DE HAVILLAND AIRCRAFT OF CANADA LIMITED

PPS 32.05

PRODUCTION PROCESS STANDARD

PROPRIETARY INFORMATION

COLOUR OR COLOURLESS ANODIZING - SULPHURIC ACID PROCESS (A3)

Issue 23
- This standard supersedes PPS 32.05, Issue 22.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- Direct PPS related questions to christie.chung@dehavilland.com or (416) 375-7641.
- This PPS is effective as of the distribution date.

Prepared By: (Christie Chung) November 13, 2020

PPS Group

Approved By: (Stephen Mabee) November 30, 2020

M&P Engineering

Issue 23 - 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.

- Deleted allowance of BAPS 160-032 Rev. C, Grade 1 processing as equivalent to this PPS.

TABLE OF CONTENTS

Sections **Page**

1 SCOPE 4
2 HAZARDOUS MATERIALS 5
3 REFERENCES 5
4 MATERIALS, EQUIPMENT AND FACILITIES 5
4.1 Materials 5
4.2 Equipment 6
4.3 Facilities 6
5 PROCEDURE 7
5.1 General 7
5.2 Restrictions 7
5.3 Preparation of Parts 7
5.4 Racking of Parts 7
5.5 Preparation of Solutions 8
5.6 Anodizing 9
5.7 Touch-Up of Anodic Coating 9
5.8 Stripping Anodic Coating 10
6 REQUIREMENTS 10
6.1 General 10
6.2 Process Qualification 10
6.3 Production Parts 11
6.3.1 General 11
6.3.2 Test Requirements 11
6.3.3 Visual Inspection 12
6.3.4 Quarterly Coating Weight/Corrosion Resistance Testing 13
6.4 Solutions Control 14
7 DHC SAFETY PRECAUTIONS 15
8 PERSONNEL REQUIREMENTS 15
9 DISPOSAL OF CHEMICAL WASTES 15
10 MAINTENANCE OF EQUIPMENT 16

Tables

TABLE I - SOLUTION MAKE-UP 8
TABLE II - ANODIZING SCHEDULES 9
TABLE III - PROCESS QUALIFICATION TESTING REQUIREMENTS 10
TABLE IV - SUMMARY OF TESTING REQUIREMENTS 11
TABLE V - VISUAL SAMPLING SCHEDULE 12
TABLE VI - CONTROL OF SOLUTIONS 14

Flow Charts

FLOW CHART 1 - SULPHURIC ACID ANODIZING - CASTINGS 17
FLOW CHART 2 - SULPHURIC ACID ANODIZING - DECORATIVE APPEARANCE ITEMS 18
FLOW CHART 3 - SULPHURIC ACID ANODIZING - DYE COLOURED PARTS 19

1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for sulphuric acid anodizing aluminum alloy castings, decorative appearance items and colour anodized parts.

1.1.1 As an alternative to the procedure and requirements specified herein for colourless anodic coatings only, it is acceptable to perform sulphuric acid anodizing according to BAPS 160-032 Rev. C, Grade 2 **ONLY** (i.e., Grade 1 and Grade 3 as defined in BAPS 160-032 Rev. C, are not deemed equivalent to PPS 32.05 requirements). **Perform colour dyed anodic coatings according to this PPS**.

- Perform colourless sulphuric acid anodizing according to the procedure and requirements of either BAPS 160-032 Rev. C or this PPS in their entirety; a piecemeal approach utilizing certain sections or portions of BAPS 160-032 Rev. C and this PPS is **not** acceptable.
- If performing colourless sulphuric acid anodizing according to BAPS 160-032 Rev. C, it is acceptable to perform pre-anodizing cleaning according to the 180 Series BAPS (i.e., BAPS 180-XXX) as specified in BAPS 160-032 Rev. C, in their entirety. The use of 180 Series BAPS shall be at the frozen revision as of June 1, 2019. Subsequent BAPS revisions cannot be used.
- Subcontractor facilities which have been approved by Bombardier to perform colourless sulphuric acid anodizing according to BAPS 160-032 Rev. C, Grade 2 **ONLY**, are considered approved to perform colourless sulphuric acid anodizing according to this PPS without further approval needed.
- PPS Process Standard Deviations (PSD's) issued against this PPS are **not** applicable to BAPS 160-032 Rev. C. Likewise, requests for deviation (RFD's) allowed against BAPS 160-032 Rev. C, are not applicable to this PPS.
- When processing parts according to BAPS 160-032 Rev. C, as an alternative to processing parts according to PPS 32.05, deviations allowed by an approved RFD against BAPS 160-032 Rev. C, may be used unless a specific limitation regarding program applicability is specified by the RFD comments/restrictions.

1.1.2 This PPS complements the engineering drawings that specify its use as an authorized instruction. The procedure specified in this PPS (or BAPS 160-032 Rev. C, as referenced in paragraph 1.1.1) shall be followed to ensure compliance with all applicable specifications and to fulfil the engineering design and reliability objectives. In general, if this PPS or BAPS 160-032 Rev. C conflicts with the engineering drawing, follow the engineering drawing.

1.1.3 Refer to PPS 13.26 for the subcontractor provisions applicable to this PPS.

1.2 Colour or colourless sulphuric acid anodizing is identified by protective treatment code A3 according to PPS 23.02.

1.3 In general, the Engineering drawing will specify "A3 Colourless" when castings or decoratively surface finished aluminum parts require sulphuric acid anodizing. The engineering drawings will specify the specific colour for sulphuric acid coloured anodizing. If the engineering drawing only specifies "A3" (i.e., neither colourless nor colour), apply an A3 colourless coating as specified herein.

2 HAZARDOUS MATERIALS

2.1 Before receipt at De Havilland Aircraft of Canada Limited (DHC), all materials shall be approved and assigned Material Safety Data Sheet (MSDS) numbers by the DHC 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 DHC Environment, Health and Safety Department.

3 REFERENCES

3.1 ASTM B117 - Standard Test Method of Salt Spray (Fog) Testing.

3.2 ASTM B137 - Standard Test Method for Measurement of Weight of Coating on Anodically Coated Aluminum.

3.3 BAERD GEN-018, Rev. E - Engineering Requirements for Laboratories.

3.4 BAERD GEN-023, Rev. A - Contamination Control for Compressed Air.

3.5 BAPS 160-032, Rev. C - Sulphuric Acid Anodizing.

3.6 PPS 13.26 - General Subcontractor Provisions.

3.7 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.8 PPS 23.02 - Protective Treatment and Decorative Surface Finish Code System.

3.9 PPS 27.06 - Decorative Surface Finishes.

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

3.11 PPS 31.04 - Degreasing Processes.

3.12 PPS 32.02 - Manual Application of C1 Chemical Conversion Coatings.

3.13 QDI-09-02 - Process Control - *DHC internal Quality procedure*.

4 MATERIALS, EQUIPMENT AND FACILITIES

4.1 Materials

4.1.1 Chromium trioxide, A-A-55827.

4.1.2 Phosphoric acid, A-A-55820.

4.1.3 Sulphuric acid, 66° Bé.

4.1.4 Aluminum alloy wire, 1/16" and 3/32" diameter gauge.

4.1.5 Suitable light and weather-fast dyes.

4.2 Equipment

4.2.1 Aluminum wool or brass wire brush.

4.2.2 Aluminum or titanium racks, straps and clamps capable of providing both support and positive electrical contact with the parts.

4.2.3 Compressed air shall meet the requirements of BAERD GEN-023 Rev. A.

4.2.4 Lint-free cotton gloves (e.g., DSC 422-1).

4.2.5 Immersion tanks resistant to the chemicals and to the operating temperatures used (e.g., stainless steel or polyethylene lined). Immersion tanks shall be equipped with an agitation system capable of providing uniform solution temperature throughout the tank (to prevent localized overheating).

4.2.5.1 Air utilized to agitate the chemical solutions shall meet the requirements of BAERD GEN-023 Rev. A.

4.3 Facilities

4.3.1 This PPS has been categorized as a Controlled Critical Process according to PPS 13.39. Except as noted in paragraph 4.3.1.1 for colourless sulphuric acid anodizing, only facilities specifically approved according to PPS 13.39 are authorized to perform sulphuric acid anodizing aluminum alloy castings, decorative appearance items and colour anodized parts according to this PPS.

4.3.1.1 Facilities approved to perform sulphuric acid anodizing according to BAPS 160-032 Rev. C are considered approved to perform colourless sulphuric acid anodizing according to this PPS without further approval needed (i.e., approval according to PPS 13.39 is not required).

4.3.2 Subcontractors shall direct requests for approval to DHC Quality.

4.3.3 Facility approval shall be based on a facility report, a facility survey and completion of a qualification test program, if required. The facility report shall 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 shall be detailed in the facility report. Based upon the facility report, DHC Engineering may identify additional qualification and/or process control test requirements. During the facility survey, the facility requesting qualification shall be prepared to demonstrate their capability. Once approved, no changes to subcontractor facilities may be made without prior written approval from DHC Quality.

4.3.3.1 For approval of subcontractor facilities to perform sulphuric acid anodizing aluminum alloy castings, decorative appearance items and colour anodized parts according to this PPS, completion of a test program and submission of suitable test samples representative of production parts is required. Test samples shall meet the requirements specified in section 6.

4.3.3.2 All testing and evaluation specified herein shall only be performed by DHC Materials Laboratory or by laboratories accredited according to BAERD GEN-018 Rev E.

5 PROCEDURE

5.1 General

5.1.1 Colourless sulphuric acid anodizing of aluminum alloy castings is used to provide corrosion protection.

5.1.2 Colourless sulphuric acid anodizing of decorative appearance items (e.g., interior trim parts) is used to enhance appearance, provide increased corrosion resistance and protect the decorative surface finish against wear.

5.1.3 Colour dyed sulphuric acid coatings are used for labels, control lever handles, etc., to provide permanent wear resistant markings.

5.1.4 Wear clean lint-free cotton gloves (e.g., DSC 422-1) when handling anodized parts.

5.2 Restrictions

5.2.1 Do not anodize parts or assemblies that contain joints or recesses which could entrap solutions.

5.2.2 Do not anodize assemblies containing inserts or attachments unless such inserts have been suitably masked off, both electrically and chemically, so as to prevent burning and corrosion in surrounding areas. When masking off inserts and attachments, ensure that the masking completely seals the faying surface between the insert and parent metal to prevent ingress of the solution.

5.3 Preparation of Parts

5.3.1 Complete, as far as possible, all fabricating operations (heat treatment, machining, welding, filing, etc.) before anodizing.

5.3.2 Surface finish decorative appearance items according to PPS 27.06 before anodizing.

5.4 Racking of Parts

5.4.1 Assemble parts on racks or wire them directly to the anode bars to:

- permit free circulation of the anodizing solution to all work surfaces
- ensure no contact points between adjacent parts
- permit good drainage to prevent solution entrapment
- prevent contact with the wall of the tank or adjacent parts
- prevent air entrapment
- the racking wires are used only once unless the oxide layer on the wire formed during anodizing is stripped before re-use
- the cross-sectional area of the suspending wire from the parts to the rack is kept uniform
- the wire is wound tightly around the parts to ensure good electrical contact.

5.4.2 If suspension of parts from an anode bar is required, use only aluminum or aluminum alloy wire of sufficient current carrying capacity.

5.5 Preparation of Solutions

5.5.1 Prepare and operate solutions according to Table I. Prepare the chemical solutions as follows:

Step 1. Half fill the tank with de-ionized water.

Step 2. Add the required amount of chemicals.

Step 3. Fill the tank to operating level with de-ionized water.

5.5.2 Equip sealing and rinse tanks with inlet and outlet provisions to allow fresh de-ionized water to be added, as required, to maintain the baths within the limits specified in Table VI.

TABLE I - SOLUTION MAKE-UP

BATH TYPE (NOTE 2)	SOLUTION MAKE-UP (NOTE 1)					OPERATING TEMPERATURE (°F)
	CHEMICALS	IMPERIAL UNITS	METRIC UNITS	U.S. UNITS	WATER (NOTE 3)	
SULPHURIC ACID ANODIZE	SULPHURIC ACID (66° Bé)	19 gal/100 gal	19 L/100 L	19 gal/100 gal	DE-IONIZED	COLOURED 68 - 88 COLOURLESS 68 - 72
HOT DE-IONIZED WATER SEALING BATH	DE-IONIZED WATER	—			DE-IONIZED	208 - 212
COLOUR DYE	BATHS SHALL BE A SOLUTION OF A TYPE AND CONCENTRATION AS REQUIRED TO ACHIEVE THE COLOUR AS SPECIFIED ON THE RELEVANT ENGINEERING DRAWING				DE-IONIZED	150 - 170
ANODIC STRIPPER	PHOSPHORIC ACID	3 gal/100 gal	3 L/100 L	3 gal/100 gal	DE-IONIZED	208 - 212
	CHROMIUM TRIOXIDE	20 lbs/100 gal	2 KG/100 L	17 lbs/100 gal		

Note 1. It is acceptable for subcontractors to deviate from the specified make-up of solutions provided that the control requirements of Table VI are met.
Note 2. The tank material shall be resistant to the chemicals and to the operating temperatures used (e.g., stainless steel or polyethylene lined).
Note 3. Incoming de-ionized water used for make-up of solutions shall meet a maximum solid requirement of 12 ppm.

5.6 Anodizing

5.6.1 Refer to Flow Chart 1 for the processing operations and sequence to be followed for sulphuric acid anodizing of castings.

5.6.2 Refer to Flow Chart 2 for the processing operations and sequence to be followed for sulphuric acid anodizing of decorative appearance items. For the purposes of this PPS, consider all parts other than castings and dye coloured parts to be decorative appearance items and process according to Flow Chart 2. Degreasing before alkaline cleaning is optional provided that the part surface is free of oil, grease and other contaminants immediately before alkaline cleaning.

5.6.3 Refer to Flow Chart 3 for the processing operations and sequence to be followed for sulphuric acid anodizing of dye coloured parts.

5.6.4 Mildly agitate the anodizing solution during the anodizing cycle. Agitation need only be sufficient to circulate the solution and **shall not** cause any movement of the parts.

5.6.5 Ensure parts are completely immersed in the anodizing bath. Parts shall not be in contact with the anodizing solution for more than one minute without the power on (both at the beginning and at the end of the anodizing cycle).

5.6.6 Anodize the parts according to the appropriate schedule specified in Table III. Voltage ramp-up shall not exceed 6 volts per minute while ensuring no current surges. Do not ramp-down voltage at the end of the anodizing cycle (i.e., immediately shut off the power at the end of the anodizing cycle.

TABLE II - ANODIZING SCHEDULES

PART TYPE	ANODE CURRENT DENSITY	PROCESSING TIME (± 2 MINUTES)	SOLUTION TEMPERATURE (°F)
CASTINGS	10 - 14 amps/ft^2	30 MINUTES	68 - 72
DYE COLOURED PARTS	14 - 18 amps/ft^2	40 MINUTES	68 - 88
DECORATIVE APPEARANCE ITEMS (NOTE 1)	10 - 14 amps/ft^2	15 MINUTES	68 - 72
Note 1. Applicable to all parts which have been decorative surface finished according to PPS 27.06.			

5.7 Touch-Up of Anodic Coating

5.7.1 If the anodic coating has been locally removed from castings by subsequent machining, deburring, etc., repair the bare areas by touching up according to PPS 32.02.

5.8 Stripping Anodic Coating

5.8.1 If it is necessary to strip the anodic coating, immerse in the anodic stripping solution for a length of time sufficient to ensure complete removal of the coating.

5.8.2 Thoroughly rinse parts in running water (65°F to 85°F) after stripping.

6 REQUIREMENTS

6.1 General

6.1.1 For the purposes of this PPS, the term “MRB” (Material Review Board) is considered to include DHC MRB and DHC delegated MRB.

6.2 Process Qualification

6.2.1 For process qualification, process test panels through the full anodizing cycle and submit for testing as specified in Table III.

6.2.2 Process qualification test panels shall be submitted to a laboratory as specified in paragraph 4.3.3.2. Additional tests may be requested at any time at the discretion of DHC.

TABLE III - PROCESS QUALIFICATION TESTING REQUIREMENTS

TEST	NUMBER OF PANELS	TEST SPECIMENS	PROCESS	TESTING PROCEDURE (NOTE 1)
VISUAL INSPECTION	ALL	AS SPECIFIED BELOW	ALL	VISUAL (ACCORDING TO SECTION 6.3.3)
COATING WEIGHT	3	LAB 065-1 or 2024-T3 per QQ-A-250/4 (0.032" min)	ANODIZE - NOT SEALED	ASTM B137
CORROSION RESISTANCE	5	LAB 064-1 or 2024-T3 per QQ-A-250/4 (0.032" min)	ANODIZE AND SEAL	ASTM B117

Note 1. Refer to the appropriate sections for details regarding test requirements.

6.3 Production Parts

6.3.1 General

6.3.1.1 During which there has been production of DHC parts, test panels shall be processed through the anodizing cycle and submitted to a laboratory as specified in paragraph 4.3.3.2 for testing as specified herein.

- Once every 6 months, subcontractors shall forward the results of quarterly test panels to DHC.
- At the discretion of DHC, it may be necessary that quarterly test panels be likewise submitted for verification of test results.
- In order to maintain qualified status, all facilities processing parts for DHC according to this PPS shall maintain records of all testing for a minimum of 2 years. Upon request, if these records cannot be produced, then the facility may be required to re-qualify.

6.3.1.2 If the A3 sulphuric acid anodizing line has not been processing any parts for more than one month, process test panels for coating weight determination, corrosion resistance testing and paint adhesion testing as specified herein and forward the test results to DHC for review and approval before resuming processing of parts for DHC.

6.3.2 Test Requirements

6.3.2.1 Refer to Table IV for a summary of test panel requirements.

TABLE IV - SUMMARY OF TESTING REQUIREMENTS

TEST	TESTING FREQUENCY	NUMBER OF PANELS	TEST SPECIMENS	TESTING PROCEDURE (NOTE 1)
Visual Inspection	Each Lot according to Table V	According to Table V	Production parts	Visual (according to section 6.3.3)
Coating Weight	Quarterly (see section 6.3.4)	3	LAB-065-1 or 2024-T3 per QQ-A-250/4 (0.032" min)	ASTM B137
Corrosion Resistance	Quarterly (see section 6.3.4)	5	LAB 064-1 or 2024-T3 per QQ-250/4 (0.032" min)	ASTM B117

Note 1. Refer to the appropriate sections for details regarding test requirements.

6.3.3 Visual Inspection

6.3.3.1 For visual inspection, select a sample from each production lot, including any parts that appear unusual in colour or evenness of colouration, by taking at random from the lot, not less than the number of items specified in Table V for visual examination for the following defects.

- The anodic coating shall be continuous, smooth, adherent and uniform in appearance.
- The anodic coating shall be free from powdery areas, breaks, scratches, or other damage.
- The number of contact points shall be at a minimum consistent with good practice.
- Contact points shall not appear on visible decorative surfaces, as installed in the aircraft.
- Colour-dyed coatings shall be light and weather-fast and closely match the colours of the appropriate test panels. The colour test panels shall be approved by DHC.

6.3.3.2 Refer colour anodized parts which have had any of the anodic coating removed or have been damaged on the visible appearance surface (as installed in the aircraft) to MRB for disposition.

6.3.3.3 If the number of non-conforming items in any sample exceeds the acceptance number specified in Table V, reject the represented lot, and disposition the lot according to paragraph 6.3.5.1.

TABLE V - VISUAL SAMPLING SCHEDULE

NUMBER OF ITEMS IN INSPECTION LOT	NUMBER OF ITEMS IN SAMPLE (SELECTED AT RANDOM)	ACCEPTANCE NUMBER (NOTE 1)	REJECTION NUMBER
1 TO 5	ALL	0	1
6 TO 25	5	0	1
26 TO 50	8	0	1
51 TO 90	13	0	1
91 TO 150	20	1	2
151 TO 280	32	1	2
281 TO 500	50	2	3
501 TO 1200	80	3	4

Note 1. Any defective items within the permitted number of defectives shall not be accepted with the lot but be rejected.

6.3.4 Quarterly Coating Weight/Corrosion Resistance Testing

6.3.4.1 Once each quarter, test specimens for coating weight and corrosion resistance testing shall be sulphuric acid anodized according to this PPS. For coating weight test specimens, it is acceptable to omit sealing. Submit the processed test samples to an approved laboratory (see paragraph 4.3.3.2) for coating weight determination and corrosion resistance testing.

6.3.4.1.1 Determine coating weight by testing three LAB 065-1 or 2024-T3 per QQ-A-250/4 (0.032" min) test panels for coating weight according to ASTM B137. The minimum acceptable coating weight is 600 milligrams per square foot. Failure of any of the test specimens shall be cause for corrective action according to paragraph 6.3.5.2.

6.3.4.1.2 For corrosion resistance testing, expose 5 anodized LAB 064-1 or 2024-T3 per QQ-A-250/4 (0.032" thick minimum) test panels to a 5% salt spray according to ASTM B117, except the test surface shall be inclined 6° from the vertical. Expose the panels for 336 hours and examine them for corrosive attack. If there is evidence of corrosive attack in excess of the following limits, suspend the anodizing process and take corrective action according to paragraph 6.3.5.2.

- There shall be no spots or pits larger than 0.031" in diameter and no more than 15 isolated spots or pits in total on the 150 in^2 of test area (do not count spots or pits less than 0.010" in diameter or within 0.062" of identification markings, holding points or panel edges).
- There shall be no more than 5 isolated spots or pits on any single panel (do not count spots or pits less than 0.010" in diameter or within 0.062" of identification markings, holding points or panel edges).

6.3.5 Disposition

6.3.5.1 Any rejected lots shall be 100% inspected. Accept all parts that meet the above requirements. For anodized parts that fail to meet the requirements after initial processing, determine the cause of failure and take corrective action before stripping according to section 5.8, re-processing and re-inspecting the parts as specified herein. If a coating fails to meet the requirements a second time after having already been stripped and re-processed once, refer the part to MRB for disposition.

6.3.5.2 In the event that processing coating weight or corrosion panels fail to meet the requirements specified herein, production shall be suspended until corrective action is implemented and verified by re-testing. Parts fabricated during the loss of control time period shall be rejected and processed through MRB.

6.3.5.3 In addition to the number of times parts can be re-processed, ensure the total of material loss per part surface does not exceed 0.0010", providing dimensional tolerances permit such material loss.

6.4 Solutions Control

6.4.1 Take samples of each bath types specified in Table VI for chemical analysis according to the analysis frequency specified. Ensure that the solutions are thoroughly mixed immediately before taking samples. Verify that the solutions meet the requirements specified in Table VI.

6.4.2 Prepare and maintain records of all solution tests according to QDI-09-02. If additions are required, then indicate in the report the amount to be added. Re-test the solution within 24 hours of any adjustment.

6.4.3 Check the pH of all solutions weekly.

TABLE VI - CONTROL OF SOLUTIONS

BATH TYPE	SOLUTION COMPONENT	CONCENTRATION			CONCENTRATION ANALYSIS FREQUENCY (Note 1)		pH (Note 2)
		IMPERIAL UNITS	METRIC UNITS	U. S. UNITS	STANDARD	EXTENDED	
Sulphuric Acid Anodize	Sulphuric Acid (66° Bé)	18 - 20% by volume			Weekly	Monthly	N/A
Hot De-ionized Water Sealing Bath	De-ionized water	12 ppm (20 mS/cm at 77 ± 10°F) maximum incoming total dissolved solids			Twice/Week	Twice/Week	4.0 - 6.0
	Total dissolved solids	50 ppm (78 mS/cm at 77 ± 10°F) maximum accumulated total dissolved solids					
Anodic Stripper	Phosphoric Acid	3.1 - 3.7% by volume			Weekly	Monthly	N/A
	Chromic Trioxide	2.9 - 3.5 wt oz/gal	18.0 - 22.0 g/L	2.4 - 2.9 wt oz/gal	Weekly	Monthly	
Rinse	De-ionized water	250 ppm (390 mS/cm at 77 ± 10°F) maximum total dissolved solids			Weekly	Weekly	5.0 - 7.0
	Tap water	350 ppm (550 mS/cm at 77 ± 10°F) maximum total dissolved solids			Weekly	Weekly	5.0 - 8.0

Note 1. If, over a 12 month period, it can be demonstrated (through SPC charts, etc.) that the concentration of the applicable solution component is well within the requirements specified, then the analysis frequency may be reduced from “standard” to “extended”. However, in the event that the solution component analysis fails the requirements specified, revert back to the “standard” analysis frequency until a controlled process can again be demonstrated.
Note 2. Check pH of all solutions weekly.

7 DHC SAFETY PRECAUTIONS

7.1 Safety precautions applicable to the materials and procedures specified herein shall be defined by the subcontractor performing the work for DHC. However, suppliers, subcontractors and partners are responsible for ensuring that their own environmental, health and safety precautions satisfy the appropriate local government regulations.

8 PERSONNEL REQUIREMENTS

8.1 This PPS has been categorized as a Controlled Critical Process according to PPS 13.39. Refer to PPS 13.39 for additional personnel requirements. Certified and/or qualified personnel shall have a good working knowledge of the following, as applicable:

- function of sulphuric acid anodic coatings as they apply to castings, decorative appearance items and dye coloured parts
- importance of proper part surface preparation for anodizing
- importance of proper racking procedures to ensure electrical conductivity to all parts
- proper anodizing baths to be used for various types of parts
- how to prepare applicable baths for anodizing, sealing, dyeing and stripping
- how to operate conveyances for moving parts between baths
- how to apply proper electrical current to parts for anodizing
- importance of sealing the anodic coating
- how to operate applicable force drying equipment
- how official documents interact
- relevant engineering drawing notes and symbols
- how to interpret instructions on work orders
- sampling schedule for anodized parts
- how to identify and process required test specimens
- frequency and procedure for submission of coating weight and corrosion resistance test specimens
- requirements for visual examination, coating weight and corrosion resistance of anodic coatings
- safety precautions for sulphuric acid anodizing in accordance with this standard

9 DISPOSAL OF CHEMICAL WASTES

9.1 Dispose of all chemical wastes according to national legislation and local regulations.

10 MAINTENANCE OF EQUIPMENT

10.1 Tighten and replace all loose clips attached to the racks.

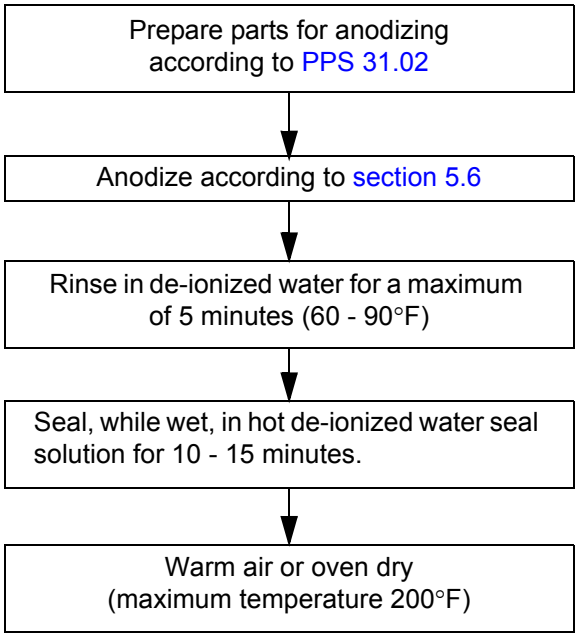
10.2 Keep the contact surfaces of the rack hook and anode rack clean and free from sulphuric acid stains.

10.3 Examine contact pads weekly and clean contact areas with aluminum wool or a brass wire brush.

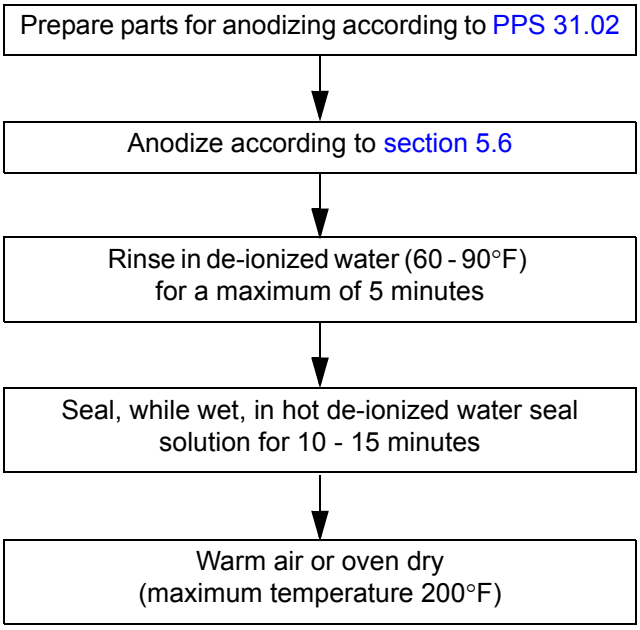
10.4 Wipe electrical equipment weekly with a cloth to remove dust and grime.

10.5 Once every 6 months, the anodizing control unit (i.e., rectifier, voltage ramp, anodizing voltage and cycle time control units) shall be calibrated. The temperature monitoring unit shall be calibrated once a year.

FLOW CHART 1 - SULPHURIC ACID ANODIZING - CASTINGS

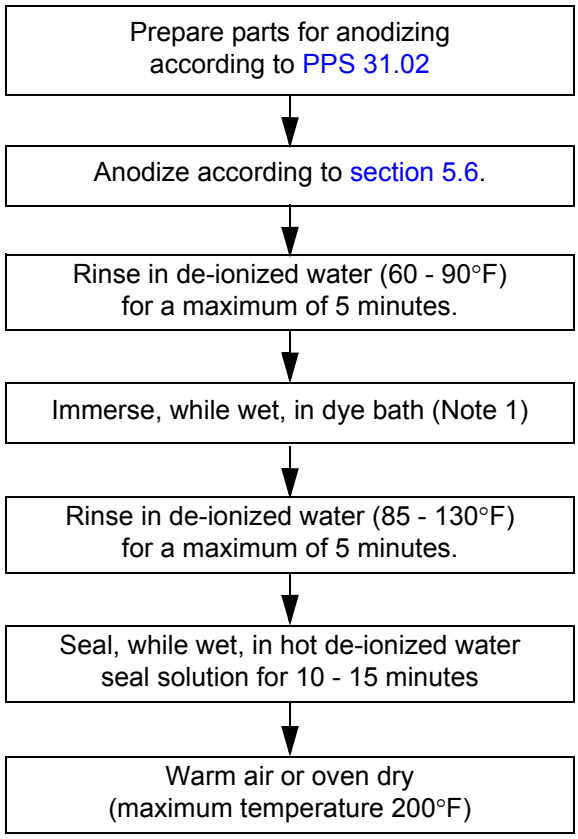


FLOW CHART 2 - SULPHURIC ACID ANODIZING - DECORATIVE APPEARANCE ITEMS



Note 1. For the purposes of this PPS, consider all parts except castings and dye coloured parts to be decorative appearance items.

FLOW CHART 3 - SULPHURIC ACID ANODIZING - DYE COLOURED PARTS



Note 1. Immerse parts in applicable colour dye bath for a sufficient length of time to obtain the required colour saturation.