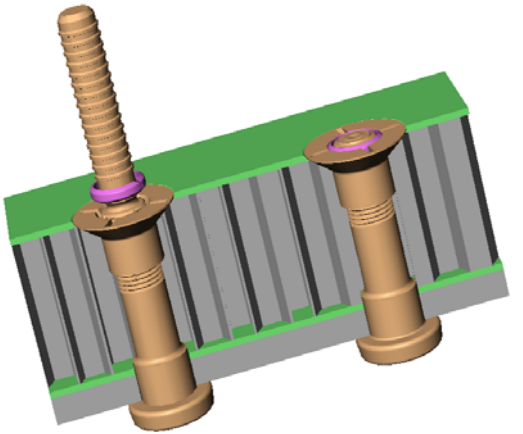
Alcoa Fastening Systems

ALCOA

ASP® Fastening System

PROCESS MANUAL



3rd Edition

Recommendations for Hole Preparation

- Holes for ASP® fasteners are “straight”. No potting, bushings, inserts or stepped holes are required.
- There are 3 basic diameters. (Oversize diameters may be available)

Nom Dia	Hole Dia +.005” -.000”	Recom-mended Drill Size	Fillet Radius (Ref)	C’sink Dia Tension Head	C’sink Dia Shear Head
-06	.203”	13/64”	.020”	.386/.380	.302/.296
-08	.266”	Letter “H”	.025”	.507/.500	.399/.393
-10	.328”	21/64”	.030”	.634/.626	.479/.472

Notes to Table:

- Countersinks are 100°.
- The product is available in tension head (AN509; pin and sleeve), shear head (NAS1097; pin only) and protruding head (pin and sleeve) configuration.
- Countersink diameter limits shown in the table are theoretical and intended for reference. When countersinking thin face sheets on sandwich panels, care must be taken to c’sink no deeper than necessary.
- Fillet radius figures apply to protruding head and flush head fasteners.

Suggestions for hole preparation and installation practice:

- Clamping of the structure with temporary devices is very helpful in avoiding sheet separation, burrs/chips between the sheets and hole misalignment.
- Drill speeds are critical to achieve hole quality and productivity, while minimizing operator fatigue.
  - Aluminum structure 4,000 to 6,000 RPM are recommended.
  - For stainless or titanium 300 to 1,000 RPM are recommended.
  - For Composite structure, carbide drills and c’sink cutters are recommended.

Recommendations for Hole Preparation Cont'd

- Lubrication of drills is very helpful in reducing drill wear, burrs and effort. Each shop has its own favorite drill lubes.
- Excessive "push" on the drill motor (dull drill) should be avoided as it can create sheet separation, and burrs and chips between the sheets.
- Hole normality is important. Angularity beyond 2° should be avoided.
- Countersink concentricity is critical, particularly with thin honeycomb face sheets. Generally, countersinks are normal to the structural surface. Flushness or head seating problems are caused by hole angularity beyond the 2° limit. Undersize countersink pilots are the most common cause of eccentricity problems and resulting cosmetics issues.
- These parts are commonly used in honeycomb panels with thin face sheets. Accuracy in countersink depth is critical in avoiding head pull through.

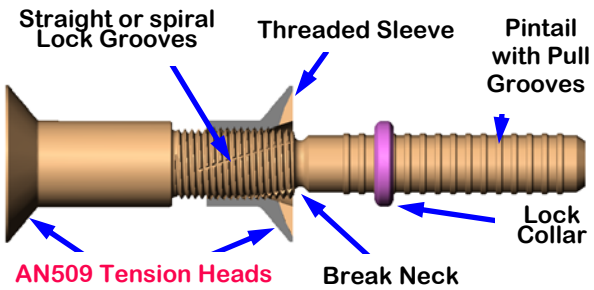
Basic Part Numbers

Description	Pin Configuration (specified)	Pin P/N	Sleeve Configuration (mating sleeve)	Sleeve P/N	Lock Collar P/N
Double Flush Full Shank	100° Tension	AspFF	100° Tension	AspF-S	Asp-LC
Double Flush Full Shank	100° Shear	Asp100F	100° Tension	AspF-S	Asp-LC
Double Flush Reduced Shank	100° Tension	2Asp509F	100° Tension	AspF-S	Asp-LC
Double Flush Reduced Shank	100° Shear	2AspFF	100° Tension	AspF-S	Asp-LC
Flush-Protr Full Shank	100° Tension	AspFP	Protr Head	2AspP-S	Asp-LC
Flush-Protr Full Shank	100° Shear	Asp100P	Protr Head	2AspP-S	Asp-LC
Flush-Protr Reduced Shank	100° Tension	2Asp509P	Protr Head	2AspP-S	Asp-LC
Flush-Protr Reduced Shank	100° Shear	2AspFP	Protr Head	2AspP-S	Asp-LC
Protr-Flush Reduced Shank	Protr Head	2AspPF	100° Tension	AspF-S	Asp-LC
Protr-Protr Full Shank	Protr Head	AspPP	Protr Head	2AspP-S	Asp-LC
Protr-Protr Reduced Shank	Protr Head	2AspPP	Protr Head	2AspP-S	Asp-LC

P/N Example for Pin: 2AspFF - DT08 - 06
P/N Example for Sleeve: AspF - S - DT08
P/N Example for Collar: Asp - LC - 2AC08

Anatomy of Asp® Components

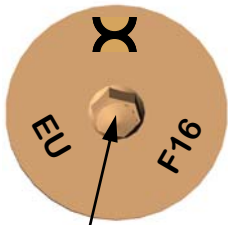
Double Flush AspFF-EU06-16



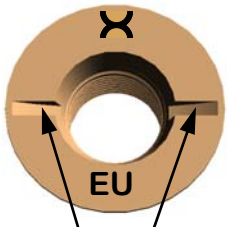
Identification Head Markings

Asp® pins carry the following identification head markings:

The Huck symbol as manufacturer's identification.
A letter "F" or "P" to identify the head style of the mating sleeve and a grip dash number (Full shank tension and protruding head only).
Pins and sleeves are identified with the letters "V" to indicate Titanium 6AL-4V or "EU" for A-286 Cres material. No material letter indicates alloy steel.
The Huck symbol is used for manufacturer's identification on the sleeves also.

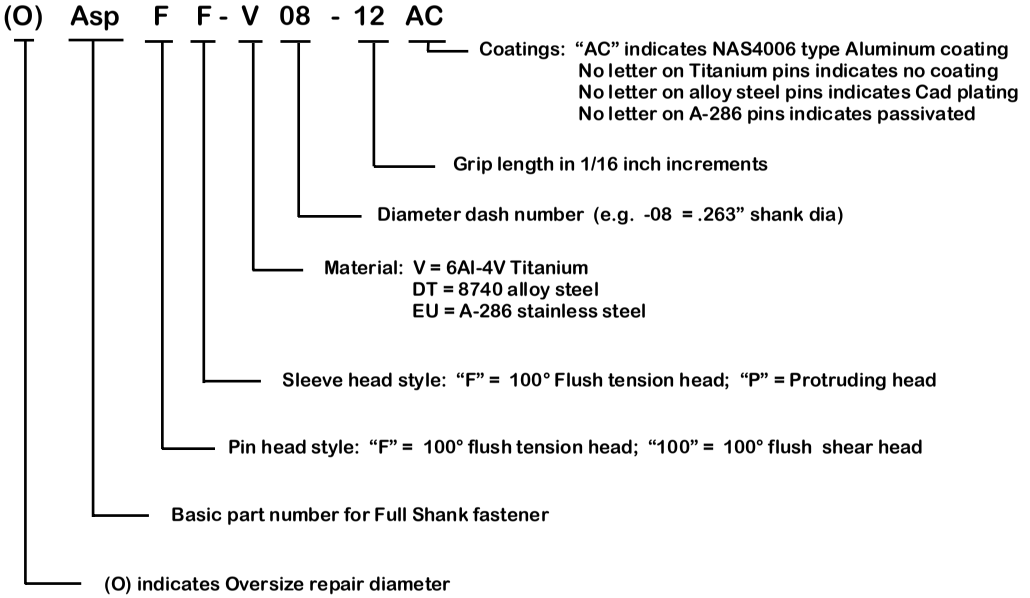


Hex Recess (pin)



Driving Recesses (sleeve)

Part Number Logic (Full Shank Pins)



Part Number Logic (Reduced Shank Pins)

(O) 2Asp F F - V 08 - 12 AC

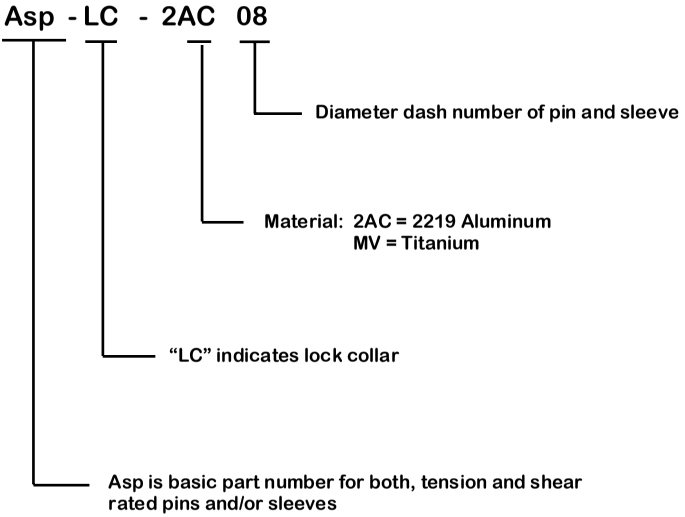
- Coatings: "AC" indicates NAS4006 type Aluminum coating
  No letter on Titanium pins indicates no coating
  No letter on alloy steel pins indicates Cad plating
  No letter on A-286 pins indicates passivated
- Grip length in 1/16 inch increments
- Diameter dash number (e.g. -08 = .263" shank dia)
- Material: V = 6Al-4V Titanium
  DT = 8740 alloy steel
  EU = A-286 stainless steel
- Sleeve head style: "F" = 100° Flush tension head; "P" = Protruding head
- Pin head style: "509" = 100° flush tension head; "F" = 100° flush shear head;
  "P" indicates protruding head
- Basic part number for Reduced Shank fastener
- (O) indicates Oversize repair diameter

Part Number Logic (Sleeves)

(O) Asp F - S - V 08 AC

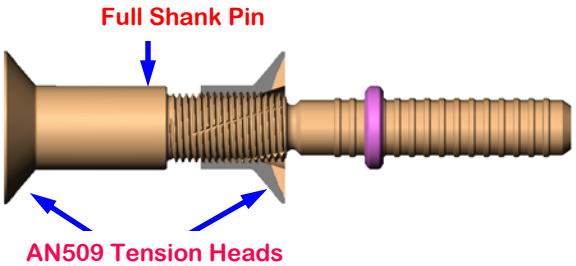
- **AC** — Coatings: "AC" indicates NAS4006 type Aluminum coating
  No letter on Titanium pins indicates no coating
  No letter on alloy steel pins indicates Cad plating
  No letter on A-286 pins indicates passivated
- **08** — Diameter number (e.g. -08 = .263" shank dia)
- **V** — Material: V = 6Al-4V Titanium
  DT = 8740 alloy steel
  EU = A-286 stainless steel
- **S** — "S" indicates sleeve component
- **F** — Sleeve head style: "F" = 100° flush tension head; "P" indicates protruding shear
- **Asp** — Asp sleeve is a 100° flush tension head per MS24694
  2Asp sleeve is a low profile protruding shear head
- **(O)** — (O) indicates Oversize repair diameter

Part Number Logic (Lock Collar)

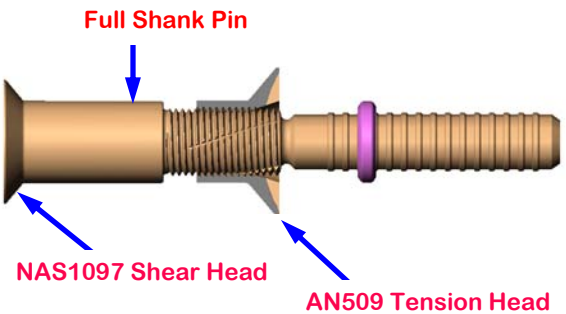


Configuration Options

Double flush AN509 Tension Heads; Full Shank; P/N family AspFF

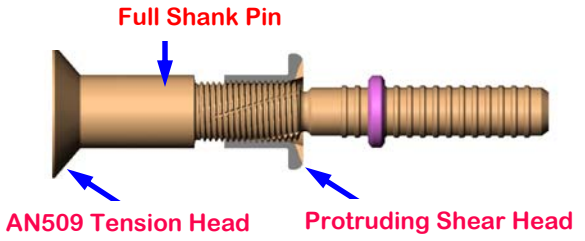


Double flush NAS1097/AN509 Heads; Full Shank; P/N family Asp100F

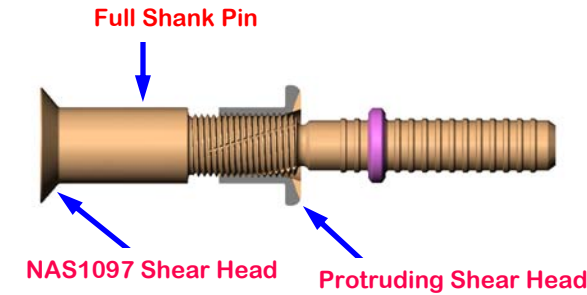


Configuration Options

Flush AN509 Tension Head and Protruding Head; Full Shank; P/N family AspFP

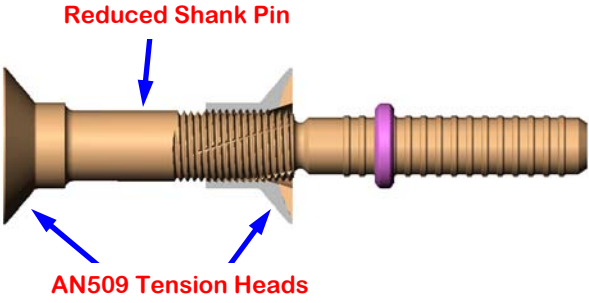


Flush NAS1097 Shear Head and Protruding Head; Full Shank; P/N family Asp100P

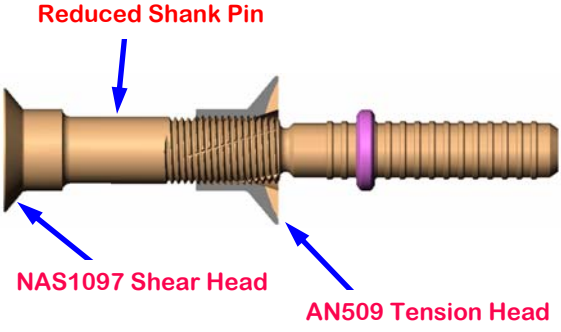


Configuration Options

Flush AN509 Tension Heads; Reduced Shank;
P/N family 2Asp509F

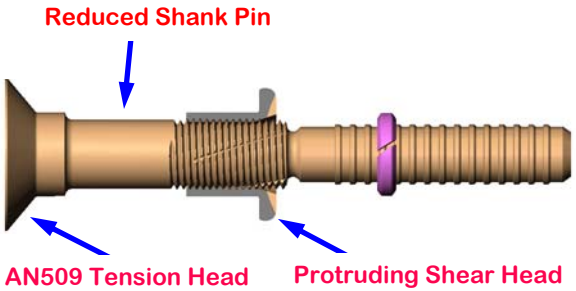


Flush NAS1097 Shear Head and 509 Tension Head;
Reduced Shank; P/N family 2AspFF

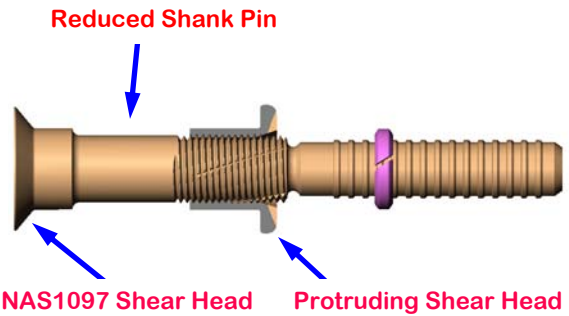


Configuration Options

Flush AN509 Tension Head and Protruding Head; Reduced Shank; P/N family 2Asp509P

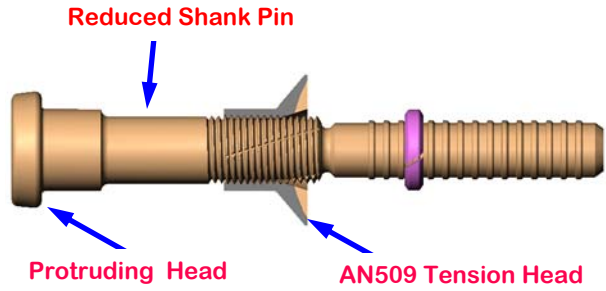


Flush NAS1097 Shear Head and Protruding Head; Reduced Shank; P/N family 2AspFP

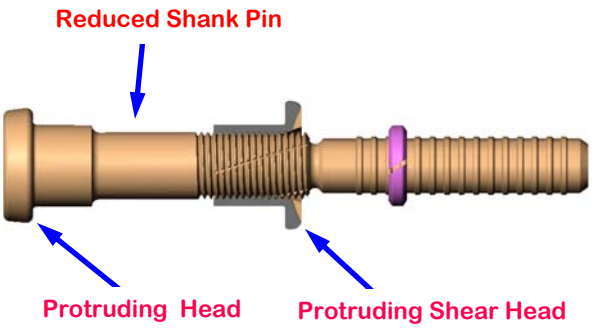


Configuration Options

Protruding Head and 509 Flush Tension Head;
Reduced Shank; P/N family 2AspPF

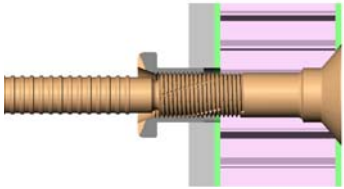


Protruding Head and Protruding Head;
Reduced Shank; P/N family 2AspPP



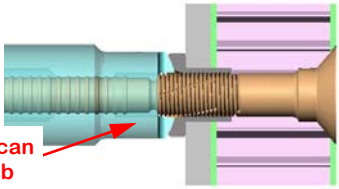
Installation Sequence

1) Pin inserted into structure. Sleeve started on pin

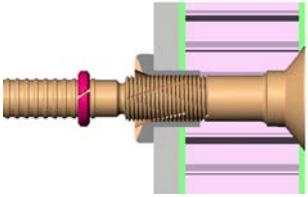


2) Sleeve tightened with torque controlled tool

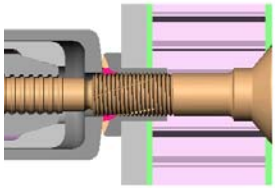
Caution: Over torquing can crush the honeycomb



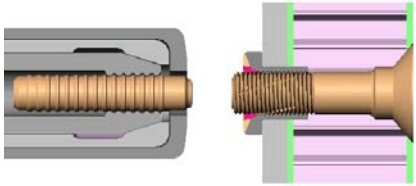
3) Lock collar is placed over pintail



4) Power tool is applied to the pintail. Lock collar is swaged into place. 100% of the swage load is reacted in the fastener, none is applied to the sandwich panel



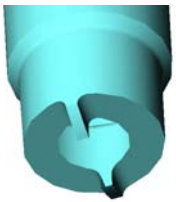
5) Pintail separates. Installation complete



Installation Tooling

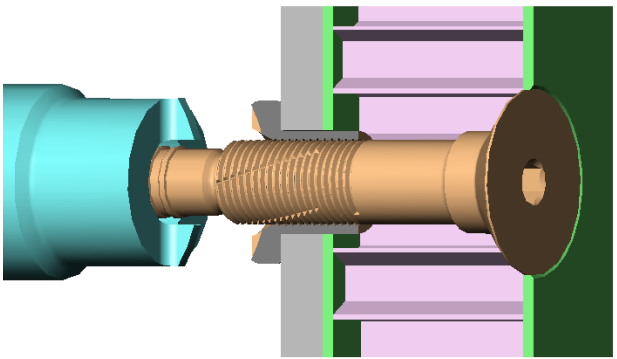
Installing the sleeve component:

- Sleeve will thread freely onto the pin.
- Sleeve may be tightened using a driver bit by hand or with a torque controlled power tool. Care must be taken not to over torque the sleeve to avoid crushing of soft cores or the honeycomb sandwich. AFS does not recommend specific tightening torque values. User determines torque based on desired compression of the specific joint geometry and materials.
- The pin head may be retained against rotation with a hex key.
- The screw driver bit is a special part as shown in the table below:



Dia	AFS P/N
-06	106524
-08	106525
-10	107735

Caution: Screw driver bit may cam out if over torqued.



Installation Tooling Cont'd

Swaging the lock ring with straight on access:

- **After the sleeve component is tightened to the desired torque, the lock collar is placed onto the pintail, the pintail is engaged with a power tool and the lock collar is swaged in place. This locks the components together mechanically and assures that they function as a unit.**
- **In 95% of all cases, there is access for straight on tools. Recommended power tools for straight access are AFS ergonomic Models 202, 2012 and 244. (Caution: Model 2012 pulls –06 and some -08 dia only!)**
- **Nose tools attaching to all these tools are shown in the table below. All of these nose attachments fit directly onto Models 202, 2012 and 244 without adapters.**

Dia	Straight-On Nose Attach
-06	99-2642
-08	99-2645
-10	99-2648

Model 244
Pneudraulic Tool

Note: The tools and nose attachments shown on this page are only the most basic styles. For other available configurations refer to www.alcoafasteners.com.

Installation Tooling Cont'd

Swaging the lock ring with limited access:

- After the sleeve component is tightened to the desired torque and the lock collar is placed in position, the pintail is engaged with a power tool and the lock collar is swaged in place. This locks the components together mechanically and assures they function as a unit.
- In some cases off-set tools are required for limited access. Recommended power tools for off-set access are AFS ergonomic Model 244OS or all-hydraulic Model 206-375.
- Nose tools attaching to all these tools are shown in the table below. All of these nose attachments fit directly onto Models 244OS and 206-375 without adapters.

Dia	Offset Nose Attach
-06	99-3728
-08	99-3729
-10	99-3730

Model 206-375 Hydraulic Tool

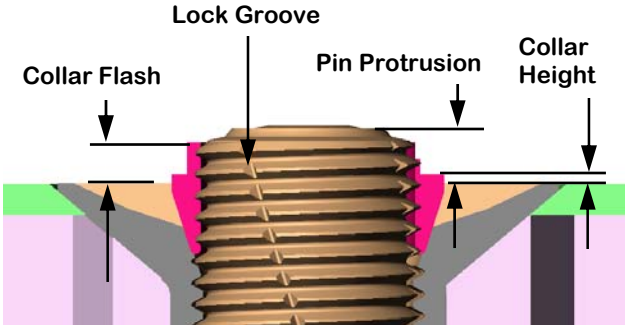
Model 244 OS Pneudraulic Tool

Note: The tools and nose attachments shown on this page are only the most basic styles. For other available configurations refer to www.alcoafasteners.com.

Prior to Shave

The fastener must be checked for the limits in pin height, collar height and collar flash prior to shaving. After protrusion verification, pin and collar may be shaved flush to the top of the sleeve head.

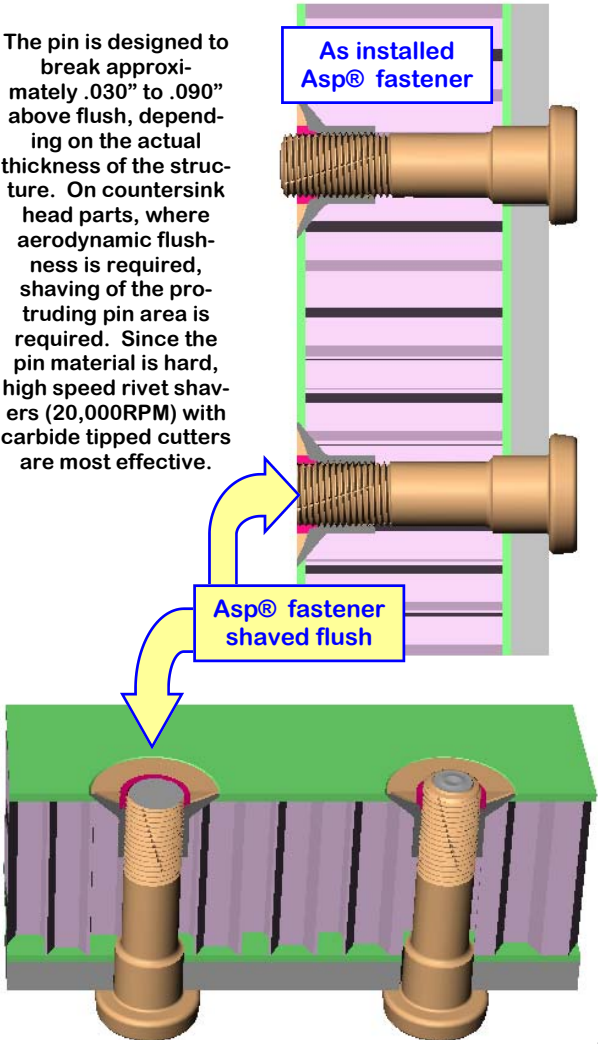
Fastener Diameter	Pin Protrusion	
	Min	Max
–06 (13/64)	.020”	.107”
-08 (17/64)	.030”	.119”
-10 (21/64)	.035”	.129”



Fastener Diameter	Collar Flash	
	Max Flash Height	Max Collar Height
–06 (13/64)	.020”	.010”
-08 (17/64)	.030”	.013”
-10 (21/64)	.040”	.016”

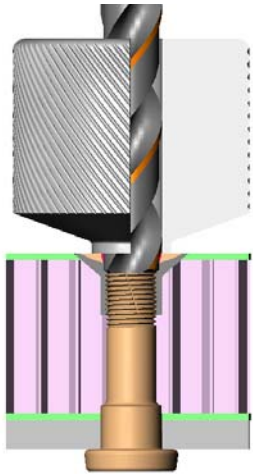
Clean up Shave

The pin is designed to break approximately .030" to .090" above flush, depending on the actual thickness of the structure. On countersink head parts, where aerodynamic flushness is required, shaving of the protruding pin area is required. Since the pin material is hard, high speed rivet shavers (20,000RPM) with carbide tipped cutters are most effective.

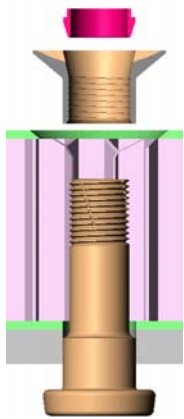


Fastener Removal

Since pin and sleeve are locked together with a swaged lock collar, drilling out of the lock collar is required.



1) Using a guide bushing and a drill slightly smaller than the hole diameter, the lock collar is drilled out



2) Remnants of lock collar are pried out, sleeve is unthreaded and pin is tapped out of the hole.

The purpose of this manual is to provide general guidelines regarding the use of Alcoa Fastening Systems ASP® fasteners. In the event of conflict between this manual and the user's company policies, the user should refer to his/her own company's policies.

For Fastener and Installation Tooling Info, Please visit www.alcoafasteners.com

AFS ASP® Fasteners and Installation Tools

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Aerospace Products
Carson Operations
Tucson, AZ
1 800 421 1459

Installation Tools
Commercial Products
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