precision finishing of the formed blanks. Automated two, three and four axis CNC turning centers and high speed automatic chuckers are employed in cells as well as work centers to permit either high volume product flow or batch processing for individual orders. Comprehensive finishing services

Precision Cold Forming

Metform's battery of presses ranging from 250 to 3,000 tons provides cold forging and extrusion capabilities to meet your high volume or short run requirements. Our equipment list includes mechanical as well as hydraulic machines featuring both automated and manually loaded delivery systems.

In addition, by utilizing induction heating processes, Metform is able to combine cold extrusion tolerances with the more difficult shapes generally associated with hot forging.

also include tapping, deflection, thread rolling, drilling, grinding, coating and assembly.

Metform's in-house engineering staff is responsible for the design of tools, dies and fixtures for all products. Process analysis of every job is carried out to ensure that an optimum mix of productivity and flexibility is achieved.



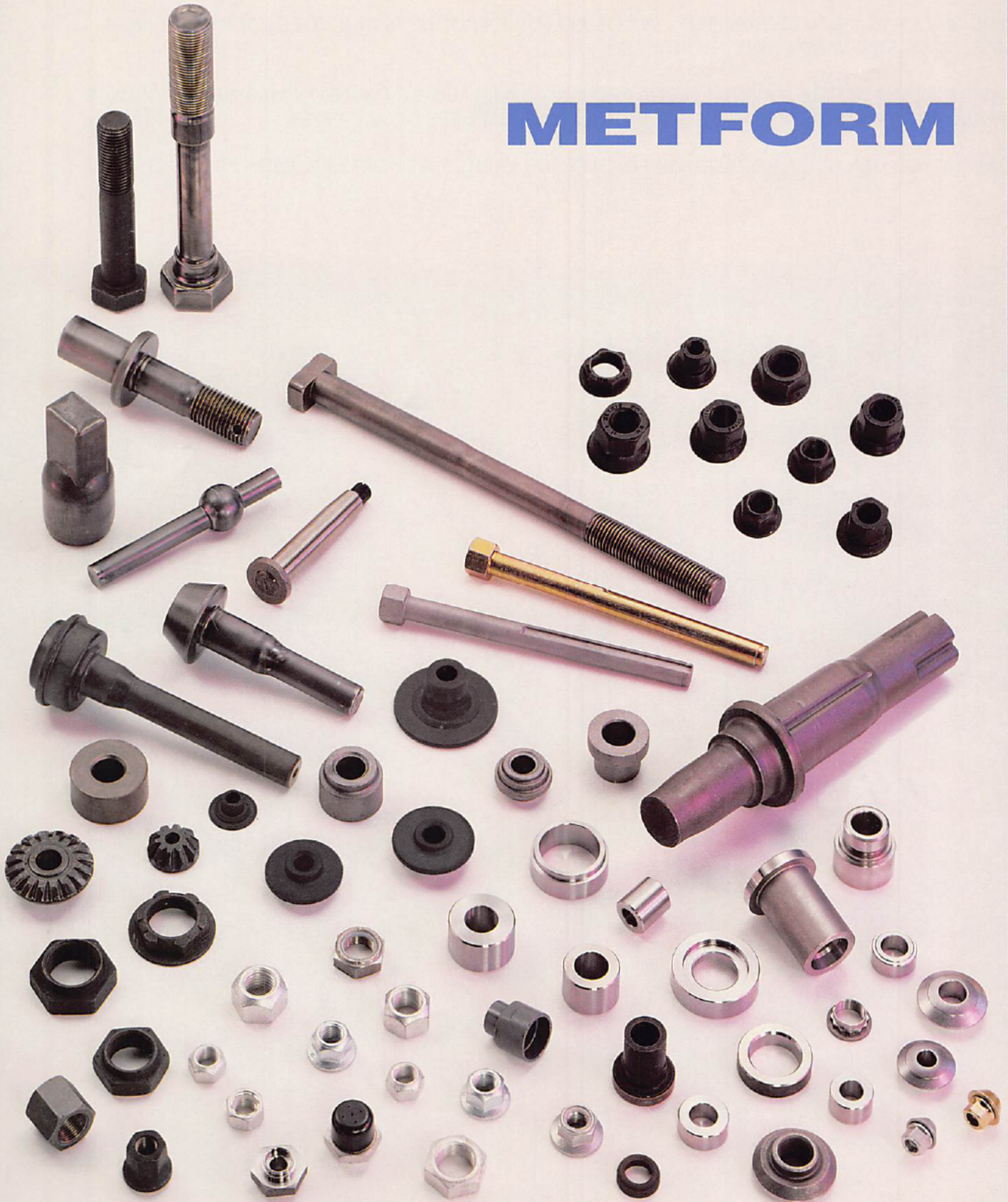
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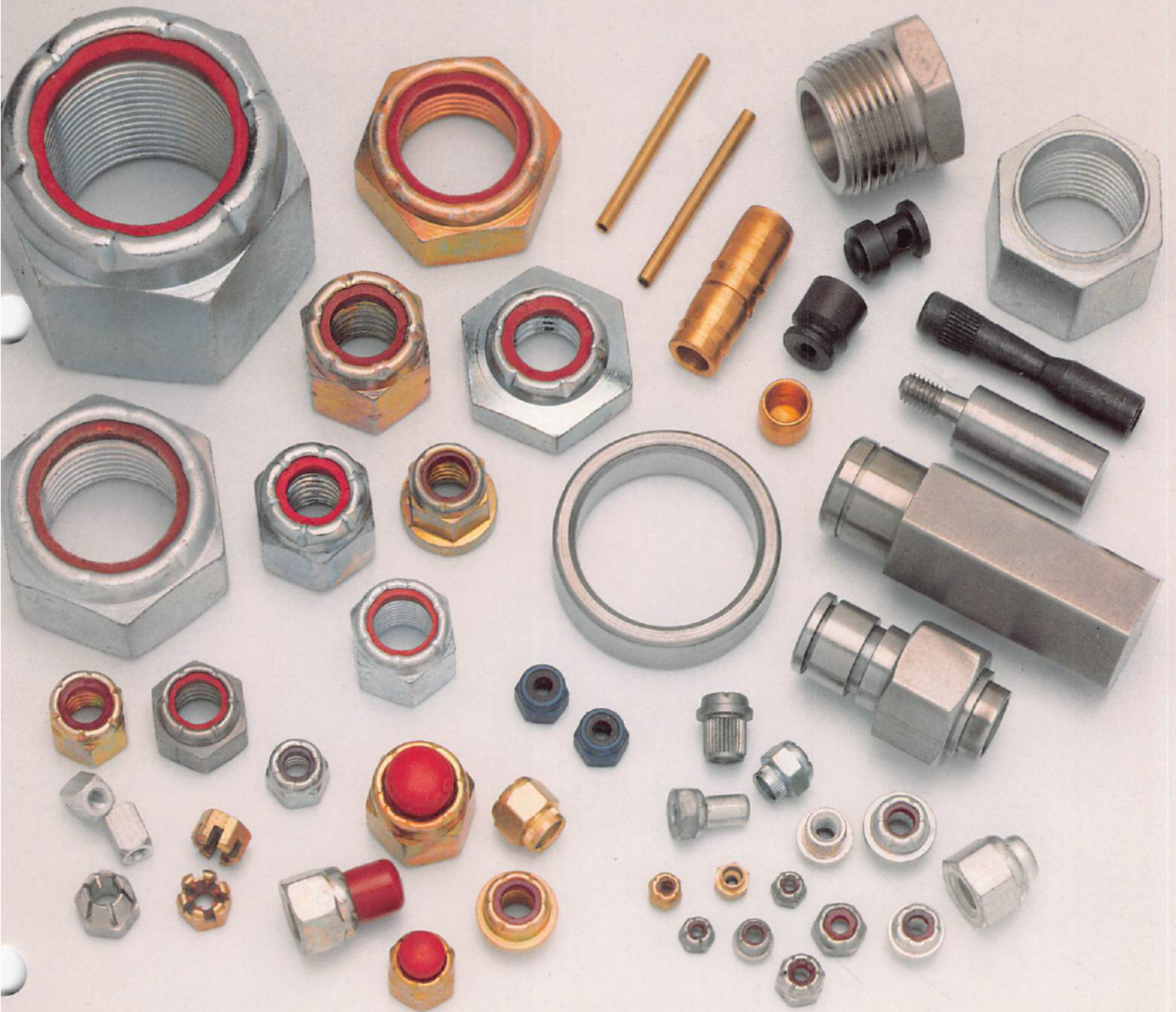


Diversified Line of MacLean-ESNA Products

THE MACLEAN-ESNA DIVERSIFIED LINE OF RELIABLE PRODUCTS INCLUDES LOCK NUTS AND PRECISION SCREW MACHINE PRODUCTS.

APPLICATION OF THE MACLEAN-ESNA PRODUCT LINES MAY BE FOUND IN MARINE, AEROSPACE, FARM, AUTOMOTIVE, MINING AND ELECTRICAL ASSEMBLIES OF ALL TYPES.

BELOW YOU CAN SEE A BROAD SAMPLING OF THE VARIETY OF MACLEAN-ESNA PRODUCTS.



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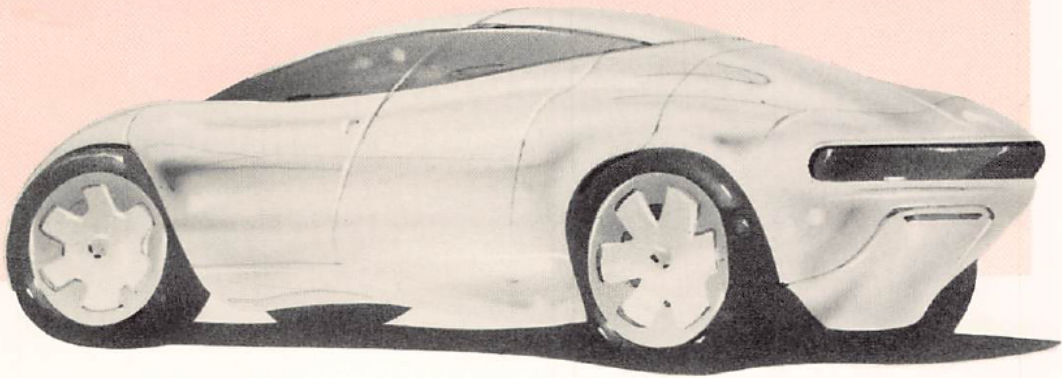
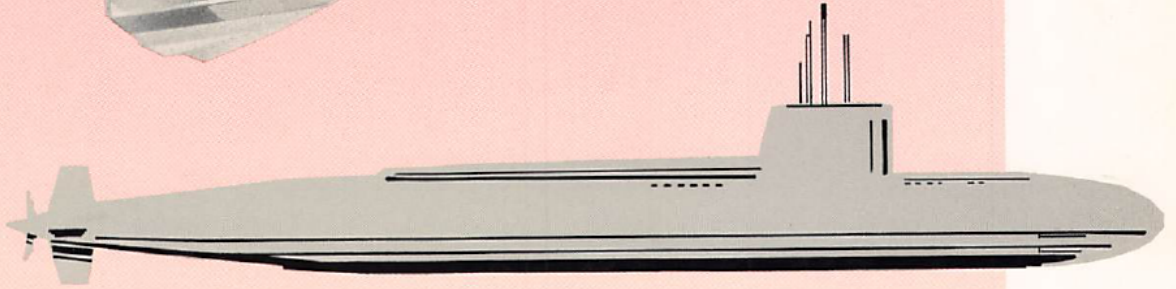
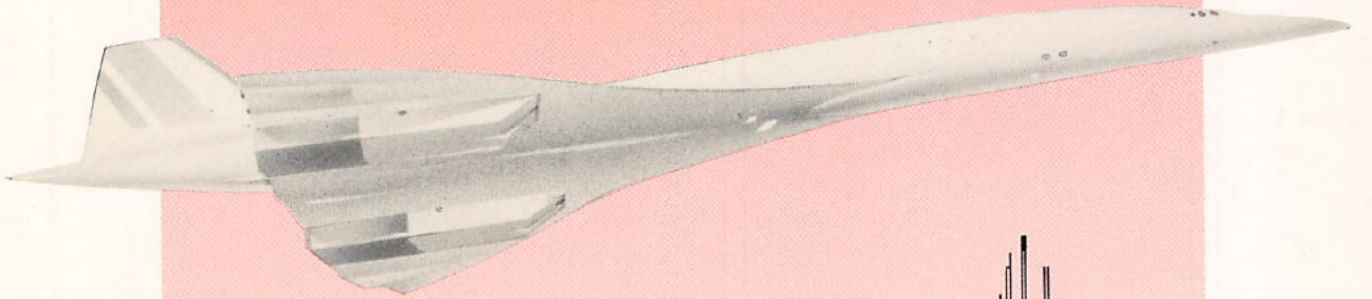
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