DE HAVILLAND AIRCRAFT OF CANADA LIMITED

PPS 34.39

PRODUCTION PROCESS STANDARD

PROPRIETARY INFORMATION

APPLICATION OF ALKYD BAKING ENAMEL (F5)

Issue 13
- This standard supersedes PPS 34.39, Issue 12.
- 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.

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Issue 13 - 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.

- Replaced throughout PPS where “Bombardier” is specified with “De Havilland Aircraft of Canada Limited” or “DHC”.
- Specified use of the following documents at frozen revisions for the DASH 8 program - BAERD GEN-007 at Rev. C; BAERD GEN-023 at Rev. A; and BAPS 138-055 at Rev. D.
- Deleted micrometer as an example of a film thickness gauge.
- Defined masking tape and masking paper, if masking of parts are required.
- Added reference to PPS 32.35 C10 coating if called out on the engineering drawing.
- Defined relative humidity recording and/or indicating equipment.
- Specified to mask off areas which are not to be enamel applied.
- Specified to wear clean lint-free gloves when handling parts for painting.
- Defined pot life.
- Revised mixing ratio of base to catalyst to 4:1 in place of 2:1 as per manufacturer’s technical data sheet.
- Revised dry film thickness to 0.002" - 0.004" in place of 0.001" - 0.0015".
- Allowed use of alternate equipment cleaning methods, provided all equipment is completely free of enamel and contaminants prior to the next use of such equipment.

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1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the spray application of baking enamel (Finish Code F5) to aircraft parts and assemblies.

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 Alternatively, where application of baking enamel (Finish Code F5) to DHMS C4.07 Type I or Type II is specified, it is acceptable to instead apply polyurethane enamel (Finish Code F24) to DHMS C4.04 Type 4, Class A according to PPS 34.03.

2 HAZARDOUS MATERIALS

2.1 Before receipt at De Havilland Aircraft of Canada Limited (DHC), all materials shall be approved and assigned Material Safety Data Sheet (MSDS) numbers by the DHC 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 Environment, Health and Safety Department.

3 REFERENCES

3.1 BAERD GEN-007, Rev. C - Quality Control of Heat Treating Equipment and Hot Forming Equipment.

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

3.3 BAPS 138-055, Rev. D - Accelerated Curing of Organic Coatings.

3.4 EHS-OP-005 - Hazardous Materials Management - *DHC internal operating procedure*.

3.5 PPS 13.26 - General Subcontractor Provisions.

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

3.7 PPS 17.02 - Abrasive Blasting.

3.8 PPS 23.02 - Protective Treatment and Decorative Surface Finish Code System.

3.9 PPS 31.04 - Degreasing Processes.

3.10 PPS 31.05 - Surface Treatment of Corrosion Resistant Steel (C9).

3.11 PPS 31.07 - Cleaning and Stripping of Painted Surfaces.

3.12 PPS 31.17 - Solvent Usage.

3.13 PPS 32.01 - Chemical Conversion Coating of Aluminum and Titanium Alloys by Immersion (C1).

3.14 PPS 32.02 - Manual Application of C1 Chemical Conversion Coatings.

3.15 PPS 32.03 - Chromic Acid Anodizing (A1).

3.16 PPS 32.07 - Corrosion Protection of Magnesium Alloys.

3.17 PPS 32.08 - Application of Zinc Phosphate Coatings to Plated Parts (C5).

3.18 PPS 32.35 - Chemical Conversion Coating for Low Electrical Resistance (C10).

3.19 PPS 34.03 - Application of Polyurethane Enamel.

4 MATERIALS AND EQUIPMENT

4.1 Materials

4.1.1 Baking Enamel, Alkyd, flat, pigmented, DHMS C4.07 Type I (single component product) or Type II (two component product).

4.2 Equipment

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

4.2.2 Protective wrapping material (e.g., neutral Kraft paper, Kimpac K41, Air-Cap C120 or D120 plastic bubble film, Poly Foam).

4.2.3 Cardboard boxes.

4.2.4 Lint-free cheese cloth or filter mesh.

4.2.5 Mechanical paint shaker, capable of agitation of enamel to ensure uniform distribution of solids without adversely affecting the enamel.

4.2.6 Masking paper, non-adhesive (e.g., 3M #06539, 3M #06736 “Scotchblok” or Kraft paper). Secure masking paper in place using the masking tape specified in paragraph 4.2.7.

4.2.7 Masking tape utilizing rubber based adhesive (e.g., 3M #218 or 3M #8428) for masking off areas which are not to be enamel applied.

4.2.8 Relative humidity recording and/or indicating equipment: sling psychrometer or hygrometer (e.g., Extech RHT20). Relative humidity recording and/or indicating equipment shall be calibrated and operated according to the manufacturers’ instructions.

4.2.9 Spray booths and rooms shall be equipped with suitable exhaust systems such that the air flow will not cause air turbulence or excessive air currents but be adequate to prevent dried overspray from settling on enamel surfaces that are still tacky. Adequate lighting shall be provided, including in under-surface areas.

4.2.10 Baking oven or area capable of maintaining a temperature of 325 ± 25°F (163 ± 14°C). Baking ovens or areas (conventional or infrared (IR)), shall be qualified according to BAPS 138-055 (including temperature uniformity survey according to BAERD GEN-007, Rev. C).

4.2.11 Film thickness gauge (e.g., Elcometer).

4.2.12 Viscometer, “Gardco EZ cup” Zahn #2 cup; do not use other brands of Zahn cups.

4.2.13 Compressed air for use with spray guns. Compressed air used with spray application equipment shall meet the requirements of BAERD GEN-023, Rev. A.

4.2.14 Spray guns and associated equipment (e.g., HVLP, air electrostatic, high pressure air assist, etc.) capable of applying coatings to the dry film thicknesses specified herein without unacceptable defects as specified in section 6. Operate spray guns and associated equipment according to the equipment manufacturers instructions.

4.2.15 Accelerated cure oven or area (conventional or infrared (IR)) qualified according to BAPS 138-055, Rev. D (including temperature uniformity survey according to BAERD GEN-007, Rev. C).

5 PROCEDURE

5.1 General

5.1.1 F5 baking enamel is a top coat which is used on interior metal surfaces for appearance purposes.

5.1.2 Type I and Type II enamels, as specified in DHMS C4.07, may be used interchangeably.

5.1.3 Always wear clean, lint-free cotton gloves (ref. paragraph 4.2.1) while handling parts for painting.

5.2 Paint Shop Conditions

5.2.1 Do not paint when the temperature is less than 60°F (16°C) or when the relative humidity is less than 30% or more than 80%. Use calibrated indicators to monitor and record temperature and humidity conditions.

5.2.2 Wash floors as frequently as required to avoid build-up of dust and loose overspray.

5.3 Preparation of Enamel

5.3.1 General

5.3.1.1 Only use Type I enamel and Type II enamel components within their storage lives (as marked on the container). Submit Type I enamel and Type II enamel components which have exceeded their storage life for shelf life extension testing and action according to PPS 13.28.

5.3.1.2 Dispose of Type I enamel or Type II enamel components which show signs of skinning, gelling, lumping, pigment separation or any other deterioration according to section 9.

5.3.1.3 Dispose of catalyst showing signs of milkiness or precipitation according to section 9.

5.3.2 Type I Enamel

5.3.2.1 Prepare F5, Type I enamel according to the manufacturers instructions or as follows:

Step 1. Use a paddle to break up any settling on the bottom of the can.

Step 2. Agitate the enamel on a mechanical paint shaker (ref. paragraph 4.2.5) for a minimum of 1 minute and a maximum of 20 minutes.

Step 3. Strain the enamel through a clean, lint-free cheesecloth or filter mesh.

Step 4. For spray application, thin the enamel to the spraying viscosity specified by the manufacturer using the solvent specified in PPS 31.17. Do not thin enamel to be used for touch-up. Verify the spray viscosity against the specified requirements with a “Gardco EZ cup” Zahn #2 cup. Ensure that the cup is thoroughly cleaned after every use. If there is reason to doubt the accuracy of the cup (e.g., clogging of the orifice) submit the cup for calibration or replace with a new certified cup.

5.3.3 Type II Enamel

5.3.3.1 Prepare F5, Type II enamel to the manufacturers instructions, or as follows:

Step 1. Use a paddle to break up any settling on the bottom of the can.

Step 2. Agitate the enamel on a mechanical paint shaker (ref. paragraph 4.2.5) for a minimum of 1 minute and a maximum of 20 minutes.

Step 3. Hand mix the base and catalyst in the ratio specified in Table I.

Step 4. Allow the mixed base and catalyst to stand for the reaction time specified in Table I.

Step 5. Strain the mixture through a clean, lint-free cheesecloth or filter mesh.

Step 6. For spray application, thin the enamel to the spraying viscosity specified by the manufacturer using the reducer specified in Table I. Do not thin enamel to be used for touch-up. Verify the spray viscosity against the specified requirements with a "Gardco EZ cup" Zahn #2 cup. Ensure that the cup is thoroughly cleaned after every use. If there is reason to doubt the accuracy of the cup (e.g., clogging of the orifice) submit the cup for calibration or replace with a new certified cup.

TABLE I - PREPARATION OF F5 TYPE II ENAMEL

MANUFACTURER	COMPONENTS	MIXING RATIO (BY VOLUME)	REACTION TIME (NOTE 1)	POT LIFE (NOTE 2)
Tristar Coatings Division of Trebor Industries Ltd.	Starcron 570 Series BASE	4	30 minutes minimum	12 hours
	Starcron 570C Series CATALYST	1		
	Starcron SB57 REDUCER	---		

Note 1. Allow the base and catalyst to react for the time specified before reducing.
Note 2. Pot life is the time during which mixed components remains suitable for application. The pot lives specified is based on a temperature of 70 to 77°F (21 to 25°C) and 50% ± 10% relative humidity. Higher temperature and humidity conditions will shorten the pot life.

5.4 Preparation of Parts

5.4.1 Ensure parts have received the appropriate surface treatment as specified below:

- Ensure that untreated aluminum alloys and Type I Ivadized parts have been chemical conversion coated according to PPS 32.35 (C10), PPS 32.01 (C1) or PPS 32.02 (C1), as applicable, or anodized according to PPS 32.03 (A1), as specified on the engineering drawing.
- Cadmium plated steel brass and bronze surfaces shall be zinc phosphate treated (C5) according to PPS 32.08 before painting.
- Corrosion resistant steel shall be passivated according to PPS 31.05 before painting.
- Magnesium shall be dichromate treated (C4) according to PPS 32.07 before painting.

5.4.2 Mask off areas which are not to be painted (ref. paragraph 4.2.6).

5.4.3 If parts are not painted immediately after conversion coating or anodizing, zinc phosphate treatment, passivating, or dichromate treatment (as applicable), vapour degrease according to PPS 31.04 or solvent clean according to PPS 31.17 to remove contaminants such as fingerprints, oil, grease, etc. immediately before painting. Begin painting immediately after the surface has been prepared.

5.5 Application of Enamel

5.5.1 Apply a thin, even cover coat (flash coat) followed by a full wet coat (final coat) to obtain a dry film thickness of 0.002" - 0.004". Allow the flash coat to become tacky before applying the final coat.

5.6 Baking of Enamel

5.6.1 Bake parts immediately after spraying at 325 ± 25°F (163 ± 14°C) for 15 minutes. Ensure that the oven or area is operating at the required temperature before inserting the parts. Ovens or areas (conventional or infrared (IR)) used for baking parts shall be qualified according to BAPS 138-055, Rev. D (including temperature uniformity survey according to BAERD GEN-007, Rev. C).

5.7 Clean Up

5.7.1 After use, clean equipment promptly according to PPS 31.17 to avoid drying of enamel on or in the equipment. Use of alternate cleaning methods are acceptable, provided all equipment is completely free of enamel and contaminants prior to the next use of such equipment.

5.8 Rework of Damaged or Defective Coatings

5.8.1 Touch up small pits and scratches by brush and air dry; heat curing is not required.

5.8.2 Strip coatings with defects other than small pits and scratches using chemical stripper according to PPS 31.07 or by abrasive blasting according to PPS 17.02 and re-process according to the original processing sequence.

5.9 Protection for Transport or Storage

5.9.1 Individually wrap painted parts to be transported or stored in protective wrapping material (ref. paragraph 4.2.2) and placed in cardboard boxes to provide protection against damage.

6 REQUIREMENTS

6.1 Check painted surfaces for damage such as scratches and defects such as blushes, runs, sags, pits, streaks, excessive orange peel, dried overspray, blisters, peeling or other irregularities that impair appearance or protective qualities. Damaged coatings are not acceptable and shall be reworked according to section 5.8.

6.2 Except as noted in paragraph 6.2.1, the dry film thickness, as measured with a film thickness gauge (ref. paragraph 4.2.11), shall be 0.002" - 0.004". Check the dry film thickness at selected locations. Refer coatings which fail to meet the dry film thickness requirements to DHC MRB or DHC delegated MRB for disposition.

6.2.1 In small repair areas touched up by brush according to section 5.8, it is acceptable to vary from the dry film thickness limitations provided that complete coverage is visually verified. Take care to avoid application of an excessively thick or thin coating beyond the dry film thickness limitations specified.

7 DHC SAFETY PRECAUTIONS

7.1 The safety precautions specified herein are specific to DHC to meet Canadian Federal and Provincial government environmental, health and safety regulations. It is strongly recommended that other facilities consider these safety precautions; however, suppliers, subcontractors and partners are responsible for ensuring that their own environmental, health and safety precautions satisfy the appropriate local government regulations.

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

7.3 Do not smoke or eat in paint spraying areas.

7.4 Always wear respiratory equipment according to PPS 13.13 while spraying or working in paint spraying areas.

7.5 Ensure that spray booths or rooms are equipped with forced or induced ventilation systems capable of maintaining sufficient ventilation to meet the requirements of the Occupational Health and Safety Act.

7.6 Do not have open flames or unprotected lights in areas where painting operations are carried out. Do not use infrared or other heat lamps in the paint booths (i.e. in any area where paint is being applied).

7.7 Soak used rags with water and keep them in the containers provided.

7.8 Refer to PPS 31.17 for safety precautions relating to solvents.

8 PERSONNEL REQUIREMENTS

8.1 Personnel responsible for the application of F5 baking enamel to aircraft parts and assemblies shall have a good working knowledge of the applicable procedure and requirements as specified herein and shall have exhibited their competency to their supervisor.

9 DISPOSAL OF CHEMICAL WASTES

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

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

10 STORAGE

10.1 Store Type I baking enamel and Type II baking enamel in a dry area at a temperature of 40°F - 100°F (4°C - 38°C); for optimum storage life, a temperature of 60°F - 80°F (16°C - 27°C) is recommended.

10.2 Refer to PPS 13.28 for the storage life of baking enamel and enamel components.

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