DE HAVILLAND AIRCRAFT OF CANADA LIMITED

BOMBARDIER

Toronto Site

PPS 25.23 - BONDING USING DHMS A6.11 TYPE I CLASS 1 ADHESIVE

Issue 11
- This standard supersedes PPS 25.23, Issue 10.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- Direct PPS related questions to christie.chung@dehavilland.com or (416) 375-7641.
- This PPS is effective as of the distribution date.

THIS PPS IS CO-OWNED BY DE HAVILLAND AIRCRAFT OF CANADA LIMITED AND BOMBARDIER INC.

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Issue 11 - Summary of Changes (over the previous issue)

The following summaries are not detailed and are intended only to assist in alerting PPS users to changes which may affect them; refer to the applicable sections of this PPS for detailed procedure and requirements.

- Specified this is a jointly owned PPS by both De Havilland Aircraft of Canada Limited and Bombardier Inc.
- Specified that use of BAERD GEN-023 is frozen at Revision A.
- Revised Facilities section.
- Added new Preparation of Adhesives section.
- Clarified that the minimum 24 hour cure is at room temperature.
- Added new Disposal of Chemical Wastes section.

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1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for bonding aircraft parts using DHMS A6.11 Type I Class 1 adhesive.

1.1.1 This PPS complements the engineering drawings that specify its use as an authorized instruction. The procedure specified in this PPS shall 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.

1.2 This PPS is co-owned by De Havilland Aircraft of Canada Limited (DHC) and Bombardier Inc. (BA) due to its applicability for both the DHC DASH 8 and BA Lear 45 programs.

2 HAZARDOUS MATERIALS

2.1 Before receipt at DHC or BA, all materials shall be approved and assigned Material Safety Data Sheet (MSDS) numbers by the DHC/BA 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 DHC/BA Environment, Health and Safety Department.

3 REFERENCES

3.1 BAERD GEN-023, Rev. A - Contamination Control for Compressed Air.

3.2 PPS 13.13 - Personal Protective Respiratory Equipment.

3.3 PPS 13.26 - General Subcontractor Provisions.

3.4 PPS 13.28 - Storage Life of Adhesives, Sealants, Paints and Composite Products.

3.5 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.6 PPS 25.66 - Cleanliness Requirements for Application of Adhesives.

3.7 PPS 31.17 - Solvent Usage.

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

4 MATERIALS, EQUIPMENT AND FACILITIES

4.1 Materials

4.1.1 DHMS A6.11 Type I Class 1 adhesive. Receipt and shelf life extension testing of DHMS A6.11 Type I Class 1 adhesive shall be as specified in PPS 13.28.

4.2 Equipment

4.2.1 Suitable bristle brush.

4.2.2 Compressed air shall meet the requirements of BAERD GEN-023, Rev. A.

4.2.3 Neoprene gloves (e.g. DSC 422-5).

4.2.4 Lint-free cotton gloves (e.g. DSC 422-1).

4.2.5 Rubber or stitch roller.

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 bonding aircraft parts using DHMS A6.11 Type I Class 1 adhesive according to this PPS.

4.3.2 Subcontractors shall direct requests for approval to DHC or BA Quality.

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 shall 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 shall be detailed in the facility report. Based upon the facility report, DHC or BA Engineering may identify additional qualification and/or process control test requirements. During the facility survey, the facility requesting qualification shall be prepared to demonstrate their capability. Once approved, no changes to subcontractor facilities may be made without prior written approval from DHC or BA Quality.

4.3.3.1 For approval of subcontractor facilities to perform bonding aircraft parts using DHMS A6.11 Type I Class 1 adhesive according to this PPS, completion of a test program and submission of suitable test samples representative of production parts is required. Test samples shall meet the requirements specified by either DHC or BA Engineering (program dependent).

5 PROCEDURE

5.1 Preparation of Parts

5.1.1 Ensure that the bonding surfaces of aluminum alloy parts and cadmium plated parts have been primed with F19 according to PPS 34.08.

5.1.2 Do not touch prepared surfaces with bare hands or allow the surface to be contaminated. Wear clean lint-free cotton gloves (ref. paragraph 4.2.4) at all times when handling prepared bonding surfaces.

5.1.3 Immediately before applying adhesive, solvent clean the bonding surfaces according to Table I.

TABLE I - PREPARATION OF PARTS FOR BONDING

MATERIAL	CLEANING PROCEDURE
All F19 primed parts	Solvent clean according to PPS 31.17.
Unprimed metal parts	Solvent clean according to PPS 31.17.
Unprimed fibreglass (including Kevlar laminates and composites)	Step 1. Lightly scuff the bonding surfaces with 120 to 180 grit abrasive paper. Step 2. Solvent clean according to PPS 31.17.
Unprimed phenolic (except Formica, Arborite, etc.)	Step 1. Lightly scuff the bonding surfaces with 120 to 180 grit abrasive paper. Step 2. Solvent clean according to PPS 31.17.
Unprimed Formica, Arborite, etc.	Solvent clean according to PPS 31.17.
Unprimed plastic parts (except Kevlar and fibreglass)	Solvent clean according to PPS 31.17.
Rubber parts (neoprene, nitrile, Buna-N, etc.)	Solvent clean according to PPS 31.17.
Rubber parts (Silicones)	Step 1. Solvent clean according to PPS 31.17. Step 2. Lightly scuff the bonding surfaces with 120 to 180 grit abrasive paper. Step 3. Solvent clean according to PPS 31.17.
Wood (except balsa)	Step 1. Sand bond surfaces with 50 to 80 grit abrasive paper. Step 2. Remove residual dust with clean compressed air.
Porous materials (Velcro, fabrics, balsa, cork, etc.)	Do not clean porous materials in any way. If the bonding surface is contaminated, refer the part to Liaison Engineering.
Rulon A	Solvent clean according to PPS 31.17.
Flexible polyurethane foam	Solvent clean according to PPS 31.17.
Rigid polyurethane foam	Step 1. Lightly scuff the bonding surfaces with 120 to 180 grit abrasive paper. Step 2. Remove residual dust with clean compressed air.

5.2 Preparation of Adhesive

5.2.1 Before use, stir adhesive thoroughly in its own container.

5.3 Bonding

5.3.1 General

5.3.1.1 Perform bonding in a clean area according to PPS 25.66.

5.3.2 Open Time Method

5.3.2.1 This method is recommended where only a small area is to be bonded or if one or both materials are porous.

5.3.2.2 Bond using the open time method as follows:

Step 1. Using a suitable bristle brush, apply a thin, uniform coat of adhesive to both bonding surfaces making as few strokes as possible.

Step 2. If necessary, apply two or more coats of adhesive to porous surfaces to ensure sufficient adhesive remains on the surface. Allow each preceding coat to air dry before the next coat is applied.

Step 3. Allow the final coat of adhesive to air dry until it is tacky, but does not transfer to the finger when touched lightly.

Step 4. Press parts together and roll down with a rubber or stitch roller to ensure intimate contact over the full bonding area.

5.3.3 Re-Activation Method

5.3.3.1 This method is recommended where large areas of non-porous materials are to be bonded or a strong immediate bond is desired.

5.3.3.2 Bond using the re-activation method as follows:

Step 1. Using a suitable bristle brush, apply a thin, uniform coat of adhesive to both bonding surfaces making as few strokes as possible.

Step 2. If necessary, apply two or more coats of adhesive to porous surfaces to ensure sufficient adhesive remains on the surface. Allow each preceding coat to air dry before the next coat is applied.

Step 3. Allow the final coat of adhesive to air dry for a minimum of 2 hours.

Step 4. If parts will not be bonded on the same shift as when the adhesive was applied, cover the adhesive coated surfaces with Kraft paper after the adhesive has dried to a tack-free condition.

Step 5. Re-activate the dry adhesive coating of the less porous material by solvent wiping with a clean cloth dampened with the solvent specified in PPS 31.17.

Step 6. Immediately join the parts together and roll down with a rubber or stitch roller or press down firmly with the fingers to ensure intimate contact over the full bonding area.

5.4 Curing

5.4.1 Allow the bond to cure at room temperature (65°F minimum) for at least 24 hours before further working the assembly or installation in the aircraft.

5.5 Clean-Up

5.5.1 Remove adhesive from tools and equipment according to PPS 31.17.

6 REQUIREMENTS

6.1 Bonded assemblies shall have intimate contact over the full bonding surface.

6.2 Visual indication of poor adhesion shall be cause for rejection.

6.3 Bonded assemblies shall be allowed to cure at room temperature (65°F minimum) for at least 24 hours before being worked or installed in the aircraft.

7 DHC/BA SAFETY PRECAUTIONS

7.1 Safety precautions applicable to the materials and procedures specified herein shall be defined by the subcontractor performing the work for DHC/BA. However, suppliers, subcontractors and partners are responsible for ensuring that their own environmental, health and safety precautions satisfy the appropriate local government regulations.

8 PERSONNEL REQUIREMENTS

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

9 DISPOSAL OF CHEMICAL WASTES

9.1 Dispose of all chemical wastes according to national legislation and local regulations. At DHC/BA, dispose of chemical wastes according to EHS-OP-005.

9.2 At DHC/BA, dispose of chemical contaminated work clothes, rags, etc., into Red Containers labelled “Waste Rags”.

10 STORAGE

10.1 Perform receipt and shelf life extension testing of DHMS A6.11 Type I Class 1 adhesive according to PPS 13.28.

10.2 Refer to PPS 13.28 for the storage life of the adhesive.

10.3 Always use the oldest stock first (i.e., first in/first out (FIFO) basis).

10.4 Store DHMS A6.11 Type I Class 1 adhesive at a temperature of 40 to 80°F according to the precautions necessary for flammable materials.

10.5 Clearly mark adhesive containers with the storage life expiry date.

10.6 Keep adhesive containers tightly closed when not in use.