BOMBARDIER
Toronto Site
PROPRIETARY INFORMATION

PPS 22.07

PRODUCTION PROCESS STANDARD

SCREEN PRINTING - REVERSE PROCESS

Issue 6
- This standard supersedes PPS 22.07, Issue 5.
- 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 7, 2019
	PPS Group	
Approved By:	(Stephen Mabee)	February 22, 2019
	Materials Technology	
	(Chris Schnitzler)	February 25, 2019
	Quality	

Issue 6 - 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.
- Specified to always use the oldest stock first (i.e., first in/first out (FIFO) basis).

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Tables

1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the fabrication of self-adhesive film labels using reverse process screen printing.

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 22.06 for direct process screen printing.

1.3 Except for braille symbol labels printed on DSC 85-8 film, 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 and Film Graphics.

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

3.7 PPS 22.06 - Screen Printing - Direct 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 as follows:

- For DSC 85-4 clear polyester film, use printing inks as specified in Table I, 9630 reducer (thinner), 9631 retarder and CT-975 Screen Wash.
- For DSC 85-8 clear Lexan polycarbonate film, use printing inks, reducer (thinner), retarder and Screen Wash solvent as specified in Table II.

4.1.2 Label film material as specified on the engineering drawing.

4.1.2.1 If label film material is not specified on the engineering drawing, use the following:

- For braille symbol labels, use DSC 85-8 clear Lexan polycarbonate film.
- For all other reverse print labels, use DSC 85-4 clear polyester film.

4.1.3 Adhesive transfer tape as follows:

- For DSC 85-4 clear polyester film, use DSC 91-14 (modified acrylic adhesive, nominal thickness 2.0 mil) OR DSC 91-13 (acrylic adhesive - nominal thickness 5.0 mil). Use DSC 91-13 **only** if specified on the engineering drawing.
- For DSC 85-8 clear Lexan polycarbonate film, use DSC 91-27 (300 high strength acrylic adhesive, nominal thickness 5.0 mil).

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 the fabrication of self-adhesive film labels using reverse process screen printing 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 the fabrication of self-adhesive film labels using reverse process screen printing 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 specified on the engineering drawing (see paragraph 4.1.2).

5.1.2 Fabrication of film labels according to this standard consists of screen printing a mirror image, if the required legend is to be on the back side of a clear film, followed by overprinting with the required background colour and application of a pressure sensitive adhesive tape overall.

5.1.2.1 The resultant self-adhesive label presents the clear plastic film as a smooth, uniform outer surface which protects the printed legend from wear or damage in service.

5.1.3 Store polyester and polycarbonate films as manufacturer supplied rolls to protect the film from contamination or damage at all times.

5.2 Film 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 Use screen printing ink of the colour specified on the engineering drawing for the label legend and background.

5.3.1.1 For screen printing polyester labels, use only polyester type inks to DSC 301. Refer to Table I for a cross reference of FS595 and DSC 301 colour codes against standard Bombardier Toronto screen printing colour inks for polyester labels.

TABLE I - SCREEN PRINTING INK COLOURS FOR POLYESTER LABELS

FS595 NO.	DSC 301 DASH NO.	COLOUR - LUSTRE
14187	-14187	GREEN - GLOSS
17178	-17178	SILVER - GLOSS
21105	-21105	RED - SEMIGLOSS
23538	-23538	YELLOW - SEMIGLOSS
27038	-27038	BLACK - SEMIGLOSS
36306	-36306	GREY - LUSTRELESS
37875	-37875	WHITE - LUSTRELESS
37886	-37886	BEIGE - LUSTRELESS

5.3.1.2 For screen printing Lexan polycarbonate labels, use Naz-Dar Canada GV Series Ink only as specified in Table II.

TABLE II - SCREEN PRINTING INK & SOLVENT FOR DSC 85-8 LEXAN FILM (SEE NOTE 1)

SCREEN PRINTING INK		SOLVENTS		
TYPE	DESCRIPTION	REDUCER (THINNER)	RETARDER	SCREEN WASH
GV Series	Vinyl Ink Gloss Finish	VF180 Vinyl Thinner	VF182 Vinyl Retarder	IMS201 Premium Graphic
Note 1. All products listed in this table are from NAZ-DAR CANADA.				

5.3.2 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. Select the correct colour ink for the label legend and stir the printing ink to a uniform consistency in its container. If necessary, use the screen printing ink Reducer (Thinner) and Retarder listed in Table II 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. Position the screen on the film and, 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. Allow the printed legend to air dry at room temperature for a minimum of 2 hours. Place film labels to dry on racks which provide adequate air circulation.

Step 6. Repeat Step 2 to Step 5, if applying multiple legend colours, for each additional legend colour.

Step 7. Apply background colours, using a 125 size mesh fabric screen prepared according to PPS 22.03.

Step 8. Allow the final colour to air dry at room temperature for a minimum of 8 hours.

Step 9. Apply adhesive transfer tape according to section 5.4.

Step 10. Apply film labels to the aircraft parts or structure according to PPS 22.02.

5.4 Application of Adhesive Transfer Tape

5.4.1 Apply adhesive transfer tape as follows:

Step 1. Place the printed film, printed side up, on a suitable clean, flat work surface.

Step 2. Cut a piece of DSC 91 (see paragraph 4.1.3) adhesive transfer tape of a sufficient size to cover the entire surface of the label and to extend a minimum of 1/2" beyond the label trim line. Use the appropriate DSC 91 adhesive transfer tape as specified in paragraph 4.1.3.

Step 3. Position the transfer tape centrally over the film label and starting at one end, carefully roll the tape down onto the film label by hand. Handle adhesive transfer tape by the corners and edges only (avoid touching the adhesive as much as possible). Do not remove the backing paper from the adhesive tape.

Step 4. Rub the adhesive tape down over the entire surface using a suitable squeegee or rubber roller to improve the bond between the adhesive and film label.

Step 5. Trim the finished label to the required size and shape according to the engineering drawing.

5.5 Clean-Up

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

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

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

5.5.4 Solvent clean the screen stencil and squeegee, using the appropriate Screen Wash solvent (see paragraph 4.1.1) according to PPS 31.17.

5.5.4.1 If necessary, lightly scrub screen stencils with a small stiff bristle brush soaked with the Screen Wash solvent to remove ink.

5.5.5 Ensure that the Screen Wash solvent have completely evaporated off the screen before storing the screen.

6 REQUIREMENTS

6.1 The finished label shall be according to the requirements of the engineering drawing.

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

6.3 Background colours shall be uniform in colour and tone over the entire label.

6.4 Adhesive transfer tape shall be trimmed flush with the label edges and shall cover the entire back of the label.

6.4.1 The adhesive tape backing paper shall not be removed until immediately before applying the label according to PPS 22.02.

6.5 Cleanliness

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

TABLE III - 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 Refer to PPS 31.17 for the safety precautions for handling and using solvents.

7.4 Do not smoke or eat in screen printing areas.

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

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

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

7.8 Equip screen printing areas with a suitable exhaust system.

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

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

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

7.12 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.

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

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.