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

# PPS 9.27

**PRODUCTION PROCESS STANDARD**

## Thermally Conductive Epoxy Adhesive

Issue 4
- This standard supersedes PPS 9.27, Issue 3.
- 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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| Prepared By: | (Michael Wright) | November 28, 2012 |
| | Production Process Standards (PPS) | |
| Approved By: | (L.K. John) | November 29, 2012 |
| | Materials Technology | |
| | (B. DeVreede) | November 30, 2012 |
| | Quality | |

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## 1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for adhesive bonding using thermally conductive epoxy adhesive (e.g., installation of heat sensors in hot zones).

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 13.26 - General Subcontractor Provisions.

3.2 PPS 31.17 - Solvent Cleaning.

## 4 Materials and Equipment

### 4.1 Materials

4.1.1 Thermally conductive epoxy adhesive - Wakefield Engineering, Components Division, Delta Bond Adhesive, P/N 152-1B (#152 resin/B-4 hardener).

### 4.2 Equipment

4.2.1 Cotton gloves (e.g., DSC 422-1).

4.2.2 Abrasive (e.g., Scotch-Brite Type A, Very Fine or 180 - 220 grit aluminum oxide abrasive paper).

## 5 Procedure

### 5.1 General

5.1.1 Series 126 thermal compound has been replaced by Delta Bond Adhesive (see Materials section, paragraph 4.1.1); therefore, if the engineering drawing specifies the application of Series 126 thermal compound, use Delta Bond Adhesive as specified herein.

5.1.2 Thermally conductive epoxy adhesive, as specified herein, provides a conductive layer which prevents surface contamination while ensuring efficient heat dissipation. One of the uses of thermally conductive epoxy adhesive is securing heat sensors in hot zones.

### 5.2 Preparation of Parts to be Bonded

5.2.1 Prepare both the bonding part surfaces, as specified by the relevant engineering drawing, as follows.

Step 1. Ensure that the surfaces are completely free from chips, burrs, dirt, grease, etc.

Step 2. Solvent clean the surfaces according to PPS 31.17.

Step 3. Using fine abrasive (see Equipment section, paragraph 4.2.2), lightly abrade the surfaces. Take care to avoid removing protective coatings (e.g., primer).

Step 4. Re-solvent clean the surfaces according to PPS 31.17.

5.2.2 Do not touch prepared surfaces with bare hands; wear clean gloves at all times when handling parts.

### 5.3 Preparation of Thermally Conductive Epoxy Adhesive

5.3.1 Before mixing, ensure that resin is free of evidence of discolouration, gelling or polymerizing and the hardener is a uniform coloured, crystal free liquid. Discard resin showing evidence of discolouration, gelling or polymerizing. If crystals are found in the hardener, heat the hardener to 150°F - 160°F and soak at this temperature for 20 - 25 minutes; if crystals persist or non-uniform colour is detected, discard the hardener.

5.3.2 Mix 3.5 parts of B-4 hardener for every 100 parts of #152 base resin. Thoroughly mix the hardener into the resin until a uniform colour and texture is achieved. The pot life of mixed thermally conductive epoxy adhesive is approximately 30 minutes at room temperature (60°F - 90°F).

### 5.4 Application of Adhesive

5.4.1 In a clean and dry area, use a suitable bristle brush to apply a **thin**, uniform film of thermally conductive adhesive to **both** surfaces to be bonded. Excessive amounts of thermally conductive epoxy adhesive is detrimental to thermoconductivity and must be avoided. Do not allow an excessive adhesive dwell time between adhesive application and mating of parts.

### 5.5 Assembly of Parts

5.5.1 Immediately after applying thermally conductive epoxy adhesive to both bonding surfaces, mate the parts, ensuring intimate contact of the thermally conductive epoxy adhesive without squeezing the adhesive out from between the mating parts.

### 5.6 Curing of Thermally Conductive Epoxy Adhesive

5.6.1 Allow mated assemblies to cure as follows before any further **handling** of the assembly:

- 6 hours at 77°F (25°C), or
- 30 minutes at 150°F (66°C), or
- 15 minutes at 250°F (121°C)

5.6.2 Allow mated assemblies to full cure as follows before further **working** the assembly:

- 4 days (96 hours) at room temperature (60°F - 90°F), or
- 4 hours at 200°F (93°C)

### 5.7 Clean-Up

5.7.1 Remove excess thermal compound from equipment or part surfaces by solvent cleaning according to PPS 31.17.

## 6 Requirements

6.1 Bonded parts must have intimate contact over the full bonding surface.

6.2 If there is any indication of poor adhesion, the assembly is not acceptable.

6.3 Bonded parts must be cured according to section 5.6 before being handled, further worked or installed into the aircraft.

## 7 Safety Precautions

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

**7.2 Keep adhesives and adhesive components away from fire and other sources of ignition.**

**7.3 Wear protective gloves when handling adhesive or adhesive components. Do not use protective hand cream as this may cause contamination.**

**7.4 Avoid eye contact with adhesive and 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 complete irrigation of all eye and lid tissue. Contact the Health Centre and a physician.**

**7.5 Avoid skin contact with adhesive and adhesive components. If skin contact occurs, wash the affected area thoroughly with soap and water.**

**7.6 Avoid ingesting adhesive or adhesive components. If ingestion occurs, immediately contact the Health Centre and a physician.**

**7.7 Ensure adequate ventilation is supplied when applying adhesives in confined areas.**

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

## 8 Personnel Requirements

8.1 Personnel responsible for bonding using thermally conductive epoxy adhesive must have a good working knowledge of the procedure and requirements as specified herein and must have exhibited their competency to their supervisor.

## 9 Storage of Materials

9.1 Store thermally conductive epoxy adhesive components in their original containers. For maximum shelf life, maintain a storage temperature of 45°F - 75°F (7°C - 24°C). If possible, use oldest stock first.