BOMBARDIER Toronto (de Havilland) **Proprietary Information**	**PPS 27.06** **Production Process Standard (PPS)**

Decorative Surface Finishes

Issue 8 - This standard supersedes PPS 27.06, Issue 7.

- Vertical lines in the left hand margin indicate technical changes over the previous issue.
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Issue 8 - 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 section(s) of this PPS for detailed procedure and requirements.

- Clarified para. 1.1.3, to dispel possible misunderstanding of the relationship between various Bombardier process specifications.
- Added new sub-section 3.1 and para. 3.1.1, to ensure correct usage of reference specifications.
- Created new sub-section 3.2, to identify PPS document references as Bombardier Toronto (de Havilland) process specifications.
- Added new para. 4.1.1, to prevent inappropriate material substitution.

Issue 8 - Summary of Changes (over the previous issue) continued

- Revised para. 4.1.3 reference to protective wrapping material to specify Kraft paper. Kimpac K41, and CAP Air C120 or D120 plastic bubble film, as examples.
- Clarified section 5.3.5, Flow Chart 1, Flow Chart 2 and Flow Chart 3 instructions for application of an SF 32 finish (Medium Brush).
- Revised para. 5.4.1, to replace reference to F13 Type 3 corrosion preventive compound with reference to F13 Grade 3 Type I corrosion preventive compound.
- Clarified para. 5.4.3 reference to post surface finishing protective treatments which may be specified by the engineering drawing.
- Revised para. 5.4.3 to remove reference to application of F30 protective coatings (as per PPS 34.36) for protection of surface finished aluminum alloy parts.
- Added para. 7.1 to clarify applicability of the safety precautions specified herein.

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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for applying surface finishes to stainless steel, aluminum and carbon/low alloy steel parts.

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 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.

2 Hazardous Materials

2.1 Before receipt at Bombardier Toronto (de Havilland), all materials must be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Toronto (de Havilland) 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 (de Havilland) 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 (de Havilland) Process Specifications

3.2.1 PPS 13.13 - Personal Protective Respiratory Equipment.

3.2.2 PPS 13.26 - General Subcontractor Provisions.

3.2.3 PPS 16.01 - Application of Hard and Soft Film (F13) Corrosion Preventive Compound.

3.2.4 PPS 17.02 - Abrasive Blast Cleaning.

3.2.5 PPS 31.02 - Cleaning Processes for Aluminum and Aluminum Alloys.

3.2.6 PPS 31.03 - Cleaning of Carbon and Low Alloy Steels.

3.2.7 PPS 31.04 - Degreasing Processes.

3.2.8 PPS 31.05 - Surface Treatment of Corrosion Resistant Steels.

3.2.9 PPS 31.15 - Electropolishing.

3.2.10 PPS 31.17 - Solvent Usage.

3.2.11 PPS 32.05 - Colour or Colourless Anodizing - Sulphuric Acid Process (A3).

3.2.12 PPS 33.07 - Satin Finish Decorative Chromium Plating (E5 & E6).

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 Adhesive protective paper (e.g., Excel 660).

4.1.3 Protective wrapping material (e.g., Kraft paper. Kimpac K41, CAP Air C120 or D120 plastic bubble film, etc.).

4.1.4 Abrasive paper, aluminum oxide, 200 - 600 grit.

4.1.5 Abrasive belt, fine (e.g., Scotch Brite).

4.1.6 Buffing and polishing compounds.

4.1.7 Glass bead shot abrasive blast media.

4.1.8 G40 steel grit abrasive blast media.

4.1.9 Sodium hydroxide bath.

4.2 Equipment

4.2.1 Drill press.

4.2.2 Polisher, portable, hand held.

4.2.3 Polishing and buffing equipment, stationary.

4.2.4 Polishing and buffing cloths.

4.2.5 Buffing and polishing wheels.

4.2.6 Rhombus (e.g., Fein #63719007001).

4.2.7 Gloves, leather (e.g., DSC 422-3).

4.2.8 Gloves, neoprene (e.g., DSC 422-5).

5 Procedure

5.1 General

5.1.1 Standard decorative surface finishes, identified by SF finish codes, define the surface finish of aircraft interior appearance items and are applied as specified on the engineering drawing. Refer to Table 1 for a general description of each type of finish.

Table 1. **Decorative Surface Finishes**

Finish Code	Name	General Description	Surface Roughness
SF 11	mirror bright buffed	highly reflective finish, essentially free of grit lines	- - - -
SF 12 (use finish type SF 11)			
SF 21	bright satin	bright finish, very fine texture	8 – 16 RMS
SF 22	semi-bright satin	matt finish, fine texture	32 – 125 RMS
SF 23 (use finish type SF 22)			
SF 24	coarse satin	matt finish, coarse texture	250 – 1000 RMS
SF 31 (use finish type SF 32)	medium brush	medium brushed finish	32 – 64 RMS
SF 32			
SF 33 (use finish type SF 32)			

5.1.2 To achieve a surface finish comparable to the respective standard sample, refer to Flow Chart 1, Flow Chart 2 or Flow Chart 3 for the recommended finishing procedure for corrosion resistant steel (CRES) parts, aluminum parts and carbon or low alloy steel parts, respectively. The surface finish preparation details specified in section 5.3 are only a guide; it is acceptable to alter the

surface finishing methods and abrasive mesh size, as necessary, to produce the required surface finish. The SF surface finish codes specified in this standard define the surface finish of the base metal only.

5.1.3 Satin finishes can be readily applied to flat surfaces as well as complex shapes. Heat treatment, forming and welding operations should be completed before SF21 surface finishing. The finishing methods used to produce the satin finish will remove any scale or discolouration from heat treatment or welding.

5.1.4 Buffed finishes are more readily applied to flat surfaces than to complex shapes. On complex shaped parts it may be difficult or even impossible to polish and buff areas such as small inside corners and outside corners may be rounded off during polishing and buffing. Except for low temperature heat treatment which will not scale or discolour the surfaces, heat treatment operations should be carried out before SF11 surface finishing. Forming operations such as dimpling, rolling or brake forming should be carried out after surface finishing the material in the flat condition. Use protective paper during such forming operations to prevent tool mark-off. Welding operations should normally be carried out after surface finishing and the heat discoloured area locally touched up by polishing and buffing. Blend in weld beads only if specified on the engineering drawing.

5.1.5 The brushed finish is more readily applied to flat surfaces than to complex shapes. On complex shaped parts it may be difficult or even impossible to polish areas such as small inside corners and outside corners may be rounded off during polishing. Except as noted, heat treatment operations should be carried out before surface finishing. Low temperature heat treatment which will not scale or discolour the surface may be carried out after surface finishing. If high temperature heat treatment is necessary after surface finishing (e.g., post weld stress relief, etc.) the parts must be chemically cleaned according to PPS 31.02, PPS 31.03 or PPS 31.05, as applicable, although some discolouration of the surface can be expected. Forming operations such as dimpling, rolling or brake forming should be carried out after surface finishing the material in the flat condition. Protective coating as per section 5.4 shall be used during such forming operations to prevent tool mark-off. Welding operations should normally be carried out after surface finishing and the heat discoloured area locally touched up by abrading to match the finish or by chemically cleaning according to PPS 31.02, PPS 31.03 or PPS 31.05, as applicable. Weld beads shall only be blended in if specified on the engineering drawing.

5.1.6 Except as noted, use only iron free abrasives and compounds when surface finishing aluminum or corrosion resistant steel parts. Cast iron or steel grit may be used for SF 24 finish on aluminum alloys but must be followed by deoxidizing according to PPS 31.02.

5.2 Preparation of Parts

5.2.1 Before surface finishing, remove contaminants from all parts by solvent cleaning according to PPS 31.17 or by degreasing according to PPS 31.04.

5.3 Surface Finishing

5.3.1 SF 11 Finish - Mirror Bright Buffed

5.3.1.1 For corrosion resistant (CRES) parts the equivalent mill finish, #8, should be used if possible.

5.3.1.2 Finish surfaces for a SF11 surface finish by abrading parallel to the material grain direction using a hand or belt sander with successively finer abrasives to 200 - 240 grit. Remove surface imperfections by abrading parallel to the material grain direction using a hand or belt sander with successively finer abrasives from 200 to 600 grit. As an alternative to abrading, stainless steel (CRES) parts may be electropolished according to PPS 31.15.

5.3.1.3 After abrading, apply buffing compound to the surface and buff the part until the surface becomes highly reflective and the grit lines from abrading have been polished out. Surfaces may require additional applications of buffing compound to produce the required finish.

5.3.2 SF 21 Finish - Bright Satin

5.3.2.1 Achieve a SF21 surface finish by dipping parts in a light sodium hydroxide bath suitable for etching.

5.3.3 SF 22 Finish - Semi-Bright Satin

5.3.3.1 Abrasive blast the part surfaces with glass beads according to PPS 17.02. Ensure that all surfaces that are not to be surface finished are suitably masked with blanking plates, masking tape, plastic caps or plugs, as necessary, before abrasive blasting.

5.3.4 SF 24 Finish - Coarse Satin

5.3.4.1 Apply the coarse satin finish to aluminum and aluminum alloy parts only. Finish the part surface by abrasive blasting with G40 steel grit according to PPS 17.02. Ensure that all surfaces that are not to be surface finished are suitably masked with blanking plates, masking tape, plastic caps or plugs, as necessary, before abrasive blasting.

5.3.5 SF 32 Finish - Medium Brush

5.3.5.1 For corrosion resistant (CRES) parts the equivalent mill finish, #4, should be used if possible.

5.3.5.2 Finish the part surface by abrading using a suitably mounted abrasive belt. Move the part continuously across the abrasive belt while maintaining uniform pressure against the belt; ensure movement of the part is continuous to prevent excessive abrading in any area of the part.

5.3.5.3 Finish small radii, inside corners and other inaccessible areas by hand using a rhombus.

5.4 Protection of Finished Surfaces

5.4.1 For carbon or low alloy steel parts, before protective wrapping, apply F13 Grade 3 Type I, corrosion preventive compound to all surfaces according to PPS 16.01.

5.4.2 Except for complex shaped parts, cover finished surfaces with adhesive protective paper. Individually wrap complex shaped parts which are unsuitable for covering with adhesive protective paper in protective wrapping material.

5.4.3 The following protective treatment of parts after surface finishing may be specified by the engineering drawing.

- Aluminum parts are normally A3 anodized (as per PPS 32.05) or left untreated.
- Stainless steel (CRES) parts normally do not require any protective treatment.
- Carbon and low alloy steel parts are normally chrome plated. A bright decorative chrome would be used for mirror bright buffed finished surfaces while either E5 (dull satin) or E6 (bright satin) decorative chrome, as per PPS 33.07, would be used for satin or brushed finishes.

5.4.4 Remove adhesive protective paper only if required for operations such as welding, heat treatment, chemical cleaning, etc. If possible, replace the protective paper immediately after the completion of the operation.

5.4.5 In order to prevent tool mark-off during operations such as dimpling, punching, shearing, rolling or forming, do not remove the protective paper.

5.4.6 Unless it is necessary to facilitate installation of the part in the aircraft, do not remove the protective paper until the aircraft undergoes final preparation for delivery.

5.4.7 Re-wrap the parts immediately after any work operations.

5.4.8 Place all surface finished parts in cardboard boxes while being transported or stored to provide additional protection against damage.

5.4.9 Take extreme care when handling surface finished parts as these surfaces are appearance items on the interior and repair of a damaged surface is extremely difficult.

5.5 Repair of Damaged Decorative Surface Finishes

5.5.1 Repair decorative surface finishes which have been damaged as detailed in para. 5.5.1.1, 5.5.1.2 or 5.5.1.3, as applicable. If a protective treatment has been applied (i.e., plating or anodizing), remove it before rework and then re-apply after rework.

5.5.1.1 For repair of mirror bright buffed finish (SF 11), repair damaged areas by locally blending in the finish using the original preparation procedure.

5.5.1.2 For repair of satin finishes (SF 21, SF 22 & SF 24), repair damaged areas of mechanically applied (i.e., abrasive blasted) satin finishes by locally blending in the finish using the original preparation procedure. Repair damaged areas of chemically applied (i.e., electropolish or sodium hydroxide etch) satin finishes by re-finishing the entire part.

5.5.1.3 For repair of brush finish (SF 32), repair damaged areas by locally blending in the finish using an abrasive block.

6 Requirements

6.1 Ensure that the surface texture of the finished parts is be comparable to the standard samples.

6.2 Ensure that the direction of the grit lines on brush finished (SF 32) parts matches the direction specified on the engineering drawing.

6.3 Ensure that the colour of the finished surface is the same as the standard samples for the same alloy and surface treatment.

6.4 It is necessary to measure the surface roughness only if there is considerable difference between the parts and the standard samples. The measured surface roughness must be within the range specified in Table 1.

7 Safety Precautions

7.1 The safety precautions specified herein are specific to Bombardier Toronto (de Havilland) 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.

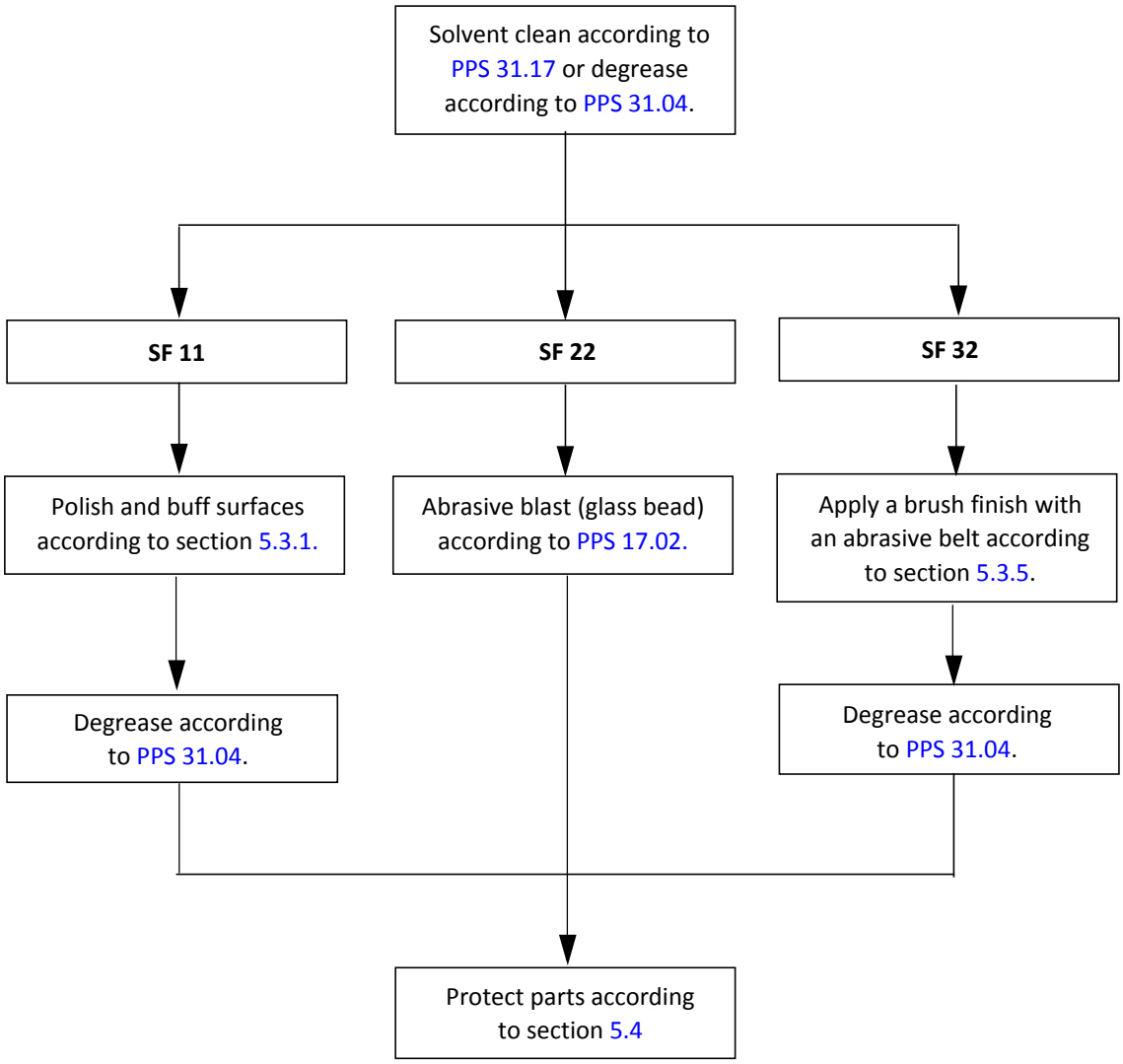
7.3 Wear protective leather gloves when handling parts.

7.4 Wear protective respiratory equipment according to PPS 13.13 at all times when abrading or buffing part surfaces.

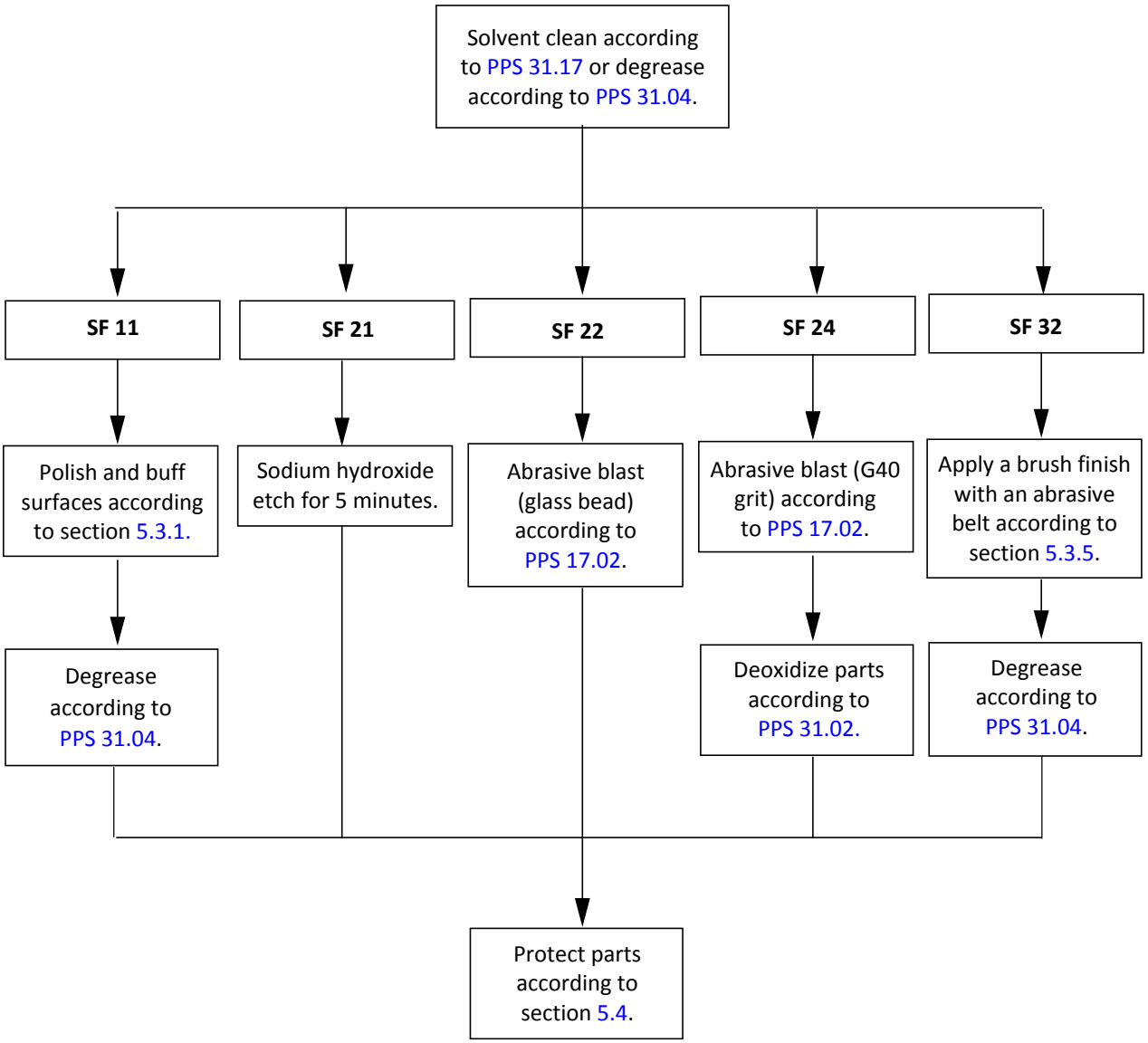
8 Personnel Requirements

8.1 Personnel responsible for applying surface finishes to stainless steel, aluminum and carbon/low alloy steel parts must have a good working knowledge of the procedure and requirements as specified herein and must have exhibited their competency to their supervisor.

Flow Chart 1. **Surface Finishing of Corrosion Resistant (CRES) Parts**



Flow Chart 2. **Surface Finishing of Aluminum Parts**



Flow Chart 3. **Surface Finishing of Carbon and Low Alloy Steel Parts**