BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 3.11

PRODUCTION PROCESS STANDARD

Magnetic Pulse Forming of Metal Sleeves on Elastic Cord Assemblies

Issue 3
- This standard supersedes PPS 3.11, Issue 2.
- 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) 375-4365.
- This PPS is effective as of the distribution date.

Signed original on file. Validation of paper prints is the responsibility of the user.

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	Quality	

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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for magnetic pulse forming metal sleeves on elastic cord assemblies.

1.1.1 This PPS complements the engineering drawings that specify its use as an authorized instruction and the procedure specified 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.

3.2 PPS 15.01 - Part Marking of Aircraft Parts and Assemblies.

4 Materials and Equipment

4.1 Materials

4.1.1 MIL-C-5651 elastic cord as called on the drawing.

4.1.2 3M EC 821 protective compound. Alternatively, 224-C-13 model cement may be used to seal cord ends.

4.1.3 CSP 295 sleeve assembly (metal and plastic) as specified by the engineering drawing. If the engineering drawing does not specify the CSP 295 sleeve assembly dash number, refer to Table I for the appropriate sleeve assembly dash number.

Table I - CSP 295 Sleeve Assembly Selection

CORD TYPE	CORD DIAMETER			
	3/16"	1/4"	5/16"	3/8"
Type I Cord	n/a	CSP 295-3	n/a	CSP 295-4
Type III Cord	CSP 295-2	CSP 295-5	CSP 295-3	n/a

4.2 Equipment

4.2.1 Magneform machine, CE 2149.

4.2.2 SD 8299 winches.

4.2.3 TS.291.04.10 locating tools.

4.2.4 Field shapers and insulators according to sleeve diameter.

5 Procedure

5.1 Magneform Machine Set-Up

5.1.1 Set-up the magneform machine according to TS.291.04.10 using suitable field shapers.

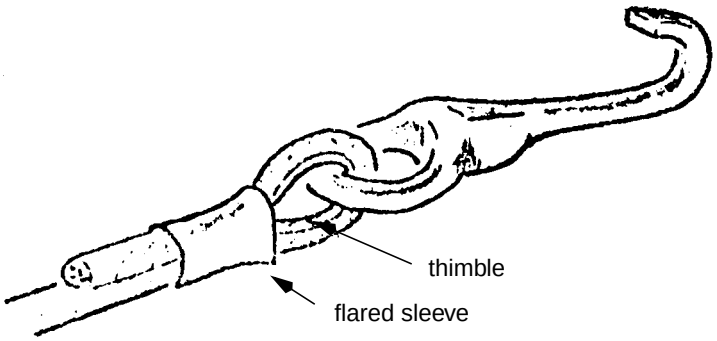
5.2 Assembly

5.2.1 Cord Assemblies with Two Looped Ends

5.2.1.1 When swaging cord assemblies with two looped ends, reduce the overall dimension of the assembly by one cord diameter, as the assembly will grow on swaging.

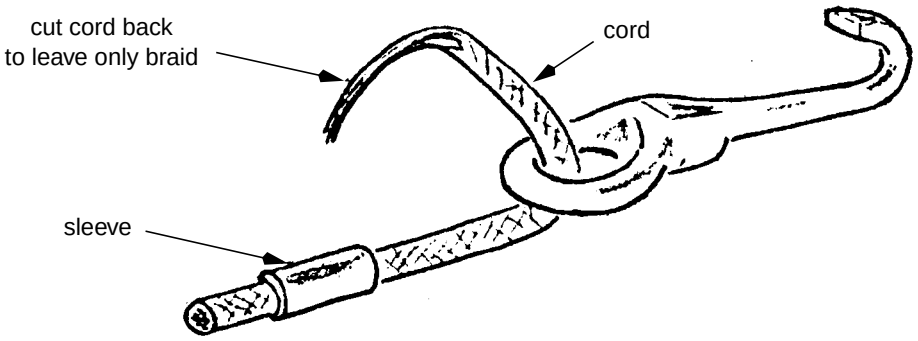
5.2.2 Cord Assembly Using Thimbles

5.2.2.1 When swaging loops where a thimble is required, flare out the sleeve portion adjacent to the thimble locally to allow the thimble to penetrate deeper into the sleeve as shown below.

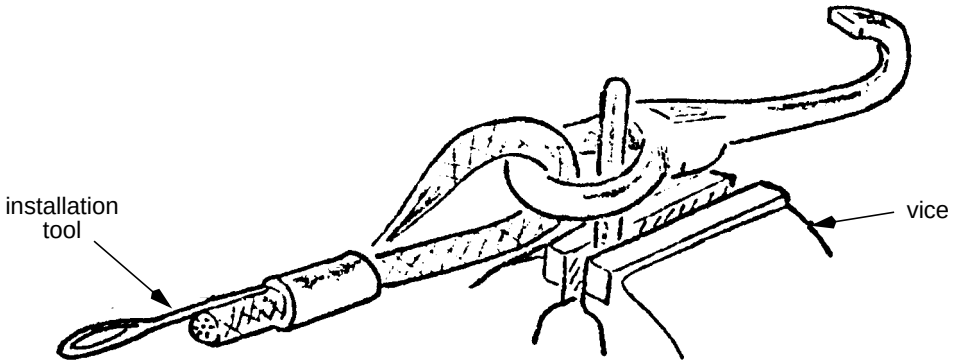


5.2.3 Installation of Hooks and Rings to Cord Assemblies

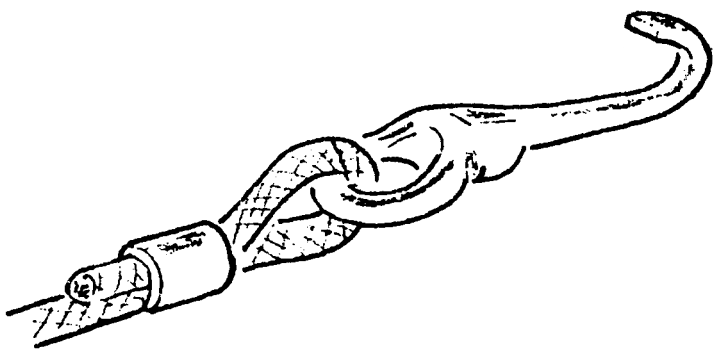
Step 1. Slip the sleeve assembly over the cord, and insert the end of the cord through the ring or hook as shown below.



Step 2. Using the installation tool, draw the end of the cord back through the sleeve as shown below.



Step 3. Position the sleeve as shown below.



5.3 Forming

5.3.1 Attach the cord assembly to the SD 8299 winches.

5.3.2 Expand the cord to 100 - 105% and position the centre of the metal sleeve to match the centre of the node hole in the field shaper.

5.3.3 Operate the magneform machine according to the manufacturers instructions.

5.3.4 If larger diameter sleeves require two or three swages, ensure that the outer swages are at least 0.35" from the end of the sleeve.

5.4 Cutting and Sealing Cord Ends

5.4.1 For Type I and Type III cord of a diameter up to 3/8", cut the end of the cord flush with plastic sleeve, thus eliminating any work or treatment to the cord end.

5.4.2 For cord diameters of over 3/8", wrap 1" wide fibreglass adhesive tape 1 1/2 turns around waste end of elastic cord as close to the sleeve as possible. Trim the waste end with cutters at a distance of approximately 1 1/2 times the cord diameter from the sleeve. Upon completion of the terminals, apply two coats of EC 821 protective compound or 224-C-13 model cement to seal the sleeve and taped ends completely. Allow 2 hours drying time between each coating.

5.5 Identification

5.5.1 Identify elastic cord assemblies according to the procedure specified in PPS 15.01.

6 Requirements

6.1 Visual Examination

6.1.1 Check assemblies for compliance with the engineering drawing requirements.

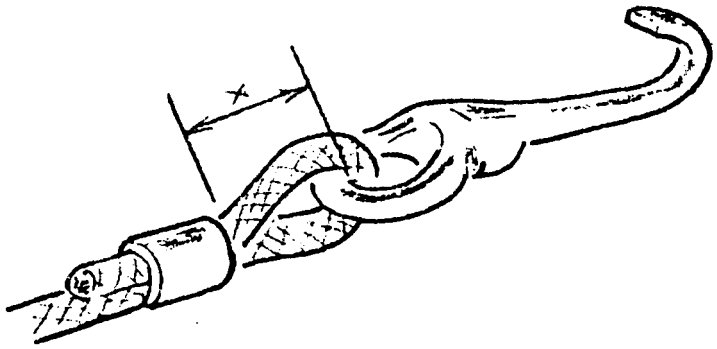
6.1.2 Ensure there is no evidence of objectionable defects such as cracks in the sleeve, or fraying in the braiding when assemblies are examined with the unaided eye or 5X magnification.

6.1.3 Assemblies with arcing marks are not acceptable.

6.2 Proof Loading - Cord Assembly Test Requirements

6.2.1 Subject one shock cord assembly in every 50 similar assemblies to a prolonged proof load test as follows:

Step 1. Measure the length of each loop as shown below.



Step 2. Set-up the assembly in the test bench and stretch the cord to elongate 100%.

Step 3. Hold under tension for 16 hours.

Step 4. Relax the assembly and after five minutes check the length of each loop. The permanent elongation of each shall not be more than 1/16" and there shall be no slippage of the elastic cord through the sleeve.

7 Safety Precautions

7.1 Observe general shop safety precautions when performing the procedure specified herein.

7.2 Ensure that the safety cover on the magneform machine remains closed while the magneforming operation is taking place.

8 Personnel Requirements

8.1 Personnel responsible for magnetic pulse forming metal sleeves on elastic cord assemblies must have a good working knowledge of the procedure and requirements as specified herein and must have exhibited their competency to their supervisor.

9 Maintenance of Equipment

9.1 It is recommended that the magneform machine be maintained according to a regular schedule.