BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 38.01

PRODUCTION PROCESS STANDARD

APPLICATION OF PLASTIC LACING

Issue 6
- This standard supersedes PPS 38.01, Issue 5.
- Vertical lines in the left hand margin indicate changes over the previous issue.
- Direct PPS related questions to PPS.Group@aero.bombardier.com or (416) 375-7641.
- This PPS is effective as of the distribution date.

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1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for securing of rigid and flexible fluid lines and electrical wires and cable assemblies by means of plastic lacing to prevent movement and chafing.

1.1.1 This PPS complements the engineering drawings that specify its use as an authorized instruction. The procedure specified in this PPS must 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 (de Havilland), all materials must be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Toronto (de Havilland) 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 (de Havilland) Environment, Health and Safety Department.

3 REFERENCES

3.1 PPS 13.26 - General Subcontractor Provisions.

4 MATERIALS AND EQUIPMENT

4.1 Materials

4.1.1 Rubber cord, ethylene propylene, 0.093" dia. For use on aircraft using DHMS F7.01 phosphate ester hydraulic fluid.

4.2 Equipment

4.2.1 No equipment specified.

5 PROCEDURE

5.1 General

5.1.1 Use plastic lacing to secure rigid fluid lines to one another, or to the aircraft structure, as specified on the relevant engineering drawing or if considered necessary to prevent lines chafing against each other or the structure. If used as a spacer to separate lines in straight runs, apply plastic lacing approximately midway between existing support clamps or fairleads. If lines are routed over or across one another, apply plastic lacing at the point of nearest contact.

5.1.2 Flexible fluid lines which are connected to the same actuator may be laced together by means of a single lacing to prevent chafing against each other. Do not lace flexible lines connected to actuators to rigid lines or to aircraft structure.

5.1.3 Use plastic lacing to secure electrical wires and wire harness assemblies to other electrical wires, rigid fluid lines, or to the aircraft structure, only where specified on the relevant engineering drawing, to secure the cable to prevent flexing or chafing.

5.1.4 Do not apply plastic lacing inside integral fuel tanks under any circumstances.

5.2 Selection of Lacing

5.2.1 For lacing applications, use ethylene propylene round rubber cord (ref. paragraph 4.1.1).

5.3 Application of Lacing to Fluid Lines

5.3.1 Apply lacing to fluid lines as follows:

Step 1. Cut off the approximate required length of plastic lacing.

Step 2. Tie one end of the plastic lacing to the top of the outermost line, leaving the waste end approximately 6 inches long as shown in Figure 1-A.

Step 3. Wrap the lacing around the lines as shown in Figure 1-A. For lines 3/4" O.D. and larger use 3 wraps of lacing. For lines less than 3/4" O.D. use 2 wraps of lacing. When lacing a combination of lines having different diameters, determine the required number of wraps to be used based on the largest diameter line involved. Take care when wrapping lines to ensure that lines are not subjected to a pre-load or re-positioned as a result of the wrapping.

Step 4. Starting at the last pair of lines, wind the lacing around the wrapping a sufficient number of turns to cover the lacing between lines. Repeat this for the next pair of lines and so on (see Figure 1-B and Figure 1-C).

Step 5. On completion of lacing between lines, loosen the waste end of the lacing and tie it to the free end using a square knot as shown in Figure 1-D.

Step 6. Trim lacing ends to approximately 1/2" on completion of tying.

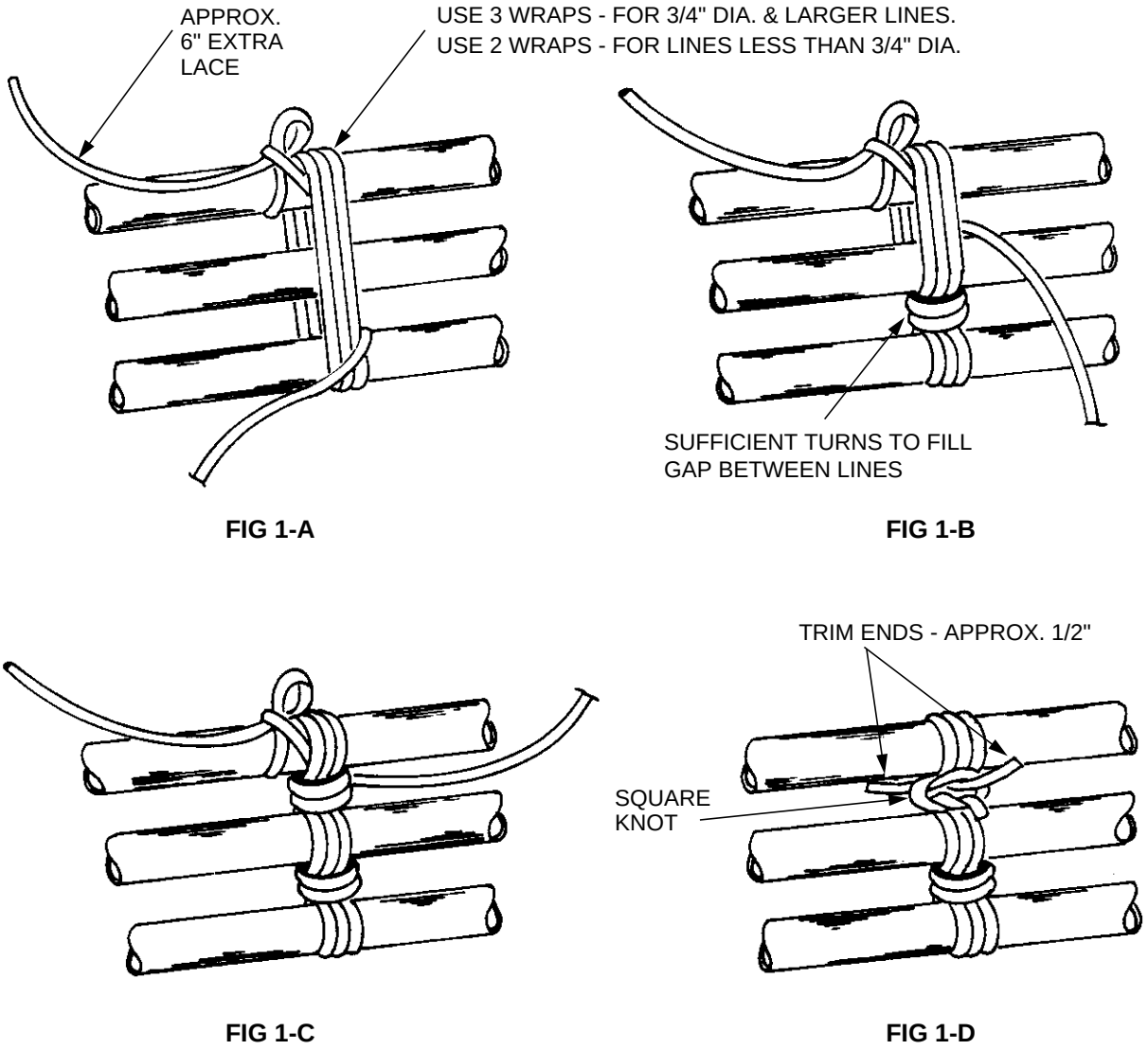

FIG 1-A

FIG 1-B

FIG 1-C

FIG 1-D

FIGURE 1 - APPLICATION OF PLASTIC LACING TO FLUID LINES (TYP.)

5.4 Application of Lacing to Electrical Wires and Wire Harness Assemblies

5.4.1 If specified on the engineering drawing, tie electrical wires and cable harnesses together by wrapping twice around with plastic lacing and securing with a square knot as shown in Figure 2-A.

5.4.2 If wires or cables are to be secured to the aircraft structure or to an adjacent fluid line to prevent flexing or chafing of the wire, ensure that the wire or cable is held away from the structure or line approx. 1/2" using a suitable temporary spacer and wrapping as follows:

Step 1. Tie one end of the plastic lacing to the fluid line or structure, leaving the waste end approximately 6" long as shown in Figure 2-B.

Step 2. Wrap the lacing around the wire/cable and structure 2 or 3 times and then wind the lacing around the wrapping a sufficient number of turns to cover the lacing between the wire/cable and structure (see Figure 2-C).

Step 3. On completion of lacing between wire/cable and structure, loosen waste end of lacing and tie it to free end using a square knot as shown in Figure 2-D.

Step 4. Trim lacing ends to approximately 1/2" on completion of tying.

Step 5. Remove temporary spacers placed as per paragraph 5.4.2.

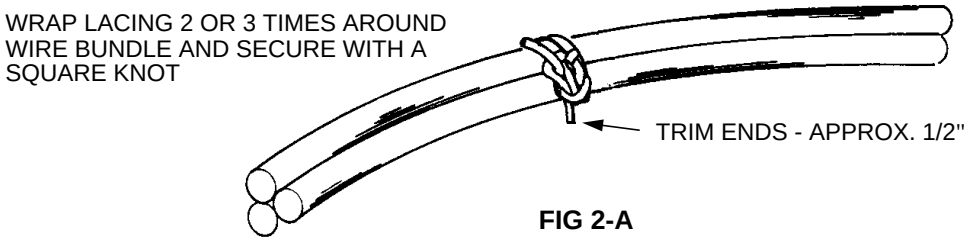

FIG 2-A

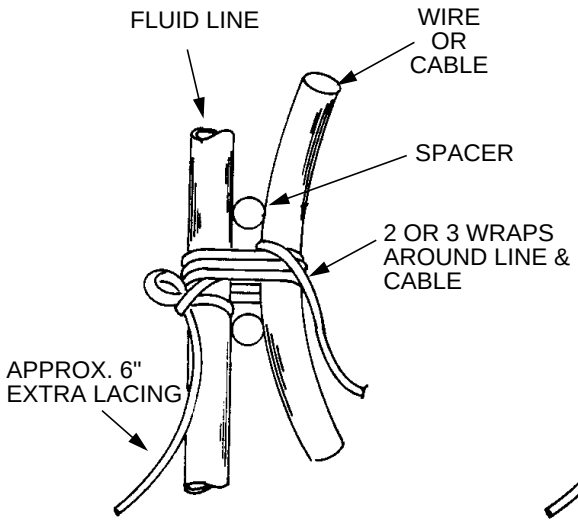

FIG 2-B

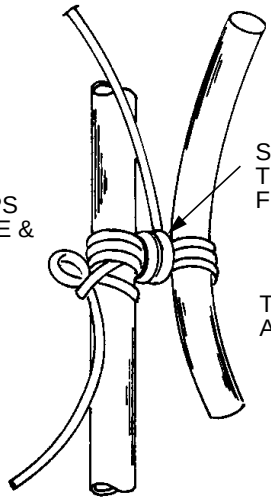

FIG 2-C

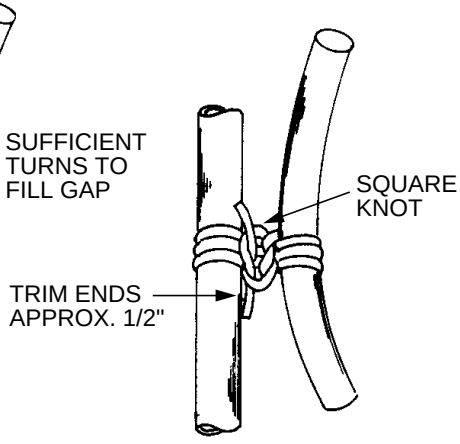

FIG 2-D

FIGURE 2 - APPLICATION OF PLASTIC LACING TO ELECTRICAL WIRES AND CABLES (TYP.)

6 REQUIREMENTS

6.1 Ensure that plastic lacing is secure on the lines or structure to which it is applied with no evidence of looseness.

6.2 Ensure that plastic lacing has not been applied to any part or line where heat is transmitted, as heat will cause the lacing to soften and become loose.

6.3 Check fluid lines or electrical wires/cables secured by plastic lacing according to this PPS to ensure that there is no evidence of movement or flexing that could cause chafing.

6.4 Ensure that only ethylene propylene rubber cord has been used.

7 SAFETY PRECAUTIONS

7.1 The procedures specified herein present no specific safety hazards when carried out according to accepted plant safety regulations.

8 PERSONNEL REQUIREMENTS

8.1 Personnel responsible for securing of rigid and flexible fluid lines and electrical wires and cable assemblies by means of plastic lacing to prevent movement and chafing must have a basic understanding of the procedure and requirements as specified herein and must have exhibited their familiarity to their supervisor.