BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 6.18

PRODUCTION PROCESS STANDARD

Certification of Tooling used for Installation of Externally Swaged (Permaswage Type) Fittings

Issue 10
- This standard supersedes PPS 6.18, Issue 9.
- Vertical lines in the left hand margin indicate technical 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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Signed original on file. Validation of paper prints is the responsibility of the user.

Table of Contents

Sections **Page**

Figures

1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for fabrication and pressure testing of assemblies necessary for the certification of tooling used for installation of externally swaged (Permaswage type) fittings.

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.

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 DH5079 Form - Tool Certification Record Card - *Bombardier Toronto (de Havilland) internal operating form*.

3.2 PPS 6.12 - Pressure Testing Hydraulic Components, Fuel and Bleed Air Lines.

3.3 PPS 6.13 - Installation of Externally Swaged (Permaswage Type) Fittings.

3.4 PPS 13.26 - General Subcontractor Provisions.

3.5 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.6 PPS 30.01 - Heat Treatment of Aluminum Alloys.

3.7 QDI-09-02 - Process Control - *Bombardier Toronto (de Havilland) internal quality procedure*.

4 Materials, Equipment and Facilities

4.1 Materials

4.1.1 Materials as specified in PPS 6.13.

4.2 Equipment

4.2.1 Tooling as specified in PPS 6.13.

4.3 Facilities

4.3.1 This PPS has been categorized as a “Controlled Special Process” according to PPS 13.39 and as such only facilities specifically approved according to PPS 13.39 are authorized to perform fabrication and pressure testing of assemblies necessary for the certification of tooling used for installation of externally swaged (Permaswage type) fittings according to this PPS.

4.3.2 Bombardier subcontractors must direct requests for approval to Bombardier Aerospace Supplier Quality Management. Bombardier Aerospace facilities must direct requests for approval to the appropriate internal Quality Manager.

4.3.3 Facility approval shall be based on a facility report, a facility survey and completion of a qualification test program, if required. The facility report must detail the materials and equipment to be used, the process sequence to be followed and the laboratory facilities used to show compliance with the requirements of this PPS. Any deviation from the procedure or requirements of this PPS must be detailed in the facility report. Based upon the facility report, Bombardier Toronto (de Havilland) Materials Technology may identify additional qualification and/or process control test requirements. During the facility survey, the facility requesting qualification must be prepared to demonstrate their capability. Once approved, no changes to subcontractor facilities may be made without prior written approval from Bombardier Aerospace Supplier Quality Management.

4.3.3.1 Unless otherwise specified by Bombardier Aerospace Supplier Quality Management, approval of subcontractors to perform fabrication and pressure testing of assemblies necessary for the certification of tooling used for installation of externally swaged (Permaswage type) fittings according to this PPS does not require completion of a test program or submission of test samples.

5 Procedure

5.1 General

5.1.1 Before being used in production, certify all new or repaired tooling used for installation of externally swaged (Permaswage type) fittings according to this PPS and appropriate facility Quality documents (e.g., QDI-09-02).

5.1.2 Except as noted in paragraph 5.1.2.1, re-certify every tool assembly used by Production for installation of externally swaged (Permaswage type) fittings according to this PPS and appropriate facility Quality documents (e.g., QDI-09-02) every 3 months.

5.1.2.1 For tool assemblies which have consistently successfully passed certification for the previous 2 full years (24 months), it is acceptable to re-certify those tool assemblies every 12 months. In the event that a tool assembly being re-certified every 12 months fails certification testing, that tool assembly must once again be checked every 3 months.

5.1.3 Except as noted in paragraph 5.1.3.1, for **each** tube material/size/wall thickness combination for which a particular tool assembly is to be used, a separate test assembly must be swaged comprised of that tube material/size/wall thickness combination using the tool assembly to be certified. Except as noted in paragraph 5.1.3.1, any particular tool assembly may only be used to swage tube material/size/wall thickness combinations for which that particular tool assembly has been certified.

5.1.3.1 For tool assemblies to be used to install fittings on aluminum drain lines it is not necessary to swage a separate test assembly representing the aluminum drain line assembly, provided the tool assembly has been certified for some other tube material/size/wall thickness combination.

5.1.4 Maintain full records of all tool assembly certification and re-certification.

5.1.5 Clearly identify certified and re-certified tooling assemblies with suitable certification/re-certification information.

5.2 Fabrication of Certification Test Assembly

5.2.1 Fabricate test assemblies for tool assemblies to be certified as follows (see Figure 1):

Step 1. For aluminum and CRES tubes, flare tube ends according to PPS 6.01 to result in 6" length tube sections. For titanium tubes, cut and face tube ends according to PPS 6.01 to result in 6" length tube sections, then swage the appropriate “flareless sleeve” fitting onto one end of each tube section according to PPS 6.19.

Step 2. Heat treat aluminum tubes to the T6 temper according to PPS 30.01.

Step 3. Install sleeves and nuts as shown in Figure 1.

Step 4. Install externally swaged (Permaswage type) fittings according to PPS 6.13.

5.2.2 Do not prime certification test assemblies.

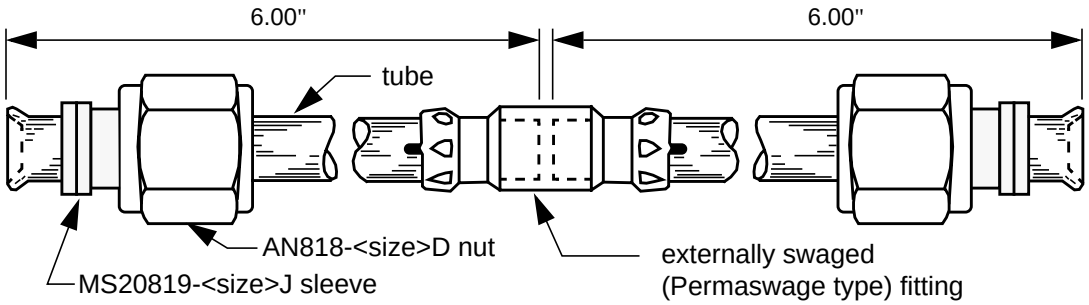

Figure 1 - Test Assembly

5.3 Testing

5.3.1 After fabrication, check certification test assemblies as follows:

Step 1. Visually and dimensionally check test assemblies according to PPS 6.13.

Step 2. Pressure test (initial and proof) according to PPS 6.12.

5.3.2 If a certification test assembly fails to meet the visual, dimensional, pressure test (initial or proof) requirements, examine the represented swage tool assembly for the cause of failure. Return new tools that fail certification testing to the manufacturer. Repair used tool assemblies and re-certification test as specified herein.

5.3.3 Complete a record form (e.g.,a DH5079 form) for each new swage tool assembly which passes certification testing. Etch or stamp all swage tool components with matched serial numbers for identification. No two swage tool assemblies shall have the same serial number. If a component of the swage tool assembly is replaced (for example, a die block), identify the new part with the serial number of the assembly.

5.3.4 For re-certified swage tool assemblies, record the following information (e.g., on a DH5079 form):

- examination and test results of re-certified tool assemblies
- repairs and test results of repaired swage tool assemblies

6 Requirements

6.1 All tool assemblies used by Production for installation of externally swaged (Permaswage type) fittings must be certified as specified herein. Maintain full records of all tool assembly certification and re-certification.

6.2 Certified and re-certified tooling assemblies must be clearly identified with suitable certification/re-certification information.

7 Safety Precautions

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

7.2 Use clear 3/8" minimum thickness Plexiglas safety shields when proof pressure testing assemblies.

8 Personnel Requirements

8.1 This PPS has been categorized as a “Controlled Special Process” by PPS 13.39. Refer to PPS 13.39 for personnel requirements.

8.2 Refer to the appropriate PPS for swaging and pressure testing personnel requirements.