BOMBARDIER

Toronto Site

PROPRIETARY INFORMATION

PPS 25.14

PRODUCTION PROCESS STANDARD

BONDING USING DHMS A6.13 ADHESIVE

Issue 20
- This standard supersedes PPS 25.14, Issue 19.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- Direct PPS related questions to christie.chung@aero.bombardier.com or (416) 375-7641.
- This PPS is effective as of the distribution date.

Signed original on file. Validation of paper prints is the responsibility of the user.

Prepared By:	(Christie Chung)	November 11, 2015
	PPS Group	
Approved By:	(Emma Jane Donlin)	November 12, 2015
	Materials Technology	
	(Stephen Pitt)	November 13, 2015
	Quality	

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1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for bonding using DHMS A6.13 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.

1.1.3 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, all materials shall be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Toronto 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 Environment, Health and Safety Department.

3 REFERENCES

3.1 ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.

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 31.17 - Solvent Usage.

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

4 MATERIALS, EQUIPMENT AND FACILITIES

4.1 Materials

4.1.1 DHMS A6.13 adhesive resin and catalyst.

4.1.2 Self-adhesive labels (see Figure 1).

4.1.3 Disposable wooden tongue depressor.

4.1.4 Masking tape.

4.2 Equipment

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

4.2.2 DSC 422-5 neoprene rubber gloves.

4.2.3 Disposable wax-free paperboard containers (e.g., Melo take-out food containers).

4.2.4 Grooved work holder.

4.2.5 Rubber or stitch roller.

4.3 Facilities

4.3.1 This PPS has been identified 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 using DHMS A6.13 adhesive according to this PPS.

4.3.2 Bombardier subcontractors shall direct requests for approval to Bombardier Aerospace Supplier Quality Management. Bombardier Aerospace facilities shall 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 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, Bombardier Toronto 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 Bombardier Aerospace Supplier Quality Management.

4.3.3.1 For approval of subcontractor facilities to perform bonding using DHMS A6.13 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 as specified by Bombardier Toronto Engineering.

5 PROCEDURE

5.1 General

5.1.1 Paint adhesion problems occur on surfaces contaminated with silicone adhesive. Therefore, avoid contaminating other areas with adhesive by masking off the surfaces adjacent to the bond area.

5.1.2 The pot life is the time and condition during which mixed adhesive remains suitable for application. The specified adhesive pot life of 3 months is based on keeping the bottle tightly capped between uses and storing at room temperature.

5.1.3 Perform receipt testing of adhesive according to section 6.2.

5.2 Preparation of Parts

5.2.1 Ensure that bonding surfaces of aluminum alloy or cadmium plated parts are primed with F19 according to PPS 34.08.

5.2.2 Prepare the bond area of each part according to PPS 31.17 immediately before applying adhesive.

5.2.3 Do not touch prepared surfaces with bare hands. Wear cotton gloves at all times when handling prepared bonding surfaces. Protect prepared surfaces from contamination.

5.3 Preparation of Adhesive

5.3.1 DHMS A6.13 adhesive is received in kits from the supplier. Each kit includes resin in a 4 fl. oz. glass bottle and a 3.3 mL glass bottle of catalyst.

5.3.2 Mix DHMS A6.13 resin and catalyst as follows:

Step 1. Remove the cap from the bottle of adhesive resin.

Step 2. Add the contents of the bottle of catalyst directly into the bottle of resin. The kit supplies the resin and catalyst in the correct mixing ratio.

Step 3. Using a disposable wooden tongue depressor, stir the resin/catalyst mixture thoroughly to obtain a homogeneous air-free mix. Immediately cap and close the bottle tightly.

Step 4. Label the bottle according to Figure 1 and stamp with the expiry date (mixing date + 3 months pot life).

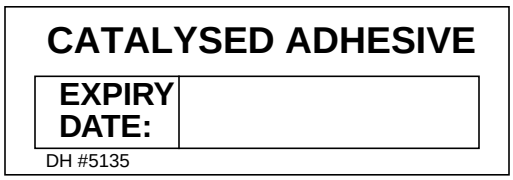

FIGURE 1 - GENERAL DESCRIPTION OF CATALYSED ADHESIVE LABEL

5.4 Bonding

5.4.1 Ensure that the surfaces to be bonded are clean and completely free of contamination such as dirt, mould release agent, grease or finger marks.

5.4.2 Perform bonding in a clean area as specified in section 6.3.

5.4.3 Perform bonding using DHMS A6.13 adhesive as follows:

Step 1. Mask off the bonding area with masking tape to prevent contamination of adjacent surfaces with silicone adhesive.

Step 2. Pour out the required amount of catalysed adhesive into a wax-free container and immediately re-cap the bottle.

Step 3. Apply a thin uniform coat (0.010" - 0.015") of adhesive to bond surfaces using a bristle brush. Ensure that both surfaces (including the butt ends of silicone foam extrusions) are completely covered. If applying adhesive to long lengths of silicone rubber extrusion, use a grooved work holder to hold and support the work.

Step 4. Allow the adhesive to dry until a firm tack develops.

Step 5. Carefully position and assemble the parts to be bonded in the correct alignment as the bond shall not be broken or re-positioned.

Step 6. Roll down with a rubber or stitch roller or press down firmly with the fingers to ensure intimate contact over the full bonding area. If the silicone extrusion lifts due to distortion, especially around the corners, apply moderate pressure using masking tape or other suitable means until the bond has cured.

Step 7. Discard unused adhesive on completion of the bonding operation. Do not pour unused adhesive back into the catalysed bottle.

5.5 Curing

5.5.1 Allow bonded assemblies to cure to handle for 24 hours at room temperature before further working the assembly or installing it in the aircraft.

5.6 Clean-Up

5.6.1 Remove uncured adhesive from tools and other equipment according to PPS 31.17.

6 REQUIREMENTS

6.1 General

6.1.1 Bonded assemblies shall have intimate contact over the full bonding area.

6.1.2 Reject parts showing visual indications of poor adhesion.

6.1.3 All bonds shall be cured for 24 hours at room temperature before further working the assembly or installing it in the aircraft.

6.1.4 All bottles of catalysed adhesive shall be identified by a “catalysed adhesive” label stamped with the expiry date as shown in Figure 1.

6.2 Receipt Testing

6.2.1 General

6.2.1.1 Upon material receipt, perform peel strength testing according to DHMS A6.13 or according to section 6.2.2 for each batch/lot of material.

6.2.1.2 Only upon successful completion of receipt testing, shall the batch/lot of adhesive be released to Production.

6.2.1.3 Material failing the initial receipt testing may be re-tested one additional time without Bombardier Toronto MRB authority. If the second receipt testing fails, then MRB authorization is required and is subject to Bombardier Toronto Materials Technology approval.

6.2.2 Peel Strength Test

6.2.2.1 Prepare one C1 and F19 Type 2 treated 6" x 9" (or minimum 4" width) test panel of 2024 clad 0.032" aluminum and three 1" x 12" strips of 0.062" silicone sheet stock (40 ± 5 Shore A Hardness). Apply a thin, uniform coat (0.002" to 0.003") of the catalyzed adhesive using a bristle brush to both the aluminum surface and the silicone strip bonding side. Allow the adhesive to dry until a firm tack develops (approximately 1 hour at room temperature). Heat the aluminum panel on a hot plate or in an oven operating at 131 ± 9°F (55 ± 5°C) for approximately 30 to 45 minutes. Remove the heated aluminum panel and align each silicone rubber strips to the aluminum panel and roll down using a rubber or stitch roller to ensure intimate contact over the full bonding area. Let the bonded test panel assembly cure for a minimum of 16 hours at room temperature before testing. Perform 180 degree peel test according to ASTM D903 at a speed of 12 inches/minute. Record the load required to peel back the rubber substrate in pounds per inch width (piw) and the mode of failure (i.e., adhesive or cohesive) and the percentage of bond area affected by each type of failure. The peel strength requirement shall be as specified in DHMS A6.13.

6.2.2.2 While individual specimens may be prepared, it is recommended that specimens be cut from bonded panels as specified in paragraph 6.2.2.1 (see Figure 2).

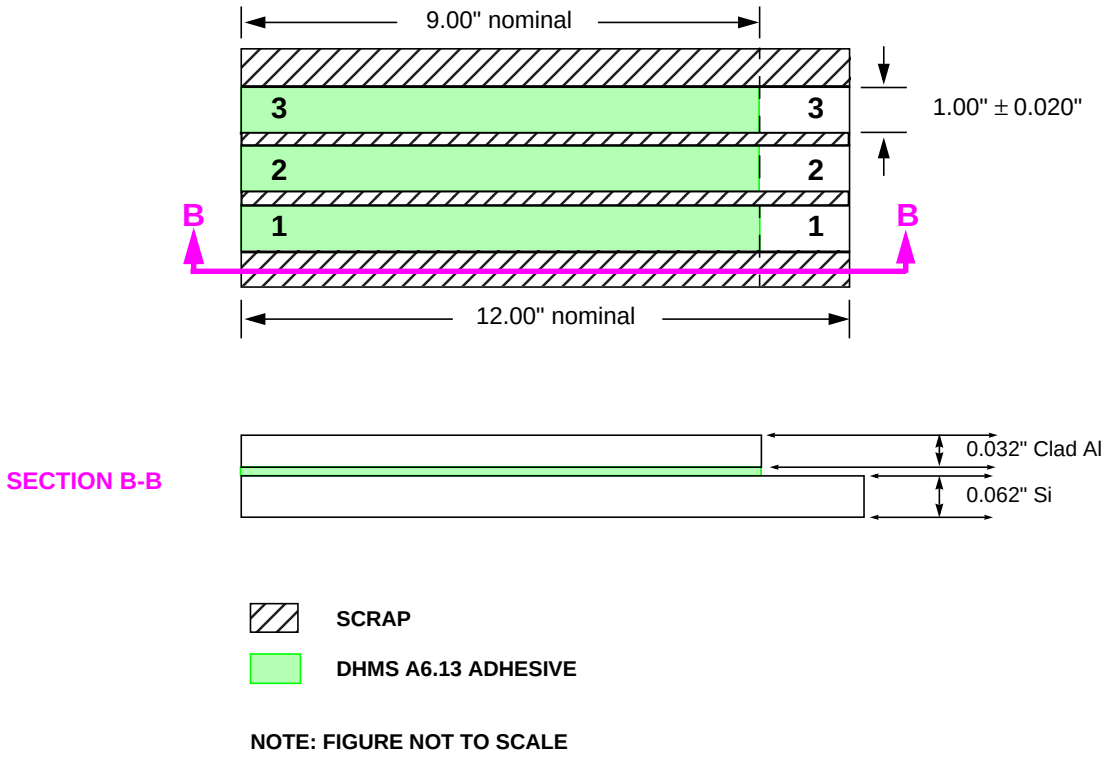

FIGURE 2 - PEEL TEST

6.3 Bonding Area Conditions

6.3.1 The cleanliness of the bonding area (e.g., tables, floors, equipment, walls, etc.) shall be inspected and cleaned as necessary to ensure that dust accumulation, dirt or other contamination will not be evident. Maintain records of dates of cleaning.

6.3.2 Maintain the temperature and relative humidity of the bonding areas within the range specified in Figure 3. Bonding when the relative humidity is below 30% will increase the chance of static discharge and worker discomfort, but will not affect part quality.

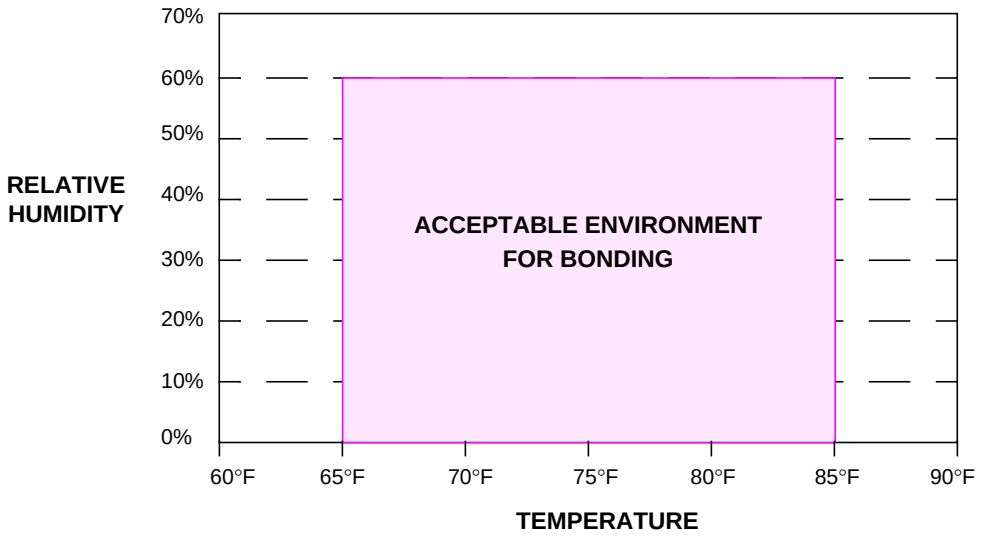

FIGURE 3 - TEMPERATURE AND HUMIDITY LIMITS

7 SAFETY PRECAUTIONS

7.1 Observe standard plant safety precautions when performing the procedure specified herein.

7.2 Refer to PPS 31.17 for the safety precautions for handling and using solvents.

7.3 Always wear protective neoprene gloves when handling adhesive. Avoid skin contact with adhesive components. If contact occurs, wash the affected area thoroughly with soap and water. If skin irritation occurs, contact the Health Centre and a physician.

7.4 Avoid eye contact with adhesive components. If eye contact occurs, immediately flush eyes in a directed stream of water for at least 15 minutes while forcibly holding eyelids apart to ensure completed irrigation of all eye and lid tissue. Contact the Health Centre and a physician.

7.5 Keep all adhesive components away from fire and other sources of ignition.

7.6 When working with adhesive, wear personal protective respiratory equipment according to PPS 13.13. Ensure that sufficient ventilation is supplied when using adhesive in confined areas. The resin contains toluene and mineral spirits.

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 STORAGE

9.1 Store adhesive components at 60 to 80°F with the precautions necessary for flammable materials.

9.2 Ensure that the containers are clearly stamped with the storage life expiry date. Refer to PPS 13.28 for the storage life of the adhesive components.

9.3 Keep containers of adhesive tightly closed when not in use.