ASPD® Fastening System PROCESS MANUAL

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3rd Edition
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)

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.

<table>
<thead>
<tr>
<th>Nom Dia</th>
<th>Hole Dia +.005&quot; - .000&quot;</th>
<th>Recommended Drill Size</th>
<th>Fillet Radius (Ref)</th>
<th>C’sink Dia Tension Head</th>
<th>C’sink Dia Shear Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>-06</td>
<td>.203&quot;</td>
<td>13/64&quot;</td>
<td>.020&quot;</td>
<td>.386/.380</td>
<td>.302/.296</td>
</tr>
<tr>
<td>-08</td>
<td>.266&quot;</td>
<td>Letter “H”</td>
<td>.025&quot;</td>
<td>.507/.500</td>
<td>.399/.393</td>
</tr>
<tr>
<td>-10</td>
<td>.328&quot;</td>
<td>21/64&quot;</td>
<td>.030&quot;</td>
<td>.634/.626</td>
<td>.479/.472</td>
</tr>
</tbody>
</table>

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.
• 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.
<table>
<thead>
<tr>
<th>Description</th>
<th>Pin Configuration</th>
<th>Sleeve Configuration</th>
<th>Pin</th>
<th>P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double Flush Full Shank</td>
<td>100° Tension</td>
<td>AspFF</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Double Flush Reduced Shank</td>
<td>100° Tension</td>
<td>2Asp509F</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Flush-Protr Full Shank</td>
<td>100° Tension</td>
<td>AspFP</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Flush-Protr Reduced Shank</td>
<td>100° Tension</td>
<td>2AspP-S</td>
<td></td>
<td></td>
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<tr>
<td>Protr-Flush Reduced Shank</td>
<td>100° Tension</td>
<td>AspF-S</td>
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<tr>
<td>Protr-Protr Reduced Shank</td>
<td>100° Tension</td>
<td>2AspPF</td>
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<td>100° Tension</td>
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<td></td>
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<tr>
<td>P/N Example for Pin: 2AspFF - DT08-06</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>P/N Example for Sleeve: AspF - S - DT08</td>
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<td></td>
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<tr>
<td>P/N Example for Collar: Asp - LC - 2AC08</td>
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</tbody>
</table>
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.
Part Number Logic (Full Shank Pins)

Basic part number for Full Shank fasteners:

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

Part Number Logic (Full Shank Pins)
Part Number Logic (Reduced Shank Pins)

- Basic part number for Reduced Shank fastener
- "O" indicates Oversize repair diameter
- "F" indicates a protruding head
- "S" indicates a flush tension head: ".F." = 0.06" flush shear head
- Material: V = 6Al-4V Titanium, DT = 8740 alloy steel, EU = A-286 stainless steel
- Diameter dash number (e.g. .08 = .262" shank dia)
- Grip length in 1/16 inch increments
- No letter on A-286 pins indicates passivated
- No letter on alloy steel pins indicates Cad plating
- No letter on Titanium pins indicates no coating
- Coatings: "AC" indicates NAS4006 Type Aluminum coating
- "AC" indicates NAS4006 Type Aluminum coating
Part Number Logic (Sleeves)

Part Number Logic (Sleeves) Diagram:

- (O) indicates Oversize repair diameter.
- Asp sleeve is a 100° flush tension head per MS24694.
- F = 100° flush tension head. "F" indicates protruding shear.
- S indicates sleeve component.
- V = 6Al-4V Titanium
- EU = 8740 alloy steel
- DT = 6Al-4V Titanium
- Material: V = 6Al-4V Titanium
- Diameter number (e.g. -08 = .263" shank dia).
- No letter on A-286 pins indicates passivation.
- No letter on alloy steel pins indicates cad plating.
- No letter on Titanium pins indicates no coating.
- Coatings: "AC" indicates NAS4006 Type Aluminum coating.
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Part Number Logic (Lock Collar)

- Asp: basic part number for both, tension and shear rated pins and/or sleeves
- "LC": indicates lock collar
- Diameter dash number of pin and sleeve
- Material: 2AC = 2219 Aluminum
  - MV = Titanium

Asp - LC - 2AC 08
Configuration Options

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

Full Shank Pin
AN509 Tension Heads

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

Full Shank Pin
NAS1097 Shear Head
AN509 Tension Head
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

- Reduced Shank Pin
- AN509 Tension Heads

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

- Reduced Shank Pin
- NAS1097 Shear Head
- AN509 Tension Head
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

Reduced Shank Pin
Protruding Head
AN509 Tension Head

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

Reduced Shank Pin
Protruding Head
Protruding Shear Head
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:

<table>
<thead>
<tr>
<th>Dia</th>
<th>AFS P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>-06</td>
<td>106524</td>
</tr>
<tr>
<td>-08</td>
<td>106525</td>
</tr>
<tr>
<td>-10</td>
<td>107735</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Dia</th>
<th>Nose Attach</th>
</tr>
</thead>
<tbody>
<tr>
<td>-06</td>
<td>99-2642</td>
</tr>
<tr>
<td>-08</td>
<td>99-2645</td>
</tr>
<tr>
<td>-10</td>
<td>99-2648</td>
</tr>
</tbody>
</table>

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.
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.

<table>
<thead>
<tr>
<th>Dia</th>
<th>Offset Nose Attach</th>
</tr>
</thead>
<tbody>
<tr>
<td>-06</td>
<td>99-3728</td>
</tr>
<tr>
<td>-08</td>
<td>99-3729</td>
</tr>
<tr>
<td>-10</td>
<td>99-3730</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Fastener Diameter</th>
<th>Pin Protrusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>-06 (13/64)</td>
<td>.020” .107”</td>
</tr>
<tr>
<td>-08 (17/64)</td>
<td>.030” .119”</td>
</tr>
<tr>
<td>-10 (21/64)</td>
<td>.035” .129”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fastener Diameter</th>
<th>Collar Flash</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max Flash Height</td>
</tr>
<tr>
<td>-06 (13/64)</td>
<td>.020”</td>
</tr>
<tr>
<td>-08 (17/64)</td>
<td>.030”</td>
</tr>
<tr>
<td>-10 (21/64)</td>
<td>.040”</td>
</tr>
</tbody>
</table>
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.

As installed Asp® fastener

Asp® fastener shaved flush
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