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

# PPS 2.41

**PRODUCTION PROCESS STANDARD**

## Installation of Long-Lok T-Sert Inserts

Issue 5
- This standard supersedes PPS 2.41, 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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| | Production Process Standards (PPS) | |
| Approved By: | (L.K. John) | December 3, 2012 |
| | Materials Technology | |
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| | Quality | |

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### Figures



### Tables

## 1 Scope

1.1 This PPS (Production Process Standard) specifies the procedure and requirements for installation, removal and replacement of Long-Lok T-Sert inserts in aluminum and aluminum alloy materials.

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 1.33 - Countersinking Holes.

3.3 PPS 13.26 - General Subcontractor Provisions.

3.4 PPS 31.17 - Solvent Usage.

3.5 PPS 34.08 - Application of Epoxy-Polyamide Primer (F19 & F45).

## 4 Materials and Equipment

### 4.1 Materials

4.1.1 T-Sert inserts as specified on the engineering drawing. Refer to Figure 1 for a part number breakdown. Refer to Figure 2 for a general description of T-Sert inserts.

4.1.2 Tapping lubricant (e.g., Boelube solid 70200 or liquid 70106).

### 4.2 Equipment

4.2.1 Plug or bottoming taps, Class 3B, as specified inTable 3.

4.2.2 T-Sert drive wrenches as specified in Table 5.

4.2.3 Standard thread gauges, Class 3B.

4.2.4 E-Z Out screw extractor tools.

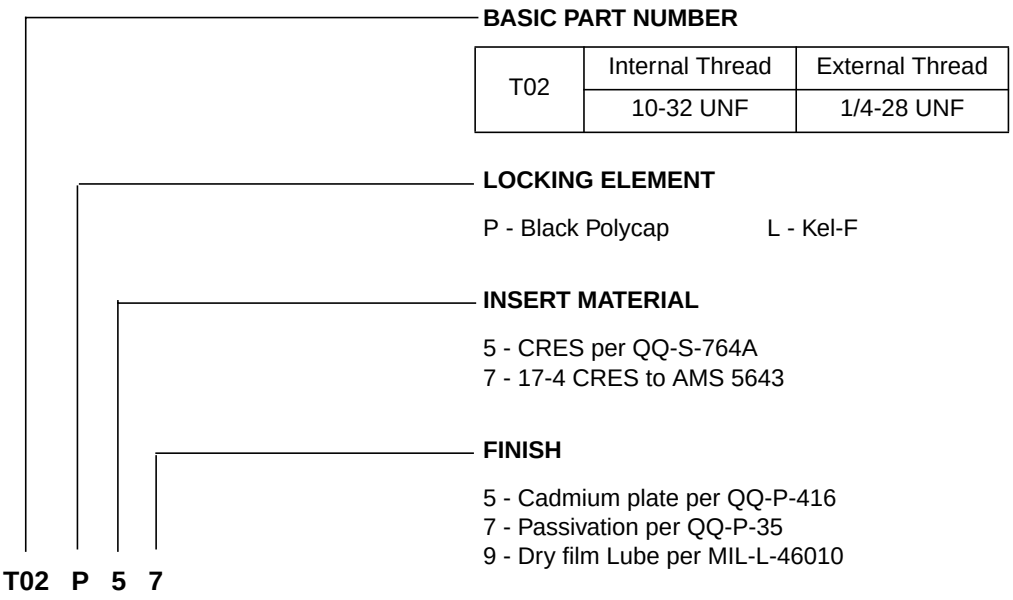



**Figure 1 - T-Sert Part Number Breakdown**

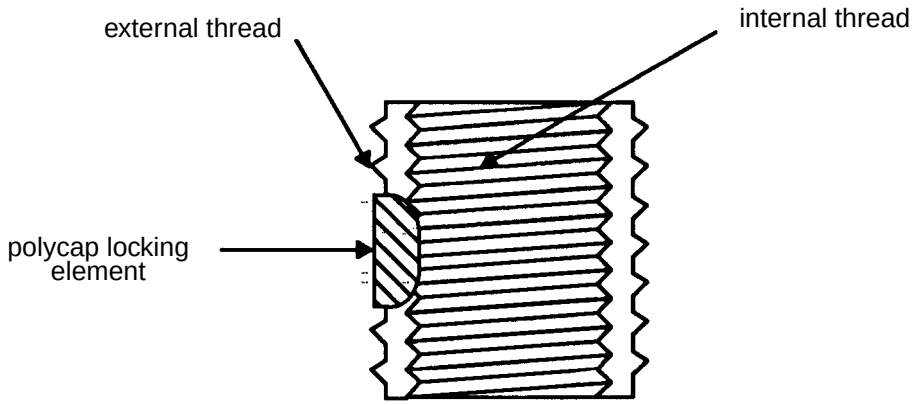



**Figure 2 - T-Sert Self-Locking Insert**

## 5 Procedure

### 5.1 General

5.1.1 Long-Lok T-Sert inserts are high strength, thin wall, light weight and self-locking inserts.

5.1.2 Long-Lok T-Sert inserts require no locking rings or other separate locking devices. An integral plastic self-locking element extends through the wall of the insert, longitudinal in the threads, and provides locking action for both internal and external threads.

### 5.2 Preparation of Work

5.2.1 Prepare holes as follows (see Figure 3):

Step 1. Drill holes to the final size specified in Table 1 according to PPS 1.09. For preparation of through holes, drill holes completely through the part. For preparation of blind holes, drill holes to the depth specified in Table 1, depending upon the type of tap that will be used to tap the hole.

**Table 1 - Hole Preparation Data**

| BASIC INSERT PART NUMBER | RECOMMENDED FINAL DRILL | HOLE SIZE | MINIMUM DRILL DEPTH | |
|---|---|---|---|---|
| | | | BOTTOMING TAP | PLUG TAP |
| T26 | #33 (0.1130") | 0.112" - 0.117" | 0.223" | 0.273" |
| T40 | #28 (0.1405") | 0.139" - 0.144" | 0.298" | 0.361" |
| T62 | #19 (0.1660") | 0.165" - 0.170" | 0.318" | 0.381" |
| T82 | #11 (0.1910") | 0.190" - 0.195" | 0.369" | 0.441" |
| T02 | #2 (0.2210") | 0.220" - 0.225" | 0.414" | 0.486" |
| T048 | 9/32" (0.2812") | 0.280" - 0.285" | 0.519" | 0.602" |
| T054 | 11/32" (0.3438") | 0.342" - 0.347" | 0.609" | 0.693" |
| T064 | Y (0.4040") | 0.403" - 0.408" | 0.720" | 0.820" |
| T070 | 15/32" (0.4688") | 0.467" - 0.472" | 0.820" | 0.920" |
| T080 | 17/32" (0.5312") | 0.530" - 0.535" | 0.889" | 0.973" |

Step 2. To make the installation of the insert easier, countersink holes on the side from which the insert is to be installed to the diameter specified in Table 2 using a **90**° countersink.

**Table 2 - Countersink Data**

| BASIC INSERT PART NUMBER | COUNTERSINK DIAMETER |
|---|---|
| T26 | 0.168" - 0.188" |
| T40 | 0.194" - 0.214" |
| T62 | 0.220" - 0.240" |
| T82 | 0.246" - 0.266" |
| T02 | 0.280" - 0.300" |

| BASIC INSERT PART NUMBER | COUNTERSINK DIAMETER |
|---|---|
| T048 | 0.362" - 0.382" |
| T054 | 0.425" - 0.445" |
| T064 | 0.487" - 0.507" |
| T070 | 0.550" - 0.570" |
| T080 | 0.612" - 0.632" |

Step 3. Remove all chips and foreign particles from the hole.

Step 4. Tap the holes using the tap specified in Table 3. Use a suitable tapping lubricant or cutting fluid for all tapping operations.

**Table 3 - Tap Selection**

| BASIC INSERT PART NUMBER | TAP (CLASS 3B) |
|---|---|
| T26 | 6-40 UNF |
| T40 | 8-32 UNC |
| T62 | 10-32 UNC |
| T82 | 12-28 UNF |
| T02 | 1/4-28 UNF |

| BASIC INSERT PART NUMBER | TAP (CLASS 3B) |
|---|---|
| T048 | 5/16-24 UNF |
| T054 | 3/8-24 UNF |
| T064 | 7/16-20 UNF |
| T070 | 1/2-20 UNF |
| T080 | 9/16-24 UNF |

Step 5. Remove chips from the tapped holes.

Step 6. Remove residual tapping lubricant or cutting fluid by solvent cleaning according to PPS 31.17, as necessary.

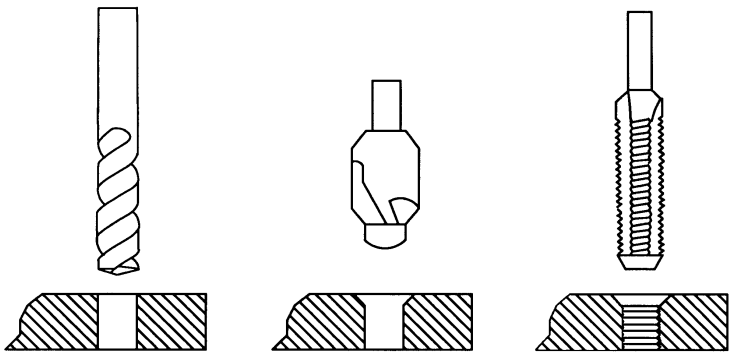



**Figure 3 - Hole Preparation**

5.2.2 On a sample basis, check at random (across the entire pattern) the number of holes specified in Table 4 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 4 - Hole Size Verification Sample Requirement**

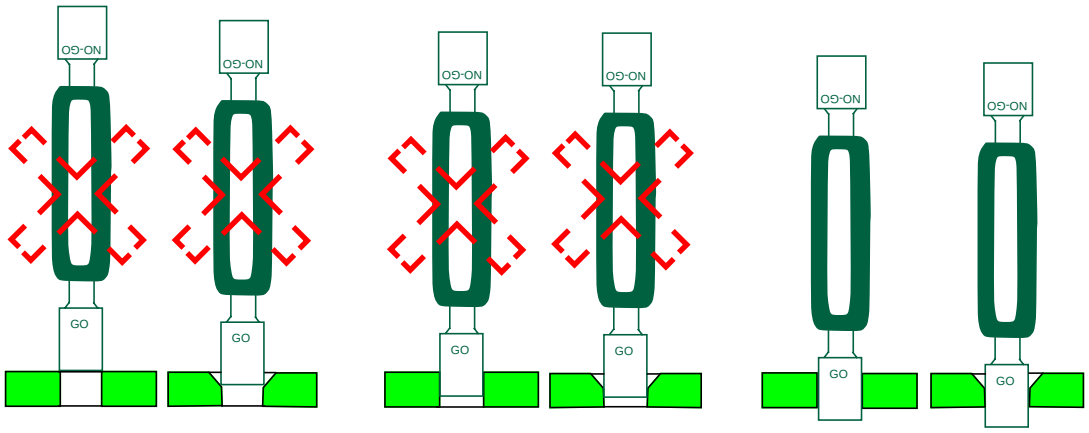
| NUMBER OF HOLES IN PATTERN | REQUIRED SAMPLE SIZE |
|---|---|
| 5 or less | all |
| 6 - 50 | 5 |
| 51 - 90 | 7 |
| 91 - 150 | 11 |
| 151 - 280 | 13 |
| 281 - 500 | 16 |
| more than 500 | 19 |

### 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 4):

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.

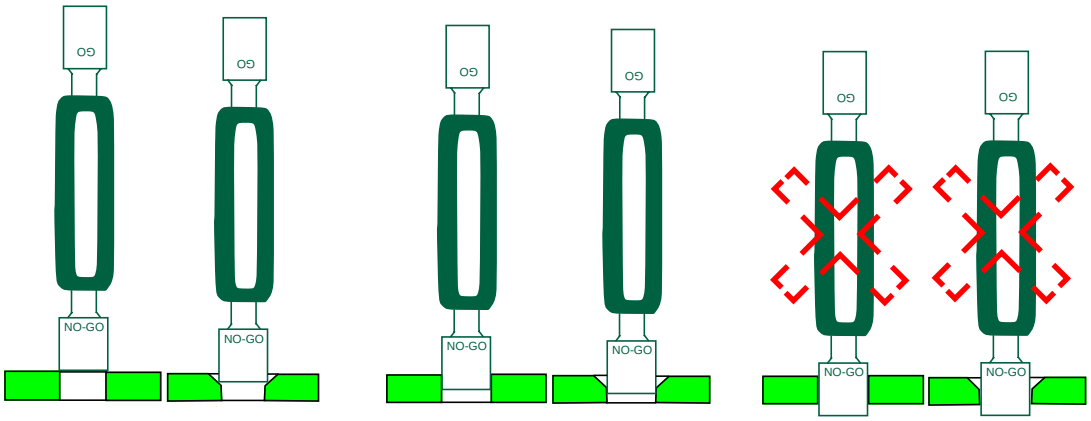



Does not go in.
UNDERSIZE HOLE

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 4 - Use of Go/No-Go Gauges**

## 5.4 Installation of Long-Lok T-Sert Inserts

5.4.1 Brush apply one coat of F19 Type 2 epoxy-polyamide primer to the holes and external threads of the inserts before installing inserts as follows (see Figure 5). Prepare F19 Type 2 epoxy primer according to PPS 34.08.

Step 1. Place the insert on the driver specified in Table 5 and install the insert while the F19 Type 2 epoxy-polyamide primer on the hole and external threads of the insert is still wet.

Step 2. Place the driver squarely over the tapped hole and screw the insert into the work until the shoulder of the tool meets the work surface.

Step 3. Retract the mandrel by rotating counter-clockwise.

Step 4. Ensure that the installed insert is 0.005" - 0.020" below the work surface.

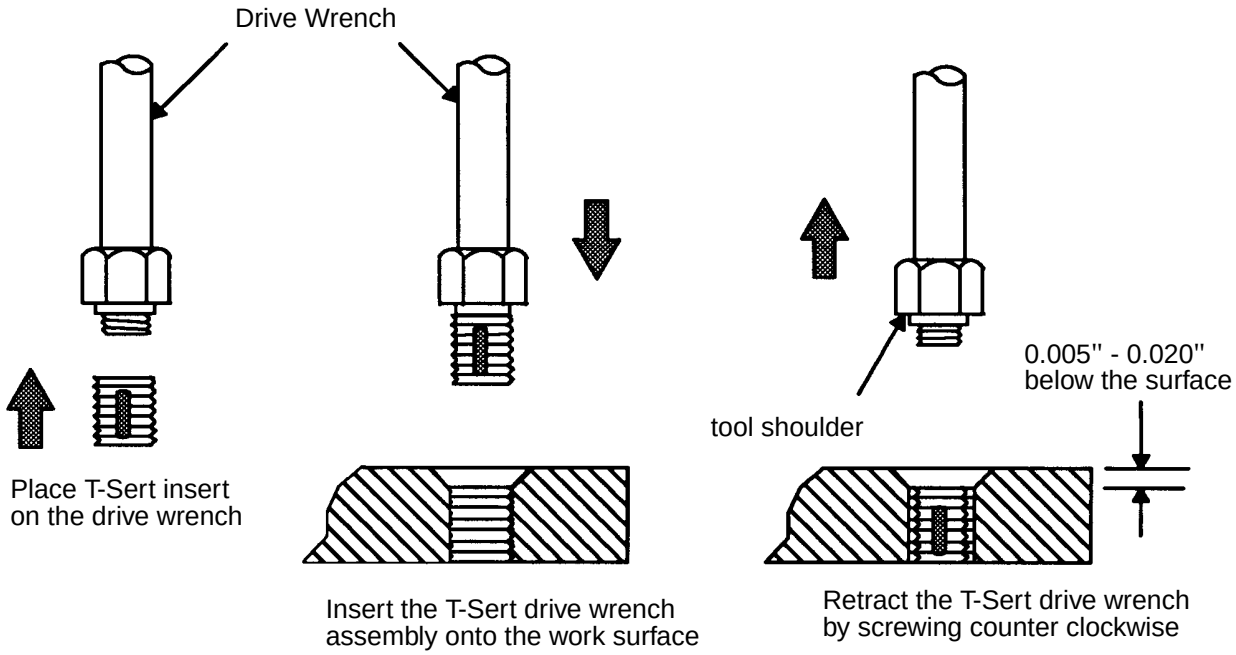



**Figure 5 - Installation of Long-Lok T-Sert Inserts**

**Table 5 - Drive Wrench Selection**

| BASIC INSERT PART NUMBER | DRIVE WRENCH |
|---|---|
| T26 | LDRT26 |
| T40 | LDRT40 |
| T62 | LDRT62 |
| T82 | LDRT82 |
| T02 | LDRT02 |

| BASIC INSERT PART NUMBER | DRIVE WRENCH |
|---|---|
| T048 | LDRT048 |
| T054 | LDRT054 |
| T064 | LDRT064 |
| T070 | LDRT070 |
| T080 | LDRT080 |

### 5.5 Removal of Installed Inserts

5.5.1 Remove inserts failing to meet the depth requirement, inserts having deformed or damaged internal threads and loose inserts as follows (Bombardier Toronto (de Havilland) MRB or Bombardier Toronto (de Havilland) delegated MRB approval is **not** required).

Step 1. Place an E-Z Out screw extractor tool over the insert.

Step 2. Rotate the tool counter-clockwise to unscrew the insert.

## 6 Requirements

6.1 Installed inserts must be 0.005" - 0.020" below the work surface.

6.2 There must be no internal thread damage after installation. A mating fastener should rotate freely through the insert to the locking device.

## 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 Long-Lok T-Sert inserts must have a good working knowledge of the procedure and requirements as specified herein and must have exhibited their competency to their supervisor.