BOMBARDIER
Toronto Site
PROPRIETARY INFORMATION

PPS 21.03

PRODUCTION PROCESS STANDARD

PRIMING, SEALING & REPAIR OF INTEGRAL FUEL TANKS

Issue 33
- This standard supersedes PPS 21.03, Issue 32.
- Vertical lines in the left hand margin indicate technical 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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1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for priming (F21) and sealing integral fuel tanks during and after assembly and for repairing integral fuel tanks.

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.

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 ASTM D1200 - Standard Test Method for Viscosity by Ford Viscosity Cup.

3.2 ASTM D2240 - Standard Test Method for Rubber Property - Durometer Hardness.

3.3 BAERD GEN-007 - Quality Control of Heat Treating Equipment and Hot Forming Equipment.

3.4 BAERD GEN-018 - Engineering Requirements for Laboratories.

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

3.6 Bombardier Toronto Engineering Order (EO) 7336 - Supersession List.

3.7 Bombardier Toronto EO 82844 - Repair Instructions for Fuel Leaks Where Stringer Joint Straps Pass Through Rib Y171.20, 8-300A A/C Only.

3.8 DASH 8 engineering drawings: G.A., Fuel Tank Sealing

Series 100/200/300 Aircraft:	85710530 (Standard Tanks)
	85711121 (Long Range Tanks)
Series 400 Aircraft:	85713005 & 85714609 (Basic Tanks)

3.9 EHS-OP-005 - Hazardous Materials Management - *Bombardier Toronto internal operating procedure*.

3.10 FTP D400-281001 - Final Fuel Tank Pressure Test (Q400).

3.11 PPS 2.16 - Installation of NAS Type Lockbolt Fasteners.

3.12 PPS 2.38 - Fluid Tight Installation of Solid Rivets.

3.13 PPS 2.60 - Installation of Barrel Nuts.

3.14 PPS 4.11 - Pressure Testing DASH 8 Series 100, 200 & 300 Integral Fuel Tanks.

3.15 PPS 4.22 - Pressure Testing Learjet Model 45 Integral Fuel Tanks.

3.16 PPS 13.04 - De-Fuming of Aircraft Fuel Tanks and Fuel Containers.

3.17 PPS 13.13 - Personal Protective Respiratory Equipment.

3.18 PPS 13.26 - General Subcontractor Provisions.

3.19 PPS 13.28 - Storage Life of Adhesives, Sealants, Paints and Composite Products.

3.20 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.21 PPS 21.15 - Machine Mixing and Handling of DHMS S3.01/B2 Sealant.

3.22 PPS 21.20 - Mixing and Handling Two-Part Sealants.

3.23 PPS 21.21 - General Sealing Practices.

3.24 PPS 31.17 - Solvent Usage.

3.25 PPS 32.35 - Chemical Conversion Coating for Low Electrical Resistance (C1).

3.26 PPS 34.08 - Application of Epoxy-Polyamide Primer (F19 & F45).

3.27 QAMTR 018 - Testing Paints and Adhesives.

3.28 QDI-09-02 - Process Control - *Bombardier Toronto's internal Quality procedure*.

4 MATERIALS, EQUIPMENT AND FACILITIES

4.1 Materials

4.1.1 Scotch-Brite pads, Type A, fine (maroon colour), 3M Canada Ltd.

4.1.2 Primer, polyurethane, finish code F21 Type I, Grade A to DHMS C4.06.

4.1.3 Primer, polyurethane high solids, finish code F21 Type I, Grade B to DHMS C4.06.

4.1.4 Primer, epoxy finish code F21 Type II, Class A to BMS 10-20.

4.1.5 PR 716, Detackifier, PRC-DeSoto.

4.2 Equipment

4.2.1 Paint spray rooms equipped with forced or induced ventilation systems capable of maintaining sufficient ventilation to meet Occupational Health and Safety Act requirements. The air flow shall not cause air turbulence or excessive air currents, but shall be able to prevent dried overspray from settling on tacky primed surfaces. Adequate lighting shall be provided, including in under-surface areas. Wash all equipment (e.g., cranes, baskets, frames, filters, etc.) and floors frequently to avoid a build-up of dust and overspray.

4.2.2 Fresh air ventilating units fitted with 8" diameter flexible hoses.

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

4.2.4 Viscometers: #4 Ford cup or Gardco EZ cup Zahn #2 cup. Do not use other brands of Zahn cups. The accuracy of the viscometers used to measure paint viscosity shall be verified at least once every 12 months. Verify the accuracy of #4 Ford cups as specified in ASTM D1200. Verify the accuracy of Gardco EZ cup Zahn #2 cups by using the cup to measure the viscosity of a fluid of known viscosity and calculating the difference between the actual and measured viscosities. If the measured viscosity is less than 10% different from the actual viscosity, apply a percent correction to the seconds flow when using the cup. Do not use viscometers whose viscosity readings vary more than 10% from the actual viscosity of the test fluid.

4.2.5 Storage freezer, chest type, capable of maintaining temperature of 0°F (-18°C) or below.

4.2.6 Film thickness gauge (e.g., Elcometer).

4.2.7 Ovens shall conform to the requirements of BAERD GEN-007 Class 15 equipment and be equipped with Type C instrumentation.

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

4.2.9 Durometer to ASTM D2240.

4.3 Facilities

4.3.1 This PPS has been categorized as a Controlled Special Process according to PPS 13.39 and as such only facilities specifically approved according to PPS 13.39 are authorized to perform priming (F21) and sealing integral fuel tanks during and after assembly and for repairing integral fuel tanks 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 priming (F21) and sealing integral fuel tanks during and after assembly and for repairing integral fuel tanks 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 Bombardier Toronto Materials Laboratory or by laboratories accredited according to BAERD GEN-018.

5 PROCEDURE

5.1 General

5.1.1 For the purposes of this PPS, the term “MRB” (Material Review Board) shall be considered to include Bombardier Toronto MRB and Bombardier Toronto delegated MRB.

5.1.2 Always take care to prevent damaging the sealant or primer coating when working inside a tank.

5.2 Priming

5.2.1 Preparation of Parts

5.2.1.1 Before priming, ensure that the surface finish and surface treatment of parts meet the requirements of the engineering drawing.

5.2.1.2 When preparing surfaces primed with bonding primer, smooth any rough bonding primer by abrading with Scotch-Brite pads.

5.2.1.3 Do not touch cleaned parts with bare hands or expose parts to contamination before priming. Always wear clean lint-free cotton gloves when handling cleaned parts.

5.2.1.4 If contaminated, strip the chemical finish and re-process it according to the engineering drawing.

5.2.1.5 Except as noted below, prime parts within 24 hours of chemical treatment (e.g., anodizing, conversion coating, etc.). Parts which are to be primed within 24 hours do not require protective wrapping, but shall be kept free from contamination.

- Parts which will not be primed within 24 hours of chemical treatment shall be sealed in plastic bags or protectively wrapped in neutral Kraft paper. Solvent clean parts according to PPS 31.17 immediately after removal from the packages. Prime parts immediately after cleaning.
- Parts which have not been primed within 72 hours of chemical treatment shall have the chemical finish stripped and re-processed according to the applicable chemical finishing PPS.

5.2.2 Preparation of Primer

5.2.2.1 General

5.2.2.1.1 Do not intermix base, curing solution and thinners of difference manufacturers and types.

5.2.2.1.2 Keep containers of primer components tightly closed when not in use.

5.2.2.1.3 Only use base or curing solution within their storage life (as marked on the containers). Submit all primer components that have exceeded their storage life for shelf Life extension testing and action according to QAMTR 018.

5.2.2.1.4 Dispose of F21 primer components showing signs of skinning, gelling, lumping, or pigment separation according to section 9.

5.2.2.1.5 Dispose of F21 curing solution showing signs of milkiness, precipitation, darkening or other deterioration according to section 9.

5.2.2.2 Preparation of Primer for Spray Application

5.2.2.2.1 Prepare the primer for spray application as follows:

Step 1. Open the base can and use a paddle to break up any caked primer at the bottom of the can.

Step 2. Close the can and agitate the base component on a mechanical shaker for a minimum of 1 minute and a maximum of 20 minutes.

Step 3. In a well ventilated area, mix together base and curing solution in the ratio specified in Table I (add curing solution to base slowly and stir). Only mix enough primer to use within the pot life specified in Table I.

Step 4. Allow the mixture to react for the time specified in Table I.

Step 5. If required, reduce the mixture to the required viscosity using the specified thinner.

Step 6. Verify the viscosity against the specified requirements with either a #4 Ford cup or a “Gardco EZ” #2 Zahn cup.

TABLE I - PRIMER MIXING RATIOS AND POT LIFE

PRIMER TYPE	MANUFACTURER	COMPONENTS	MIXING RATIO (By Volume)	REACTION TIME (Note 1)	REDUCING RATIO (By Volume)	VISCOSITY (@ 60 - 90°F)		POT LIFE (Note 2)
						#4 FORD CUP	"GARDCO EZ" #2 ZAHN CUP	
F21 Type I Grade A	PRC - DeSoto	823-707 Base	4	30 minutes minimum	—	10 - 14 seconds	12 - 17 seconds	8 hours
		910-702 Curing Solution	1		—			
		020-707 Thinner	—		4 maximum			
	Akzo Nobel	20P1-10 Base	4	30 minutes minimum	—	10 - 12 seconds	18 - 19 seconds	8 hours
		PC-108 Hardener	1		—			
		TR-53 Thinner	—		4 maximum			
F21 Type I Grade B	PRC - DeSoto	833K086 Base	2	5 minutes minimum	—	10 - 20 seconds	17 - 20 seconds	4 hours
		930K088 Curing Solution	1		—			
	Akzo Nobel	20P1-21 Base	3	15 minutes	—	18 - 22 seconds	19 - 24 seconds	4 hours
		PC-235 Curing Solution	1		—			
F21 Type II	Akzo Nobel	454-4-1 Base	3	30 minutes minimum	—	11 - 13 seconds	13 - 16 seconds	8 hours
		CA-109 Curing Solution	1		—			
		TL-52 Thinner	—		1 maximum			

Note 1. If a reaction time is specified, allow the base and curing solution to react for the time specified before reduction.
Note 2. The pot life is the time during which mixed primer remains suitable for application at 75 ± 5°F. The time indicated is for a 100 gram mix unless otherwise specified.

5.2.2.3 Preparation of Touch-up Primer

5.2.2.3.1 To increase storage life, prepare F21 Type II primer used for touch-up as follows:

Step 1. Open the base can and use a paddle to break up any caked primer at the bottom of the can.

Step 2. Close the can and agitate the base component on a mechanical shaker for a minimum of 1 minute and a maximum of 20 minutes.

Step 3. Mix 3 parts of Akzo Nobel 454-4-1 Base to 1 part CA-109 Curing Solution.

Step 4. Let the mixture stand for a minimum of 30 minutes (reaction time) before adding a maximum of 1 part TL-52 Thinner.

Step 5. Fill touch-up bottles bearing the mixing date with the mixed components and immediately place in a freezer operating at a temperature between -58°F (-50°C) and 0°F (-18°C).

5.2.2.3.2 Inspect the mixing dates on touch-up bottles of pre-mixed F21 Type II primer on a daily basis and discard according to section 9 any bottles which have been prepared and stored for more than 12 days. Discard according to section 9 any primer that has been out of the freezer for more than approximately 8 hours or is too thick to apply and does not flow out smoothly.

5.2.3 Application of Primer

5.2.3.1 If the engineering drawing does not specify primer type, use F21 Type I, Grade A or Grade B.

5.2.3.2 Priming of integral fuel tanks consists of applying F21 primer to all parts completely enclosed within the tank and to the inside surfaces of parts such as spar webs, shims, etc. that form the walls of the tanks.

5.2.3.3 For larger parts (e.g., stringers, ribs or spars), process two LAB 066-1 test panels positioned at opposite ends of the part during primer application. For all other parts, process one LAB 066-1 test panel for testing with every batch of primed parts. At the discretion of Bombardier Quality, additional panels may be requested.

5.2.3.4 Only apply F21 Type I primer when the temperature is greater than 60°F (16°C) and the relative humidity is between 30% and 80%. Only apply F21 Type II primer when the temperature is greater than 60°F (16°C) and the relative humidity is less than 80%. Use calibrated (e.g., according to QDI-09-02) indicators to monitor and record temperature and humidity.

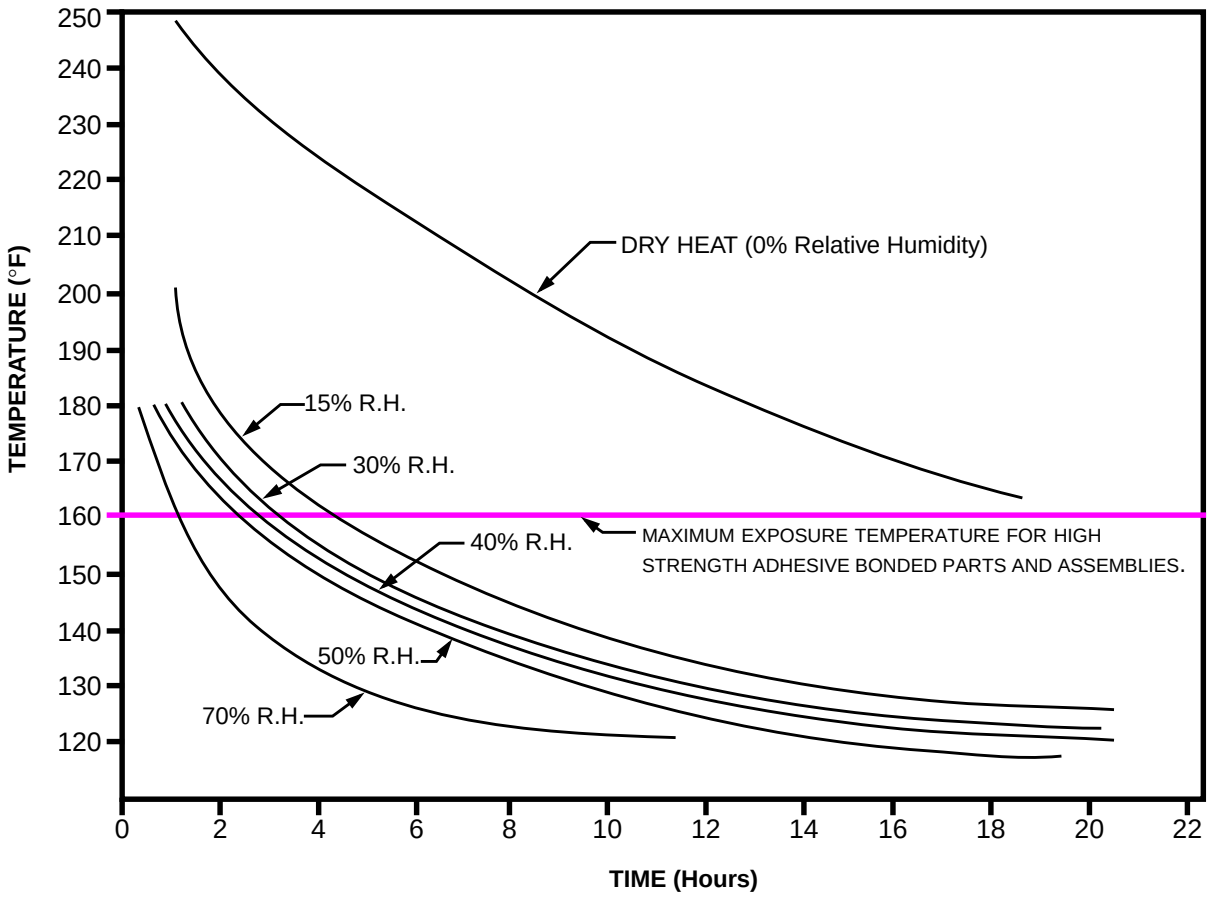
5.2.3.5 If the engineering drawing specifies F21 Type I primer, apply one even coat to a dry film thickness of 0.0008" - 0.0012". If the engineering drawing specifies F21 Type II primer, apply one even coat to a dry film thickness of 0.0006" - 0.0009".

5.2.4 Curing of Primer

5.2.4.1 Allow F21 Type I primed parts to air dry at 60 to 90°F for a minimum of 30 minutes for Akzo Nobel primers and for a minimum of 2 hours for PRC-DeSoto primers before heat curing according to Figure 1. If the PPS requirements conflict with the primer manufacture's technical data sheet, follow the manufacturer's instructions (e.g., flash off time, cure data, etc.).

5.2.4.2 Cure F21 Type I Grade A and F21 Type II Class A primed parts according to Table II.

5.2.4.3 Cure F21 Type I Grade B polyurethane high solids primer according to Table III for conventional curing or according to Table IV for infra-red curing.



Note 1 Allow a minimum drying time as specified in paragraph 5.2.4.1 before curing at higher temperatures.
Note 2. If the above heat cure chart conflicts with the primer manufacturer's technical data sheet, follow the manufacturer's instructions.

FIGURE 1 - ACCELERATED FULL CURE OF F21 TYPE I PRIMER (NOTES 1 & 2)

TABLE II - PRIMER CURE SCHEDULE

PRIMER TYPE	CURE TO RE-COAT (60 - 90°F) (Note 1)	CURE FOR FUEL (Notes 1 & 2)	ULTIMATE (FULL) CURE (Notes 1 & 3)
F21 Type I Grade A	30 minutes to 8 hours	According to Figure 1	minimum 14 days at 60 to 90°F, 50% R.H. or according to Figure 1
F21 Type II Class A	30 minutes minimum (Note 4)	N/A	N/A

Note 1. Cure time may vary depending on relative humidity (R.H.).
Note 2. For repair of fuel tanks on completed aircraft.
Note 3. Before any transporting, cleaning, sealing or assembly of primed parts.
Note 4. Before applying overcoat of F21 Type I primer.

TABLE III - CONVENTIONAL CURING OF HIGH SOLIDS F21 TYPE I GRADE B PRIMER

FLASH-OFF TIME (NOTE 1)	TEMPERATURE RANGE	TIME TO OVERCOAT (NOTE 1)	TIME TO HANDLE & STACK (NOTE 1)	TIME TO ASSEMBLE & SEAL (NOTE 1)	ULTIMATE (FULL) CURE (NOTES 1 & 2)
Akzo Nobel: 30 minutes minimum PRC-DeSoto: 2 hours minimum	64 to 84°F	4 hours minimum	6 hours minimum	7 days minimum	minimum 14 days at 60 to 90°F, 50% R.H.
	130 to 150°F	30 minutes minimum	1 hour minimum	18 hours minimum	minimum 24 hours (note 3)
	180 to 200°F	N/A	30 minutes minimum	1 hour minimum	—

Note 1. The time specified does not include flash-off time. Cure time may vary depending on relative humidity (R.H.). If the R.H. is not specified, apply primer under the R.H. condition as specified in paragraph 5.2.3.4. If any of the time specified conflicts with the primer manufacture's technical data sheet, follow the manufacturer's instructions.
Note 2. Before any transporting of primed parts.
Note 3. The time specified is for PRC-DeSoto primer. For Akzo Nobel primer, allow to cure for 24 hours at 77 ± 2°F and 55 ± 5% R.H., followed by 24 hours cure at 140 ± 2°F and 55 ± 5% R.H.

TABLE IV - INFRA-RED CURING OF HIGH SOLIDS F21 TYPE I GRADE B PRIMER

FLASH-OFF TIME (NOTE 1)	TEMPERATURE	TIME TO MASK & OVERCOAT (NOTE 1)	TIME TO HANDLE & STACK (NOTE 1)	TIME TO ASSEMBLE & SEAL (NOTE 1)
Akzo Nobel: 30 minutes minimum PRC-DeSoto: 2 hours minimum	200°F maximum	6 minutes minimum	40 minutes minimum	40 minutes minimum

Note 1. The time specified does not include flash-off time. Cure time may vary depending on relative humidity (R.H.). If the R.H. is not specified, apply primer under the R.H. condition as specified in paragraph 5.2.3.4. If any of the time specified conflicts with the primer manufacture's technical data sheet, follow the manufacturer's instructions.

5.2.5 Priming of Broken Pin Ends of Pull Type Lockbolts

5.2.5.1 Except as specified in paragraph 5.2.5.1.1, within 24 hours of installation, brush apply either F19 primer according to PPS 34.08 or, preferably, F21 Type II primer to broken pin ends of pull type lockbolts inside the fuel tank. Allow primer to cure for 60 - 70 minutes before applying dome seals according to PPS 21.21.

5.2.5.1.1 For **titanium** lockbolts, it is not necessary to apply F19 or F21 Type II primer to the broken pin ends of pull type lockbolts prior to dome sealing according to PPS 21.21.

5.2.6 Priming of Hi-Lok & Hi-Lite Collars

5.2.6.1 Unless the collar has been dome sealed, for **aluminum** single hex and double hex Hi-Lok or Hi-Lite collars where the hex end of the collar has been torqued off, touch-up the exposed bare metal of the collar within 24 hours of installation with F21 Type II primer. Touch-up of the collar with F19 Type 2 primer according to PPS 34.08 is also acceptable, but use of F21 Type II primer is preferred. It is not necessary to touch-up the exposed bare metal of titanium or stainless steel collars in the break-off area.

5.2.7 Clean-Up and Disposal

5.2.7.1 Immediately after use, solvent clean all equipment used to apply F21 primer according to PPS 31.17.

5.2.7.2 Dispose of excess mixed F21 primer and containers, rags and paper contaminated with mixed F21 primer or primer components according to section 9.

5.3 Sealing

5.3.1 Preparation of Parts

5.3.1.1 Clean surfaces according to PPS 21.21 immediately before application of sealant or touch-up of primer coating.

5.3.1.2 Before laying any sealant bead or fay seal, inspect the underlying primer coating for evidence of scratches or other defects.

5.3.1.3 Except as noted in paragraph 5.3.1.4 and paragraph 5.3.1.5, touch-up minor scratches to F21 Type I primer coatings as follows:

Step 1. Solvent clean the affected area according to PPS 31.17.

Step 2. Brush apply F21 Type II primer or pre-mixed primer prepared according to section 5.2.2.3 to the cleaned surface. It is acceptable to apply F19 primer according to PPS 34.08 in place of F21 Type II primer. Let bottles of frozen primer warm at 60 to 90°F for a minimum of 30 minutes before applying with a brush. The pot life of pre-mixed frozen F21 Type II primer, from the time of removal from the freezer is approximately 8 hours; discard according to section 9 any primer that has been out of the freezer for more than approximately 8 hours or is too thick to apply and does not flow out smoothly.

Step 3. Allow the primer to cure for 60 to 90 minutes.

Step 4. If using F19 primer for touch-up, apply a thin brush coat of DHMS S3.01/A2, DHMS S3.01/A1/2, PR1440 A2, or PR1440 A1/2 sealant to the F19 primed surface. Ensure that the sealant overlaps onto the original F21 primer by at least 1/2".

5.3.1.4 If the base material of the part has been exposed, MRB approval is required for repair. If authorized by an approved dispositioned Non-Conformance Report (NCR), repair such defects as follows:

Large Surface Repair

Step 1. For metallic parts only, if possible, completely strip the detail part according to PPS 31.07, provided that the restrictions and limitations of PPS 31.07 are adhered to.

Step 2. Solvent clean the affected area according to PPS 31.17.

Step 3. Apply chemical conversion coating (e.g., Alodine) to the exposed metal surface according to PPS 32.01.

Step 4. Re-apply F21 Type II primer as specified herein to the chemical conversion coated surface.

Step 5. Allow the primer to cure as specified herein.

Small Surface Repair

Step 1. Remove or blend the damaged or defective primer by sanding it with abrasive paper or a Scotchbrite pad.

Step 2. Solvent clean the affected area according to PPS 31.17.

Step 3. Manually apply chemical conversion coating (e.g., Alodine) to the exposed metal surface according to PPS 32.02.

Step 4. Brush apply F21 Type II primer or pre-mixed primer prepared according to section 5.2.2.3 to the chemically converted surface. It is acceptable to apply F19 primer according to PPS 34.08 in place of F21 Type II primer. Let bottles of frozen primer warm at 60 to 90°F for a minimum of 30 minutes before applying with a brush. The pot life of pre-mixed frozen F21 Type II primer, from the time of removal from the freezer is approximately 8 hours; discard according to section 9 any primer that has been out of the freezer for more than approximately 8 hours or is too thick to apply and does not flow out smoothly.

Step 5. Allow the primer to cure for 60 to 90 minutes.

Step 6. If using F19 primer for touch-up, apply a thin brush coat of DHMS S3.01/A2, DHMS S3.01/A1/2, PR1440 A2, or PR1440 A1/2 sealant to the F19 primed surface. Ensure that the sealant overlaps onto the original F21 primer by at least 1/2".

5.3.1.5 Cracked or chipped F21 primer around rivet heads shall be repaired as follows:

Step 1. Solvent clean the affected area according to PPS 31.17.

Step 2. If specified by the engineering drawing, dome seal the rivet tail or head according to PPS 21.21 with DHMS S3.01/B2 sealant prepared according to PPS 21.20.

5.3.2 Preparation of Sealant

5.3.2.1 Mix and handle two-part sealants according to PPS 21.20. To ensure a uniform air-free mixture, machine mix DHMS S3.01/B2 sealant according to PPS 21.15 or use pre-mixed sealant meeting DHMS S3.01 requirements. Refer to PPS 21.20 for a cross reference between the DHMS/BAMS number and the sealant material.

5.3.3 Tank Sealing

5.3.3.1 Sealing of integral fuel tanks consists of applying sealant to parts, including fasteners, either during or after assembly to produce a completely leak-proof structure.

5.3.3.2 The area to be sealed, type of sealant and fillet dimensions shall be according to the engineering drawing, assembly manual or work order. Refer to paragraph 3.8 for a listing of the G.A. fuel tank sealing drawings for each aircraft type.

5.3.3.3 Apply sealant according to PPS 21.21 and as noted below:

- Pot all barrel nut holes inside the integral fuel tank with DHMS S3.01/B2 according to PPS 2.60.
- Avoid damaging the primer coating during assembly and sealing of parts.
- If possible, fit all details whose assembly obstructs the application of sealant so that assembly is possible immediately after sealing without further drilling. Do not disturb the sealant when assembling such parts. If pre-fitting of the parts is not possible, allow the sealant to cure tack-free before assembly.

5.3.3.4 After assembly of the structural box, seal as follows:

Step 1. Thoroughly vacuum the interior of the tank to remove all foreign particles.

Step 2. Position the structural box to obtain the easiest access and working position.

Step 3. Place a suitable covering, such as a soft lint-free fabric, inside the tank bottom to prevent damage to primed surfaces.

Step 4. When entering the fuel tank, wear coveralls, soft shoe covers and a suitable head covering without exposed hard fasteners. Wear coveralls when working in the fuel tank through the overwing access cover openings.

Step 5. Perform final sealing according to the engineering drawing. A ventilating unit shall be in operation while sealing the inside of completed fuel tanks.

5.3.3.5 Exposed fillets or brush sealants that have been applied to sub-assemblies (skins, closing ribs, spars, etc.) before assembly of the wing box may be brush coated with PR 716 coating whenever the sealant is liable to contamination from metal chips, soils, or from boots and shoes. **Apply PR 716 coating within 1 hour after sealant application**. Overlap of coating shall be kept to a minimum on base metal.

5.3.4 Curing of Sealant

5.3.4.1 Using a durometer meeting ASTM D2240, ensure sealant has cured to a minimum of 30 Shore A hardness prior to pressure testing.

5.3.4.2 Except as noted below, allow sealed areas or assemblies to cure tack-free according to PPS 21.20 before further working.

- It is acceptable to further work a fay sealed area immediately after assembly, but do not pressure test until the sealant has cured to a minimum of 30 Shore A hardness using a durometer meeting ASTM D2240.

5.3.5 Post Sealing Examination and Clean-Up

5.3.5.1 Immediately after use, remove all equipment, tools, etc. from the tank. Remove uncured sealant from equipment, tools, etc. by solvent cleaning according to PPS 31.17.

5.3.5.2 Examine the tank interior for damage to the primed surfaces and, if necessary, repair according to paragraph 5.3.1.3 or paragraph 5.3.1.5.

5.3.5.3 After the sealant is cured, thoroughly vacuum the interior to remove all loose particles.

5.3.5.4 Place suitable covers over the access holes of completed tanks to prevent contamination of the tank interiors and damage to the primer coatings or sealant beads.

5.4 Repair of Integral Fuel Tanks

5.4.1 General

5.4.1.1 Unless prior written authorization has been granted by Engineering, the sealant used for repair shall be the same type as that used for the initial application.

5.4.1.2 Mark all external leak points on the tank structure as follows:

Step 1. Wipe the tank structure dry in the area of the fuel leak.

Step 2. Using a suitable wax crayon marker, mark the leak point and the extent of the leak at the fastener, seam or joint.

5.4.1.3 If necessary, de-fuel and de-fume fuel tanks according to PPS 13.04 before starting the repair.

5.4.2 Faulty Sealant

5.4.2.1 Repair faulty sealant on the pressure side of the seam according to PPS 21.21.

5.4.2.2 If faulty sealant exists where the DASH 8 300A stringer joint straps pass through rib Y171.20, repair it according to EO 82844.

5.4.3 Faulty Rivets

5.4.3.1 Replace leaking rivets according to the applicable fastener PPS (e.g., PPS 2.38) and, if necessary, re-seal according to section 5.3.

5.4.4 Leaks in Bolt Locations

5.4.4.1 Repair leaks in bolt locations as follows:

Step 1. Remove the leaking bolts and set aside.

Step 2. Remove all old sealant from the bolt and structure in the area of the bolt hole.

Step 3. Inspect the bolt hole for out-of-tolerance and other defects and, if rework is necessary, contact Bombardier Liaison Engineering.

Step 4. After cleaning and re-work, re-install and re-seal bolts according to PPS 21.21. If the leaks persist, seal the bolt head or nut, whichever is on the pressure side.

5.4.5 Leaks in Lockbolt Locations

5.4.5.1 Repair leaks in lockbolt locations as follows:

Step 1. Remove and discard leaking lockbolts. Never re-use lockbolts.

Step 2. Carefully remove all old sealant from the structure and bolt hole.

Step 3. Inspect the hole for out-of-tolerance and other defects and, if re-work is necessary, contact Bombardier Liaison Engineering.

Step 4. Replace the lockbolt according to PPS 2.16 and re-seal.

5.4.6 Leaks in DASH 8 Access Cover Seams

5.4.6.1 Repair leaks in DASH 8 access cover seams as follows:

Step 1. Remove the leaking access cover.

Step 2. Examine the seal for damage or the presence of any foreign matter.

Step 3. Replace the seal, if damaged.

Step 4. If foreign matter is evident, solvent clean the seal according to PPS 31.17.

Step 5. If the leak is originating from a domed nut, replace the nut and seal.

5.4.7 Repair of Primer

5.4.7.1 Touch-up scratches or removed primer according to paragraph 5.3.1.3 or paragraph 5.3.1.5.

5.4.8 Post Repair Procedure

5.4.8.1 After completion of all repairs and the new sealant has cured tack-free, thoroughly vacuum the interior of the tank to remove all loose particles.

5.4.8.2 Examine all sealant inside the tank in the area of the external leak at a seam or joint for evidence of lack of adhesion, air bubbles or any other defect which may impair its sealing properties. Remove and replace such sealant according to section 5.3.

5.4.8.3 Pressure test all repaired integral fuel tanks according to the following:

- DASH 8 Series 400 - FTP D400-281001
- DASH 8 Series 100, 200 & 300 - PPS 4.11
- Learjet Model 45 - PPS 4.22

5.4.8.4 Place suitable covers over the access holes of repaired tanks to prevent contamination of the tank interiors and damage to the primer coatings or sealant beads.

6 REQUIREMENTS

6.1 All testing and evaluation specified herein shall only be performed by Bombardier Toronto Materials Laboratory or by laboratories accredited according to BAERD GEN-018.

6.2 Inspect the characteristics listed on the Fluid Resistant Primer Control Record (e.g., Form DH 4900 according to QDI-09-02).

6.3 All F21 primed parts shall be fully cured according to Table II or Table III, as applicable, before any transporting, cleaning, sealing or assembly operations.

6.4 The type of sealant, method of sealing and dimensional requirements shall be according to the engineering drawing.

6.5 Replace the suspect portion of a sealant bead according to section 5.3, if there is reason to doubt proper adhesion to the part.

6.6 Sealed areas or assemblies shall be cured according to section 5.3.4 before further working or pressure testing.

6.7 After sealant is cured according to section 5.3.4, complete tank structures shall be pressure tested according to the following standards:

- DASH 8 Series 400 - FTP D400-281001
- DASH 8 Series 100, 200 & 300 - PPS 4.11
- Learjet Model 45 - PPS 4.22

6.8 The primer coating shall be uniform in appearance and shall completely cover the surface of the parts with no evidence of scratches or discontinuities in the coating. The dry film thickness of F21 Type I, Grade A and Grade B primer shall be 0.0008" to 0.0012". The dry film thickness of F21 Type II, Class A primer shall be 0.0006" to 0.0009".

6.9 Perform paint adhesion testing of the fully cured coating on LAB 066-1 test panels processed with the parts by wet tape testing after immersion in de-ionized water for 24 hours according to DHLPM Procedure No. 3055 Method III, Class 3 or ASTM D3359 Method B. The coating shall have a minimum adhesion level of 3B. If the engineering drawing specifies more than one coat of F21 primer (including cases where it is specified that a coat of F21 Type I primer be applied over a coat of F21 Type II primer), perform paint adhesion testing on fully cured test panels to which both coats have been applied. If the engineering drawing specifies that only a section of the part receive multiple coats, then test panels for both single coats and multiple coats are required. Refer parts that fail to meet the minimum requirement to MRB for disposition.

7 SAFETY PRECAUTIONS

7.1 The safety precautions specified are specific to Bombardier Toronto to meet Canadian Federal and Provincial government environmental, health and safety regulations. It is strongly recommended that subcontractors consider these safety precautions; however, subcontractors are responsible for ensuring that their own environmental, health and safety precautions satisfy the appropriate local government regulations.

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

7.3 Keep sealants and primers away from fire and other sources of ignition. Use only explosion proof safety lamps when working inside fuel tanks.

7.4 Provide sufficient ventilation when using primers and sealants in confined areas. When working inside the fuel tank, arrange fresh air blowers to provide an air stream from above and behind the operator. Locate discharge or suction vents at the bottom of the tank at the opposite end. When working in a tank that has contained fuel, wear splash goggles and protective respiratory equipment according to PPS 13.13. Wear protective respiratory equipment according to PPS 13.13 when working in the fuel tanks through the overwing access cover openings.

7.5 In the event of spillage of mixed F21 primer or raw curing solution, clear the immediate area of all personnel and clean the spill according to EHS-OP-005.

7.6 Avoid ingestion of any of the materials specified herein. Always wash hands before smoking or eating. If ingestion occurs, obtain medical attention immediately.

7.7 Avoid skin and eye contact with primers and sealants. Do not use protective hand cream because it may contaminate the sealant and cleaned surfaces. Always wear protective gloves, safety glasses or goggles and protective respiratory equipment according to PPS 13.13 when mixing or spraying F21 primer. If primer material enters the eyes, flush eyes thoroughly with clean water for 15 minutes minimum. Obtain medical attention immediately. If skin contacts sealant or primer, immediately wash the affected area with soap and water. Remove contaminated clothing.

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

8 PERSONNEL REQUIREMENTS

8.1 This PPS has been categorized as a Controlled Special 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:

- importance of preparing parts before priming and before sealing
- able to define and understand curing solution, base and thinner components
- importance of proper primer and sealant curing
- safety precautions for handling sealant and primer components
- how to interpret engineering drawing notes
- ability to apply F21 primer and sealant according to the requirements of this PPS and the engineering drawing
- priming broken ends of pull type lockbolts
- primer and sealant clean-up and disposal procedures
- storage requirements of primers and sealants
- how to use protective respiratory equipment during priming
- able to mix and apply F21 primer according to this PPS and engineering drawing notes using spraying and curing equipment
- importance of cleaning and preparing damaged F21 primer before sealing
- documentation controlling the part preparation before sealing
- sealant handling and application procedures
- able to prepare the part or assembly for sealing
- requirements before final sealing
- primer and sealant repair procedures
- procedure for repairing leaks

9 DISPOSAL OF CHEMICAL WASTES

9.1 Dispose of all chemical wastes according to national legislation and local regulations. At Bombardier Toronto, dispose of chemical wastes according to EHS-OP-005.

9.2 At Bombardier Toronto, dispose of chemical contaminated work clothes, rags, etc., into Red Containers labelled “Waste Rags”.

10 STORAGE

10.1 Always use the oldest stock first (i.e., first in/first out (FIFO) basis).

10.2 Store F21 primer components in a dry area at a temperature of 40 to 100°F. For optimum storage life, a temperature of 60 to 90°F is recommended.

10.3 Store sealants according to the applicable sealant PPS.

10.4 Refer to PPS 13.28 for the storage life of sealants and primers.

10.5 Keep containers of primer and sealant material tightly closed when in storage.