BOMBARDIER
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PROPRIETARY INFORMATION

PPS 39.07

PRODUCTION PROCESS STANDARD

INSTALLATION OF DASH 8 AIR INTAKE DE-ICER BOOTS

Issue 18
- This standard supersedes PPS 39.07, Issue 17.
- 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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Figures and Tables

1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the installation and, when necessary, the removal of engine air intake de-icers on Dash 8 aircraft.

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.

1.2 Refer to PPS 39.06 for installing Dash 8 airframe de-icers.

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 6.05 - Closure of Fluid Lines and Fluid System Components.

3.3 PPS 13.26 - General Subcontractor Provisions.

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

3.5 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.6 PPS 15.04 - Use of Markers for Marking Aircraft Parts and Assemblies.

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

3.8 PPS 21.21 - General Sealing Practices.

3.9 PPS 25.63 - Bonding Using DHMS A6.11 Type I Class 2 Adhesive.

3.10 PPS 31.17 - Solvent Usage.

3.11 PPS 39.09 - Application of Cosmetic Treatment on De-Icer Boots.

3.12 QAMTR 001 - Testing of DHMS S3.01, A1/2, A2, B1/2 and B2 Polysulphide Sealant.

3.13 QAMTR 007 - Testing of Adhesives.

3.14 QDI-15-02 - Shelf Life of Aeronautical Products.

4 MATERIALS, EQUIPMENT AND FACILITIES

4.1 Materials

4.1.1 Abrasive paper, aluminum oxide, 180 - 220 grit size.

4.1.2 DHMS A6.11 Type I Class 2 adhesive.

4.1.3 DHMS S3.01/B1/2 sealant.

4.1.4 DHMS S3.01/B2 sealant.

4.1.5 Duct tape.

4.1.6 Flashbreaker tape, 1" width (e.g., DSC 234-15-1).

4.1.7 Kraft paper.

4.1.8 Lint-free wiping cloth (e.g., DSC 378-3).

4.1.9 Masking tape, 1/2", 1" and 2" widths.

4.1.10 Protective latex coating, Textile Rubber & Chemical Co. (Canada) Ltd., B-1357.

4.1.11 Red tint, Textile Rubber & Chemical Co. (Canada) Ltd., B-0436.

4.2 Equipment

4.2.1 Aircraft tool, SD5197.

4.2.2 Bristle brush, adhesive application.

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

4.2.4 Paint brush, 1/2" to 1" wide.

4.2.5 Permanent type felt tip marker as specified in PPS 15.04.

4.2.6 Pressure test rig (e.g., SD5454). Use clean compressed air.

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

4.2.7 Paint shaker, mechanical.

4.2.8 Rubber roller, approximately 3" wide X 2" diameter, (e.g., B.F. Goodrich 74-451-74).

4.2.9 Spatula, sealant application.

4.2.10 Trimming knife (e.g., Hyde #K-422-120).

4.2.11 Shop vacuum source, capable of maintaining and monitoring a minimum vacuum of 20" Hg.

4.3 Facilities

4.3.1 This PPS has been categorized as a Controlled Critical Process according to PPS 13.39 and as such only facilities specifically approved according to PPS 13.39 are authorized to perform the installation and, when necessary, the removal of engine air intake de-icers on Dash 8 aircraft 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 Toronto Engineering.

4.3.3.1 For approval of subcontractor facilities to perform the installation and, when necessary, the removal of engine air intake de-icers on Dash 8 aircraft according to this PPS, completion of a test program and submission of suitable test samples representative of production parts may be required. Test samples shall meet the requirements as defined by Bombardier Toronto Engineering.

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 Do not use protective hand cream as it may cause contamination of cleaned or adhesive coated surfaces.

5.2 Preparation of Air Intake Structure

5.2.1 Do not touch cleaned areas with bare hands. Wear clean cotton gloves at all times when handling cleaned surfaces. Protect cleaned parts from contamination.

5.2.2 Prepare the air intake structure for de-icer boot application as follows:

Step 1. Remove all sharp edges, resin ridges, etc., particularly around the connector opening (see Figure 1).

Step 2. Lightly abrade the intake bond surface using aluminum oxide 180 - 220 grit abrasive paper.

Step 3. Ensure that the Kevlar fibres are not exposed, as the adhesive used to bond the boots in place can damage exposed fibres and compromise the structural integrity of the part.

Step 4. Solvent clean the abraded surface twice according to PPS 31.17.

Step 5. Mask the area adjacent to the recessed structure bonding area with masking tape.

Step 6. Using a straight edge, locate and mark the centre of the air intake leading edge in several places. Connect the marks to create a centreline on the leading edge as shown in Figure 2 (the leading edge is marked to assist in alignment of the boot and to specify work zones when bonding).

Step 7. Place 1/2" wide masking tape around the inside edge of the centreline on the air intake and draw a line on the inside edge of the tape parallel to the centreline.

Step 8. Remove the tape.

Step 9. Draw a vertical line from the air connection hole to the inside edge of the air intake. The point where this line crosses the centreline is Point A as shown in Figure 2.

Step 10. Starting at Point A, and using a flexible measuring tape, mark the centreline at points B, C and D as shown in Figure 2. For series 100, 200, and 300 aircraft, these points are located at 15", 30", and 45" (from Point A) around the centreline. For series 400 aircraft, these points are located at 17.25", 34.5", and 51.75" (from Point A) around the centreline.

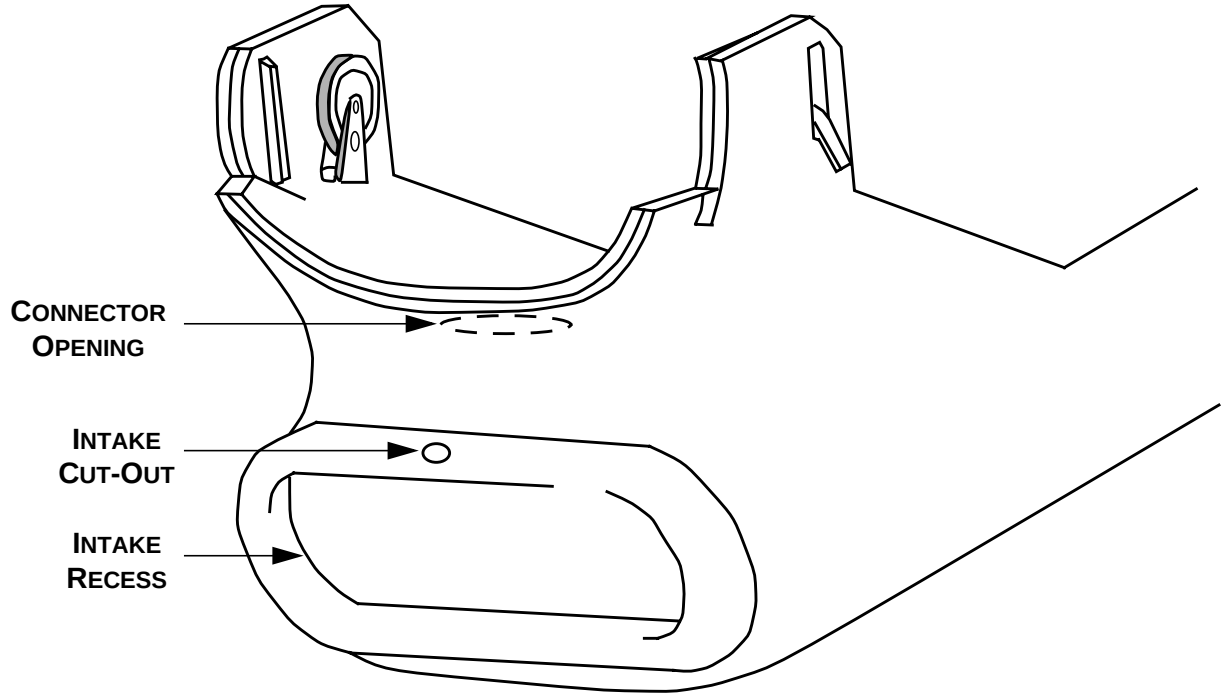
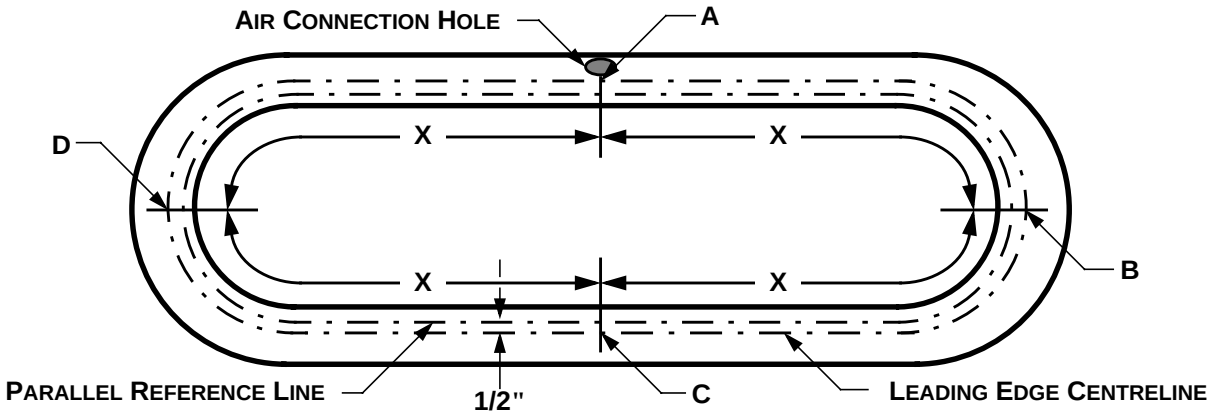


FIGURE 1 - LOWER COWL ASSEMBLY



FOR SERIES 100, 200, AND 300: X = 15"
FOR SERIES 400: X = 17.25"

FIGURE 2 - MARKING THE AIR INTAKE LEADING EDGE

5.3 Preparation of De-Icer Boots

5.3.1 Before installation, submit all de-icer boots for inspection according to section 6.1.

5.3.1.1 Prepare the de-icer boot as follows:

Step 1. Place the de-icer boot on a clean flat surface with the inner surface (bonding side) up. Remove folds and wrinkles from the surface.

Step 2. Solvent clean the entire bonding surface twice according to PPS 31.17. Clean small areas at a time. Do not touch cleaned areas with bare hands or subject them to any form of contamination.

Step 3. Visually inspect the bonding surface for evidence of dust, cloth fibres, etc. If necessary, remove particles by wrapping 2" wide masking tape, with the adhesive surface out, around a 6" to 8" long cardboard tube and slowly rolling the tube across the boot surface, allowing the tape to pick up foreign materials.

Step 4. Immediately after cleaning, overlay the de-icer boot with clean Kraft paper until immediately before the application of adhesive.

5.3.2 It is not necessary to clean the non-bonding surface of the de-icer boot at any time during its installation. If desired, it is acceptable to use a cloth dampened in the solvent specified in PPS 31.17 to remove shop dust or debris from the non-bonding surface.

5.4 Application of the Adhesive

5.4.1 Do not touch adhesive coated surfaces with bare hands. Wear clean cotton gloves at all times and protect adhesive coated surfaces from contamination.

5.4.2 Apply the adhesive as follows:

Step 1. Prepare DHMS A6.11 Type I Class 2 adhesive according to PPS 25.63.

Step 2. Immediately after preparing the air intake structure according to section 5.2 and the boot according to section 5.3, apply the adhesive to the de-icer boot and structure bonding surfaces according to PPS 25.63. Distribute the adhesive evenly and cover all bonding surfaces.

Step 3. Allow the first coat of adhesive to dry for a minimum of one hour. Do not touch the adhesive during this time.

Step 4. Locate the factory marked centreline on the back of the de-icer boot. Draw a reference line 1/2" from the centreline away from the air connection by using 1/2" wide masking tape as a guide. Lift the tape off carefully, to avoid removing the bonding adhesive.

Step 5. Draw a vertical line from the centre of the air connection to the inner edge of the boot. The point where this line crosses the factory marked centreline is equivalent to Point A in Figure 2 on the leading edge of the aircraft air intake.

Step 6. Starting at Point A, and using a flexible measuring tape, mark points at 15", 30", and 45" around the centreline. These points correspond to points B, C and D on the leading edge of the air intake.

Step 7. Follow the procedure specified in Step 5 to draw lines through points B, C and D.

Step 8. If the second coat of adhesive is not going to be applied right away, cover the first coat of adhesive with Kraft paper. Do not wait more than 48 hours between applying the first and second coats of adhesive.

Step 9. If Kraft paper was applied as specified in Step 8, remove the Kraft paper and apply a second coat of adhesive to the de-icer boot and structure bonding surfaces according to PPS 25.63. Distribute the adhesive evenly and cover all bonding surfaces.

Step 10. Before installing the boot, allow the second adhesive coat to dry as follows:

- If the relative humidity is 75% or less and the temperature is 10°C (50°F) or greater, dry for a minimum of 1 hour.
- If the relative humidity is greater than 75% or the temperature is less than 10°C (50°F), dry for a minimum of 2 hours.

Step 11. If the boot is not going to be installed immediately after the initial drying time, cover the adhesive with Kraft paper. Do not wait more than 48 hours between applying the second coat of adhesive and installing the boot.

5.5 Bonding of De-Icer Boots

5.5.1 Install the de-icer boot on the cowling as follows:

Step 1. Use suitable weights to secure the lower cowl assembly, right side up on the work table.

Step 2. Remove the access cover from the top forward nacelle structure and feed the vacuum pump line through the open structure access and out through the intake cut-out (see Figure 3). Connect the hose to the boot connector and apply a vacuum of 6" Hg to 10" Hg. Do not apply a vacuum of over 20" Hg. Maintain the vacuum on the boot until installed.

Step 3. Holding the de-icer boot against the inlet, ensuring that the boot is aligned properly.

Step 4. Use a clean, lint-free cloth or paint brush dampened with the solvent specified in PPS 31.17 to reactivate the adhesive at point A on both the boot and the leading edge.

Step 5. Tack the boot to the inlet.

Step 6. Reactivate the adhesive at points B, C and D and tack on to the inlet. This will help keep the de-icer aligned during installation.

Step 7. Starting at point A, use a clean, lint-free cloth or paint brush dampened with the solvent specified in PPS 31.17 to reactivate the adhesive on both the boot and the leading edge over a length of 2" to 3" between the centreline and the parallel reference line.

Step 8. When the adhesive is tacky, press the boot onto the inlet, ensuring that the centrelines and parallel reference lines on the boot and inlet match and that the de-icer air connection is centred in the inlet air connection hole. Ensure that there are no bubbles, wrinkles or voids.

Step 9. Roll a rubber roller along the bonded area of the de-icer boot, parallel to the boot tubes. Roll again with a metal roller to ensure good adhesion.

Step 10. Working in 2" to 3" increments, continue to reactivate the adhesive and press the boot in place as specified in Step 7 to Step 9 until the entire centreline is bonded and rolled.

Step 11. Beginning at point B, fold back the de-icer boot to expose the bonding side from the inside edge to the bonded centreline. Working in 2" increments, reactivate the adhesive and, when it is tacky, roll the boot onto the leading edge of the intake.

Step 12. Repeat Step 11 for the areas around points D, A and C, in that order. The order is important to minimize wrinkling of the boot.

Step 13. Reactivate the adhesive in a 6" to 8" area from the outside edge of the boot and inlet to the bonded centreline, on either side of point B.

Step 14. With two people, pull the de-icer boot over the centreline and down, rolling it against the inlet. Ensure that there are no wrinkles, bubbles or voids. Roll the surface with a rubber roller.

Step 15. Duct tape the de-icer boot to the leading edge, from the inside edge to the outside edge over the area that was just bonded.

Step 16. Repeat the above steps for the areas around points D, A and C, in that order. Roll firmly with a rubber roller.

Step 17. After bonding, roll a roller along all boot surfaces to ensure contact and to roll out entrapped air.

Step 18. Remove excess adhesive with a clean wiper dampened in the solvent specified in PPS 31.17.

Step 19. Check the installed boot for proper alignment and evidence of trapped air. If necessary, correct misaligned surfaces through small, sharp tugs on the boot aided by applying the solvent specified in PPS 31.17 (to loosen the tack and allow adjustment).

Step 20. Shut off the vacuum pump, remove the line from the connector and attach the structure de-icer line to the boot connector.

Step 21. Allow 4 to 8 hours drying time before removing the Duct tape.

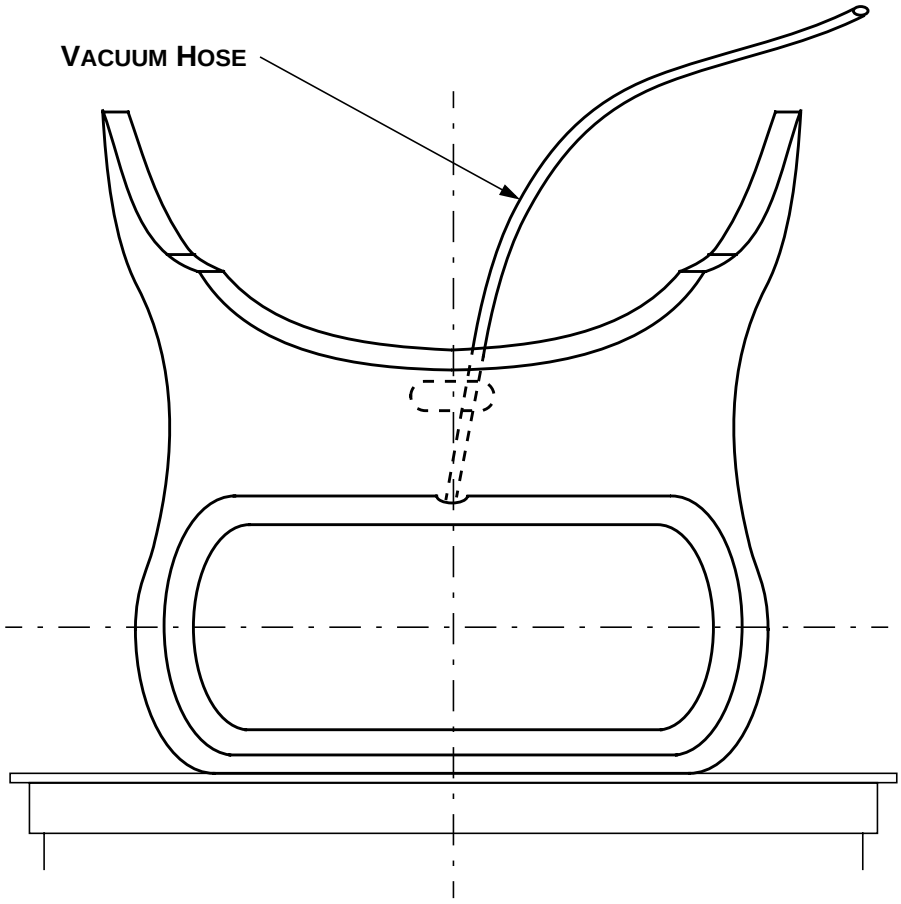


FIGURE 3 - APPLICATION OF VACUUM TO DE-ICER BOOT

5.6 Trimming of Installed De-Icer Boots

5.6.1 Trim de-icer boots at the outer aft intake recess edge with a trimming knife (see paragraph 4.2.10) to provide a flush, continuous surface between the boot edge and the structure.

5.6.2 Hold the tool such that the cutting edge rotates toward the recess face to prevent slippage and damage to the boot (see Figure 4).

5.6.3 After trimming, ensure the bond is intact. Reactivate and roll any unbonded areas.

5.6.4 Allow bonded boots to cure for a minimum of 24 hours before inflated check after sealing according to section 5.8.

5.6.5 Remove and discard improperly trimmed boots according to section 5.7.

5.6.6 After trimming, ensure that all recessed boot edges are approximately flush with the adjacent surfaces and that feathered edges of boots are in intimate contact with the structure.

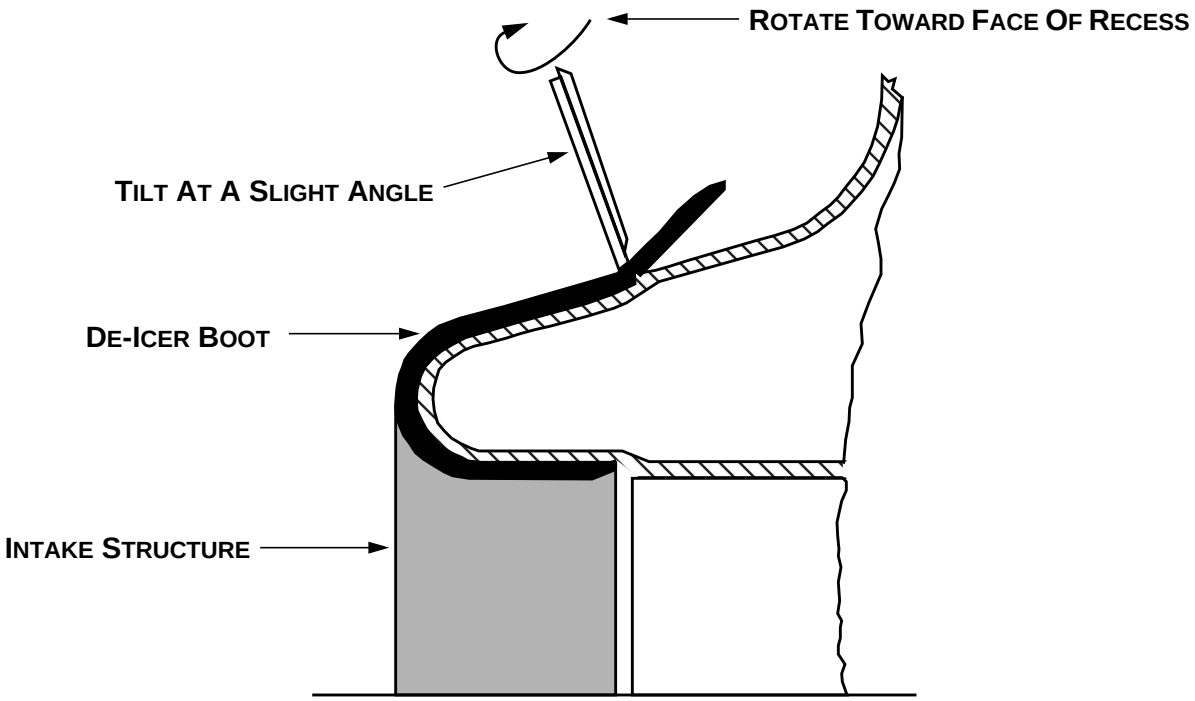


FIGURE 4 - TRIMMING OF DE-ICER BOOT

5.7 Removal of De-Icer Boots

5.7.1 After the adhesive cures, it is extremely difficult to remove a well-bonded boot without damaging the boot.

5.7.2 If a de-icer boot is going to be scrapped, peel it off the structure in sections parallel to the inflatable tubes. After peeling, clean the structure with the solvent specified in PPS 31.17 to remove all adhesive.

5.7.3 It is generally impractical to re-use a de-icer boot trimmed to fit an air intake recess. If a boot is going to be re-used, release the adhesive bond between the structure and boot by applying the solvent specified in PPS 31.17 as follows:

Step 1. Peel back one boot edge section from the recess and apply solvent to the seam line while applying tension to peel the boot back (see Figure 5). Use a polyethylene squeeze bottle to keep a supply of solvent at the seam line.

Step 2. Allow the solvent to form a reservoir at the seam line and apply even tension to strip the boot back to the outermost leading edge. If possible, rotate the cowl to retain a solvent reservoir while peeling the boot from the bottom.

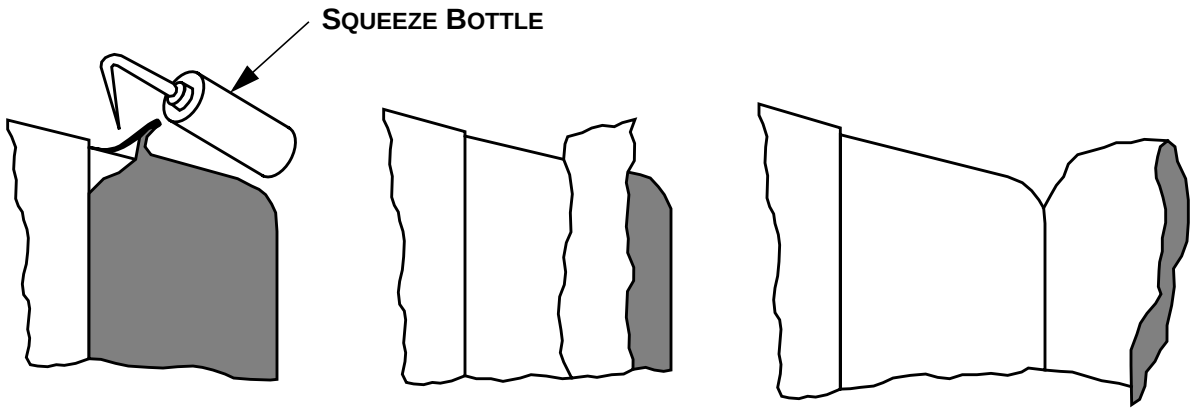


FIGURE 5 - REMOVAL OF DE-ICER BOOT

5.7.4 If partially removing a boot to correct alignment or free entrapped air, use the solvent specified in PPS 31.17 to break the bond.

5.7.5 Except as noted in paragraph 5.7.5.1, use the solvent specified in PPS 31.17 to remove all adhesive from the air intake and the boot being re-installed before re-installation.

5.7.5.1 Do not remove adhesive from the structure or boot when re-installing a boot within 48 hours of applying the second adhesive coat. Instead, touch up any adhesive starved areas with DHMS A6.11 Type I Class 2 adhesive.

5.8 Sealing De-Icer Boots

5.8.1 Fill the gap between the de-icer boot edge and structure recess with DHMS S3.01/B2 sealant as follows:

Step 1. Lightly abrade the sealing area with aluminum oxide 180 - 220 grit abrasive paper. Ensure that at least 1/2" of both the boot edge and the structure are abraded.

Step 2. Wipe loose particles from the surfaces being sealed with a clean dry wiping cloth.

Step 3. Apply 1" wide masking tape around the sealing area to mask the boot and structure.

Step 4. Solvent clean the sealing area as specified in PPS 31.17.

Step 5. Apply a thin sealant bead along the boot edge and, using a spatula, feather the sealant toward the tape (see Figure 6). Ensure that the sealant closely conforms to the boot and adjacent structure surfaces. Ridges or protrusions on the sealant edges are not acceptable.

Step 6. Allow sealant to cure for a minimum of 24 hours before performing inflated boot pressure testing according to paragraph 6.2.5 or further handling or working the assembly.

5.8.2 Allow sealant to cure for a minimum of 36 hours at room temperature before functional or pressure testing or subjecting to boot to flight conditions.

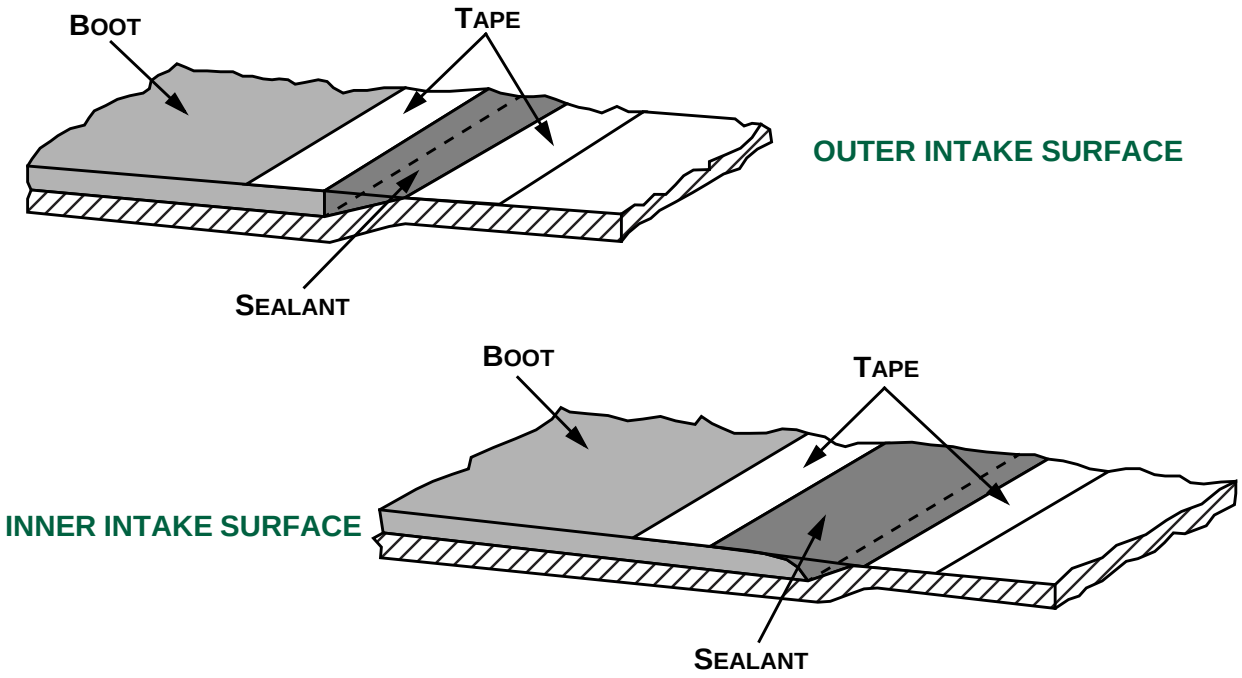


FIGURE 6 - SEALING OF DE-ICER BOOT

5.9 Sealing Gap Around De-Icer Boot Manifold Tube

5.9.1 After sealing boots according to section 5.8, fill the gap between the structure and the de-icer boot manifold tube with either DHMS S3.01/B2 sealant or DHMS S3.01/B1/2 sealant (see Figure 7).

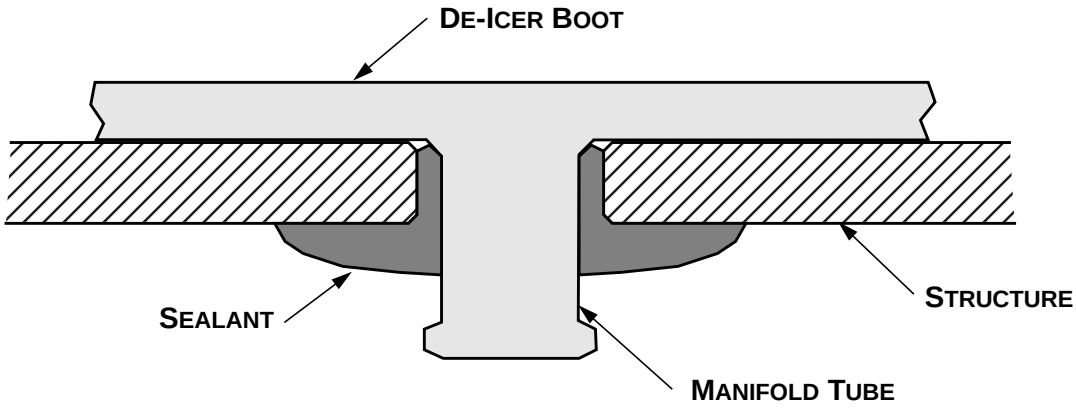


FIGURE 7 - CROSS SECTION OF SEALANT AROUND MANIFOLD TUBE

5.10 Repair of De-Icer Boots

5.10.1 Refer de-icer boots damaged during or following installation to MRB for disposition.

5.10.2 Do not clean boots being returned to the manufacturer for repair after removal.

5.10.3 For de-icer boots being shipped back to the manufacturer, cap the air connectors according to PPS 6.05, seal the boots in a polyethylene bag, and place them back in the original box (if available). If the original box is not available place the bagged and capped boots in a suitable storage or shipping carton.

5.11 Application of Removable Latex Protective Coating

5.11.1 After the inflated boot pressure test according to paragraph 6.2.5, apply protective latex coating (see Materials section, paragraph 4.1.10) to the boot surfaces as follows:

Step 1. On both the inner and outer intake boot surfaces, apply a 1" wide strip of flashbreaker tape at the sealant edge. Leave the flashbreaker tape in place until latex coating removal.

Step 2. Using 1" wide masking tape, mask the outer half of the flashbreaker tape to permit the latex to cover the inner half of the flashbreaker tape (see Figure 7).

Step 3. Thoroughly mix 4 to 5 grams of red tint (see Materials section, paragraph 4.1.11) per 500 grams of latex coating. The mixture shall not exceed the 1% ratio as stated (i.e., 5 grams of the red tint), as excessive amount of red tint will stain the de-icer boot.

Step 4. Use a brush to apply one coat of red latex to the unmasked de-icer boot surface, overlapping the unmasked flashbreaker tape.

Step 5. Remove the masking tape immediately after applying the latex coat.

Step 6. Allow the latex to dry for 20 to 30 minutes at room temperature or 5 minutes at 100°F - 110°F.

Step 7. Re-apply masking tape to the same area as specified in Step 2.

Step 8. Use a brush to apply a second coat of red latex.

Step 9. Remove the masking tape immediately after applying the second latex coat.

Step 10. Allow the latex to cure for a minimum of 8 hours at room temperature, or for 1 hour at 100°F - 110°F, before further working the assembly.

Step 11. Place a second strip of flashbreaker tape around the entire edge of the cured latex, overlapping slightly onto the first strip of flashbreaker tape, to aid in removal of the latex coating.

Step 12. Using a permanent marker specified in PPS 15.04, apply the following note to a visible surface of the cured latex coating:

“REMOVE LATEX COATING FOR ENGINE RUNS AND FLIGHT”

5.11.2 Leave the latex coating on the de-icer boot for all further fabrication, assembly, functional test and pressure test operations and do not remove it until immediately before engine runs, flying the aircraft, or as specified in paragraph 5.11.4.1.

5.11.3 Remove latex coating by lifting the flashbreaker tape and peeling off the coating.

5.11.3.1 Remove stubborn areas using a soft cloth and warm, mild soapy water. Do not scrub the de-icer boot surfaces or use sharp or pointed objects to remove the latex coating.

5.11.4 For de-icer boots which have not been installed onto the aircraft, do not store or expose de-icer boots with the applied latex coating to ultraviolet (UV) radiation (e.g., direct or indirect sunlight).

5.11.4.1 For de-icer boots that have been installed onto the aircraft, remove the latex coating if the aircraft has been, or is expected to be, exposed to UV radiation (e.g., sunlight) for longer than normal periods of time before engine runs or flight testing as the tinted latex will degrade in UV radiation (e.g., sunlight).

5.11.5 For de-icer boots that have been exposed to high temperatures (above 100°F), allow the latex coating to cool down to room temperature (60°F - 80°F) before attempting to remove according to paragraph 5.11.3.

5.11.6 If the protective latex coating has been removed as specified in paragraph 5.11.4.1 and further fabrication, assembly, functional test and/or pressure test operations is still to be performed that would expose the pneumatic de-icer boots to possible damage, re-apply the latex coating according to section 5.11 before performing such operations.

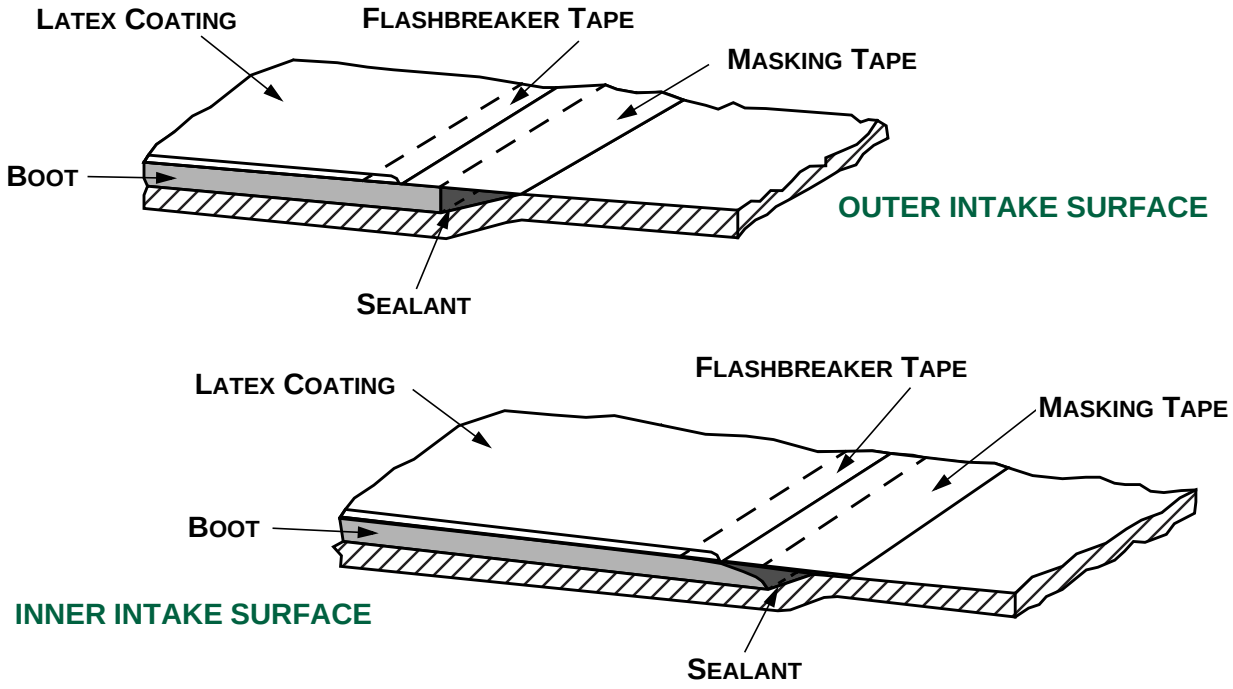


FIGURE 8 - APPLICATION OF REMOVABLE PROTECTIVE LATEX COATING

5.12 Pre-Delivery Procedure

5.12.1 Apply cosmetic treatment to all de-icer boots according to PPS 39.09 immediately before final delivery of the aircraft.

6 REQUIREMENTS

6.1 Inspection of Boot Before Installation

6.1.1 Ensure that the boot have not exceeded the maximum shelf life storage period as specified in QDI-15-02.

6.1.2 Before installation, inspect boots for damage and evidence of deterioration as specified in paragraph 6.1.2.1, paragraph 6.1.2.2 and paragraph 6.1.2.3.

6.1.2.1 With the exception of wrinkle inspection, place the de-icer boot on a clean flat surface and connect the boot to a vacuum source of 6" Hg to 10" Hg and inspect the de-icer boot according to Table I. For wrinkle inspection, inspect for wrinkles according to Table I without applying a vacuum to the de-icer boot. If the defects magnitude exceeds the limits as specified in Table I, reject the boot and take corrective action as specified in paragraph 6.1.3.

6.1.2.2 Reject boots with deformation in the air connection. Check air connectors for cracks by squeezing between the thumb and forefinger.

6.1.2.3 Reject boots having any separation and/or evidence of brittleness.

6.1.3 Return boots which fail to meet all the above requirements to their original boxes and refer to MRB for disposition.

6.1.4 De-icer boots shall be installed within 48 hours of the application of the second coat of adhesive.

6.2 Inspection of Installed Boots

6.2.1 Immediately after bonding and before any required trimming, the installed boot shall be checked for correct positioning and entrapped air.

6.2.1.1 If complete or partial removal of boots is necessary due to incorrect positioning, remove and replace improperly installed de-icer boots according to section 5.7.

6.2.1.2 Entrapped air shall be removed by sliding a thin spatula between the bonded surfaces into the air bubble and pressing out the bubble while simultaneously removing the spatula.

6.2.2 Check sealed edges for aerodynamic smoothness and, when sealing is required to protect the bond line, ensure the seal is continuous, smooth and uniform.

6.2.3 Ensure that the manufacturer’s label is visible on the installed boot.

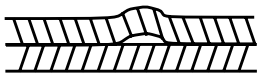
6.2.4 After sealing according to section 5.8, the boot shall be checked by Inspection in both the uninflated and inflated conditions for evidence of lack of adhesion and proper inflation.

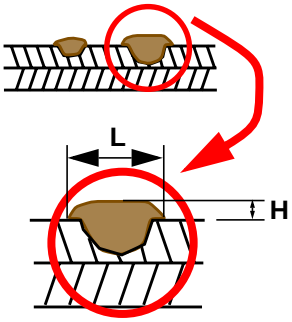
6.2.5 After the sealant has fully cured, use a suitable regulator (see Equipment section, paragraph 4.2.6) to inflate the installed and sealed de-icer boots to 15 psi and hold for 1 minute and visually checking the boots as follows:

- Inspect boots according to Table I. If the defects magnitude exceeds the limits as specified in Table I, refer the part to MRB for disposition. Perform all removal of the de-icer boot according to section 5.7.
- There shall be no lack of adhesion over the entire bonded area of the de-icer boot.
- The pressure drop during the 15 psi pressure test shall be less than 1 psi/minute. Remove and discard boots with a pressure drop greater than 1 psi/minute according to section 5.7.
- A narrow inflation strip may occur outside the last active inflation tube. The narrow strip is approximately 3/16" wide and is located between the last (upper or lower side) stitch line and the tapered fillet in the de-icer tapered edge. This condition is not a construction defect, does not affect the form, fit or function of the de-icer, and is acceptable.
- Reject boots with deformation in the air connection.
- Reject boots having evidence of brittleness.

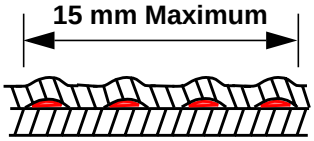
6.2.5.1 Before and after the inflated boot pressure test as specified in paragraph 6.2.5, with the exception of wrinkle inspection, connect the boot to a vacuum source of 6" Hg to 10" Hg and while maintaining the boot under vacuum, inspect the de-icer boot according to Table I. When performing this test after the inflation test, allow the boot to deflate naturally before connecting the boot to the vacuum source. For wrinkle inspection, inspect for wrinkles according to Table I without applying a vacuum to the de-icer boot, both before and after the inflated boot pressure test as specified in paragraph 6.2.5. If the defects magnitude exceeds the limits as specified in Table I, refer the part to MRB for disposition.

TABLE I - DEFECTS IN DE-ICER BOOTS

DEFECT	DESCRIPTION (NOTES 1 AND 2)	ILLUSTRATION
Blisters	• Air pockets • Maximum size of 0.006 square inch (4 mm^2) • No more than 2 such defects per square meter • No more than 5 such defects per air intake de-icer boot	
Craters, Voids or Impressions (Note 3)	• First ply only • Maximum size of 0.008 square inch (5 mm^2) • Maximum depth of 0.008 inch (0.20 mm) • Density ≤ 0.002 in^2/ft^2 (14 mm^2/m^2)	

Filled Craters, Voids or Impressions	• These are acceptable “filled” craters, voids or impressions performed by the de-icer boot manufacturer not exceeding the following limits:
	  • Length (L) ≤ 0.118 inch (3 mm)
	  • Height (H) ≤ 0.008 inch (0.20 mm)
	  • Density ≤ 5 “filled” reworks (i.e., craters, voids, or impressions) per square meter
		

Cuts	• Refer to MRB for disposition	
Hard Foreign Body (Stationary)	• Unknown embedded impurity (e.g., dirt) slight bump in the outer layer • Height (H) ≤ 0.008 inch (0.20 mm) • Maximum size of 0.003 square inch (2 mm^2) • Density ≤ 0.002 in^2/ft^2 (14 mm^2/m^2)	

	• Embedded “loose weave” from thread (indicated by multiple sequential bumps) in the outer layer is acceptable provided it does not exceed the following limits:
	  • Height (H) ≤ 0.008 inch (0.20 mm)
	  • Maximum size of each bump shall be 0.003 square inch (2 mm^2)
	  • Maximum length of 0.6 inch (15 mm)
		

Foreign Body (Moving)	• Refer to MRB for disposition	
Surface Scratches	• First ply only • Maximum length of 0.39 inch (10 mm) • Maximum depth of 0.004 inch (0.1 mm) • Surface scratches shall not exceed 10% per square foot of boot surface	
Linear Marks	• Hairline marks on the external ply (Note 3) • Linear marks shall not exceed 10% per square foot of boot surface	

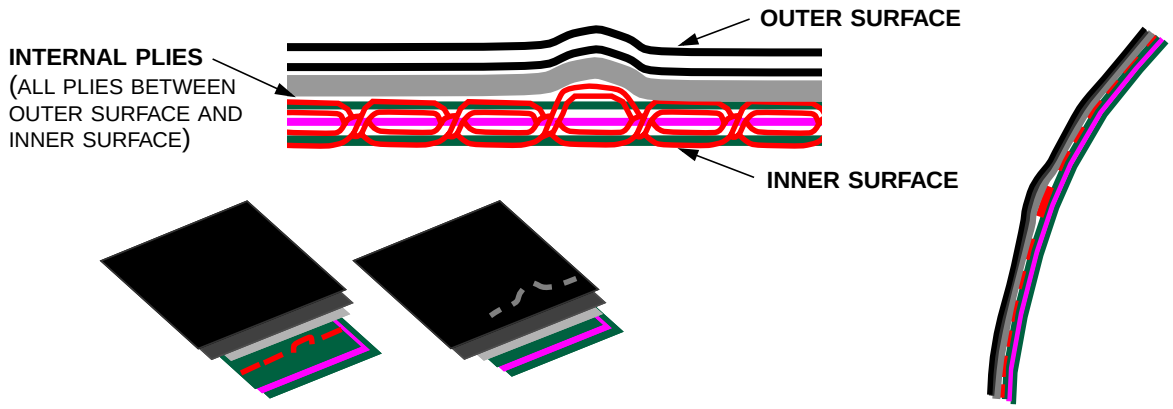
TABLE I - DEFECTS IN DE-ICER BOOTS

DEFECT	DESCRIPTION (NOTES 1 AND 2)	ILLUSTRATION
Matt Finish	• First ply only • Differences in the shiny appearance of the outer surface, however, first ply is still intact (i.e., no Tear Offs) • Areas of dull finish shall not exceed 10% per square foot of boot surface • Matt finish caused by solvents are unacceptable as a brittle surface will result	
Stitch	• No more than 1 skipped stitch per single length of stitching • No skipped stitches along the centre line tube stitching • No broken threads • Slight bump caused by "loose thread" (see Note 4) allowed. No more than one "loose thread" bump per single length of stitching allowed	

Tear Offs	• Lack of material in the inner or outer ply
	• Not allowed for outer surface. Refer to MRB for disposition
	• Inner surface, first ply only, is allowed provided that the following limits are not exceeded:
	  • Maximum size of 0.05 square inch (30 mm^2)
	  • Maximum depth of 0.008 inch (0.2 mm). Internal plies shall be intact.
	  • No more than 1 such defect per square meter	

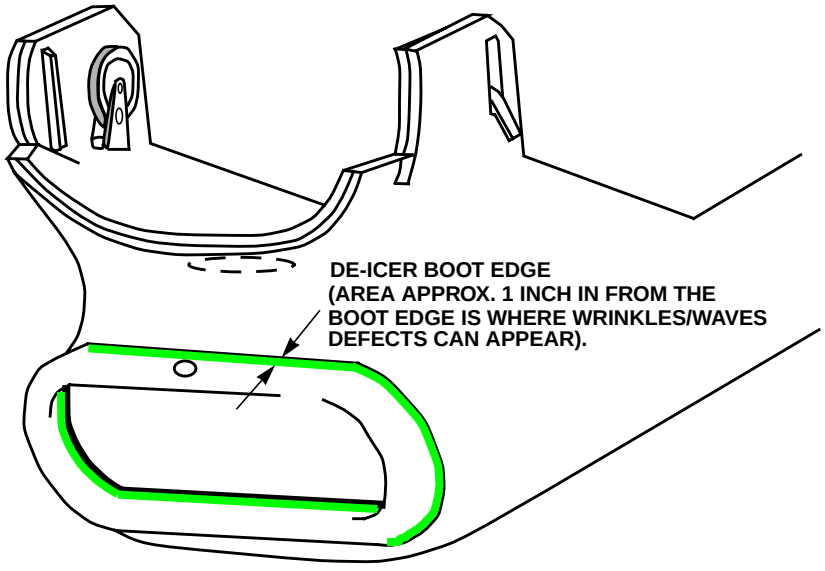
Wrinkles/Waves	• Outer surface (Allowed 1 inch in from de-icer boot edges only - see Figure 9)
	  • Maximum length of 0.8 inch (20 mm) per wrinkle/wave
	  • Maximum height of 0.016 inch (0.4 mm) per wrinkle/wave
	  • No more than 6 such defects per de-icer boot
	• Inner surface (Allowed 1 inch in from de-icer boot edges only - see Figure 9)
	  • This is only acceptable prior to bonding the de-icer boot. After bonding, these wrinkles/waves should not be visible	

Note 1. These are the limitations to which these defects do not require MRB disposition. All defects exceeding the limitations specified shall be referred to MRB for disposition.
Note 2. Any defects which appear at the edges of the de-icer boot where it will be trimmed off after bonding shall not be cause for rejection.
Note 3. During the de-icer boot manufacturing process, dust or hairline scratches on the tool may cause impressions and/or linear marks.
Note 4. See below for depictions of "LOOSE THREAD". During the de-icing boot manufacturing process, the "loose thread" is compressed down and forms a bump under the three plies of protective rubber.



UNINSTALLED DE-ICER BOOT

DE-ICER BOOT EDGES (AREA APPROX. 1 INCH IN FROM THE BOOT EDGE IS WHERE WRINKLES/WAVES DEFECTS CAN APPEAR. A MAXIMUM OF 6 SUCH DEFECT PER DE-ICER BOOT IS ALLOWED)



INSTALLED DE-ICER BOOT

FIGURE 9 - DE-ICING BOOT WRINKLE/WAVE INSPECTION AREAS

6.3 Receipt Testing and Shelf Life Extension

6.3.1 Perform receipt and shelf life extension testing of DHMS A6.11 Type I Class 2 adhesive according to QAMTR 007.

6.3.2 Perform receipt and shelf life extension testing of DHMS S3.01 sealants according to QAMTR 001.

7 SAFETY PRECAUTIONS

7.1 Safety precautions applicable to the materials and procedures specified herein shall be defined by the subcontractor performing the work for Bombardier Toronto.

8 PERSONNEL REQUIREMENTS

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

- know the function of de-icer boots
- know how de-icer boots work
- know why not to inflate de-icer boots before installation
- know the procedure for bonding de-icer boots to the air intake structure
- know the procedure for removal and/or repositioning of de-icer boots
- know how to trim installed boots
- know the procedure for sealing de-icer boot edges
- know how to apply protective latex coating to installed de-icer boots
- know the procedure for inflated inspection of installed de-icer boots
- know how to operate the pressure test rig
- know the requirements for de-icer boots, before and after installation
- know the safety precautions to observe when installing de-icer boots
- know how to attach de-icer boots to a vacuum source and hold them under vacuum during installation
- know how to use rubber rollers to improve de-icer boot bonds

9 STORAGE

9.1 Solvents, Sealants and Adhesives

9.1.1 Store sealant according to PPS 21.20.

9.1.2 Store solvents according to PPS 31.17.

9.1.3 Store DHMS A6.11 Type I Class 2 adhesive according to PPS 25.63.

9.1.4 Clearly mark the contents on all containers of solvents, adhesives and sealants.

9.1.5 Keep containers of solvents, adhesives and sealants tightly closed when not in use.

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

9.2 De-Icer Boots

9.2.1 Do not leave boots unrolled for more than 48 hours. If installing boots or storing for short periods, lay boots on a clean flat surface with the air connectors capped according to PPS 6.05.

9.2.2 If shipping boots or storing them for longer than 48 hours, roll them as follows:

9.2.2.1 Lay the boot on a clean flat surface with the shiny side up. Ensure both sides are free of metal chips or other contamination. Ensure air connectors are open (uncapped) to the atmosphere.

9.2.2.2 Interleaf with paper and roll the boot, with the shiny side facing in, onto a 3" minimum diameter cardboard shell.

9.2.2.3 Roll each boot individually, never roll 2 or more together.

9.2.2.4 Always start rolling at the end away from the air connector and roll toward the air connector.

9.2.2.5 Re-cap the air connector according to PPS 6.05.

9.2.2.6 Place the rolled boot in a polyethylene bag and seal the bag.

9.2.2.7 For shipping, place the sealed de-icer boot in a shipping carton.

9.2.3 For de-icer boots which have not been installed onto the aircraft, do not store or expose de-icer boots with the applied latex coating to UV radiation (e.g., direct or indirect sunlight).

10 MAINTENANCE OF EQUIPMENT

10.1 Solvent clean sealant and adhesive application tools after use according to PPS 31.17.

11 ADDITIONAL INFORMATION

11.1 Clean or buff boot surfaces, as necessary, to maintain the surface gloss.

11.2 If necessary, wash installed de-icer boot surfaces with a mild neutral soap solution and rinse with water. Do not scrub de-icer boot surfaces. Remove oil and grease from de-icer boot surfaces by solvent cleaning according to PPS 31.17.

11.3 Take care when handling assemblies with installed de-icer boots or when moving work platforms near completed aircraft as boots puncture easily.

11.4 Cap installed boot air connectors which are disconnected according to PPS 6.05.