BOMBARDIER

Toronto Site

PROPRIETARY INFORMATION

PPS 31.01

PRODUCTION PROCESS STANDARD

CLEANING OF ALUMINUM AND ALUMINUM ALLOYS FOR RESISTANCE WELDING

Issue 13
- This standard supersedes PPS 31.01, Issue 12.
- Vertical lines in the left hand margin indicate 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.

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Signed original on file. Validation of paper prints is the responsibility of the user.

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1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for cleaning aluminum and aluminum alloys before resistance welding.

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. 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, 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 BAERD GEN-023 - Contamination Control for Compressed Air.

3.2 PPS 13.26 - General Subcontractor Provisions.

3.3 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.4 PPS 31.02 - Cleaning Processes For Aluminum and Aluminum Alloys.

3.5 PPS 31.04 - Degreasing Processes.

3.6 PPS 31.17 - Solvent Usage.

3.7 QDI-09-02 - Process Control - *Bombardier Toronto internal Quality procedure.*

4 MATERIALS, EQUIPMENT AND FACILITIES

4.1 Materials

4.1.1 Alkalume No. 13, Alkalume Deoxidant and Alkalume Fixant.

4.1.2 Deoxidizer according to PPS 31.02.

4.1.3 Alkaline cleaning solution according to PPS 31.02.

4.1.4 Chromium trioxide, A-A-55827.

4.2 Equipment

4.2.1 Surface resistance analyzer (e.g., Model No. VT-II-A). The surface resistance analyzer used shall be capable of reliably measuring the surface resistance of cleaned aluminum and aluminum alloys to ensure the part surfaces have been suitably prepared for resistance welding.

4.2.2 Air lines shall meet the requirements of BAERD GEN-023.

4.2.3 Soft stainless steel wire wheel, No. 164F.

4.2.4 Cotton gloves (e.g., DSC 422-1).

4.2.5 Neoprene rubber gloves (e.g., DSC 422-5).

4.2.6 Neoprene rubber boots and aprons.

4.2.7 Immersion tanks resistant to the chemicals and to the operating temperatures used (e.g., stainless steel and polyethylene lined mild steel).

4.3 Facilities

4.3.1 This PPS has been identified as a “Critical or Special” process according to PPS 13.39 and as such only facilities specifically approved according to PPS 13.39 are authorized to perform cleaning aluminum and aluminum alloys before resistance welding according to this PPS.

4.3.2 Bombardier subcontractors shall direct requests for approval to Bombardier Aerospace Supplier Quality Management. Bombardier Aerospace facilities shall direct requests for approval to the appropriate internal Quality Manager.

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, Bombardier Toronto 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 Bombardier Aerospace Supplier Quality Management.

4.3.3.1 For approval of subcontractor facilities to perform cleaning aluminum and aluminum alloys before resistance welding 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.

5 PROCEDURE

5.1 Preparation of Solutions

5.1.1 Make up cleaning solutions according to Table I. When making up solutions, half-fill the tank with water, cautiously add the required amount of chemicals and fill the tank to operating level with water.

TABLE I - MAKE-UP OF SOLUTIONS

BATH TYPE (Note 1)	BATH MAKE-UP		OPERATING TEMPERATURE
	CHEMICALS	WATER	
Alkalume No. 13	Dissolve Alkalume No. 13 in a separate container with hot water and add it to the bath to give a concentration of 65 lbs per 100 gallons of final solution	Tap water	164 - 170°F
Alkalume Deoxidant	Slowly add 30 lbs of Alkalume Deoxidant per 100 gallons of final solution	De-ionized	60 - 90°F
Alkalume Fixant	Add 30 lbs of chromium trioxide per 100 gallons of final solution Add 7 lbs, 8 oz of Alkalume Fixant per 100 gallons of final solution	De-ionized	160 - 165°F
Deoxidizer	According to PPS 31.02		
Alkaline Cleaning Solution	According to PPS 31.02		

Note 1. The tank material shall be resistant to the chemicals and to the operating temperatures used (e.g., stainless steel and polyethylene lined mild steel).

5.2 Cleaning Applications

5.2.1 Except for the following parts and assemblies, chemically clean all detail parts and assemblies according to Flow Chart 1:

- Mechanically clean detail parts and assemblies which have been manufactured from 2219 alloy or surface coated according to Flow Chart 2.
- Mechanically clean assemblies which are bonded, contain dissimilar metals or which may entrap cleaning solutions according to Flow Chart 2.

5.3 Set-Up of Surface Resistance Analyzers

5.3.1 Set-up Model No. VT-II-A surface resistance analyzers (see Figure 1) as follows:

Step 1. With the Air Shut-Off Valve in the OPEN position, adjust the air pressure to 50 ± 2 psi by means of the pressure regulator.

Step 2. With the On/Off Switch selected to the OFF position, turn the Zero Adjust Screw to set the meter needle to zero, if necessary.

Step 3. With the On/Off Switch in the ON position, allow the machine to warm up for a minimum of 3 minutes.

Step 4. Set the Calibrate/Operate Switch to the CALIBRATE position and open the Air Shut-Off Valve to bring the Pressure Tips together.

Step 5. Press the FINE button and adjust the meter needle to read 150 microhms by means of the calibration knob.

Step 6. Close the Air Shut-Off Valve and set the Calibrate/Operate Switch to the OPERATE position.

Step 7. Place the Calibrated Resistance Test Bar between the pressure tips at the 25 microhms position and open the Air Shut-Off Valve.

Step 8. Press the FINE button and check if the meter reads 25 microhms. If not, re-calibrate the instrument.

5.3.2 For surface resistance analyzers other than Model No. VT-II-A, set-up the surface resistance analyzer according to the manufacturers instructions.

5.4 Special Points to Note

5.4.1 Strictly adhere to immersion times in the cleaning baths and time using suitable timers.

5.4.2 Thoroughly rinse between operations to avoid contamination of subsequent baths and to reduce staining to a minimum.

5.4.3 Rinsing following hot baths shall be done immediately after the removal from the bath to prevent the solution from drying on the parts.

5.4.4 Do not touch cleaned surfaces with bare hands. All personnel handling cleaned parts shall wear clean cotton gloves.

5.4.5 Store parts in such a location that protects them from shop contamination.

5.4.6 If the surface resistance before spot welding is above 40 microhms, re-clean the parts.

5.4.7 Before use, degrease all new stainless steel wire wheels according to PPS 31.04 to remove all traces of the shipping oil with which they are impregnated. Do periodic re-cleaning, as required, to remove contamination build-up.

6 REQUIREMENTS

6.1 Before resistance welding cleaned parts, check the surface resistance on at least 1 item of each production batch, or a representative pair of test panels cleaned with each production batch, to ensure the following requirements are met. Record the results of all surface resistance analyses, including batch and part numbers of each item tested.

- The surface resistance shall not be greater than 40 microhms when measured on the surface resistance analyzer with the air pressure set to 50 psi (500 pounds load).
- The range of surface resistance on any 1 part or test piece shall not exceed 20% of the mean value obtained.

6.1.1 If individual parts or test pieces fail to meet the requirements of paragraph 6.1, re-clean the represented batch of parts according to section 5.2.

6.2 Light staining as a result of the Alkalume Fixant is not be cause for re-cleaning, provided that the surface resistance meets the requirements specified herein.

6.3 Evidence of damage to the surfaces of parts, resulting from the use of stainless steel wire wheels (e.g., deep scratches, metal flow, galling or orange peeling) is not acceptable. Refer parts with such defects/damage to Bombardier Toronto MRB or Bombardier Toronto delegated MRB for disposition.

6.4 At least once per shift, check bath temperatures (e.g., according to QDI-09-02) and record the results (e.g., on a QA Process Control Record, DH Form #3520).

7 SAFETY PRECAUTIONS

7.1 Observe standard plant safety precautions when performing the procedure specified herein.

7.2 Operators shall wear neoprene rubber gloves, boots and aprons when carrying out cleaning operations.

7.3 Take special care to prevent cleaning solutions from contacting bare skin. If skin contact occurs, wash the affected area with copious amounts of clean water. Contact First Aid immediately if irritation of the skin occurs.

7.4 Refer to PPS 31.17 for the safety precautions for handling and using solvents.

7.5 Refer to PPS 31.02 for the safety precautions necessary for handling and use of the deoxidizer and alkaline cleaning solutions.

8 PERSONNEL REQUIREMENTS

8.1 This PPS has been categorized as a “Controlled Special Process” by PPS 13.39. Refer to PPS 13.39 for personnel requirements.

9 MAINTENANCE OF SOLUTIONS

9.1 Alkalume Cleaning Solutions

9.1.1 Submit a sample of each of the solutions to the laboratory immediately after an initial bath make-up and every 3 months thereafter.

9.1.2 Maintain solutions according to Table II.

9.1.3 Keep records of all alterations made to the solutions and the dates on which they were made.

9.1.4 When the effectiveness of the solutions deteriorates, as indicated by an unacceptable increase in the surface resistance, discard the solutions and make up new solutions.

TABLE II - MAINTENANCE OF ALKALUME CLEANING SOLUTIONS

SOLUTION	CONCENTRATION	pH
Alkalume No. 13	9.0 - 12.0 ounces Alkalume No. 13 per gallon	—
Alkalume Deoxidant	4.0 - 6.0 ounces Alkalume Deoxidant per gallon	4.0 - 5.0
Alkalume Fixant	4.0 - 5.5 ounces Chromium Trioxide per gallon	—

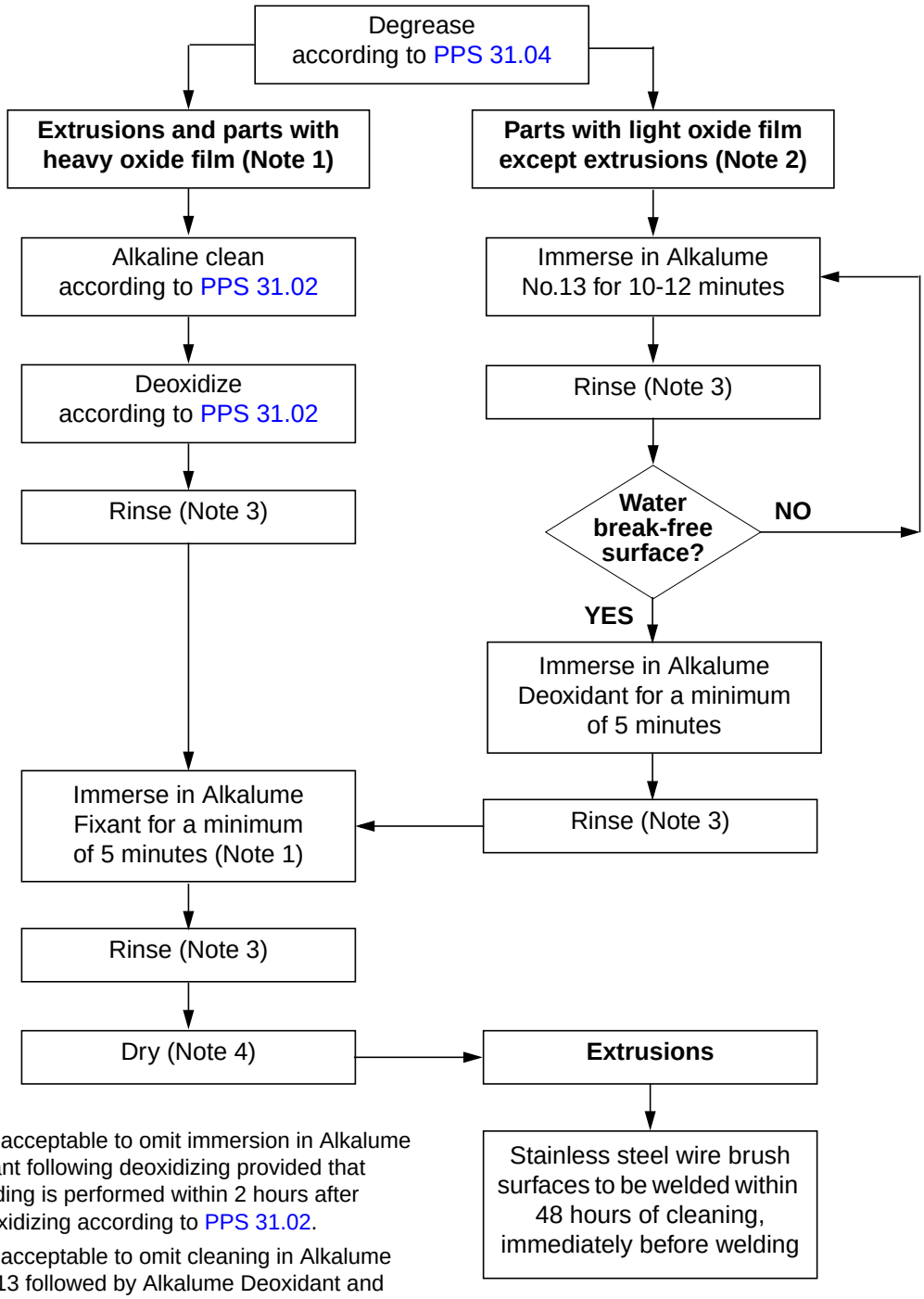
9.2 Deoxidizer and Alkaline Cleaning Solutions

9.2.1 Sample and maintain the deoxidizer and alkaline cleaning solutions according to PPS 31.02.

10 DISPOSAL OF SOLUTIONS

10.1 Process solutions for disposal through the chemical disposal facility.

FLOW CHART 1 - CHEMICAL CLEANING



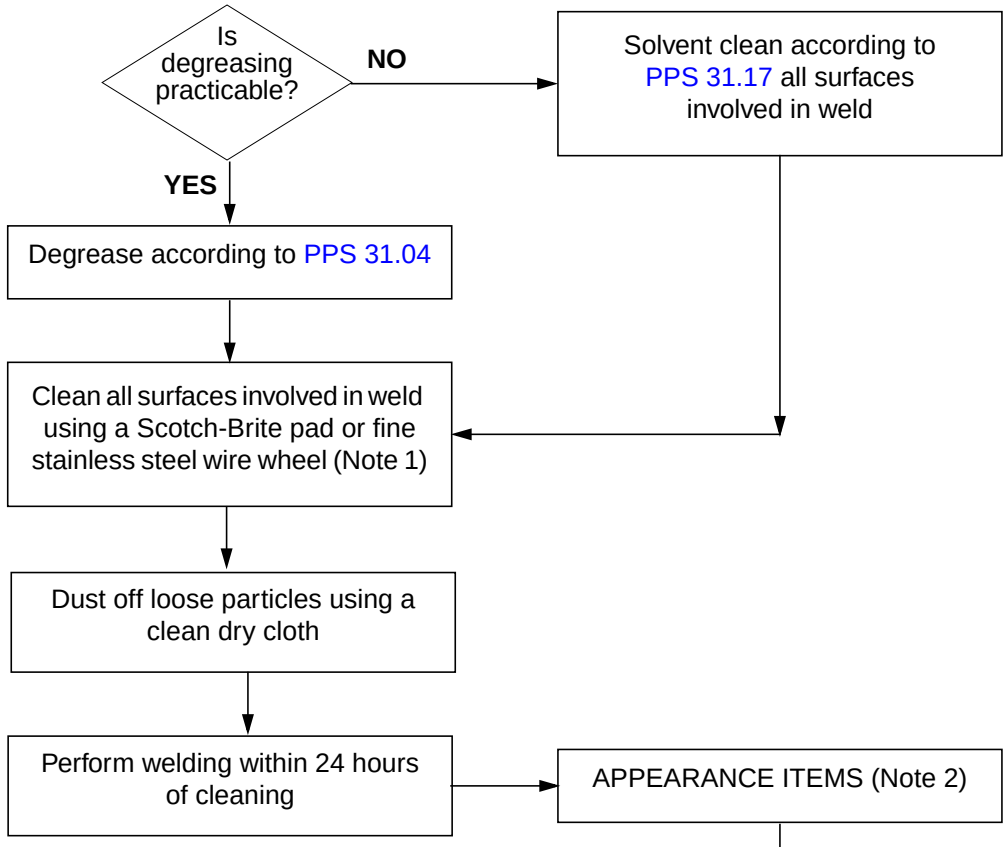
Note 1. It is acceptable to omit immersion in Alkalume Fixant following deoxidizing provided that welding is performed within 2 hours after deoxidizing according to PPS 31.02.

Note 2. It is acceptable to omit cleaning in Alkalume No.13 followed by Alkalume Deoxidant and Fixant provided that welding is performed within 2 hours following degreasing.

Note 3. Rinse parts for a minimum of 3 minutes with cold re-circulating water in a tank, by means of a hose or in a suitable spray booth.

Note 4. Drying may be accelerated by means of a warm air blower or by placing the parts in a suitable oven.

FLOW CHART 2 - MECHANICAL CLEANING



Note 1. Only operators who have demonstrated competence in the handling of stainless steel wire wheels shall be allowed to clean aluminum parts and assemblies by this method. When using stainless steel wire wheels, the pressure shall be light and the time of application as short as possible.

Note 2. Appearance items are those which are in view on the completed aircraft and do not receive any surface treatment.

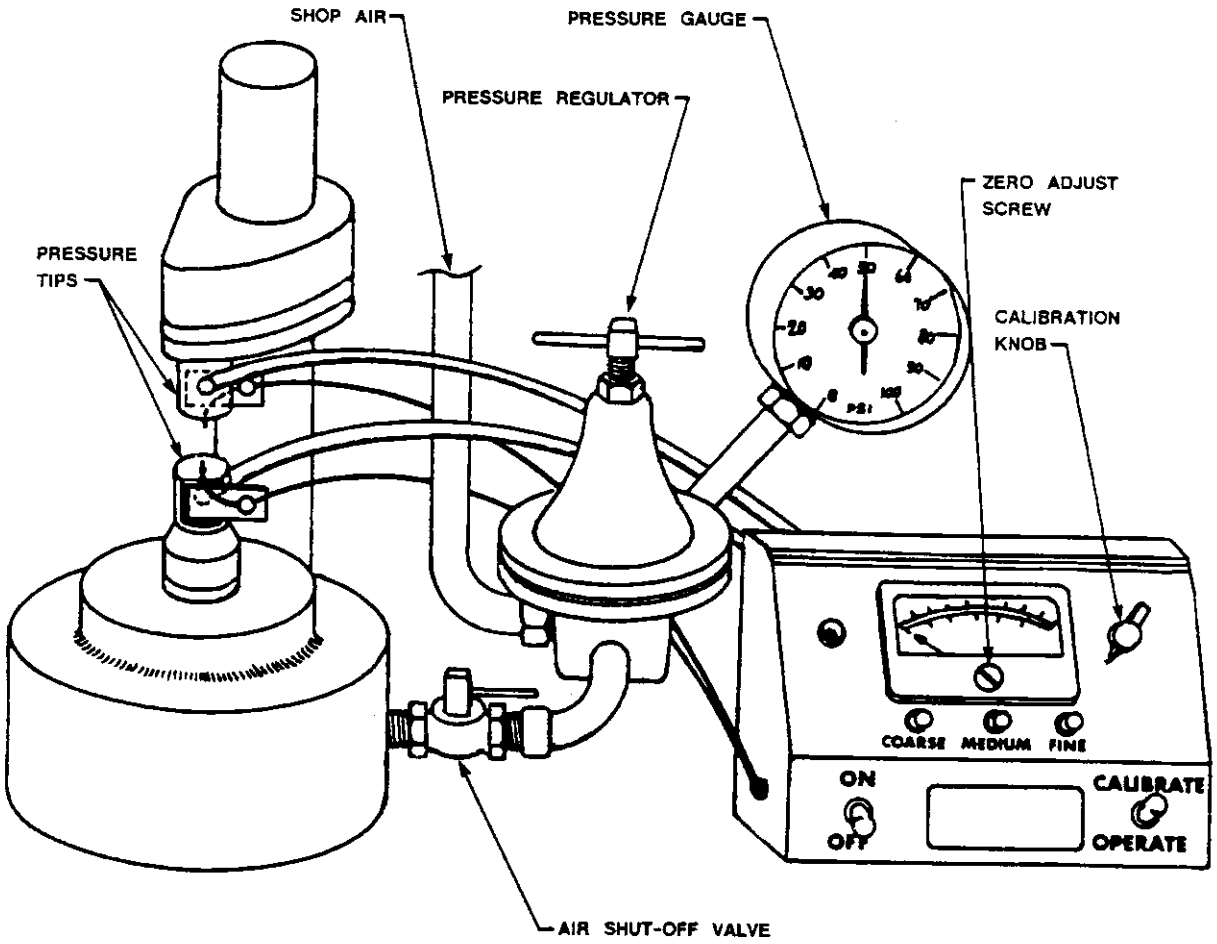


FIGURE 1 - SURFACE RESISTANCE ANALYZER, MODEL NO. VT-II-A