BOMBARDIER

Toronto Site

PROPRIETARY INFORMATION

PPS 21.21

PRODUCTION PROCESS STANDARD

GENERAL SEALING PRACTICES

Issue 26
- This standard supersedes PPS 21.21, Issue 25.
- 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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	Quality	

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 applying sealant materials to aircraft structures and fittings.

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-018 - Engineering Requirements for Laboratories.

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

3.3 BATS 3461 - Shear Strength for Sealants.

3.4 PPS 2.68 - Installation of Hi-Lite Fasteners.

3.5 PPS 10.15 - Wet Lay-Up Fabrication of Epoxy Resin/Glass Fabric Reinforced Laminates.

3.6 PPS 13.13 - Personal Protective Respiratory Equipment.

3.7 PPS 13.26 - General Subcontractor Provisions.

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

3.9 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.10 PPS 21.01 - Index of Aircraft Sealing.

3.11 PPS 21.03 - Priming, Sealing & Repair of Integral Fuel Tanks.

3.12 PPS 21.19 - Sealing Removable Parts.

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

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

3.15 PPS 31.17 - Solvent Usage.

3.16 Engineering Order (E.O.) 7336 - Supersession List.

4 MATERIALS, EQUIPMENT AND FACILITIES

4.1 Materials

4.1.1 Use the sealant material specified on the engineering drawing or PPS except as follows:

- PR-1431-G Type I, II and III sealants are replaced by DHMS S3.06 Type I, Class C-80 sealant (see E.O. 7336).
- Do not use PR-1436-G sealant. Where PR-1436-G E-2 or DHMS S3.06 Type I Class E sealants are specified on the engineering drawing, use P/S 870 C-80 sealant for all fay sealing and for all other applications contact Liaison Engineering.
- For fay sealing applications, if the engineering drawing specifies DHMS S3.06 sealant (i.e., no type or class is specified), use P/S 870 C-80 sealant to DHMS S3.06 Type I Class C-80 sealant.
- DHMS S3.01/B2 Type I sealant is replaced by DHMS S3.01/B2 Type II sealant.
- When the engineering drawing does not specify the type of DHMS S3.01 sealant, use DHMS S3.01 Class B Type II sealant.
- It is acceptable to use DHMS S3.01 Type II Form D polysulfide sealing caps for dome sealing the collars specified in Table I.
- With the exception of fuel tank, firewalls and high temperature zones (e.g., nacelles), where use of DHMS S3.01 Type II Class B sealant is specified, it is acceptable to use BAMS 552-008 sealants as specified in PPS 21.20 in place of DHMS S3.01 Type II Class B sealant.
- Where use of PR-1422 A-1/2 or A-2 sealant to DHMS S3.01 Type I Class A is specified, it is acceptable to use PR-1440 A-1/2 or A-2 to AMS-S-8802 Type II Class A in place of PR-1422 A-1/2 or A-2 sealant.

4.1.2 PR-716, Detackifier, PRC-DeSoto.

4.1.3 Release agent, water-soluble and silicone-free (e.g., DSC 234-13-5 - Parting Agent 13).

4.1.4 Polyethylene sheet, LP512 Type I, CLH/M Grade 2, 0.060" thick, approximately 12" X 18", Commercial Supply Corp.

4.1.5 Isopropyl alcohol (IPA) to Federal Specification TT-I-735, Grade A or B.

4.2 Equipment

4.2.1 Air operated sealant guns (e.g., Semco #250-6, Pyles #950-25-H).

4.2.1.1 Compressed air shall meet the requirements of BAERD GEN-023.

4.2.2 Standard polyethylene nozzles, 1/16" orifice, (e.g., Semco #420).

4.2.3 Modified polyethylene nozzles for dome sealing rivets and lockbolts, for example:

- Semco S220565-MOD
- Semco S220565-MOD-45 (45° offset)
- Semco S220565-MOD-90 (90° offset)

4.2.4 Flared polyethylene nozzles, (e.g., Semco #8608).

4.2.5 Modified flared polyethylene nozzles for dome sealing capped anchor nuts (e.g., Semco S231348-MOD).

4.2.6 Sealant spatulas (e.g., SD9164, Mk1, Mk2, Mk3 and Mk4).

4.2.7 Plastic sealant scrapers (e.g., SD9265).

4.2.8 Spray gun (e.g., De Vilbiss P-MBC-510, fitted with #704E nozzle and air cap and AV-601E fluid tip (0.070" I.D.) and fluid needle).

4.2.9 Pressure pot, 2 quart with regulator, pressure gauge and hoses.

4.2.10 Air pressure regulator fitted with pressure gauge and oil and water separators.

4.2.11 Bristle brushes, 1/2" width.

4.2.12 Mohair paint roller, 3" width.

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

4.2.14 Solvent resistant protective gloves (e.g., DSC 422-2).

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 application of sealant materials to aircraft structures and fittings 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 application of sealant materials to aircraft structures and fittings according to this PPS, completion of a test program and submission of test samples as specified in section 6 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 Seal the areas specified on the engineering drawing.

5.1.2 Refer to PPS 21.01 for an index of Bombardier Toronto sealing PPS's for specific sealing applications.

5.1.3 Do not apply sealants if the temperature of the part surfaces is below 50°F (10°C).

5.1.4 Sealant application shall be accomplished in an area where the ambient temperature and relative humidity are within Zones 1, 2 or 3 as specified in Figure 14.

5.1.5 Sealant application and curing outside of the temperature and relative humidity specified in Figure 14 may result in an unacceptable seal (e.g., excessive shrinkage, dragging effect on vertical surfaces, etc.).

5.1.6 Extrude sealants using air operated sealant guns and standard polyethylene sealant cartridges fitted with polyethylene nozzles.

5.1.7 Except where silicone base sealant is used (e.g., DSC 233 RTV silicone adhesive/sealant, DHMS A6.15 fluorosilicone adhesive/sealant), exposed fillets or brush sealants that have been applied to sub-assemblies (skins, closing ribs, spars, etc.) prior to assembly 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.

5.2 Preparation of Sealants

5.2.1 Stir one part sealant in its container before use.

5.2.2 Mix and handle two-part sealants according to PPS 21.20.

5.2.3 Prepare DHMS S3.01 Type II Form D polysulfide dome sealing caps according to paragraph 5.11.2.6.1.

5.3 Preparation of Parts

5.3.1 If possible, complete all mechanical fabrication operations before sealing.

5.3.2 Ensure surfaces are clean and completely free from any chips, burrs, dirt, grease, previously applied sealant, etc., that would interfere with adequate sealing.

5.3.3 Solvent clean part surfaces according to PPS 31.17. Clean a greater area than the area to be sealed or, if necessary, clean the entire part surface.

5.3.4 Always wear clean cotton gloves when handling cleaned parts.

5.3.5 If the use of PR-1826 Class B sealant to DHMS S3.08 Type I Class B is called out on the engineering drawing, surfaces shall be primed with PR-1826 Adhesion Promoter prior to the application of PR-1826 Class B sealant. After cleaning the surface, apply a uniform thin coat of PR-1826 Adhesion Promoter with a clean brush or a gauze pad. Allow to dry for 30 minutes at room temperature. Apply PR-1826 Class B sealant within 8 hours of the application of the adhesion promoter. If this time is exceeded, the surface shall be re-cleaned and the adhesion promoter re-applied prior to applying sealant. Do not use adhesion promoter if it contains particles or precipitate.

5.4 Faying Surface Sealing

5.4.1 A faying surface seal is a thin, even layer of sealant between two overlapping surfaces preventing leakage of air or liquid from a sealed area to an unsealed area (see Figure 1).

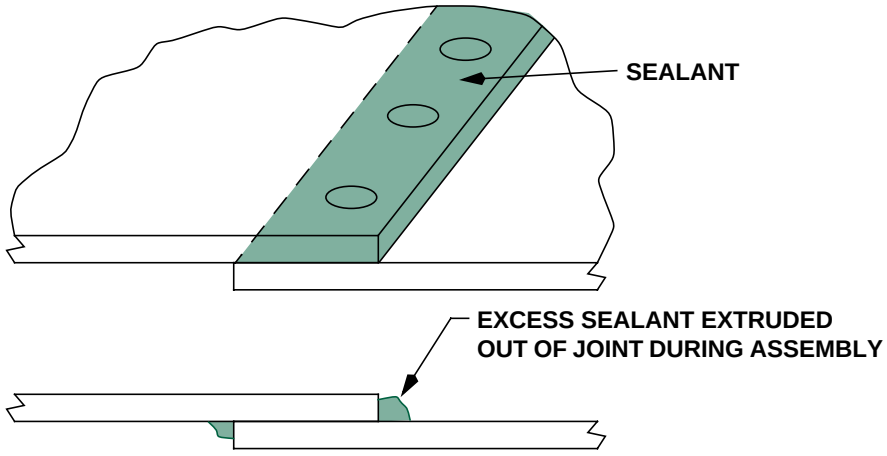


FIGURE 1 - FAYING SURFACE SEAL

5.4.2 Fay seal as follows:

Step 1. If necessary, mask off adjacent areas using masking tape and/or cardboard.

Step 2. If using a 3" mohair roller, pour a small quantity of sealant onto a clean piece of polyethylene plastic sheet and saturate the roller surface with sealant. If using a standard 1/2" bristle brush, pour the sealant into a clean wax free container and saturate the brush with sealant.

Step 3. Apply a uniform coat of sealant to the faying surface of one part. Completely cover the faying surface leaving a smooth layer approximately 0.005" thick if using the brush method or approximately 0.004" thick if using the roller method. Avoid applying the sealant too heavily or over-brushing applied sealant.

Step 4. Draw parts together using Cleco fasteners or slave bolts in at least every fourth fastener hole. Install temporary fasteners with a washer under the head and nut to prevent marking the part surfaces.

Step 5. Re-tighten wing-nut Clecos or slave bolts approximately 5 minutes after initial tightening.

Step 6. Install permanent fasteners starting at the centre of the pattern or line and working outwards, removing Clecos or slave bolts as installation progresses. Do not remove temporary fasteners until installing permanent fasteners. Remove sealant extruded into fastener holes before inserting fasteners or wipe sealant from fastener ends, locking grooves or threads after insertion.

Step 7. Torque or drive all fasteners at least twice within the assembly life of the sealant. Allow a minimum of 5 minutes between torquing operations.

Step 8. Wipe sealant from fastener ends. Remove and fair the excess sealant extruded along both sides of the overlap after assembly using a sealant scraper before the sealant cures (see Figure 1). Minimum visible sealant shall remain along the entire mating surfaces.

5.5 Fillet Sealing

5.5.1 A fillet seal is a bead of sealant applied as a dam along a seam, on either the pressure or weather side of the structure, preventing the passage of air or liquid through the joint. A concave sealant bead is unacceptable. A **fully** cured fillet seal should resemble the following Figure 2 while also meeting the requirements of Figure 3.

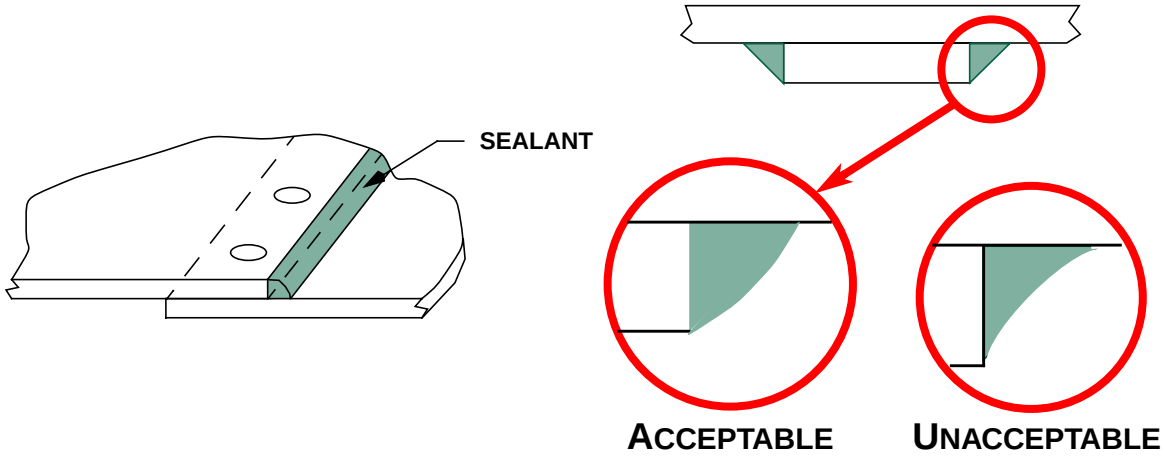


FIGURE 2 - GENERAL DESCRIPTION OF FILLET SEAL

5.5.2 Apply fillet seals as follows:

Step 1. Load a sealant gun with sealant. For vertical surfaces and overhead fillet sealing, use sealant that has approximately half of its application life expired.

Step 2. Hold the flared or standard nozzle at 90° to the direction of travel and 45° to the surface of the parts.

Step 3. Squeeze the gun trigger and move the nozzle along the seam in approximately 3 foot increments at a rate that maintains a slight build-up of sealant in front of the nozzle. This will force the sealant into the root of the angle and exclude air from the bead. If required, cut nozzles back to obtain larger holes.

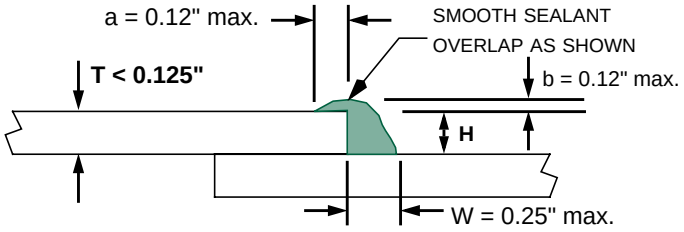
Step 4. Within the sealants application life, smooth the sealant using a spatula or a fairing tool. The sealant may be smoothed with a 50/50 mix by volume of isopropyl alcohol and water.

Step 5. Ensure that applied sealant beads do not extend across the manufactured heads of installed fasteners (refer to Figure 3).

Step 6. After applying each 3 foot increment, examine the seal for air bubbles. Open any air bubbles and fill them with fresh sealant. When opening bubbles, make the cavities large enough to permit the fresh sealant to fill them.

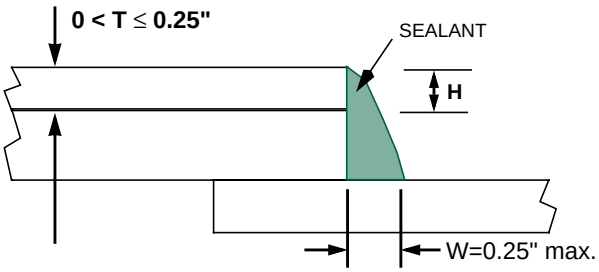
Step 7. If a sealant bead overlaps onto the structure in a fuel area, fair the sealant bead into the structure as shown in Figure 3.

5.5.3 Unless otherwise specified by the engineering drawing, the **fully cured** fillet sealant beads shall meet the requirements specified in Figure 3.

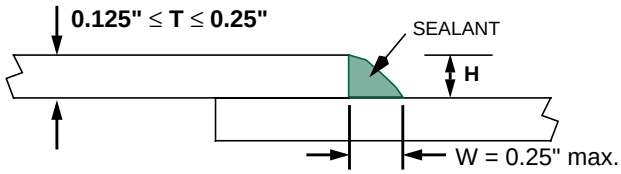


NOTE:
- Overlap in the fuel tank shall be faired in.
- Overlap shall be as shown in Figure.
- Minimum sealant height (H) is the panel thickness (T).

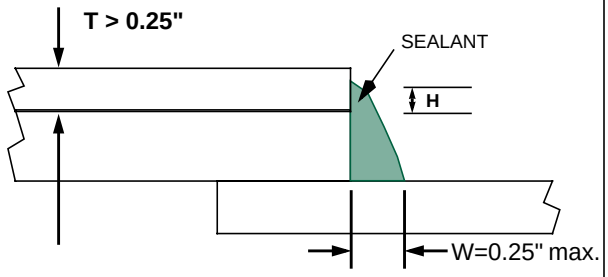
EXCEPTIONS:
- Overlap is not acceptable on the aircraft weather side (exterior) after final processing (i.e., painting). Overlap prior to painting is acceptable provided overlap can be lightly sanded flush to the structure prior to painting.



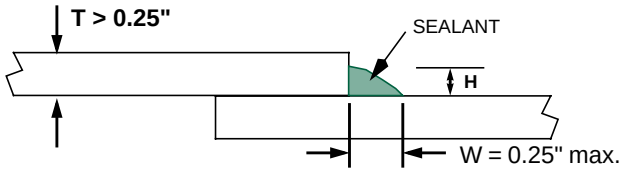
NOTE:
- Overlap is not acceptable.
- Minimum sealant height (H) is thickness, T.



NOTE:
- Overlap is not acceptable.
- Minimum sealant height (H) is the panel thickness (T).



NOTE:
- Overlap is not acceptable.
- Minimum sealant height (H) is 0.25". It is not necessary or required to apply excessive sealant beyond 0.25". Apply sufficient sealant for the job on hand.



NOTE:
- Overlap is not acceptable.
- Minimum sealant height (H) is 0.25". It is not necessary or required to apply excessive sealant beyond 0.25". Apply sufficient sealant for the job on hand.

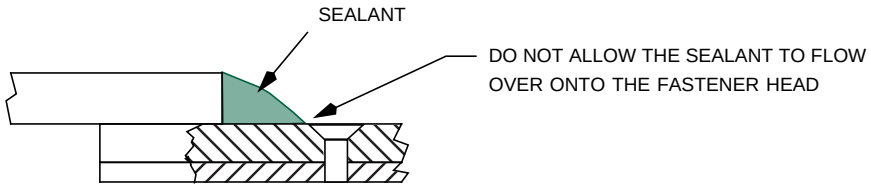


FIGURE 3 - ACCEPTABLE APPLICATION OF FILLET SEALS

5.6 Pipe Penetration Sealing

5.6.1 A pipe penetration seal is a bead of sealant applied around the circumference of a pipe protecting it at its junction with a bulkhead (refer to Figure 4).

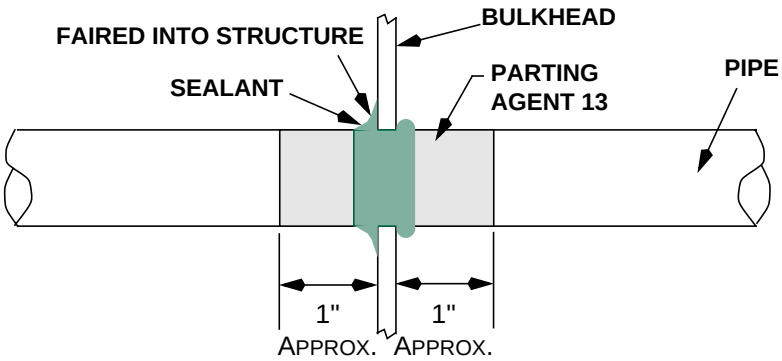


FIGURE 4 - PIPE PENETRATION SEAL

5.6.2 Seal the junction as follows:

Step 1. Apply 2 thin, even coats of Parting Agent 13 to the pipe over an area extending approximately 1" to each side of the junction. Allow each coat to dry to the touch between coats and before applying sealant.

Step 2. Load a sealant gun with sealant. Use a standard nozzle. If necessary, cut the nozzle back to obtain a larger hole.

Step 3. Hold the nozzle at approximately 45° to the pipe surface at the junction.

Step 4. Squeeze the gun trigger and move the nozzle along the circumference at a rate that maintains a slight build-up of sealant in front of the nozzle. Force the sealant through to the other side of the bulkhead to provide a full bearing surface around the circumference of the pipe.

5.7 Butt Joint Sealing

5.7.1 A butt joint seal is a bead of sealant applied to the gap between parts that butt together, such as skin panels, providing an aerodynamically smooth surface (see Figure 5).

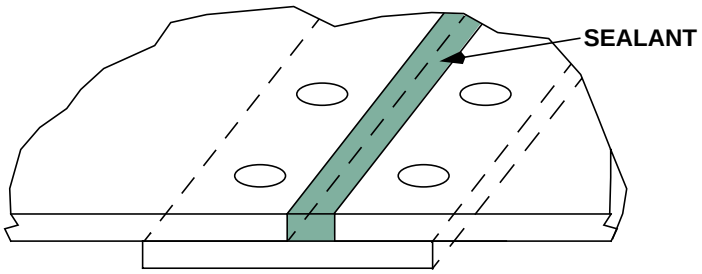


FIGURE 5 - BUTT JOINT SEAL

5.7.2 Except as specified below, avoid applying butt joint seals between exterior skin panels within 72 hours before painting the aircraft exterior.

- If emergency sealing within 24 - 72 hours before painting, use either DHMS S3.01 B1/2 or BAMS 552-008 B1/2 sealant specified in PPS 21.20.
- If emergency sealing within 12 - 72 hours before painting, use BAMS 552-008 B1/2 sealant.

5.7.3 Apply butt joint seals as follows:

Step 1. If necessary, to avoid underflush due to sealant shrinkage with the surrounding structure after the sealant has fully cured, it is acceptable to build up the adjacent surfaces with Bombardier approved masking tape of up to 0.010" maximum height. Inspect the sealant height following the end of the sealant's application life as specified in PPS 21.20 and ensure that the maximum height of 0.010" has not been exceeded (see Figure 6).

Step 2. Load a sealant gun with sealant. Use a standard nozzle. If necessary, cut the nozzle back to obtain a larger hole. For vertical surfaces and overhead butt joint sealing, use sealant that has approximately half of its application life expired.

Step 3. Hold the nozzle in line with the joint, at approximately 45° to the part surface, and place the nozzle tip in the bottom of the joint.

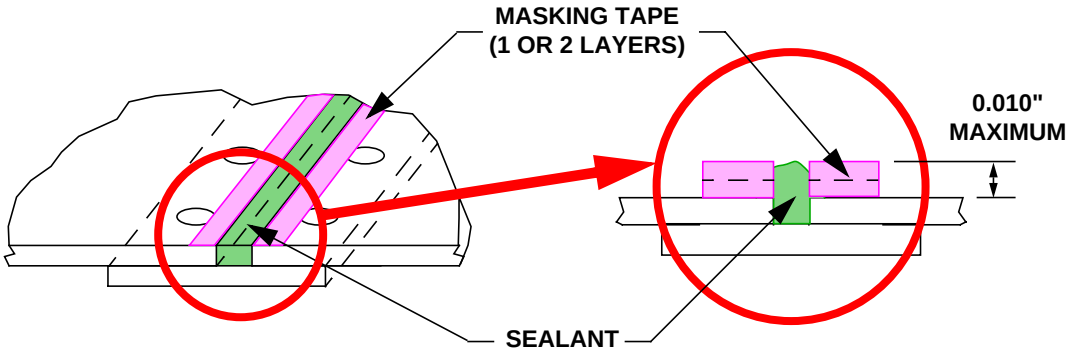
Step 4. Squeeze the trigger and move the nozzle back along the joint in approximately 3 foot increments at a rate that allows the sealant to continuously fill the joint flush with the adjacent surfaces. Avoid air entrapment in the sealant bead.

Step 5. After applying each 3 foot increment of sealant, examine the bead for air bubbles. Open any air bubbles and fill them with fresh sealant. When opening bubbles, make the cavities large enough to permit the fresh sealant to fill them easily.

Step 6. If masking tape was applied as specified in Step 1, remove masking tape. Removal of masking tape shall not exceed 1/2 of the sealant's maximum application life as specified in PPS 21.20. Pull the tape away at an angle to minimize any ridging of the sealant.

Step 7. If necessary, within the sealant's application life, smooth out the sealant bead with a sealant spatula. The sealant may be then smoothed with a 50/50 mix by volume of isopropyl alcohol and water.

Step 8. Inspect to ensure the **fully cured** sealant is flush (0" to + 0.005") with the surrounding structure (refer to Figure 7). Ensure sealant does not overlap onto adjacent skin surfaces on the weather side of a structure when aerodynamic smoothness is a requirement.



Note 1. Remove masking tape following sealant application. Removal of masking tape shall not exceed 1/2 of the sealant's maximum application life as specified in PPS 21.20.

FIGURE 6 - MAXIMUM DIMENSIONAL ALLOWANCE AFTER SEALANT APPLICATION LIFE

5.7.3.1 Refer to Figure 7 for acceptable and unacceptable butt joint sealing configurations.

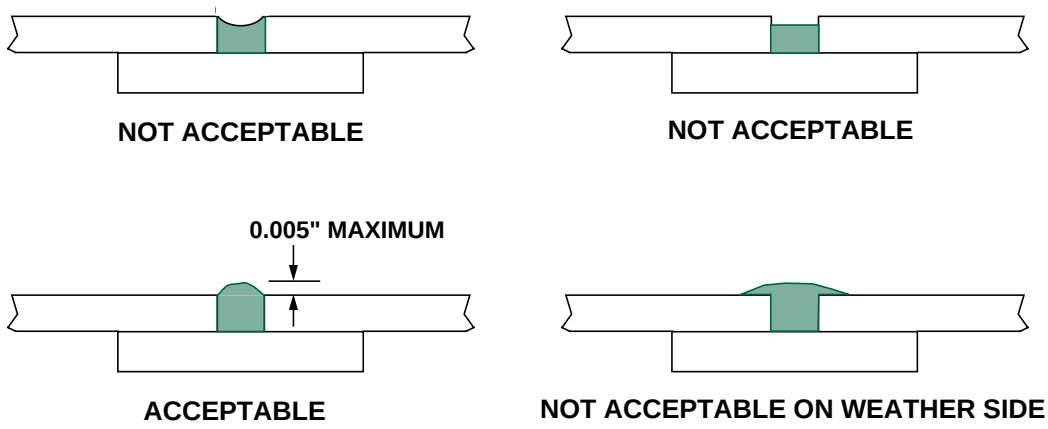


FIGURE 7 - BUTT JOINT SEAL CONFIGURATIONS

5.8 Filling Gaps and Voids

5.8.1 Wet assemble all structures that step up onto another structure or cross a void (refer to Figure 8).

5.8.2 Apply sealant to gaps and voids as follows:

Step 1. Load a sealant gun with sealant. Use a standard nozzle. If necessary, cut the nozzle back to obtain a larger hole.

Step 2. Hold the tip of the nozzle against the step-up or void and apply enough sealant to ensure an extrusion of the sealant during assembly.

Step 3. Using a sealant spatula, fair the sealant bead at each end of the gap to approximately 45°.

Step 4. Remove excess sealant.

5.8.3 Seal voids or gaps in unsupported structure (e.g., tooling holes) as follows:

Step 1. Close the back of the hole or void using masking tape.

Step 2. Fill the hole with DHMS S3.01 B1/2 or DHMS S3.01 B2 sealant.

Step 3. Allow the sealant to cure “tack free” according to PPS 21.20.

Step 4. Remove the masking tape.

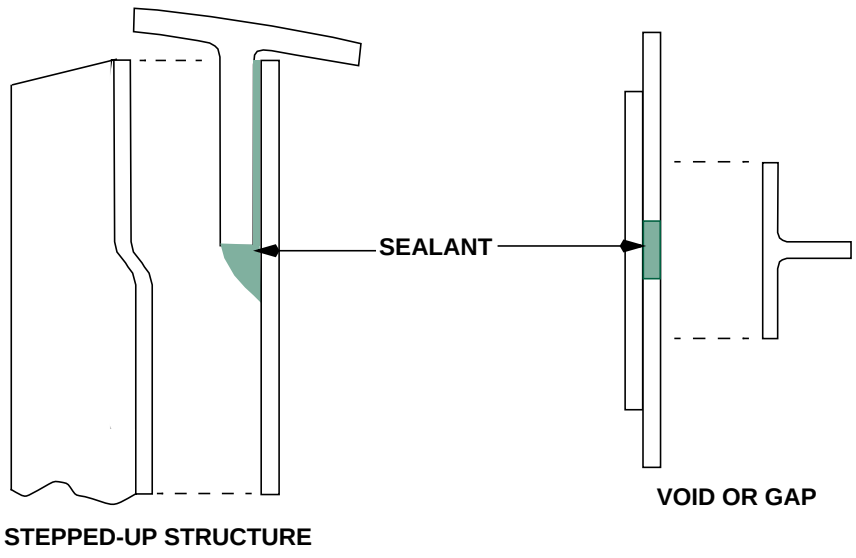


FIGURE 8 - WET ASSEMBLY OF STEPPED-UP STRUCTURES AND VOIDS

5.8.4 Apply sealant to Y-stringers as follows:

Step 1. Fill the gap just above flush with DHMS S3.01 B2 sealant for approximately 2" along the stringer to form a dam at the end of the stringer (refer to Figure 9).

Step 2. Wet assemble the Y-stringer immediately.

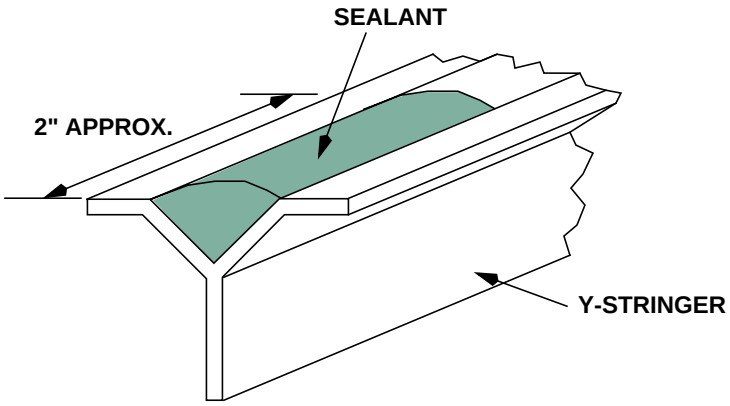


FIGURE 9 - SEALING DAM FOR Y-STRINGERS

5.9 Formed-In-Place Gaskets

5.9.1 Refer to PPS 21.19 for the procedure and requirements for formed-in-place gaskets.

5.10 Assembly Sealing of Fasteners

5.10.1 Apply a thin brush coat of DHMS S3.06 Type I Class C-80 sealant to the underside of the head of all flush head lockbolts, Hi-Shear and Hi-Lok fasteners according to the applicable fastener installation PPS.

5.10.2 If the engineering drawing specifies wet assembly, apply a thin brush coat of sealant to the fastener shank and head, as shown in Figure 10. Do not apply sealant to fastener threads or to the locking grooves of lockbolts or Hi-Shear rivets.

5.10.3 Immediately after insertion of the fastener, remove all traces of sealant from the protruding threads, locking grooves and surrounding surfaces before installing nuts or locking collars.

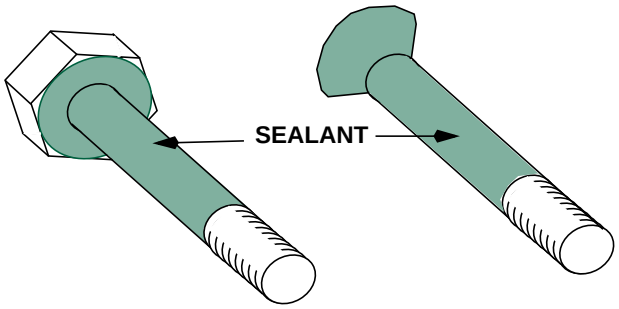


FIGURE 10 - TYPICAL WET ASSEMBLY OF FASTENERS

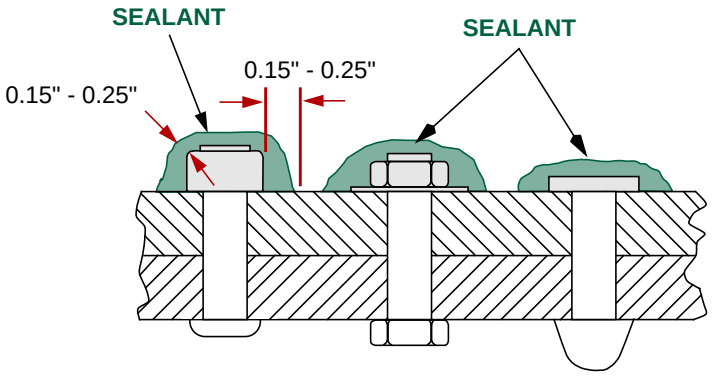
5.11 Sealant Coatings

5.11.1 If specified on the engineering drawing, apply sealant coatings to part surfaces, after assembly and installation, to provide an additional sealant barrier preventing fluid leaks through fasteners or lapped seam joints into adhesive bonded stringers and doublers.

5.11.2 Dome Sealing Fasteners

5.11.2.1 If the engineering drawing specifies dome sealing fasteners that penetrate pressure or fluid tight structures, dome seal on the pressure side.

5.11.2.2 Dome seals shall completely cover the fastener head or end (including attachment hardware, nuts, washers, locking collars, etc.) and overlap the adjacent structure 0.15" to 0.25". The sealant thickness shall be between 0.15" and 0.25" all around the fastener (see Figure 11).



Note 1. Only one fastener is dimensioned. All three fasteners shown shall have the sealant thickness to be between 0.15" and 0.25" all around each fastener.

FIGURE 11 - TYPICAL DOME SEALING OF FASTENERS

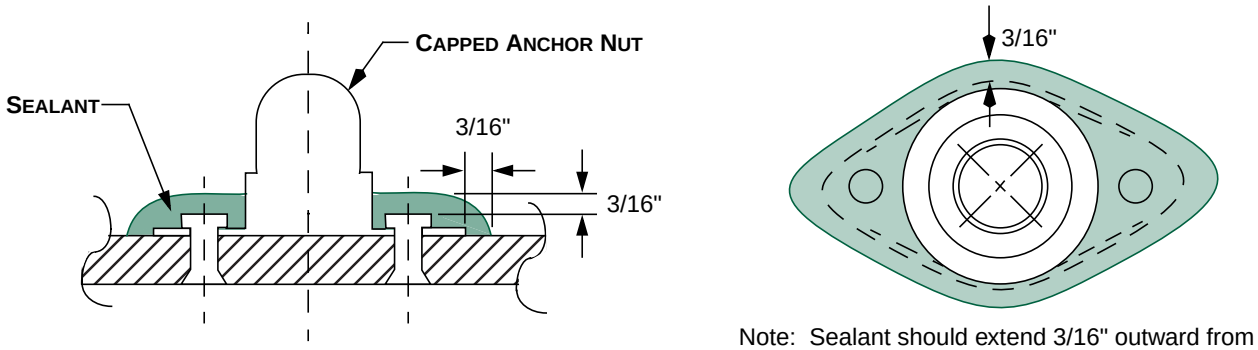
5.11.2.3 If using modified nozzles for dome sealing rivets and lockbolts, ensure the nozzle is full of sealant and free of voids before applying the first dome seal in a series.

5.11.2.4 It is acceptable to use a modified flared nozzle for dome sealing NAS 1473A-3 and NAS 1473A-4 capped anchor nuts. Ensure the nozzle is full of sealant and free of voids before applying the first dome seal in a series.

5.11.2.5 Dome seal anchor nuts approximately as follows (refer to Figure 12):

Step 1. Hold the sealant gun perpendicular to the work with the modified flared nozzle completely covering the anchor nut.

Step 2. Apply the dome seal to completely cover the anchor nut plate. Ensure that the sealant dome is at least 0.1875" (3/16") above each rivet shop head and also extends 0.1875" (3/16") beyond the edge of the anchor nut plate as shown in Figure 12.



Note: Sealant should extend 3/16" outward from the plate edge.

FIGURE 12 - DOME SEALING ANCHOR NUT

5.11.2.6 For Learjet Model 70/75 (previously referred to as Learjet Model 45) and DASH 8 series 400 aircraft, it is acceptable to use the DHMS S3.01 Type II Form D polysulfide sealing caps with its respective collars specified in Table I as an alternate dome sealing procedure as specified in paragraph 5.11.2.6.1.

TABLE I - SELECTION OF POLYSULFIDE DOME SEALING CAPS

COLLAR	POLYSULFIDE DOME SEAL CAP PART NO.	NUMERICAL MARKING ON CAP (NOTE 1)
B0206016CY-10 (HST1070CY-10/HST1479CY-10)	85714888	10
B0206017TP-10 (HST1488TP-10)		
B0206061-10		
B0206018CY-8 (HST1183CY-8)		
B0206019TP-8 (HST1275TP-8)		
B0206016CY-8 (HST1070CY-8/HST1479CY-8)	85714889	8
B0206017TP-8 (HST1488TP-8)		
B0206061-8		
B0206018CY-5 (HST1183CY-5) & B0206018CY-6 (HST1183CY-6)		
B0206019TP-5 (HST1275TP-5) & B0206019TP-6 (HST1275TP-6)		
B0206016CY-5 (HST1070CY-5/HST1479CY-5) & B0206016CY-6 (HST1070CY-6/HST1479CY-6)	85714890	6
B0206017TP-5 (HST1488TP-5) & B0206017TP-6 (HST1488TP-6)		
B0206061-5 & B0206061-6		

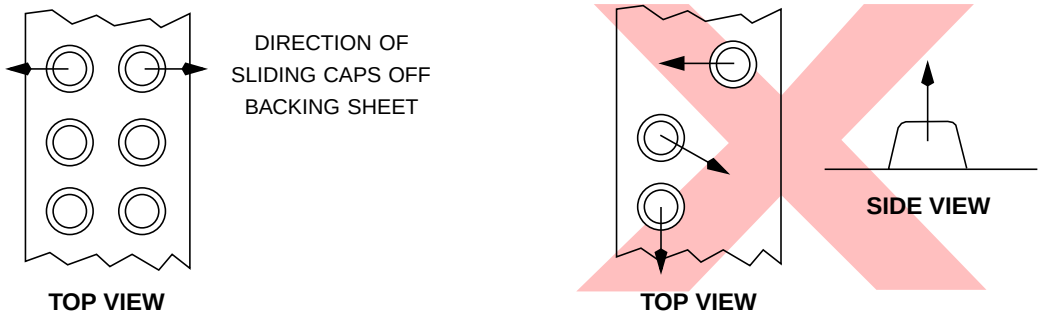
Note 1. The caps should all have a numerical impression on the centre of the upper surface of the cap. This marking corresponds to the cap's part number and identifies the cap's dimensions.

5.11.2.6.1 Prepare and install polysulfide caps as follows:

Step 1. Prepare fastener collars by solvent cleaning according to PPS 31.17.

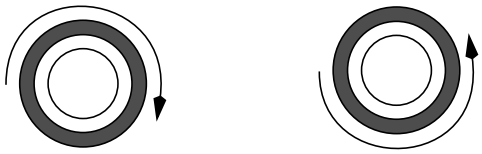
Step 2. Remove caps from the freezer and let stand at room temperature for a minimum of 15 minutes. Caps may not be removed from the backing sheet until fully thawed.

Step 3. Remove caps from backing sheet by first sliding caps sideways towards the nearest edge and then lifting them off (see figure below). Caps shall be installed within 2 hours of removal from freezer and shall be installed immediately after removal from backing sheet. Discard caps which have not been used within 2 hours of removal from the freezer. Refer to PPS 21.20 for acceptable application conditions.

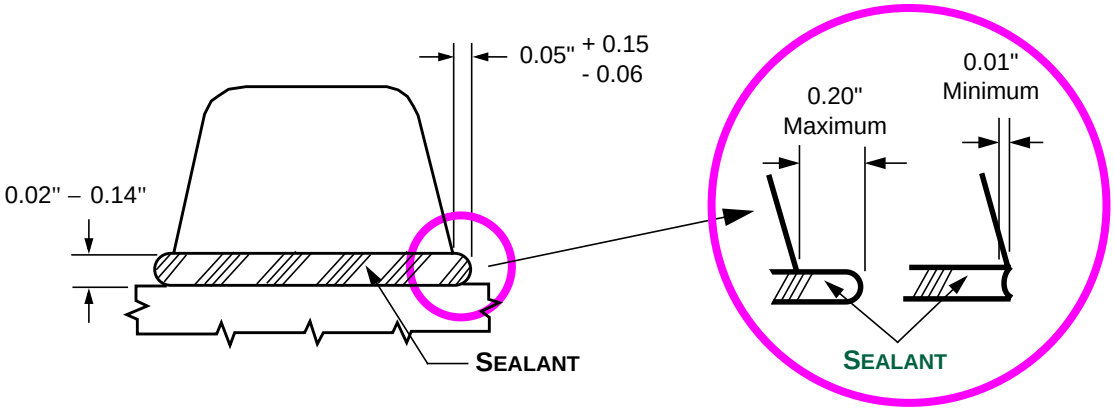


CORRECT **INCORRECT**

Step 4. Push the cap gently onto the collar vertically until sealant makes contact with the aircraft surface, then twist the cap approximately 360° in either direction to ensure that uncured sealant extrudes out from the cap evenly (see Figure 13).



Step 5. Allow caps to cure according to PPS 21.20 following application life (e.g. If PPS 21.20 specifies a cure time of 72 hours, then the sealant cap will be fully cured after 74 hours from the time first taken out of the freezer).



ACCEPTABLE INSTALLATION

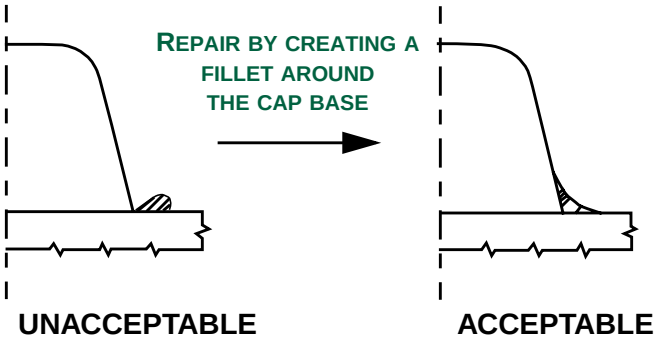


FIGURE 13 - POLYSULFIDE CAP INSTALLATION

5.11.3 Brush Coating of Surfaces

5.11.3.1 If specified on the engineering drawing or in the PPS, brush coat specified surfaces with a thin, uniform coating of sealant after assembly or installation as follows:

Step 1. Mask adjacent parts or surfaces at sealant edges with masking tape.

Step 2. Apply sealant to surfaces.

Step 3. Brush coat with standard 1/2" bristle brushes. Avoid applying sealant too heavily or over-brushing applied sealant. If brush sealing a boundary along part edges, overlap the sealant approximately equally onto each part.

5.11.4 Spray Coating of Surfaces

5.11.4.1 If the engineering drawing specifies or authorizes spray coating as an alternative to brush sealing, the specified areas may be sprayed with a thin uniform coating of sealant after assembly or installation as follows:

Step 1. Mask adjacent areas with masking tape.

Step 2. Connect the spray equipment air line to the air pressure regulator. Adjust the fluid and trigger controls on the spray gun to provide a narrow spray pattern, approximately 2" wide, with the gun held 6 to 8" from the surface.

Step 3. Hold the spray gun at right angles to the part surface.

Step 4. Spray sealant using the paint spray gun. Always keep the gun moving when spraying to prevent localized heavy coatings or runs. Apply just enough sealant to provide a thin, continuous coating on the parts.

5.12 Curing of Sealants

5.12.1 Allow sealant to cure to tack free according to PPS 21.20 before further working sealed assemblies or surfaces.

5.12.2 For aerodynamic sealing, sealant application and curing outside of the temperature and relative humidity specified in PPS 21.20 may result in an unacceptable aerodynamic fillet seal (e.g., excessive shrinkage, etc.) or butt joint seal (e.g., excessive shrinkage, dragging effect on vertical surfaces, etc.).

5.12.3 Post “WET SEALANT” warnings on sealed areas susceptible to damage by nearby assembly operations until the sealant cures tack free.

5.13 Repair

5.13.1 If sealant becomes damaged or contaminated, remove the affected portion using a sealant scraper and re-clean and re-seal the area according to the PPS specified on the engineering drawing used for initial sealing.

5.13.2 If removing fillet seals, trim the broken ends of the seal to approximately 45°.

5.14 Clean-Up

5.14.1 Before the sealant cures, remove excess sealant from parts and structures using sealant scrapers and by solvent cleaning according to PPS 31.17.

5.14.2 Immediately after spraying, thoroughly rinse spraying equipment including the pressure pot, fluid lines and spray gun and flush through with solvent according to PPS 31.17.

5.14.3 After sealing, remove excess Parting Agent 13 from part surfaces by washing thoroughly with clean water. Dry surfaces.

6 REQUIREMENTS

6.1 General

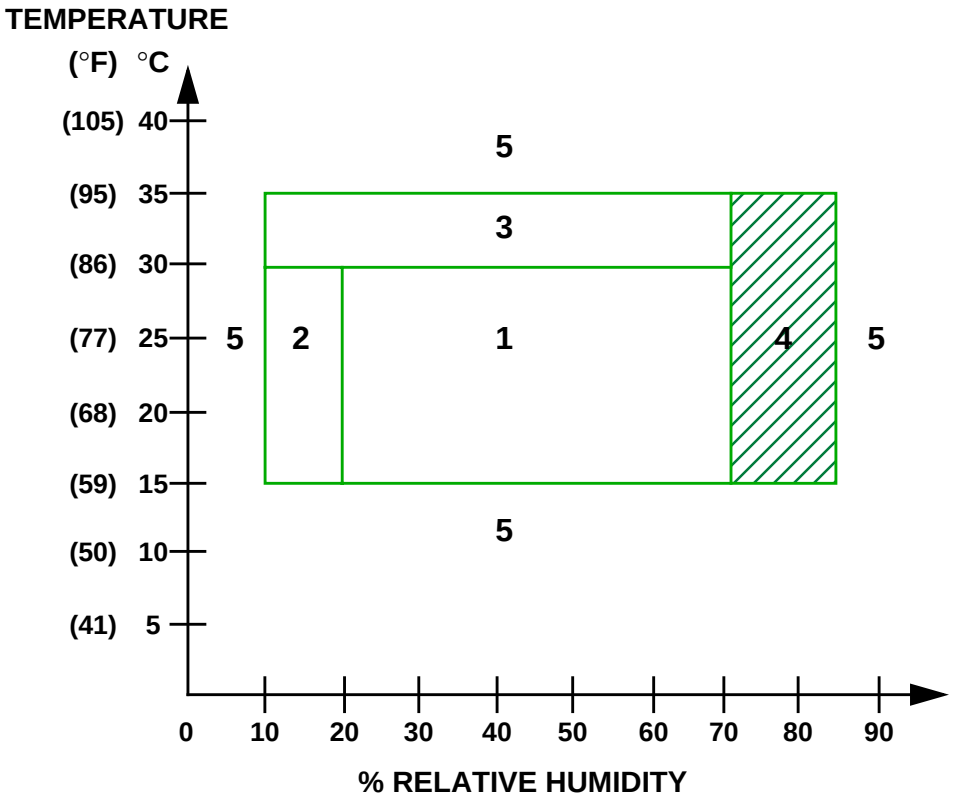
6.1.1 Ensure parts are cleaned before applying sealant.

6.1.2 The type of sealant and method of sealing shall be as specified on the engineering drawing except as specified in paragraph 4.1.1.

6.1.3 Sealant application shall be accomplished in an area where the ambient temperature and relative humidity are within Zones 1, 2 or 3 as specified in Figure 14.

6.1.4 Sealant application in Zone 4 is not allowed without prior written authorization (e.g., Process Standard Deviation, PSD). The application of sealant in Zone 5 is prohibited.

6.1.5 Compressed air shall meet the requirements of BAERD GEN-023.



Zone 1: Normal Application Conditions
Zone 2: Low Humidity Application Conditions
Zone 3: High Temperature Application Conditions
Zone 4: High Humidity Non-Authorized Application Conditions
Zone 5: Prohibited Application Conditions

FIGURE 14 - TEMPERATURE AND HUMIDITY LIMITS FOR SEALING AREAS

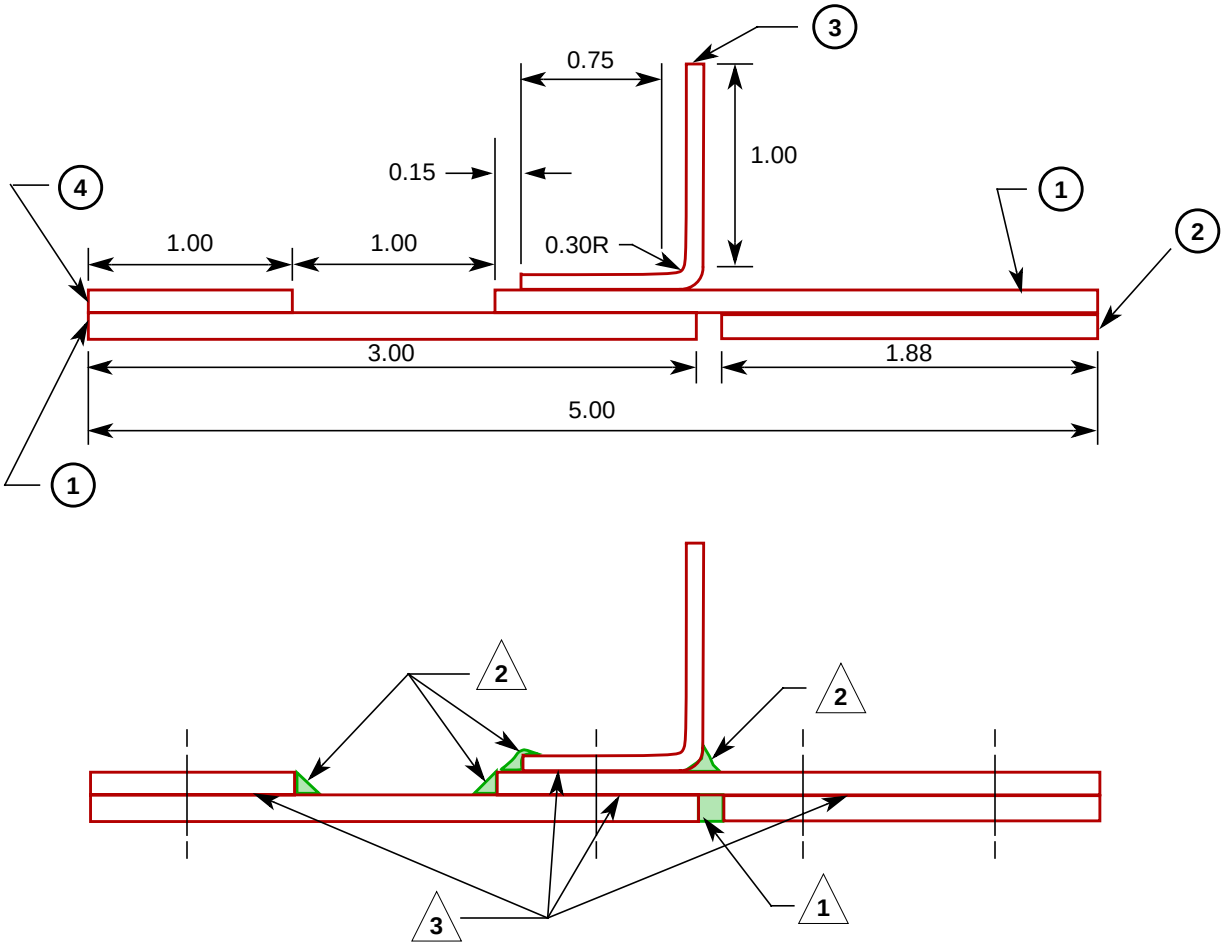
6.2 Process Qualification

6.2.1 For process qualification, the facility to be qualified shall manufacture two test panels conforming to Figure 15, Figure 16 and Table II and submit panels to an approved laboratory as specified in paragraph 4.3.3.2. All panels shall meet the requirements as specified herein prior to commencing processing parts for Bombardier Toronto. Additional tests may be requested at any time at the discretion of Bombardier.

6.2.2 Qualified status automatically lapses for any qualified process that is inoperative for more than four months. Once qualified status has lapsed, prior to commencing sealing of production parts, re-qualify according to paragraph 6.2.1.

TABLE II - INSPECTION REQUIREMENTS

TASK PERFORMED	DETAIL REQUIREMENTS
VISUAL INSPECTION	• Verify if sealant has been applied per the requirements of this PPS. • Visible sealant (including fastener seals) shall be homogeneous and uniform in colour. • Fillet seals shall be smooth, continuous, free from voids and air bubbles and shall meet the dimensional requirements of this PPS. • Inspect for aerodynamic sealant smoothness and sealant flushness with surrounding surfaces.
DESTRUCTIVE INSPECTION	• With a non-metallic scraper, strip all fillet seals. Record any poor adhesion between the sealant and the specimens. Also, indicate whether the fillet seal failure was adhesive or cohesive. • Four lap shear samples shall be cut from each original specimen. The one inch wide specimen shall be obtained from the identified “Lap Shear Zones” of Figure 16 and shall have their aerodynamic seal fully removed. Test samples per BATS 3461 and report shear strength and percentage of cohesive failure. Minimum shear strength shall be 200 psi and failure shall be at least 80% cohesive. • Dismount the remaining portions of the specimens and visually inspect the faying surface sealing, fastener sealing and aerodynamic sealing.

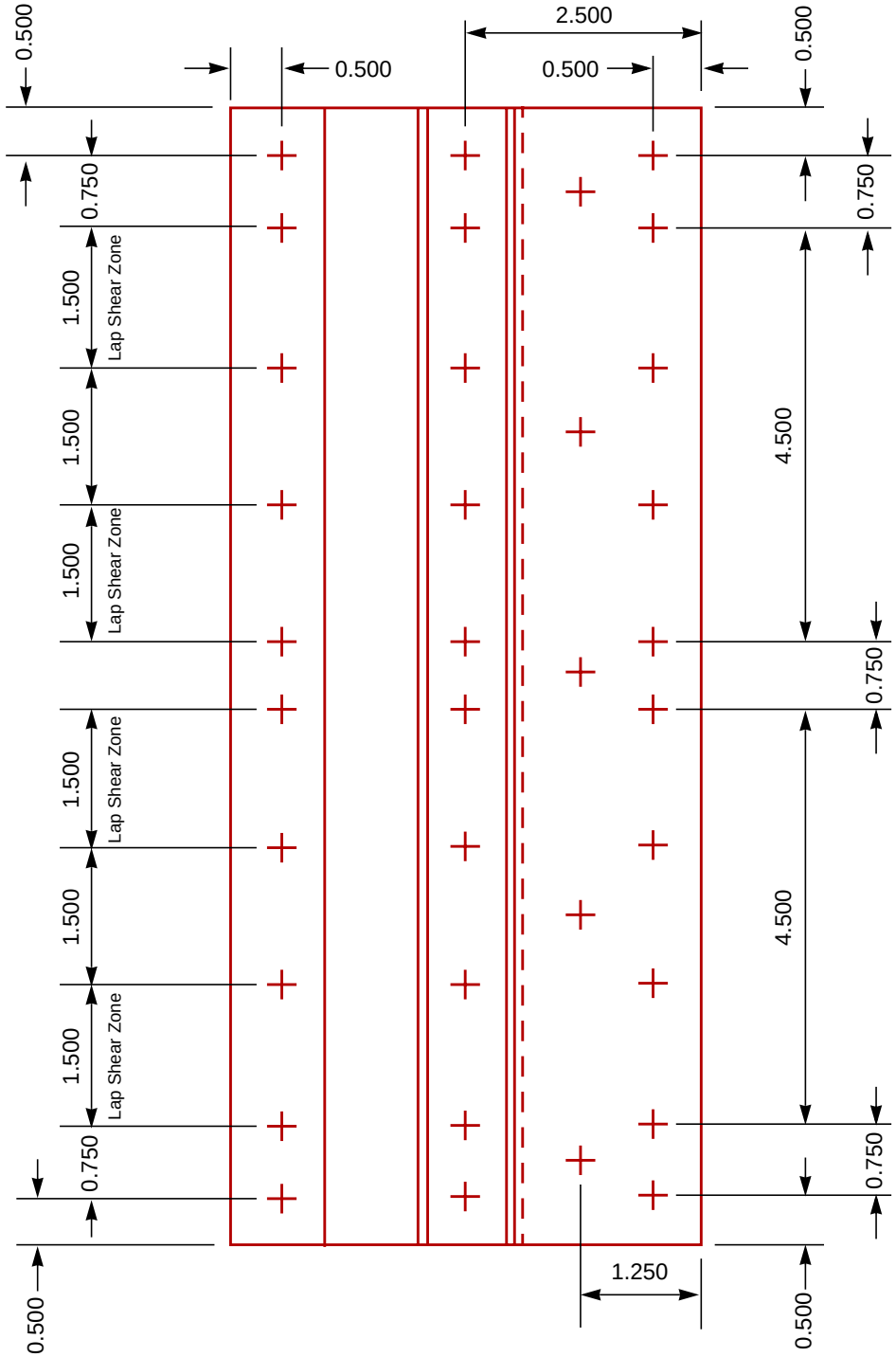


Notes:

- All dimensions are in inches.
- Install fasteners per PPS 2.68. Fay seal as specified herein. Torque each fastener to a final torque value of 30 in. lbs.
- Refer to Table III for required material listing and dimension of items (1) (2) (3) (4)
- Perform the following sealing operations:

△1	Aerodynamic Seal. Flushness to be 0" to + 0.005".
△2	Fillet Seal
△3	Faying Surface Seal
●	Wet install all fasteners.
●	Seal collar side of all fasteners.

FIGURE 15 - SEALING QUALIFICATION SPECIMEN



Notes:
- All dimensions are in inches.
- Unless otherwise noted, spacing between fasteners is equidistant.
- Unless otherwise noted, fasteners are: B0206001AG6-5 pins and B0206010CK-6 collars.
- All fastener heads are to be installed on the near side.

FIGURE 16 - FASTENERS LOCATION

TABLE III - QUALIFICATION REQUIRED MATERIAL

COMPONENT NUMBER	MATERIAL AND FINISH	DIMENSION (INCHES)	QUANTITY
1	AMS-QQ-A-250/13 Finish per Note 1	3.0 x 12.25 x 0.125	4
2	AMS-QQ-A-250/13 Finish per Note 1	1.88 x 12.25 x 0.125	2
3	AMS-QQ-A-250/13 Finish per Note 1	2.25 x 12.25 x 0.063	2
4	AMS-QQ-A-250/13 Finish per Note 1	1.0 x 12.25 x 0.125	2
—	B0206001 AG6-5 (Pin)	—	50
—	B0206001 AG6-6 (Pin)	—	20
—	B0206010CK6 (Collar) See Note 2	—	70
—	Sealant as specified paragraph 4.1.1	—	As Required

Note 1. C1 followed by F19 Type 2 epoxy primer finish as per PPS 23.02.
Note 2. It is permissible to use KFN587-3 nut in place of B0206010CK6 collar.

6.3 Production Parts

6.3.1 Applied sealant shall meet the configuration requirements specified herein. The **fully cured** fillet sealant beads shall meet the requirements specified in Figure 3.

6.3.2 Before the sealant is fully cured, it shall be visually examined for pockets of entrapped air. Such pockets shall be opened and then filled with fresh sealant and allowed to cure according to PPS 21.20.

6.3.3 All fillet seals shall be continuous. The sealant shall be free of visible voids, bubbles and foreign matter such as metal chips.

6.3.4 Fillet seals, butt seals and seals of fasteners shall meet the geometrical requirements of the engineering drawing and this PPS.

6.3.5 Do not work sealed areas or assemblies, except faying surface seals, until the sealant cures to a tack free condition.

6.3.6 Do not remove Clecos or slave bolts used to draw fay sealed parts together until installing permanent fasteners.

7 SAFETY PRECAUTIONS

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

7.2 Keep sealants and release agents away from fire and other sources of ignition.

7.3 Do not smoke or eat in areas where sealants and release agents are being applied. Avoid ingestion of sealants and release agents. If ingestion occurs, obtain medical attention immediately.

7.4 Wash hands thoroughly with soap and water immediately after working with sealants and release agents.

7.5 Ensure sufficient ventilation when using sealants and release agents in confined areas.

7.6 Avoid skin and eye contact with sealants and release agents. Wear DSC 422-2 protective gloves when handling sealants. If skin contact occurs, wash the affected area thoroughly with soap and water. Do not use protective hand cream as it may cause contamination. If eye contact occurs, immediately flush eyes for 15 minutes minimum with large quantities of water at an eye wash station and report to the Health Centre.

7.7 Store sealants and release agents in their original containers or in approved 1 gallon safety cans kept in yellow flammable material storage cabinets.

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 personnel requirements. Personnel responsible for sealing integral fuel tanks shall be qualified according to PPS 21.03.

9 MAINTENANCE OF EQUIPMENT

9.1 Immediately after use, solvent clean sealant residue from all equipment according to PPS 31.17.

10 STORAGE

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

10.2 Store sealants according to PPS 21.20.

10.3 Refer to PPS 13.28 for the storage life of the sealant.