BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 2.58

PRODUCTION PROCESS STANDARD

Installation of Pop Rivets

Issue 5
- This standard supersedes PPS 2.58, Issue 4.
- 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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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedures and requirements for the installation of aluminum, open end, domed head (protruding) type POP-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 13.26 - General Subcontractor Provisions.

3.3 PPS 18.01 - Limitations on Punching and Shearing Aluminum Alloy Sheet.

4 Materials and Equipment

4.1 Material

4.1.1 Pop rivets as specified on the engineering drawing. Use oldest stock first.

4.2 Equipment

4.2.1 Pop rivet PRG 520 Installation Gun.

4.2.2 Cherry Lock 2000 Series Rivet Grip Gauge.

5 Procedure

5.1 General

5.1.1 Pop rivets are hollow rivets assembled on a solid mandrel for use in blind and non-blind applications. Refer to Figure 1 for the breakdown of the manufacturers part number designations. See Figure 2 for rivet nomenclature.

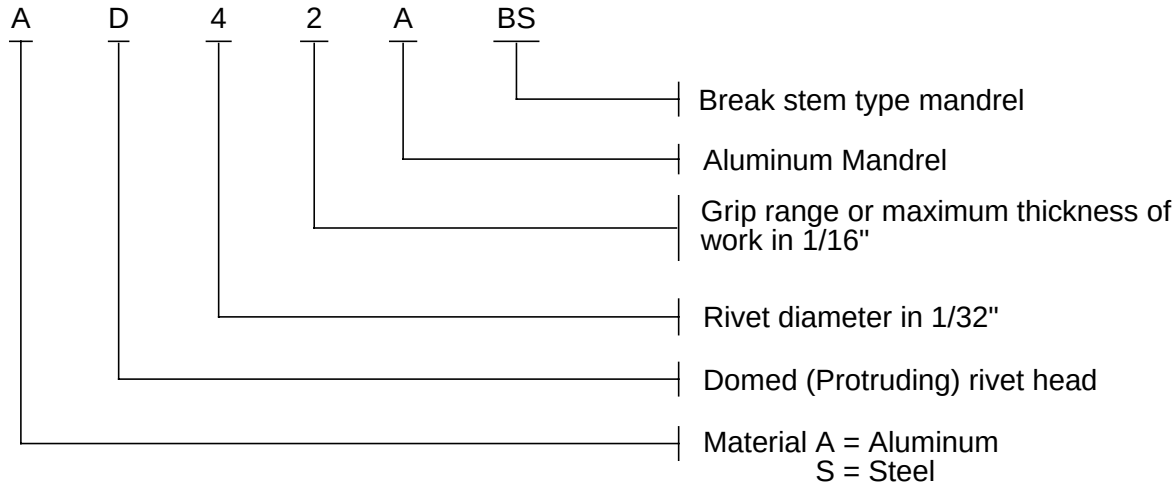


Figure 1 - Breakdown of Cherry Part Number Designation

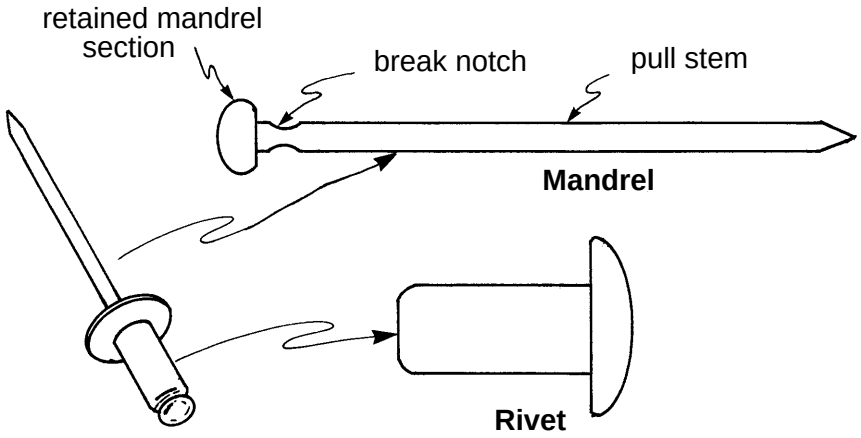


Figure 2 - Rivet Nomenclature

5.1.2 Pop-rivets are pre-assembled on their mandrels by the manufacturer; do not disassemble before installation.

5.1.3 Protect fasteners at all times from dust, dirt, moisture and excessive heat. If possible, keep fasteners in their original containers; if this is not possible, store in non-absorbent containers.

5.2 Preparation of Parts

5.2.1 Holes may be drilled or punched to the size specified in Table 1. Perform drilling according to PPS 1.09. Punch aluminum alloys within the limitations specified in PPS 18.01.

Table 1 - Hole Preparation Data

NOMINAL RIVET DIAMETER	RECOMMENDED DRILL SIZE	HOLE SIZE
-3 (3/32")	#41	0.096" - 0.100"
-4 (1/8")	#30	0.128" - 0.132"
-5 (5/32")	#20	0.160" - 0.164"
-6 (3/16")	#11	0.192" - 0.196"

5.2.2 On a sample basis, check at random (across the entire pattern) the number of holes specified in Table 2 for conformance to the hole limit requirements, using a go/no-go gauge or other hole measuring gauge. If any oversize holes are found in the sample, check every hole in the pattern. Refer all oversize holes to Bombardier Toronto (de Havilland) MRB or Bombardier Toronto (de Havilland) delegated MRB for disposition.

5.2.2.1 While checking holes using a GO/NO-GO gauge or other hole measuring gauge, also check visually for hole ovality. For holes with a visually evident oval or out of round shape, check the hole diameter at several positions using suitable hole measurement equipment (e.g., vernier calliper, hole micrometer, etc.) to determine the minor and major diameters of the hole. The minor and major diameters of the hole must be within the minimum and maximum hole diameter tolerances, respectively. If the minor or major diameters of any oval hole in the sample are not within the minimum and maximum hole diameter tolerance, check every hole in the pattern for conformance to the hole limit requirements and visually for ovality as specified herein. Refer all non-conforming holes to Bombardier Toronto (de Havilland) MRB or Bombardier Toronto (de Havilland) delegated MRB for disposition.

Table 2 - Hole Size Verification Sample Requirement

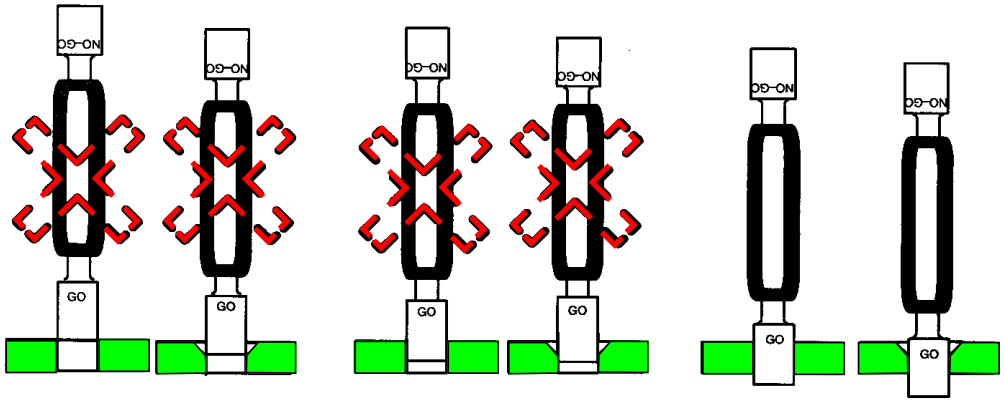
NUMBER OF HOLES IN PATTERN	REQUIRED SAMPLE SIZE
5 or less	all
6 - 50	5
51 - 90	7
91 - 150	11
151 - 280	13
281 - 500	16
more than 500	19

5.3 Use of GO/NO-GO Gauges

5.3.1 Check selected fastener holes for conformance to the requirements of Table 1 using the applicable go/no-go gauge as follows (see Figure 3):

Step 1. Taking care not to force or rotate the go/no-go gauge, lightly insert the go end of the gauge into the fastener hole. If the go end of the gauge goes in only partially or does not go into the hole at all, the hole is **undersize**. Open undersize holes to the final diameter specified in Table 1.

Step 2. Lightly insert the no-go end of the plug gauge in the fastener hole. If the gauge goes completely into the hole, the hole is **oversize**; oversize holes are not acceptable and must be referred to Bombardier Toronto (de Havilland) MRB or Bombardier Toronto (de Havilland) delegated MRB for disposition.

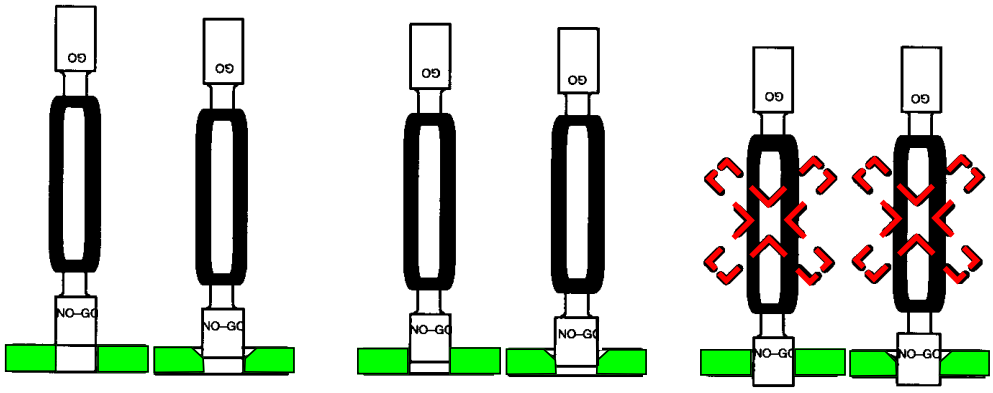


Does not go in.
UNDERSIZE HOLE

Goes only partially in.
UNDERSIZE HOLE

Goes in completely.
ACCEPTABLE

USE OF GO END



Does not go in.
ACCEPTABLE

Goes only partially in.
ACCEPTABLE

Goes in completely.
OVERSIZE HOLE

USE OF NO-GO END

Figure 3 - Use of GO/NO-GO Gauges

5.4 Fastener Selection

5.4.1 Use only the fastener type, diameter and grip length specified on the engineering drawing. If the grip length is not specified, measure the combined material thickness using a grip gauge and determine the required rivet length accordingly (see Figure 4). Always read to the next higher number (i.e., if the reading is past the **end** of the -3 marking then use a -4 fastener).

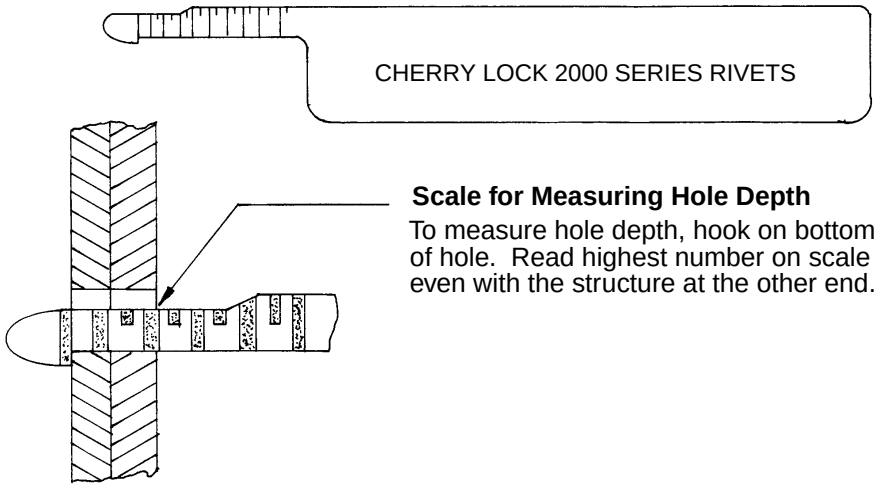


Figure 4 - Cherry Lock Rivet Grip Gauge

5.5 Riveting Operation

5.5.1 Install rivets as follows (see Figure 5):

Step 1. Clamp the parts to be riveted tightly using Cleco or similar fasteners in approximately every fourth to sixth rivet hole. Ensure that all holes are in alignment and no excessive gaps exist between sheets.

Step 2. Insert the rivet shank into the prepared hole.

Step 3. Place the nose piece of the pulling head over the rivet mandrel so that the pulling jaws grip the pulling stem and the nose piece contacts the head of the rivet.

Step 4. Holding the gun perpendicular to the surface of the work, apply just sufficient pressure to ensure that the rivet is fully seated and then squeeze the trigger to set the rivet and break off the pulling stem of the mandrel.

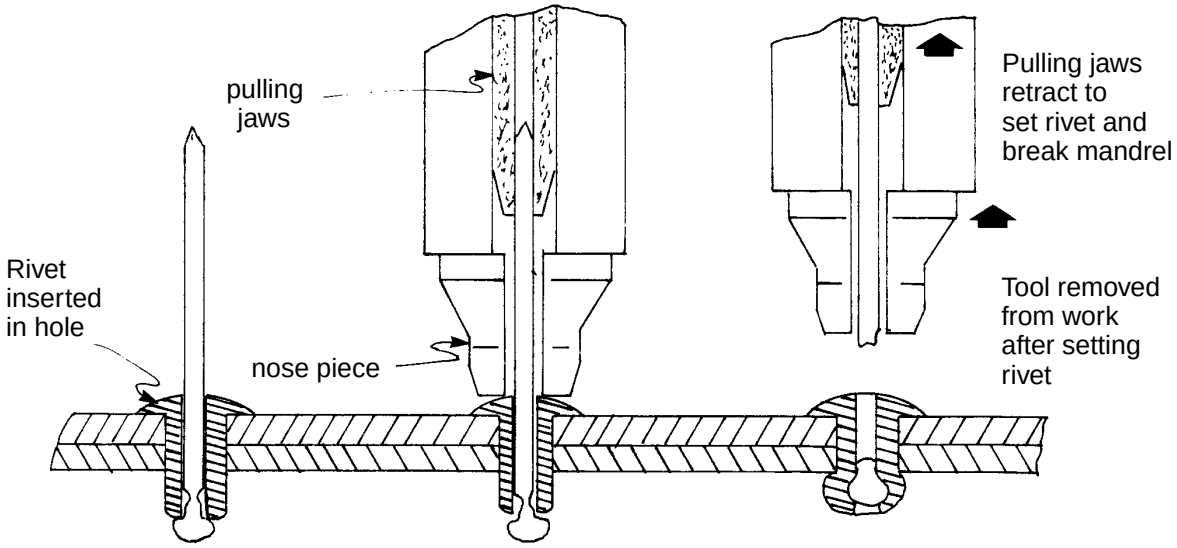


Figure 5 - Riveting Operation

5.6 Removal of Installed Rivets

5.6.1 If necessary, remove installed pop rivets as follows (see Figure 6):

Step 1. Using a drill of the same size as the nominal rivet diameter, drill completely through the head of the installed rivet so as to break off the rivet head.

Step 2. Using a drift punch of the same diameter as the nominal rivet size, drive out the rivet shank. In order to prevent damage to thin gauge material, it may be necessary to support the structure from the reverse side with a suitable support block, while driving out the rivet shank.

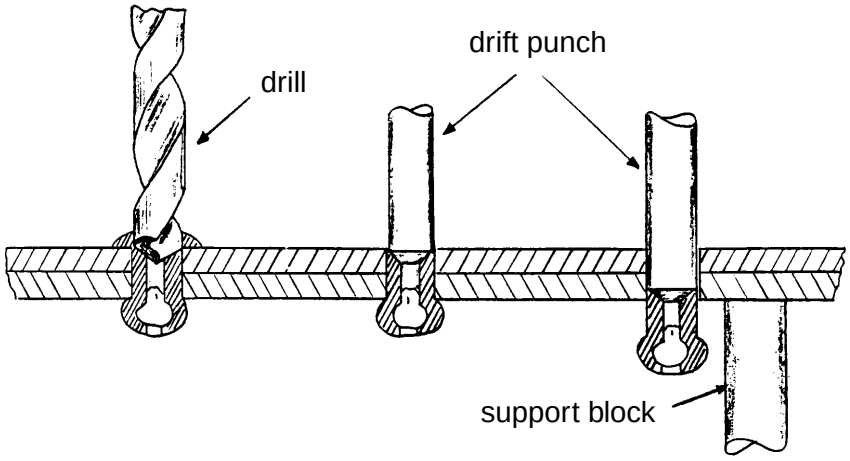


Figure 6 - Removal of Installed Rivet

6 Requirements

6.1 Rivets with cracks in the rivet head or bulbed section of the shank are not acceptable.

6.2 Loose rivets are not acceptable.

6.3 The tilt under the head of an installed rivet (see Figure 7) must not exceed 0.002".

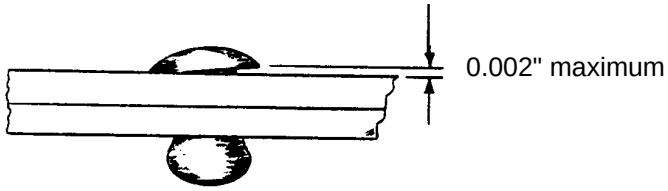


Figure 7 - Maximum Allowable Tilt Under Installed Rivet Head

7 Safety Precautions

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

8 Personnel Requirements

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

9 Recommended Maintenance of Equipment

9.1 Keep installation tools clean and moving parts lightly oiled or greased. Inject a few drops of light machine oil injected into the air inlet of pneumatic tools daily.

9.2 Periodically check installation tools and accessories. Replace damaged or badly worn parts.

9.3 Do not rework or alter installation tools without proper authorization.