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RIVETLESS NUT PLATE BENEFITS

Cherry® Aerospace provides a new approach to nut plate applications. The Cherry® Rivetless Nut Plate is a replacement for standard riveted nut plates. It features a retainer that does not require flaring to meet NASM25027 torque-out and push-out requirements and eliminates the need for two additional rivet holes, as well as reaming, counter-boring and countersinking steps.

BENEFITS:

• Meets or exceeds NASM25027
• Fast, reliable installation with lower installed cost
• Requires only a single drill-quality hole
• Eliminates rivet setting or blind rivet installation
• Available in a variety of configurations and sizes
• Designed to be installed with conventional blind rivet tooling
• Light weight

A single drill-quality hole replaces the 3 holes required for a conventional riveted nut plate. Additional labor savings are achieved by the elimination of rivet setting or blind rivet installation required by the conventional nut plate. The Rivetless Nut Plate design features a retainer shank with lobe formations that resist torque out and push out forces, without cutting into the base material. The Rivetless Nut Plate is a precisely manufactured product incorporating a retaining clip (used in replaceable nut element versions), a nut element, a retainer, and a mandrel.
HOW THE RIVETLESS NUT PLATE WORKS

1. The Rivetless Nut Plate is inserted from one side of the structure.

2. The installation tool engages the mandrel from the other side of the structure.

3. The installation tool pulling head features a specially designed insert which guides the Rivetless Nut Plate retainer shank into the structure, ensuring a perpendicular attitude to the work piece.

4. As the mandrel is being pulled thru the retainer shank, the lobes that are formed on the outer diameter of the retainer shank displace the structure material and insure that the retainer will resist both push out and torque out forces. The mandrel is discarded after installation.
SELECTING THE RIVETLESS NUT PLATE

NUMBERING SYSTEM

CNP01 C 3-2-02 CC

- Retainer Finish Code
- Retainer Grip Capability
- Nut Counterbore
- Nut Thread Size (in Standard Units unless preceded by M in Metric Units)
- Nut Material Code
- Cherry Nut Plate Series (01, 02, 03, etc.)

Criteria for Rivetless Nut Plate selection includes: thread diameter and pitch, nut element alignment capability (often referred to as “float”), counterbore depth, material thickness, additional coatings/finishes for corrosion protection and special applications requirements. The Table 1 provides a guide to the selection properties of the Cherry Rivetless Nut Plates currently available.

Diameter and pitch information will continue to be added to as this product line expands to meet our customers’ applications. Cherry recommends that the standards pages for the specific Rivetless Nut Plate being used, be reviewed for the most accurate information. Table 1 should be considered as a guide only. Maximum material thickness is established by the amount of mandrel exposed above the structure. The installation tool system must be able to engage completely to provide an acceptable installation.

The Rivetless Nut Plate is a growing Product Line. Contact Cherry Aerospace for updates to this list or to inquire about special needs.
# SELECTING THE RIVETLESS NUT PLATE

## TABLE 1 — RIVET SELECTION DATA

<table>
<thead>
<tr>
<th>RNP</th>
<th>Thread Size</th>
<th>Nut Plate Bolt Clearance (Min)</th>
<th>Counterbore Range</th>
<th>Minimum Material Thickness (Grip)</th>
<th>Maximum Material Thickness</th>
<th>Hole Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNP01x3</td>
<td>0.1900-32</td>
<td>0.024</td>
<td>2,3,4,5</td>
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<td></td>
<td>.249-.253&quot;</td>
</tr>
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<td>CNP02</td>
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<td>2</td>
<td></td>
<td></td>
<td>.343-.347</td>
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<td>CNP03x08</td>
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<td>0.030</td>
<td>2,3,4,5</td>
<td></td>
<td></td>
<td>.249-.253&quot;</td>
</tr>
<tr>
<td>CNP03x3</td>
<td>0.1900-32</td>
<td>0.030</td>
<td>2,3,4,5</td>
<td></td>
<td></td>
<td>.249-.253&quot;</td>
</tr>
<tr>
<td>CNP03x4</td>
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<td>2,3,4,5</td>
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<td></td>
<td>.311-.315</td>
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<tr>
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<td>-2</td>
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<td>.249-.253</td>
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<td>CNP11x3</td>
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<td>0.060</td>
<td>1,2,3,4,5</td>
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<td>.280-.284</td>
</tr>
<tr>
<td>CNP11x4</td>
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<td>0.060</td>
<td>1,2,3,4,5</td>
<td></td>
<td></td>
<td>.343-.347</td>
</tr>
<tr>
<td>CNP14A3</td>
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<td></td>
<td>.249-.253</td>
</tr>
<tr>
<td>CNP14A4</td>
<td>0.2500-28</td>
<td>0.030</td>
<td>n/a</td>
<td></td>
<td></td>
<td>.311-.315</td>
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<tr>
<td>CNP15CM5</td>
<td>M15 x, 0,8mm</td>
<td>0.5mm</td>
<td>2,4</td>
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<td></td>
<td>6,32mm-6,42mm</td>
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<tr>
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<td></td>
<td></td>
<td>.343-.346</td>
</tr>
<tr>
<td>CNP16C4</td>
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<td>0.120</td>
<td>2,3,4,5</td>
<td></td>
<td></td>
<td>.404-.408</td>
</tr>
<tr>
<td>CNP53C3</td>
<td>0.1900-32</td>
<td>0.030</td>
<td>1,2,3,4,5</td>
<td></td>
<td></td>
<td>.275-.278</td>
</tr>
</tbody>
</table>
RIVETLESS NUT PLATE SELECTION

Nut element alignment capability or “float” refers to the ability of the nut element to radially align with the bolt being engaged into the Rivetless Nut Plate. Common float ranges are .030”, .060” and .120”. Float is defined as the minimum amount of radial movement of the nut element from the installed centerline of the retainer.

Float of the unit is the amount of freedom of the nut within the nut retainer and it is defined as the difference between the internal width of the nut retainer, \( W_R \), and the width of the nut base, \( W_N \).

Total Nut Float = \( W_R - W_N \)

Float of the bolt is the amount of freedom of the bolt shank within the hole in the structure and it is defined as the difference between the diameter of the hole and the diameter of the bolt shank, \( D_B \). In the case of the Rivetless Nut Plate, the ID of the hole after installation is specified on the standard pages as \( Z \). Thus,

Float of the Bolt = \( Z - D_B \)

In the case of riveted nut plates, the float of the nut is again defined as the difference between the internal width of the nut retainer, \( W_R \), and the width of the nut base, \( W_N \). However, the float of the bolt can differ from the float of the nut. The designer has the option of selecting a hole diameter, \( D \), for desired float as long as it remains less than the hole in base of the cage element, \( D_C \).

Total Nut Float = \( W_R - W_N \)
Float of the Bolt = \( D - D_B \)

*Radial float is defined as 1/2 the Total Nut Float*
RIVETLESS NUT PLATE INSTALLATION TOOLING

The Cherry® Rivetless Nut Plate is designed to be installed with existing blind fastener tooling. Shown below are some existing systems that can be used for Rivetless Nut Plate installation. See Table 2 for more details.

G750A HAND RIVETER

The Cherry® G750A hydraulic hand riveter features a unique 2-step hydraulic power cylinder design. The ergonomic design allows the user to easily squeeze the handle throughout the increased power requirement, without strain normally encountered during high strength fastener installations. The tool weighs just 1.9 lbs. and is only 7.5" long.

Combined with the 750A-088 adapter, the G750A can be used with the H704 series Pulling Heads to install most Rivetless Nut Plates. (See Table 2 on page 9).

G704B POWER RIVETER

The Cherry® G704B is a pneumatic-hydraulic tool designed specifically for the most efficient installation of Cherry® Rivetless Nut Plate rivets. It weighs just over 4-1/2 lbs. and can be operated in any position with one hand.

The G704B consumes approximately 3.9 cubic feet of air at 20 cycles per minute and its maximum noise level under load does not exceed 85 dB(A).

Pulling heads are not furnished with this riveter and must be ordered separately.

The G704B has a stroke of .518 and a pulling capacity of 3136 lbs. on 90 psi per pressure at the air inlet. Normal operating air pressure range is 90-110 psi at the inlet.

The G704B can be used with the H704 series Pulling Heads to install most Rivetless Nut Plates.

*Stem deflector may be removed for use in limited access areas.
RIVETLESS NUT PLATE INSTALLATION TOOLING

G84 LIGHTWEIGHT LOCKBOLT TOOL

The G84 pneumatic-hydraulic lockbolt installation tool is a rugged production tool designed for high speed, reliable installation of the most popular sizes of aircraft lockbolts. The tool incorporates a bayonet attachment for quick change of pulling heads.

Weighing only 7.70 pounds (3.5 kg), this tool has been designed with many ergonomic features: less recoil, low noise and a comfortable fit in the operator’s hand. It can be operated in any position with one hand. The tool can install blind bolts and blind rivets. H84C Series mounts directly to the G84 without adapters.

G84-LS SPLIT TOOL

The G84-LS pneumatic-hydraulic installation tool is a heavy duty production tool designed for high speed, reliable installation of the most popular sizes of blind rivets, lockbolts and blind bolts. The G84-LS is a “split” version of the standard G84. The power unit sits on the floor and transmits its power through 10 feet of hose to a lightweight head cylinder. This facilitates fastener installation in many limited access areas and also reduces operator fatigue. Its durable, all metal housing makes this tool very robust for use in a shop environment. Use 744-700 adapter with H84C series when installing RNP products.
RIVETLESS NUT PLATE INSTALLATION TOOLING

PULLING HEADS

The H704 series pulling head shown here will install Cherry® Rivetless Nut Plate rivets in all materials, heads styles and grip lengths. This head fits directly on the G704B Power Riveter.

The H84C-()NP family of pulling heads fit the G84 Power Riveter and G84-LS Split Power Riveter (with adapter 744-700).

ADAPTERS

750A-088 ADAPTER
This adapter fits the G750A riveter to permit the use of Rivetless Nut Plate Pulling Heads.

744-700 ADAPTER
This adapter fits the G84-LS Split Power Riveter for use with the H84C Pulling Head.
# Rivetless Nutplate Tool Selection Chart

## Table 2

<table>
<thead>
<tr>
<th>RNP</th>
<th>Installation Tool</th>
<th>Pulling Head</th>
<th>Removal Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNP01x3</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-249NP</td>
<td>R721-3-30</td>
</tr>
<tr>
<td>CNP02</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-343NP</td>
<td>R721-4-60</td>
</tr>
<tr>
<td>CNP03x08</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-249NP</td>
<td>R721-3-30</td>
</tr>
<tr>
<td>CNP03x3</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-249NP</td>
<td>R721-3-30</td>
</tr>
<tr>
<td>CNP03x4</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-311NP</td>
<td>R721-4-30</td>
</tr>
<tr>
<td>CNP04</td>
<td>G84</td>
<td>H84C-404NP</td>
<td>R721-5-60</td>
</tr>
<tr>
<td>CNP05</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-249NP</td>
<td>TBD</td>
</tr>
<tr>
<td>CNP11x3</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-280NP</td>
<td>R721-3-60</td>
</tr>
<tr>
<td>CNP11x4</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-343NP</td>
<td>R721-4-60</td>
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<tr>
<td>CNP14A3</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-249NP</td>
<td>R721-3-30</td>
</tr>
<tr>
<td>CNP14A4</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-311NP</td>
<td>R721-4-30</td>
</tr>
<tr>
<td>CNP15CM5</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-249NP</td>
<td>R721-3-30</td>
</tr>
<tr>
<td>CNP16C3</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-343NP</td>
<td>R721-4-60</td>
</tr>
<tr>
<td>CNP16C4</td>
<td>G84</td>
<td>H84C-404NP</td>
<td>R721-5-60</td>
</tr>
<tr>
<td>CNP53C3</td>
<td>G704B or G750A-750A-088 adapter</td>
<td>H704-275NPC</td>
<td>R721-275</td>
</tr>
</tbody>
</table>
HOLE PREPARATION

Refer to hole diameter and grip length requirements on the specific Rivetless Nut Plate standards pages for correct hole size and minimum grip requirements. A single drill quality hole is all that is required for hole preparation.

DRILLING PROCEDURE

Use a clean, sharp, properly ground drill. Improperly ground drills will create oval or oversize holes. Cherry recommends the use of pilot or center drills prior to final hole machining.

Center the drill in the chuck so that the drill will run true. A “wobble” in the drill will create an oversize hole.

Hold the drill perpendicular to the surface being drilled. Do not force the drill through the material.

Note: If drill flash is present, it should be removed without forming a chamfer around the perimeter.
RIVETLESS NUT PLATE INSTALLATION

The Cherry Rivetless Nut Plate may be installed in 2024-T3, 7075-T73 or equivalent strength Aluminum alloys. The Rivetless Nut Plate grip selection should be made based on the material thickness in the location where the Rivetless Nut Plate is to be installed.

Insert the Rivetless Nut Plate stem into the hole with the nut assembly aligned to the backside hole diameter.

Insert the stem of the Rivetless Nut Plate into the pulling head. Ensure that the tool and fastener are perpendicular to the work surface.

Activate the tool.

Discard the mandrel after successful installation.

PLACING THE PULLING HEAD ON THE RNP MANDREL

Holding the riveter in line with the serrated stem as accurately as possible, apply a steady, firm pressure and pull the trigger.
RIVETLESS NUT PLATE INSPECTION

Correct Rivetless Nut Plate installation allows the retainer to bear upon the work piece. Gaps in excess of .010” (0,25mm) indicate an unacceptable installation. Careful hole preparation and drill flash removal will prevent this from occurring.

Ensure that the nut element is free to float between the retainer stops. Make sure the retaining clip is located in the retainer slots.

In some rare instances, the Retainer ID after installation will have a burr that protrudes from the backside of the structure as shown in the photos opposite. If required, these types of burrs may be removed using industry standard deburring techniques. Contact Cherry Aerospace for additional assistance with Rivetless Nut Plate installation inspection and/or deburring.
RIVETLESS NUT PLATE REMOVAL

NUT ELEMENT REPLACEMENT
The Rivetless Nut Plate nut element may be renewed without removal of the retainer. The nut element can be replaced by: removing the retaining clip, exchanging the nut element and re-installing the retaining clip. Note: This is not applicable to lightweight or sealed versions which do not have a retaining clip.

RIVETLESS NUT PLATE REMOVAL
Removal tools are available for each Rivetless Nut Plate. Cherry recommends using the removal tool system to avoid damage to the structure when removing a previously installed Rivetless Nut Plate. Access to both sides of the installed Rivetless Nut Plate must be available. Table 2 shows both installation tool and removal tool information.

The Rivetless Nut Plate removal pulling head consists of a mandrel, cup and pulling head.

The cup is placed over the installed Rivetless Nut Plate, the mandrel is inserted through the cup and Rivetless Nut Plate and into the pulling head.

The tool is actuated and the Rivetless Nut Plate is removed from the structure.
RIVETLESS NUT PLATE REPLACEMENT

Should replacement of the complete Rivetless Nut Plate assembly be required, and an increase in float is not an issue, Cherry recommends that a larger float Rivetless Nut Plate, of the same thread diameter and pitch, be used. Referring to Table 1, an example would be replacing a CNP03C3-2-03 with a CNP11C3-2-03. In this example a .031" additional amount of material would be gained in a repair operation.

Contact Cherry Aerospace for further information on repair options.

THINGS TO KNOW

• Prepare the holes with the correct drill size. When in doubt always refer to the Rivetless Nut Plate bag for the correct size range.

• Remove drill flash, but do not create a chamfer in the structure

• Select the correct installation tool system for the Rivetless Nut Plate product to be installed

• Where galvanic corrosion is a concern, specify corrosion resistant coatings described on the standards pages.

• Rivetless Nut Plate products with replaceable nut elements are easily repaired with no special tools

• If removal is required, always use the recommended removal tools to avoid damage to the structure

• Be aware that sheet deformation may occur when holes are positioned close to the edges. Material type and thickness will influence this potential condition.
LIMITED WARRANTY

Seller warrants the goods conform to applicable specifications and drawings and will be manufactured and inspected according to generally accepted practices of companies manufacturing industrial or aerospace fasteners. In the event of any breach of the foregoing warranty, Buyer's sole remedy shall be to return defective goods (after receiving authorization from Seller) for replacement or refund of the purchase price, at the Seller's option. Seller agrees to any freight costs in connection with the return of any defective goods, but any costs relating to removal of the defective or nonconforming goods or installation of replacement goods shall be Buyer's responsibility. SELLER'S WARRANTY DOES NOT APPLY WHEN ANY PHYSICAL OR CHEMICAL CHANGE IN THE FORM OF THE PRODUCT IS MADE BY BUYER. THE FOREGOING EXPRESS WARRANTY AND REMEDY ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER WARRANTIES AND REMEDIES; ANY IMPLIED WARRANTY AS TO QUALITY, FITNESS FOR PURPOSE, OR MERCHANTABILITY IS HEREBY SPECIFICALLY DISCLAIMED AND EXCLUDED BY SELLER. This warranty is void if seller is not notified in writing of any rejection of the goods within one (1) Year aAfter initial use by buyer of any power Riveter or ninety (90) days after initial use of any other product.

Seller shall not be liable under any circumstances for incidental, special or consequential damages arising in whole or in part from any breach by Seller, AND SUCH INCIDENTAL, SPECIAL, OR CONSEQUENTIAL DAMAGES ARE HEREBY EXPRESSLY EXCLUDED.

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