BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 31.15

PRODUCTION PROCESS STANDARD

ELECTROPOLISHING

Issue 2 - This standard supersedes PPS 31.15, Issue 1, Amdt. 1-1.
- Vertical lines in the left hand margin indicate changes over the previous issue.

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This PPS is effective as of the distribution date specified on the accompanying distribution notice.

Direct any PPS related questions to the PPS Group (416) 375-4365.

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1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for electropolishing 300 and 400 Series corrosion resistant steels.

1.1.1 This PPS complements the engineering drawings that specify its use as an authorized instruction and the procedure specified 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. Similarly, the procedure and requirements specified in this PPS are not applicable when use of a BAPS, MPS, LES or P. Spec. is specified.

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 PPS 13.26 - General Subcontractor Provisions.

3.2 PPS 16.01 - Application of Hard and Soft Film Corrosion Preventive Compound.

3.3 PPS 31.05 - Surface Treatment of Corrosion Resistant Steel.

4 MATERIALS AND EQUIPMENT

4.1 Materials

4.1.1 The materials used for electropolishing (e.g., electropolishing solution) shall be at the discretion of the subcontractor performing this operation. It is the responsibility of the subcontractor to ensure that materials used are capable of producing satisfactory parts which meet the requirements of this PPS and the engineering drawing.

4.2 Equipment

4.2.1 The equipment used for electropolishing shall be at the discretion of the subcontractor performing this operation. It is the responsibility of the subcontractor to ensure that their equipment is capable of producing satisfactory parts which meet the requirements of this PPS and the engineering drawing.

5 PROCEDURE (see Flow Chart 1)

5.1 Racking of Parts

5.1.1 Rack the parts so that positive contact is made with the anode bar and so as to permit free circulation of the solution around the part. Rack flat and irregularly shaped parts so that the major plane is at an angle of approximately 45° to the direction of agitation. Rack cylindrical parts so that the longitudinal axis is inclined at 45° to the solution surface and, if possible, in a plane at 90° to the direction of agitation.

5.2 Preparation of Parts for Electropolishing

5.2.1 Prepare parts for electropolishing according to PPS 31.05.

5.2.1.1 After part preparation according to PPS 31.05, it is acceptable to neutralize any remaining traces of alkaline solution by briefly dipping the parts in the electroplating solution. After dipping in the electroplating solution, rinse parts in cold tap water.

5.3 Electropolishing

5.3.1 For each part, record the optimum electropolishing technique, once established, on a Process Control Document. As a minimum, Process Control Documents must contain the following information:

- Part number and drawing revision
- Material specification and final heat treat temper
- Voltage
- Current density
- Time
- Temperature

5.3.2 Parts must be mechanically agitated at a rate of 15 to 20 cycles per minute with an amplitude of 4 to 6 inches during electropolishing.

5.3.3 Analyse the cleaning and polishing solution at regular intervals in order to maintain proper concentrations and operating conditions.

5.4 Rinsing after Electropolishing

5.4.1 After immersion in the electropolishing solution, allow the electropolished parts to drain briefly before rinsing as follows to avoid excessive contamination of the rinse water. However, the transfer time from the electropolishing solution to the first rinse tank must not exceed 30 seconds. Ensure that the pH of any rinse tanks is at least 5.

Step 1. Rinse in cold recirculating tap water.

Step 2. Rinse in warm tap water (80° - 115°F).

Step 3. Rinse in hot de-ionized water (160° - 180°F).

5.5 Protection of Parts for Transporting

5.5.1 Protect electropolished surfaces with application of F13 Grade 3 corrosion protective compound according to PPS 16.01 for transporting or shipping.

6 REQUIREMENTS

6.1 Take a random sample from each lot as indicated in Table I for visual examination as follows:

- Electropolished surfaces must be uniformly smooth with a slight matte appearance and the surface roughness (RMS) must be approximately 1/2 the surface roughness before polishing.
- Grinding marks must appear smoothed and slightly matte when inspected at 10X magnification.
- Pitting, pock marking and cratering must be minimal when inspected at 10X magnification and in the case of threaded parts, must not extend more than 1/3 down the thread flanks.
- Surfaces must feel scratch free (i.e. no burrs or sharp corners) to the bare hand.

6.1.1 Consider parts failing to meet the above requirements as non-conforming. If the number of parts in the sample failing to meet the requirements is less than or equal to the acceptance number specified in Table I, the remainder of the parts may be accepted without further visual examination. However, if the number of parts in the sample failing to meet the requirements is greater than the acceptance number specified in Table I, all the parts in the represented lot must be visually examined as specified in paragraph 6.1. Refer all parts not meeting the visual examination requirements to Bombardier Toronto (de Havilland) MRB or Bombardier Toronto (de Havilland) delegated MRB for disposition.

TABLE I - SAMPLING FOR VISUAL INSPECTION

Acceptance Quality Level (approx.) - 1.5 percent defective		
Number of items in Lot	**Number of Items in Sample (selected at random)**	**Acceptance Number**
1 - 15	7 (Note 1)	0
16 - 40	10	0
41 - 110	15	0
111 - 300	25	1
301 - 500	35	1
501 and over	50	2
Note 1. If the number of items in a lot is 7 or less, examine all the items in the lot.		

7 SAFETY PRECAUTIONS

7.1 Safety precautions applicable to the materials and procedures specified herein must be defined by the subcontractor performing such work for Bombardier Toronto (de Havilland).

8 PERSONNEL REQUIREMENTS

8.1 Personnel responsible for electropolishing must have a basic understanding of the applicable procedure and requirements as specified herein and must have exhibited their familiarity to their supervisor.

FLOW CHART 1 - ELECTROPOLISHING