**BOMBARDIER**
*Toronto Site*
**PROPRIETARY INFORMATION**

# PPS 34.13

**PRODUCTION PROCESS STANDARD**

## APPLICATION OF TEFLON FILLED POLYURETHANE ENAMEL (F29)

Issue 13
- This standard supersedes PPS 34.13, Issue 12.
- Vertical bars in the left hand margin indicate technical changes over the previous issue.
- Direct PPS 34.13 related questions to michael.wright@aero.bombardier.com.
- This PPS is effective as of the distribution date.

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|---|---|---|---|
| Prepared By: | *Michael Wright* | (Michael Wright) | September 3, 2015 |
| | PPS Group | | |
| Approved By: | *Ken Quon*, for | (Emma Donlin) | September 4, 2015 |
| | Materials Technology | | |
| | *Anthony Assivero*, for | (David Dawe) | September 11, 2015 |
| | Quality | | |

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## 1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the spray application of abrasion and impact resistant teflon filled polyurethane enamel (finish code F29 according to PPS 23.02) to aircraft parts and small assemblies.

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 This standard covers the application of F29 enamel to parts in the detail or small assembly stage of manufacture. Refer to PPS 34.11 when painting major components (i.e. rudder, flaps) or completed aircraft with the aircraft exterior paint system.

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.

## 2 Hazardous Materials

2.1 Before receipt at Bombardier (Toronto Site), all materials must be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier (Toronto Site) 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 Site) Environment, Health and Safety Department.

## 3 References

### 3.1 General

3.1.1 Unless a specific issue is indicated, the issue of the reference documents specified in this section in effect at the time of manufacture shall form a part of this specification to the extent indicated herein.

### 3.2 Bombardier (Toronto Site) Specifications

3.2.1 EHS-OP-005 - Hazardous Materials Management - *Bombardier (Toronto Site) internal operating procedure*.

3.2.2 PPS 13.13 - Personal Protective Respiratory Equipment.

3.2.3 PPS 13.26 - General Subcontractor Provisions.

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

3.2.5 PPS 17.02 - Abrasive Blasting.

3.2.6 PPS 31.07 - Cleaning and Stripping of Painted Surfaces.

3.2.7 PPS 31.17 - Solvent Usage.

3.2.8 PPS 34.16 - Application of Epoxy-Amine, Urethane Compatible, Intermediate Primer (F23).

### 3.3 Bombardier Aerospace Specifications

3.3.1 BAERD GEN-023 - Contamination Control for Compressed Air.

## 4 Materials and Equipment

### 4.1 Materials

4.1.1 Unless otherwise specified in this section, use only the materials specified; use of superseding or alternative materials is not allowed.

4.1.2 Enamel, Teflon Filled, Polyurethane, Gloss or Pigmented, Finish Code F29, to DHMS C4.08.

4.1.3 Abrasives, 180 and 220 grit aluminum oxide abrasive paper (e.g., 3M TRI-M-ITE).

4.1.4 Polishing Compound, Met-All No. 1187.

4.1.5 Protective wrapping material (e.g., brown Kraft paper, Kimpac K41, AIR-CAP C120 or D120 plastic bubble film or Poly Foam).

4.1.6 Compressed air for use with spray guns. Compressed air used with spray application equipment must meet the requirements of BAERD GEN-023.

### 4.2 Equipment

4.2.1 Paint spray rooms equipped with forced or induced ventilation systems such that the air flow will not cause turbulence or excessive air currents but be adequate to prevent dried overspray from settling on surfaces which remain tacky. Adequate lighting must be provided. Spray rooms must be equipped with calibrated temperature and humidity indicators. Wash floors as frequently as required to avoid build-up of dust and loose overspray.

4.2.2 Mechanical paint shaker, capable of agitation of the base component to ensure uniform distribution of solids without adversely affecting the base component.

4.2.3 Sling psychrometer or hygrometer (hair type).

4.2.4 Lint free cheesecloth or filter mesh.

4.2.5 Film thickness gauge (e.g., Elcometer or micrometer).

4.2.6 Tack rags (e.g., DSC 375-1).

4.2.7 Neoprene rubber gloves (e.g., DSC 422-5).

4.2.8 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.

## 5 Procedure

### 5.1 General

5.1.1 F29 teflon filled polyurethane enamel is an abrasion and impact resistant coating for use on F19 primed surfaces.

5.1.2 F29 catalyst contains isocyanate. All personnel working with this material must be familiar with the safety precautions listed in section 7 and internal company procedures applicable to isocyanate material before handling or using such material.

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

### 5.2 Preparation of Enamel

5.2.1 Only use catalyst and base which are within their storage lives (as marked on the containers). Submit catalyst or base which is beyond its storage life for shelf life extension testing and action according to PPS 13.28.

5.2.2 Scrap any enamel base which shows signs of skinning, gelling, lumping, pigment separation, or any other deterioration.

5.2.3 If the catalyst shows signs of milkiness, precipitation and other deterioration, dispose of it according to EHS-OP-005.

5.2.4 Prepare F29 enamel according to the manufacturers instructions or as follows:

Step 1. Open the can and use a paddle to break up any caked paint at the bottom of the can.

Step 2. Close the can and agitate the base component on a mechanical paint shaker (ref. para. 4.2.2) for a minimum of 1 minute and a maximum of 20 minutes.

Step 3. Hand mix the base and hardener in the ratio specified in Table 1.

Step 4. Allow the mixture to react for at least 10 minutes.

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

Step 6. This is a high solids paint with a mixed viscosity at room temperature (i.e., 60 - 90°F (16 - 32°C)) of 15 - 25 seconds Zahn #3 (54 - 90 seconds Zahn #2). Add reducer to the mixture as required to obtain a desirable spraying viscosity, to a maximum of 50% of the volume of the catalyst/base mixture.

**Table 1 - Preparation of F29 Teflon Filled Polyurethane Enamel**

| MANUFACTURER | COMPONENTS | MIXING RATIO (BY VOLUME) | REACTION TIME (Note 1) | REDUCING RATIO (BY VOLUME) | POT LIFE |
|---|---|---|---|---|---|
| Akzo Nobel Aerospace Coatings | 23T3-XXX Base | 3 | 10 minutes minimum | ------ | 2 hours |
| | PC-216 Hardener | 1 | | | |
| | 66-C-28 Reducer | --- | --- | Note 2 | |

Notes 1. Allow the base and catalyst to react for the time specified before reducing.
2. Add reducer as required to obtain spraying viscosity (to a maximum of 50% of the volume of the catalyst/base mixture).

## 5.3 Preparation of Parts

5.3.1 Prime unprimed parts with F19 primer according to PPS 34.08. After cure, prepare the primed parts according to para. 5.3.2, para. 5.3.3 or para. 5.3.4, as applicable.

5.3.2 For F19, F22 and F24 primed or painted surfaces which have been cured for less than 12 hours at room temperature, to obtain proper topcoat adhesion use a tack cloth to remove loose particles (i.e., dust, etc.) immediately before painting.

5.3.3 For F19, F22 and F24 primed or painted surfaces which have been cured for 12 to 48 hours at room temperature, to obtain proper topcoat adhesion solvent clean according to PPS 31.17 and then wipe surfaces with a tack cloth immediately before painting.

5.3.4 Prepare F19, F22 and F24 primed or painted surfaces which have been heat cured or which have cured at room temperature for more than 48 hours as follows:

Step 1. Scuff the surface using aluminum oxide abrasive paper (180 grit for vibrating sanders, 220 grit for hand abrading). This helps achieve proper adhesion of the topcoat.

Step 2. Dust off the surface with a clean cloth.

Step 3. Re-activate the enamel or primer (as applicable) according to PPS 31.17.

Step 4. Apply a light coat of F23 (0.0003" - 0.0005") according to PPS 34.16.

Step 5. Allow parts to air dry approximately 2 - 24 hours before applying the topcoat.

Step 6. Immediately before painting, tack rag the surface to remove loose particles (i.e. dust, etc.).

## 5.4 Application of Enamel

5.4.1 Start painting immediately after the surface has been prepared.

5.4.2 Apply the enamel in even coats with a dry film thickness of 0.0015" to 0.0025" each.

5.4.3 Allow 15 minutes flash-off time between coats.

5.4.4 Unless otherwise specified by the engineering drawing, Engineering Order, or Product Specification, apply enamel to a total dry film thickness of 0.008" - 0.010".

## 5.5 Curing of Enamel

5.5.1 Allow the enamel to cure according to Table 2.

**Table 2 - Cure Schedule for F29 Teflon Filled Polyurethane Enamel**

| APPLICABILITY | MINIMUM CURE TIME at 77°F (25°C) (Note 1) |
|---|---|
| Shipping or transporting | 12 hours |
| Exposure to moisture, rain, or temperatures below 60°F (16°C) | 24 hours |
| Full cure | 168 hours (7 days) |
| Note 1. Longer cure times are necessary at temperatures below 77°F (25°C); do not allow the cure temperature to fall below 60°F (16°C) minimum. Do not heat cure above room temperature. | |

### 5.6 Rework of Damaged or Defective Coatings

#### 5.6.1 Dried Overspray

5.6.1.1 Allow the coating to cure for at least 24 hours before removing dried overspray.

5.6.1.2 Remove dried overspray by solvent cleaning according to PPS 31.17 or by polishing with Met-All polishing compound.

#### 5.6.2 Small Pits and Scratches

5.6.2.1 Use a brush to touch up small pits and scratches.

#### 5.6.3 Other Minor Defects

5.6.3.1 Repair other minor defects as follows:

Step 1. Locally strip the coating in the area of the defect according to PPS 31.07.

Step 2. Feather edge the old finish adjacent to the stripped area by sanding with abrasive paper and wiping with a tack rag.

Step 3. Spot in the applicable pre-treatment coatings where the base material (metal or plastic) has been exposed, lapping slightly over the old finish.

Step 4. Repaint the area according to the procedures specified in this standard.

#### 5.6.4 Major Defects

5.6.4.1 Completely strip coatings with major defects using chemical stripper according to PPS 31.07 or by abrasive blasting according to PPS 17.02.

5.6.4.2 After stripping, reprocess the part according to the original processing sequence.

### 5.7 Protection for Transport or Storage

5.7.1 Use protective wrapping (see Materials section, para. 4.1.5) to individually wrap painted parts to be transported or stored and place them in cardboard boxes to provide protection against damage.

### 5.8 Clean-Up

5.8.1 Promptly solvent clean equipment according to PPS 31.17 to avoid dried paint on or in the spray equipment.

## 6 Requirements

6.1 Check painted surfaces for damage (such as scratches), defects (such as blushes, runs, sags, pits, streaks, excessive orange peel, dried overspray, blisters, peeling) or other irregularities that impair appearance or protective qualities. Repair damaged or defective coatings as specified in section 5.6.

6.2 Unless otherwise specified by the engineering drawing, E.O. or Product Specification, the dry film thickness, as measured with a dry film thickness gauge or micrometer, shall be 0.008" - 0.010". Check the dry film thickness at selected locations. When using a micrometer or film thickness gauge, check the thickness at locations where the total material thickness, including the underlying primer coating, has been previously measured and recorded. If the thickness cannot be measured with a film thickness gauge (i.e., non-metallic parts) or where the thickness cannot be measured by micrometer, a test panel shall be sprayed, using the same procedure as the production parts, to measure the film thickness. Refer coatings which fail to meet the dry film thickness requirements to Bombardier (Toronto Site) MRB or Bombardier (Toronto Site) delegated MRB.

6.2.1 In small repair areas touched up by brush application, 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 Safety Precautions

**7.1 The safety precautions specified herein are specific to Bombardier Toronto to meet Canadian Federal and Provincial government environmental, health and safety regulations. It is 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 general shop safety precautions when performing the procedure specified herein.**

**7.3 Do not smoke or eat in paint spraying areas.**

**7.4 Spray booths and spray rooms shall be equipped with suitable exhaust system. Paint spray rooms must be equipped with forced or induced ventilation systems capable of maintaining sufficient ventilation to meet the requirements of the Occupational Health and Safety Act.**

**7.5 Avoid inhalation of fumes or vapours from mixed F29 or its components.**

**7.6 Always wear personal protective respiratory equipment as specified in PPS 13.13 when working with mixed F29 or raw catalyst.**

**7.7 Always wear protective coveralls, rubber gloves, and de Havilland approved safety glasses when handling mixed F29 or raw catalyst. Avoid skin contact with mixed F29 or its components. If skin contact occurs, wash contact area thoroughly with soap and water. 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.**

**7.8 Wash hands thoroughly with soap and water immediately after using F29.**

**7.9 If there is a spillage of mixed F29 or raw catalyst, clear the immediate area of all personnel and clean up the spill according to EHS-OP-005.**

**7.10 Dispose of empty cans, containers, rags, wipers, or paper contaminated with mixed F29 or raw catalyst according to EHS-OP-005.**

**7.11 Dispose of excess mixed F29 according to EHS-OP-005.**

## 8 Personnel Requirements

8.1 Personnel responsible for the spray application of abrasion and impact resistant teflon filled polyurethane enamel to aircraft parts and small assemblies must have a good working knowledge of the procedure and requirements as specified herein and shall have exhibited their competency to their supervisor.

## 9 Storage

9.1 Store F29 enamel in a dry area at a temperature of 40 - 100°F (4 - 38°C); for optimum storage life, a temperature of 60 - 80°F (16 - 27°C) is recommended. Store primer catalyst and base according to PPS 13.28.