BOMBARDIER
Toronto Site
PROPRIETARY INFORMATION

PPS 22.06

PRODUCTION PROCESS STANDARD

SCREEN PRINTING - DIRECT PROCESS

Issue 10
- This standard supersedes PPS 22.06, Issue 9.
- 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.

Prepared By:	(Christie Chung)	February 11, 2019
	PPS Group	
Approved By:	(Stephen Mabee)	February 22, 2019
	Materials Technology	
	(Chris Schnitzler)	February 25, 2019
	Quality	

Issue 10 - 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.

- Added new Facilities Requirements section (i.e., this PPS has been categorized as a Controlled Special Process according to PPS 13.39).
- Revised Personnel Requirements section to refer to PPS 13.39 for additional requirements.
- Added new Disposal of Chemical Wastes and Storage sections.
- Added new paragraph to Safety Precautions section that the safety precautions specified herein are specific to Bombardier Toronto 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.
- Added additional storage information for material.

TABLE OF CONTENTS

Sections **Page**

Tables

1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for screen printing label markings directly onto aircraft parts or onto a self-adhesive film to be applied to the part.

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.

1.2 Refer to PPS 22.07 for reverse process screen printing.

1.3 In place of the procedure outlined in this PPS, as an alternative, it is acceptable to apply the Gerber process for marking labels for aircraft parts according to PPS 22.12.

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 EHS-OP-005 - Hazardous Materials Management, *Bombardier Toronto internal operating procedure*.

3.2 PPS 13.13 - Personal Protective Respiratory Equipment.

3.3 PPS 13.26 - General Subcontractor Provisions.

3.4 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.5 PPS 22.02 - Application of Film Labels.

3.6 PPS 22.03 - Photographic Process for Preparation of Screen Print Stencils.

3.7 PPS 22.07 - Screen Printing - Reverse Process.

3.8 PPS 22.12 - Preparation of Gerber Labels.

3.9 PPS 31.17 - Solvent Usage.

4 MATERIALS, EQUIPMENT AND FACILITIES

4.1 Materials

4.1.1 Printing inks, thinners, retarders and wash-up solvents as listed in Table I.

4.1.2 Pressure sensitive film (as specified on the engineering drawing).

4.2 Equipment

4.2.1 Screen printing stencils, prepared according to PPS 22.03.

4.2.2 Suitable squeegees for application of screen printing ink.

4.2.3 Polyethylene squeeze bottles.

4.2.4 Plunger cans (Protectoseal Co.).

4.2.5 Light duty neoprene rubber gloves (e.g. DSC 422-5).

4.2.6 Bombardier approved chemical splash goggles.

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 screen printing label markings directly onto aircraft parts or onto a self-adhesive film to be applied to the part according to this PPS.

4.3.2 Bombardier subcontractors must direct requests for approval to Bombardier Aerospace Supplier Quality Management. Bombardier Aerospace facilities must direct requests for approval to the appropriate internal Quality Manager.

4.3.3 Facility approval must be based on a facility report, a facility survey and completion of a qualification test program, if required. The facility report must 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 must 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 must 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 screen printing label markings directly onto aircraft parts or onto a self-adhesive film to be applied to the part according to this PPS, completion of a test program and submission of suitable test samples representative of production parts may be required. Test samples must meet the requirements specified by Bombardier Toronto Engineering.

5 PROCEDURE

5.1 General

5.1.1 Use DSC 85 pressure sensitive film of the type and colour specified on the engineering drawing for self-adhesive labels.

5.1.2 Store pressure sensitive film as manufacturer supplied sheets or rolls to protect the film from contamination or damage at all times.

5.2 Surface Preparation

5.2.1 If necessary, solvent wipe the film surface to be screen printed according to PPS 31.17.

5.3 Screen Printing

5.3.1 Refer to Table I for the screen printing inks to use on specific surfaces.

5.3.2 Use screen printing ink of the colour specified on the engineering drawing.

5.3.3 Screen print surfaces as follows:

Step 1. Use blocks to raise the screen frame 1/8" to 1/4" above the surface to be printed (i.e., the off-contact method of screen printing).

Step 2. Stir the printing ink to a uniform consistency in its container. If necessary, use the screen printing ink thinners and retarders listed in Table I to thin the printing ink to the required viscosity while maintaining an acceptable drying time.

Step 3. Pour a small quantity of ink into one end of the screen print frame.

Step 4. Using a suitable squeegee, draw the ink across the screen stencil in one smooth motion. Apply sufficient pressure to the squeegee to maintain the screen stencil in contact with the surface during the printing stroke.

Step 5. If applying multiple colour markings, allow each colour to air dry at room temperature for a minimum of 2 hours before screen printing the next colour as specified above. Place film labels to dry on racks which provide adequate air circulation.

Step 6. Allow the final colour to dry for a minimum of 24 hours before handling or protective coating the film or structure.

Step 7. Apply film labels to the aircraft parts or structure according to PPS 22.02.

TABLE I - SCREEN PRINTING INK & SOLVENT SELECTION (SEE NOTE 1)

TYPE OF SURFACE TO BE PAINTED	SCREEN PRINTING INK		SOLVENTS		
	TYPE	DESCRIPTION	THINNER	RETARDER	WASH-UP
DSC 85-1 Polyester Film	9600 (RAM)	Polyester Ink Gloss Finish	9630	9631	CT-975
DSC 85-2 Vinyl Film DSC 85-3 Glow Film	System 2 (LOV)	Vinyl Ink Gloss Finish	S230	S231	CT-902
• Bare Metal • Primer • Paint • Fibreglass • ORCON OT6 (silver tape)	59000 (PE)	Enamel Ink Gloss Finish	59000 Thinning Varnish	CT-910	
• Polycarbonate • Ultem • Declar	GV-Gloss Vinyl	Vinyl Ink Gloss Finish	VF 180 Vinyl Thinner	VF 182 Vinyl Retarder	VF 184 Screen Wash
Note 1. All products listed in this table are from NAZ-DAR CANADA.					

5.4 Clean-Up

5.4.1 Ensure that adequate ventilation is provided at all times while cleaning tools and screens with solvent.

5.4.2 Always wear rubber gloves and splash goggles when cleaning tools and screen stencils.

5.4.3 Before solvent cleaning, remove as much screen ink as possible from the screen stencil and squeegee and return the ink to its original container.

5.4.4 Solvent clean the screen stencil and squeegee, using the wash-up thinners specified in Table I, according to PPS 31.17.

5.4.4.1 If necessary, lightly scrub screen stencils with a small stiff bristle brush soaked with wash-up thinners to remove ink.

5.4.5 Ensure that the wash-up thinners have completely evaporated off the screen before storing the screen.

6 REQUIREMENTS

6.1 Except as noted in paragraphs 6.1.1 and 6.1.2, the finish markings shall be according to the requirements of the engineering drawing.

6.1.1 If identification markings in any of the following areas have faded or been removed through shop handling, re-screen the identification onto clear self-adhesive film and apply it as a label:

- the backs of instrument panels
- inside junction boxes
- non-visible areas

6.1.2 If identification markings have been obscured or covered by parts of the assembly, contact Liaison Engineering to have the marking re-positioned on the assembly drawing.

6.2 All lettering and markings shall be clear, legible, and free from runs, smears, blisters or other defects.

6.3 All lettering and marking colours shall be as specified on the engineering drawing.

6.4 If screen printing on vinyl or polyester films, the film shall be of the correct type and colour as specified on the engineering drawing.

6.5 Cleanliness

6.5.1 Clean label manufacturing room at the intervals specified in Table II or sooner if any accumulation of dust, dirt or other contamination is evident. Maintain records of dates of cleaning.

TABLE II - SCHEDULE FOR CLEANING LABEL MANUFACTURING ROOM

ITEMS	MAXIMUM CLEANING TIME INTERVAL	CLEANING METHOD
Tables	Monthly	Wipe with damp cloth
Floors	Monthly	Vacuum and/or damp mop
Equipment	Monthly	Wipe with damp cloth
Walls from the floor to a height of 7 feet	6 Months (check condition at least once every 7 days and clean if necessary)	Appropriate method to remove accumulated dirt, dust, grease, etc.
Walls above 7 feet high, ceilings, beams, light fixtures, etc.	6 Months (check condition at least once every 30 days and clean if necessary)	

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 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 screen printing areas.

7.4 Do not ingest any of the materials specified herein. Always wash hands before eating or smoking. If any material is ingested, obtain immediate medical attention.

7.5 Keep screen printing inks away from fire and other sources of ignition.

7.6 Wear protective respiratory equipment as specified in PPS 13.13 when working with any of the inks specified herein.

7.7 Equip screen printing areas with a suitable exhaust system.

7.8 Store inks in their original containers or Bombardier Toronto approved safety cans. Keep the containers or safety cans in flammable material (yellow) storage cabinets.

7.9 Wear rubber gloves and splash goggles all times when handling the inks specified herein.

7.10 Avoid skin contact with the inks specified herein. If contact occurs, wash thoroughly with soap and water.

7.11 Wear safety eye glasses when handling inks specified herein. 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.

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

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

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 DISPOSAL OF CHEMICAL WASTES

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

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

10 STORAGE

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

10.2 Films shall be stored at relative humidity above 40% and at a temperature of 65 to 90°F (18 to 32°C). Light sensitive film should be stored in the as-received container in a dark cabinet.

10.3 Store films as manufacturer supplied rolls to protect the film from contamination or damage at all times.

10.4 Store inks in its original container sealed tightly. Inks shall be stored at a temperature of 65 to 90°F (18 to 32°C).

10.5 Films and inks shall not be used if shelf life is exceeded.

10.6 Store solvents according to PPS 31.17.