BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 6.13

PRODUCTION PROCESS STANDARD

Installation of Externally Swaged (Permaswage Type) Fittings

Issue 26 - This standard supersedes PPS 6.13, Issue 25.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- This PPS is effective as of the distribution date.
- Validation of issue status is the responsibility of the user. Signed original on file.

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Issue 26 - 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 section(s) of this PPS for detailed procedure and requirements.

- Added new Dykem Cross Check tamper proof torque mark as an acceptable tamper proof sealant.
- Deleted Bombardier Toronto (de Havilland) specific instruction to only use 3M EC-1252 tamper proof sealant to depletion of existing stock.
- Revised references to tamper proof sealant resistance to hydraulic fluids (e.g., Skydrol) to specify that all the tamper proof sealants specified are resistant to splashes of hydraulic fluid but are not resistant to immersion.
- Added an instruction to allow applied tamper proof sealant to cure undisturbed according to the manufacturer's recommendations.
- Added an instruction to apply tamper proof sealant sparingly, especially in overhead applications.
- Added additional safety precautions relating to tamper proof sealant.

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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for installation of externally swaged (Permaswage type) fittings using Designed Metal Connections (Deutsch DMC) DLT series swage tools.

1.2 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.

1.2.1 Refer to PPS 13.26 for the subcontractor provisions applicable to this PPS.

1.2.2 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) Specifications

3.2.1 PPS 6.01 - Fabrication of Rigid Fluid lines.

3.2.2 PPS 6.03 - Installation of Fluid Lines and Fittings.

3.2.3 PPS 6.05 - Closure of Fluid Lines and Fluid System Components.

3.2.4 PPS 6.10 - Cleaning of Fluid System Components.

3.2.5 PPS 6.12 - Testing and Inhibiting of Hydraulic Components, Fuel and Bleed Air Lines.

3.2.6 PPS 6.18 - Certification of Permaswage Tooling.

3.2.7 PPS 13.26 - General Subcontractor Provisions.

3.2.8 PPS 13.28 - Storage Life of Adhesives, Sealants, Paints and Composite Products.

3.2.9 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.2.10 PPS 14.01 - Torquing Method and Identification.

3.2.11 PPS 31.04 - Degreasing Processes.

3.2.12 PPS 31.07 – Cleaning and Stripping of Painted Surfaces.

3.2.13 PPS 31.17 – Solvent Usage.

3.2.14 PPS 32.02 - Manual Application of Chemical Conversion Coatings.

3.2.15 PPS 34.08 - Application of Epoxy Polyamide Primer (F19 and F45).

4 Materials, Equipment and Facilities

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 Externally swaged (Permaswage type) fittings as specified on the engineering drawing. See Figure 1 for a general description of externally swaged (Permaswage type) fittings. See Figure 2 for a breakdown of externally swaged (Permaswage type) fitting part numbers. For DASH 8 aircraft and Learjet 45 wing assemblies, applicable B030XXXX externally swaged (Permaswage type) fittings shall be installed according to this PPS, even if the B030XXXX specification specifies installation according to BAPS 174-017.

4.1.3 Tamper proof sealant, white:

- Dykem Cross Check tamper proof torque mark, p/n 83319 (white)
- Organic Products Co. F-900 or F-925 Torque Seal
- 3M EC-1252 tamper proof sealant

4.1.3.1 Refer to PPS 13.28 for the storage life of tamper proof sealant. The tamper proof sealants specified herein are resistant to splashes of hydraulic fluid (e.g., Skydrol) but are not resistant to immersion. After application, allow tamper proof sealant to cure undisturbed according to the manufacturer's recommendations. Apply tamper proof sealant sparingly, do not apply more than needed, especially in overhead applications.

4.1.4 Abrasive polishing pads (e.g., Scotch-Brite pads, Type A Fine (maroon colour), 3M Canada Ltd.).

4.1.5 Non-chlorine/non-graphite marking pen (e.g., Designed Metal Connections (Deutsch DMC) DLT5301-000-01) suitable for use on aluminum, CRES and titanium tubing. **Do not** use marking pens containing chlorides or graphite.

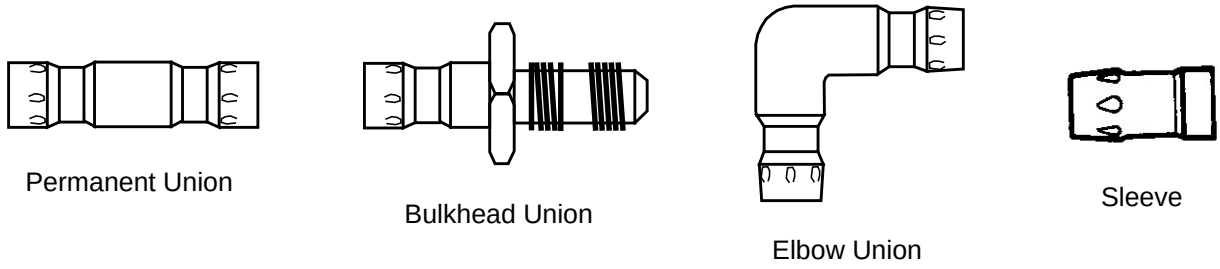


Figure 1. General Description of Externally Swaged (Permaswage Type) Fittings

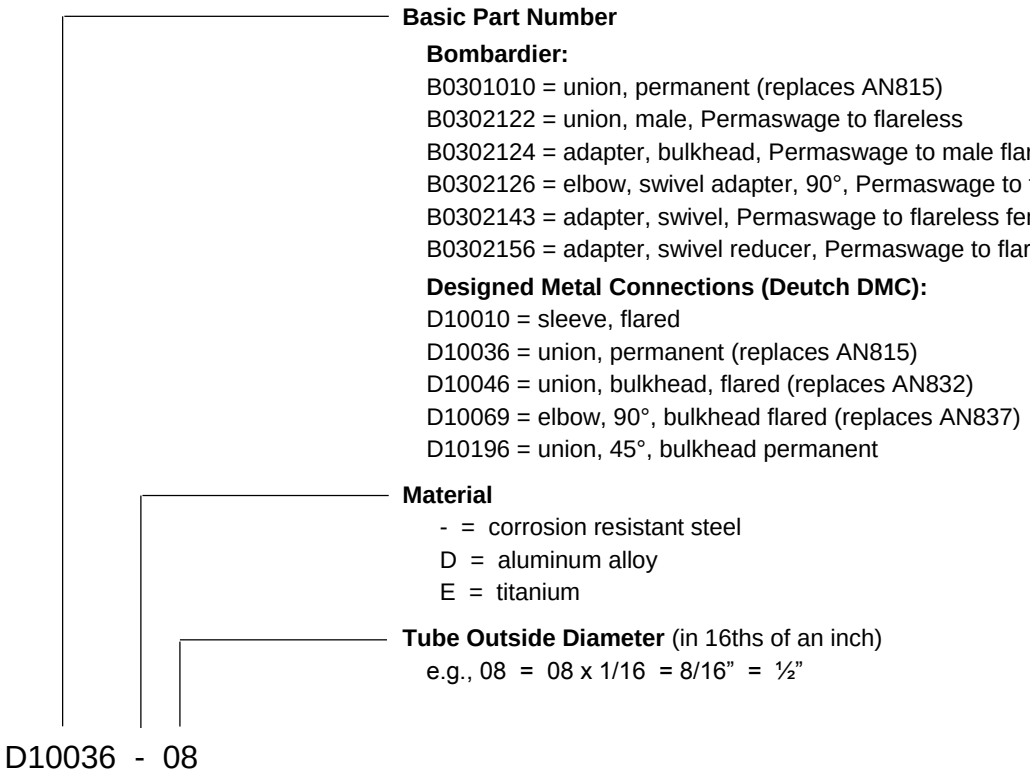


Figure 2. Breakdown of Externally Swaged (Permaswage Type) Fitting Part Numbers

4.2 Equipment

4.2.1 Chipless tube cutter (e.g., TS.621.32.11 wrench type tools). Chipless tube cutters must be capable of cutting tubing to length without creating chips or other cutting debris which could contaminate the tubing bore.

4.2.2 Deburring tools as listed in Table 2.

4.2.3 Hydraulic pump, capable of supplying a swage pressure of 10,000 ± 250 psig.

4.2.4 Installation tools (e.g., as listed in Table 3). Before being issued for use, all new or repaired tool assemblies must be certified according to PPS 6.18. Every three months, or if there is cause for doubt as to the reliability of the tooling, each tool assembly in use by Production must be re-certified according to PPS 6.18. For tool assemblies which have consistently successfully passed certification for the previous 2 full years (24 months), it is acceptable to re-certify those tool assemblies every 12 months according to PPS 6.18. In the event that a tool assembly being re-certified every 12 months fails certification testing, that tool assembly must once again be checked every 3 months. Maintain full records of all tool assembly certification and re-certification.

4.3 Facilities

4.3.1 This PPS has been categorized as a "Controlled Special Process" according to PPS 13.39 and as such only facilities specifically approved according to PPS 13.39 are authorized to perform installation of externally swaged (Permaswage type) fittings according to this PPS.

4.3.2 Bombardier subcontractors must direct requests for approval to Bombardier Aerospace Supplier Quality Management. Bombardier Aerospace facilities must direct requests for approval to the appropriate internal Quality Manager.

4.3.3 Facility approval shall be based on a facility report, a facility survey and completion of a qualification test program, if required. The facility report must detail the materials and equipment to be used, the process sequence to be followed and the laboratory facilities used to show compliance with the requirements of this PPS. Any deviation from the procedure or requirements of this PPS must be detailed in the facility report. Based upon the facility report, Bombardier Toronto (de Havilland) Materials Technology may identify additional qualification and/or process control test requirements. During the facility survey, the facility requesting qualification must be prepared to demonstrate their capability. Once approved, no changes to subcontractor facilities may be made without prior written approval from Bombardier Aerospace Supplier Quality Management.

4.3.3.1 Unless otherwise specified by Bombardier Aerospace Supplier Quality Management, for approval of subcontractor facilities to perform installation of externally swaged (Permaswage type) fittings according to this PPS completion of a test program and submission of suitable test samples representative of production parts is required. Test samples must meet the requirements specified in section 6.

5 Procedure

5.1 General

5.1.1 Install externally swaged (Permaswage type) fittings only if specified by the engineering drawing.

5.1.2 Before swaging the fitting, ensure that tubing is in the final heat treat temper specified on the engineering drawing.

5.1.3 Install fluid lines and fittings according to PPS 6.03.

5.2 Preparation of Tubing

5.2.1 General

5.2.1.1 Prepare tubes for installation of externally swaged (Permaswage type) fittings as follows:

Step 1. Cut the tubing to length and deburr. The maximum gap allowed between line ends to be rejoined is 0.300". Ensure that cut tubing ends are square to within ±1°. It is imperative to leave a minimum straight section of tubing specified by the engineering drawing (measured from the cut end) to allow the fitting to seat correctly; if the engineering drawing does not specify a minimum straight length, refer to Table 1.

When preparing tubing at the detail stage, which will be cleaned and flushed according to PPS 6.10 or PPS 31.04 before assembly of fittings, cut the tubing to length and deburr according to PPS 6.01.

Use a chipless tube cutter when cutting tubing to length is required in-situ or at Final Assembly. Refer to section 5.2.2 for the procedure for cutting tubing to length using a wrench type chipless tube cutter. If using an alternative chipless tube cutter to cut the tubing to length, refer to the equipment manufacturers instructions for the cutting procedure. Refer to section 5.2.3 for the procedure for deburring after cutting tubing to length using a chipless tube cutter. Ensure that cut tubing ends are square to within ±1°.

Step 2. For all primed tubes, strip the primer according to PPS 31.07 over a minimum length of 2" from the tube end. **Do not** mechanically remove the primer.

Step 3. Remove all surface defects (e.g., scratches, gouges, etc.) over a minimum length of 2" from the tube end to be swaged by polishing with abrasive polishing pads (ref. para. 4.1.4). Polish the tube end using radial motions about its circumference (**do not** polish the tube in a longitudinal direction). If surface defects cannot be removed by polishing, refer the tube to Bombardier Toronto (de Havilland) Material Review Board (MRB) or Bombardier Toronto (de Havilland) delegated MRB for disposition.

Step 4. Ensure that the tube surface is free of dirt, grease, etc. for at least 4" from the tube end. Solvent clean according to PPS 31.17, if necessary.

Step 5. Using the marking pen in the insertion marking slot corresponding to the tube size dash number, apply 3 location marks spaced equally around the tube end (see Figure 3). Do not use a pencil to mark the tubing.

Table 1. Minimum Straight Length Before Bends

Tube Size	Minimum Straight Length	Tube Size	Minimum Straight Length
-03 (3/16")	0.750"	-12 (3/4")	1.625"
-04 (1/4")	0.938"	-16 (1")	1.750"
-06 (3/8")	1.000"	-20 (1-1/4")	1.875"
-08 (1/2")	1.500"	-24 (1-1/2")	2.000"
-10 (5/8")	1.563"		

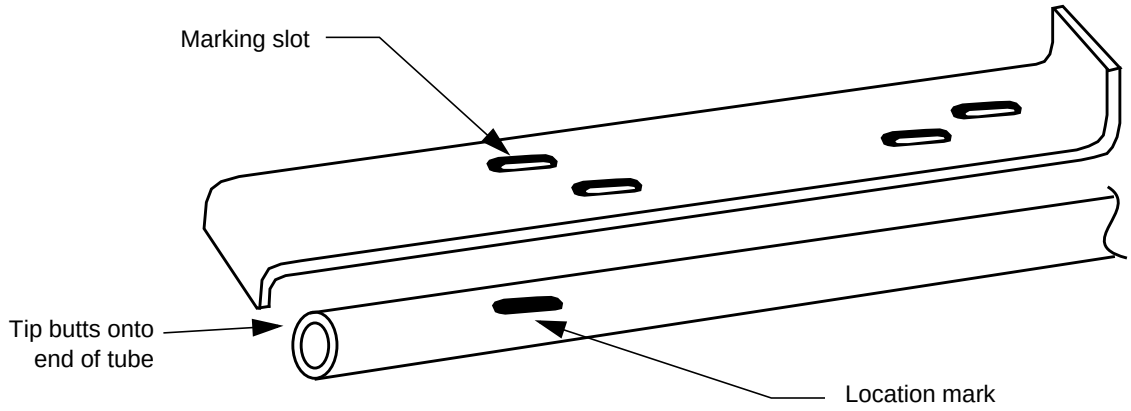


Figure 3. Insertion Marking Tool

5.2.2 **Use of Wrench Type Chipless Tube Cutters (e.g., TS.621.32.11)**

5.2.2.1 Cut tubing using a wrench type chipless tube cutter as follows:

Step 1. Loosen the drive screw using a suitable hex wrench and locate the cutter head on the tube in the desired cutting position (see Figure 4).

Step 2. Tighten the drive screw until the cutter wheel lightly contacts the tube, then tighten 1/4 of a turn.

Step 3. Rotate the tool handle back and forth around the tube until there is no resistance.

Step 4. Tighten the drive screw a further 1/8 -1/4 turn and rotate.

Step 5. Repeat the operation until the cut is complete.

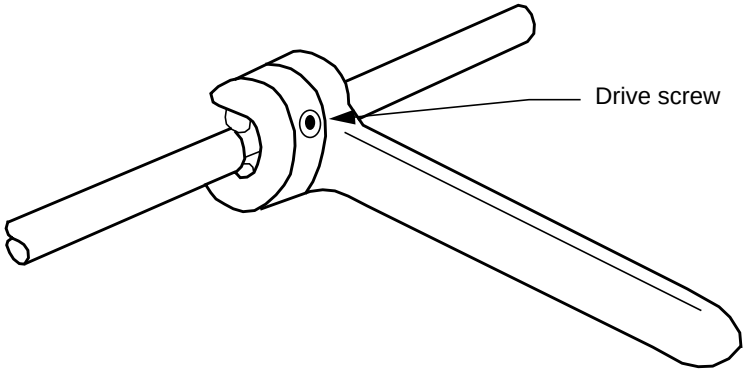


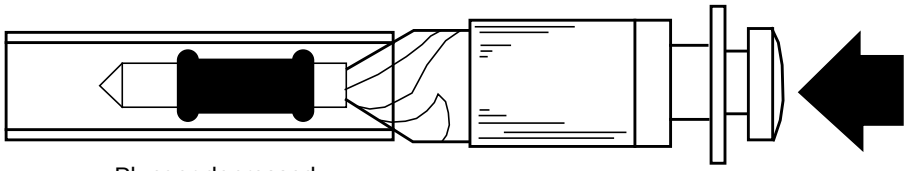
Figure 4. Wrench Type Chipless Tube Cutter

5.2.3 Deburring of Tubing Cut with a Chipless Tube Cutter

5.2.3.1 For tubes that have been cut to length using a chipless tube cutter, deburr the ends as follows:

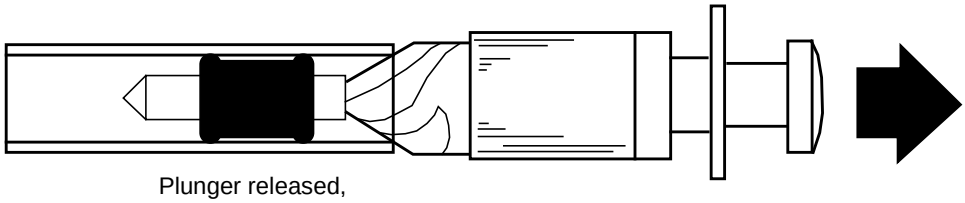
Step 1. Select the correct size stem assembly as specified in Table 2 for the applicable tube size and assemble it in the tool body.

Step 2. Depress the tool plunger to extend the plug and insert it into the tube until the cutters contact the tube end as shown below.



Plunger depressed,
plug extended

Step 3. Release the plunger to expand the plug in the tube as shown below.



Plunger released,
plug expanded

Table 2. Deburring Tubing Cut with a Chipless Tube Cutter

Tube Size	Wall Thickness	Designed Metal Connections (Deutsch DMC) Deburring Tool	
		Tool Body	Stem Assembly
-03	0.030"	Use D10210 complete tool	
-04	0.016" - 0.028"	D9851-14	D9851-13-04
	0.028" - 0.050"		D9651-13-03
-06	0.016" - 0.035"		D9851-13-06
	0.035" - 0.058"		D9851-13-07
-08	0.016" - 0.042"	D9850-14	D9850-13-08
-10	0.016" - 0.058"		D9850-13-10
-12	0.016" - 0.065"		D9850-13-12
-16	0.020" - 0.083"	D9849-15	D9849-13-16
-20	0.024" - 0.065"		D9849-13-20
-24	0.028" - 0.083"		D9849-13-24

Step 4. Apply a light pressure to the knurled body and rotate the tool against the tube end. Do not deburr excessively.

Step 5. Without depressing the plunger, withdraw the tool to the first bulge of the plug and wipe off the chips. Do not depress the plunger before withdrawing the tool or chips of metal will enter the tube.

Step 6. Completely withdraw the tool.

Step 7. Remove the sharp outer edge left by the chipless tube cutter by polishing the outer edge with abrasive polishing pads.

Step 8. Solvent clean the tube end according to PPS 31.17 to remove dust and chips from the tube surface.

5.3 Preparation of the Hydraulic Pump

5.3.1 Prepare the hydraulic pump as follows:

Step 1. Select the applicable swage tool assembly (e.g., from Table 3) for the size of fitting to be installed.

Table 3. Designed Metal Connections (Deutsch DMC) Swage Tool Assemblies

Tube Size	Swage Head Assembly	Power Unit	Go/No-Go Gauge	Crimping Dies	Marking Template
-03 (3/16")	DLT05PSHA3003	DLT05MAPW0000	D12-9892-03	DLT05PSDI3003	
-04 (1/4")	DLT05PSHA3004	DLT05MAPW0000	D12-9892-04	DLT05PSDI3004	DLT5302-013-01
-06 (3/8")	DLT10PSHA3006	DLT10MAPW0000	D12-9892-06	DLT10PSDI3006	
-08 (1/2")	DLT20PSHA3008	DLT20MAPW0000	D12-9892-08	DLT20PSDI3008	
-10 (5/8")	DLT20PSHA3010	DLT20MAPW0000	D12-9892-10	DLT20PSDI3010	DLT5302-031-01
-12 (3/4")	DLT30PSHA3012	DLT30MAPW0000	D12-9892-12	DLT30PSDI3012	
-16 (1")	DLT40PSHA3016	DLT40MAPW0000	D12-9892-16	DLT40PSDI3016	
-20 (1 1/4")	DLT40PSHA3020	DLT40MAPW0000	D12-9892-20	DLT40PSDI3020	DLT5302-040-01
-24 (1 1/2")	DLT40PSHA4024	DLT40MAPW0000	D12-9892-24	DLT40PSDI4024	

Step 2. Visually check the swaging tools to be used for signs of damage and ensure that the serial numbers on the die segments match. Also, check that the number engraved on the swage head and dies matches the calibration stickers on the Permaswage tool box and that the calibration stickers are valid.

Step 3. Ensure that the chamfered ends of the upper and lower die segments are installed correctly as shown in Figure 5.

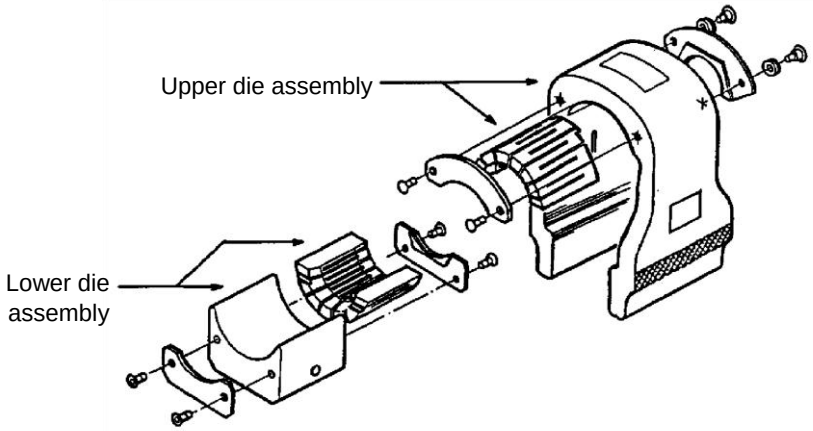


Figure 5. Upper and Lower Die Assemblies

Step 4. Align and fit the lower die block onto the power unit (see Table 3).

Step 5. Slide the swage head yoke on the power unit and align the upper and lower die segments.

Step 6. Connect the hydraulic pressure hose to the power unit and to the hydraulic outlet on the hydraulic power supply (see Figure 6).

Step 7. Connect the shop air supply (see Figure 6).

Step 8. Cycle the unit by pressing the ON actuating switch until the pulsing action of the pump stops. Verify the hydraulic power supply gauge is reading 10,000 ± 250 psig.

Step 9. Ensure that the swaging dies close and are seated correctly.

Step 10. Release the hydraulic pressure by releasing the actuating switch.

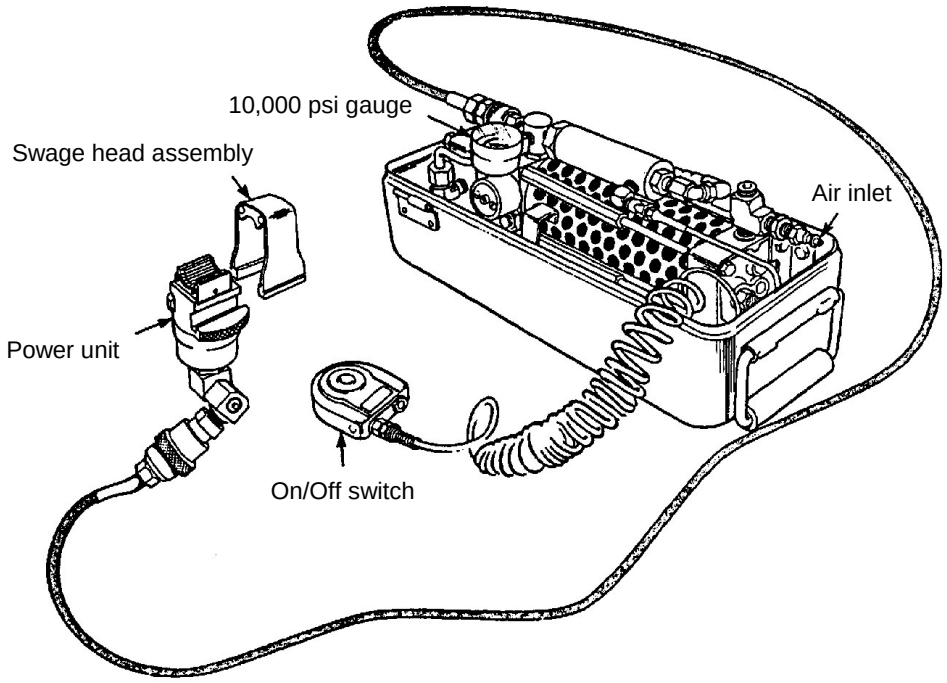


Figure 6. Designed Metal Connections (Deutsch DMC) DLT Swaging Kit Assembly

5.4 Preparation of Fitting

5.4.1 Store externally swaged (Permaswage type) fittings as received in their protective packages until required for installation.

5.4.2 Before installation, check that the inside of the fitting is free from scratches, dirt, etc. and that both internal seals are present and undamaged. If a fitting has been contaminated with dirt, grease or shop soil, wipe it with a clean dry cloth or, if necessary, solvent wipe it according to PPS 31.17.

5.5 Installation of Bulkhead Fittings

5.5.1 Assemble Permaswage bulkhead fittings in place on the aircraft and torque the jam nut as follows:

Step 1. Align elbow type bulkhead fittings by inserting the tube end into the fitting and then clamping the tube in its proper location before tightening the jam nut.

Step 2. After assembly, hold elbow type bulkhead fittings by hand to prevent rotation and torque the jam nut according to PPS 14.01 to the range specified in Table 4. Hold union type bulkhead fittings with a suitable wrench to prevent rotation and torque the jam nut according to PPS 14.01 to the range specified in Table 4.

Step 3. Apply a rotation witness mark using white tamper proof sealant to the bulkhead and the fitting as shown in Figure 7. Do not apply a witness mark to the jam nut.

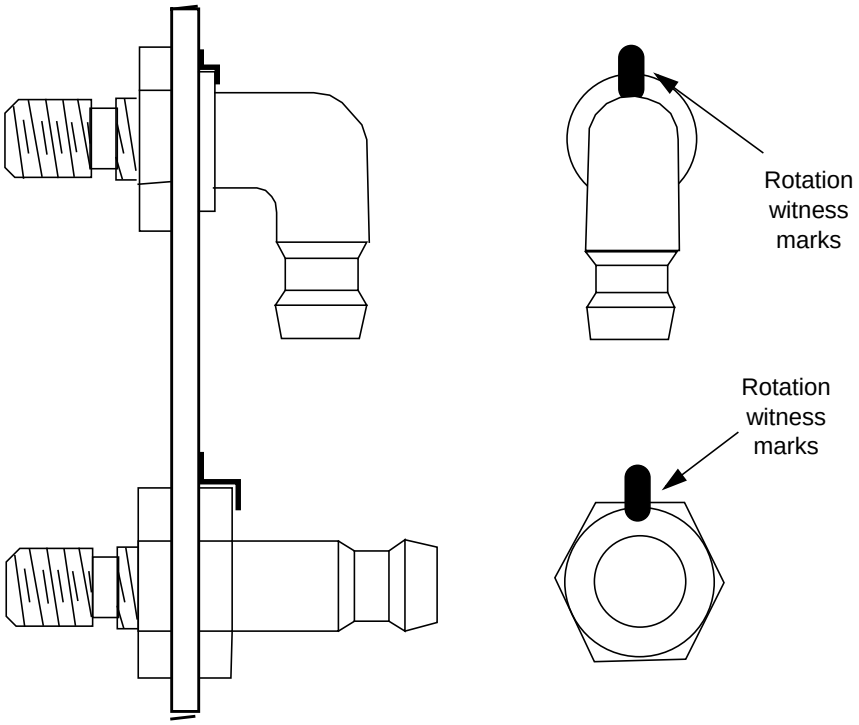


Figure 7. Rotation Witness Marking of Bulkhead Fittings

Table 4. Jam Nut Torque Values

Tube Size	**Torque** (in·lbs)
-03	95 - 105
-04	135 - 145
-06	215 - 245
-08	470 - 510
-10	620 - 680

Tube Size	**Torque** (in·lbs)
-12	855 - 945
-16	1140 - 1260
-20	1520 - 1680
-24	1900 - 2100

5.6 **Assembly of the Fitting and Tube**

5.6.1 Ensure that tube ends have been prepared according to section 5.2 and that they are free from surface defects (e.g., scratches, gouges, etc.) over a minimum length of 2" from the tube end.

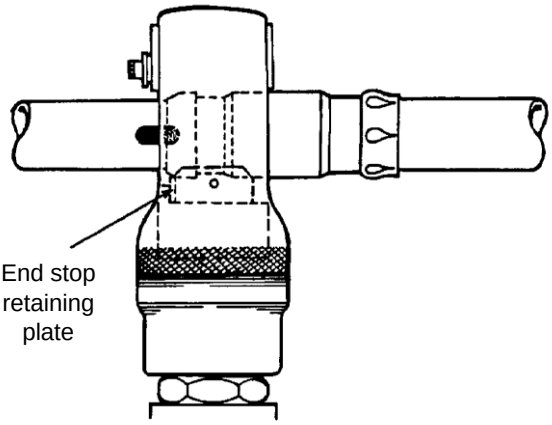
5.6.2 Slide the fitting over the tube end until the fitting end is approximately centred over the location marks. If the fitting does not freely slide onto the tube, check the tube end for roundness or the presence of burrs. When joining tube ends with a union, slide the fitting back along one tube to allow the other to be aligned and slide the fitting back over the tube. Centralize the fitting ends over the location marks.

5.6.3 Assemble all fitting and tube combinations loosely without force or preloading. Never swage a fitting and tube combination that exhibits misalignment or preloading since an inaccurate torque value may result. Disassemble fitting and tube combinations that exhibit preload or misalignment and correct the geometry of the line before swaging.

5.6.4 Locate the tube and fitting in the swage tool as follows:

Step 1. Position the swage head yoke over the fitting. Ensure that the end stop die retaining plate is towards the fitting end. If the tool cannot be fitted directly over the fitting, slide the swage head yoke off the power unit and re-assemble it over the fitting.

Step 2. Ensuring that the fitting is correctly located on the tube, move the swage tool against the fitting until the end stop retaining plates contact the fitting end (as shown).



5.7 **Swaging**

5.7.1 Perform swaging as follows:

Step 1. Ensure that the swaging tools have been prepared as specified herein, and that the fitting and tube are correctly located according to para. 5.6.4.

Step 2. Depress the actuating switch until the pressure gauge registers 10,000 ± 250 psig.

Step 3. Release the actuating switch to release the hydraulic pressure.

Step 4. Immediately rotate the swage head or tube as close to approximately 90° from the original position as possible (15° minimum) and swage again as above.

5.8 **Post Swaging Procedure**

5.8.1 Remove the swaged fitting from the tool and check the swage visually and dimensionally according to section 6. Do not swage the other end of the fitting, if applicable, until the first swage has passed the GO/NO-GO check. If a swaged fitting is oversized, the fitting assembly is not acceptable; send the tooling for evaluation and re-calibration.

5.8.2 Apply a rotation witness mark using white tamper proof sealant to the tube and the fitting as shown in Figure 7 (bulkhead fittings) or Figure 9 (union fittings).

5.8.3 After swaging, each fitting must be checked according to section 6.

5.8.4 Cap tube assemblies or fittings that are not closed off according to PPS 6.05.

5.8.5 After checking the swaged fitting visually and dimensionally and pressure testing according to section 6, touch-up exposed aluminum tubing by applying chemical conversion coating to within 2" of the tube end according to PPS 32.02 followed by F19 primer with a brush according to PPS 34.08 to the tube end without applying any primer to the fitting.

6 **Requirements**

6.1 Ensure only tool assemblies certified according to PPS 6.18 have been used to swage externally swaged (Permaswage type) fittings.

6.2 Check the swaged fitting and adjacent tube area for evidence of cracks, dents, folding or gouges. Assemblies with such defects are not acceptable.

6.3 Ensure that a portion of the location mark, applied during assembly, is visible on the tube at the fitting end (see Figure 8). If the mark is completely exposed or the mark is not visible, the swaged joint is not acceptable.

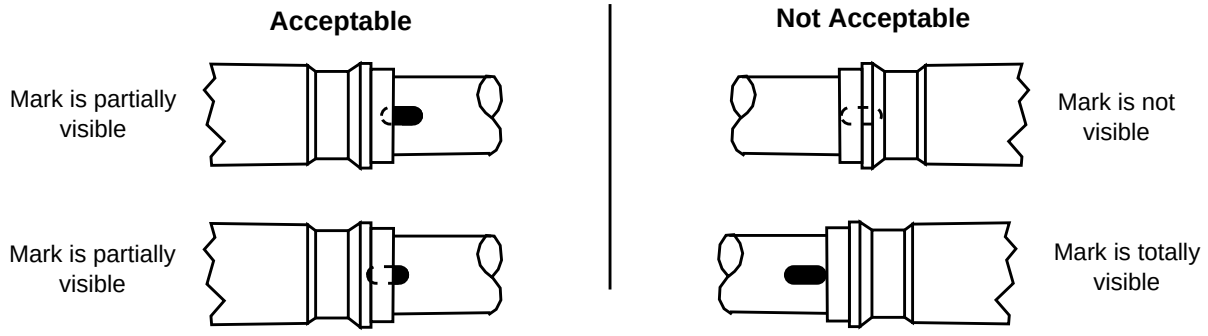


Figure 8. Fitting Location

6.4 Check the rotation witness mark (see Figure 9) on all unions for evidence of rotation. If evidence of rotation is found, take corrective action as required.

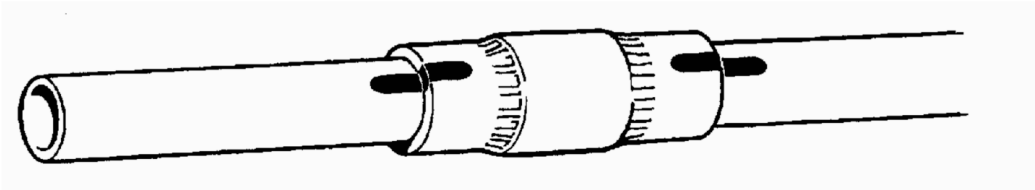


Figure 9. Union Rotation Witness Stripe

6.5 Check bulkhead fittings for evidence of rotation (see Figure 10). If there is evidence of rotation, as indicated by the displacement of the rotation witness mark, correct as follows:

Step 1. While holding the fitting to prevent rotation, loosen the fitting jam nut.

Step 2. Attempt to re-align the witness mark with slight rotation of the tube by hand.

Step 3. If the witness mark remains displaced, also loosen the coupling nut and attempt to re-align the witness mark. If the witness mark cannot be re-aligned, the installation is not acceptable.

Step 4. Re-torque the jam nut and, if applicable, the coupling nut.

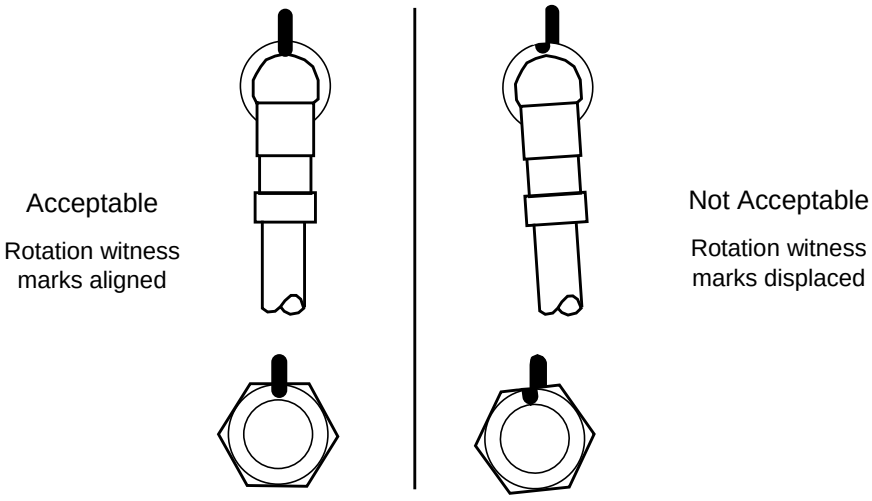


Figure 10. Bulkhead Fitting Location

6.6 Check to ensure an adequately swaged outside diameter and that a sufficient length of the fitting has been swaged (see Figure 11) using the applicable GO/NO-GO gauge from Table 3 for the swaged tube size. The die segment produces longitudinal ridges on the swaged fitting. Check the outside diameter of the fitting in the area between the ridges. Ensure that the GO/NO-GO gauge is against the fitting end so that the swage diameter is checked at the correct location. If the GO/NO-GO gauge does not fit over the swaged fitting end, the fitting is oversized and is not acceptable. It is not necessary for the gauge to rotate freely when in position; if in doubt check using the gauge at several points around the swage. Fittings that fail to meet the dimensional requirements are unacceptable and

the cause of the failure must be determined and corrected before performing any further swaging. If the swaging tool is suspect, return the swage tool assembly for re-calibration.

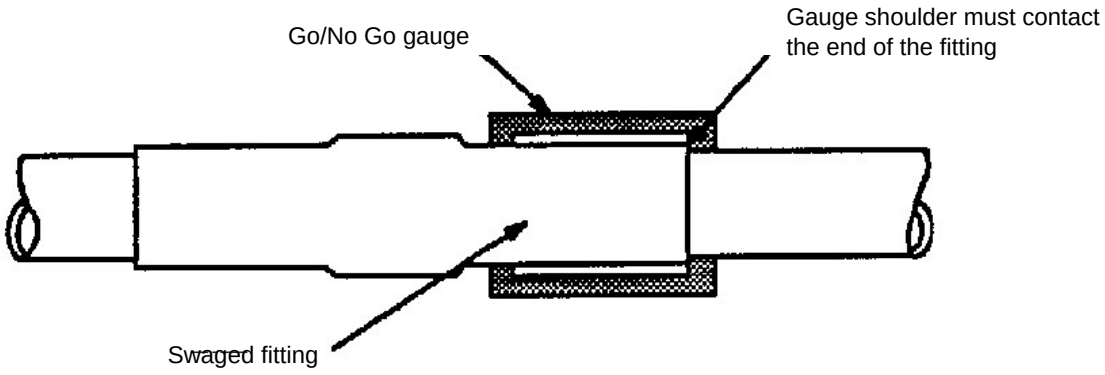


Figure 11. Go/No-Go Swage Check

6.7 Pressure test tube assemblies having a swaged fitting that are visually and dimensionally acceptable according to PPS 6.12. For assemblies that have been installed and swaged in the aircraft, perform the pressure test by isolating the application section of line or, if this is not possible, test during the aircraft functional test procedures. Externally swaged (Permaswage type) fittings that leak during pressure testing may be re-swaged once while maintaining a pressure of 1,000 psi in the hydraulic line.

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.**

7.3 **Keep hands clear of the die block assembly during swaging operations.**

7.4 **Take all necessary precautions associated with operating hydraulic equipment.**

7.5 **Disconnect the shop air line from the hydraulic power supply before inserting or removing die assemblies in the yoke or attaching the yoke to the power head.**

7.6 **Ensure sufficient ventilation when applying tamper proof sealant, especially in confined areas.**

7.7 **Avoid skin and eye contact with tamper proof sealant. Wear chemical resistant protective gloves when applying tamper proof sealant. If skin contact occurs, wash the affected area immediately and thoroughly with soap and water. If eye contact occurs, immediately flush eyes with large quantities of water at an eye-wash station; after initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Report any contact with tamper proof sealant to the Health Centre. Take care when applying tamper proof sealant in overhead applications to avoid applying excess sealant, as drips may result.**

8 Personnel Requirements

8.1 This PPS has been categorized as a “Controlled Special Process” by PPS 13.39. Refer to PPS 13.39 for personnel requirements.

9 Maintenance of Equipment

9.1 It is recommended that the hydraulic power unit, swaging unit and all accessories be kept free from chips, dirt and other foreign matter.

9.2 It is recommended that worn or damaged parts be repaired or replaced immediately.

9.3 Any tool modification requires appropriate authorization.

10 Additional Information

10.1 Take care to ensure that hydraulic fluid lines and hydraulic system components used with MIL-H-5606 hydraulic fluid do not come into contact with solvent blends containing isopropyl alcohol (IPA), also known as isopropanol and 2-propanol. Hydraulic fluid lines and hydraulic system components used with MIL-H-5606 hydraulic fluid which have been contaminated with solvent blends containing isopropyl alcohol must be cleaned according to PPS 6.10.