BOMBARDIER
Toronto Site
PROPRIETARY INFORMATION

PPS 10.30

PRODUCTION PROCESS STANDARD

CASTING OF SYNTHETIC RESINS

Issue 8
- This standard supersedes PPS 10.30, Issue 7.
- 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.

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1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for casting of aircraft parts using Akemi AP2108 epoxy resin system.

1.1.1 Akemi AP2108 epoxy resin system replaces Hysol 2085 polyurethane resin and DHMS P1.15 epoxy resin for all casting applications.

1.1.2 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.

1.1.3 Refer to PPS 13.26 for the subcontractor provisions applicable to this PPS.

1.1.4 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 PPS 13.26 - General Subcontractor Provisions.

3.2 PPS 13.28 - Storage Life of Adhesive, Sealants, Paints and Composite Products.

3.3 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.4 PPS 31.17 - Solvent Usage.

4 MATERIALS, EQUIPMENT AND FACILITIES

4.1 Materials

4.1.1 Epoxy resin, Akemi AP2108 (Component 1 - resin, Component 2 - catalyst).

4.1.2 Parting agent, REN RP803.

4.1.3 Lint-free cotton wiping cloths (e.g., DSC 378-2).

4.1.4 Disposable wax-free paperboard containers (e.g., MELO take-out containers).

4.2 Equipment

4.2.1 Suitable casting moulds.

4.2.2 Vacuum chamber.

4.2.3 Weighing scale (e.g., triple beam balance type) capable of weighing to ± 0.5 grams.

4.2.4 Rubber gloves (e.g., DSC 422-2) and apron.

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 casting of aircraft parts using Akemi AP2108 epoxy resin system 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 Materials Technology 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 Toronto Materials Technology.

4.3.3.1 For approval of subcontractor facilities to perform casting of aircraft parts using Akemi AP2108 epoxy resin system according to this PPS, completion of a test program and submission of suitable test samples representative of production parts may be required.

5 PROCEDURE

5.1 Preparation of Moulds

5.1.1 Before use, solvent clean the inner and mating surfaces of the moulds according to PPS 31.17.

5.1.2 After cleaning, apply two coats of parting agent (see paragraph 4.1.2) to the mould surfaces. After drying, buff to a high gloss.

5.2 Preparation of Resins

5.2.1 Prepare epoxy resin as follows:

Step 1. Thoroughly stir the resin and catalyst in their separate containers.

Step 2. Weigh out the resin in a disposable mixing container in even 100 gram increments or fraction thereof as required for the work on hand.

Step 3. Weigh the correct proportion of catalyst according to Table I directly into the resin container on the scale. Do not weigh the catalyst into a separate container.

Step 4. Stir the resin and catalyst to obtain a homogeneous air-free mixture. If necessary, place mixed resin in a vacuum chamber to remove entrapped air.

5.2.2 Mixing ratios, pot life and cure time of the mixed resin is shown in Table I.

5.2.3 Mix only sufficient material for the job on hand or which will be used up within the pot life of the material.

5.2.4 Discard excess material upon expiration of the pot life.

TABLE I - MIXING RATIO FOR EPOXY RESIN

RESIN SYSTEM	COMPONENTS	MIXING RATIO (Parts by Weight)	POT LIFE (Note 1)	CURE TO HANDLE (@ 75 ± 5°F)
Akemi AP2108	Component 1 - Resin	100	20 minutes	12 hours
	Component 2 - Catalyst	25		

Note 1. The pot life is the time during which mixed adhesive remains suitable for application at 75 ± 5°F. The time indicated is for a one pound mass at a temperature of 75 ± 5°F and 50% relative humidity. Greater masses and higher temperature or humidity will shorten the pot life.

5.3 Casting Resin

5.3.1 Fill the mould to the required level by pouring or injecting the resin mixture slowly into the mould so as to prevent air being trapped inside.

5.3.2 Allow the mould to stand for several minutes then re-check to ensure that the mould is filled to the required level, add resin as necessary.

5.4 Curing

5.4.1 Allow parts to cure for the time specified in Table I before removal from mould.

5.5 Finishing

5.5.1 After removal from the mould, trim parts of all excess resin, if necessary, to conform to the drawing requirements.

5.5.2 Thoroughly wipe parts with a clean dry cloth to remove all traces of the parting agent.

5.6 Clean-Up

5.6.1 Remove uncured resin from tools and equipment by solvent cleaning according to PPS 31.17.

6 REQUIREMENTS

6.1 Allow parts to cure for the time specified in Table I before removal from mould.

6.2 The surfaces of the moulded parts shall be free from voids and air bubbles.

6.3 Parts shall be free from distortion and shall meet the dimensional requirements of the engineering drawing.

7 SAFETY PRECAUTIONS

7.1 Safety precautions applicable to the materials and procedures specified herein shall be defined by the subcontractor performing the work for Bombardier Toronto.

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 solvents according to PPS 31.17.

9.2 Store resin components according to the precautions necessary for flammable materials.

9.3 Store resin components at a temperature of 60°F to 80°F.

9.4 Storage life of the resin components shall be as specified in PPS 13.28.

9.5 Resins and catalyst are supplied in matched batches and shall not be inter-mixed.

9.6 Clearly mark containers of resin and catalyst with the storage life expiry date.

9.7 When not in use, keep containers of resin components tightly closed.

10 MAINTENANCE OF EQUIPMENT

10.1 Keep all equipment clean and free from oil, moisture, dirt or other contaminants.

10.2 Carefully store and protect moulds against damage.

10.3 Clean tools according to PPS 31.17 before the resin hardens.