

**Alcoa  
Fastening  
Systems**



Alcoa Fastening Systems KEENSERT products are available from MARYLAND METRICS

## Inserts and Studs



Alcoa Fastening Systems has the broadest selection of threaded Inserts and Studs available

MARYLAND METRICS P.O. Box 261 Owings Mills, MD 21117 USA

phones: (410)358-3130 (800)638-1830 faxes: (410)358-3142 (800)872-9329

email: [sales@mdmetric.com](mailto:sales@mdmetric.com) web: <http://mdmetric.com> RFQ form: <http://mdmetric.com/rfq.htm>

**Keenserts inserts and studs** are designed to provide high resistance to torque-out and pull-out loads. The keys that are pre-assembled onto each fastener are driven down through the threads of the parent material, mechanically locking it into place. These keys positively prevent rotation due to torsion and vibration.

Keenserts **inserts** are available with internal threads that are either free-running, or come with locking devices such as deformed threads, Vespel™ insert, or beam lock. Inserts are also available with the unique patented Spiralock™ thread form, which allows for a free running bolt installation. Once the mating bolt preload is applied, Spiralock™ inserts will resist the most severe transverse vibration.

Keenserts **studs** provide a nut-end thread designed to transfer high axial loads into weak base materials. The stud or keyed end is installed into the parent material, thus eliminating the need for removing or replacing a bolt.

Keenserts inserts and studs are easy to install using standard drills, taps and gages. Alcoa Fastening Systems offers a wide selection of manual and power installation and removal **tools**.

Both inserts and studs come in a variety of **materials** including 303, 304, A286, and 17-4 PH Corrosion Resistant Steels, along with Inconel 718 Nickel-Chromium Alloy, 6Al-4V Titanium, 4140 Alloy Steel, and Carbon Steel. Locking key materials consist of 302, A286, and 420 Corrosion Resistant

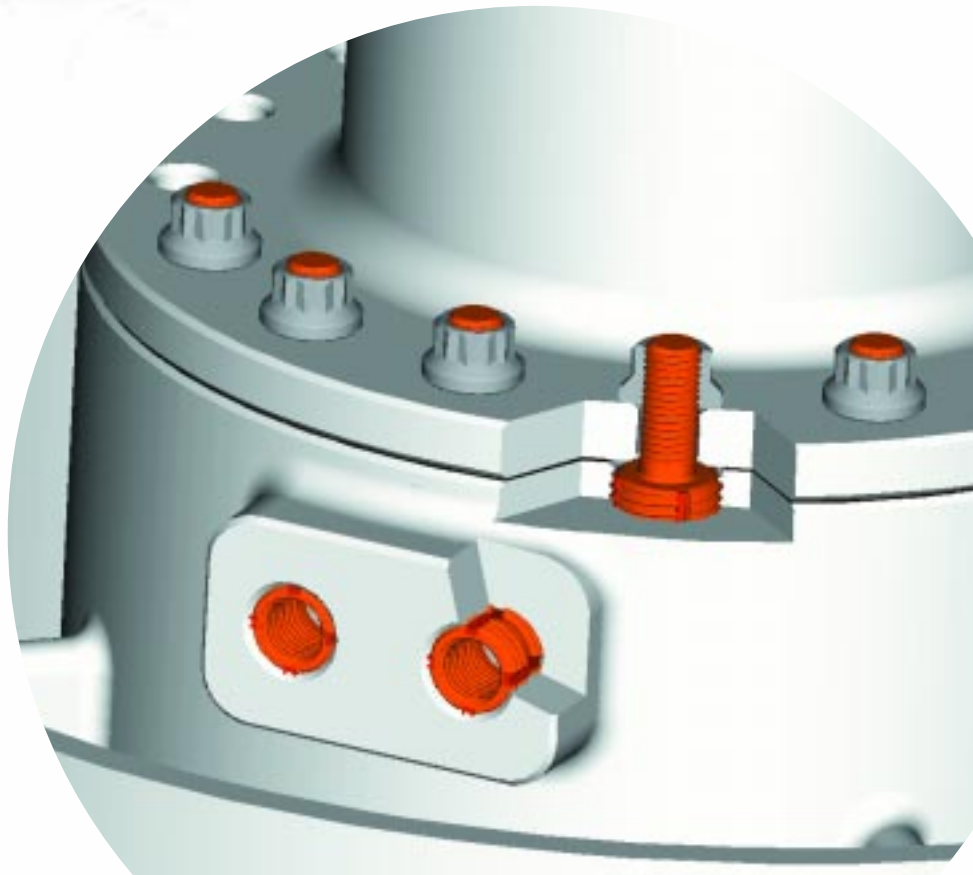


Steels, as well as Inconel X-750 and Inconel 718 Nickel-Chromium Alloys.

**Variations** of the standard insert include miniature, lightweight, heavy duty, extra heavy duty, floating, blind, solid, and hydraulic. Variations of the stud design include shear load, lightweight and heavy duty. Keenserts inserts and studs are also available with self-broaching keys for ease of installation into a hard parent material.

Both unified and metric products are available. Keenserts inserts and studs are covered by "AS", "MS", and "NAS" **standards**.

Typical Keenserts **applications** include fixed and rotary-wing aircraft, engines, gearboxes, tracked vehicles, accessory housings, electronic packaging, and thread hole repair.





# Alcoa Fastening Systems

## Features and Benefits of Tridair KEENSERTS® Inserts

- FEATURE:** Designed and manufactured by a well-known and respected manufacturer of thread repair parts. Supplier to OEMs, industrial maintenance, military, and all phases of the aftermarket.
- BENEFIT:** No need to doubt its performance . . . regardless of application.
- FEATURE:** Solid bushing with locking kees.
- BENEFIT:** Positive mechanical lock against rotation.
- FEATURE:** May be used in virtually any material . . . aluminum, magnesium, cast iron, cold rolled steel and plastic.
- BENEFIT:** No restrictions on parent material.
- FEATURE:** High strength and reliability.
- BENEFIT:** Provides maximum pullout strength- -breaks grade 8 bolt.
- FEATURE:** No special skill required to use KEENSERTS Inserts.
- BENEFIT:** Installation procedures can be learned in minutes.
- FEATURE:** Hole preparation with standard drill and tap.
- BENEFIT:** No special, costly, single-purpose drills or taps required.
- FEATURE:** Inserted with fingers.
- BENEFIT:** No special rewinder tools required.
- FEATURE:** Impossible to cross-thread during installation.
- BENEFIT:** Perfect installation every time.
- FEATURE:** Can be removed very simply when necessary.
- BENEFIT:** Permanently installed unless removal is required.
- FEATURE:** Prepared hole not affected when insert is removed.
- BENEFIT:** New insert can be installed in same hole.
- FEATURE:** No tang to break off after installation.
- BENEFIT:** No need to worry about metal piece falling into prepared hole.
- FEATURE:** Available in inch and metric sizes.
- BENEFIT:** One line for all types of threads.
- FEATURE:** Available in Thinwall (10-24 through 1/2-20 I.D.) and Heavy Duty (8-32 through 1 3/4-12 I.D.). Special sizes quoted on request.
- FEATURE:** Also available in stainless.
- BENEFIT:** One line for all applications.
- FEATURE:** Available for spark plug applications.
- BENEFIT:** Designed for both tapered and straight seats.

**Once you try Tridair KEENSERTS Inserts, you'll never go back to any other insert!**





# Alcoa Fastening Systems

## **KEENSERTS<sup>®</sup> Inserts Installation Guidelines**

### **1. Edge Distance**

Boss Diameter: 1 1/2 x O.D. of insert.

Edge distance to a flat side: Can be as little as 1/32 over 1/2 O.D. of the insert. Tap marks may show on flat side and the insert should be positioned with kees 45° to 90° (2 kees).

### **2. Broaching**

General material harder than R<sup>c</sup> 30 may require that the tapped holes be broached for the kees. Aluminum, anodized after tapping, also may require broaching. Broach blades may not stand up for more than 3 or 4 holes when broaching inconel and similar alloys. It is possible to drive kees of the KNH and KNHXXH series in harder material than the KN series because of wall collapse. Tools with threads to support to the inside of the insert are available if wall collapse is encountered.

### **3. Thickness of Parent Material**

Miniature KEENSERTS Inserts - .015 (minimum) thicker than the length of the insert if it is undesirable to have it protrude through underside of panel. "T" (dimension from catalog) + .015 if protrusion through underside is permissible.

KN, KNH and KNHXXH KEENSERTS Inserts - General minimum thickness should be equal to bolt diameter (Tridair Engineering should be consulted for these applications). Insert will protrude through bottom surface unless length is coded.

### **4. Internal Thread Lock**

All our internal thread locks conform to MIL-N-25027.

MIL-N-25027 does not call for seating the bolt.

We test with minimum P.D. 3A bolts. 2A bolts, being smaller, will provide very little or no torque and should not be used. Bolts should have 4 turns after encountering the lock. Less turns may not provide the required torque and more turns will wear out the lock faster. For a metric thread a 4H Class bolt is used to test locking feature.

Seating the bolt will affect the locking torque and the number of locking cycles. How it will be affected depends on the material of the bolt and the insert, the finish on bolt and insert, lubrication on the threads and under the head of the bolt, and the seating torque.

### **5. Standard Minor Diameter Versus Modified Minor**

All other things being equal standard minor diameters will provide greater shear engagement areas. This would be desirable where a bolt goes directly into a tapped hole. In the case of inserts where the O.D. of the insert is so much larger than the diameter of the bolt being used, using a larger tap drill, as we do, does not lower the pullout values to any great extent.



# Alcoa Fastening Systems

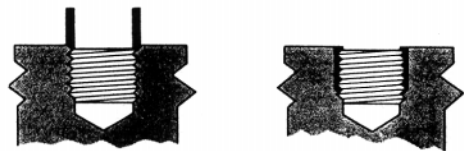
## KEENSERTS® INSERTS AND STUDS

KEENSERTS Inserts and Studs provide strong, permanent, metal threads in virtually any material - ferrous, non-ferrous or non-metallic.

Tridair pioneered the design of this type of insert and is able to offer the widest available choice of standard sizes,

lengths, materials and types. Because of our years of application experience, we are geared to provide solutions to all types of special insert problems. If you don't see a design in this catalog that will suit your application, consult our Sales Engineer for other designs to meet your specific needs.

### Positive mechanical lock against rotation.



KEES are driven down into the tapped threads of the parent material during installation to securely lock the insert against rotation.

Featuring an exclusive external thread design, KEENSERTS provide maximum pull-out strength with a minimum outside diameter.

- Installed with standard taps and drills.
- Available from stock in many sizes and types.



*Securely  
locked  
against  
rotation.*

### Internal thread lock feature available.

Inserts with this feature are designed to securely lock a bolt when it is entered into the insert only a few turns. The locking torque values are consistent and well within the range established by MIL-I-45914A.

Even after repeated installations and removals of the bolt, the lock maintains sufficient locking torque to prevent the bolt from vibrating out.

### PULL-OUT STRENGTH *(For Reference Purposes Only)*

To compute the Pull-Out Strength in any parent material, use the following formula:

$$\begin{array}{lcl} \text{Calculated} & & \text{Minimum Ultimate} \\ \text{Pull-Out Strength} & = & \text{Engagement Area (IN}^2\text{)} \times \text{Shear Strength of the Parent Material (PSI)} \end{array}$$

### ABOUT SHEAR ENGAGEMENT AREA

Catalog values for shear engagement areas are based on shear failure in the parent material when the parent material is significantly weaker than the insert or stud material. Such failure occurs in the parent material at or near the major diameter of the insert or stud end external thread. For parent materials of hardness similar to that of the insert or stud, failure occurs by combined shear of both materials simultaneously and will occur along a surface approaching the pitch line. The calculated shear engagement area should be reduced accordingly. For sufficiently hard parent materials, failure may occur by thread shear at the internal thread of the insert or by stud nut end thread failure.

### NOTES:

**Inserts:** MIL-I-45914, as amended 25 Nov 1970 has been superseded by MIL-I-45914A dated 25 Apr 1991. Any reference to MIL-N-25027 is to be disregarded. The tests and methods are all covered in MIL-I-45914A.

**Studs:** MIL-S-45915 dated 25 Nov 1970 has been superseded by MIL-S-45915A dated 21 Aug 1991.



## SELECTOR GUIDE/INDEX

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### 1 4 INSTALLATION

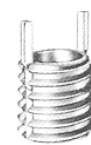
### 2 5-10 CROSS REFERENCE INDEX - Part No./MS and NAS Equivalents. Decimal Equivalents.

### 3 11 GENERAL PURPOSE INSERTS

- 12 **Miniature Inserts:** For use in electronic and aerospace applications where size and weight are critical.
- 13-15 **Lightweight, Heavy Duty and Extra Heavy Duty Inserts:** A wide choice of sizes, lengths and materials suit virtually any requirement.
- 16 **Carbon Steel Inserts:** These inserts offer the designer a commercial version of our NAS/MS KEENINSERTS at a more economical price.



Miniature



Lightweight



Heavy Duty



Extra Heavy  
Duty



Carbon  
Steel



Carbon  
Steel

### 4 17 SPECIAL PURPOSE INSERTS

- 18 **Floating Inserts:** Compensate for misalignment automatically. Ideal for use on curved surfaces or for use with flathead screws.
- 19 **Blind End Inserts:** Where it is important to keep a screw isolated from certain assemblies.
- 20,21 **Hydraulic Inserts:** For complete port protection in hydraulic or fuel systems.
- 22 **High-Strength Aluminum Inserts:** For miniaturized space and electronic systems.
- 22 **Solid Inserts:** For relocating holes that have been drilled or tapped in the wrong location, to fill holes, or salvage expensive castings.
- 23 **Cast-In Inserts:** For casting into place during die casting and plastic molding operations.



Floating



Blind End



Hydraulic



High-Strength  
Aluminum



Solid



Cast-In



# Alcoa Fastening Systems

## SECTION

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### 5

#### 25 METRIC INSERTS

- 26 Miniature Series Inserts
- 26 Lightweight Series Inserts
- 27 Heavy Duty Series Inserts
- 28 Carbon Steel Inserts

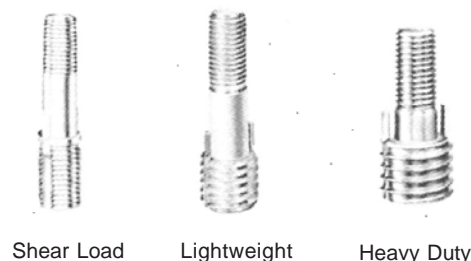


These metric inserts are used in the same way and have the same design features as General Purpose Inserts. They should be specified in applications wherever design dimensions are required in millimeters instead of inches.

### 6

#### 29 GENERAL PURPOSE STUDS

- 30 Shear Load Series Studs/ AND Standards
- 31 Lightweight Series Studs
- 32 Heavy Duty Series Studs/ AND Standards



Offered in high performance materials to meet the requirements of aerospace and military specifications. Particularly suited for high temperature, cryogenic or high loading applications.

### 7

#### 33 METRIC STUDS

- 34 Shear Load Series Studs
- 34 Lightweight Series Studs
- 35 Heavy Duty Series Studs



These metric studs are used in the same way and have the same design features as General Purpose Studs. They should be specified in applications wherever design dimensions are required in millimeters instead of inches.

### 8

#### SELF-BROACHING KEENSERTS®

- 36, 37 Self-Broaching KEENSERTS®
- 38 TR28000 ( ) Series Studs
- 39 TR29000 ( ) Series Inserts



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#### BULK INSERTS AND KITS

Test results



Tridair Products 3



## INSTALLATION

One-piece **KEENSERTS** Inserts are supplied with **KEES** pre-assembled into dove-tailed slots at the factory, to eliminate the problems of selecting, stocking and assembling separate parts. The prepositioned **KEES** automatically set the insert at the proper depth below the surface of the parent material.

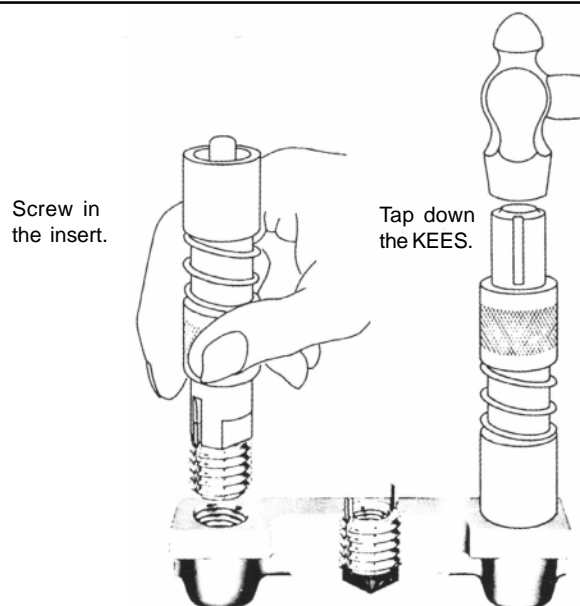
Unlike conventional inserts, there is no need to maintain critical depth tolerances . . . no chance of inadequate locking or deformation of internal threads due to miscalculations of depth. For critical edge distance applications, please consult our home office or our local Sales Engineer.

- **DRILL** with a **STANDARD** drill.
- **COUNTERSINK** with a **STANDARD** countersink (82° to 100°).
- **TAP** with a **STANDARD** Unified Thread Series tap.

Screw in insert with fingers or installation tool. Insert is designed to stop at the correct depth below the surface of the casting.

Using the installation tool, drive in the **KEES**. The tool may be used with a hammer or held in an arbor press. The correct insert tool is tabulated with each type of insert in this catalogue.

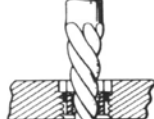
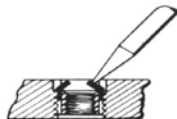
- For **Miniature Series** inserts, screw the insert onto the threaded mandrel and turn the insert into the tapped hole.
- When the tool handle is depressed, a special spring-loaded trip mechanism within the tool will drive the **KEES** into the parent material.
- The replacement of inserts is accomplished without reworking the parent material, and the same size insert is used in the original hole.



### Removal of **KEENSERTS** Inserts

It is unlikely that **KEENSERTS** inserts will ever have to be removed since their threads are stronger than original threads. If removal is necessary, however, follow these simple steps.

1. Use **STANDARD** **DRILL** to remove insert material between "Kees."
2. Deflect "Kees" inward and break off.
3. Remove insert with **E-Z OUT** type tool.
4. An identical insert can now be installed in the original hole. No re-work of the hole will be necessary.



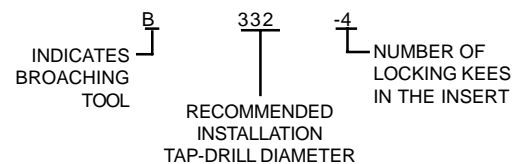
### Broaching Tool

for very hard materials.

When the parent material is very hard or tough, a special broach for the **KEES** is available.



Broaching Tools are coded in the following manner:



NOTE: THE SMALLEST TAP DRILL DIAMETER FOR WHICH BROACHING TOOLS CAN BE MADE IS .213.





## Miniature Inserts

## Lightweight Inserts

Cross Reference MS 51830 Series and NAS 1394 Series.

# CROSS REFERENCE INDEX

## Coarse Threads

MATERIAL		
303 CRES	4140/160 KSI	A286/140 KSI
KNCA(L) 0256J	KNCA(L) 0256JMXSY	KNCA(L) 0256JT
MS 51830-101(L)	MS 51830A101(L)	MS 51830CA101(L)
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KNCA(L) 0440J	KNCA(L) 0440JMXSY	KNCA(L) 0440JT
MS 51830-102(L)	MS 51830A102(L)	MS 51830CA102(L)
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KNC(L) 0632J	KNC(L) 0632JMXSY	KNC(L) 0632JT
MS 51830-103(L)	MS 51830A103(L)	MS 51830CA103(L)
---	---	---
KNCA(L) 0832J	KNCA(L) 0832JMXSY	KNCA(L) 0832JT
MS 51830-104 (L)	MS 51830A104 (L)	MS 51830CA104 (L)
---	---	---
KN(L) 0832J	KN(L) 0832JMXSY	KN(L) 0832JT
---	---	---
NAS 1394C08(L)	NAS 1394-08(L)	NAS 1394CA08(L)
KN(L) 1024J	KN(L) 1024JMXSY	KN(L) 1024JT
MS 51830-105(L)	MS 51830A105(L)	MS 51830CA105(L)
---	---	---
KN(L) 420J	KN(L) 420JMXSY	KN(L) 420JT
MS 51830-106(L)	MS 51830A106(L)	MS 51830CA106(L)
---	---	---
KN(L) 518J	KN(L) 518JMXSY	KN(L) 518JT
MS 51830-107(L)	MS 51830A107(L)	MS 51830CA107(L)
---	---	---
KN(L) 616J	KN(L) 616JMXSY	KN(L) 616JT
MS 51830-108(L)	MS 51830A108(L)	MS 51830CA108(L)
---	---	---
KN(L) 714J	KN(L) 714JMXSY	KN(L) 714JT
MS 51830-109(L)	MS 51830A109(L)	MS 51830CA109(L)
---	---	---
KN(L) 813J	KN(L) 813JMXSY	KN(L) 813JT
MS 51830-110(L)	MS 51830A110(L)	MS 51830CA110(L)
---	---	---

## Fine Threads

	MATERIAL	
303 CRES	4140/160 KSI	A286/140 KSI
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---	---	---
---	---	---
---	---	---
KN(L) 1032J	KN(L) 1032JMX**	KN(L) 1032JT
MS 51830-201(L)	MS 51830A201(L)	MS 51830CA201(L)
NAS 1394C3(L)	NAS 1394-3(L)	NAS 1394CA3(L)
KN(L) 428J	KN(L) 428JMX**	KN(L) 428JT
MS 51830-202(L)	MS 51830A202(L)	MS 51830CA202(L))
NAS 1394C4(L)	NAS 1394-4(L)	NAS 1394CA4(L)
KN(L) 524J	KN(L) 524JMX**	KN(L) 524JT
MS 51830-203(L)	MS 51830A203(L)	MS 51830CA203(L)
NAS 1394C5(L)	NAS 1394-5(L)	NAS 1394CA5(L)
KN(L) 624J	KN(L) 624JMX**	KN(L) 624JT
MS 51830-204(L)	MS 51830A204(L)	MS 51830CA204(L)
NAS 1394C6(L)	NAS 1394-6(L)	NAS 1394CA6(L)
KN(L) 720J	KN(L) 720JMX**	KN(L) 720JT
MS 51830-205(L)	MS 51830A205(L)	MS 51830CA205(L)
NAS 1394C7(L)	NAS 1394-7(L)	NAS 1394CA7(L)
KN(L) 820J	KN(L) 820JMX**	KN(L) 820JT
MS 51830-206(L)	MS 51830A206(L)	MS 51830CA206(L)
NAS 1394C8(L)	NAS 1394-8(L)	NAS 1394CA8(L)

- NOTES:
1. When Dry Film is not required on locking parts, add the suffix, N on NAS Part No., or NE on KN Part No.
  2. The suffix, SPNAS added to KN Part No. or S added to NAS Part No. indicates Silver Plate per AMS 2410.
  3. **Use (L) in Part No. ONLY if Internal Thread Locking feature is required.**
  4. "J" code as in KNCA0256J designates threads manufactured to MIL-S-8879.
  5. Replace "\*\*\*" with one of the following suffixes:  
    "SY" for MS parts  
    "SZ" for NAS parts



# Alcoa Fastening Systems

## SECTION 2

## Heavy Duty Inserts

Cross Reference MS 51831 Series and NAS 1395 Series.

### Coarse Threads

MATERIAL		
303 CRES	4140/160 KSI	A286/140 KSI
KNH(L) 0440J	KNH(L) 0440JMXSY	KNH(L) 0440JT
---	---	---
NAS 1395C04(L)	NAS 1395-04(L)	NAS 1395CA04(L)
KNH(L) 0632J	KNH(L) 0632JMXSY	KNH(L) 0632JT
---	---	---
NAS 1395C06(L)	NAS 1395-06(L)	NAS 1395CA06(L)
KNH(L) 0832J	KNH(L) 0832JMXSY	KNH(L) 0832JT
---	---	---
NAS 1395C08(L)	NAS 1395-08(L)	NAS 1395CA08(L)
KNH(L) 1024J	KNH(L) 1024JMXSY	KNH(L) 1024JT
MS 51831-101(L)	MS 51831A101(L)	MS 51831CA101(L)
---	---	---
KNH(L) 420J	KNH(L) 420JMXSY	KNH(L) 420JT
MS 51831-102(L)	MS 51831A102(L)	MS 51831CA102(L)
---	---	---
KNH(L) 518J	KNH(L) 518JMXSY	KNH(L) 518JT
MS 51831-103(L)	MS 51831A103(L)	MS 51831CA103(L)
---	---	---
KNH(L) 616J	KNH(L) 616JMXSY	KNH(L) 616JT
MS 51831-104(L)	MS 51831A104(L)	MS 51831CA104(L)
---	---	---
KNH(L) 714J	KNH(L) 714JMXSY	KNH(L) 714JT
MS 51831-105(L)	MS 51831A105(L)	MS 51831CA105(L)
---	---	---
KNH(L) 813J	KNH(L) 813JMXSY	KNH(L) 813JT
MS 51831-106(L)	MS 51831A106(L)	MS 51831CA106(L)
---	---	---
KNH(L) 912J	KNH(L) 912JMXSY	KNH(L) 912JT
MS 51831-107(L)	MS 51831A107(L)	MS 51831CA107(L)
---	---	---
KNH(L) 1011J	KNH(L) 1011JMXSY	KNH(L) 1011JT
MS 51831-108(L)	MS 51831A108(L)	MS 51831CA108(L)
---	---	---
KNH(L) 1210J	KNH(L) 1210JMXSY	KNH(L) 1210JT
MS 51831-109(L)	MS 51831A109(L)	MS 51831CA109(L)
---	---	---
KNH(L) 1409J	KNH(L) 1409JMXSY	KNH(L) 1409JT
MS 51831-110(L)	MS 51831A110(L)	MS 51831CA110(L)
---	---	---
KNH(L) 1608J	KNH(L) 1608JMXSY	KNH(L) 1608JT
MS 51831-111(L)	MS 51831A111(L)	MS 51831CA111(L)
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### Fine Threads

MATERIAL		
303 CRES	4140/160 KSI	A286/140 KSI
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---	---	---
---	---	---
---	---	---
---	---	---
---	---	---
---	---	---
---	---	---
KNH(L) 1032J	KNH(L) 1032JMX**	KNH(L) 1032JT
MS 51831-201(L)	MS 51831A201(L)	MS 51831CA201(L)
NAS 1395C3(L)	NAS 1395-3(L)	NAS 1395CA3(L)
KNH(L) 428J	KNH(L) 428JMX**	KNH(L) 428JT
MS 51831-202(L)	MS 51831A202(L)	MS 51831CA202(L)
NAS 1395C4(L)	NAS 1395-4(L)	NAS 1395CA4(L)
KNH(L) 524J	KNH(L) 524JMX**	KNH(L) 524JT
MS 51831-203(L)	MS 51831A203(L)	MS 51831CA203(L)
NAS 1395C5(L)	NAS 1395-5(L)	NAS 1395CA5(L)
KNH(L) 624J	KNH(L) 624JMX**	KNH(L) 624JT
MS 51831-204(L)	MS 51831A204(L)	MS 51831CA204(L)
NAS 1395C6(L)	NAS 1395-6(L)	NAS 1395CA6(L)
KNH(L) 720J	KNH(L) 720JMX**	KNH(L) 720JT
MS 51831-205(L)	MS 51831A205(L)	MS 51831CA205(L)
NAS 1395C7(L)	NAS 1395-7(L)	NAS 1395CA7(L)
KNH(L) 820J	KNH(L) 820JMX**	KNH(L) 820JT
MS 51831-206(L)	MS 51831A206(L)	MS 51831CA206(L)
NAS 1395C8(L)	NAS 1395-8(L)	NAS 1395CA8(L)
KNH(L) 918J	KNH(L) 918JMX**	KNH(L) 918JT
MS 51831-207(L)	MS 51831A207(L)	MS 51831CA207(L)
NAS 1395C9(L)	NAS 1395-9(L)	NAS 1395CA9(L)
KNH(L) 1018J	KNH(L) 1018JMX**	KNH(L) 1018JT
MS 51831-208(L)	MS 51831A208(L)	MS 51831CA208(L)
NAS 1395C10(L)	NAS 1395-10(L)	NAS 1395CA10(L)
KNH(L) 1216J	KNH(L) 1216JMXSY	KNH(L) 1216JT
MS 51831-209(L)	MS 51831A209(L)	MS 51831CA209(L)
---	---	---
KNH(L) 1414J	KNH(L) 1414JMXSY	KNH(L) 1414JT
MS 51831-210(L)	MS 51831A210(L)	MS 51831CA210(L)
---	---	---
KNH(L) 1612J	KNH(L) 1612JMXSY	KNH(L) 1612JT
MS 51831-211(L)	MS 51831A211(L)	MS 51831CA211(L)
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Use (L) in Part No. ONLY if Internal Thread Locking feature is required. NOTE: Replace "\*" with one of the following suffixes:  
 "SY" for MS parts  
 "SZ" for NAS parts



# Alcoa Fastening Systems

## SECTION 2

### Extra Heavy Duty Inserts

Cross Reference MS 51832 Series.

#### Coarse Threads

MATERIAL		
303 CRES	4140/160 KSI	A286/140 KSI
KNHXH(L) 1024J	KNHXH(L) 1024JMXSY	KNHXH(L) 1024JT
MS 51832-101(L)	MS 51832A101(L)	MS 51832CA101(L)
---	---	---
KNHXH(L) 420J	KNHXH(L) 420JMXSY	KNHXH(L) 420JT
MS 51832-102(L)	MS 51832A102(L)	MS 51832CA102(L)
---	---	---
KNHXH(L) 518J	KNHXH(L) 518JMXSY	KNHXH(L) 518JT
MS 51832-103(L)	MS 51832A103(L)	MS 51832CA103(L)
---	---	---
KNHXH(L) 616J	KNHXH(L) 616JMXSY	KNHXH(L) 616JT
MS 51832-104(L)	MS 51832A104(L)	MS 51832CA104(L)
---	---	---
KNHXH(L) 714J	KNHXH(L) 714JMXSY	KNHXH(L) 714JT
MS 51832-105(L)	MS 51832A105(L)	MS 51832CA105(L)
---	---	---
KNHXH(L) 813J	KNHXH(L) 813JMXSY	KNHXH(L) 813JT
MS 51832-106(L)	MS 51832A106(L)	MS 51832CA106(L)
---	---	---
KNHXH(L) 912J	KNHXH(L) 912JMXSY	KNHXH(L) 912JT
MS 51832-107(L)	MS 51832A107(L)	MS 51832CA107(L)
---	---	---
KNHXH(L) 1011J	KNHXH(L) 1011JMXSY	KNHXH(L) 1011JT
MS 51832-108(L)	MS 51832A108(L)	MS 51832CA108(L)
---	---	---
KNHXH(L) 1210J	KNHXH(L) 1210JMXSY	KNHXH(L) 1210JT
MS 51832-109(L)	MS 51832A109(L)	MS 51832CA109(L)
---	---	---
KNHXH(L) 1409J	KNHXH(L) 1409JMXSY	KNHXH(L) 1409JT
MS 51832-110(L)	MS 51832A110(L)	MS 51832CA110(L)
---	---	---
KNHXH(L) 1608J	KNHXH(L) 1608JMXSY	KNHXH(L) 1608JT
MS 51832-111(L)	MS 51832A111(L)	MS 51832CA111(L)
---	---	---

#### Fine Threads

MATERIAL		
303 CRES	4140/160 KSI	A286/140 KSI
KNHXH(L) 1032J	KNHXH(L) 1032JMXSY	KNHXH(L) 1032JT
MS 51832-201(L)	MS 51832A201(L)	MS 51832CA201(L)
---	---	---
KNHXH(L) 428J	KNHXH(L) 428JMXSY	KNHXH(L) 428JT
MS 51832-202(L)	MS 51832A202(L)	MS 51832CA202(L)
---	---	---
KNHXH(L) 524J	KNHXH(L) 524JMXSY	KNHXH(L) 524JT
MS 51832-203(L)	MS 51832A203(L)	MS 51832CA203(L)
---	---	---
KNHXH(L) 624J	KNHXH(L) 624JMXSY	KNHXH(L) 624JT
MS 51832-204(L)	MS 51832A204(L)	MS 51832CA204(L)
---	---	---
KNHXH(L) 720J	KNHXH(L) 720JMXSY	KNHXH(L) 720JT
MS 51832-205(L)	MS 51832A205(L)	MS 51832CA205(L)
---	---	---
KNHXH(L) 820J	KNHXH(L) 820JMXSY	KNHXH(L) 820JT
MS 51832-206(L)	MS 51832A206(L)	MS 51832CA206(L)
---	---	---
KNHXH(L) 918J	KNHXH(L) 918JMXSY	KNHXH(L) 918JT
MS 51832-207(L)	MS 51832A207(L)	MS 51832CA207(L)
---	---	---
KNHXH(L) 1018J	KNHXH(L) 1018JMXSY	KNHXH(L) 1018JT
MS 51832-208(L)	MS 51832A208(L)	MS 51832CA208(L)
---	---	---
KNHXH(L) 1216J	KNHXH(L) 1216JMXSY	KNHXH(L) 1216JT
MS 51832-209(L)	MS 51832A209(L)	MS 51832CA209(L)
---	---	---
KNHXH(L) 1414J	KNHXH(L) 1414JMXSY	KNHXH(L) 1414JT
MS 51832-210(L)	MS 51832A210(L)	MS 51832CA210(L)
---	---	---
KNHXH(L) 1612J	KNHXH(L) 1612JMXSY	KNHXH(L) 1612JT
MS 51832-211(L)	MS 51832A211(L)	MS 51832CA211(L)
---	---	---

Use (L) in Part No. ONLY if Internal Thread Locking feature is required.



# Alcoa Fastening Systems

## SECTION 2

### Lightweight Studs

Cross Reference MS 51833 Series.

#### Coarse Threads

MATERIAL		
303 CRES	4140/160 KSI	A286/140 KSI
KNNS 1024JS-(NL)	KNNS 1024JMSY-(NL)	KNNS 1024JT-(NL)
MS 51833 C101-(NL)	MS 51833-101-(NL)	MS 51833 A101-(NL)
---	---	---
KNNS 420JS-(NL)	KNNS 420JMSY-(NL)	KNNS 420JT-(NL)
MS 51833 C102-(NL)	MS 51833-102-(NL)	MS 51833 A102-(NL)
---	---	---
KNNS 518JS-(NL)	KNNS 518JMSY-(NL)	KNNS 518JT-(NL)
MS 51833 C103-(NL)	MS 51833-103-(NL)	MS 51833 A103-(NL)
---	---	---
KNNS 616JS-(NL)	KNNS 616JMSY-(NL)	KNNS 616JT-(NL)
MS 51833 C104-(NL)	MS 51833-104-(NL)	MS 51833 A104-(NL)
---	---	---
KNNS 714JS-(NL)	KNNS 714JMSY-(NL)	KNNS 714JT-(NL)
MS 51833 C105-(NL)	MS 51833-105-(NL)	MS 51833 A105-(NL)
---	---	---
KNNS 813JS-(NL)	KNNS 813JMSY-(NL)	KNNS 813JT-(NL)
MS 51833 C106-(NL)	MS 51833-106-(NL)	MS 51833 A106-(NL)
---	---	---

#### Fine Threads

MATERIAL		
303 CRES	4140/160 KSI	A286/140 KSI
KNNS 1032JS-(NL)	KNNS 1032JMSY-(NL)	KNNS 1032JT-(NL)
MS 51833 C201-(NL)	MS 51833-201-(NL)	MS 51833 A201-(NL)
---	---	---
KNNS 428JS-(NL)	KNNS 428JMSY-(NL)	KNNS 428JT-(NL)
MS 51833 C202-(NL)	MS 51833-202-(NL)	MS 51833 A202-(NL)
---	---	---
KNNS 524JS-(NL)	KNNS 524JMSY-(NL)	KNNS 524JT-(NL)
MS 51833 C203-(NL)	MS 51833-203-(NL)	MS 51833 A203-(NL)
---	---	---
KNNS 624JS-(NL)	KNNS 624JMSY-(NL)	KNNS 624JT-(NL)
MS 51833 C204-(NL)	MS 51833-204-(NL)	MS 51833 A204-(NL)
---	---	---
KNNS 720JS-(NL)	KNNS 720JMSY-(NL)	KNNS 720JT-(NL)
MS 51833 C205-(NL)	MS 51833-205-(NL)	MS 51833 A205-(NL)
---	---	---
KNNS 820JS-(NL)	KNNS 820JMSY-(NL)	KNNS 820JT-(NL)
MS 51833 C206-(NL)	MS 51833-206-(NL)	MS 51833 A206-(NL)
---	---	---

**NOTE:** Replace (NL) in Part No. with Nut End Length in 1/16" increments.  
Ex.: -22 = 1 3/8"

**NOTE:** When referring to MS Part Nos. use "dash" (-) in Part No. in lieu of "D" if drilled hole is not required. Use "D" in Part No. in lieu of "dash" (-) only if drilled hole is required.  
Ex.: MS 51833 C103 D24

**NOTE:** MIL-S-45915 dated 25 Nov 1970 has been superseded by MIL-S-45915A dated 21 Aug 1991.

#### Notes & sketches





# Alcoa Fastening Systems

## SECTION 2

## Heavy Duty Studs

Cross Reference MS 51834 Series.

### Coarse Threads

MATERIAL		
303 CRES	4140/160 KSI	A286/140 KSI
KNHS 0832JS-(NL)	KNHS 0832JMXSY-(NL)	KNHS 0832JT-(NL)
MS 51834 C101-(NL)	MS 51834-101-(NL)	MS 51834 A101-(NL)
---	---	---
KNHS 1024JS-(NL)	KNHS 1024JMXSY-(NL)	KNHS 1024JT-(NL)
MS 51834 C102-(NL)	MS 51834-102-(NL)	MS 51834 A102-(NL)
---	---	---
KNHS 420JS-(NL)	KNHS 420JMXSY-(NL)	KNHS 420JT-(NL)
MS 51834 C103-(NL)	MS 51834-103-(NL)	MS 51834 A103-(NL)
---	---	---
KNHS 518JS-(NL)	KNHS 518JMXSY-(NL)	KNHS 518JT-(NL)
MS 51834 C104-(NL)	MS 51834-104-(NL)	MS 51834 A104-(NL)
---	---	---
KNHS 616JS-(NL)	KNHS 616JMXSY-(NL)	KNHS 616JT-(NL)
MS 51834 C105-(NL)	MS 51834-105-(NL)	MS 51834 A105-(NL)
---	---	---
KNHS 714JS-(NL)	KNHS 714JMXSY-(NL)	KNHS 714JT-(NL)
MS 51834 C106-(NL)	MS 51834-106-(NL)	MS 51834 A106-(NL)
---	---	---
KNHS 813JS-(NL)	KNHS 813JMXSY-(NL)	KNHS 813JT-(NL)
MS 51834 C107-(NL)	MS 51834-107-(NL)	MS 51834 A107-(NL)
---	---	---
KNHS 912JS-(NL)	KNHS 912JMXSY-(NL)	KNHS 912JT-(NL)
MS 51834 C108-(NL)	MS 51834-108-(NL)	MS 51834 A108-(NL)
---	---	---
KNHS 1011JS-(NL)	KNHS 1011JMXSY-(NL)	KNHS 1011JT-(NL)
MS 51834 C109-(NL)	MS 51834-109-(NL)	MS 51834 A109-(NL)
---	---	---
KNHS 1210JS-(NL)	KNHS 1210JMXSY-(NL)	KNHS 1210JT-(NL)
MS 51834 C110-(NL)	MS 51834-110-(NL)	MS 51834 A110-(NL)
---	---	---
KNHS 1409JS-(NL)	KNHS 1409JMXSY-(NL)	KNHS 1409JT-(NL)
MS 51834 C111-(NL)	MS 51834-111-(NL)	MS 51834 A111-(NL)
---	---	---
KNHS 1608JS-(NL)	KNHS 1608JMXSY-(NL)	KNHS 1608JT-(NL)
MS 51834 C112-(NL)	MS 51834-112-(NL)	MS 51834 A112-(NL)
---	---	---

### Fine Threads

MATERIAL		
303 CRES	4140/160 KSI	A286/140 KSI
KNHS 0836JS-(NL)	KNHS 0836JMXSY-(NL)	KNHS 0836JT-(NL)
MS 51834 C201-(NL)	MS 51834-201-(NL)	MS 51834 A201-(NL)
---	---	---
KNHS 1032JS-(NL)	KNHS 1032JMXSY-(NL)	KNHS 1032JT-(NL)
MS 51834 C202-(NL)	MS 51834-202-(NL)	MS 51834 A202-(NL)
---	---	---
KNHS 428JS-(NL)	KNHS 428JMXSY-(NL)	KNHS 428JT-(NL)
MS 51834 C203-(NL)	MS 51834-203-(NL)	MS 51834 A203-(NL)
---	---	---
KNHS 524JS-(NL)	KNHS 524JMXSY-(NL)	KNHS 524JT-(NL)
MS 51834 C204-(NL)	MS 51834-204-(NL)	MS 51834 A204-(NL)
---	---	---
KNHS 624JS-(NL)	KNHS 624JMXSY-(NL)	KNHS 624JT-(NL)
MS 51834 C205-(NL)	MS 51834-205-(NL)	MS 51834 A205-(NL)
---	---	---
KNHS 720JS-(NL)	KNHS 720JMXSY-(NL)	KNHS 720JT-(NL)
MS 51834 C206-(NL)	MS 51834-206-(NL)	MS 51834 A206-(NL)
---	---	---
KNHS 820JS-(NL)	KNHS 820JMXSY-(NL)	KNHS 820JT-(NL)
MS 51834 C207-(NL)	MS 51834-207-(NL)	MS 51834 A207-(NL)
---	---	---
KNHS 918JS-(NL)	KNHS 918JMXSY-(NL)	KNHS 918JT-(NL)
MS 51834 C208-(NL)	MS 51834-208-(NL)	MS 51834 A208-(NL)
---	---	---
KNHS 1018JS-(NL)	KNHS 1018JMXSY-(NL)	KNHS 1018JT-(NL)
MS 51834 C209-(NL)	MS 51834-209-(NL)	MS 51834 A209-(NL)
---	---	---
KNHS 1216JS-(NL)	KNHS 1216JMXSY-(NL)	KNHS 1216JT-(NL)
MS 51834 C210-(NL)	MS 51834-210-(NL)	MS 51834 A210-(NL)
---	---	---
KNHS 1414JS-(NL)	KNHS 1414JMXSY-(NL)	KNHS 1414JT-(NL)
MS 51834 C211-(NL)	MS 51834-211-(NL)	MS 51834 A211-(NL)
---	---	---
KNHS 1612JS-(NL)	KNHS 1612JMXSY-(NL)	KNHS 1612JT-(NL)
MS 51834 C212-(NL)	MS 51834-212-(NL)	MS 51834 A212-(NL)
---	---	---

**NOTE:** Replace (NL) in Part No. with Nut End Length in 1/16" increments.  
Ex.: -22 = 1 3/8"

**NOTE:** When referring to MS Part Nos. use "dash" (-) in Part No. in lieu of D if drilled hole is not required. Use "D" in Part No. in lieu of "dash" (-) only if drilled hole is required.  
Ex.: MS 51834 C103 D24



# Alcoa Fastening Systems

## SECTION 2

### Decimal/Metric Equivalents

Decimal Equivalents											
DRILL SIZES	M/M	DECI-MAL	DRILL SIZES	M/M	DECI-MAL	DRILL SIZES	M/M	DECI-MAL	DRILL SIZES	M/M	DECI-MAL
..	.1	.0039	45	..	.0820	5	..	.2055	7/16	..	.4375
..	.2	.0079	44	..	.0860	4	..	.2090	29/64	..	.4531
..	.3	.0118	43	..	.0890	3	..	.2130	15/32	..	.4687
80	..	.0135	42	..	.0935	7/32	..	.2187	..	12.	.4724
79	..	.0145	3/32	..	.0937	2	..	.2210	31/64	..	.4844
1/64	..	.0156	41	..	.0960	1	..	.2280	1/2	..	.5000
..	.4	.0157	40	..	.0980	A	..	.2340	..	13.	.5118
78	..	.0160	39	..	.0995	15/64	..	.2344	33/64	..	.5156
77	..	.0180	38	..	.1015	..	6.	.2362	17/32	..	.5312
..	.5	.0197	37	..	.1040	B	..	.2380	35/64	..	.5469
76	..	.0200	36	..	.1065	C	..	.2420	..	14.	.5512
75	..	.0210	7/64	..	.1094	D	..	.2460	9/16	..	.5625
74	..	.0225	35	..	.1100	1/4	..	.2500	37/64	..	.5781
..	.6	.0236	34	..	.1110	E	..	.2500	..	15.	.5906
73	..	.0240	33	..	.1130	F	..	.2570	19/32	..	.5937
72	..	.0250	32	..	.1160	G	..	.2610	39/64	..	.6094
71	..	.0260	..	3.	.1181	17/64	..	.2656	5/8	..	.6250
..	.7	.0276	31	..	.1200	H	..	.2660	..	16.	.6299
70	..	.0280	1/8	..	.1250	I	..	.2720	41/64	..	.6406
69	..	.0292	30	..	.1285	..	7.	.2756	21/32	..	.6562
68	..	.0310	29	..	.1360	J	..	.2770	..	17.	.6693
1/32	..	.0312	28	..	.1405	K	..	.2810	43/64	..	.6719
..	.8	.0315	9/64	..	.1406	9/32	..	.2812	11/16	..	.6875
67	..	.0320	27	..	.1440	L	..	.2900	45/64	..	.7031
66	..	.0330	26	..	.1470	M	..	.2950	..	18.	.7087
65	..	.0350	25	..	.1495	19/64	..	.2969	23/32	..	.7187
..	.9	.0354	24	..	.1520	N	..	.3020	47/64	..	.7344
64	..	.0360	23	..	.1540	5/16	..	.3125	..	19.	.7480
63	..	.0370	5/32	..	.1562	..	8.	.3150	3/4	..	.7500
62	..	.0380	22	..	.1570	O	..	.3160	49/64	..	.7656
61	..	.0390	..	4.	.1575	P	..	.3230	25/32	..	.7812
..	1.	.0394	21	..	.1590	21/64	..	.3281	..	20.	.7874
60	..	.0400	20	..	.1610	Q	..	.3320	51/64	..	.7969
59	..	.0410	19	..	.1660	R	..	.3390	13/16	..	.8125
58	..	.0420	18	..	.1695	11/32	..	.3437	..	21.	.8268
57	..	.0430	11/64	..	.1719	S	..	.3480	53/64	..	.8281
56	..	.0465	17	..	.1730	..	9.	.3543	27/32	..	.8437
3/64	..	.0469	16	..	.1770	T	..	.3580	55/64	..	.8594
55	..	.0520	15	..	.1800	23/64	..	.3594	..	22.	.8661
54	..	.0550	14	..	.1820	U	..	.3680	7/8	..	.8750
53	..	.0595	13	..	.1850	3/8	..	.3750	57/64	..	.8906
1/16	..	.0625	3/16	..	.1875	V	..	.3770	..	23.	.9055
52	..	.0635	12	..	.1890	W	..	.3860	29/32	..	.9062
51	..	.0670	11	..	.1910	25/64	..	.3906	59/64	..	.9219
50	..	.0700	10	..	.1935	..	10.	.3937	15/16	..	.9375
49	..	.0730	9	..	.1960	X	..	.3970	..	24.	.9449
48	..	.0760	..	5.	.1968	Y	..	.4040	61/64	..	.9531
5/64	..	.0781	8	..	.1990	13/32	..	.4062	31/32	..	.9687
47	..	.0785	7	..	.2010	Z	..	.4130	..	25.	.9842
..	2.	.0878	13/64	..	.2031	27/64	..	.4219	63/64	..	.9844
46	..	.0810	6	..	.2040	..	11.	.4331	1	25.4	1.0000



# GENERAL PURPOSE INSERTS

Inserts shown in this section were designed for general purpose applications.

The **Miniature size inserts** are for use in electronic and aerospace applications where size and strength are critical. These inserts may be installed in sheet material as thin as 1/16" providing protrusion of insert is not objectional. Their pull-out strength exceeds the tensile strength of most Military Standard screws. the internal Thread Locking versions conform to MIL-N-25027.

**Lightweight, Heavy Duty and Extra Heavy Duty inserts** are offered in a wide choice of thread diameters and materials to suit virtually any performance requirement. Each is available with Internal Thread Locking features.

**Carbon Steel inserts** are for use in commerical or repair applications where NAS or MS specifications are not required.

Internal thread sizes larger than shown are available upon request.

INDEX	PAGE NO.
How To Order	12
Miniature Inserts	12
Lightweight Inserts	13
Heavy Duty Inserts	14
Extra Heavy Duty Inserts	15
Thinwall & Heavy Duty Carbon Steel Inserts	16

## SPECIFICATIONS:

All dimensions in inches.

Tolerances for all inserts in this section are  $\pm 0.010$  unless otherwise specified.

Other materials available upon request.

Shear engagement area dimensions shown (sp. in.) are minimums.

NOTE: All internal threads are manufactured to MIL-S-8879 except where noted.

## INSTALLATION TAP-DRILL HOLE TOLERANCE

.120 TO .233 =  $-.001 + .002$

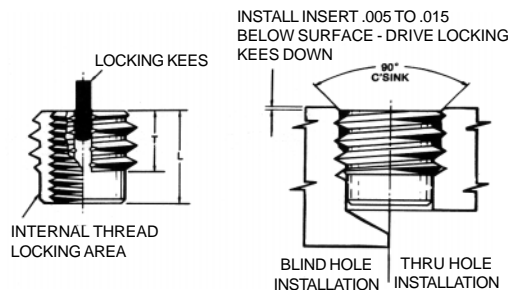
.234 TO .500 =  $-.001 + .004$

Above .500 =  $-.001 + .005$



# Alcoa Fastening Systems

## Miniature Inserts



## SECTION 3

PART NO.		DIMENSIONS					INSTALLATION DATA					REMOVAL DATA	
NON-LOCKING	INTERNAL THREAD LOCKING	INTERNAL THREAD SIZE	EXTERNAL THREAD		L	T	TAP DRILL	C'SINK DIA. +.010 -.000	THREAD TAP		INSTALLATION TOOL PART NUMBER	DRILL	
			SIZE	SHEAR ENGAG.			SIZE +.003 -.001		↑SIZE UNF-2B	DEPTH MIN.		SIZE	DEPTH
KNC0080J		0 - 80 UNJF-3B	6 - 40 UNF-3A	.0132	.10	.085	.120*	.140	6 - 40	.130	TKNC 008	#38 (.101)	1/16
▲KNCC0256J	▲KNCC0256J	2-56 UNJC-3B	6 - 40 UNF-3A	.0132	.10	.085	.120*	.140	6 - 40	.130	TKNCCL 02	#38 (.101)	
▲KNCA0256J	▲KNCA0256J	2-56 UNJC-3B	8 - 32 UNC-3A	.0157	.12	.088	.134	.166	† 8 - 32	.140	TKNC 02	#33 (.113)	
▲KNCA0440J	▲KNCA0440J	4 - 40 UNJC-3B	10 - 32 UNF-2A	.0302	.17	.125	.161	.194	10 - 32	.160	TKNC 04	#29 (.136)	3/32
▲KNC0632J	▲KNCL0632J	6 - 32 UNJC-3B	12 - 28 UNF-2A	.0329	.17	.125	.187	.220	12 - 28	.160	TKNC 06	#21 (.159)	
▲KNCA0832J	▲KNCA0832J	8 - 32 UNJC-3B	** 1/4 - 28 UNF-2A	.0669	.22	.175	.228	.255	1/4 - 28	.210	TKNC 08	#8 (.199)	1/8

▲ indicates that parts are normally available from stock. \*\*MODIFIED MINOR DIAMETER \* +.002 STANDARD MATERIALS: Insert: 303 CRES (passivated)  
† 8-32 is UNC-2B -.001 KEES: 302 CRES  
See "How To Order," Page 12 for more information.

**How To Order:** Standard Insert Material and Finish: 303 CRES (passivated). No identifying marks on insert. **Standard Kees Material:** 302 corrosion resistant steel. Other materials available by special request. ■ This ordering code may be used for all inserts in this section except for RKKA and RKK series inserts on Page 16 which are supplied in carbon steel only. These should be ordered by part numbers as tabulated. ■ All others may also be ordered by part numbers tabulated unless a special finish, length or material is required. In this case, use the ordering code below.

KNHL 428 J MX-9 SY	
BASIC SERIES	FINISH DESIGNATION
HEAVY DUTY SERIES	(Used ONLY if finish required is other than standard.)
INTERNAL THREAD LOCK	SP = Silver Plate per QQ-S-365
INTERNAL THREAD DIAMETER	SX = Cad. Plate per QQ-P-416 Type I CL.3
in 1/16 inch increments, except below	SY = Cad. Plate per QQ-P-416 Type II CL.3
1/4 inch bolt size	SZ = Cad. Plate per QQ-P-416 Type II CL.2
Numbered screw sizes as follows:	DRY FILM LUBRICANT
10 - #10 screw size	On all locking parts unless otherwise specified by adding "NE" to
08 - #8 screw size	finish designation.
06 - #6 screw size	LENGTH
04 - #4 screw size	Specified in 1/16 inch increments (used ONLY if length
02 - #2 screw size	required is other than standard) (EX: -7 for .437 length)
008 - #08 screw size	KEENSERTS shorter than standard lengths have no
NO. OF INTERNAL THREADS PER INCH	counterbore unless requested.
DESIGNATES MIL-S-8879 INTERNAL	MATERIAL DESIGNATION
THREADS	(Used ONLY if material required is other than specified
	standard.)

MX = Chrome Moly Steel 160,000 P.S.I. MIN. identified on top of insert (TYP.) by two parallel dash marks (cad. plated per QQ-P-416 TYPE 1 CL.3.

T = A286 CRES (passivated) identified on top of insert (TYP.) by one dash mark.

BR = Bronze, completely non-magnetic inserts (cad. plated per QQ-P-416 TYPE II CL.3)

**Tridair Products 12**

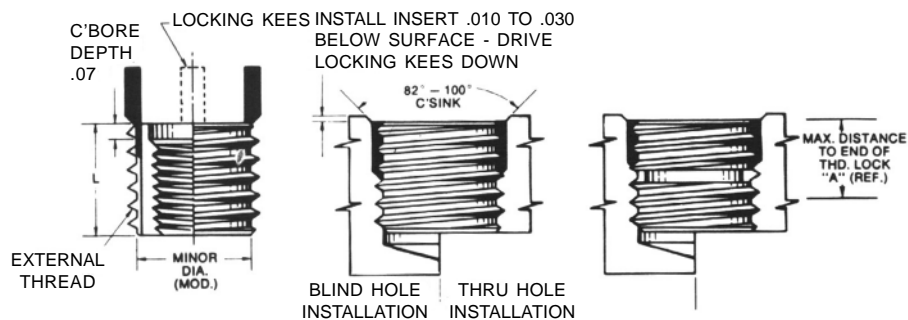




# Alcoa Fastening Systems

## SECTION 3

### Lightweight Inserts



PART NO.		DIMENSIONS					INSTALLATION DATA					REMOVAL DATA	
NON-LOCKING	INTERNAL THREAD LOCKING	INTERNAL THREAD CLASS 3B	EXTERNAL THREAD		L	A	TAP DRILL DIA.	C'SINK DIA. +.010 -.000	THREAD TAP		INSTALLATION TOOL PART NUMBER	DRILL	
			SIZE CLASS 2A (MOD.)	SHEAR ENGAG.					SIZE CLASS 2B	MIN. DEPTH		SIZE	DEPTH
▲KN1032J		10 - 32	5/16 - 18	.1517	.31	.31	.272	.323	5/16 - 18	.37	TD 1032L	7/32	5/32
	▲KNL1032J			.0945									
▲KN1024J		10 - 24	5/16 - 18	.1517	.31						TD 1024L		
	▲KNL1024J			.0945									
▲KN428J		1/4 - 28	3/8 - 16	.2371	.37	.33	.332	.385	3/8 - 16	.43	TD 428L	9/32	3/16
	▲KNL428J			.1726									
▲KN420J		1/4 - 20	3/8 - 16	.2371	.36						TD 420L		
	▲KNL420J			.1726									
▲KN524J		5/16 - 24	7/16 - 14	.3049	.43	.34	.397	.447	7/16 - 14	.50	TD 524L	11/32	
	▲KNL524J			.2321									
▲KN518J		5/16 - 18	7/16 - 14	.3049	.37						TD518L		
	▲KNL518J			.2321									
▲KN624J		3/8 - 24	1/2 - 13	.4299	.50	.36	.453	.510	1/2 - 13	.56	TD 624L	13/32	
	▲KNL624J			.3366									
▲KN616J		3/8 - 16	1/2 - 13	.4299	.40						TD 616L		
	▲KNL616J			.3366									
KN720J		7/16 - 20	9/16 - 12	.5665	.56	.41	.516	.572	9/16 - 12	.62	TD 720L	15/32	
	KNL720J			.4606									
KN714J		7/16 - 14	9/16 - 12	.5665	.45						TD 714L		
	KNL714J			.4606									
KN820J		1/2 - 20	5/8 - 11	.7175	.62	.42	.578	.635	5/8 - 11	.68	TD 820L	17/32	
	KNL820J			.5906									
KN813J		1/2 - 13	5/8 - 11	.7175	.47						TD 813L		
	KNL813J			.5906									

▲ indicates that parts are normally available from stock.

STANDARD MATERIALS: Insert: 303 CRES (passivated)  
KEES: 302 CRES

Inserts with internal thread size 5/16 and above furnished with 4 locking KEES. See "How To Order," Page 12 for more information.

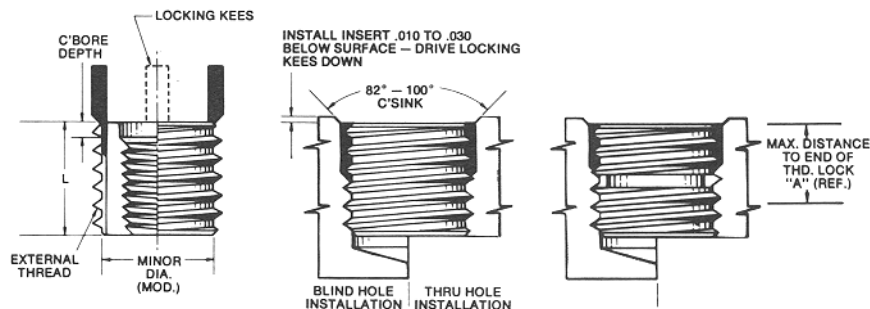
#### Notes & sketches



# Alcoa Fastening Systems

## SECTION 3

### Heavy Duty Inserts



PART NO.		DIMENSIONS					INSTALLATION					REMOVAL DATA																				
NON-LOCKING	INTERNAL THREAD LOCKING	INTERNAL THREAD CLASS 3B	EXTERNAL THREAD		L	C' BORE DEPTH	A	TAP DRILL DIA.	C'SINK DIA. +.010 -.000	THREAD TAP		INSTALLATION TOOL PART NUMBER	DRILL																			
			* SIZE CLASS 2A	SHEAR ENGAG.						SIZE UNC-2B	MIN. DEPTH		SIZE	DEPTH																		
▲KNH0832J		8 - 32	5/16 - 18	.1517	.31	.04		.272	.323	5/16 - 18	.37	THD 0832L	7/32	1/8																		
	▲KNHL0832J			.0945																												
▲KNH1032J		10 - 32	3/8 - 16	.1901											.332	.385	3/8 - 16	.43	THD 1032L	9/32												
	▲KNHL1032J			.1156																												
KNH1024J		10 - 24		.1901																	.397	.447	7/16 - 14	.50	THD 1024L	11/32						
	KNHL1024J			.1156																												
▲KNH428J		1/4 - 28	7/16 - 14	.2842	.453	.510	1/2 - 13	.56	THD 428L	13/32																						
	▲KNHL428J	.1970																														
▲KNH420J		1/4 - 20		.2842							.516	.572	9/16 - 12	.68	THD 420L	15/32																
	▲KNHL420J			.1970																												
▲KNH524J		5/16 - 24	1/2 - 13	.3588													.578	.635	5/8 - 11	.75	THD 524L	17/32										
	▲KNHL524J	.2608																														
▲KNH518J		5/16 - 18		.3588	.766	.822	13/16 - 16 UN	.94	THD 518L	23/32																						
	▲KNHL518J			.2608																												
▲KNH624J		3/8 - 24	9/16 - 12	.4975							.828	.885	7/8 - 14 UNF	1.00	THD 624L	25/32																
	▲KNHL624J	.3843																														
▲KNH616J		3/8 - 16		.4975													1.062	1.145	1-1/8 - 12 UNF	1.31	THD 616L	31/32										
	▲KNHL616J			.3843																												
KNH720J		7/16 - 20	5/8 - 11	.7172	1.187	1.270	1-1/4 - 12 UNF	1.44	THD 720L	1-3/32																						
	KNHL720J	.5831																														
KNH714J		7/16 - 14		.7172							1.312	1.395	1-3/8 - 12 UNF	1.56	THD 714L	1-7/32																
	KNHL714J			.5831																												
▲KNH820J		1/2 - 20	11/16 - 11 NS	.8884													.69	1.270	1.395	1.56	THD 820L	5/16										
	▲KNHL820J	.7368																														
▲KNH813J		1/2 - 13		.8884	.77	1.312	1.395	1.56	THD 813L																							
	▲KNHL813J			.7368																												
KNH918J		9/16 - 18	13/16 - 16	1.2493						.86	1.395	1.56	THD 918L																			
	KNHL918J	1.0247																														
KNH912J		9/16 - 12		1.2493										1.062	1.145	1-1/8 - 12 UNF	1.44	THD 912L														
	KNHL912J			1.0247																												
KNH1018J		5/8 - 18	7/8 - 14	1.4866	.69	1.270	1.395	1.56	THD 1018L																							
	KNHL1018J	1.2415																														
KNH1011J		5/8 - 11		1.4866						.77	1.312	1.395	1.56						THD 1011L													
	KNHL1011J			1.2415																												
KNH1216J		3/4 - 16	1-1/8 - 12	2.4901										1.12	.68	1.062	1.145	1-1/8 - 12 UNF		1.31	THD 1216L											
	KNHL1216J	2.4478		1.25										.75								1.187	1.270	1.395	1.56	THD 1210L						
KNH1210J		3/4 - 10		2.4901	1.12	.69	1.270	1.395	1.56																		THD 1214L					
	KNHL1210J			2.4478	1.25																							.77	1.312	1.395	1.56	THD 1409L
KNH1414J		7/8 - 14	1-1/4 - 12	3.1370	1.25					.78	1.312	1.395	1.56						THD 1414L													
	KNHL1414J	3.0775		1.37	.86																											
KNH1409J		7/8 - 9		3.1370											1.25	.86	1.395	1.56		THD 1409L												
	KNHL1409J			3.0775										1.37	.86						1.395	1.56	THD 1608L									
KNH1612J		1 - 12	1-3/8 - 12	3.8381		1.37	.86	1.395	1.56					THD 1612L																		
	KNHL1612J	3.7929		1.50		.86																		1.395	1.56	THD 1608L						
▲KNH1608J		1 - 8		3.8381						1.37	.86	1.395	1.56						THD 1608L													
	▲KNHL1608J			3.7929	1.50																											

▲indicates that parts are normally available from stock.

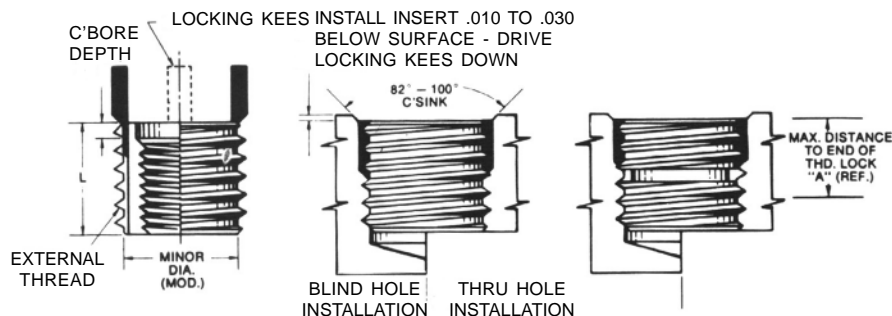
\*MODIFIED MINOR DIAMETER

Inserts with internal thread size 5/16 and above furnished with 4 locking KEES.

STANDARD MATERIALS: Insert: 303 CRES (passivated)  
KEES: 302 CRES

See "How To Order," Page 12 for more information.

# Extra Heavy Duty Inserts



## SECTION 3

PART NO.		DIMENSIONS					INSTALLATION DATA						REMOVAL DATA	
NON-LOCKING	INTERNAL THREAD LOCKING	INTERNAL THREAD CLASS 3B	EXTERNAL THREAD		L	C' BORE DEPTH	A	TAP DRILL DIA.	C'SINK DIA. ±.010 -.000	THREAD TAP		INSTALLATION TOOL PART NUMBER	DRILL	
			* SIZE CLASS 2A	SHEAR ENGAG.						SIZE UNC-2B	MIN. DEPTH		SIZE	DEPTH
KNHXXH0632J		6-32	5/16-18	.0855	.25	.04	.25	.272	.323	5/16-18	.31	THXHD	7/32	1/8
	KNHXXHL0632J			.0542										
KNHXXH0832J		8-32	3/8-16	.1901	.31	.07	.31	.332	.385	3/8-16	.37	THXHD	9/32	3/16
	KNHXXHL0832J			.1156										
KNHXXH1032J		10-32	7/16-14	.2299	.37	.10	.31	.397	.447	7/16-14	.44	THXHD	11/32	1/2
	KNHXXHL1032J			.1403										
KNHXXH1024J		10-24		.2299	.43	.10	.31	.453	.510	1/2-13	.50	THXHD	15/32	5/8
	KNHXXHL1024J			.1403										
KNHXXH428J		1/4-28	1/2-13	.2997	.50	.10	.37	.578	.635	5/8-11	.56	THXHD	19/32	3/4
	KNHXXHL428J			.2005										
KNHXXH420J		1/4-20		.2997	.62	.10	.41	.700	.700	11/16-11 NS	.68	THXHD	23/32	1 1/8
	KNHXXHL420J			.2005										
KNHXXH524J		5/16-24	9/16-12	.4163	.81	.10	.48	.828	.885	7/8-14 UNF	.94	THXHD	27/32	1 1/4
	KNHXXHL524J			.3029										
KNHXXH518J		5/16-18		.4163	.87	.10	.54	1.020	1.020	1-12 UNF	1.00	THXHD	1-3/32	1 3/8
	KNHXXHL518J			.3029										
KNHXXH624J		3/8-24	5/8-11	.5584	1.12	.10	.59	1.187	1.270	1-1/4-12 UNF	1.31	THXHD	1-7/32	1 7/8
	KNHXXHL624J			.4243										
KNHXXH616J		3/8-16		.5584	1.25	.10	.64	1.312	1.395	1-3/8-12 UNF	1.44	THXHD	1-7/32	2 1/8
	KNHXXHL616J			.4243										
KNHXXH720J		7/16-20	11/16-11 NS	.8000	1.37	.10	.71	1.437	1.520	1-1/2-12 UNF	1.56	THXHD	1-11/32	2 1/2
	KNHXXHL720J			.6498										
KNHXXH714J		7/16-14		.8000	1.50	.10	.78	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	3 1/8
	KNHXXHL714J			.6498										
KNHXXH820J		1/2-20	13/16-16	1.0293	1.62	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	3 1/2
	KNHXXHL820J			.8642										
KNHXXH813J		1/2-13		1.0293	1.75	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	3 3/4
	KNHXXHL813J			.8642										
KNHXXH918J		9/16-18	7/8-14	1.3761	1.87	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	4 1/8
	KNHXXHL918J			1.1131										
KNHXXH912J		9/16-12		1.3761	1.90	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	4 1/4
	KNHXXHL912J			1.1131										
KNHXXH1018J		5/8-18	1-12	1.6420	2.00	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	4 3/4
	KNHXXHL1018J			1.2770										
KNHXXH1011J		5/8-11		1.6420	2.12	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	5 1/8
	KNHXXHL1011J			1.2770										
KNHXXH1216J		3/4-16	1-1/4-12	2.7966	2.25	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	5 1/2
	KNHXXHL1216J			2.5505										
KNHXXH1210J		3/4-10		2.7966	2.37	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	5 3/4
	KNHXXHL1210J			2.5505										
KNHXXH1414J		7/8-14	1-3/8-12	3.4652	2.50	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	6 1/8
	KNHXXHL1414J			3.2769										
KNHXXH1409J		7/8-9		3.4652	2.62	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	6 3/8
	KNHXXHL1409J			3.2769										
KNHXXH1612J		1-12	1-1/2-12	4.2374	2.75	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	6 3/4
	KNHXXHL1612J			4.2135										
KNHXXH1608J		1-8		4.2374	2.87	.10	.82	1.520	1.520	1-1/2-12 UNF	1.68	THXHD	1-11/32	7 1/8
	KNHXXHL1608J			4.2135										

Inserts with internal thread size 1/4 and above furnished with 4 locking KEES.

STANDARD MATERIALS: Insert: 303 CRES (passivated)  
KEES: 302 CRES

\*MODIFIED MINOR DIAMETER

See "How To Order," Page 12 for more information.

**Tridair Products 15**

# Carbon Steel Inserts



## SECTION 3

PART NO.		DIMENSIONS			INSTALLATION DATA				REMOVAL DATA	
		INTERNAL THREAD SIZE CLASS 2B	EXTERNAL THREAD SIZE (MOD.) CLASS 2A	LENGTH	TAP DRILL DIA.	C'SINK DIA.	TAP SIZE CLASS 2B	INSERT TOOL PART NUMBER	DRILL	
									SIZE	DEPTH
THINWALL	▲RKKA 10-24	10-24	5/16-18	.31	"I"	.32	5/16-18	TRKA 10	7/32	5/32
	▲RKKA 10-32	10-32								
	▲RKKA 1/4-20	1/4-20	3/8-16	.37	"Q"	.38	3/8-16	TRKA 1/4	9/32	3/16
	▲RKKA 1/4-28	1/4-28								
	▲RKKA 5/16-18	5/16-18	7/16-14	.43	"X"	.44	7/16-14	TRKA 5/16	11/32	
	▲RKKA 5/16-24	5/16-24								
	▲RKKA 3/8-16	3/8-16	1/2-13	.50	29/64	.51	1/2-13	TRKA 3/8	13/32	
	▲RKKA 3/8-24	3/8-24								
	▲RKKA 7/16-14	7/16-14	9/16-12	.56	33/64	.57	9/16-12	TRKA 7/16	15/32	
	▲RKKA 7/16-20	7/16-20								
	▲RKKA 1/2-13	1/2-13	5/8-11	.62	37/64	.63	5/8-11	TRKA 1/2	17/32	
	▲RKKA 1/2-20	1/2-20								
HEAVY DUTY	▲RKK 8-32	8-32	5/16-18	.31	"I"	.32	5/16-18	TRK 08	7/32	1/8
	▲RKK 10-24	10-24	3/8-16	.31	"Q"	.38	3/8-16	TRK 10	9/32	
	▲RKK 10-32	10-32								
	▲RKK 1/4-20	1/4-20	7/16-14	.37	"X"	.44	7/16-14	TRK 1/4	11/32	3/16
	▲RKK 1/4-28	1/4-28								
	▲RKK 5/16-18	5/16-18	1/2-13	.43	29/64	.51	1/2-13	TRK 5/16	13/32	
	▲RKK 5/16-24	5/16-24								
	▲RKK 3/8-16	3/8-16	9/16-12	.50	33/64	.57	9/16-12	TRK 3/8	15/32	
	▲RKK 3/8-24	3/8-24								
	▲RKK 7/16-14	7/16-14	5/8-11	.62	37/64	.63	5/8-11	TRK 7/16	17/32	
	▲RKK 7/16-20	7/16-20								
	▲RKK 1/2-13	1/2-13	3/4-16	.81	45/64	.76	3/4-16	TRK 1/2	21/32	
	▲RKK 1/2-20	1/2-20								
	▲RKK 9/16-12	9/16-12	3/4-16	.81	45/64	.76	3/4-16	TRK 9/16	21/32	
	▲RKK 9/16-18	9/16-18								
	▲RKK 5/8-11	5/8-11	7/8-14	.87	53/64	.88	7/8-14	TRK 5/8	25/32	
	▲RKK 5/8-18	5/8-18								
	▲RKK 3/4-10	3/4-10	1-1/8-12	1.12	1-1/16	1.14	1-1/8-12	TRK 3/4	31/32	5/16
	▲RKK 3/4-16	3/4-16								
	▲RKK 7/8-9	7/8-9	1-1/4-12	1.25	1-3/16	1.27	1-1/4-12	TRK 7/8	1-3/32	
	▲RKK 7/8-14	7/8-14								
	▲RKK 1-8	1-8	1-3/8-12	1.37	1-5/16	1.39	1-3/8-12	TRK 1	1-7/32	
	▲RKK 1-12	1-12								
	▲RKK 1-14	1-14	1-1/2-12	1.62	1-7/16	1.52	1-1/2-12	TRK 1-1/8	1-11/32	
	▲RKK 1-1/8-7	1-1/8-7								
	▲RKK 1-1/8-12	1-1/8-12	1-5/8-12	1.81	1-9/16	1.64	1-5/8-12	TRK 1-1/4	1-15/32	
	▲RKK 1-1/8-18	1-1/8-18								
	▲RKK 1-1/4-7	1-1/4-7	1-7/8-12	.200	1-13/16	1.89	1-7/8-12	TRK 1-1/2	1-23/32	
	▲RKK1-1/4-12	1-1/4-12								
	▲RKK 1-1/2-6	1-1/2-6	2-1/8-12	2.12	2-1/16	2.14	2-1/8-12	TRK 1-3/4	1-31/32	
	▲RKK 1-1/2-12	1-1/2-12								
	▲RKK 1-3/4-5	1-3/4-5	2-1/8-12	2.12	2-1/16	2.14	2-1/8-12	TRK 1-3/4	1-31/32	
	▲RKK 1-3/4-12	1-3/4-12								

▲ indicates that parts are normally available from stock.

THREADS ARE MANUFACTURED TO MIL-S-7742.

Inserts with internal thread size 5/16 and above furnished with 4 locking KEES.

Material: C1215 Steel or equivalent.

Finish: Parkerize

**Tridair Products 16**





# Alcoa Fastening Systems

## SECTION 4

## SPECIAL PURPOSE INSERTS

**Floating Inserts** are designed to compensate automatically for misalignment from .015 (for 2-56) up to .040 (for #10 and larger sizes). The floater is supplied as a one-piece unit. Ideal for use on curved surfaces or for use with flathead screws.

**Blind End Inserts** are used in applications where it is important to keep a screw isolated from certain assemblies, such as electronic circuitry. They assure that dust, chips and other foreign objects will not contaminate an assembly.

**Hydraulic Inserts** are for use in hydraulic or fuel systems. They offer strong, permanent threads and wear-resistant sealing surfaces in soft metal casing or accessories. They permit repeated installation and removal of AND and MS fittings without damage to expensive castings and ports.

**High-Strength Aluminum Inserts**, designed for miniaturized space and electronic systems, may be used in most any material, including aluminum and magnesium. A significant reduction in weight can be realized with these non-magnetic inserts. They may be installed in materials as thin as 1/8" (1/16" if end may protrude).

**Solid Inserts** are ideal for relocating holes that have been drilled or tapped in wrong location, to fill holes that are too large, or to salvage expensive casings.

**Cast-In Inserts** are designed for casting into place during die casting, centrifugal, investment and permanent mold processes and many plastic molding operations. Their high strength resists high pressures generated during these processes.

Other materials available upon request.

**SPECIFICATIONS:** Tolerances for all inserts in this section are  $\pm 0.010$  unless otherwise specified. Shear engagement area dimensions shown (sq. in.) are minimums.

INSTALLATION TAP-DRILL HOLE TOLERANCE: .134 TO .228 =  $-.001 + .003$   
 .234 TO .500 =  $-.001 + .004$   
 All dimensions in inches Above .500 =  $-.001 + .005$

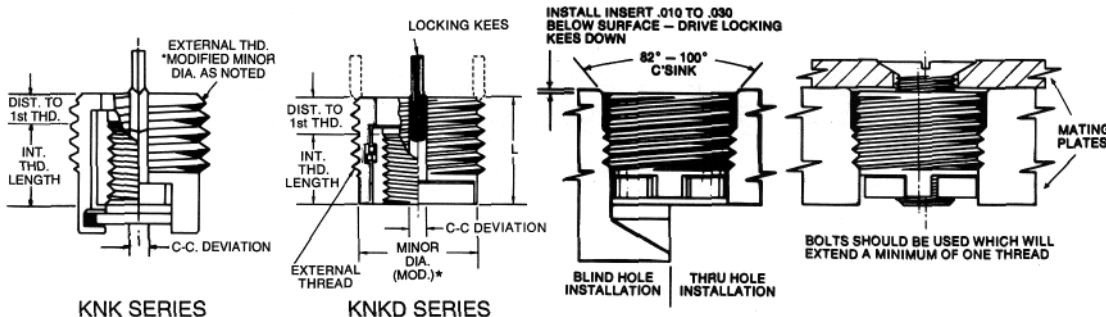
NOTE: All internal threads are manufactured to MIL-S-8879 except where noted.

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# Alcoa Fastening Systems

## Floating Inserts



## SECTION 4

PART NO.	DIMENSIONS							INSTALLATION DATA					REMOVAL DATA	
	INTERNAL THREAD CLASS 3B	EXTERNAL THREAD		L ±.015	MIN. C-C DEVIA.	INT. THREAD LENGTH	DIST. TO 1st THD. (APPROX.)	TAP DRILL DIA.	C'SINK DIA. +.010 -.000	THREAD TAP		INSTAL- LATION TOOL PART NUMBER	DRILL	
		SIZE CLASS 2A	SHEAR ENGAG.							SIZE UNF-2B	MIN. DEPTH FULL THD.		SIZE	DEPTH
KNK(L)0256J	2-56	1/4-28*	.0352	.19	.015	.10	.05	.228	.250	1/4-28	.12	TK 02	#8(.199)	3/32
▲KNK(L)0440J	4-40	5/16-24	.0815	.32	.020	.21	.07	.272	.323	5/16-24	.31	TK 04	7/32	1/8
▲KNK(L)0632J	6-32	3/8-24	.1143	.36	.030	.22	.08	.332	.385	3/8-24	.38	TK06	9/32	
▲KNK(L)0832J	8-32	3/8-24	.1143	.36	.030	.22	.08	.332	.385	3/8-24	.38	TK08	9/32	
▲KNKD(L)1032J	10-32	7/16-20*	.2202	.40	.040	.25	.15	.406	.447	7/16-20	.39	TK 010	11/32	5/32
KNKD(L)1024J	10-24													
▲KNKD(L)428J	1/4-28	1/2-20*	.2520	.40	.040	.25	.15	.468	.510	1/2-20	.39	TK 4	13/32	
KNKD(L)420J	1/4-20													
KNK(L)524J	5/16-24	5/8-18*	.3992	.53	.040	.39	.13	.578	.635	5/8-18	.50	TK 5	17/32	3/16
KNK(L)518J	5/16-18													
KNKD(L)624J	3/8-24	3/4-16*	.6816	.65	.040	.45	.20	.703	.760	3/4-16	.62	TK6	21/32	
KNKD(L)616J	3/8-16													
KNKD(L)714J	7/16-14	7/8-14*	.7965	.67	.040	.45	.20	.828	.885	7/8-14	.62	TK 7	25/32	
KNKD(L)720J	7/16-20													
KNKD(L)820J	1/2-20	1-12*	.9972	.73	.040	.50	.23	.937	1.020	1-12	.65	TK 8	27/32	5/16
KNKD(L)813J	1/2-13													

▲ indicates that parts are normally available from stock.

\*MODIFIED MINOR DIAMETER

STANDARD MATERIAL FOR FLOATING INSERTS: KNK 0256 through KNK 0832-303 Corrosion-resistant steel. KNKD 1032 through KNKD 813- chrome-Moly steel (Cad. Plated Type I, CL.3). 160,000 PSI MIN. U.T.S.

Inserts with internal thread size 5/16 and above furnished with 4 locking KEES.

Use (L) in Part No. ONLY if Internal Thread Locking Feature is required.

**How To Order:** The products in this section may be ordered by part numbers tabulated unless a special finish, length or material is required. In this case, use the ordering code below. **Standard Material and Finish:** For Floating Inserts: KNK 0256 through KNK 0832 - 303 Corrosion-resistant steel. KNKD 1032 through KNKD 813 - chrome-Moly steel (Cad. Plated Type I, CL.3). 160,000 PSI MIN. U.T.S. **For High Strength Aluminum Inserts:** 7075-T6 Aluminum alloy. **For Other Inserts in Section 4:** 303 CRES (passivated) unless otherwise specified. **Standard Kees Material:** 302 Corrosion-resistant steel unless otherwise requested. (Beryllium copper KEES are standard on KNCE(L) and all bronze inserts.)

### KNHBL 428 J MX-12 SZ

#### BASIC SERIES HEAVY DUTY BLIND-END SERIES

**INTERNAL THREAD LOCK**  
(Use "L" in part number only if internal thread locking feature required.)

**INTERNAL THREAD DIAMETER**  
in 1/16 inch increments, except below 1/4 inch bolt size

Numbered screw sizes as follows:  
10 - #10 screw size  
08 - #8 screw size  
06 - #6 screw size  
04 - #4 screw size  
02 - #2 screw size

**NO. OF INTERNAL THREADS PER INCH**  
DESIGNATES MIL-S-8879 INTERNAL THREADS

#### FINISH DESIGNATION

(Used ONLY if finish required is other than standard.)

SP = Silver Plate per QQ-S-365

SX = Cad. Plate per QQ-P-416 Type I CL.3

SY = Cad. Plate per QQ-P-416 Type II CL.3

SZ = Cad. Plate per QQ-P-416 Type III CL.2

#### DRY FILM LUBRICANT

On all locking parts unless otherwise specified by adding "NE" to finish designation.

**LENGTH** (Does not apply to Floating Inserts.)

Must be specified in 1/16 inch increments (used ONLY if length required is other than standard) (EX: -7 for .437 length) KEENSERTS shorter than standard lengths have no counter-bore unless requested.

#### MATERIAL DESIGNATION

(Used ONLY if material required is other than specified standard. See above "How To Order" Standard Material and Finish.)

MX = Chrome Moly Steel 160,000 P.S.I. MIN. identified on top of insert (TYP.) by two parallel dash marks (cad. plated per QQ-P-416 TYPE I CL.3)

T = A286 CRES (passivated) identified on top of insert (TYP.) by one dash mark

BR = Bronze, completely non-magnetic inserts (cad. plated per QQ-P-416 TYPE II CL.3)

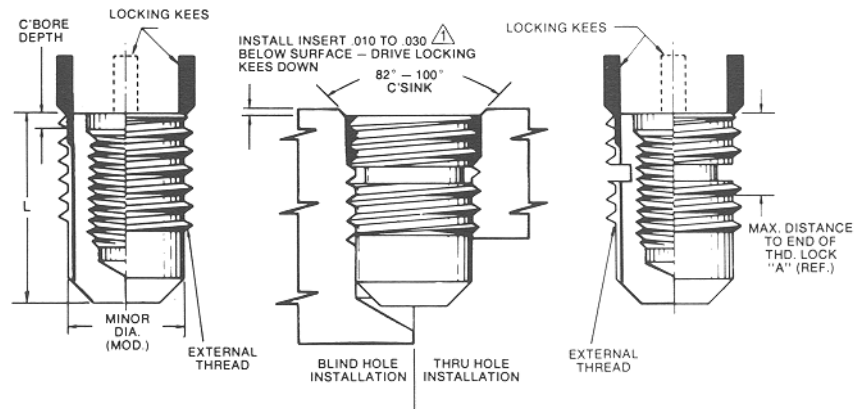
S = 303 CRES (for KNKD series only)



# Alcoa Fastening Systems

## SECTION 4

### Blind End Insert Miniature, Lightweight, Heavy Duty



PART NO.		DIMENSIONS								INSTALLATION DATA					REMOVAL DATA	
		INTERNAL THREAD SIZE CLASS 3B	EXTERNAL THREAD (MOD.)		L	INT. THD. DEPTH MIN.	EXT. THD. LGTH.	C'BORE DEPTH	A (REF.)	TAP DRILL DIA.	C'SINK DIA +.010 -.000	THREAD TAP		INSTALLATION TOOL PART NUMBER	DRILL	
			SIZE CLASS 2A	SHEAR ENGAG.								SIZE CLASS 2B	MIN. DEPTH		SIZE	DEP TH
MINIATURE	KNCB(L)0256J	2 - 56	*8 - 32	.0418 (.0181)	.24	.13	.18	C'SIN- K	.10	.134	.166	8-32	.24	TKNC 02	33(.113)	1/16
	KNCB(L)0440J	4 - 40	*10 - 32	.0634 (.0342)	.31	.17	.22	C'SIN- K	.12	.161	.194	10-32	.28	TKNC 03	29(.136)	
	KNCB(L)0632J	6 - 32	*12 - 28	.0736 (.0376)	.39	.21	.22	C'SIN- K	.12	.187	.220	12-28	.28	TKNC 04	21(.159)	3/32
	KNCB(L)0832J	8 - 32	1/4 - 28	.1002 (.0537)	.43	.25	.24	C'SIN- K	.13	.228	.255	1/4-28	.30	TKNC 05	8(.199)	
LIGHTWEIGHT	KNB(L)1032J	10 - 32	5/16-18	.1517 (.0945)	.50	.31	.31	.07	.31	.272	.323	5/16-18	.37	TD 1032L	7/32	3/32
	KNB(L)1024J	10 - 24							.31					TD1024L		
	KNB(L)428J	1/4 - 28	3/8-16	.2371 (.1726)	.62	.37	.37	.07	.33	.332	.385	3/8-16	.43	TD 428L	9/32	
	KNB(L)420J	1/4 - 20							.36					TD 420L		
	KNB(L)524J	5/16 - 24	7/16-14	.3049 (.2321)	.75	.43	.43	.07	.34	.397	.447	7/16-14	.50	TD 524L	11/32	
	KNB(L)518J	5/16 - 18							.37					TD 518L		
	KNB(L)624J	3/8 - 24	1/2-13	.4299 (.3366)	.81	.50	.50	.07	.36	.453	.510	1/2-13	.56	TD 624L	13/32	3/16
	KNB(L)616J	3/8 - 16							.40					TD 616L		
	KNB(L)720J	7/16 - 20	9/16-12	.5665 (.4606)	.87	.56	.56	.07	.41	.516	.572	9/16-12	.62	TD 720L	15/32	
	KNB(L)714J	7/16 - 14							.45					TD 714L		
	KNB(L)820J	1/2 - 20	5/8-11	.7172 (.5831)	1.06	.62	.62	.07	.42	.578	.635	5/8-11	.68	TD 820L	17/32	
	KNB(L)813J	1/2 - 13							.47					TD 813L		
HEAVY DUTY	KNHB(L)0832J	8-32	5/16-18	.1517 (.0945)	.50	.31	.31	.04	.31	.272	.323	5/16-18	.37	THD 0832L	7/32	1/8
	KNHB(L)1032J	10-32	3/8-16	.1901 (.1156)	.56	.31	.31	.07	.31	.332	.385	3/8-16	.37	THD 1032L	9/32	
	KNHB(L)1024J	10-24							.31					THD 1024L		
	KNHB(L)428J	1/4-28	7/16-14	.2842 (.1970)	.62	.37	.37	.07	.34	.397	.447	7/16-14	.43	THD 428L	11/32	
	KNHB(L)420J	1/4-20							.36					THD 420L		
	KNHB(L)524J	5/16-24	1/2-13	.3588 (.2608)	.75	.43	.43	.07	.34	.453	.510	1/2-13	.50	THD 524L	13/32	
	KNHB(L)518J	5/16-18							.37					THD 518L		
	KNHB(L)624J	3/8-24	9/16-12	.4975 (.3843)	.81	.50	.50	.07	.37	.516	.572	9/16-12	.56	THD 624L	15/32	3/16
	KNHB(L)616J	3/8-16							.41					THD 616L		
	KNHB(L)720J	7/16-20	5/8-11	.7172 (.5831)	1.00	.62	.62	.07	.42	.578	.635	5/8-11	.68	THD 720L	17/32	
	KNHB(L)714J	7/16-14							.46					THD 714L		
	KNHB(L)820J	1/2-20	11/16-11 NS	.8884 (.7368)	1.06	.68	.68	.10	.42	.641	.700	11/16-11 NS	.75	THD 820L	19/32	
	KNHB(L)813J	1/2-13							.47					THD 813L		
	KNHB(L)918J	9/16-18	13/16-16	1.2493 (1.0247)	1.25	.81	.81	.10	.48	.766	.822	13/16-16	.94	THD 918L	23/32	
	KNHB(L)912J	9/16-12							.54					THD 912L		
	KNHB(L)1018J	5/8-18	7/8-14	1.4866 (1.2415)	1.31	.87	.87	.10	.49	.828	.885	7/8-14	1.00	THD 1018L	25/32	
KNHB(L)1011J	5/8-11							.57					THD 1011L			
KNHB(L)1216J	3/4-16	1-1/8-12	2.7905 (2.4478)	1.75	1.25	1.25	.10	.68	1.062	1.145	1-1/8-12	1.44	THD 1216L	31/32		
KNHB(L)1210J	3/4-10							.75					THD 1210L			
KNHB(L)1414J	7/8-14	1-1/4-12	3.4747 (3.0775)	1.94	1.37	1.37	.10	.69	1.187	1.270	1-1/4-12	1.56	THD 1414L	1-3/32	5/16	
KNHB(L)1409J	7/8-9							.77					THD 1409L			
KNHB(L)1612J	1-12	1-3/8-12	4.2282 (3.7929)	2.12	1.50	1.50	.10	.78	1.312	1.395	1-3/8-12	1.68	THD 1612L	1-7/32		
KNHB(L)1608J	1-8							.86					THD 1608L			

\*STANDARD CLASS 2 A EXTERNAL THREAD. NO MODIFIED MINOR DIAMETER

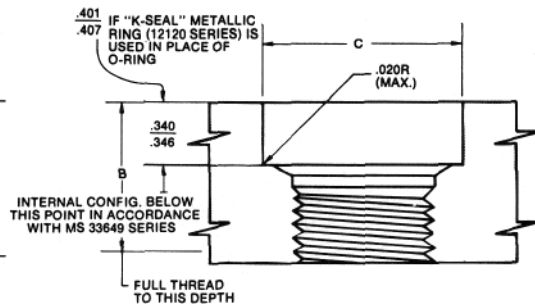
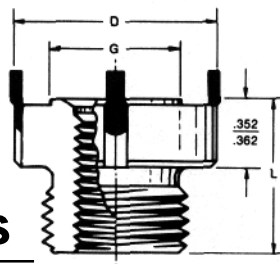
Use (L) Part No. ONLY if Internal Thread Locking feature is required.  
Inserts with internal thread size 5/16 and above furnished with 4 locking KEES

STANDARD MATERIALS: Insert: 303 CRES (passivated)  
KEES: 302 CRES

See "How To Order," Page 18 for more information

△ .005 to .015 for miniatures

# Hydraulic Inserts



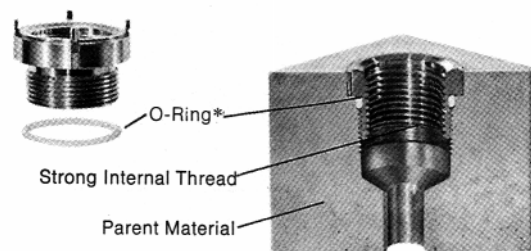
## SECTION 4

For all standard MS 33649 port connections.  
Internal configuration per MS 33649.

PART NO.	FITTING DIMENSIONS						INSTALLATION DATA					REMOVAL DATA	
	TUBING O.D. (REF.)	D +.000 -.002	L +.000 -.020	G ±.002	INTERNAL THREADS UNJF-3B PER MIL-S-8879	EXTERNAL THREADS UNJF-3A PER MIL-S-8879	MS 33649 DASH NUMBER	C ±.001	B MIN.	O-RING (REF.) MS 28778	INSTALLATION TOOL PART NUMBER	DRILL	
												SIZE	DEPTH
KNYJ - 2	1/8	.757	.812	.604	5/16-24	1/2-20	-5	.760	.87	-5	TDKNYJ2	11/16	3/16
KNYJ - 3	3/16	.819	.812	.667	3/8-24	9/16-18	-6	.822	.87	-6	TDKNYJ3	13/16	
KNYJ - 4	1/4	1.007	.812	.730	7/16-20	3/4-16	-8	1.010	.87	-8	TDKNYJ4	15/16	
KNYJ - 5	5/16	1.007	.812	.792	1/2-20	3/4-16	-8	1.010	.87	-8	TDKNYJ5	15/16	
KNYJ - 6	3/8	1.132	.875	.854	9/16-18	7/8-14	-10	1.135	.93	-10	TDKNYJ6	1-1/16	
KNYJ - 8	1/2	1.410	1.000	1.042	3/4-16	1-1/16-12**	-12	1.413	1.06	-12	TDKNYJ8	1-11/32	
KNYJ - 10	5/8	1.663	1.125	1.167	7/8-14	1-5/16-12**	-16	1.666	1.25	-16	TDKNYJ10	1-9/16	
KNYJ - 12	3/4	1.977	1.250	1.417	1-1/16-12*	1-5/8-12**	-20	1.980	1.37	-20	TDKNYJ12	1-7/8	

## How To Install

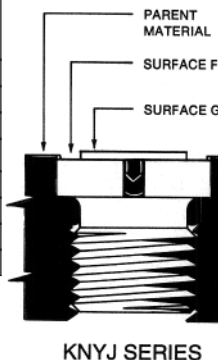
1. Lubricate insert and O-Ring and assemble, cover threads prior to assembly of O-Ring.
2. Screw insert/O-Ring assembly into tapped hole, until properly seated using tool specified. Surface "F" should be below parent material; surface "G" above.
3. Turn tool over and drive home the four KEES, using tool and ordinary hammer or press.



\*O-Rings for KNYJ and KNYDJ series to be supplied by user.

### KNYJ SERIES

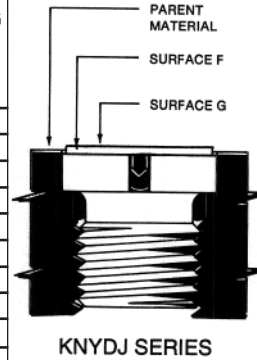
INSERT NUMBER	O-Ring (REF.) MS28778	INSTALLATION TOOL PART NUMBER	SEATING TORQUE IN-LBS
KNYJ - 2	-5	TDKNYJ 2	40-65
KNYJ - 3	-6	TDKNYJ 3	90-100
KNYJ - 4	-8	TDKNYJ 4	135-150
KNYJ - 5	-8	TDKNYJ 5	180-200
KNYJ - 6	-10	TDKNYJ 6	270-300
KNYJ - 8	-12	TDKNYJ 8	450-500
KNYJ - 10	-16	TDKNYJ 10	650-700
KNYJ - 12	-20	TDKNYJ 12	900-1000



KNYJ SERIES

### KNYDJ SERIES

INSERT PART NUMBER	TEFLON SEAL EQUIV. TO DIM. OF MS28775	INSTALL. TOOL DASH NO. TKNYDJ	SEATING TORQUE IN-LBS.
KNYDJ - 2	-110	-2	40-65
KNYDJ - 3	-111	-3	90-100
KNYDJ - 4	-112	-4	135-150
KNYDJ - 5	-114	-5	180-200
KNYDJ - 6	-114	-6	270-300
KNYDJ - 7	-115	-7	350-400
KNYDJ - 8	-117	-8	450-500
KNYDJ - 9	-118	-9	550-600
KNYDJ - 10	-119	-10	650-700
KNYDJ - 11	-121	-11	750-850
KNYDJ - 12	-122	-12	900-1000
KNYDJ - 14	-124	-14	1050-1200
KNYDJ - 16	-126	-16	1200-1400



KNYDJ SERIES



# Alcoa Fastening Systems

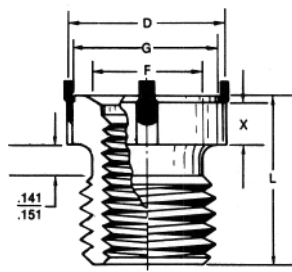
## Hydraulic Inserts

continued:

### For pressures to 3000 psi

(One piece unit complete with Teflon seal.)

- Unlimited shelf life.
- Minimum space and weight.



## SECTION 4

PART NO.	DIMENSIONS							
	TUBING O.D. (REF.)	D DIA. ±.002	L ±.020	INTERNAL THREADS CLASS 3B PER MIL-S-8879	EXTERNAL THREADS CLASS 3A	F DIA. ±.002	G DIA. ±.002	X DEPTH OF FLANGE
KNYDJ - 2	1/8	.676	.658	5/16 - 24 UNJF	1/2 - 20 UNF	.399	.604	.210/.200
KNYDJ - 3	3/16	.739	.658	3/8 - 24 UNJF	9/16 - 18 UNF	.462	.667	.210/.200
KNYDJ - 4	1/4	.802	.667	7/16 - 20 UNJF	5/8 - 18 UNF	.524	.730	.210/.200
KNYDJ - 5	5/16	.864	.676	1/2 - 20 UNJF	3/4 - 16 UNF	.649	.792	.210/.200
KNYDJ - 6	3/8	.926	.685	9/16 - 18 UNJF	3/4 - 16 UNF	.649	.854	.210/.200
KNYDJ - 7	7/16	.989	.748	5/8 - 18 UNJF	13/16 - 16 UN	.711	.917	.210/.200
KNYDJ - 8	1/2	1.176	.805	3/4 - 16 UNJF	15/16 - 16 UN	.837	1.042	.330/.320
KNYDJ - 9	9/16	1.238	.840	13/16 - 16 UNJ	1 - 16 UN	.899	1.104	.330/.320
KNYDJ - 10	5/8	1.301	.880	7/8 - 14 UNJF	1-1/16 - 16 UN	.962	1.167	.330/.320
KNYDJ - 11	11/16	1.488	.900	1 - 12 UNJF	1-3/16 - 16 UN	1.087	1.354	.330/.320
KNYDJ - 12	3/4	1.551	.919	1-1/16 - 12 UNJ	1-1/4 - 16 UN	1.149	1.417	.330/.320
KNYDJ - 14	7/8	1.676	.942	1-3/8 - 16 UNJ	1-3/8 - 16 UN	1.274	1.542	.330/.320
KNYDJ - 16	1	1.801	.966	1-5/16 - 12 UNJ	1-1/2 - 16 UN	1.399	1.667	.330/.320

PART NO.	INSTALLATION DATA									REMOVAL DATA	
	A DIA. +.005 - .001	B DIA. ±.001	Y DEPTH OF C'BORE	C DIA. +.005 - .000	E +.015 - .000	I THREADS CLASS 3B	H MIN. THREAD DEPTH	TEFLON SEAL EQUIV. TO DIM. OF MS 28775	INSTALL. TOOL DASH NO. TKNYDJ	DRILL	
										SIZE	DEPTH
KNYDJ - 2	.453	.680	.205/.215	.562	.351	1/2 - 20 UNF	.72	-110	-2	5/8	1/8
KNYDJ - 3	.515	.743	.205/.215	.625	.351	9/16 - 18 UNF	.72	-111	-3	11/16	
KNYDJ - 4	.578	.806	.205/.215	.687	.351	5/8 - 18 UNF	.73	-112	-4	3/4	
KNYDJ - 5	.687	.868	.205/.215	.812	.351	3/4 - 16 UNF	.74	-114	-5	13/16	
KNYDJ - 6	.687	.930	.205/.215	.812	.351	3/4 - 16 UNF	.75	-114	-6	7/8	
KNYDJ - 7	.750	.993	.205/.215	.875	.351	13/16 - 16 UN	.81	-115	-7	15/16	
KNYDJ - 8	.875	1.180	.335/.325	1.000	.470	15/16 - 16 UN	.87	-117	-8	1-1/16	3/16
KNYDJ - 9	.937	1.242	.335/.325	1.062	.470	1-16 UN	.90	-118	-9	1-1/8	
KNYDJ - 10	1.000	1.305	.335/.325	1.125	.470	1-1/16 - 16 UN	.94	-119	-10	1-3/16	
KNYDJ - 11	1.125	1.492	.335/.325	1.250	.470	1-3/16 - 16 UN	.96	-121	-11	1-3/8	
KNYDJ - 12	1.188	1.555	.335/.325	1.312	.470	1-1/4 - 16 UN	.98	-122	-12	1-7/16	
KNYDJ - 14	1.312	1.680	.335/.325	1.437	.470	1-3/8 - 16 UN	1.00	-124	-14	1-9/16	
KNYDJ - 16	1.438	1.805	.335/.325	1.562	.470	1-1/2 - 16 UN	1.03	-126	-16	1-11/16	

NOTE: KNYDJ series inserts normally supplied with factory installed O-Rings.  
Teflon O-Rings per AMS 3651, Viton O-Rings and Buna-N O-Rings available.  
Please specify at time of quotation.

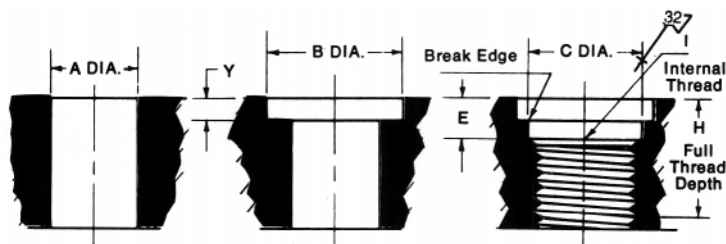
STANDARD MATERIALS: Insert: 303 CRES (passivated)

KEES: 302 CRES

See "How To Order," Page 18 for more information.

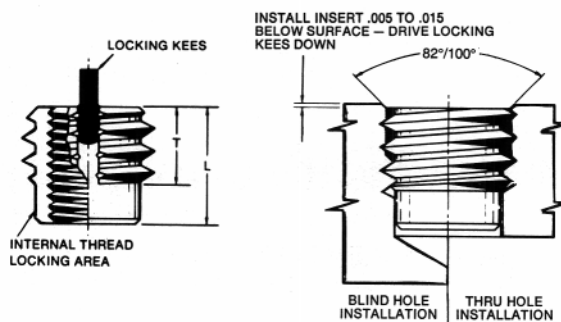
### How to prepare hole

1. Drill "A" Diameter . . . Minus 1/64
2. Ream "A" and C' Bore "B" to "Y" Depth
3. Drill "C" Diameter to "E" Depth
4. Tap "I" Thread to "H" Minimum Perfect Threads





# High-Strength Aluminum Inserts



PART NO.	DIMENSIONS					INSTALLATION DATA					REMOVAL DATA	
	INTERNAL THREAD SIZE UNC-3B**	EXTERNAL THREAD		L	T	TAP DRILL SIZE +.003 -.001	C'SINK DIA. +.010 -.000	THREAD TAP		INSTALLATION TOOL PART NUMBER	DRILL	
		SIZE CLASS 2A	SHEAR ENGAG.					SIZE UNF-2B	MIN. DEPTH		SIZE	DEPTH
KNCE(L) 0256J	2-56	8-32 UNC-2A	.0157	.12	.088	.134	.166	8-32	.140	TKNC 02	#33 (.113)	1/16
KNCE(L) 0440J	4-40	10-32 UNF-2A	.0302	.17	.125	.161	.194	10-32	.160	TKNC 04	#29 (.136)	3/32
KNCE(L) 0632J	6-32	12-28 UNF-2A	.0329	.17	.125	.187	.220	12-28	.160	TKNC 06	#21 (.159)	
KNCE(L) 0832J-.22	8-32	*1/4-28 UNF-2A	.0669	.22	.175	.228	.255	1/4-28	.210	TKNC 08	#8 (.199)	1/8

\*MODIFIED MINOR DIAMETER

\*\*PER MIL-S-8879

**Use (L) in Part No. ONLY if Internal Thread Locking feature is required.**

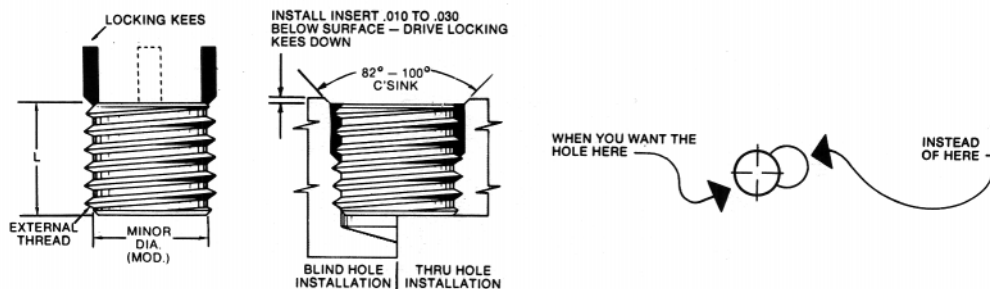
MATERIAL: 7075-T6 ALUMINUM ALLOY, NON-MAGNETIC BERYLLIUM COPPER KEES.

FINISH: BLACK ANODIZED - FOR INSERTS WITH INTERNAL THREAD LOCK.

GREEN ANODIZED - FOR INSERTS WITH NO INTERNAL THREAD LOCK.

INTERNAL THREAD LOCK VERSIONS CONFORM TO MIL-N-25027.

## Solid Inserts



PART NO.	DIMENSIONS			INSTALLATION DATA					REMOVAL DATA	
	EXTERNAL THREAD		L	TAP DRILL DIA.	C'SINK DIA. +.010 -.000	THREAD TAP		INSTALLATION PART TOOL NUMBER	DRILL	
	SIZE CLASS 2A	SHEAR ENGAG.				SIZE UN-2B	MIN. DEPTH FULL THD.		SIZE	DEPTH
KNJ 5	5/16-18	.1517	.31	.272	.323	5/16-18	.37	TJ 5	7/32	1/8
KNJ 6	3/8-16	.1901	.31	.332	.385	3/8-16	.37	TJ 6	9/32	
KNJ 7	7/16-14	.2842	.37	.397	.447	7/16-14	.43	TJ 7	11/32	
KNJ 8	1/2-13	.3588	.43	.453	.510	1/2-13	.50	TJ 8	13/32	
KNJ 9	9/16-12	.4975	.50	.516	.572	9/16-12	.56	TJ 9	15/32	
KNJ 10	5/8-11	.7172	.62	.578	.635	5/8-11	.68	TJ 10	17/32	
KNJ 11	11/16-11 NS	.8884	.68	.641	.700	11/16-11 NS	.75	TJ 11	19/32	3/16
KNJ 13	13/16-16	1.2493	.81	.766	.822	13/16-16	.94	TJ 13	23/32	
KNJ 14	7/8-14	1.4866	.87	.828	.885	7/8-14	1.00	TJ 14	25/32	
KNJ 18	1-1/8-12	2.4901	1.12	1.062	1.145	1-1/8-12	1.31	TJ 18	31/32	
KNJ 20	1-1/4-12	3.1370	1.25	1.187	1.270	1-1/4-12	1.44	TJ 20	1-3/32	5/16
KNJ 22	1-3/8-12	3.8381	1.37	1.312	1.395	1-3/8-12	1.56	TJ 22	1-7/32	

INSERTS WITH EXTERNAL THREAD SIZES 7/16 AND ABOVE FURNISHED WITH 4 LOCKING KEES.

STANDARD MATERIALS: Insert: 303 CRES (passivated)  
KEES: 302 CRES

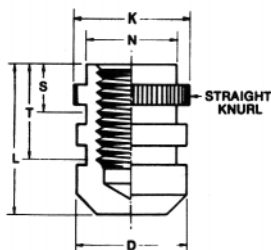
See "How To Order," Page 18 for more information.





# Alcoa Fastening Systems

## Cast-In Inserts



PART NO.	DIMENSIONS						
	INTERNAL THREAD CLASS 3B	T MIN. FULL THREAD	L	D	K OVER KNURL	N	S DIST. TO LOCK
BX(L) 0256	2-56	.14	.28	5/32	.166	.116	1/16
BX(L) 0440	4-40	.16	.31	3/16	.200	.160	3/32
BX(L) 0632	6-32	.19	.34	1/4	.262	.200	
BX(L) 0832	8-32	.22	.37	9/32	.294	.230	1/8
BX(L) 1032	10-32	.28	.43	5/16	.324	.265	
BX(L) 428	1/4-28	.37	.62	3/8	.386	.345	3/16
BX(L) 524	5/16-24	.43	.68	7/16	.451	.407	
BX(L) 624	3/8-24	.50	.75	9/16	.576	.522	

NO DRY FILM LUBRICANT ON LOCKING PARTS.  
NON-LOCKING PART ALSO AVAILABLE IN BRASS.

STANDARD MATERIALS: Insert: 303 CRES (passivated)  
See "How To Order," Page 18 for more information.

## SECTION 4



# Alcoa Fastening Systems

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## METRIC INSERTS

Tridair's full line of Metric **KEEN**INSERTS Inserts are used in the same way and have the same design features as the General Purpose Inserts shown in this catalog.

### SPECIFICATIONS:

All dimensions are in millimeters.

Shear engagement area dimensions in MM<sup>2</sup>.

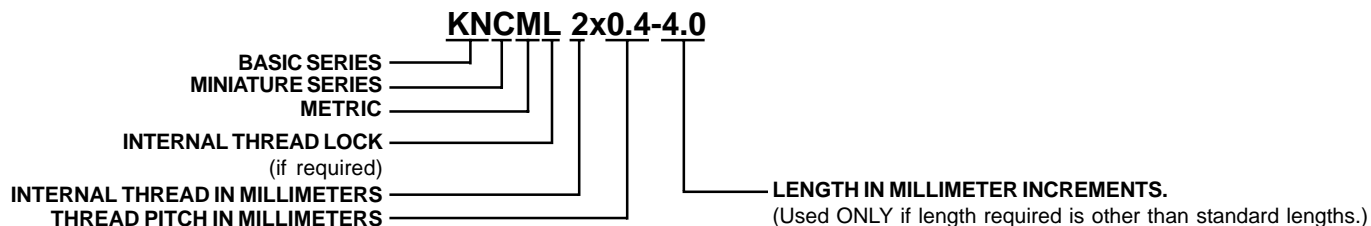
Other materials available upon request.

Other materials available upon request. Threads are manufactured to I.S.O. stds.

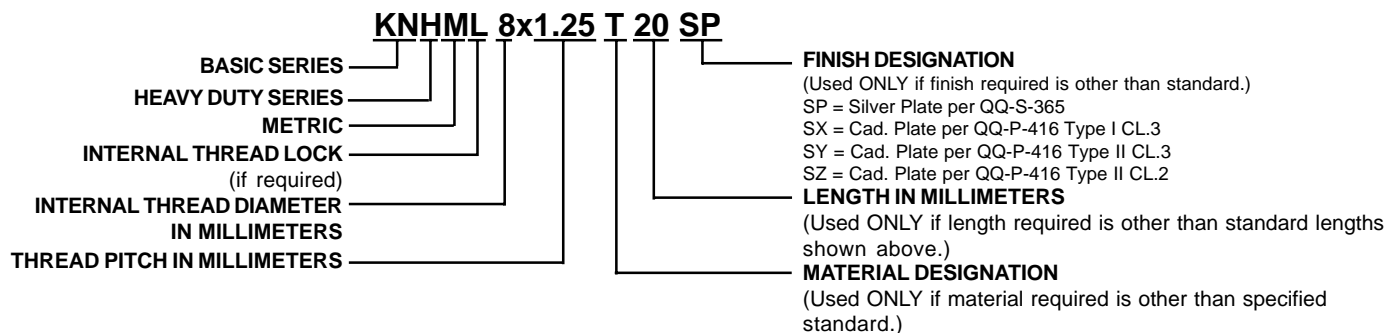
INDEX	PAGE NO.
How To Order	25
Miniature Series Inserts	26
Lightweight Series Inserts	26
Heavy Duty Series Inserts	27
Thinwall & Heavy Duty Carbon Steel Inserts	28

**How To Order:** **Standard Material and Finish:** 303 CRES (passivated). Has no identifying marks on insert. ■ Order by part numbers tabulated unless special finish, length or material is required. In this case, use the ordering code below.  
**■ KEES:** 302 corrosion resistant steel. This ordering code may be used for all inserts in this section except the KNMF Series Inserts on Page 28 which are supplied in Carbon Steel only.

### Miniature Insert Series:



### Lightweight and Heavy Duty Series:



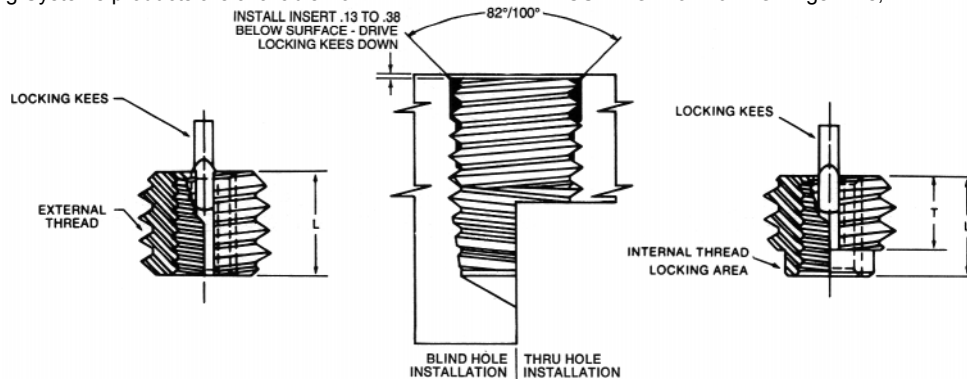
MX = Chrome Moly Steel 160,000 P.S.I. MIN. identified on top of insert (TYP.) by two parallel dash marks (cad. plated per QQ-P-416 TYPE 1 CL.3).

T = A286 CRES (passivated) identified on top of insert (TYP.) by one dash mark.

BR = Bronze, completely non-magnetic inserts (cad. plated per QQ-P-416 TYPE II CL.3)

**Tridair Products 25**

# Minature Inserts



## SECTION 5

PART NO.		DIMENSIONS				INSTALLATION DATA						REMOVAL DATA	
NON-LOCKING	INTERNAL THREAD LOCKING	INTERNAL THREAD CLASS 5H	EXTERNAL THREAD		L ±0.25	T	TAP DRILL DIA.	C'SINK DIA. +.25 -.00	THREAD TAP		INSTALLATION TOOL PART NUMBER	DRILL	
			SIZE CLASS 4h	SHEAR ENGAG.					SIZE CLASS 6h	MIN. DEPTH		SIZE	DEPTH
KNCM 2x0.4		M 2x0.4	M 4x0.7	16.5	3.0	2.2	3.4	4.1	M 4x0.7	4.0	TKNCM 2x0.4	2.8	2.00
	KNCML 2x0.4			10.3									
KNCM 2.5x0.45		M 2.5x0.45	M 4.5x0.75	26.5	3.8	2.7	3.9	4.6	M 4.5x0.75	5.0	TKNCM 2.5x0.45	3.0	2.00
	KNCML 2.5x0.45			15.9									
KNCM 3x0.5		M 3x0.5	M 5x0.8	33.1	4.25	3.1	4.4	5.1	M 5x.8	5.5	TKNCM 3x0.5	3.5	2.25
	KNCML 3x0.5			21.4									
KNCM 4x0.7		M 4x0.7	M 6x0.75	58.4	5.25	4.1	5.5	6.1	M 6x0.75	6.5	TKNCM 4x0.7	4.6	2.50
	KNCML 4x0.7			42.9									

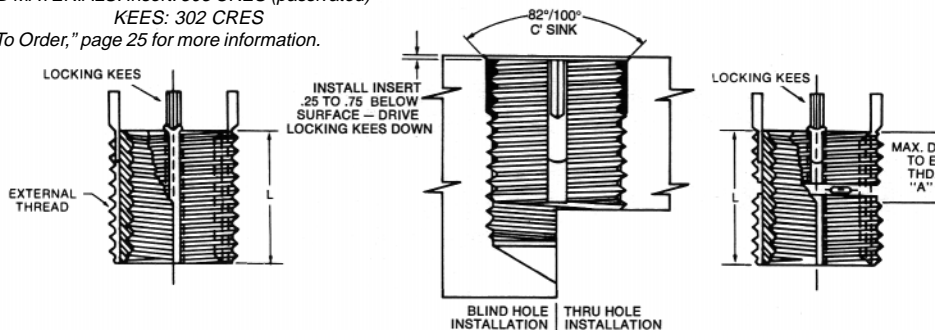
EXTERNAL THREAD FURNISHED WITH 2 LOCKING KEES.

STANDARD MATERIALS: Insert: 303 CRES (passivated)  
KEES: 302 CRES

See "How To Order," page 25 for more information.

INSTALLATION TAP-DRILL TOLERANCE 2.0 TO 5.5= -.025 +.08

# Lightweight Inserts



INSTALLATION TAP-DRILL TOLERANCE  
4.0 TO 12.70= -.025 +.100  
ABOVE 12.70 = -.025 +.130

PART NO.		DIMENSIONS					INSTALLATION DATA					REMOVAL DATA	
NON-LOCKING INTERNAL	INTERNAL THREAD LOCKING	INTERNAL THREAD CLASS 5H	EXTERNAL THREAD		L ±0.3	A	TAP DRILL DIA.	C'SINK DIA. +.25 -.00	THREAD TAP		INSTALLATION TOOL PART NUMBER	DRILL	
			SIZE CLASS 4h	SHEAR. ENGAG.					SIZE CLASS 6H	MIN. DEPTH		SIZE	DEPTH
KNM 5x0.8		M 5x0.8	M 8x1.25	104.9	8.0	-	6.9	8.25	M 8x1.25	9.5	TM - 5	5.50	4.00
	KNML 5x0.8			83.1		7.6							
KNM 5x0.5		M 5x0.5	M 8x1.25	104.9	8.0	-	6.9	8.25	M 8x1.25	9.5	TM - 5	5.50	
	KNML 5x0.5			83.1		7.0							
KNM 6x1.0		M 6x1.0	M 10x1.25	177.7	10.0	-	8.8	10.25	M 10x1.25	11.5	TM - 6	7.50	4.75
	KNML 6x1.0			152.7		8.2							
KNM 6x0.75		M 6x0.75	M 10x1.25	177.7	10.0	-	8.8	10.25	M 10x1.25	11.5	TM - 6	7.50	
	KNML 6x0.75			152.7		7.3							
KNM 8x1.25		M 8x1.25	M 12x1.25	266.7	12.0	-	10.8	12.25	M 12x1.25	13.5	TM - 8	9.50	
	KNML 8x1.25			242.5		9.5							
KNM 8x1.0		M 8x1.0	M 12x1.25	266.7	12.0	-	10.8	12.25	M 12x1.25	13.5	TM - 8	9.50	
	KNML 8x1.0			242.5		9.0							
KNM 10x1.5		M 10x1.5	M 14x1.5	341.6	14.0	-	12.8	14.25	M 14x1.5	15.5	TM - 10	11.50	
	KNML 10x1.5			316.4		10.0							
KNM 10x1.25		M 10x1.25	M 14x1.5	341.6	14.0	-	12.8	14.25	M 14x1.5	15.5	TM - 10	11.50	
	KNML 10x1.25			316.4		9.5							
KNM 12x1.75		M 12x1.75	M 16x1.5	470.2	16.0	-	14.75	16.25	M 16x1.5	17.5	TM - 12	13.50	
	KNML 12x1.75			441.4		11.20							
KNM 12x1.25		M 12x1.25	M 16x1.5	470.2	16.0	-	14.75	16.25	M 16x1.5	17.5	TM - 12	13.50	
	KNML 12x1.25			441.4		10.20							

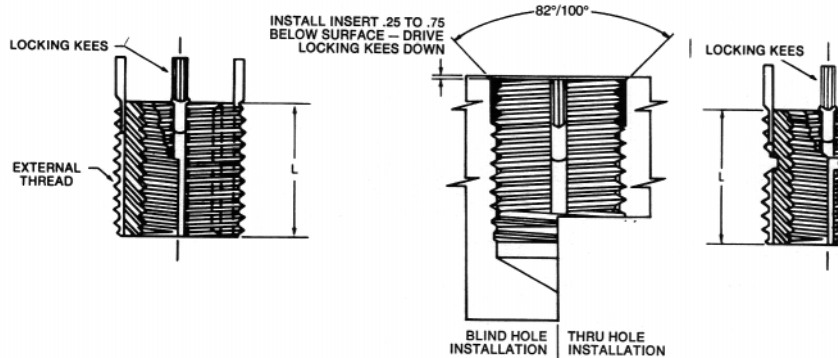
STANDARD MATERIALS: Insert: 303 CRES (passivated)  
KEES: 302 CRES

See "How To Order," Page 25 for more information.

INSERTS WITH INTERNAL THREAD SIZES OF KNM 6 AND UNDER ARE FURNISHED WITH 2 LOCKING KEES, KNM 8 AND ABOVE SIZES ARE FURNISHED WITH 4 LOCKING KEES.

**Tridair Products 26**

# Heavy Duty Inserts



## SECTION 5

PART NO.		DIMENSIONS					INSTALLATION DATA					REMOVAL DATA	
NON-LOCKING	INTERNAL THREAD LOCKING	INTERNAL THREAD CLASS 5H	EXTERNAL THREAD		L ±0.3	A	TAP DRILL DIA.	C'SINK DIA. +.25 -.00	THREAD TAP		INSTALLATION TOOL PART NUMBER	DRILL	
			SIZE CLASS 4h	SHEAR ENGAG. (MM)*					SIZE CLASS 6H	MIN. DEPTH		SIZE	DEPTH
KNHM 4x0.7		M 4x0.7	M 8x1.25	104.9	8.0	8.0	6.9	8.25	M 8x1.25	9.5	THM - 4	5.50	4.00
	KNHML 4x0.7			83.1									
KNHM 5x0.8		M 5x0.8	M 10x1.25	177.7	10.0	8.7	8.8	10.25	M 10x1.25	12.5	THM - 5	7.50	4.75
	KNHML 5x0.8			152.7									
KNHM 6x1.0		M 6x1.0	M 12x1.25	266.7	12.0	9.5	10.8	12.25	M 12x1.25	14.5	THM - 6	9.50	4.75
	KNHML 6x1.0			242.5									
KNHM 8x1.25		M 8x1.25	M 14x1.5	341.6	14.0	10.0	12.8	14.25	M 14x1.5	16.5	THM - 8	11.50	4.75
	KNHML 8x1.25			316.4									
KNHM 8x1.0		M 8x1.0	M 14x1.5	341.6	14.0	10.0	12.8	14.25	M 14x1.5	16.5	THM - 8	11.50	4.75
	KNHML 8x1.0			316.4									
KNHM 10x1.5		M 10x1.5	M 16x1.5	470.2	16.0	10.0	14.75	16.25	M 16x1.5	18.5	THM - 10	13.50	4.75
	KNHML 10x1.5			441.4									
KNHM 10x1.25		M 10x1.25	M 16x1.5	470.2	16.0	10.0	14.75	16.25	M 16x1.5	18.5	THM - 10	13.50	4.75
	KNHML 10x1.25			441.4									
KNHM 12x1.75		M 12x1.75	M 18x1.5	608.5	18.0	10.7	16.75	18.25	M 18x1.5	20.5	THM - 12	15.50	4.75
	KNHML 12x1.75			561.8									
KNHM 12x1.5		M 12x1.5	M 18x1.5	608.5	18.0	10.7	16.75	18.25	M 18x1.5	20.5	THM - 12	15.50	4.75
	KNHML 12x1.5			561.8									
KNHM 12x1.25		M 12x1.25	M 18x1.5	608.5	18.0	10.7	16.75	18.25	M 18x1.5	20.5	THM - 12	15.50	4.75
	KNHML 12x1.25			561.8									
KNHM 14x2.0		M 14x2.0	M 20x1.5	770.5	20.0	12.4	18.75	20.25	M 20x1.5	22.5	THM - 14	17.50	4.75
	KNHML 14x2.0			724.4									
KNHM 14x1.5		M 14x1.5	M 20x1.5	770.5	20.0	12.4	18.75	20.25	M 20x1.5	22.5	THM - 14	17.50	4.75
	KNHML 14x1.5			724.4									
KNHM 16x2.0		M 16x2.0	M 22x1.5	896.8	22.0	12.4	20.5	22.25	M 22x1.5	24.5	THM - 16	17.75	6.35
	KNHML 16x2.0			855.2									
KNHM 16x1.5		M 16x1.5	M 22x1.5	896.8	22.0	12.4	20.5	22.25	M 22x1.5	24.5	THM - 16	17.75	6.35
	KNHML 16x1.5			855.2									
KNHM 18x1.5		M 18x1.5	M 24x1.5	1084.4	24.0	16.8	22.5	24.25	M 24x1.5	26.5	THM - 18	19.75	6.35
	KNHML 18x1.5			1051.5									
KNHM 20x2.5		M 20x2.5	M 30x2.0	1774.3	30.0	17.5	28.0	30.25	M 30x2.0	34.5	THM - 20	25.75	6.35
	KNHML 20x2.5			1736.4									
KNHM 20x1.5		M 20x1.5	M 30x2.0	1774.3	30.0	17.5	28.0	30.25	M 30x2.0	34.5	THM - 20	25.75	6.35
	KNHML 20x1.5			1736.4									
KNHM 22x1.5		M 22x1.5	M 32x2.0	2045.9	32.0	18.3	30.0	32.25	M 32x2.0	36.5	THM - 22	27.75	6.35
	KNHML 22x1.5			2014.7									
KNHM 24x3.0		M 24x3.0	M 33x2.0	2189.4	33.0	19.0	31.0	33.25	M 33x2.0	37.5	THM - 24	28.75	6.35
	KNHML 24x3.0			2161.9									
KNHM 24x2.0		M 24x2.0	M 33x2.0	2189.4	33.0	19.0	31.0	33.25	M 33x2.0	37.5	THM - 24	28.75	6.35
	KNHML 24x2.0			2161.9									

INSERTS WITH INTERNAL THREAD SIZES OF KNM 6 AND UNDER ARE FURNISHED WITH 2 LOCKING KEES. KNM 8 AND ABOVE SIZES ARE FURNISHED WITH 4 LOCKING KEES.

\*TO CONVERT MM<sup>2</sup> TO IN<sup>2</sup> MULTIPLY MM<sup>2</sup> BY .001550

INSTALLATION TAP-DRILL TOLERANCE  
4.0 TO 12.70= -.025 + .100  
ABOVE 12.70= -.025 + .130

STANDARD MATERIALS: Insert: 303 CRES (passivated)  
KEES: 302 CRES

See "How To Order," Page 25 for more information.



# Alcoa Fastening Systems

## SECTION 5

### Thinwall & Heavy Duty Series

(Carbon Steel Material only)

PART NO.	INSTALLATION DATA							REMOVAL DATA	
	INTERNAL THREAD SIZE	EXTERNAL THREAD SIZE	LENGTH	TAP DRILL DIA.	C'SINK DIA.	TAP SIZE	INSERT TOOL PART NO.	DRILL	
								SIZE	DEPTH
▲KNM 5x0.8F	M 5x0.8	M 8x1.25	8	6.9	8.25	M 8x1.25	TRKM 5	5.50	4.00
▲KNM 6X1F	M 6x1.0	M 10x1.25	10	8.8	10.25	M 10x1.25	TRKM 6	7.50	4.75
KNM 7X1F	M 7x1.0	M 11x1.0	11	9.8	11.25	M 11x1.0	TRKM 7	8.50	
▲KNM 8X1F	M 8x1.0	M 12x1.25	12	10.8	12.25	M 12x1.25	TRKM 8	9.50	
▲KNM 8X1.25F	M 8x1.25	M 12x1.25							
▲KNM 10X1.25F	M 10x1.25	M 14x1.5	14	12.8	14.25	M 14x1.5	TRKM 10	11.50	
▲KNM 10X1.5F	M 10x1.5	M 14x1.5							
▲KNM 12X1.25F	M 12x1.25	M 16x1.5	16	14.75	16.25	M 16x1.5	TRKM 12	13.50	
▲KNM 12X1.75F	M 12x1.75	M 16x1.5							
KNM 14X1.5F	M 14x1.5	M 20x1.5	20	18.75	20.25	M 20x1.5	TRKHM 14	17.50	
KNM 14X2F	M 14x2.0	M 20x1.5							
KNM 16X1.5F	M 16x1.5	M 22x1.5	22	20.5	22.25	M 22x1.5	TRKHM 16	17.75	6.35
KNM 18X1.5F	M 18x1.5	M 24x1.5	24	22.5	24.25	M 24x1.5	TRKHM 18	19.75	
KNM 20X1.5F	M 20x1.5	M 30x2	30	28.0	30.25	M 30x2.0	TRKHM 20	25.75	
KNM 22X1.5F	M 22x1.5	M 32x2	32	30.0	32.25	M 32x2.0	TRKHM 22	27.75	
KNM 24X2F	M 24x2.0	M 33x2	33	31.0	33.25	M 33x2.0	TRKHM 24	28.75	

▲ indicates that parts are normally available from stock.

Other sizes are available on request.

Material: C1215 Steel or equivalent.

Countersink diameters are optional providing KEENSERTS insert installs below flush of surface.

KEENSERTS Inserts are also available under the Aerospace Industries Association of America's 'NA' part numbers. NA0145 Through NA0151 can be obtained from:

**National Standards Association, Inc.**  
**5161 River Road**  
**Washington, D.C. 20016**





## GENERAL PURPOSE STUDS

KEENINSERTS studs are offered in a wide variety of high performance materials to meet the requirements of aerospace and military specifications. They are particularly suited for high temperature, cryogenic or high loading applications.

INDEX	PAGE NO.
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Shear Load Series AND Standards	30
Lightweight Series	31
Heavy Duty Series AND Standards	32

### SPECIFICATIONS:

All dimensions in inches.

Tolerances are  $\pm .010$  unless otherwise specified.

Shear engagement area dimensions (sq. in.) shown are minimums.

Studs with nut end thread size 5/16 and larger are furnished with 4 locking KEES.

If ordering nut end length equal to or shorter than nut end *thread* length, then nut end will be fully threaded to within 2-1/2 pitches of shoulder.

Nut end threads are fully formed by a single rolling process subsequent to heat treatment and prior to plating.

Drilled hole in nut end is optional on all studs except AND standard parts.

Other materials available upon request.

Consult home office or local sales engineer about installation tools to be used with studs having nut end lengths greater than maximum specified for standard tools.

NOTE: Nut end threads are manufactured to MIL-S-8879 except where noted.

### INSTALLATION TAP-DRILL HOLE TOLERANCE

.182 TO .250 =  $-.001 + .002$   
 .251 TO .271 =  $-.001 + .003$   
 .272 TO .500 =  $-.001 + .004$   
 Above .500 =  $-.001 + .005$

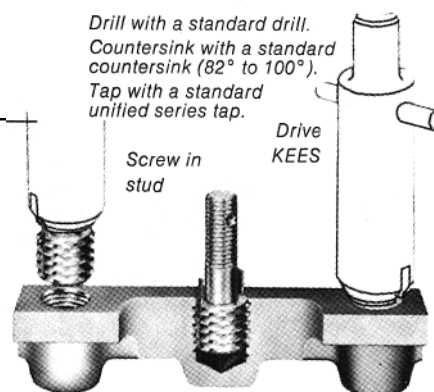
### Installation:

Studs are installed in the same manner as described for inserts. However, the installation tool for the studs has a hole to receive the stud.

To remove a stud, simply cut off the nut end at a point just above the

surface. A drill bushing will be required for removal drill.

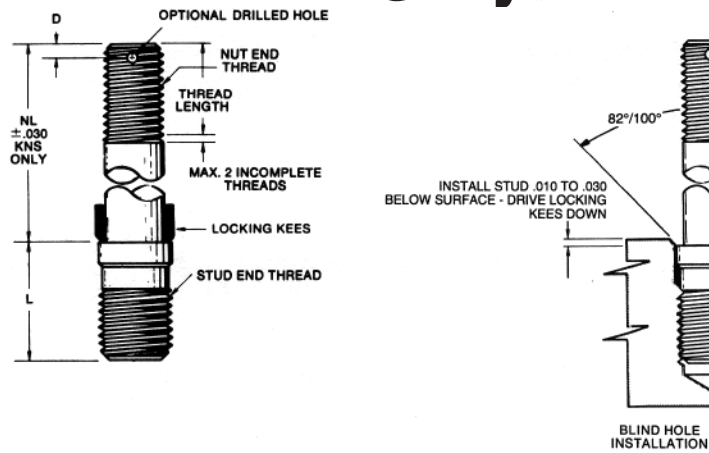
Removal is the same as for inserts. The same size replacement stud may be installed in the original hole. Strength of the replacement is equal to that of the original.





# Alcoa Fastening Systems

## Shear Load Studs



## SECTION 6

PART NO.	DIMENSIONS							INSTALLATION DATA							REMOVAL DATA	
	NUT END				STUD END			TAP DRILL DIA.	C'DRILL		THREAD TAP		INSTALLATION TOOL		DRILL	
	THREAD SIZE UNJ-3A	THREAD LENGTH ± .030	DRILLED HOLE		THREAD SIZE UNJF-3A	SHEAR ENGAG	L		SIZE	DEPTH + .010 - .000	SIZE CLASS 3B	DEPT- H (MIN.)	PART NUMBER	MAX. NL LENGTH	SIZE	DEPT- H
			D ± .020	DIA.												
KNS0632J	6 - 32	.37	—	—	12 - 28	.0492	.312	.182	.218	.156	12 - 28	.37	TS 06	1-7/16	.147	1/8
KNS0832J	8 - 32	.41	—	—	1/4 - 28	.0863	.375	.213	.250	.156	1/4 - 28	.44	TS 08	1-7/16	.189	
KNS1032J	10 - 32	.41	.141	.070	1/4 - 28	.1132	.437	.213	.250	.156	1/4 - 28	.50	TS 010	2	.189	5/32
KNS1024J	10 - 24															
KNS428J	1/4 - 28	.47	.156	.076	5/16 - 24	.2579	.625	.272	.312	.156	5/16 - 24	.68	TS 4	2	1/4	
KNS420J	1/4 - 20															
KNS524J	5/16 - 24	.53	.172	.076	3/8 - 24	.3049	.687	.332	.375	.187	3/8 - 24	.75	TS 5	2-1/2	5/16	
KNS518J	5/16 - 18															
KNS624J	3/8 - 24	.64	.172	.106	7/16 - 20	.4740	.750	.390	.437	.187	7/16 - 20	.81	TS 6	2-1/2	3/8	
KNS616J	3/8 - 16															
KNS720J	7/16 - 20	.66	.172	.106	1/2 - 20	.5416	.812	.453	.500	.187	1/2 - 20	.87	TS 7	2-1/2	7/16	
KNS714J	7/16 - 14															
KNS820J	1/2 - 20	.78	.172	.106	9/16 - 18	.6796	.875	.515	.562	.187	9/16 - 18	.93	TS 8	3	1/2	
KNS813J	1/2 - 13															

## AND Standards

STANDARD MATERIALS: Stud: Must be specified  
KEES: 302 CRES  
See "How To Order," Page 31 for stud materials and additional information.

PART NO.	DIMENSIONS								INSTALLATION DATA						REMOVAL DATA	
	NUT END					STUD END			TAP DRILL DIA.	C'DRILL		THREAD TAP		INSTAL- L. TOOL PART NUMBE- R	DRILL	
	AND STANDARD		THREAD SIZE UNF-3A MIL-S-7742	THREA- D LENG- H MIN.	NL ± .020	THREAD SIZE UNJF-3A MIL-S-8879	SHEAR ENGAG.	L		SIZE	DEPT- H + .010 - .000	SIZE CLASS 3B	MIN. DEPTH FULL THD.		SIZE	DEPT- H
	NUMBER (REF. ONLY)	TYPES														
KNAS00	20000	ALL	1/4 - 28	.688	.875	5/16 - 24	.2579	.625	.272	.312	.156	5/16 - 24	.68	TS 4	1/4	5/32
KNAS01	20001	ALL	5/16 - 24	.688	.906	3/8 - 24	.3049	.688	.332	.375	.187	3/8 - 24	.75	TS 5	5/16	
KNAS03	20003	ALL														
KNAS02	20002	ALL	3/8 - 24	.812	1.020	7/16 - 20	.4740	.750	.390	.437	.187	7/16 - 20	.81	TS 6	3/8	
KNAS07	20007	ALL														
KNAS04	20004	XIV-A	3/8 - 24	.812	1.020	7/16 - 20	.4740	.750	.390	.437	.187	7/16 - 20	.81	TS 6	3/8	
	20004	XIV-B														
KNAS04X	20004	XIV-C	7/16 - 20	.812	1.125	1/2 - 20	.5416	.812	.453	.500	.187	1/2 - 20	.87	TS 7	7/16	
KNAS05	20005	ALL	1/4 - 28	.656	.750	5/16 - 24	.2579	.625	.272	.312	.156	5/16 - 24	.68	TS 4	1/4	
KNAS06	20006	ALL	3/8 - 24	.812	1.125	7/16 - 20	.4740	.750	.390	.437	.187	7/16 - 20	.81	TS 6	3/8	
KNAS09	20009	ALL	5/16 - 24	.688	.880	3/8 - 24	.3049	.688	.332	.375	.187	3/8 - 24	.75	TS 5	5/16	
KNAS10	20010	ALL	5/16 - 24	.719	1.000	3/8 - 24	.3049	.688	.332	.375	.187	3/8 - 24	.75	TS 5	5/16	

Order by part number tabulated. Add material designation only.  
Nut end length and thread length are fixed.

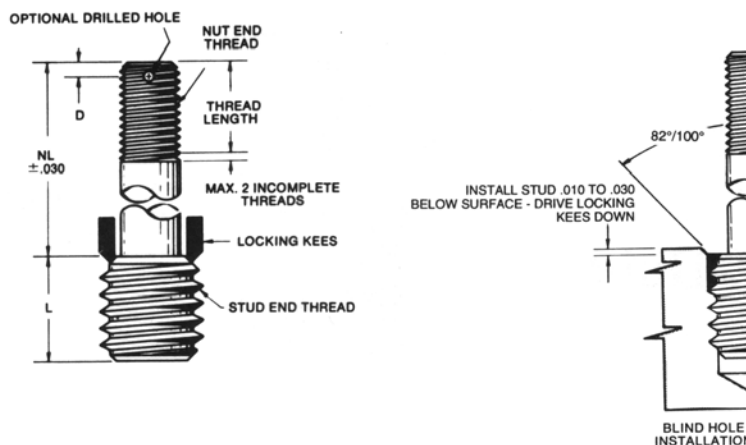
STANDARD MATERIALS: Stud: Must be specified  
KEES: 302 CRES  
See "How To Order," Page 31 for stud materials and additional information.



# Alcoa Fastening Systems

## SECTION 6

### Lightweight Studs



PART NO.	DIMENSIONS							INSTALLATION DATA						REMOVAL DATA	
	NUT END			STUD END				TAP DRILL DIA.	C'SINK DIA. ± .010 - .000	THREAD TAP		INSTALLATION TOOL		DRILL	
	THREAD SIZE CLASS 3A	THREAD LENGTH ± .030	DRILLED HOLE D ± .020 DIA.	THREAD SIZE CLASS 2A (Minor Dia. Mod.)	SHEAR ENGAG.	L				SIZE UNC-2B	MIN. DEPTH FULL THD.	PART NUMBER	MAX. NL LENGTH	SIZE	DEPTH
KNNS1032J	10 - 32	.41	.141	.070	5/16 - 18	.1517	.31	.272	.323	5/16 - 18	.37	TNS 010	2-1/2	7/32	5/32
KNNS1024J	10 - 24	.41	.141	.070	5/16 - 18	.1517	.31	.272	.323	5/16 - 18	.37	TNS 010	2-1/2	7/32	5/32
KNNS428J	1/4 - 28	.47	.156	.076	3/8 - 16	.2371	.37	.332	.385	3/8 - 16	.43	TNS 4	2-1/2	9/32	
KNNS420J	1/4 - 20	.47	.156	.076	3/8 - 16	.2371	.37	.332	.385	3/8 - 16	.43	TNS 4	2-1/2	9/32	
KNNS524J	5/16 - 24	.53	.172	.076	7/16 - 14	.3049	.43	.397	.447	7/16 - 14	.50	TNS 5	2-1/2	11/32	
KNNS518J	5/16 - 18	.53	.172	.076	7/16 - 14	.3049	.43	.397	.447	7/16 - 14	.50	TNS 5	2-1/2	11/32	
KNNS624J	3/8 - 24	.64	.172	.106	1/2 - 13	.4299	.50	.453	.510	1/2 - 13	.56	TNS 6	2-1/2	13/32	3/16
KNNS616J	3/8 - 16	.64	.172	.106	1/2 - 13	.4299	.50	.453	.510	1/2 - 13	.56	TNS 6	2-1/2	13/32	3/16
KNNS720J	7/16 - 20	.66	.172	.106	9/16 - 12	.5665	.56	.516	.572	9/16 - 12	.62	TNS 7	2-1/2	15/32	
KNNS714J	7/16 - 14	.66	.172	.106	9/16 - 12	.5665	.56	.516	.572	9/16 - 12	.62	TNS 7	2-1/2	15/32	
KNNS820J	1/2 - 20	.78	.172	.106	5/8 - 11	.7172	.62	.578	.635	5/8 - 11	.68	TNS 8	2-1/2	17/32	
KNNS813J	1/2 - 13	.78	.172	.106	5/8 - 11	.7172	.62	.578	.635	5/8 - 11	.68	TNS 8	2-1/2	17/32	

STANDARD MATERIALS: Stud: Must be specified  
KEES: 302 CRES  
See "How To Order," Page 31 for stud materials and additional information.

**How To Order:** This ordering code must be used to complete all part numbers tabulated in this section except the AND Standard studs.

**KNHS 428 J MX-22D SY-1.36**

**BASIC HEAVY DUTY STUD**

**NUT END THREAD**  
in 1/16 inch increments, except below 1/4 inch bolt size  
Numbered screw sizes as follows:  
10 - #10 screw size  
08 - #8 screw size  
06 - #6 screw size

**NUT END THREADS PER DESIGNATES MIL-S-8879 THREADS ON**

**NUT END THREAD**  
(In decimals if Non-Standard.)

**FINISH DESIGNATION**  
(Used ONLY if finish required is other than standard specified for material designated.)  
SP= Silver Plate per QQ-S-365  
SX= Cad. Plate per QQ-P-416 Type I CL. 3  
SY= Cad. Plate per QQ-P-416 Type II CL. 3  
SZ= Cad. Plate per QQ-P-416 Type II CL. 2

**DRILLED HOLE IN NUT END THREADS**

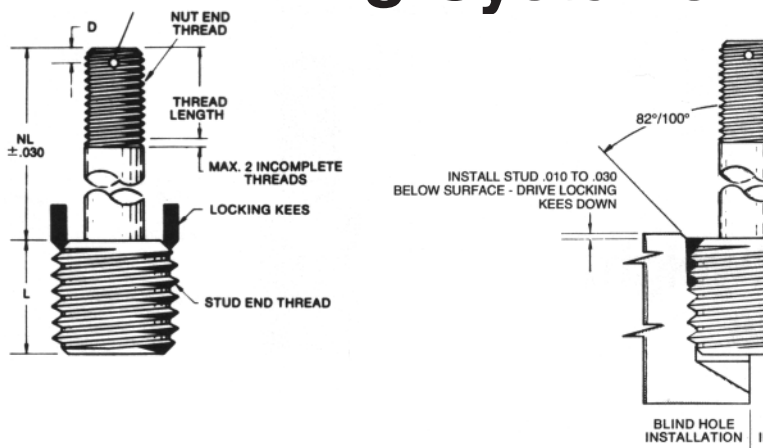
**NUT END LENGTH**  
Must be specified in 1/16 inch increments,  
(Ex.: - 22 = 1-3/8 inch)

**MATERIAL DESIGNATION**  
S= 303 CRES (passivated), has no identifying marks on stud  
M= Chrome Moly Steel 125,00 P.S.I. MIN. identified on top of stud by two non-parallel dash marks (cad. plated per QQ-P-416 Type I CL. 3)  
MX= Chrome Moly Steel 160,00 P.S.I. MIN. identified on top of stud by two parallel marks (cad. plated per QQ-P-416 Type I CL. 3)  
T= A286 CRES 140,000 P.S.I. MIN. (passivated) identified on top of stud by one mark  
TX= A286 CRES 180,000 P.S.I. MIN. (passivated) identified on top of stud by



# Alcoa Fastening Systems

## Heavy Duty Studs



## SECTION 6

PART NO.	DIMENSIONS							INSTALLATION DATA						REMOVAL DATA	
	NUT END			STUD END			TAP DRILL DIA.	C'SINK DIA. ± .010 - .000	THREAD TAP		INSTALLATION TOOL		DRILL		
	THREAD SIZE CLASS 3A	THREAD LENGTH ± .030	DRILLED HOLE		THREAD SIZE CLASS 2A (Minor Dia. Mod.)	SHEAR ENGAG.			L	SIZE CLASS 2B	MIN. DEPTH FULL THD.	PART NUMBER	MAX. NL LENGTH	SIZE	DEPTH
			D ± .020	DIA.											
KNHS0832J	8 - 32	.41	—		5/16 - 18	.1517	.31	.272	.323	5/16 - 18	.37	THS 08	1-7/16	7/32	1/8
KNHS1032J	10 - 32	.41	.141	.070	3/8 - 16	.1901	.31	.332	.385	3/8 - 16	.37	THS 010	1-1/2	9/32	
KNHS1024J	10 - 24														
KNHS428J	1/4 - 28	.47	.156	.076	7/16 - 14	.2842	.37	.397	.447	7/16 - 14	.43	THS 4	2	11/32	3/16
KNHS420J	1/4 - 20	.53	.172	.076	1/2 - 13	.3588	.43	.453	.510	1/2 - 13	.50	THS 5	2-1/2	13/32	
KNHS524J	5/16 - 24														
KNHS518J	5/16 - 18	.64	.172	.106	9/16 - 12	.4975	.50	.516	.572	9/16 - 12	.56	THS 6	2-1/2	15/32	
KNHS624J	3/8 - 24														
KNHS616J	3/8 - 16	.66	.172	.106	5/8 - 11	.7172	.62	.578	.635	5/8 - 11	.68	THS 7	2-1/2	17/32	
KNHS720J	7/16 - 20														
KNHS714J	7/16 - 14	.78	.172	.106	11/16 - 11 NS	.8864	.68	.641	.700	11/16 - 11 NS	.75	THS 8	3	19/32	
KNHS820J	1/2 - 20														
KNHS813J	1/2 - 13	.91	.22	.141	13/16 - 16	1.2493	.81	.766	.822	13/16 - 16	.94	THS 9	3	23/32	
KNHS918J	9/16 - 18														
KNHS912J	9/16 - 12	.95	.22	.141	7/8 - 14	1.4866	.87	.828	.885	7/8 - 14	1.00	THS 10	3	25/32	
KNHS1018J	5/8 - 18														
KNHS1011J	5/8 - 11	1.09	.22	.141	1-1/8 - 12	2.4901	1.12	1.062	1.145	1-1/8 - 12	1.31	THS 12	3	31/32	
KNHS1216J	3/4 - 16														
KNHS1210J	3/4 - 10	1.25	.27	.141	1-1/4 - 12	3.1370	1.25	1.187	1.270	1-1/4 - 12	1.44	THS 14	3	1-3/32	
KNHS1414J	7/8 - 14														
KNHS1409J	7/8 - 9	1.37	.28	.141	1-3/8 - 12	3.8381	1.37	1.312	1.395	1-3/8 - 12	1.56	THS 16	3	1-7/32	
KNHS1612J	1 - 12														
KNHS1608J	1 - 8														

STANDARD MATERIALS: Stud: Must be specified  
KEES: 302 CRES

See "How To Order," Page 31 for stud materials and additional information.

## AND Standards

PART NO.	DIMENSIONS								INSTALLATION DATA					REMOVAL DATA	
	NUT END					STUD END			TAP DRILL DIA.	C'SIN- K DIA. + .010 - .000	THREAD TAP		INSTALL. TOOL PART NUMBER	DRILL	
	AND STANDARD		THREAD SIZE UNF-3A MIL-S-7742	THREAD LENGTH MIN.	NL ± .020	THREAD SIZE CLASS 2A (Minor Dia Mod.) MIL-S-7742	SHEAR ENGAG	L			SIZE UNC-2B	MIN. DEPTH FULL THREAD		SIZE	DEPT. H
	NUMBER (REF. ONLY)	TYPES													
KNHAS00	20000	ALL	1/4 - 28	.688	.875	7/16 - 14	.2842	.37	.397	.447	7/16 - 14	.41	THS 4	11/32	3/16
KNHAS01	20001	ALL	5/16 - 24	.688	.906	1/2 - 13	.3588	.43	.453	.510	1/2 - 13	.50	THS 5	13/32	
KNHAS03	20003	ALL													
KNHAS02	20002	ALL	3/8 - 24	.812	1.020	9/16 - 12	.4975	.50	.516	.572	9/16 - 12	.56	THS 6	15/32	
KNHAS07	20007	ALL													
KNHAS04	20004	XIV-A	3/8 - 24	.812	1.020	9/16 - 12	.4975	.50	.516	.572	9/16 - 12	.56	THS 6	15/32	
	20004	XIV-B													
KNHAS04X	20004	XIV-C	7/16 - 20	.812	1.125	5/8 - 11	.7175	.62	.578	.635	5/8 - 11	.68	THS 7	17/32	
KNHAS05	20005	ALL	1/4 - 28	.656	.750	7/16 - 14	.2842	.37	.397	.447	7/16 - 14	.41	THS 4	11/32	
KNHAS06	20006	ALL	3/8 - 24	.812	1.125	9/16 - 12	.4975	.50	.516	.572	9/16 - 12	.56	THS 6	15/32	
KNHAS09	20009	ALL	5/16 - 24	.688	.880	1/2 - 13	.3588	.43	.453	.510	1/2 - 13	.50	THS 5	13/32	
KNHAS10	20010	ALL	5/16 - 24	.719	1.000	1/2 - 13	.3588	.43	.453	.510	1/2 - 13	.50	THS 5	13/32	

STANDARD MATERIALS: Stud: Must be specified  
KEES: 302 CRES

See "How To Order," Page 31 for stud materials and additional information.

Order by part number tabulated. Add material designation only.  
Nut end length and thread length are fixed.

Tridair Products 32



# Alcoa Fastening Systems

## METRIC STUDS

## SECTION 7

### SPECIFICATIONS:

Other materials available upon request.

If ordering nut end length equal to or shorter than nut end *thread* length, then nut end will be fully threaded to within 2 1/2 pitches of shoulder.

*Studs with nut end thread sizes M8.0 and above furnished with 4 locking KEES.*

*Tolerances are  $\pm .25$  unless otherwise specified.*

*Dimensions are in millimeters.*

NOTE: Nut end threads are manufactured to I.S.O. stds.

#### INSTALLATION TAP-DRILL HOLE TOLERANCE

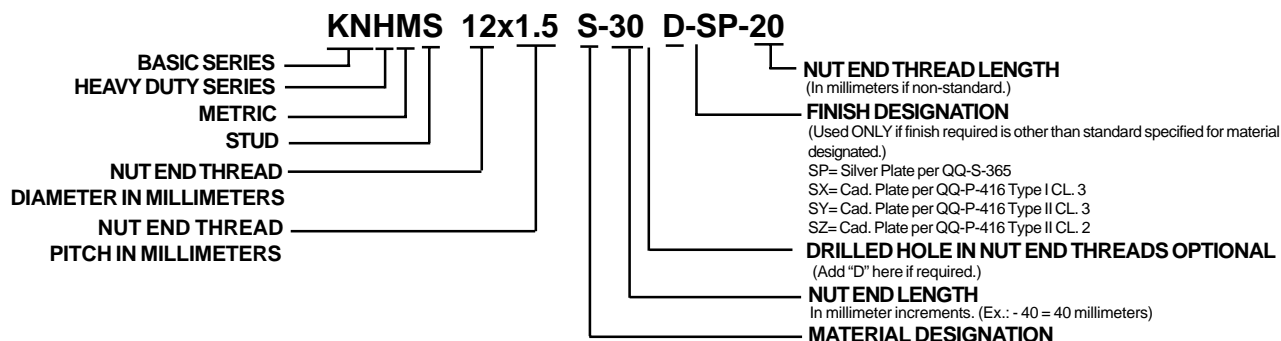
4.0 TO 12.70 =  $-.025 + .100$

Above 12.70 =  $-.025 + .130$

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Lightweight Series	34
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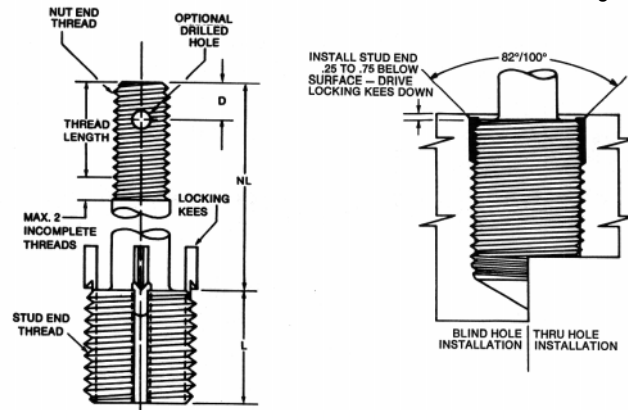
**How To Order:** Ordering by part number tabulated. Add material designation only. Nut end length and thread length are fixed.

**KEES:** 302 corrosion resistant steel. Dimensions are in millimeters. Shear Engagement Area in MM<sup>2</sup>



S= 303 CRES (passivated), has no identifying marks on stud  
M= Chrome Moly Steel 125,00 P.S.I. MIN. identified on top of stud by two non-parallel dash marks (cad. plated per QQ-P-416 Type I CL. 3)  
MX= Chrome Moly Steel 160,00 P.S.I. MIN. identified on top of stud by two parallel marks (cad. plated per QQ-P-416 Type I CL. 3)  
T= A286 CRES 140,000 P.S.I. MIN. (passivated) identified on top of stud by one mark  
TX= A286 CRES 180,000 P.S.I. MIN. (passivated) identified on top of stud by "H"  
BR= Bronze, completely non-magnetic stud (cad. plated per QQ-P-416 Type II CL. 3)

# Shear Load Studs



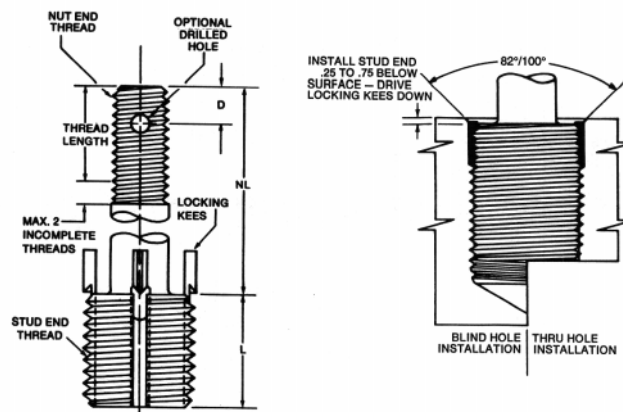
## SECTION 7

PART NO.	NUT END			STUD END			INSTALLATION								REMOVAL DATA	
	THREAD SIZE CLASS 4h	THREAD LENGTH ± .075	DRILLED HOLE		THREAD SIZE CLASS 4h	SHEAR ENGAG.	L ± 0.75	TAP DRILL SIZE	C'DRILL		THREAD TAP		INSTALLATION TOOL		DRILL	
			D	DIA.					SIZE	DEPTH + 0.25 - 0.00	SIZE	DEPTH	PART NO.	MAX. NL LENGTH	SIZE	DEPTH
KNMS 3.5 x 0.6	M 3.5 x 0.6	9.4	—	—	M 5 x 0.5	29.2	8.0	4.5	5.0	4.0	M 5 x 0.5	9.5	TMS 3.5	36	3.4	3.2
KNMS 4 x 0.7	M 4 x 0.7	10.4	—	—	M 6 x 0.75	50.7	9.5	5.2	6.0	4.0	M 6 x 0.75	11.0	TMS 4	36	4.4	3.2
KNMS 5 x 0.8	M 5 x 0.8	10.4	3.5	1.8	M 7 x 0.75	81.3	11.0	6.2	7.0	4.0	M 7 x 0.75	12.5	TMS 5	50	5.4	3.2
KNMS 5 x 0.5	M 5 x 0.5	10.4	3.5	1.8	M 7 x 0.75	81.3	11.0	6.2	7.0	4.0	M 7 x 0.75	12.5	TMS 5	50	5.4	3.2
KNMS 6 x 1.0	M 6 x 1.0	11.9	4.0	2.0	M 8 x 1.0	108.1	16.0	7.0	8.0	4.0	M 8 x 1.0	17.5	TMS 6	50	6.4	4.0
KNMS 6 x 0.75	M 6 x 0.75	11.9	4.0	2.0	M 8 x 1.0	108.1	16.0	7.0	8.0	4.0	M 8 x 1.0	17.5	TMS 6	50	6.4	4.0
KNMS 8 x 1.25	M 8 x 1.25	13.5	4.4	2.0	M 10 x 1.25	198.7	17.0	8.7	10.0	4.8	M 10 x 1.25	18.5	TMS 8	63	8.4	4.0
KNMS 8 x 1.0	M 8 x 1.0	13.5	4.4	2.0	M 10 x 1.25	198.7	17.0	8.7	10.0	4.8	M 10 x 1.25	18.5	TMS 8	63	8.4	4.0
KNMS 10 x 1.5	M 10 x 1.5	16.3	4.4	2.7	M 12 x 1.25	293.1	19.0	10.7	12.0	4.8	M 12 x 1.25	20.5	TMS 10	63	10.4	4.0
KNMS 10 x 1.25	M 10 x 1.25	16.3	4.4	2.7	M 12 x 1.25	293.1	19.0	10.7	12.0	4.8	M 12 x 1.25	20.5	TMS 10	63	10.4	4.0
KNMS 12 x 1.75	M 12 x 1.75	19.8	4.4	2.7	M 14 x 1.5	432.3	22.0	12.5	14.0	4.8	M 14 x 1.5	23.5	TMS 12	76	12.4	4.0
KNMS 12 x 1.25	M 12 x 1.25	19.8	4.4	2.7	M 14 x 1.5	432.3	22.0	12.5	14.0	4.8	M 14 x 1.5	23.5	TMS 12	76	12.4	4.0

STANDARD MATERIALS: Stud: Must be specified  
KEES: 302 CRES

See "How To Order," Page 33 for stud materials and additional information.

# Lightweight Studs



PART NO.	NUT END				STUD END			INSTALLATION						REMOVAL DATA	
	THREAD SIZE CLASS 4h	THREAD LENGTH ± .075	DRILLED HOLE		THREAD SIZE CLASS 4h	SHEAR ENGAG.	L ± 0.75	TAP DRILL SIZE	C'SINK DIA. + 0.25 - 0.00	THREAD TAP		INSTALLATION TOOL		DRILL	
			D	DIA.						SIZE CLASS 5H	MIN. DEPTH FULL THD.	PART NO.	MAX. NL LENGTH	SIZE	DEPTH
KNNMS 5 x 0.8	M 5 x 0.8	10.4	3.5	1.8	M 8 x 1.25	104.9	8.0	6.9	8.25	M 8 x 1.25	9.5	TNMS 5	50	5.50	4.0
KNNMS 6 x 1.0	M 6 x 1.0	11.9	3.9	2.0	M 10 x 1.25	177.7	10.0	8.8	10.25	M 10 x 1.25	11.5	TNMS 6	50	7.50	4.7
KNNMS 8 x 1.25	M 8 x 1.25	13.5	4.0	2.0	M 12 x 1.25	266.7	12.0	10.8	12.25	M 12 x 1.25	13.5	TNMS 8	63	9.50	4.75
KNNMS 8 x 1.0	M 8 x 1.0	13.5	4.0	2.0	M 12 x 1.25	266.7	12.0	10.8	12.25	M 12 x 1.25	13.5	TNMS 8	63	9.50	4.75
KNNMS 10 x 1.5	M 10 x 1.5	16.3	4.4	2.7	M 14 x 1.5	341.6	14.0	12.8	14.25	M 14 x 1.5	15.5	TNMS 10	63	11.50	4.75
KNNMS 10 x 1.25	M 10 x 1.25	16.3	4.4	2.7	M 14 x 1.5	341.6	14.0	12.8	14.25	M 14 x 1.5	15.5	TNMS 10	63	11.50	4.75
KNNMS 12 x 1.75	M 12 x 1.75	19.8	4.4	2.7	M 16 x 1.5	470.2	16.0	14.75	16.25	M 16 x 1.5	17.5	TNMS 12	76	13.50	4.75
KNNMS 12 x 1.25	M 12 x 1.25	19.8	4.4	2.7	M 16 x 1.5	470.2	16.0	14.75	16.25	M 16 x 1.5	17.5	TNMS 12	76	13.50	4.75

STANDARD MATERIALS: Stud: Must be specified  
KEES: 302 CRES

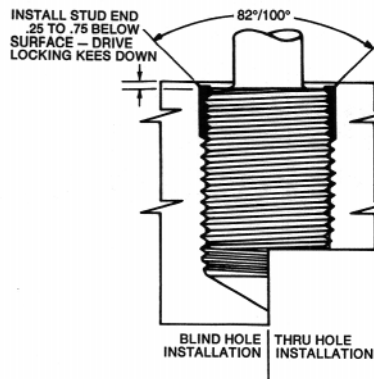
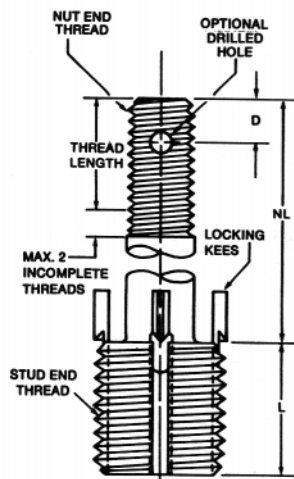
See "How To Order," Page 33 for stud materials and additional information.





# Alcoa Fastening Systems

## Heavy Duty Studs



## SECTION 7

PART NO.	NUT END				STUD END			INSTALLATION						REMOVAL DATA	
	THREAD SIZE CLASS 4h	THREAD LENGTH ± .075	DRILLED HOLE		THREAD SIZE CLASS 4h	SHEAR ENGAG.	L ± 0.75	TAP DRILL SIZE	C'SINK DIA. + 0.25 - 0.00	THREAD TAP		INSTALLATION TOOL		DRILL	
			D	DIA.						SIZE CLASS 5h	MIN. DEPT-H FULL THD.	PART NO.	MAX. NL LENGTH	SIZE	DEPTH
KNHMS 4 x 0.7	M 4 x 0.7	10.5	—	—	M 8 x 1.25	104.9	8.0	6.9	8.25	M 8 x 1.25	9.5	THMS 4	36	5.50	4.00
KNHMS 5 x 0.8	M 5 x 0.8	11.0	3.5	1.8	M 10 x 1.25	177.7	10.0	8.8	10.25	M 10 x 1.25	12.5	THMS 5	50	7.50	4.75
KNHMS 6 x 1.0	M 6 x 1.0	12.0	4.0	2.0	M 12 x 1.25	266.7	12.0	10.8	12.25	M 12 x 1.25	14.5	THMS 6	50	9.50	4.75
KNHMS 8 x 1.25	M 8 x 1.25	14.0	4.6	2.0	M 14 x 1.5	341.6	14.0	12.8	14.25	M 14 x 1.5	16.5	THMS 8	63	11.50	4.75
KNHMS 8 x 1.0	M 8 x 1.0	14.0	4.6	2.0	M 14 x 1.5	341.6	14.0	12.8	14.25	M 14 x 1.5	16.5	THMS 8	63	11.50	4.75
KNHMS 10 x 1.5	M 10 x 1.5	16.0	5.2	2.7	M 16 x 1.5	470.2	16.0	14.75	16.25	M 16 x 1.5	18.5	THMS 10	63	13.50	4.75
KNHMS 10 x 1.25	M 10 x 1.25	16.0	5.2	2.7	M 16 x 1.5	470.2	16.0	14.75	16.25	M 16 x 1.5	18.5	THMS 10	63	13.50	4.75
KNHMS 12 x 1.75	M 12 x 1.75	20.0	5.6	2.7	M 18 x 1.5	608.5	18.0	16.75	18.25	M 18 x 1.5	20.5	THMS 12	76	15.50	4.75
KNHMS 12 x 1.5	M 12 x 1.5	20.0	5.6	2.7	M 18 x 1.5	608.5	18.0	16.75	18.25	M 18 x 1.5	20.5	THMS 12	76	15.50	4.75
KNHMS 12 x 1.25	M 12 x 1.25	20.0	5.6	2.7	M 18 x 1.5	608.5	18.0	16.75	18.25	M 18 x 1.5	20.5	THMS 12	76	15.50	4.75
KNHMS 14 x 2.0	M 14 x 2.0	24.0	5.6	3.6	M 20 x 1.5	770.5	20.0	18.75	20.25	M 20 x 1.5	22.5	THMS 14	76	17.50	4.75
KNHMS 14 x 1.5	M 14 x 1.5	24.0	5.6	3.6	M 20 x 1.5	770.5	20.0	18.75	20.25	M 20 x 1.5	22.5	THMS 14	76	17.50	4.75
KNHMS 16 x 2.0	M 16 x 2.0	26.0	5.6	3.6	M 22 x 1.5	896.8	22.0	20.5	22.25	M 22 x 1.5	24.5	THMS 16	76	17.75	4.75
KNHMS16 x 1.5	M 16 x 1.5	26.0	5.6	3.6	M 22 x 1.5	896.8	22.0	20.5	22.25	M 22 x 1.5	24.5	THMS 16	76	17.75	4.75
KNHMS 18 x 1.5	M 18 x 1.5	28.0	5.6	3.6	M 24 x 1.5	1084.4	24.0	22.5	24.25	M 24 x 1.5	26.5	THMS 18	76	19.75	4.75
KNHMS 20 x 2.5	M 20 x 2.5	30.0	5.6	3.6	M 30 x 2.0	1774.3	30.0	28.0	30.25	M 30 x 2.0	34.5	THMS 20	76	25.50	6.35
KNHMS 20 x 1.5	M 20 x 1.5	30.0	5.6	3.6	M 30 x 2.0	1774.3	30.0	28.0	30.25	M 30 x 2.0	34.5	THMS 20	76	25.50	6.35
KNHMS 22 x 1.5	M 22 x 1.5	32.0	6.8	3.6	M 32 x 2.0	2045.9	32.0	30.0	32.25	M 32 x 2.0	36.5	THMS 22	76	27.50	6.35
KNHMS 24 x 3.0	M 24 x 3.0	34.0	7.2	3.6	M 33 x 2.0	2189.4	33.0	31.0	33.0	M 33 x 2.0	37.5	THMS 24	76	28.50	6.35
KNHMS 24 x 2.0	M 24 x 2.0	34.0	7.2	3.6	M 33 x 2.0	2189.4	33.0	31.0	33.0	M 33 x 2.0	37.5	THMS 24	76	28.50	6.35

STANDARD MATERIALS: Stud: Must be specified  
KEES: 302 CRES  
See "How To Order," Page 33 for stud materials and additional information.



# Alcoa Fastening Systems

## SECTION 8

### Self-Broaching KEENSERTS Inserts and Studs.



#### Design and Features

Rexnord Specialty Fastener Division pioneered the design of permanent, wear-resistant, threaded inserts and studs which feature a positive mechanical lock against rotation. The high-performance, self-broaching KEENSERTS inserts and studs shown in this catalog are designed to dramatically reduce time and labor required for installation into hard or tough aerospace parent materials. Precision-treated 400 series corrosion resistant steel locking KEES "self-broach" into parent materials, eliminating broaching tools, saving time, labor and considerable costs.

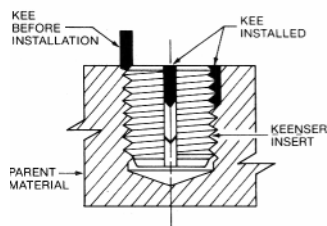
Standard KEENSERTS inserts and studs install easily into soft materials, such as magnesium and aluminum. The KEE "self-broaches" these materials, thus providing a positive lock against rotation. However, hard or tough materials such as 17-4 PH CRES, INCO718 or titanium require an additional installation step of broaching the keeways using a broaching tool. This "prebroaching" procedure is time-consuming, expensive and sometimes frustrating.

Self-broaching KEENSERTS inserts and studs feature a KEE configuration and material that broaches hard parent materials which previously required the "prebroaching" step. The result is a fast, efficient method for installing inserts or studs in parent materials with a Rockwell hardness in excess of Rc 40.

The pre-positioned KEES automatically set the insert or stud at the proper depth below the surface of the parent material. Unlike conventional inserts, there is no need to maintain critical depth tolerances, and no chance of inadequate locking or deformation of internal threads due to miscalculations of depth.

#### Features:

\*Positive mechanical lock against rotation.



*KEES are driven down into the tapped threads of the parent material during installation to securely lock the insert against rotation.*

- \*Hole prepared with standard taps and drills.
- \*Installs in seconds with Tridair power installation tool.
- \*Available in many sizes in heavy duty and extra heavy duty configuration.
- \*Meets the following configuration specifications: MS51831, MS51832, MS51833, MS51834 series.
- \*Internal thread locking feature meets the requirements of MIL-I-45914.
- \*Exclusive external thread design provides maximum pull-out strength with a minimum outside diameter.

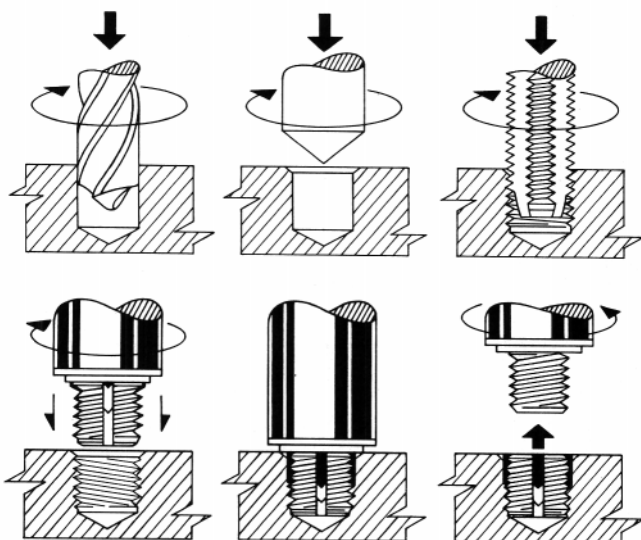


## Installation Comparison in Hard Materials.

Time saved using self-broaching **KEENSERTS** Inserts and Studs has been estimated at upwards of 7 minutes per individual installation.

### Self-Broaching **KEENSERTS** Inserts and Studs

Six simple steps



1. Drill with a standard drill.
2. Countersink with a standard countersink (82° to 100°).
3. Tap with a standard unified thread series tap.
4. Screw in insert or stud using 70950-6 power tool.
5. Drive KEES.
6. Remove installation tool.

### Standard Version

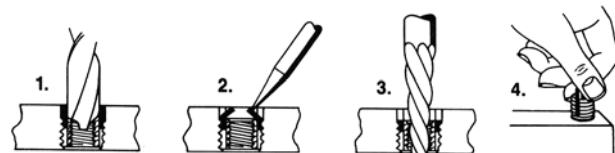
Fourteen steps

1. Drill with a standard drill.
2. Countersink with a standard countersink (82° to 100°).
3. Tap with a standard unified thread series tap.
4. Insert insert or stud.
5. Mark KEE location.
6. Remove insert or stud.
7. Cut keeways using broaching tool.
8. Remove chips with tap.
9. Blow out chips.
10. Screw in insert or stud.
11. Align KEES to keeways.
12. Drive KEES.
13. Remove installation tool.
14. Replace blades in broaching tool as required (one to three cuts per blade in INCO718 material is common).

## Removal

(If removal is necessary follow these simple steps.)

### Inserts



1. Use standard drill to remove insert material between KEES.
2. Deflect KEES inward and break off.
3. Remove insert with E-Z out type tool.
4. An identical insert can now be installed in the original hole. No re-work of the hole will be necessary.

### Studs

To remove a stud, simply cut off the nut end at a point just above the surface.

Removal is the same as for inserts, except a drill bushing will be required to align removal drill. The same size replacement stud may be installed in the original hole. Strength of the replacement is equal to that of the original.

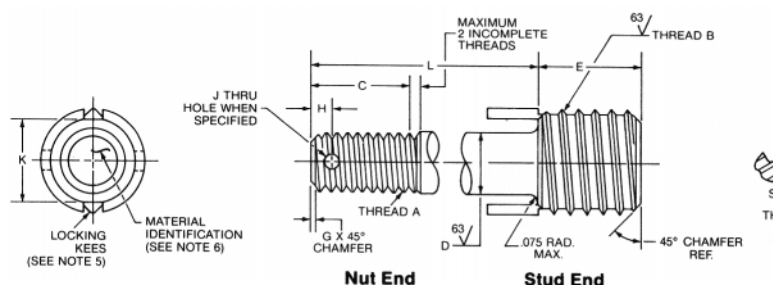
### Special Note:

Catalog values for shear engagement areas are based on shear failure in the parent material when the parent material is significantly weaker than the insert or stud. Such failure occurs in the parent material at or near the major diameter of the insert or stud. For parent materials of hardness similar to

that of the insert or stud, failure occurs by combined shear of both materials simultaneously and will occur along a surface approaching the pitch line. The calculated shear engagement area should be reduced accordingly. For sufficiently hard parent materials, failure may occur by thread shear at the internal thread of the insert or by stud nut end thread failure.

## Self-Broaching KEENSERTS Inserts and Studs.

### Standard Self-Broaching Stud. TR28000 ( ) Series.



Dash Number	A Nut End Thread Size UNJF-3A	B Stud End Thread Modified Minor Dia.		Shear Engagement Area Min. *	C ± .030	D Dia.	E ± .015	G	H ± .020	J Dia. ± .010	K ± .004
	Size	Size	Minor Dia.								
201	.1900 - 32	.3125 - 18 UNC-2A	.256 .249	.1517	.410	.189 .185	.312	.060 .030	.141	.070	.220
202	.2500 - 28	.3750 - 16 UNC-2A	.320 .312	.2371	.470	.249 .245	.375	.060 .030	.156	.076	.284
203	.3125 - 24	.4375 - 14 UNC-2A	.383 .375	.3049	.530	.312 .308	.437	.060 .030	.172	.076	.345
204	.3750 - 24	.5000 - 13 UNC-2A	.440 .432	.4299	.640	.374 .370	.500	.060 .030	.172	.106	.407

**Stud:**

4140 alloy steel per MIL-S-5626.

A-286 corrosion resistant steel per AMS5731 capable of AMS5732, AMS5734, and AMS5737.

### Locking KEES:

400 series corrosion resistant steel per QQ-S-763 chemistry only.

### Finish:

Alloy steel, cadmium plated per QQ-P-416, type II, class 3.  
Corrosion resistant steel, passivated per QQ-P-35.

### Threads:

b. Stud end threads conform to handbook H-28 except minor diameters are modified as specified herein.

**Heat Treatment:**

4140 alloy steel studs heat treated in accordance with MIL-H-6875 to 160,000 PSI FTU minimum.

A-286 corrosion resistant steel studs heat treated to 140,000 PSI FTU minimum.

Locking KEES heat treated to Rc 48 minimum.

**Notes:**

1. All dimensions are after protective coating or treatment.
2. See pages 9 and 10 for hole preparation and installation information.
3. Install stud using 70950-6 power unit and proper nose assembly (see page 8).
4. Grip diameter concentric to pitch diameter of stud end thread within .006 T.I.R.
5. Studs are supplied with two (2) locking KEES for dash numbers 201 and 202; four (4) locking KEES for dash numbers 203 and 204.
6. Marking:
  - a. 4140 alloy steel identified on top of stud by two parallel dash marks.
  - b. A-286 corrosion resistant steel identified on top of stud by one dash mark.



# Alcoa Fastening Systems

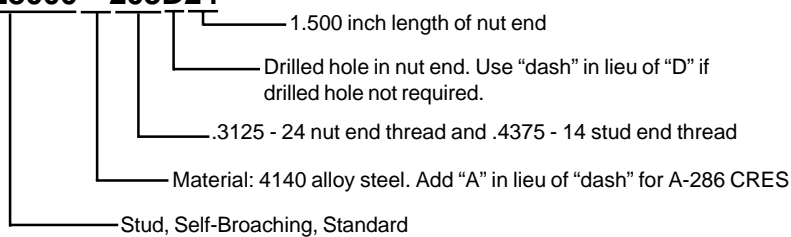
## SECTION 8

### Standard Self-Broaching Stud. TR28000 ( ) Series.

#### How to Order:

#### Part Number Example:

#### TR28000—203D24



L Nut end ± .030	Dash Number			
	Nominal Diameter			
	.1900	.2500	.3125	.3750
.375	6	6	—	—
.438	7	7	—	—
.500	8	8	—	—
.562	9	9	9	—
.625	10	10	10	10
.688	11	11	11	11
.750	12	12	12	12
.812	13	13	13	13

Dash numbered parts above the heavy line are threaded to the stud end as specified herein. The maximum distance from the stud end to the first full thread shall be equal to the sum of the maximum fillet radius and a maximum of two incomplete threads. Incompleted threads not to enter fillet area.

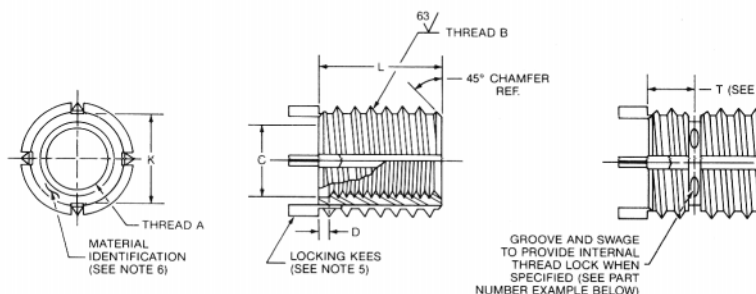


# Alcoa Fastening Systems

## SECTION 8

### Self-Broaching KEENSERTS Inserts and Studs.

#### Heavy Duty Self-Broaching Inserts. TR29000 ( ) Series.



Dash Number	A Internal Thread UNJF-3B		B External Thread Modified Minor Dia.		Shear Engagement Area Min. *	C Dia ± .005	D ± .010	K	L ± .015	T ± .030
	Size	Minor Dia.	Size	Minor Dia.						
201	.1900 - 32	.1675	.3750 - 16 UNC-2A	.320	.1901	.196	.070	.288 .280	.312	.220
201L		.1596			.1156					
202	.2500 - 28	.2229	.4375 - 14 UNC-2A	.383	.2842	.257	.070	.348 .341	.375	.220
202L		.2152			.1970					
203	.3125 - 24	.2799	.5000 - 13 UNC-2A	.440	.3588	.316	.070	.411 .403	.437	.220
203L		.2719			.2608					
204	.3750 - 24	.3418	.5625 - 12 UNC-2A	.503	.4975	.380	.070	.473 .465	.500	.220
204L		.3344			.3843					

#### Material:

##### Insert:

4140 alloy steel per MIL-S-5626.

A-286 corrosion resistant steel per AMS5731 capable of AMS5732, AMS5734, and AMS5737.

##### Locking KEES:

400 series corrosion resistant steel per QQ-S-763 chemistry only.

#### Finish:

Alloy steel, cadmium plated per QQ-P-416, type II, class 3.

Corrosion resistant steel, passivated per QQ-P-35.

#### Lubrication:

Dry film lube per MIL-L-8937.

#### Threads:

Internal threads conform to MIL-S-8879. External threads conform to FED-STD-H28 except minor diameters are modified as specified herein.

#### Heat Treatment:

Alloy steel inserts are heat treated in accordance with MIL-H-6875 to 160,000 PSI FTU minimum.

A-286 corrosion resistant steel inserts heat treated to 140,000 PSI FTU minimum.

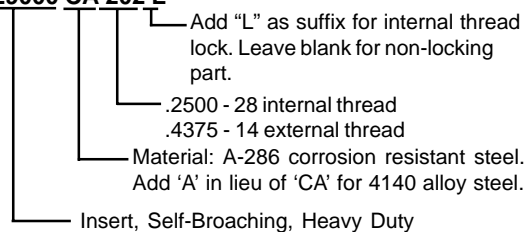
#### Notes:

1. All dimensions are after protective coating or treatment.
2. See pages 9 and 10 for hole preparation and installation information.
3. Install insert stud using 70950-6 power unit and proper nose assembly (see page 8).
4. Distance to center of internal thread locking device.
5. Inserts are supplied with two (2) locking KEES for dash numbers 201(L) and 202(L); four (4) locking KEES for dash numbers 203(L) and 204(L).
6. Marking:
  - a. 4140 alloy steel identified on top of insert by two parallel dash marks.
  - b. A-286 corrosion resistant steel identified on top of stud by one dash mark.

#### How to Order:

##### Part Number Example:

**TR29000 CA 202 L**



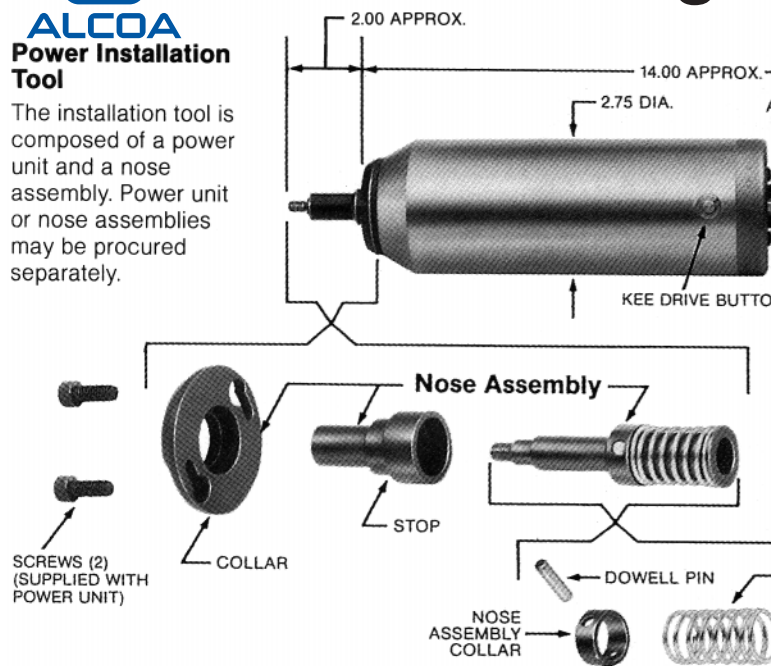




# Alcoa Fastening Systems

## ALCOA Power Installation Tool

The installation tool is composed of a power unit and a nose assembly. Power unit or nose assemblies may be procured separately.



## SECTION 8

Stud Part No.	Installation Tool Part No. **	Basic Power Unit Part No. **	Nose Assembly Part No. **	Tapped Hole Thread Size (Ref.)
TR28000-201-( ) TR28000-201-( )	70950-6-1-201-(*)	70950-6	70945SBK-201-(*)	.3125 - 18 UNC-2B Modified Tap Drill .272
TR28000-202-( ) TR28000A202-( )	70950-6-1-202-(*)	70950-6	70945SBK-202-(*)	.3750 - 16 UNC-2B Modified Tap Drill .332
TR28000-203-( ) TR28000A203-( )	70950-6-1-203-(*)	70950-6	70945SBK-203-(*)	.4375 - 14 UNC-2B Modified Tap Drill .397
TR28000-204-( ) TR28000A204-( )	70950-6-1-204-(*)	70950-6	70945SBK-204-(*)	.5000 - 13 UNC-2B Modified Tap Drill .453
TR28001-202-( ) TR28001A202-( )	70950-6-1-202-(*)H	70950-6	70945SBK-202- (*)H	.3750 - 16 UNC-2B Modified Tap Drill .332
TR28001-203-( ) TR28001A203-( )	70950-6-1-203-(*)H	70950-6	70945SBK-203- (*)H	.4375 - 14 UNC-2B Modified Tap Drill .397
TR28001-207-( ) TR28001A204-( )	70950-6-1-204-(*)H	70950-6	70945SBK-204- (*)H	.5000 - 13 UNC-2B Modified Tap Drill .453
TR28001-205-( ) TR28001A205-( )	70950-6-1-205-(*)H	70950-6	70945SBK-205- (*)H	.5625 - 12 UNC-2B Modified Tap Drill .516

\*Enter stud end length dash number. Example: stud part no. TR28001-203-24 requires installation tool part no. 70950-6-1-203-24H which is composed of the 70950-6 basic power unit and a 70945SBK-203-24H nose assembly. Power unit or nose assemblies may be procured separately.

Insert Part No.	Installation Tool Part No. **	Basic Power Unit Part No. **	Nose Assembly Part No. **	Tapped Hole Thread Size (Ref.)
TR29000A201 TR29000A201L TR29000CA201 TR29000CA201L	70950-6-0-201H	70950-6	70947SBK-201H	.3750 - 16 UNC-2B Modified Tap Drill .332
TR29000A202 TR29000A202L TR29000CA202 TR29000CA202L	70950-6-0-202H	70950-6	70947SBK-202H	.4375 - 14 UNC-2B Modified Tap Drill .397
TR29000A203 TR29000A203L TR29000CA203 TR29000CA203L	70950-6-0-203H	70950-6	70947SBK-203H	.5000 - 13 UNC-2B Modified Tap Drill .453
TR29000A204 TR29000A204L TR29000CA204 TR29000CA204L	70950-6-0-204H	70950-6	70947SBK-204H	.5625 - 12 UNC-2B Modified Tap Drill .516

\*\*Basic power unit part no. 70950-6 can utilize any of the nose assembly part numbers listed. To install more than one size insert or stud, order only one power unit with as many nose assemblies as required.

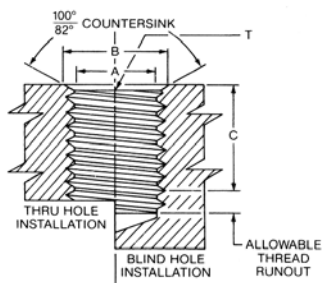


# Alcoa Fastening Systems

## SECTION 8

### Self-Broaching KEENSERTS Inserts and Studs.

#### Hole Preparation, Installation and Removal Data.



#### Notes:

1. Locate and drill with standard drill to "A" Dia.
2. Countersink with standard countersink (82° to 100°), to "B" Dia.
3. Tap with a standard unified thread series tap "T" dimension.

Description	Part No. *	A Tap Drill Dia.	B C'Sink Dia. + .010 - .000	T Thread Tap Size UNC-2B	C Min. Full Thread	Power Installation Tool Part No. **	Removal Data	
							Drill Ref.	
							Size	Depth
Standard Self- Broaching Studs	TR28000-201-(*) TR28000A201-(*)	.272	.323	.3125 - 18	.37	70950-6-1-201- (**	.2187	.1562
	TR28000-202-(*) TR28000A202-(*)	.332	.385	.3750 - 16	.43	70950-6-1-202- (**)	.2812	.1875
	TR28000-203-(*) TR28000A203-(*)	.397	.447	.4375 - 14	.50	70950-6-1-203- (**)	.3437	
	TR28000-204-(*) TR28000A204-(*)	.453	.510	.5000 - 13	.56	70950-6-1-204- (**)	.4062	
Heavy Duty Self- Broaching Studs	TR28001-202-(*) TR28001A202-(*)	.332	.385	.3750 - 16	.37	70950-6-1-202- (**)H	.2812	
	TR28001-203-(*) TR28001A203-(*)	.397	.447	.4375 - 14	.43	70950-6-1-203- (**)H	.3437	
	TR28001-204-(*) TR28001A204-(*)	.453	.510	.5000 - 13	.50	70950-6-1-204- (**)H	.4062	
	TR28001-205-(*) TR28001A205-(*)	.516	.572	.5625 - 12	.56	70950-6-1-205- (**)H	.4687	
Heavy Duty Self- Broaching Inserts	TR29000A201 TR29000CA201	.332	.385	.3750 - 16	.43	70950-6-0-201H	.2812	
	TR29000A201L TR29000CA201L				.37			
	TR29000A202 TR29000CA202	.397	.447	.4375 - 14	.50	70950-6-0-202H	.3437	
	TR29000A202L TR29000CA202L				.43			
	TR29000A203 TR29000CA203	.453	.510	.5000 - 13	.56	70950-6-0-203H	.4062	
	TR29000A203L TR29000CA203L				.50			
	TR29000A204 TR29000CA204	.516	.572	.5625 - 12	.62	70950-6-0-204H	.4687	
	TR29000A204L TR29000CA204L				.56			

\* See ordering information on page 39 for proper stud dash number selection.

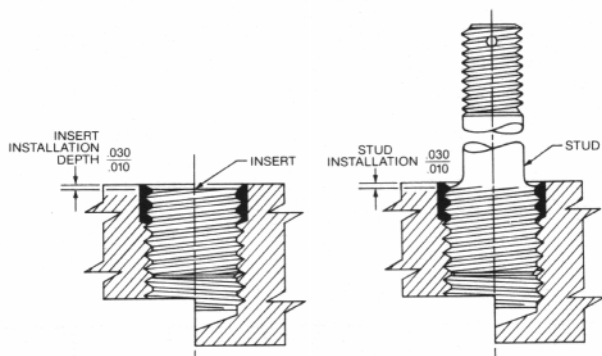
\*\* See power tool page 41 for proper dash number selection as required for studs.



# Alcoa Fastening Systems

## SECTION 8

### Hole Preparation, Installation and Removal Data (cont'd.).



Installation of Inserts and Studs

#### Notes (Continued):

4. Start the tool by depressing the Air Supply Lever. This will rotate the threaded mandrel in a clockwise direction. Place the top end of the **KEENSERT** against the rotating mandrel and thread it on.

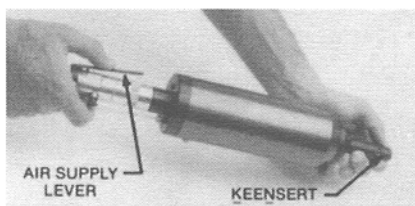


Figure 1

5. With the loaded tool rotating clockwise (Air Supply Lever depressed), place the **KEENSERT** against the threaded hole in the part and allow it to screw in. Take care to align the tool with the axis of the hole. When the insert is at the correct depth the shoulder on the nosepiece will contact the part and stall the tool. Remove hand from Air Supply Lever.

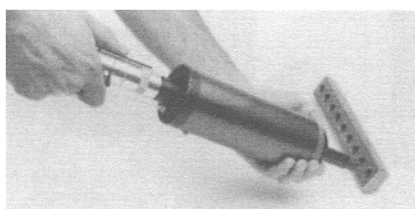


Figure 2

6. Drive KEES to  $\frac{.030}{.010}$  depth by pushing KEE Drive Button (figure 3).

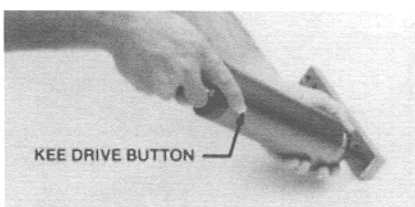


Figure 3

7. Back the tool out by first depressing the Reverse Button and then the Air Supply Lever. Release the button after the tool is out. The tool is now ready to be loaded for the next installation.

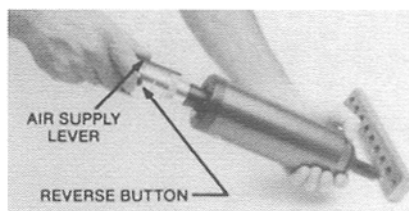


Figure 4

#### 8. Tool Inlet Pressure

The 70950-6 power tool has automatically installed self-broaching **KEENSERT** inserts and studs into materials such as A-286, Inconel 718, Hastoloy X, 17-4 PH and titanium. Since the 420 CRES KEE acts as a cutting tool, each application using the self-broaching **KEENSERT** should allow for some test samples of the material used in production to determine actual minimum pressure required.

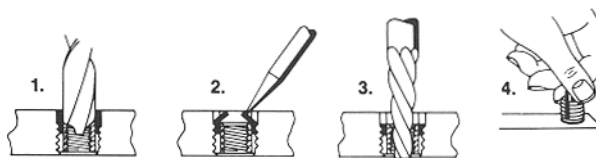
TYPICAL PRESSURE SETTINGS REQUIRED:	
Rc HARDNESS	PRESSURE TO 70950-6 TOOL
to 26.6	90-100 PSI
26.6 to 34.3	100-125 PSI
34.3 to 43.1	125-150 PSI

**WARNING:** DO NOT SET PRESSURE ABOVE 150 PSI

9. Axis of hole to be normal to entry surface or provide spotface when required.

#### Removal (if required follow these simple steps):

##### Inserts:



1. Use standard drill to remove insert material between KEES (see table opposite page).

2. Deflect KEES inward and break off.

3. Remove insert with E-Z out type tool.

4. An identical insert can be installed in the original hole. No re-work of the hole is necessary. Strength of the replacement is equal to that of the original.

##### Studs:

5. To remove stud, simply cut off nut end at a point just above the surface.

6. Removal is the same as for inserts, except a drill bushing is required to align removal drill. The same size replacement stud may be installed in the original hole. Strength of the replacement is equal to that of the original.



# Alcoa Fastening Systems

## SECTION 8

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# Alcoa Fastening Systems

## SECTION 6

### INDEX

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Description/Installation/	
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### KIT DESCRIPTIONS

**THINWALL INSERT KITS.** The most versatile series in this catalog, these kits may be used for the majority of applications.

**METRIC INSERT KITS.** Contain inserts with external and internal metric threads.

**HEAVY DUTY INSERT KITS.** For applications requiring higher pullout strengths or thread sizes exceeding 1/2".

**MASTER INSERT KITS.** Contains various sizes of inserts and tools in one package.

**SPARK PLUG MASTER KITS.** Used in the repair or modification of spark plug threads in cylinder heads.

**VOLKSWAGEN STUD INSERT KIT.** Used to replace damaged engine stud holes in VW crank-case assemblies.

**CUMMINS ENGINE STUD INSERT KIT.** Special inserts for repair of 11/16-16 holes in Cummins engine blocks.

## KEENSERTS® INSERTS

strong,  
permanent,  
metal threads



*National Coarse, National Fine or Metric Threads.*

Available in kits or in bulk quantities. Kits are particularly suited for use by repair facilities. Individual kits are available containing inserts of one size per box or as master kits containing a selection of various size inserts in one package. These kits provide convenient storage and easy access to inserts and tools. Included in each kit are installation tools for driving "Kees" as well as complete instructions for installation or removal of the KEENSERTS. Refills for each kit may be ordered simply and easily so that an appropriate stock may be maintained at all times. Bulk inserts may also be ordered.

### FEATURES

- Installed with standard drills and taps.
- No pre-winder tool required.
- No tang break-off.
- Positive mechanical lock against rotation.
- May be used in virtually any material. . .aluminum, magnesium, cast iron, cold rolled steel and plastic.
- Provide high strength and reliability. Onelength per size provides maximum pullout strength.
- Easy to remove.
- No special skills required. Installation procedures can be learned in minutes.

### TYPICAL APPLICATIONS

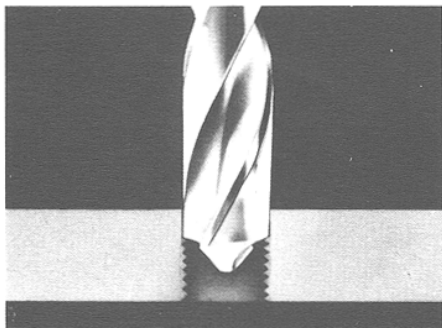
- Automobiles ■ Buses ■ Trucks
- Heavy Equipment ■ Marine Equipment
- Machinery ■ Tooling ■ Power Tools
- Recreational Vehicles ■ Small Engines





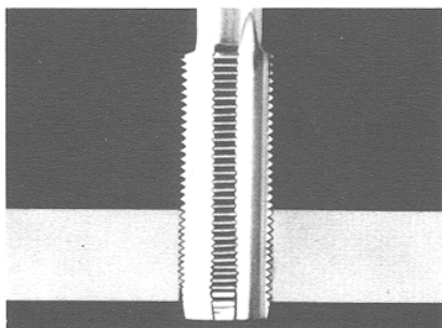
# Alcoa Fastening Systems

## Easy Installation/4 Simple Steps



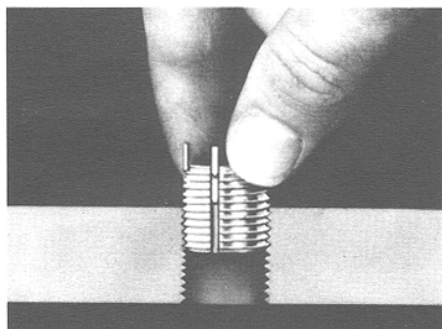
# 1

Drill out old threads, using standard drill.



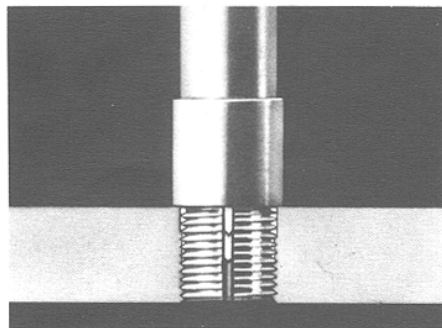
# 2

Tap new threads using standard tap.



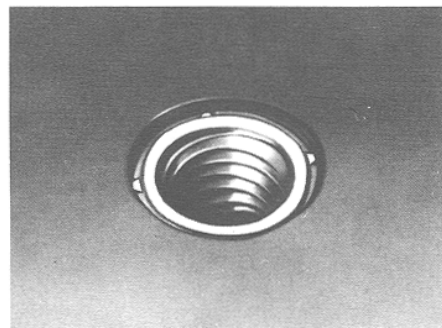
# 3

Screw in insert until slightly below surface. "Kees" act as depth stop.



# 4

Drive "Kees" down with several light taps on installation tool.

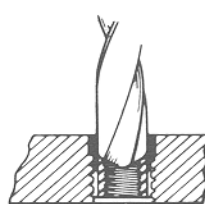


# 5

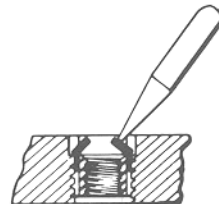
Installed Insert

### Removal of KEENSERTS Inserts

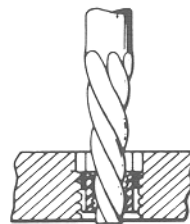
*It is unlikely that KEENSERTS inserts will ever have to be removed since their threads are stronger than original threads. If removal is necessary, however, follow these simple steps.*



1. Use STANDARD DRILL to remove insert material between "Kees."



2. Deflect "Kees" inward and break off.

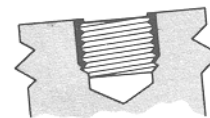
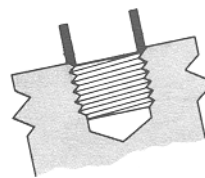


3. Remove insert with E-Z OUT type tool.



4. An identical insert can now be installed in the original hole. No re-work of the hole will be necessary.

"Kees" firmly lock insert in place, preventing rotation.



"Kees" are driven into the surrounding base material to securely lock the insert against rotation.

# SECTION 6

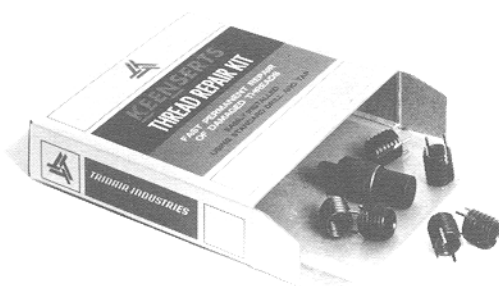




# Alcoa Fastening Systems

## SECTION 6

### Single Size Kits Thinwall and Metric



#### THINWALL INSERT KITS AND REFILL KITS

Internal Thread Size	External Thread, Modified Minor Diameter	Kit Part No.	No. of Inserts Per Kit	Refill Kit Part No.	No. of Inserts Per Kit
10-24	5/16-18	TR 17738	9	TR17788	32
10-32		TR 17739	9	TR 17789	32
1/4-20	3/8-16	TR 17740	8	TR 17790	31
1/4-28		TR 17741	8	TR 17791	31
5/16-18	7/16-14	TR 17742	7	TR 17792	27
5/16-24		TR 17743	7	TR 17793	27
3/8-16	1/2-13	TR 17744	6	TR 17794	24
3/8-24		TR 17745	6	TR 17795	24
7/16-14	9/16-12	TR 17746	5	TR 17796	22
7/16-20		TR 17747	5	TR 17797	22
1/2-13	5/8-11	TR 17748	4	TR 17798	16
1/2-20		TR 17749	4	TR 17799	16

*All dimensions in inches*

All inserts on these pages are made of carbon steel. Each kit shown includes a tool for driving "Kees," and complete installation instructions. Refill kits also include instructions but do not include the tool. ■ **THINWALL** inserts are the most versatile available and are recommended for the majority of applications. Where higher strengths or larger sizes are required, see Heavy Duty inserts on the following page. ■ **METRIC** inserts are supplied with both external and internal metric threads. ■ **BULK** inserts with part numbers shown on Page 5 may be ordered for high-volume usage.

#### METRIC INSERT KITS AND REFILL KITS

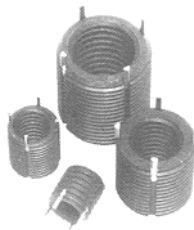
Internal Thread Size	External Thread Size	Kit Part No.	No. of Inserts Per Kit	Refill Kit Part No.	No. of Inserts Per Kit
M5x0.8	M8x1.25	TR17503	8	TR17553	29
M6x1.0	M10x1.25	TR17504	8	TR17554	28
M7x1.0	M11x1.0	TR17511	6	TR17555	21
M8x1.0	M12x1.25	TR17505	6	TR17556	21
M8x1.25	M12x1.25	TR17506	6	TR17557	21
M10x1.25	M14x1.5	TR17507	4	TR17558	16
M10x1.5	M14x1.5	TR17508	4	TR17559	16
M12x1.25	M16x1.5	TR17509	3	TR17560	15
M12x1.75	M16x1.5	TR17510	3	TR17561	15
M14x1.5	M20x1.5	TR17512	4	TR17562	10
M14x2.0	M20x1.5	TR17513	4	TR17563	10
M16x1.5	M22x1.5	TR17514	3	TR17564	10
M18x1.5	M24x1.5	TR17515	2	TR17565	10
M20x1.5	M30x2.0	TR17516	3	TR17566	8
M22x1.5	M32x2.0	TR17517	3	TR17567	8
M24x2.0	M33x2.0	TR17518	2	TR17568	5



# Alcoa Fastening Systems

## SECTION 6

### Bulk Inserts Thinwall and Metric



#### THINWALL BULK INSERTS

Internal Thread Size	External Thread, Modified Minor Diameter	Insert Part No.	Length	INSTALLATION DATA				REMOVAL DATA	
				Tap Drill Dia.	C'Sink Dia.	Tap Size	Insert Tool Part. No.	Drill	
								Size	Depth
10-24	5/16-18	RKKA 10-24	.31	"I"	.32	5/16-18	TRKA 10	7/32	5/32
10-32		RKKA 10-32							
1/4-20	3/8-16	RKKA 1/4-20	.37	"Q"	.38	3/8-16	TRKA 1/4	9/32	3/16
1/4-28		RKKA 1/4-28							
5/16-18	7/16-14	RKKA 5/16-18	.43	"X"	.44	7/16-14	TRKA 5/16	11/32	3/16
5/16-24		RKKA 5/16-24							
3/8-16	1/2-13	RKKA 3/8-16	.50	29/64	.51	1/2-13	TRKA 3/8	13/32	3/16
3/8-24		RKKA 3/8-24							
7/16-14	9/16-12	RKKA 7/16-14	.56	33/64	.57	9/16-12	TRKA 7/16	15/32	3/16
7/16-20		RKKA 7/16-20							
1/2-13	5/8-11	RKKA 1/2-13	.62	37/64	.63	5/8-11	TRKA 1/2	17/32	3/16
1/2-20		RKKA 1/2-20							

#### METRIC BULK INSERTS

Internal Thread Size	External Thread Size	Insert Part No.	Length	INSTALLATION DATA				REMOVAL DATA	
				Tap Drill Dia.	C'Sink Dia.	Tap Size	Insert Tool Part. No.	Drill	
								Size	Depth
M5x0.8	M8x1.25	KNM 5x0.8F	.315	"H"	.32	M8x1.25	TRKM 5	7/32	5/32
M6x1.0	M10x1.25	KNM 6x1F	.394	"S"	.40	M1.0x1.25	TRKM 6	19/64	3/16
M7x1.0	M11x1.0	KNM 7x1F	.433	"W"	.44	M11x1.0	TRKM 7	"Q"	
M8x1.0	M12x1.25	KNM 8x1F	.472	27/64	.48	M12x1.25	TRKM 8	3/8	
M8x1.25	M12x1.25	KNM 8x1.25F							
M10x1.25	M14x1.5	KNM 10x1.25F	.551	1/2	.56	M14x1.5	TRKM10	29/64	
M10x1.5	M14x1.5	KNM 10x1.5F							
M12x1.25	M16x1.5	KNM 12x1.25F	.630	37/64	.63	M16x1.5	TRKM 12	17/32	
M12x1.75	M16x1.5	KNM 12x1.75F							
M14x1.5	M20x1.5	KNHM 14x1.5F	.787	47/64	.79	M20x1.5	TRKHM 14	11/16	
M14x2.0	M20x1.5	KNHM 14x2F							
M16x1.5	M22x1.5	KNHM 16x1.5F	.866	13/16	.87	M22x1.5	TRKHM 16	45/64	1/4
M18x1.5	M24x1.5	KNHM 18x1.5F	.945	57/64	.95	M24x1.5	TRKHM 18	25/32	
M20x1.5	M30x2.0	KNHM 20x1.5F	1.181	1-7/64	1.18	M30x2	TRKHM 20	1 - 1/64	
M22x1.5	M32x2.0	KNHM 22x1.5F	1.260	1-3/16	1.26	M32x2	TRKHM 22	1 - 3/32	
M24x2.0	M33x2.0	KNHM 24x2F	1.299	1-7/32	1.29	M33x2	TRKHM 24	1 - 1/8	

Other sizes are available on request

Countersink diameters are optional providing  
KEENINSERTS insert is below flush of surface.

All dimensions in inches.

No standard packaging applies on bulk quantities.

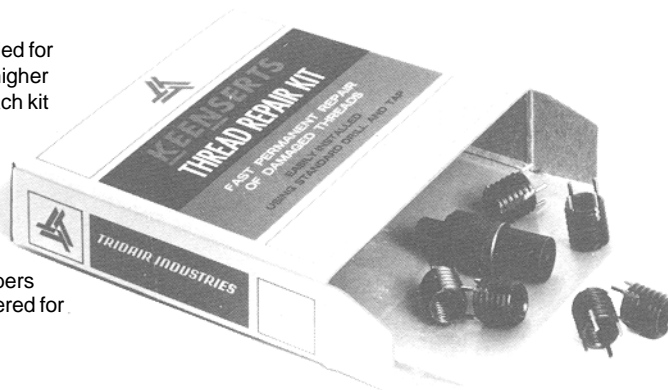


# Alcoa Fastening Systems

## SECTION 6

### Single Size Kits Heavy Duty

These kits are recommended for use where larger sizes or higher strengths are required. Each kit shown includes a tool for driving "Kees," and complete installation instructions. Refill kits also include instructions but do not include the tool. Bulk inserts with part numbers shown Page 7 may be ordered for high-volume usage.



#### KITS AND REFILL KITS

Internal Thread Size	External Thread, Modified Minor Diameter	Kit Part No.	No. of Inserts Per Kit	Refill Kit Part No.	No. of Inserts Per Kit
8-32	5/16-18	TR 17700	9	TR 17750	32
10-24	3/8-16	TR 17701	9	TR 17751	32
10-32		TR 17702	9	TR 17752	32
1/4-20	7/16-14	TR 17703	8	TR 17753	31
1/4-28		TR 17704	8	TR 17754	31
5/16-18	1/2-13	TR 17705	7	TR 17755	27
5/16-24		TR 17706	7	TR 17756	27
3/8-16	9/16-12	TR 17707	6	TR 17757	24
3/8-24		TR 17708	6	TR 17758	24
7/16-14	5/8-11	TR 17709	6	TR 17759	22
7/16-20		TR 17710	6	TR 17760	22
1/2-13	3/4-16	TR 17711	4	TR 17761	16
1/2-20		TR 17712	4	TR 17762	16
9/16-12	3/4-16	TR 17713	3	TR 17763	12
9/16-18		TR 17714	3	TR 17764	12
5/8-11	7/8-14	TR 17715	3	TR 17765	10
5/8-18		TR 17716	3	TR 17766	10
3/4-10	1-1/8-12	TR 17717	3	TR 17767	7
3/4-16		TR 17718	3	TR 17768	7
7/8-9	1-1/4-12	TR 17719	3	TR 17769	6
7/8-14		TR 17720	3	TR 17770	6
1-8	1-3/8-12	TR 17721	2	TR 17771	3
1-12		TR 17722	2	TR 17772	3
**1-14		—	—	—	—
1-1/8-7	1-1/2-12	TR 17723	2	TR 17773	2
1-1/8-12		TR 17724	2	TR 17774	2
**1-1/8-18		—	—	—	—
1-1/4-7	1-5/8-12	TR 17725	2	TR 17775	2
1-1/4-12		TR 17726	2	TR 17776	2
1-1/2-6	1-7/8-12	TR 17727	2	TR 17777	2
1-1/2-12		TR 17728	2	TR 17778	2
**1-3/4-5	2-1/8-12	—	—	—	—
**1-3/4-12		—	—	—	—



# Alcoa Fastening Systems

## Bulk Inserts Heavy Duty



## SECTION 6

Internal Thread Size	External Thread, Modified Minor Diameter	Insert Part No.	Length	INSTALLATION DATA				REMOVAL DATA	
				Tap Drill Dia.	C'Sink Dia.	Tap Size	Insert Tool Part No.	Drill	
								Size	Depth
8-32	5/16-18	RKK 8-32	.31	"I"	.32	5/16-18	TRK 08	7/32	1/8
10-24	3/8-16	RKK 10-24	.31	"Q"	.38	3/8-16	TRK 10	9/32	1/8
10-32		RKK 10-32							
1/4-20	7/16-14	RKK 1/4-20	.37	"X"	.44	7/16-14	TRK 1/4	11/32	3/16
1/4-28		RKK 1/4-28							
5/16-18	1/2-13	RKK 5/16-18	.43	29/64	.51	1/2-13	TRK 5/16	13/32	3/16
5/16-24		RKK 5/16-24							
3/8-16	9/16-12	RKK 3/8-16	.50	33/64	.57	9/16-12	TRK 3/8	15/32	3/16
3/8-24		RKK 3/8-24							
7/16-14	5/8-11	RKK 7/16-14	.62	37/64	.63	5/8-11	TRK 7/16	17/32	3/16
7/16-20		RKK 7/16-20							
1/2-13	3/4-16	RKK 1/2-13	.81	45/64	.76	3/4-16	TRK 1/2	21/32	3/16
1/2-20		RKK 1/2-20					TRK 9/16		
9/16-12	3/4-16	RKK 9/16-12	.87	53/64	.88	7/8-14	TRK 5/8	25/32	3/16
9/16-18		RKK 9/16-18							
5/8-11	7/8-14	RKK 5/8-11	1.12	1-1/16	1.14	1-1/8-12	TRK 3/4	31/32	5/16
5/8-18		RKK 5/8-18							
3/4-10	1-1/8-12	RKK 3/4-10	1.25	1-3/16	1.27	1-1/4-12	TRK 7/8	1-3/32	5/16
3/4-16		RKK 3/4-16							
7/8-9	1-1/4-12	RKK 7/8-9	1.37	1-5/16	1.39	1-3/8-12	TRK 1	1-7/32	5/16
7/8-14		RKK 7/8-14							
1-8	1-3/8-12	RKK 1-8	1.62	1-7/16	1.52	1-1/2-12	TRK 1 1/8	1-11/32	5/16
1-12		RKK 1-12							
1-14	1-5/8-12	RKK 1-14	1.81	1-9/16	1.64	1-5/8-12	TRK 1 1/4	1-15/32	5/16
1-1/8-7		RKK 1 1/8-7							
1-1/8-12	1-7/8-12	RKK 1 1/8-12	2.00	1-13/16	1.89	1-7/8-12	TRK 1 1/2	1-23/32	5/16
1-1/8-18		RKK 1 1/8-18							
1-1/4-7	2-1/8-12	RKK 1 1/4-7	2.12	2-1/16	2.14	2-1/8-12	TRK 1 3/4	1-31/32	5/16
1-1/4-12		RKK 1 1/4-12							
1-1/2-6		RKK 1 1/2-6							
1-1/2-12		RKK 1 1/2-12							
1-3/4-5		RKK 1 3/4-5							
1-3/4-12		RKK 1 3/4-12							

All dimensions are in inches.

Countersink diameters are optional providing  
KEENSERTS insert is below flush of surface.

No standard packaging applies on bulk quantities.

**Tridair Products 50**

Maryland Metrics ph: (410)358-3130 (800)638-1830 fx: (410)358-3142 (800)872-9329 email: sales@mdmetric.com web: http://mdmetric.com

## Master Insert Kits



These master kits are ideal for use where inserts are used on a regular basis for repair operations. Each kit contains several different sizes of inserts as tabulated, tool for driving "Kees," and complete installation instructions. The kits provide convenient storage and easy access to the various sizes. All inserts are made of carbon steel.

See page 4 and 5 for refill kits and bulk inserts.

	Internal Thread Size	External Thread Modified Minor Diameter	Master Kit Part No.	No. of Inserts Per Kit
Heavy Duty			COARSE	
	1/4-20	7/16-14	TR 17735	20
	5/16-18	1/2-13		15
	3/8-16	9/16-12		10
	7/16-14	5/8-11		10
	1/2-13	3/4-16		6
	9/16-12	3/4-16		5
	5/8-11	7/8-14		3
	3/4-10	1-1/8-12		3
	7/8-9	1-1/4-12	Unified National Coarse Series Threads	3
	1-8	1-3/8-12		2
			FINE	
	1/4-28	7/16-14	TR 17736	20
	5/16-24	1/2-13		15
	3/8-24	9/16-12		10
	7/16-20	5/8-11		10
	1/2-20	3/4-16		6
	9/16-18	3/4-16		5
	5/8-18	7/8-14		3
	3/4-16	1-1/8-12		3
Thinwall	7/8-14	1-1/4-12	Unified National Coarse Series Threads	3
	1-12	1-3/8-12		2
			COARSE	
	10-24	5/16-18	TR17780	20
	1/4-20	3/8-16		20
	5/16-18	7/16-14		15
	3/8-16	1/2-13		10
	7/16-14	9/16-12		10
	1/2-13	5/8-11		6
			FINE	
	10-32	5/16-18	TR17781	20
	1/4-28	3/8-16		20
	5-16-24	7/16-14		15
	3/8-24	1/2-13		10
	7/16-20	9/16-12		10
	1/2-20	5/8-11		6
Metric				
	6x1.0	10x1.25	TR17525	20
	8x1.0	12x1.25		20
	8x1.25	12x1.25		15
	10x1.25	14x1.5		10
	10x1.5	14x1.5		10
	12x1.25	16x1.5		6
	12x1.75	16x1.5		6
	14x1.5	20x1.5	TR17550	4
	14x2.0	20x1.5		4
	16x1.5	22x1.5		3
	18x1.5	24x1.5		2
	20x1.5	30x2.0		3
	22x1.5	32x2.0		3
	24x2.0	33x2.0		2



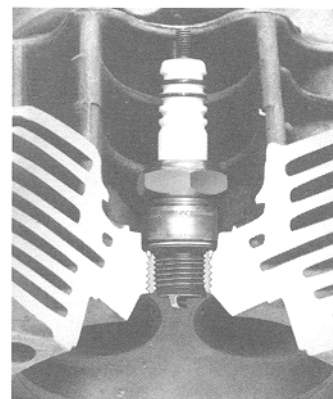
# Alcoa Fastening Systems

## Spark Plug Insert Kits

## SECTION 6



Inserts in these kits are designed for use in the repair or modification of spark plug threads in many types of cylinder heads. 14mm spark plug inserts can be used with most types of spark plugs, tapered seat as well as gasket seat. ■ Manufactured from a high-strength aluminum alloy, only KEENSERTS inserts will operate as cool as the original condition. Cooler operation means better performance, increased plug life and reduced emissions. ■ Sealing washers are also included in each kit. They provide a positive seal to prevent the escape of gas from the combustion chamber. Each master kit includes complete instructions and tools for installation. Refill kits are available to replenish the master kit.



### SPARK PLUG MASTER KITS AND REFILL KITS

Spark Plug Reach	Spark Plug Size	Kit Part No.	No. of Inserts/ Sealing Washers Per Kit	Refill Kit Part No.	No. of Inserts/ Sealing Washers Per Kit
1/2"	M10x1.0	TR 17420	12	TR 17421	10
1/2" & 3/4" Mixed	M12x1.25	TR 17425	6 each size	TR 17426	10 1/2" reach
				TR 17427	10 3/4" reach
3/8"	M14x1.25	TR 17401	12	TR 17411	10
7/16"		TR 17402		TR 17412	
1/2"		TR 17403		TR 17413	
3/4"		TR 17404		TR 17414	
3/8"-7/16" 1/2"-3/4" Mixed	M14x1.25	TR 17406	3 each size	TR 17411 through TR 17414 as needed	

### SPARK PLUG BULK INSERTS

Spark Plug Size	Insert Part No.	Length	INSTALLATION DATA			REMOVAL DATA		Sealing Washer Part No.	Ream & C'Sink Tool Part No.	Tap Tool Part No.
			Tap Drill Size	Tap Size	Insert Tool Part No.	Drill				
						Size	Depth			
M10x1.0	KNPM 10E-3	1/2	1/2	M14X1.5	TRKM-10	29/64	3/16	KNPMW-10	-	-
M12x1.25	KNPM 12E-3	1/2	37/64	M16X1.5	TRKM-12	17/32		KNPMW-12	-	-
	KNPM 12E-4	3/4						-	-	
M14x1.25	KNP 14E-1	3/8	*	*	TR 17595	21/32	1/4	KNPW-14	TR 17596	TKNP 14-4
	KNP 14E-2	7/16								
	KNP 14E-3	1/2								
	KNP 14E-4	3/4								

\*For installation of M14 spark plugs, see installation instructions included with Spark Plug Master Kit.  
No standard packaging applies on bulk inserts.

All dimensions are in inches.





## Typical Insert Test Results

### RKK Series

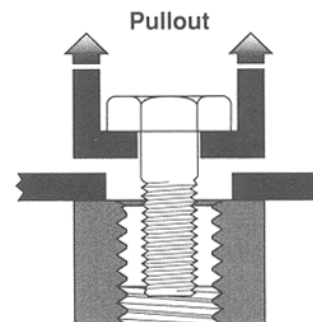
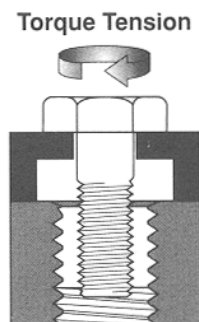
Carbon Steel Insert Part No.	Bolts Grade 8 and 8.1 Ref.		(2) Average Pullout Test Results 6061-T6 Aluminum (Lbs.)	(3) (4) Low and High Torque Tension Test Results (In.-Lbs.)	(5) Max. Suggested Seating Torque of Bolt (In.-Lbs.)	Stainless Steel Insert Part No. (6)	(7) Average Pullout Test Results 6061-T6 Aluminum (Lbs.)
	Proof Load, Lbs.	Tensile Strength Min., Lbs.					
RKK 10-32	1,700 <sup>(1)</sup>	2,400 <sup>(1)</sup>	5,590 (B)	112-125 (B)	50	KNH1032J	5,050 (C)
RKK 1/4-20	3,800	4,750	7,238 (A)	197-247 (B)	105	KNH420J	8,250 (B)
RKK 5/16-18	6,300	7,850	9,381 (A)	465-537 (B)	165	KNH518J	11,100 (C)
RKK 3/8-16	9,300	11,600	12,372 (A)	882-940 (B)	294	KNH616J	14,350 (C)
RKK 3/8-24	10,500	13,200	13,000 (A)	769-1,003 (A)	294	KNH624J	13,750 (C)
RKK 1/2-13	17,000	21,300	21,300 (A)	1,476-2,208 (B)	690	KNH813J	25,100 (C)
RKK 5/8-11	27,100	33,900	37,600 (A)	3,203--4,881 (B)	1,290	KNH1011J	44,950 (C)
RKK 5/8-18	30,700	38,400	33,000 (A) <sup>(3)</sup>	4,514-4,641 (B)	1,290	KNH1018J	38,000 (C)
RKK 3/4-10	40,100	50,100	71,200 (A) <sup>(3)</sup>	6,072 (T.S)	2,080	KNH1210J	78,300 (C)

#### Notes:

- Grade 5 bolt values.
- Data from engineering report No.2112.
- Test conducted in 2024-T4 aluminum.
- Test from engineering report No. 9311. The 10-32 size used was a 160,000psi bolt. The other bolts were grade 8. T.S.= test stopped.
- This data is based upon torque loads necessary to develop approximately 75% of the proof loads of a cadmium plated grade 8 bolt. It assumes the insert is in an aluminum or steel with a 37,000 psi shear strength. Should the torque tension relationship be critical, the user should conduct tests to determine the proper values to use.

- The "KN" and "KNH" series inserts are made of 303 stainless. The configuration is the same as the "RKK" or "RKK" inserts shown in this catalog, except the KNH813J has an 11/16-11NS external thread.
- The values are the average of various lot tests

### Test Methods





# Alcoa Fastening Systems

## SECTION 6

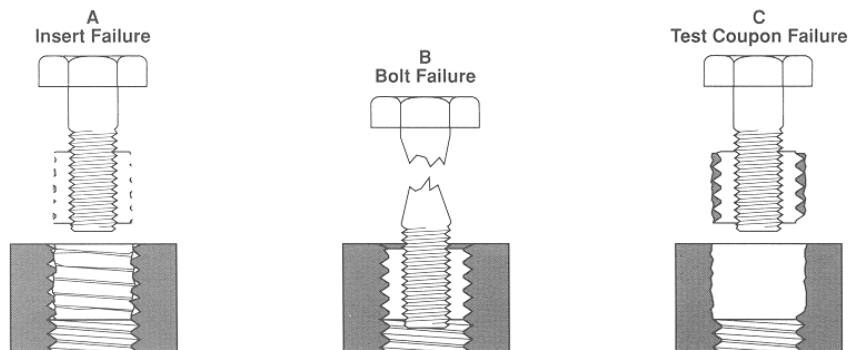
### RKKA Series

Carbon Steel Insert Part No.	Bolts Grade 8 and 8.1 Ref.		(2) Average Pullout Test Results 6061-T6 Aluminum (Lbs.)	(3) (4) Low and High Torque Tension Test Results (In.-Lbs.)	(5) Max. Suggested Seating Torque of Bolt (In.-Lbs.)	Stainless Steel Insert Part No. (6)	(7) Average Pullout Test Results 6061-T6 Aluminum (Lbs.)
	Proof Load, Lbs.	Tensile Strength Min., Lb.					
RKKA 1/4-20	3,800	4,750	7,448 (A)	163-260 (B)	105	KN420J	7,600 (C)
RKKA 5/16-18	6,300	7,850	7,537 (A)	376-470 (A)	165	KN518J	9,600 ( C)
RKKA 3/8-16	9,300	11,600	11,556 (A)	504-741 (A)	294	KN616J	13,400 (C)
RKKA 3/8-24	17,000	21,300	16,812 (A)	1,536-1,740 (A)	690	KN813J	21,000 (C)
RKKA 1/2-20	19,200	24,000	16,860 (A)	1,100-1,599 (A)	690	KN820J	20,700 (C)

#### Notes:

- Grade 5 bolt values.
- Data from engineering report No.2112.
- Test conducted in #2024-T4 aluminum.
- Test from engineering report No. 9311.
- This data is based upon torque loads necessary to develop approximately 75% of the proof loads of a cadmium plated grade 8 bolt. It assumes the insert is in an aluminum or steel with 37,000 psi shear strength. Should the torque tension relationship be critical, the user should conduct tests to determine the proper values to use.
- The "KN" and "KNH" series inserts are made of 303 stainless. The configuration is the same as the "RKKA" or "RKK" inserts shown in this catalog.
- The values are the average of various lot tests

### Failure Modes

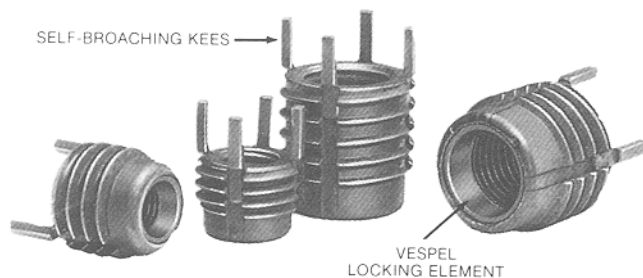




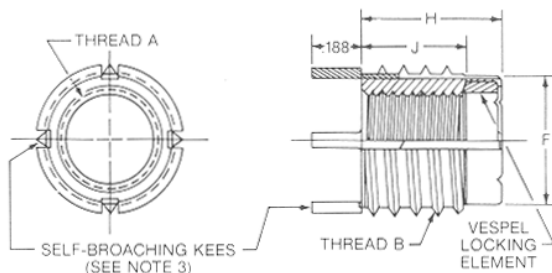
# Alcoa Fastening Systems

## Tridair® Self-Broaching KEENSERTS® Inserts with Vespel® Locking Element

- High Temperature Tolerance for Hostile Environmental Applications
- Vespel Locking Element Provides High Reuseability
- Self-Broaching KEES Ease Installation into Hard Parent Material
- Insert may be removed and replaced with identical insert with no loss of strength or re-work of the hole



These new Tridair Self-Broaching KEENSERTS® Inserts have a Vespel SP polymide resin locking element to provide an interference fit with the bolt at the time of assembly. The Vespel material allows for high temperatures and multiple reuse. They have been tested to 600°F with an INCO 7-18 bolt loaded to 120 KSI stress for 6 hours. And, after fifty repeated tests the minimum breakaway torque of the insert was still within the values of MIL-I-45914 and other applicable specifications. The 420 CRES KEES ease installation into parent materials with Rockwell hardness of R<sub>c</sub> 44 or less.



### Ordering Information

Part Number	A Internal Thread UNJF-3B	B External Thread UNC-2A		F Max.	H ± .015	J ± .015
	Size	Size	Modified Minor Dia.			
TR24361-3	.1900-32	.3750-16	.312-.320	.312	.350	.265
TR24361-4	.2500-28	.4375-14	.375-.383	.375	.400	.300
TR24361-5	.3125-24	.5000-13	.434-.438	.432	.480	.360
TR24361-6	.3750-24	.5625-12	.495-.503	.495	.540	.400

#### Material:

Insert:  
A286 CRES per AMS5737, AMS5731  
Locking KEES:  
420CRES per QQ-S-763  
Locking Element:  
Vespel SP polymide resin

#### Finish:

Insert:  
Passivated per QQ-S-35, with dry film lube

#### Heat Treat:

Insert:  
Per MIL-H-6875 to 1400,000 PSI FTU minimum

#### Notes:

1. Unless otherwise noted, all dimensions are in inches.
2. See reverse side for Hole Preparation. Installation and Removal Data.
3. Inserts with Internal Thread "B" size .250 and below are furnished with two Self-Broaching KEES: all others are furnished with four.
4. Also available in metric sizes: see Catalog No. 4700.

TRIDAIR and KEENSERTS are registered trademarks of ALCOA & FAIRCHILD FASTENERS.  
VESPEL is a registered trademark of the E.I. DuPont de Nemours & Co.

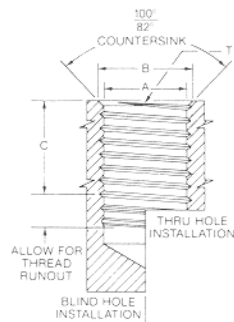
**Tridair Products**



# Alcoa Fastening Systems

## Tridair® Self-Broaching KEENSERTS® Inserts with Vespel® Locking Element

### Typical Hole Preparation



Insert Part No.	A Tap Drill Dia	B C'Sink Dia. +.010 - .000	C Min. Full Thread Depth	T Thread Tap Size UNC-2B	Power Installation Tool Nosepiece Part No.*	Removal Data	
						Drill Ref.	
						Size	Depth
TR24361-3	.332	.385	.44	.3750-16	TR24361-3-100	9/32	.188
TR24361-4	.397	.447	.50	.4375-14	TR24361-6-100	11/32	
TR24361-5	.453	.510	.59	.5000-13	TR24361-5-100	13/32	
TR24361-6	.516	.572	.66	.5625-12	TR24361-6-100	15/32	

\*Nosepieces are for use on KEENSERT® Power Installation Tool, Part No. 70950-6

### Hole Preparation:

1. Locate and drill with standard drill to "A" Dia.
2. Countersink with standard countersink (82° to 100°), to "B" Dia.
3. Tap with a standard tap to produce thread form "T."

### Insert Installation:

1. Start the tool by depressing the Air Supply Lever. This will rotate the threaded mandrel in a clockwise direction. Place the top end of the KEENSERT against the rotating mandrel and thread it on (Figure 1).
2. With the loaded tool rotating clockwise (Air Supply Lever depressed), place the KEENSERT threaded hole in the part and allow it to screw in (Figure 2). Take care to align the tool with the axis of the hole. When the insert is at the correct depth the shoulder on the nosepiece will contact the part and stall the tool. Remove hand from Air Supply Lever.
3. Drive KEES bt pushing KEE Drive Button (Figure 3).
4. Back the tool out by first depressing the Reverse Button and then the Air Supply Lever. Release the button after the tool is out. The tool is now ready to be loaded for the next installation (Figure 4).
5. Tool Inlet Pressure

The 70950-6 power tool has automatically installed self-broaching KEENSERT inserts and studs into materials such as A286, Inconel 718, Hastelloy X, 17-4PH and titanium. Since the 420 CRES KEE acts as a cutting tool, each application using the self-broaching KEENSERT should allow for some test samples of the material used in production to determine actual minimum pressure required.

Typical Pressure Settings Required:	
Rc Hardness	Pressure to 709050-6 Tool
to 26.6	90-100 PSI
26.6 to 34.3	100-125 PSI
34.3 to 43.1	125-150 PSI

### WARNING:

Do not set pressure above 150 PSI.

6. Axis of hole to be normal to entry surface or provide spotface when required

Removal (if required follow these simple steps):

1. Use standard drill to remove insert material between KEES (see table above).
2. Deflect KEES inward and break off.
3. Remove insert with E-Z out type tool.
4. An identical insert can be installed in the original hole. No re-work of the hole is necessary. Strength of the replacement is equal to that of the original.

### Installed Insert

