**BOMBARDIER**
Toronto (de Havilland)
**PROPRIETARY INFORMATION**

# PPS 2.06

**PRODUCTION PROCESS STANDARD**

## Riveting Connecting Links on Chains

Issue 10
- This standard supersedes PPS 2.06, Issue 9.
- 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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|---|---|---|
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| | Production Process Standards (PPS) | |
| Approved By: | (L.K. John) | June 19, 2012 |
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| | Quality | |

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**Tables**

## 1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for riveting connecting links and end connectors to roller chains.

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 3.05 - Proof Loading Cable and Chain Assemblies.

3.2 PPS 13.26 - General Subcontractor Provisions.

3.3 PPS 15.01 - Part Marking.

3.4 QDI-12-02 - Usage and Control of Inspection, Test and Special Quality Stamps - *Bombardier Toronto (de Havilland) internal quality procedure*.

## 4 Materials and Equipment

### 4.1 Materials

4.1.1 Roller chain, connecting links and end connectors as specified on the engineering drawing.

4.1.2 Lubricant, MIL-G-23827 grease.

### 4.2 Equipment

4.2.1 Hollow punch. Use hollow punches which have a hollow larger than the bearing pin diameter and an outside diameter less than the side plate diameter around the bearing pin.

4.2.2 Vertical head or orbital riveter (e.g., Townsend No. 1, High Speed Hammer Company Inc. No. 3-A, etc.). Only vertical head or orbital riveters similar in function to the examples given may be used for riveting connecting links on chains as specified herein. It is **not** acceptable to use standard squeeze riveters or riveting guns.

4.2.3 Ball peen hammer, 8 oz maximum.

## 5 Procedure

### 5.1 General

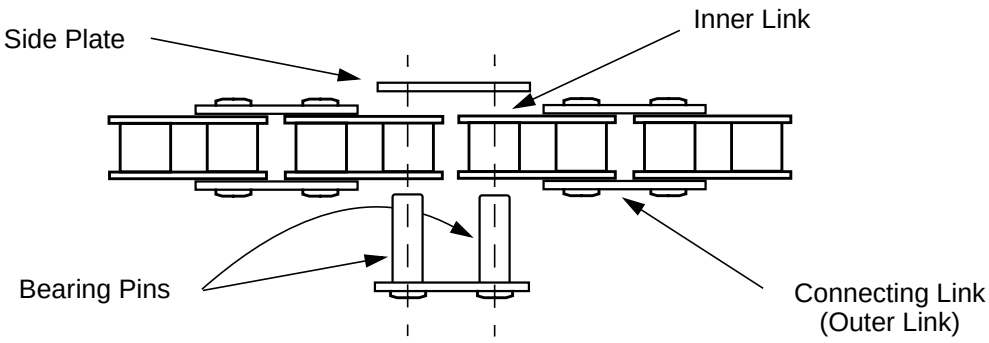
5.1.1 Refer to Flow Chart 1 for the installation sequence.

### 5.2 Setting of Side Plates

5.2.1 The side plate of the connecting link is a force fit over the bearing pins and must be set as follows before forming the shop head on the bearing pins:

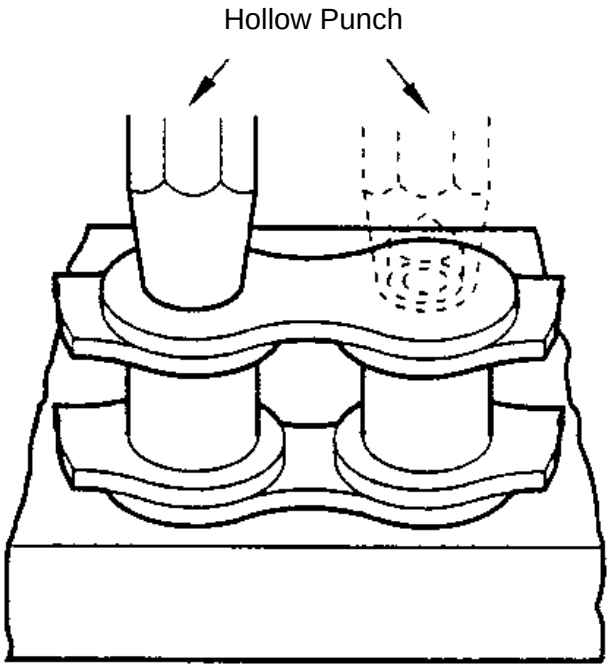
Step 1. Determine the standard clearance between the outer and inner links using feeler gauges.

Step 2. Join the end connector or chain ends with a link and position the side plate on the link bearing pin ends as shown:



Step 3. Place the chain assembly on a solid support.

Step 4. Place a suitable hollow punch over one the holes in the side plate and tap the punch with a hammer.




Step 5. Place the hollow punch over the other hole in the side plate and tap the punch with the hammer. Take care to ensure no cross binding takes place by keeping the pin protrusion through the side plate approximately equal.

Step 6. Check the clearance between the side plate and the inner links using the feeler gauge determined in Step 1.

Step 7. Repeat Step 4 and Step 6 until the side plate is fully seated on the bearing pin ends (i.e., proper clearance has been reached).

5.2.2 Alternatively, it is acceptable to set the side plate in position using an arbor press or other mechanical press provided that suitable hardware is available to ensure the side plate may be seated properly without binding or damage to the bearing pins.

### 5.3 Riveting

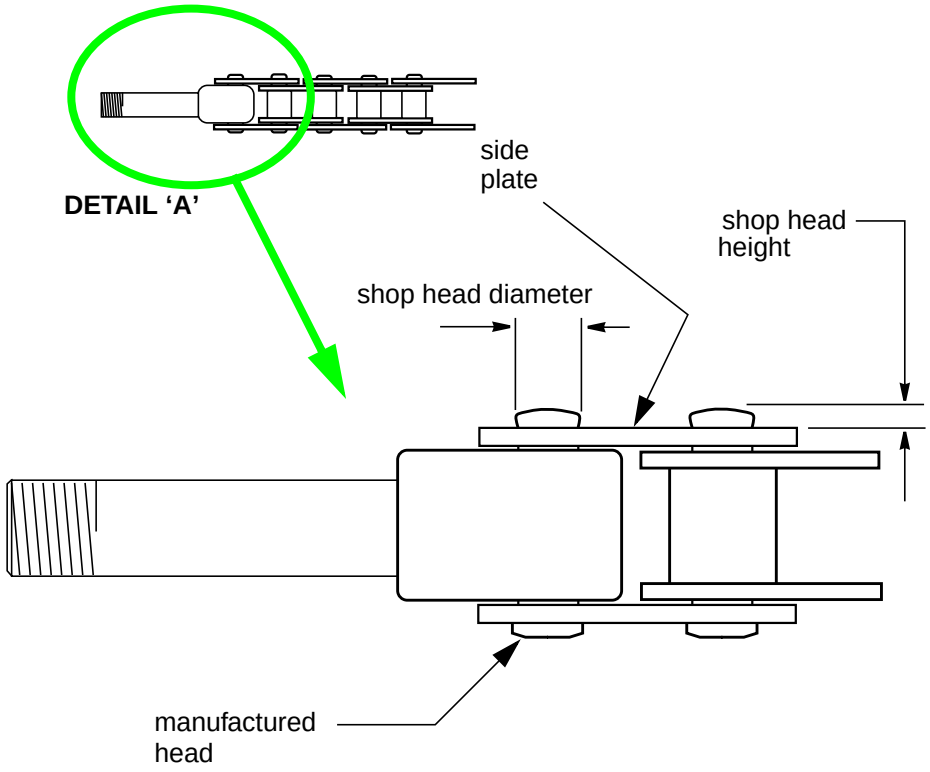
5.3.1 If a suitable vertical head or orbital riveter is available, operate the riveter according to the manufacturers instructions to form a shop head which meets the requirements specified in section 6. Vertical head riveters must be equipped with shaped rivet snaps which will produce the required shop head shape.

5.3.2 As an alternative to riveting using a vertical head or orbital riveter, it is acceptable to form shop heads using a hammer as follows:

Step 1. Support the chain and the connecting link on a suitable steel anvil.

Step 2. Using a ball peen hammer (see Equipment section, paragraph 4.2.3) peen the bearing pin end to produce shop head dimensions which meet the requirements of Table 1. Take care to avoid applying excessive force (the force required to spread the pin will vary with the pitch of the chain). If necessary it is acceptable to use a setting punch to assist in achieving the required shop head dimensions.

**Table 1 - Shop Head Dimensional Requirements**




| CHAIN SIZE | MINIMUM DIAMETER OF SHOP HEAD | MINIMUM HEIGHT OF SHOP HEAD ABOVE SIDE PLATE |
|---|---|---|
| A.S.A. 25 | 0.093" | 0.020" |
| A.S.A. 35 | 0.144" | 0.025" |
| A.S.A. 40 | 0.158" | |
| A.S.A. 41 | 0.144" | |

### 5.4 Lubrication

5.4.1 After installation of connecting links, lubricate chain assemblies with MIL-G-23827 grease.

### 5.5 Part Marking

5.5.1 Part mark chain assemblies according to PPS 15.01.

## 6 Requirements

6.1 The manufactured and shop formed heads in connecting links must have an even and uniform shape. There must be no evidence of damage or slippage of the manufactured heads on the connecting link.

6.2 Micro fractures in the shop head may be caused by riveting and are acceptable. However, fractures visible without magnification are not acceptable.

6.3 Shop heads formed on roller type chain using permanent connecting links or round rivet pins must meet the dimensional requirements of Table 1.

6.4 In all cases, the chain links or end connectors must be free to move about the pins without binding.

6.5 Proof load completed complete chain assemblies according to PPS 3.05. After proof loading, ensure that the chain and any newly fitted links articulate freely without binding. Stamp each satisfactorily tested assembly with an Inspection mark (e.g., according to QDI-12-02).

## 7 Safety Precautions

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

## 8 Personnel Requirements

8.1 Personnel responsible for riveting connecting links or end connectors to roller chains must have a good working knowledge of the procedure and requirements as specified herein and must have exhibited their competency to their supervisor.

**FLOW CHART 1 - INSTALLATION SEQUENCE**