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BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 2.61

PRODUCTION PROCESS STANDARD

Installation of CSP310 and CSP371 Rivets for Repair or Rework

Issue 8
- This standard supersedes PPS 2.61, Issue 7.
- Vertical lines in the left hand margin indicate changes over the previous issue.
- Direct PPS related questions to PPS.Group@aero.bombardier.com or (416) 375-4365.
- This PPS is effective as of the distribution date.

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Table of Contents

Sections **Page**

1 Scope . . . 3
2 Hazardous Materials . . . 3
3 References . . . 3
4 Materials and Equipment . . . 4
4.1 Materials . . . 4
4.2 Equipment . . . 4
5 Procedure . . . 5
5.1 General . . . 5
5.2 Removing Rivets . . . 5
5.3 Hole Requirements . . . 5
5.4 Selecting Replacement Rivet Length . . . 6
5.5 Riveting Operations . . . 6
6 Requirements . . . 7
7 Safety Precautions . . . 10
8 Personnel Requirements . . . 10

Tables

Table 1 - Hole Data . . . 6
Table 2 - Requirements for Shop Heads . . . 10

Figures

Figure 1 - Breakdown Code, CSP310 AND CSP371 Rivets . . . 4
Figure 2 - General Description of CSP310 and CSP371 Rivets . . . 4
Figure 3 - Determining Suitable Rivet Length . . . 6
Figure 4 - Visual Examination of Installed Rivets . . . 7

1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the installation of CSP310 and CSP371 flush head solid rivets in aircraft structures for repair or rework of previously installed CSP310 or CSP371 rivets, respectively. For production purposes other than repair or rework, if the engineering drawing specifies installation of CSP310 and CSP371, install B0205017AD and B0205018 rivets, respectively, in place of the CSP310 and CSP371 rivets specified. Refer to PPS 2.01 for the procedure and requirements for installation of B0205017AD and B0205018 rivets.

1.1.1 This PPS complements the engineering drawings that specify its use as an authorized instruction. The procedure specified in this PPS must be followed to ensure compliance with all applicable specifications. In general, if this PPS conflicts with the engineering drawing, follow the engineering drawing. The requirements specified in this PPS are necessary to fulfil the engineering design and reliability objectives.

1.1.2 Refer to PPS 13.26 for the subcontractor provisions applicable to this PPS.

1.1.3 Procedure or requirements specified in a Bombardier BAPS, MPS, LES or P. Spec. **do not** supersede the procedure or requirements specified in this PPS. Similarly, the procedure and requirements specified in this PPS are not applicable when use of a BAPS, MPS, LES or P. Spec. is specified.

2 Hazardous Materials

2.1 Before receipt at Bombardier Toronto (de Havilland), all materials must be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Toronto (de Havilland) Environment, Health and Safety Department. Refer to the manufacturer's MSDS for specific safety data on any of the materials specified in this PPS. If the MSDS is not available, contact the Bombardier Toronto (de Havilland) Environment, Health and Safety Department.

3 References

3.1 PPS 1.09 - Drilling and Reaming.

3.2 PPS 1.14 - Use of Pneumatic Rivet Guns.

3.3 PPS 1.33 - Countersinking for Flush Head Fasteners.

3.4 PPS 13.13 - Personal Protective Respiratory Equipment.

3.5 PPS 13.26 - General Subcontractor Provisions.

3.6 PPS 21.21 - General Sealing Practices.

4 Materials and Equipment

4.1 Materials

4.1.1 CSP310 and CSP371 rivets for repair or rework. For production purposes other than repair or rework, CSP310 and CSP371 have been superseded. Refer to Figure 1 for a breakdown of the rivet code number. Refer to Figure 2 for a general description of the CSP310 and CSP371 rivets.

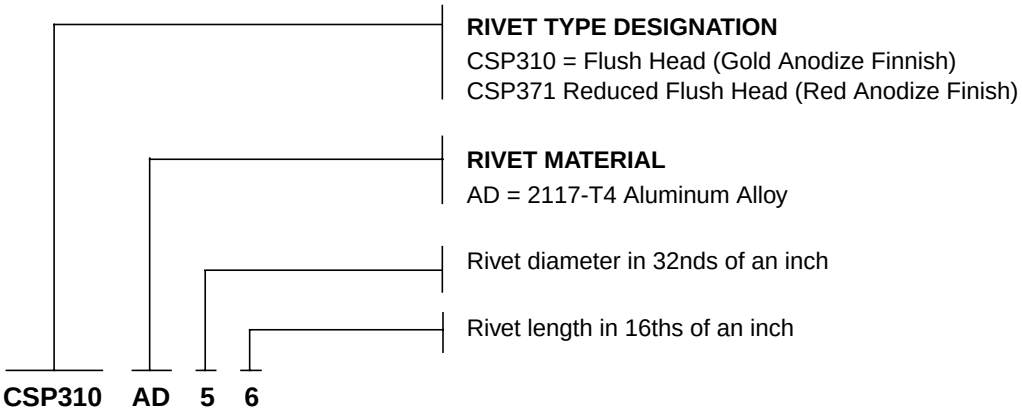


Figure 1 - Breakdown Code, CSP310 AND CSP371 Rivets

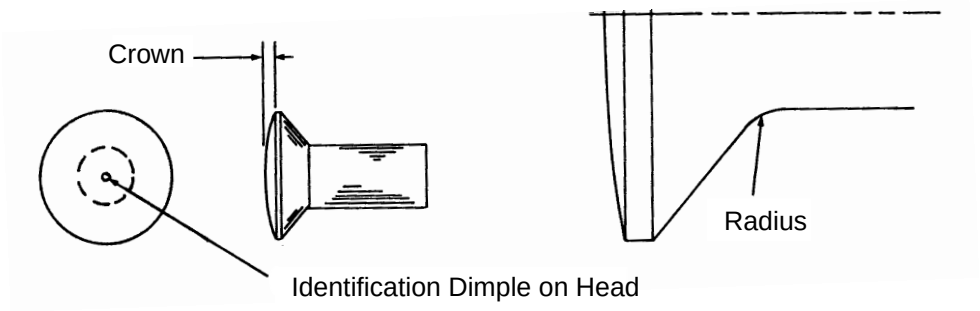


Figure 2 - General Description of CSP310 and CSP371 Rivets

4.2 Equipment

4.2.1 Straight punches, slightly smaller than nominal rivet diameter.

4.2.2 Rivet installation equipment as specified by the reference PPS's.

5 Procedure

5.1 General

5.1.1 CSP310 and CSP371 rivets are similar to B0205017 and B0205018 rivets, respectively, with the exception of the slight crown on the manufactured head and the inclusion of a radius at the head/shank juncture.

5.1.2 These rivets are designed to be self sealing by means of localized interference of the head/shank radius at the bottom of the countersink.

5.1.3 Although the maximum sealing function of the rivet is achieved when installed in a machined countersunk hole, installation in dimpled holes is permissible where specified on the engineering drawing.

5.1.4 When replacing installed CSP310 and CSP371 rivets for repair or rework, it is necessary to install another CSP310 or CSP371 rivet as the existing countersink diameter will be too large for proper installation of a B0205017 or B0205018 rivet.

5.2 Removing Rivets

5.2.1 Remove installed rivets as follows:

Step 1. Select a drill the same diameter as the nominal rivet shank diameter according to PPS 1.09.

Step 2. Using a drill guide block, drill through the manufactured rivet head a distance equal to its height according to PPS 1.09. If access to the manufactured head is blocked, it is acceptable to drill through the shop head instead. Drilling through the manufactured head is preferable to the drilling through the shop head as it is centred with more accuracy than the shop head and the identification dimple can be used as a guide for the drill.

Step 3. Pry off the head with a straight punch. Take care to avoid damaging the structure.

Step 4. Back up the sheet on the side opposite the drilled out head to prevent dimpling around the rivet hole and drive out the rivet shank with a straight punch slightly smaller than the nominal rivet diameter.

5.3 Hole Requirements

5.3.1 After removing the rivet, ensure that the hole requirements specified in Table 1 are met. Measure the countersink diameter according to PPS 1.33. Do not attempt to verify the size of a countersink by inserting a CSP310 or CSP371 rivet into the rivet hole. Refer all enlarged holes or countersinks to Liaison Engineering for disposition.

Table 1 - Hole Data

RIVET DIAMETER	MAXIMUM HOLE SIZE	COUNTERSINK DIAMETER	
		CSP310 RIVETS	CSP371 RIVETS
-4 (1/8")	0.133"	0.222" - 0.232"	0.189" - 0.193"
-5 (5/32")	0.166"	0.283" - 0.293"	0.242" - 0.246"
-6 (3/16")	0.196"	0.351" - 0.361"	0.298" - 0.302"

5.4 Selecting Replacement Rivet Length

5.4.1 Select the rivet length which will form a shop head meeting the requirements of this PPS. As a general rule, the length of the undriven rivet should be 1 1/2 times the nominal shank diameter plus the thickness of the material in which the rivet is to be installed (see Figure 3).

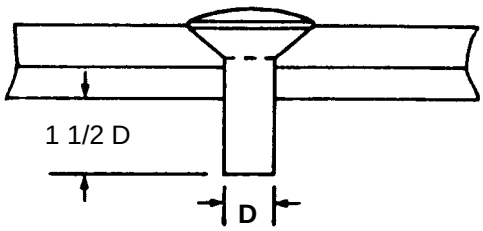


Figure 3 - Determining Suitable Rivet Length

5.5 Riveting Operations

5.5.1 Ensure that parts mate without excessive gaps. If necessary, clamp the assembly with plunger type fasteners or tack rivet every fourth to sixth rivet hole.

5.5.2 If riveting dissimilar materials (i.e. stainless steel and aluminum, titanium and aluminum), wet assemble the rivets with PR1413G, Type 2 sealant, mixed and applied according to PPS 21.21.

5.5.3 Using a pneumatic rivet gun, install rivets according to PPS 1.14. Unless otherwise specified, use the reaction (rather than percussion) riveting method for upsetting CSP310 and CSP371 rivets. Squeeze riveting using stationary or portable squeezers is not recommended for CSP310 and CSP371 rivets.

5.5.4 Ensure that the shop formed heads meet the diameter and height requirements specified in Table 2.

6 Requirements

6.1 Visually check all installed solid rivets to ensure the requirements of Figure 4 are met.

6.2 Ensure that the height and diameter of shop formed rivet heads meet the requirements of Table 2.

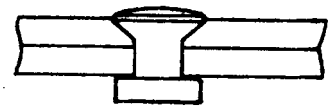
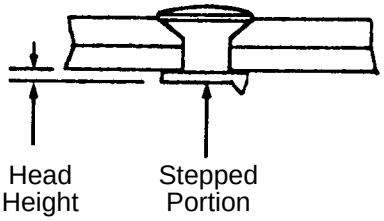
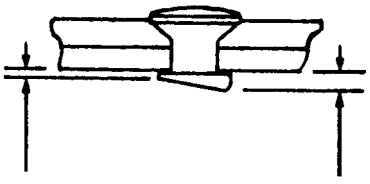
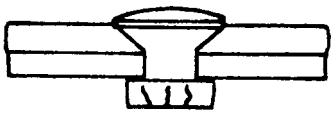
VISUAL APPEARANCE	DESCRIPTION	CORRECTIVE ACTION
	ACCEPTABLE - good installation - sheets drawn up tight - shop head dimension in accordance with Table 2 - no cracks in shop head - no gap under rivet head	NONE REQUIRED
	ACCEPTABLE - stepped portion of shop head not less in height than minimum head height specified in Table 2	NONE REQUIRED
	UNACCEPTABLE - height of stepped portion less than minimum head height specified in Table 2	- replace rivet
 Mean Height = $\frac{A + B}{2}$	ACCEPT - mean height of sloped shop head is not less than minimum head height specified in Table 2	NONE REQUIRED
	UNACCEPTABLE - mean height of sloped shop head is less than minimum head height specified in Table 2	- replace rivet
	UNACCEPTABLE - cracks in manufactured or shop formed head	- replace rivet

Figure 4 - Visual Examination of Installed Rivets

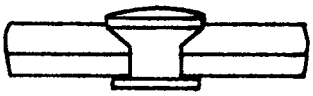
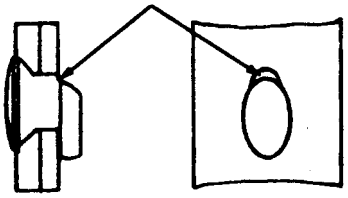
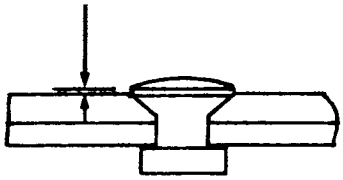
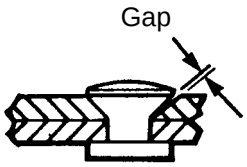
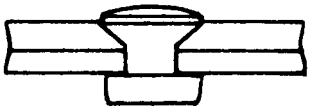
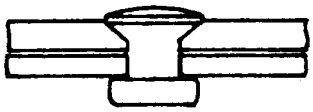
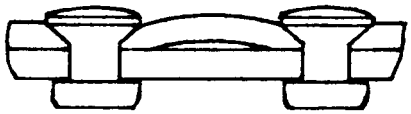
VISUAL APPEARANCE	DESCRIPTION	CORRECTIVE ACTION
	UNACCEPTABLE - shop head too small according to Table 2	- remove rivet - check hole diameter - replace with correct length rivet
Rivet Hole Visible 	UNACCEPTABLE - rivet hole visible beyond periphery of eccentric shop head.	- replace rivet
Measure Flushness Here 	ACCEPT - rivet head protrudes 0.002'' to 0.005''.	NONE REQUIRED
	UNACCEPTABLE - countersink too deep - rivet head protrudes less than 0.002''.	- remove rivet - check countersink diameter - replace rivet if csk. dia. within specified limits.
	UNACCEPTABLE - rivet head protrudes 0.005'' to 0.010''	- CSP310, shave rivet head flush to 0.005'' above flush (Ensure that the surrounding skin is not damaged or marked)
		- CSP371, remove rivet, enlarge countersink diameter and replace rivet
	UNACCEPTABLE - countersink too shallow. - rivet head protrudes more than 0.010''	- remove rivet - enlarge countersink to correct dia. - replace rivet

Figure 4 - Visual Examination of Installed Rivets

VISUAL APPEARANCE	DESCRIPTION	CORRECTIVE ACTION
	UNACCEPTABLE - gap under rivet head greater than 0.001" (check with 0.002" feeler gauge). - bearing surface less than 240° (i.e., gap.around circumference greater than 120°).	- replace rivet - check countersink diameter
	ACCEPT - shop head too large according to Table 2.	NONE REQUIRED - use correct grip length rivets
	UNACCEPTABLE - sheets not drawn up tight	- remove rivet - draw-up sheets before installing rivet
	UNACCEPTABLE - bulge in sheets between rivets	REFER TO LIAISON ENGINEERING

NOTE: 1. Ensure that the surrounding skin is not damaged or marked when shaving of CSP310 rivets.

Figure 4 - Visual Examination of Installed Rivets

Table 2 - Requirements for Shop Heads

NOMINAL RIVET DIAMETER	SHOP HEAD REQUIREMENTS (NOTE 1)	
	DIAMETER	HEIGHT
-4 (1/8")	0.163" - 0.188"	0.042" - 0.084"
-5 (5/32")	0.203" - 0.234"	0.052" - 0.104"
-6 (3/16")	0.244" - 0.281"	0.063" - 0.126"

Note 1. Shop formed heads must meet the **minimum** height and diameter requirements specified above. Although excessive button height or diameter adds unnecessary weight and should be avoided, exceeding the **maximum** head thickness and/or diameter specified above is acceptable

7 Safety Precautions

7.1 Observe general shop safety precautions when performing the procedure specified herein.

7.2 Pneumatic riveting guns shall not be used without a snap-retaining spring being fitted.

7.3 Disconnect the shop air supply line from pneumatic riveting guns when changing snaps.

7.4 Wear Bombardier approved safety glasses and hearing protectors at all times while riveting.

8 Personnel Requirements

8.1 Personnel responsible for installation of CSP310 and CSP371 rivets must have a good working knowledge of the procedure and requirements as specified herein and shall have exhibited their competency to their supervisor.