BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 2.60

PRODUCTION PROCESS STANDARD

Installation of Barrel Nuts

Issue 4
- This standard supersedes PPS 2.60, Issue 3.
- 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.

Prepared By:	(Michael Wright)	October 19, 2011
	Production Process Standards (PPS)	
Approved By:	(L.K. John)	October 20, 2011
	Materials Technology	
	(B. DeVreede)	October 21, 2011
	Quality	

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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for installation of barrel nuts.

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 2.20 - Installation of Bolts and Screws.

3.2 PPS 14.01 - Torquing Method and Identification.

3.3 PPS 14.04 - Installation of Preload Indicating Washers.

3.4 PPS 16.01 - Application of Hard and Soft Film Corrosion Preventive Compound.

3.5 PPS 21.20 - Mixing and Handling Two Part Sealants.

3.6 PPS 21.21 - General Sealing Practices.

3.7 PPS 27.02 - Edge Finishing Aluminum Alloy Parts.

3.8 PPS 31.17 - Solvent Usage.

4 Materials

4.1 Barrel nuts and retainers as specified on the engineering drawing. Refer to Figure 1 for a general description of barrel nut and retainer.

4.2 Sealants as specified on the engineering drawing.

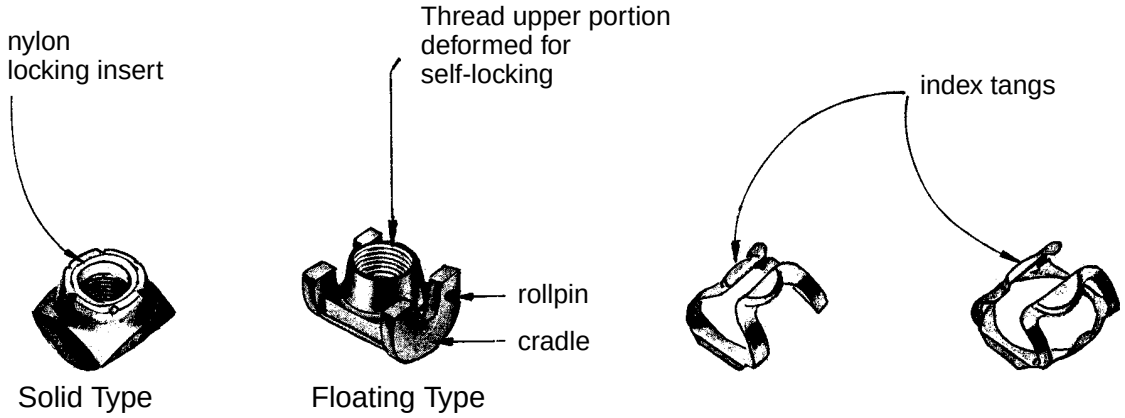


Figure 1 - General Description of Barrel Nut and Retainer

5 Procedure

5.1 General

5.1.1 Barrel nuts are used as a means of directly attaching machined parts without the use of integral flanges or angle fittings for conventional nuts to bear against.

5.1.2 Barrel nuts ride in holes which are precisely machined at right angles to the corresponding bolt hole and are normally held in place by spring steel retainers.

5.2 Preparation of Parts

5.2.1 Prepare holes for barrel nuts as follows:

Step 1. Machine holes for barrel nuts as specified by the engineering drawing such that squareness between bolt head seating face, bolt hole and barrel nut hole in ensured.

Step 2. Deburr holes according to PPS 27.02.

Step 3. Ensure that the bolt hole and the barrel nut hole are free of swarf and contamination.

5.3 Preparation of Bolts and Barrel Nuts

5.3.1 Unless the engineering drawing specifies potting of the barrel nut hole, apply F13 Type 2 compound to the bolt and the seating surface of the barrel nut according to PPS 16.01 (see Figure 2). Do not apply F13 Type 2 compound to threads of the bolts or areas of the barrel nut other than the seating surface.

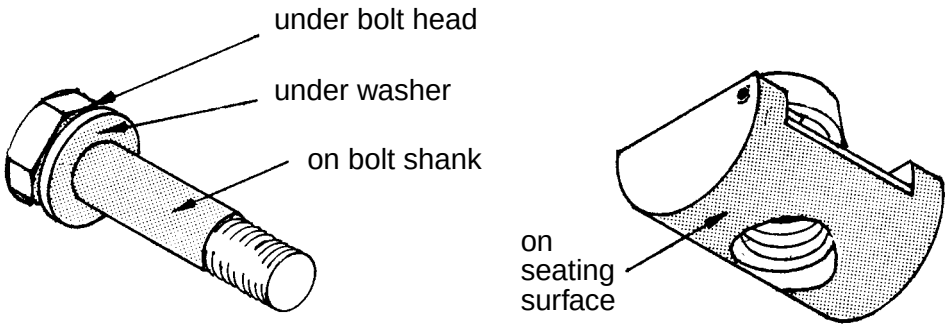


Figure 2 - Application of F13 Type 2 Compound to Bolt and Barrel Nut

5.4 Installation of Barrel Nuts

5.4.1 If retainers are specified on the engineering drawing, install the barrel nut as follows:

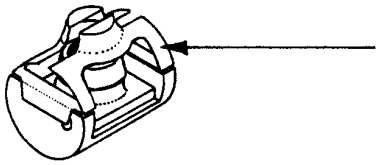
Step 1. Place the retainer on the barrel nut as shown in Figure 3-A.

Step 2. Depress the retainer index tangs slightly and slide the barrel nut and retainer approximately halfway into the barrel nut hole (see Figure 3-B).

Step 3. Ensure that the barrel nut is properly aligned with the bolt hole (see Figure 3-C) and push the nut and retainer into the hole until the index tangs on the retainer snap into the recess at the rear of the barrel nut hole.

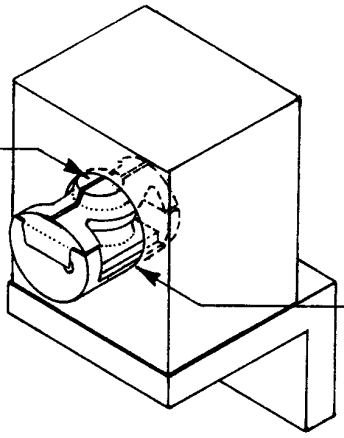
5.4.2 If use of retainers is not specified on the engineering drawing, slide the barrel nut into the hole ensuring that it is properly aligned with the bolt hole.

Figure 3-A



Retainer positioned on barrel nut.

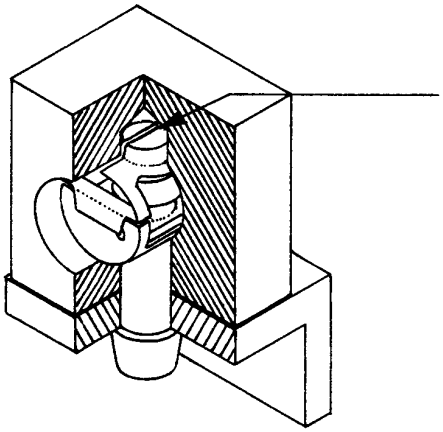
Figure 3-B



index tangs depressed.

barrel nut hole aligned with bolt hole.

Figure 3-C



retainer index tangs located in recess at rear of barrel nut hole.

Figure 3 - Barrel Nut Installation

5.5 Installation of Bolts

5.5.1 Install bolts as follows:

Step 1. Insert the bolt into the bolt hole and turn the bolt **by hand** (to avoid cross threading) until the locking element of the barrel nut is reached.

Step 2. Unless the engineering drawing specifies the use of PLI washers, use a torque wrench to turn the bolt through the locking element. If the torque value required to turn the bolt through the locking element does not fall within the torque limits specified in Table 1, remove the barrel nut and discard.

If use of PLI washers is specified on the engineering drawing, torque according to PPS 14.04.

Table 1 - Torque Range limitations for Barrel Nut Locking Feature

BARREL NUT THREAD SIZE	TORQUE LIMITS
1/4 - 28 UNF	3.5 - 30 in-lbs
5/16 - 24 UNF	6.5 - 60 in-lbs
3/8 - 24 UNF	9.5 - 80 in-lbs
7/16 - 20 UNF	14 - 100 in-lbs
1/2 - 20 UNF	18 - 150 in-lbs

BARREL NUT THREAD SIZE	TORQUE LIMITS
9/16 - 18 UNF	24 - 200 in-lbs
5/8 - 18 UNF	32 - 300 in-lbs
3/4 - 16 UNF	50 - 400 in-lbs
7/8 - 14 UNF	70 - 600 in-lbs
1 - 12 UNF	90 - 800 in-lbs

Step 3. Remove excess F13 Type 2 compound from around the head of the bolt and from the barrel nut hole by solvent cleaning according to PPS 31.17.

5.6 Post Installation Potting Procedure

5.6.1 If the engineering drawing specifies potting of the barrel nut hole, pot the hole with sealant as follows:

Step 1. Solvent clean the barrel nut hole according to PPS 31.17.

Step 2. Prepare the sealing compound specified on the engineering drawing according to PPS 21.20.

Step 3. Apply the sealant using an air operated sealant gun fitted with a 1/16" to 1/8" dia. nozzle according to PPS 21.21 to both sides of the barrel nut hole, starting at the centre and working outwards so as to completely fill the hole as shown in Figure 4. Take care to ensure complete filling of the hole and to avoid the entrapment of air.

Step 4. If necessary, use masking tape as shown in Figure 4 to form the sealant flush with the end of the hole. Do not remove the tape until completion of the tack free time as specified in PPS 21.20.

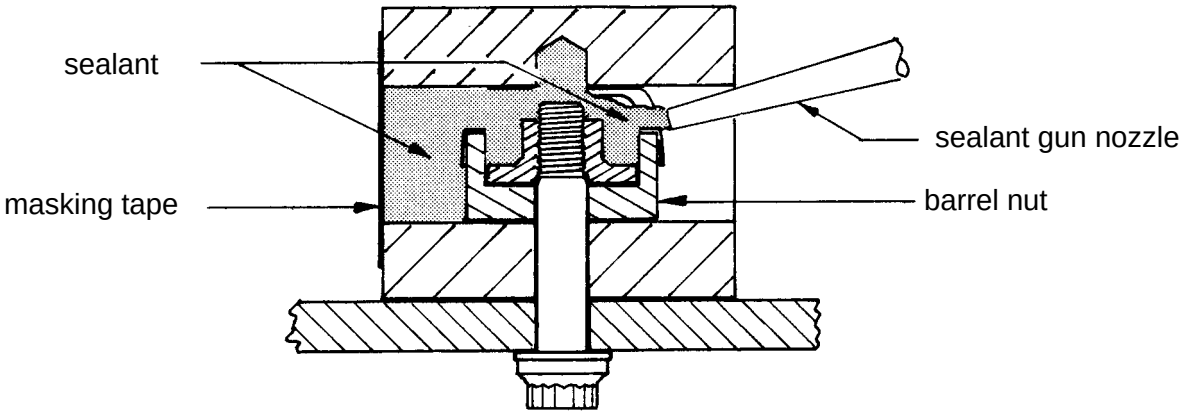


Figure 4 - Potting Barrel Nut Holes

6 Requirements

6.1 Installed bolts must meet the requirements of PPS 2.20.

6.2 Barrel nut holes potted with sealant must show no signs of entrapped air, voids, blisters, lack of adhesion and shall be flush with the ends of the hole.

7 Safety Precautions

7.1 The procedure specified herein presents no special safety hazards when performed according to accepted Plant safety regulations.

7.2 Refer to PPS 31.17 for the safety precautions for solvent cleaning.

8 Personnel Requirements

8.1 Personnel responsible for the installation of barrel nuts must have a good working knowledge of the procedure and requirements as specified herein and must have exhibited their familiarity to their supervisor.