

SPECIFICATION FOR ELECTROPOLISHING

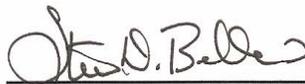
Stainless Steel Material

Process No. CELCO - 1008

Dated: August 16, 1996

Revision B, Dated: October 28, 2008

Reviewed and approved for adequacy prior to issue by:

 11/04/08

Steve D. Bellesine, President

 11/04/08

Randy Moore, Vice President

Process No. CELCO – 1008

Revision A: Dated – February 13, 1997

Para 6.2.5.1 – Revise first sentence to read “The electrolyte fluid specific gravity, 1.750 +/- .020, is extremely important to the process -----.”

Para 6.2.5.1 - Replace the sixth sentence with “If pitting of finish occurs, decant with new fluid to bring solution back to appropriate iron level.”

Para 7.1.3 - Revise first sentence to read “This fluid is a 30% - 50% Nitric Acid Bath.” Add new sentence to read “Fluid level will be controlled using equal strength fluid.

Revision B: Dated – October 28, 2008

Add approval signatures and dates.

1.1 This procedure will define the various steps involved in electropolishing components for use in Learjet, Inc. applications.

2.0 MATERIAL

2.1 The material used in these components will be 300 series stainless steel alloy, or of a chromium/nickel alloy suitable for electropolishing.

2.2 The components will be in a prefinished state with the surface to be electropolished having a surface roughness no more than twice the roughness of the desired finished roughness.

2.3 All components will be assumed to be clean and absent of all scale, oil or surface film upon receiving.

2.3.1 If components are received with scale, oil or surface film. The parts will be cleaned using the following procedures.

2.3.1.1 Soak parts in commercial grade Acetone for five minutes to remove light oils. Air dry.

2.3.1.2 Soak parts in a commercial grade detergent and hot water (120-160 degrees) for thirty minutes to remove heavy oils and grease. Rinse clean with potable water until free of soaps.

2.3.1.3 Soak parts in a nitric acid pickle bath per ASTM-A-380, Code D to remove heat scales and discolorations. Rinse clean with potable water.

3.0 RECEIVING

3.1 All components received will be inspected for damage during shipment immediately after receipt of shipment.

3.2 All surfaces will be checked for visual damage to critical surfaces. If any protective cover is separated from the component, the customer will be notified immediately.

3.3 All quantities will be varied to the quantity shown on the packing list. If

discrepancies are found, the customer will be notified immediately.

4.0 STORAGE OF INCOMING COMPONENTS

- 4.1 All components will be stored in there shipping containers until preparation for electropolishing.
- 4.2 All components will be stored with a work order detailing the quantity, EP instructions and customer purchase order.

5.0 RECEIVING INSPECTION

- 5.1 An inspection will be undertaken prior to electropolishing to verify the components conform to the specifications and/or the instructions so noted on the customer P.O. or provided drawings.
- 5.2 If a specific surface roughness is specified by the specification and/or instructions the surface may be checked with a profilometer as required to verify that the initial surface is suitable for the instructed surface to be obtained.

6.0 ELECTROPOLISHING

- 6.1 The component will be polished as instructed on the work order.
- 6.2 The following steps define the electropolishing procedure.
 - 6.2.1 The component(s) is to be racked in an appropriate manner to assure secure anodic contact.
 - 6.2.2 Place the component rack or fixture on the anodic bar over the electrolyte bath and assure the component is fully submerged into the electrolyte to cover the area which is to be electropolished.
 - 6.2.3 Polish the component for the required time using the appropriate electrical load.
 - 6.2.3.1 Most electropolishing is performed using direct current at 50 - 500 amp per square foot of polished area.

inches per surface per minute depending on the surface finish before working and finish desired afterwards.

6.2.3.3 Using the above analysis the voltage is set beforehand and the time of processing is determined by the surface treatment desired.

6.2.4 After examination of the first article(s), the time and voltage will be recorded for the component(s) being electropolished.

6.2.5 The electrolyte used by CELCO is a proprietary fluid purchased from Electropolish Systems, Inc. of Menomonee Falls, Wisconsin, solution number 4000.

6.2.5.1 The electrolyte fluid specific gravity, 1.750 ± .020, is extremely important to the process and must be balanced within the suppliers tolerance. This balance must be checked at least once a week. Another factor which can cause erratic finishes is the iron content of the fluid. This level should not exceed 3.5%. The indicator of high iron content is usually a pitting of the finish on the flat surfaces. If pitting of finish occurs, decant with new fluid to bring solution back to appropriate iron level. If testing is essential a sample of 200 ml should be sent to a laboratory for testing.

7.0 RINSING

7.1 Following the electropolishing of the component the following rinsing procedure is performed.

7.1.1 Rinse the components in the drag out rinse to reclaim EP fluid.

7.1.2 Clean water rinse.

7.1.3 Rinse in pigging fluid. This fluid is a 30% - 50% Nitric Acid Bath. Fluid level will be controlled using equal strength fluid.

7.1.4 Rinse in first state water rinse.

7.1.5 Rinse in second state water rinse. The components can be stored in this tank until final rinse.

7.1.6 Final rinse is made with 8-10 MEG-OHM D.I. water.

8.0 INSPECTION

- 8.1 The components are placed in a clean air flow area to dry.
- 8.2 The components are 100% visually inspected for consistency and uniformity of electropolishing.
- 8.3 If required, the micro inch roughness is measured by a profilometer to assure the required surface.
- 8.4 All rejects are either rerun or recorded for separate packaging.

9.0 PACKAGING

- 9.1 Normal packaging of components are placed in plastic bags and heat sealed to assure maximum cleanliness.
- 9.2 Large components which are not placed in plastic bags are wrapped in appropriate material to assure maximum cleanliness.
- 9.3 The components are counted for final packaging and placed in the original shipping container or appropriate container for final shipment.

10.0 SHIPPING

- 10.1 All shipments are shipped by most efficient means.