BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 13.34

PRODUCTION PROCESS STANDARD

Installation of Plastic Cable Ties

Issue 1
- This is a new standard.
- Direct PPS 13.34 related questions to michael.wright@aero.bombardier.com.
- This PPS is effective as of the distribution date.

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Production Process Standards

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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for installation of plastic cable ties ("Ty-wraps").

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.

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 General

3.1.1 Unless a specific issue is indicated, the issue of the reference documents specified in this section in effect at the time of manufacture shall form a part of this specification to the extent indicated herein.

3.2 Bombardier Toronto (de Havilland) Process Specifications

3.2.1 PPS 9.04 – Assembly and Installation of Electrical and Electronic Wire Assemblies.

3.2.2 PPS 13.26 - General Subcontractor Provisions.

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 Plastic cable ties, Bombardier B0816019, as specified in Table 1.

4.1.2.1 For secondary support applications as specified in PPS 9.04 only, Boeing BACS38K plastic cable ties may be used in place of B0816019 cable ties.

4.1.3 Guideline tape (fire resistant filler tape).

- Freudenberg-NOK Inc. #52672 Guideline tape or insulation tape to A-A-59163 (e.g., Freudenberg-NOK Inc. #50215).

4.1.4 Fiberglass tape to MIL-I-19166.

4.2 Equipment

4.2.1 Plastic cable tie installation tools.

Plastic cable tie installation tools must be capable of installing cable ties at the appropriate tension without causing damage to wire bundles or surrounding structure and leave a clean cut cable tie end which will not present an abrasion hazard or danger to installers or maintenance. Set-up and operate plastic cable tie installation tools in accordance with the manufacturer's instructions.

- Plastic cable tie manual installation tool (e.g., HellermannTyton EVO7 or MS90387-1). At Bombardier Toronto (de Havilland), use of the HellermannTyton EVO7, if available, is recommended for ergonomic reasons.
- Automatic cable tie installation tools (e.g., T&B TR300 for 1/32" - 5/8" wire bundles, T&B TR400 for 5/8" - 1 1/8" wire bundles, etc.).

5 Procedure

5.1 General

5.1.1 Unless otherwise specified, use B0816019 cable ties as specified in Table 1.

5.1.1.1 For secondary support applications specified in PPS 9.04 **only**, BACS38K plastic cable ties may be used in place of B0816019 cable ties; refer to Table 2 for BACS38K cable tie selection.

Table 1. Bombardier B0816019 Cable Tie Selection

B0816019 Dash Number	Nominal Length	Nominal Width	Applicable Wire Bundle Diameter	
			Minimum	Maximum
-002	4.00"	0.098"	-	0.87"
-003	7.35"	0.187"	0.062"	1.75"
-004	8.00"	0.136"	-	2.00"
-005	14.40"	0.184"	0.062"	4.00"
-006	11.60"	0.190"	-	3.00"
-007	11.50"	0.300"	-	3.00"
-009	14.60"	0.300"	-	4.00"

Note 1. Unless otherwise specified by the engineering drawing, when several different cable ties are acceptable for a given wire diameter, the thinner width and/or shorter length cable tie is preferred.

Note 2. Unless otherwise specified by the engineering drawing or wiring list, use 0.190" wide cable ties (i.e., B0816019-006) to tie co-axial cables.

Table 2. Boeing BACS38K Secondary Support Cable Tie Selection

Wire Bundle Diameter	BACS38K Secondary Support Cable Tie
1/16" - 5/8"	All
5/8" - 1 1/4"	-1, -2, -3, -5, -6, -7, -10, -11 or -12
1 1/4" - 1 3/4"	-1, -2, -3, -6, -7 or -10
1 3/4" - 3"	-2, -3, -6 or -7
3" - 4"	-2, -3 or -6
4" - 6"	-6

Note 1. For secondary support applications **only**, BACS38K plastic cable ties may be used in place of B0816019 cable ties.

Note 2. Unless otherwise specified by the engineering drawing, when several different cable ties are acceptable for a given wire diameter, the thinner width and/or shorter length cable tie is preferred.

5.1.2 If the size of cable tie to use is not specified by the engineering drawing or wiring list, use the size of tie specified in Table 1.

5.1.3 When installing plastic cable ties on wire bundles, if specified by the engineering drawing or PPS wrap Guideline (filler) tape around the wire bundle to increase its outside diameter. For wire bundles with an outside diameter of less than 0.25", it is acceptable to wrap the bundle with Guideline (filler) tape to help prevent axial slippage even if the use of Guideline (filler) tape is not specifically referenced on the engineering drawing or PPS.

5.1.4 If installing any cable tie on a co-axial cable or a primary support tie on a cable bundle which is greater than 3/8" in diameter, wrap 1 1/2 turns of MIL-I-19166 fiberglass tape (adhesive side down) around the co-axial cable or wire bundle. This helps to protect the cable or bundle from chafing caused by vibration. Wrap the tape with the adhesive side towards the cable or wire bundle to maintain the tape in position on the co-axial cable or bundle and prevent slippage leading to excessive slack in the harness.

5.1.5 When installing cable ties, take care to ensure that the cable tie is snug without pinching, crushing or cutting into the wire insulation, co-axial cable or conduit. Co-axial cables and conduit are particularly susceptible to this form of damage and therefore, use of the lowest possible tension setting on the installation tool is recommended.

5.1.6 Do not use plastic cable ties if the engineering drawing or wiring list specifies the use of high temperature resistant ties, or in areas of high (above 200°F) operating temperature (e.g., nacelles forward of the firewall). In high temperature areas wires must be tied using high temperature resistant fiberglass lacing tape.

5.1.7 Wires, cables and harnesses that are installed in conduit must not be tied together.

5.2 Manual Installation of Plastic Cable Ties

5.2.1 Install plastic cable ties manually as follows:

Step 1. Wrap the cable tie around the wire bundle. Ensure that the ribbed side of the strap is facing toward the bundle. If installing primary support ties, feed the strap through the tie mount.

Step 2. Pass the tip of the plastic strap through the eye in the head and pull the strap until the tie is just snug around the wire bundle.

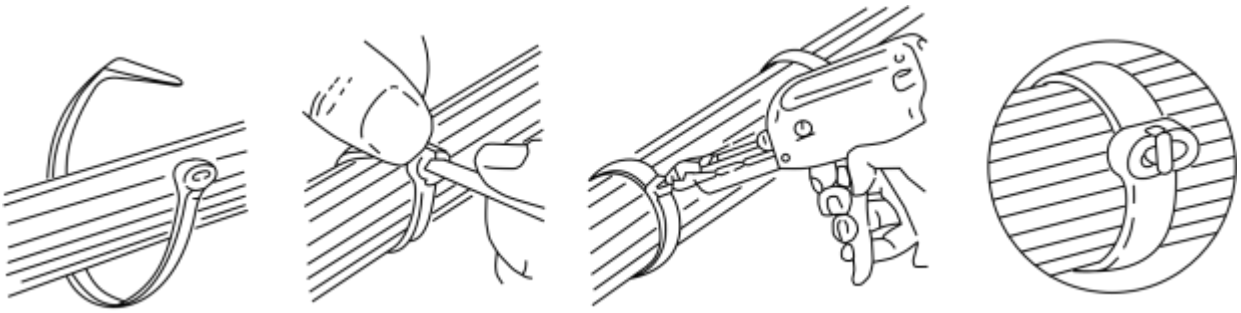
Step 3. Tighten the cable tie by hand or using a manual installation tool so that it is snug without pinching, crushing or cutting into the wire insulation, co-axial cable, conduit, etc.

- When using a manual installation tool, adjust the tension setting appropriately, grip the protruding end of the strap with the jaws of the tool and squeeze the trigger repeatedly until the pre-set automatic cut-off snips off the strap.

- If installing by hand, cut off excess cable tie material flush with the end of the locking mechanism using side cutters.

Step 4. If the cable tie is too loose (i.e., it slips along the wire bundle with little or no force applied) or too tight (i.e., it pinches wire or cable insulation), cut off and replace the plastic cable tie.

5.2.2 Refer to Figure 1 for the sequence for manual plastic cable tie installation on a wire bundle.



Wrap the cable tie around the wire bundle.

Pass the tip through the eye and draw snug.

Apply the installation tool and squeeze the trigger repeatedly until the automatic cut-off snips off the strap

End view of the installed tie,

Figure 1. Manual Cable Tie Installation on a Wire Bundle

5.3 Automatic Installation of Plastic Cable Ties

5.3.1 It is acceptable to use automatic cable tie installation tools to install plastic cable ties on wire assemblies for secondary support and to keep the assembly together for installation in the aircraft according to PPS 9.04 (i.e., are not being installed through tie mounts), although the use of manual tools is recommended.

6 Requirements

6.1 Ensure that installed plastic cable ties are snug enough to resist axial slippage without pinching, crushing or cutting into the wire insulation, co-axial cable, conduit, etc.

7 Safety Precautions

7.1 **The safety precautions specified herein are specific to Bombardier Toronto (de Havilland) to meet Canadian Federal and Provincial government environmental, health and safety regulations. It is 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 general shop safety precautions when performing the procedure specified herein.**

8 Personnel Requirements

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