DE HAVILLAND AIRCRAFT OF CANADA LIMITED

# PPS 9.48

**PRODUCTION PROCESS STANDARD**

**PROPRIETARY INFORMATION**

# ABRASION PROTECTION OF WIRE ASSEMBLIES

Issue 4
- This standard supersedes PPS 9.48, Issue 3.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- Direct PPS related questions to PPS.Group@dehavilland.com or (416) 375-7641.
- This PPS is effective as of the distribution date.

| | | | |
|---|---|---|---|
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**Issue 4 - Summary of Changes (over the previous issue)**

The following summaries are not detailed and are intended only to assist in alerting PPS users to changes which may affect them; refer to the applicable sections of this PPS for detailed procedure and requirements.

- Corrected the labelling of the figures specified in paragraph 5.6.1.1.1 to match the text.

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## 1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for abrasion protection of wire assemblies.

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.

## 2 HAZARDOUS MATERIALS

2.1 Before receipt at De Havilland Canada, all materials shall be approved and assigned Material Safety Data Sheet (MSDS) numbers by the De Havilland Canada 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 De Havilland Canada Environment, Health and Safety Department.

## 3 REFERENCES

3.1 PPS 9.04 - Assembly and Installation of Electrical and Electronic Wire Assemblies.

3.2 PPS 9.22 - Assembly of Connectors.

3.3 PPS 13.26 - General Subcontractor Provisions.

3.4 PPS 13.34 - Installation of Plastic Cable Ties.

3.5 PPS 25.23 - Bonding using DHMS A6.11 Type I Class 1 Adhesive.

3.6 PPS 25.30 - Bonding using DHMS A6.09 Epoxy Adhesive.

3.7 PPS 25.62 - Bonding using Fast-Weld #10 Epoxy Adhesive.

3.8 PPS 25.63 - Bonding using DHMS A6.11 Type I Class 2 Adhesive.

3.9 PPS 31.17 - Solvent Usage.

## 4 MATERIALS AND EQUIPMENT

### 4.1 Materials

4.1.1 Unless otherwise specified in this section, use only the materials specified. Use of superseding or alternative materials is not allowed.

4.1.2 Fiberglass tape to MIL-I-19166.

4.1.3 Plastic cable ties as specified in PPS 13.34.

4.1.4 Fiberglass lacing tape, silicone resin impregnated, size 3 (0.077" - 0.094" wide and 0.013" - 0.019" thick) to A-A-52083-F-3.

4.1.4.1 The following fiberglass lacing tape may be used to depletion of the existing stock, but thereafter, only fiberglass lacing tape to A-A-52083-F-3 must be used.

- A-A-52083-C-2, A-A-52083-C-3 or A-A-52083-D-2
- MIL-T-43435 Type IV, Finish F

4.1.5 Spacers: Panduit CR4H, Panduit CSCS, NAS43 or NAS44, for preventing potential abrasive contact or fouling, or to make abrasion protection unnecessary.

4.1.6 S10155H( )-( ) conduit, thin walled Teflon tubing. H in the part number represents thin walled Teflon material, the number after the H indicates the conduit diameter and the optional dash number, if any, indicates the conduit length.

4.1.7 DSC230-( )HT Teflon spiral wrapping (also known as “Spirap”). The dash number indicates the diameter of the Spirap.

4.1.8 Protective edging:

- MS21266-( )N nylon grommet/edging (also known as “caterpillar grommet”). The dash number indicates the edging width and the letter following the dash number indicates the edging material (N represents nylon material).
- NAS557-( )( ) split plastic (polyamide) grommet. The dash number indicates the grommet diameter and the letter following the dash number indicates the grommet type.
- Rayrim self-adhering edging, radiation cross-linked polyolefin, Raychem Corp. part number RK-6182.
- Device Technologies Inc. S9-006-S01 grommet (steel substrate, EPDM gasket).

## 4.2 Equipment

4.2.1 Hot air gun, complete with reflector (e.g., Steinel HG 2520E or Steinel STEI-HG 2310-BB). For safety reasons, it is recommended that hot air guns include a power interrupt reset feature which will prevent an unattended heat gun from resuming heat (e.g., after a power failure).

4.2.1.1 Whenever using a hot air gun or heat gun, take care to ensure not to use too high a heat setting. The heat setting used must be appropriate to the task the hot air gun is being used for without causing damage to parts or surrounding structure. If necessary, use heat guards to protect surrounding structure. If unsure what heat setting to use, start at a lower temperature setting and increase slowly to determine the proper setting.

4.2.2 Gloves, high temperature resistant/heat resistant (e.g., DSC 422-3-( ) or Kevlar).

## 5 PROCEDURE

### 5.1 General

5.1.1 *Fouling*: For the purposes of this PPS, a fouling condition occurs when a wire or bundle is routed under pressure over a sharp cutting edge of adjacent equipment or structure (i.e., the wire or bundle is pulled against an edge). Unless otherwise specified by Liaison Engineering, fouling conditions cannot be corrected simply by using abrasion protection (e.g., S10155 conduit, caterpillar grommet or Spirap); refer instances of fouling to Liaison Engineering for disposition (i.e., re-routing, additional support, etc.).

5.1.2 *Contact*: For the purposes of this PPS, a contact condition occurs when a wire or bundle touches (i.e., makes contact with) a surface or the edge of adjacent equipment or structure without pressure (i.e., without fouling). In contact conditions the wire or bundle must be protected using abrasion protection as specified herein.

5.1.3 Refer to PPS 9.22 for the abrasion protection requirements associated with backshell clamping screws.

5.1.4 Route and clamp wire assemblies as specified by the engineering drawing. Within the requirements specified by the engineering drawing, make every effort to maintain a clearance of at least 3/8" between wire assemblies and the edge of adjacent equipment or structure (including lightning holes).

5.1.5 Refer to PPS 9.04 for the special protection requirements between wire assemblies and flammable fluid lines, high temperature lines (lines where surface temperature can exceed 150°C), hydraulic lines and control cables.

5.1.6 Unless specific abrasion protection requirements and/or provisions are specified by the engineering drawing, protect wire assemblies (including wire assemblies with flexible metallic conduit) in the affected areas with S10155H( )-( ) conduit (thin wall Teflon tubing) according to section 5.3 if potential movement could result in any of the following:

- The wire assembly rubbing or vibrating against a surface.
- The wire assembly coming within 3/8" of the edge of adjacent equipment or structure (including lightning holes).
- Contact of the wire assembly with the edge of adjacent equipment or structure without fouling.

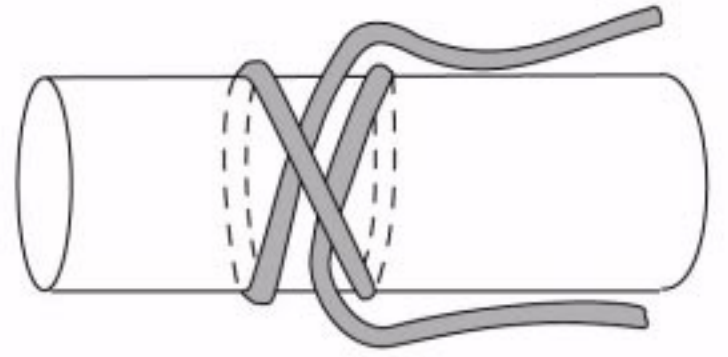
5.1.6.1 If potential movement could result in fouling over a sharp cutting edge of adjacent equipment or structure (including lightning holes) or pinching of the wire assembly, refer to Liaison Engineering for disposition (i.e., re-routing, additional support, etc.).

5.1.6.2 Spirap protective covering may be used to protect the wire assembly in place of S10155H( )-( ) conduit only in areas where potential movement could result in the wire assembly rubbing or vibrating against a surface; do not use Spirap in areas where potential movement could result in the wire assembly contacting or coming within 3/8" of the edge of adjacent equipment or structure (including lightning holes). Install Spirap according to section 5.4.

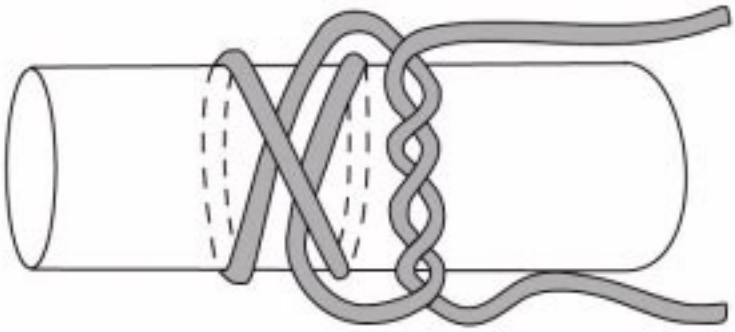
5.1.7 Secure wire bundles, S10155H( )-( ) conduit and Spirap protective covering as specified herein with plastic cable ties according to PPS 13.34 or fiberglass lacing tape.

5.1.8 Tie fiberglass lacing tape (ref. paragraph 4.1.4) as follows:

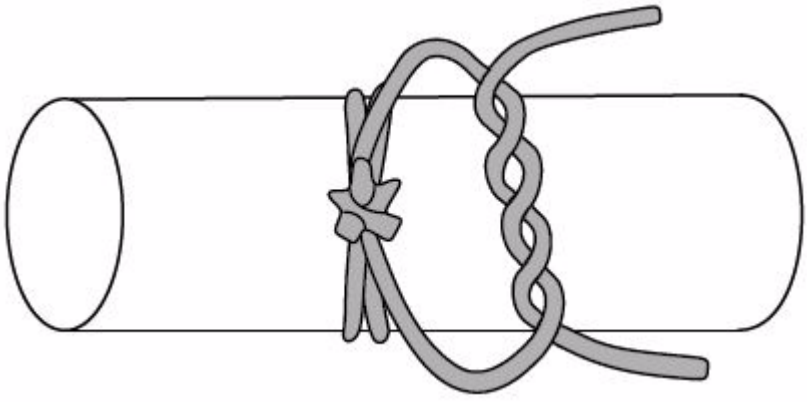
Step 1. Form a clove hitch around the wire bundle as shown below.



Step 2. Over the clove hitch, form the first portion of a square knot plus an extra turn as shown and pull tight.

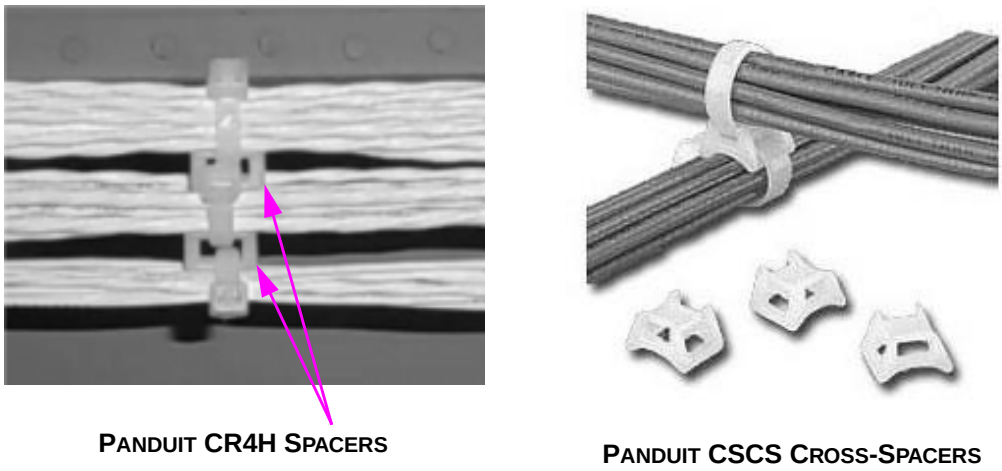


Step 3. Complete the second portion of a square knot, again with an extra turn, as shown and pull tight.



### 5.2 Prevention of Contact or Fouling

5.2.1 Except in high temperature areas, in order to make the use of abrasion protection unnecessary and to prevent potential contact or fouling, it is acceptable to use Panduit CR4H, Panduit CSCS, NAS44 spacers, as necessary, to assist in maintaining the required wire assembly clearance (see Figure 1).



PANDUIT CR4H SPACERS

PANDUIT CSCS CROSS-SPACERS

**FIGURE 1 - USE OF SPACERS**

5.2.2 **Do not** use spacers in high temperature areas (i.e., nacelles). In high temperature areas, tie wire bundles as shown in Figure 2 using fiberglass lacing tape in place of spacers.

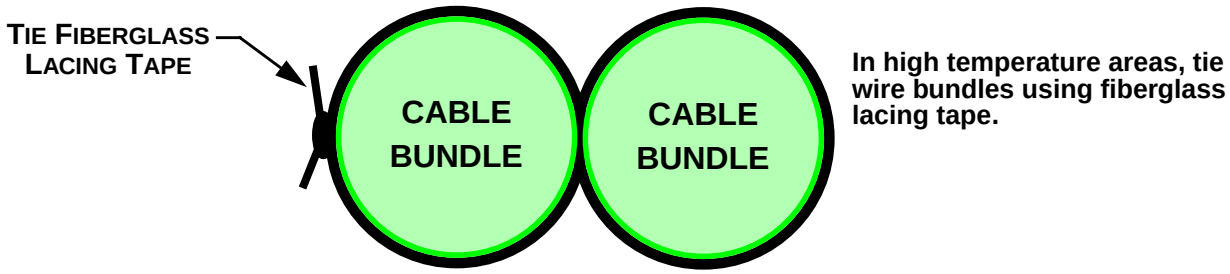
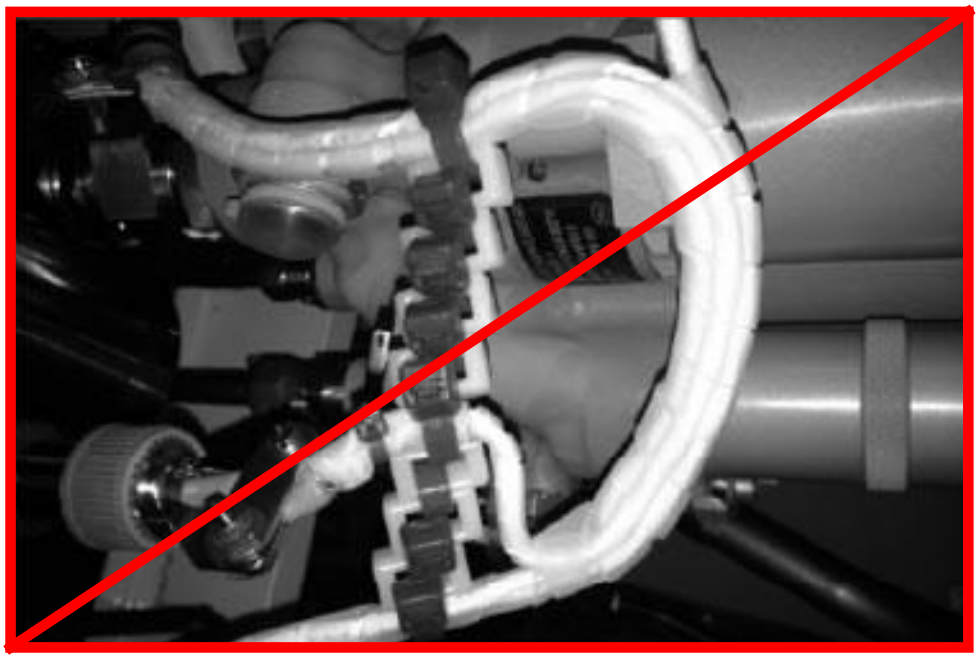



**FIGURE 2 - USE OF FIBERGLASS LACING TAPE IN HIGH TEMPERATURE AREAS**

5.2.3 Unless otherwise specified by the engineering drawing or wiring list, do not “daisy chain” Panduit CR4H spacers (see Figure 3). If “daisy chaining” of CR4H spacers appears to be necessary to make the use of abrasion protection unnecessary or to prevent potential contact or fouling, refer to Liaison Engineering for authorization.



“Daisy chaining” of CR4H spacers is **only** allowed where specified by the engineering drawing or wiring list, or where allowed by Liaison Engineering.

**FIGURE 3 - “DAISY CHAIN” OF CR4H SPACERS**

5.2.4 If use of a particular length of NAS43 or NAS44 spacer is specified by the engineering drawing, it is acceptable to use a longer or shorter length spacer, as necessary to assist in maintaining the required wire assembly clearance.

### 5.3 Abrasion Protection using S10155H( )-( ) Conduit

5.3.1 If abrasion protection using S10155H( )-( ) conduit is required by the engineering drawing, Liaison Engineering or paragraph 5.1.6, install the conduit as specified in this section.

5.3.2 At wire bundle breakouts, terminate the S10155H( )-( ) conduit at the breakout and add conduit protection to the branches, as necessary and as specified herein. Do not route a wire bundle breakout through the conduit.

5.3.3 Do not cover resistors or other heat generating devices with S10155H( )-( ) conduit. If abrasion protection of a wire assembly in the area of a resistor or other heat generating device is required, refer to Liaison Engineering.

5.3.4 Unless otherwise specified by the engineering drawing or wiring list, do not include conduit under P-clamps or other securing hardware. If it is necessary to protect the wire assembly in the area of a P-clamp or other securing hardware, terminate the conduit immediately before and after the securing hardware and secure it in place using two turns of MIL-I-19166 fiberglass tape and a plastic cable tie according to PPS 13.34.

5.3.5 Use the diameter of conduit specified in Table I to obtain an overlap of 70° to 130°.

**TABLE I - S10155H( )-( ) CONDUIT SELECTION**

| BUNDLE OR WIRE DIAMETER | S10155H( )-( ) CONDUIT | |
|---|---|---|
| | PART NUMBER | NOMINAL DIAMETER |
| 0.025" - 0.028" | S10155H30-( ) | 0.034" |
| 0.029" - 0.045" | S10155H27-( ) | 0.053" |
| 0.046" - 0.071" | S10155H23-( ) | 0.085" |
| 0.072" - 0.080" | S10155H22-( ) | 0.095" |
| 0.081" - 0.089" | S10155H21-( ) | 0.106" |
| 0.090" - 0.099" | S10155H20-( ) | 0.118" |
| 0.100" - 0.112" | S10155H19-( ) | 0.133" |
| 0.113" - 0.124" | S10155H18-( ) | 0.148" |
| 0.125" - 0.140" | S10155H17-( ) | 0.166" |
| 0.141" - 0.156" | S10155H16-( ) | 0.186" |
| 0.157" - 0.175" | S10155H15-( ) | 0.208" |
| 0.176" - 0.193" | S10155H14-( ) | 0.234" |

| BUNDLE OR WIRE DIAMETER | S10155H( )-( ) CONDUIT | |
|---|---|---|
| | PART NUMBER | NOMINAL DIAMETER |
| 0.194" - 0.221" | S10155H13-( ) | 0.263" |
| 0.222" - 0.247" | S10155H12-( ) | 0.294" |
| 0.248" - 0.277" | S10155H11-( ) | 0.330" |
| 0.278" - 0.320" | S10155H10-( ) | 0.375" |
| 0.321" - 0.360" | S10155H9-( ) | 0.438" |
| 0.361" - 0.420" | S10155H8-( ) | 0.500" |
| 0.421" - 0.525" | S10155H7-( ) | 0.625" |
| 0.526" - 0.630" | S10155H6-( ) | 0.750" |
| 0.631" - 0.735" | S10155H5-( ) | 0.875" |
| 0.736" - 0.840" | S10155H4-( ) | 1.000" |
| 0.841" - 1.050" | S10155H3-( ) | 1.250" |
| 1.051" - 1.250" | S10155H2-( ) | 1.500" |

5.3.6 Install S10155H( )-( ) conduit as follows:

Step 1. Prepare the conduit for installation by carefully cutting the tubing down its length.

Step 2. Wrap each end of the wire assembly in the area to be covered with two turns of MIL-I-19166 fiberglass tape (to prevent axial slippage) before applying the conduit.

Step 3. Secure the conduit in place using plastic cable ties on each end according to PPS 13.34.

Step 4. For tubing lengths greater than 6" long, further secure the conduit with additional plastic cable ties spaced 3 to 4 inches apart according to PPS 13.34. Orient the overlap (70° - 130°) to prevent ingress of moisture into the conduit.

### 5.4 Abrasion Protection using DSC230-( )HT Spiral Wrapping ("Spirap")

5.4.1 If abrasion protection using Spirap is required by the engineering drawing, Liaison Engineering or is allowed by paragraph 5.1.6, install the conduit as specified in this section.

5.4.2 Refer to Table II for the size of Spirap which may be used.

**TABLE II - DSC230-( )HT SPIRAL WRAPPING (SPIRAP) SELECTION**

| WIRE BUNDLE SIZE | SPIRAP |
|---|---|
| 1/16" - 1/2" | DSC230-6HT |
| 3/16" - 2.0" | DSC230-7HT |
| 3/8" - 4.0" | DSC230-8HT |

Note 1. If the engineering drawing specifies use of a particular size of Spirap and the resultant fit of that size of Spirap would be too tight or too loose on the wire assembly, it is acceptable to use of Spirap one size larger or one size smaller than the size specified.

5.4.3 When applying Spirap, it is acceptable to soften the Spirap by heating it with a hot air gun (ref. paragraph 4.2.1).

5.4.4 When applying Spirap, wrap the spiral wrapping tightly around the wire bundle so as to eliminate any gaps.

5.4.5 Unless otherwise specified by the engineering drawing or wiring list, do not include Spirap under P-clamps or other securing hardware. It is necessary to protect the wire assembly in the area of a P-clamp or other securing hardware, terminate the Spirap immediately before and after the securing hardware and secure it in place using two turns of MIL-I-19166 fiberglass tape and a plastic cable tie according to PPS 13.34.

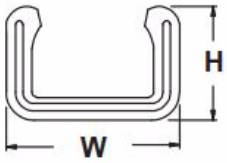
5.4.6 At wire bundle breakouts, terminate Spirap at the breakout and add Spirap protection to the branches, as necessary and as specified herein. Do not route a wire bundle breakout **through** Spirap.

5.4.7 Do not cover resistors or other heat generating devices with Spirap. If abrasion protection of a wire assembly in the area of a resistor or other heat generating device is required, refer to Liaison Engineering.

5.4.8 Unless otherwise specified, use two turns of MIL-I-19166 fiberglass tape and a plastic cable tie as per PPS 13.34 to secure Spirap in position.

### 5.5 Installation of S9-006-S01 Grommet

5.5.1 See below for the size of S9-006-S01 edge protection grommet:




**Profile "D"**

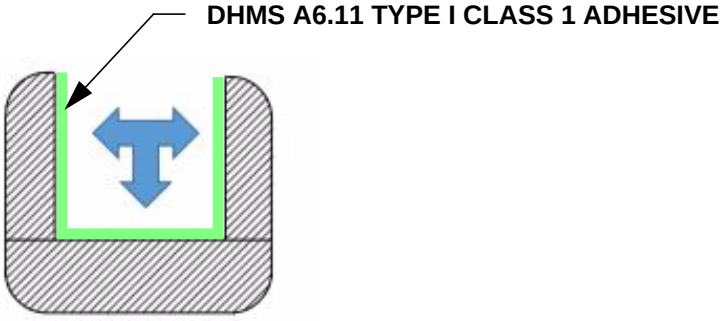
**W = 0.926 inches**
**H = 0.607 inches**
**Application Thickness = 0.625 inches Nom.**

5.5.2 Secure S9-006-S01 grommet as follows:

Step 1. Remove any sharp edges from applicable structural edge.

Step 2. Solvent clean the structural edge according to PPS 31.17.

Step 3. Using a small bristle brush, apply a thin uniform coat of DHMS A6.11 Type I Class 1 adhesive to the structural edge and to the contact surface of the grommet according to PPS 25.23.




Step 4. Allow both adhesive applied surfaces to air dry until tacky.

Step 5. Install grommet to the prepared structural edge. Press and roll all sides of the grommet until contact is achieved over the full length of the bonding surface.

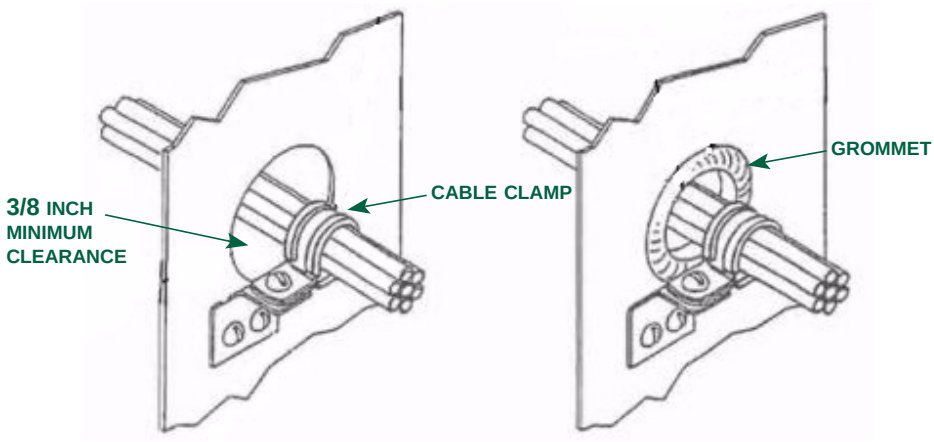
Step 6. Allow to full cure.

## 5.6 Abrasion Protection at Lightning Holes

### 5.6.1 General

5.6.1.1 Except as noted in paragraph 5.6.1.1.1 or paragraph 5.6.1.1.2, if a wire harness or assembly is being routed through a hole in the aircraft structure (e.g., lightning hole), cover the entire edge of the hole with a MS21266 caterpillar grommet protective strip. In pressurized fuselage areas only, Rayrim RK-6182 edging or a NAS557 split grommet may be used in place of caterpillar grommet.

5.6.1.1.1 If a primary support fixture (e.g., P-clamp) is positioned at the hole (e.g., lightning hole) securing the wire assembly such that there is no possibility of the wiring harness contacting the hole edges and have a wire clearance of a minimum 3/8" from the hole edge, then it is not necessary to cover the edge of the hole with protective strips/grommet.




**WIRE 3/8 INCH OR GREATER FROM HOLE EDGE (GROMMET NOT REQURIED)**

**WIRE LESS THAN 3/8 INCH FROM HOLE EDGE (GROMMET REQUIRED)**

5.6.1.1.2 If aircraft structure or hardware make application of protective strips impossible, apply the protective strips to as much of the lightning hole as possible. If danger of exposure of the wire harness to lightning hole edges persists due to interference of aircraft structure or hardware preventing the application of protective strips, refer to Liaison Engineering for disposition.

5.6.1.2 Cut protective strips to length diagonally as shown in Figure 4 to result in a diagonal gap at the seam no more than 1/16" wide. Locate the seam of the protective covering on the side of the hole opposite the wire pressure direction (e.g., at the top of a vertical hole as shown below).

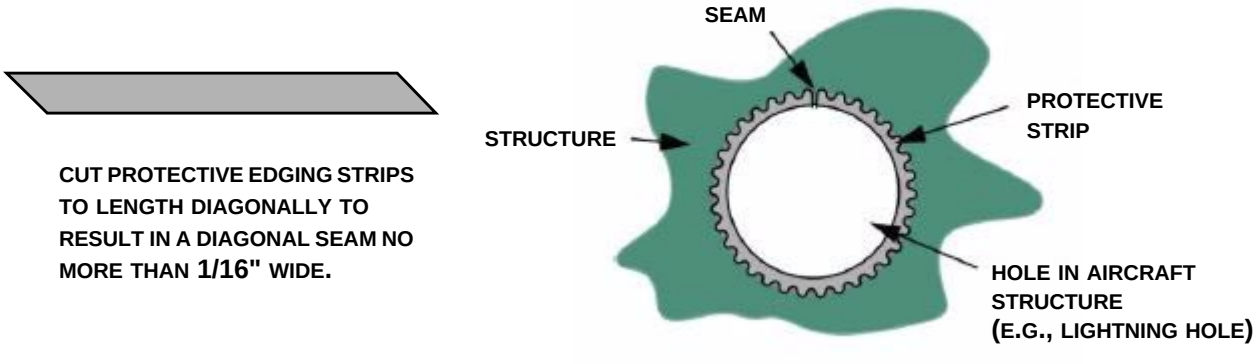



**FIGURE 4 - INSTALLATION OF PROTECTIVE EDGING**

5.6.1.3 Ensure that potential contact of the wire harness would occur only on the protective face, not the abrasive sides of the caterpillar grommet.

### 5.6.2 Installation of MS21266-( )N Edging (“Caterpillar Grommet”)

5.6.2.1 Refer to Table III for the size (width) of MS21266-( )N caterpillar grommet to use.

**TABLE III - SELECTION OF MS21266-( )N CATERPILLAR GROMMET**

| SHEET THICKNESS | MS21266-CATERPILLAR GROMMET |
|---|---|
| 0.015" - 0.052" | MS21266-1N |
| 0.053" - 0.085" | MS21266-2N |
| 0.086" - 0.128" | MS21266-3N |
| 0.129" - 0.192" | MS21266-4N |

5.6.2.2 Secure MS21266-( )N caterpillar grommet as follows:

- Inside the pressurized fuselage, secure caterpillar grommet with DHMS A6.11 Type I Class 2 polychloroprene rubber based adhesive according to PPS 25.63 or DHMS A6.09 epoxy adhesive according to PPS 25.30.
- In areas other than the pressurized fuselage, secure caterpillar grommet using DHMS A6.09 epoxy adhesive according PPS 25.30 or Fast-Weld No.10 epoxy adhesive according to PPS 25.62.

### 5.6.3 Installation of NAS557-( )( ) Grommet

5.6.3.1 In pressurized fuselage areas **only**, NAS557-( )( ) split grommet may be used in place of caterpillar grommet.

5.6.3.2 Refer to Table IV for the type of NAS557-( )( ) grommet to use.

**TABLE IV - NAS557-( )( ) GROMMET TYPE SELECTION**

| SHEET THICKNESS (NOTE 1) | NAS557-( )( ) SPLIT GROMMET |
|---|---|
| 0.025" - 0.051" | NAS557-( )A |
| 0.064" - 0.081" | NAS557-( )B |
| 0.091" - 0.125" | NAS557-( )C |

Note 1. For sheet thicknesses outside the ranges specified, use caterpillar grommet or Rayrim.

5.6.3.3 Refer to Table V for the size of NAS557 split grommet required for the hole edge to be covered.

**TABLE V - NAS557-( )( ) GROMMET SELECTION**

| STRUCTURAL HOLE DIAMETER | NAS557 GROMMET DASH NUMBER |
|---|---|
| up to 0.234" | NAS557-3( ) |
| 0.235" - 0.296" | NAS557-4( ) |
| 0.297" - 0.422" | NAS557-6( ) |
| 0.423" - 0.594" | NAS557-8( ) |
| 0.595" - 0.719" | NAS557-10( ) |
| 0.720" - 0.844" | NAS557-12( ) |
| 0.845" - 0.969" | NAS557-14( ) |
| 0.970" - 1.094" | NAS557-16( ) |
| 1.095" - 1.219" | NAS557-18( ) |

| STRUCTURAL HOLE DIAMETER | NAS557 GROMMET DASH NUMBER |
|---|---|
| 1.220" - 1.344" | NAS557-20( ) |
| 1.345" - 1.500" | NAS557-22( ) |
| 1.501" - 1.625" | NAS557-24( ) |
| 1.626" - 1.875" | NAS557-28( ) |
| 1.876" - 2.125" | NAS557-32( ) |
| 2.126" - 2.375" | NAS557-36( ) |
| 2.376" - 2.625" | NAS557-40( ) |
| 2.626" - 2.882" | NAS557-44( ) |
| 2.883" - 3.000" | NAS557-48( ) |

5.6.3.4 Secure NAS557-( )( ) split grommet with DHMS A6.11 Type I Class 2 polychloroprene rubber based adhesive according to PPS 25.63 or DHMS A6.09 epoxy adhesive according to PPS 25.30.

### 5.6.4 Installation of Rayrim RK-6182 Edging

5.6.4.1 In pressurized fuselage areas **only**, Rayrim RK-6182 protective edging may be used in place of caterpillar grommet.

5.6.4.2 Refer to Table VI for the size of Rayrim RK-6182 protective edging required for the edge to be covered.

**TABLE VI - RAYRIM SELECTION**

| THICKNESS OF EDGE | RAYRIM RK-6182 |
|---|---|
| up to 0.040" | Rayrim Nr.6 |
| 0.041" - 0.090" | Rayrim Nr.7 |
| 0.091" - 0.180" | Rayrim Nr.8 |
| over 0.180" | Rayrim Nr.9 |

5.6.4.3 Install Rayrim RK-6182 protective edging as follows:

Step 1. Before applying Rayrim, solvent clean the application area according to PPS 31.17.

Step 2. Rayrim strips are internally coated with a heat activated adhesive. Heat the inner surface of the Rayrim to a temperature of 300°F - 400°F (149°C - 204°C) using a heat gun to make the adhesive on the inner surface tacky. Heat one end of the strip until the adhesive is tacky and then apply to the edge.

Step 3. With one end anchored, heat the remaining Rayrim and feed it onto the edge incrementally at a rate of approximately 8 inches/minute, keeping the strip reasonably taut while performing the heating operation continuously until the strip is fully applied.

Step 4. alloy the Rayrim to cool before removing excess adhesive by carefully solvent cleaning according to PPS 31.17.

## 6 REQUIREMENTS

6.1 Unless specific abrasion protection requirements and/or provisions are specified by the engineering drawing, wire assemblies (including wire assemblies within flexible metallic conduit) must be protected in the affected areas with S10155H( )-( ) conduit (thin wall Teflon tubing) if potential movement could result in any of the following:

- the wire assembly rubbing or vibrating against a surface
- the wire assembly coming within 3/8" of the edge of adjacent equipment or structure (including lightning holes)
- contact of the wire assembly with the edge of adjacent equipment or structure without fouling

6.1.1 If potential movement could result in fouling over a sharp cutting edge of adjacent equipment or structure (including lightning holes) or pinching of the wire assembly, refer to Liaison Engineering for disposition (i.e., re-routing, additional support, etc.).

6.2 DSC 230 spiral wrapping (i.e., “Spirap” protective covering) may be used to protect the wire assembly in place of S10155H( )-( ) conduit **only** in areas where potential movement could result in the wire assembly rubbing or vibrating against a surface. Use of Spirap in areas where potential movement could result in the wire assembly contacting or coming within 3/8" of the edge of adjacent equipment or structure (including lightning holes) is **not** acceptable.

6.3 If a wire harness or assembly has been routed through a hole in the aircraft structure (e.g., lightning hole), the entire edge of the hole shall have been covered with a MS21266-( )N caterpillar grommet. In pressurized fuselage areas only, Rayrim RK-6182 edging or a NAS557-( )( ) split grommet may have been used in place of caterpillar grommet.

6.3.1 For wire harnesses or assemblies which have been routed through a hole in the aircraft structure (e.g., lightning hole), if specified by the engineering drawing or Liaison Engineering or if any of the conditions specified in paragraph 5.1.6 apply, the wire harness or assembly shall have been protected against abrasion using S10155 conduit or Spirap in addition to application of MS21266-( )N caterpillar grommet, NAS557-( )( ) or Rayrim, as applicable, to the hole in the aircraft structure.

## *7 DE HAVILLAND CANADA SAFETY PRECAUTIONS*

*7.1 The safety precautions specified herein are specific to De Havilland Canada to meet Canadian Federal and Provincial government environmental, health and safety regulations. It is strongly recommended that other facilities consider these safety precautions; however, suppliers, subcontractors and partners 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 Refer to PPS 31.17 for the safety precautions for handling and using solvents.*

*7.4 Hot air guns develop extremely high temperatures at the screen nozzle. Exercise caution during handling to avoid burns. After the completion of operations, cool the heat gun by activating the switch to the cool position until the nozzle is cool enough to handle.*

*7.5 When using hot air guns for installing Rayrim, wear high temperature resistant gloves (i.e., DSC 422-3-( ) or Kevlar).*

## 8 PERSONNEL REQUIREMENTS

8.1 Personnel shall have a good working knowledge of the applicable procedure and requirements as specified herein and shall have exhibited their competency to their supervisor.