BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 13.11

PRODUCTION PROCESS STANDARD

General Procedure for Handling Aircraft Oxygen Cylinders and Systems

Issue 7
- This standard supersedes PPS 13.11, Issue 6.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- Direct PPS 13.11 related questions to michael.wright@aero.bombardier.com.
- This PPS is effective as of the distribution date.

Prepared By:	(Michael Wright)	May 22, 2014
	Production Process Standards (PPS)	
Approved By:	(L.K. John)	May 28, 2014
	Materials Technology	
	(Adam Gordon)	May 28, 2014
	Quality	

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1 Scope

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for charging, discharging, shipping and storage of aircraft oxygen cylinders.

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, all materials must be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Toronto 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 Environment, Health and Safety Department.

3 References

3.1 PPS 13.26 - General Subcontractor Provisions.

3.2 PPS 31.17 - Solvent Usage.

3.3 QDI-15-02 - Shelf Life of Aeronautical Products.

3.4 I.A.T.A. Regulations - UN 1072.

4 Materials and Equipment

4.1 Materials

4.1.1 Castile soap.

4.1.2 Aviators breathing oxygen to MIL-O-27210.

4.2 Equipment

4.2.1 Oxygen system charging rig.

4.2.2 Suitable "NO SMOKING" warning signs or placards.

5 Procedure

5.1 General

5.1.1 Many materials, particularly oils and grease, and non-metallic materials are likely to burn when exposed to oxygen under pressure. To avoid fire or an explosion, it is essential that all oxygen equipment be kept clean and free from oil or grease at all times.

5.1.2 An oxygen fire or explosion depends on a combination of oxygen, combustible material, pressure, and heat. The danger of ignition is in direct ratio to the concentration of oxygen, the combustible nature of the material exposed to the oxygen, and the temperature of the oxygen and material.

5.1.3 Polytetrafluoroethylene (PTFE) liners of stainless steel braided flexhoses are susceptible to ignition during rapid pressurization with oxygen at pressures above 500 psi. Transferring oxygen via PTFE lined flexhoses must be done at as slow a rate as possible. Under no circumstances must oxygen systems be pressurized using equipment fitted with quick opening valves. Avoid applications where PTFE lined flexhoses are configured with no or very small downstream volume, as this would cause rapid pressure build up. The smaller the downstream volume, the greater the chances of ignition of the PTFE liner. It is imperative that the above precautions are strictly observed as internal burning of PTFE liners is difficult to detect and will cause toxic contamination of the oxygen system.

5.2 Charging Procedures

5.2.1 Carry out charging of aircraft oxygen cylinders or complete oxygen systems in well ventilated areas.

5.2.2 Only operators familiar with the necessary safety precautions and operation of the charging rig shall carry out oxygen system charging procedures.

5.2.3 Smoking is prohibited within 50 feet of the area where charging operations are being carried out. Display suitable “NO SMOKING” signs during such operations.

5.2.4 Ensure that all clothing, hands, tools, fittings, connections, and the charging rig are free from oil or grease. Oil or grease exposed to oxygen could result in an explosion. Remove all traces of oil or grease around equipment by solvent cleaning according to PPS 31.17 or washing with a castile soap and water solution.

5.2.5 Connect charging rig to cylinder or oxygen system charging adapter, as applicable and charge system or bottle to the applicable FULL CHARGE pressure at a rate not exceeding 500 psi pressure rise per minute. Charge high pressure oxygen systems or cylinders (painted GREEN) to 1800 ± 50 psi and low pressure oxygen systems or cylinders (painted LIGHT YELLOW) to 425 - 450 psi. A slow rate of charge is essential to avoid overheating the system or bottle with an increased risk of fire.

5.2.6 On completion of charging, disconnect charging rig, replace dust caps and if applicable, re-connect oxygen cylinder to aircraft oxygen system.

5.2.7 Purge the aircraft oxygen system if the system pressure has been reduced to less than 25 psi for more than 2 hours before charging.by opening each oxygen outlet in the system in turn using the appropriate adapter or mask and allow oxygen to flow from the outlet for 30 - 40 seconds.

5.3 Discharging Procedure

5.3.1 Carry out discharging of aircraft oxygen cylinders in a well ventilated area, preferably outside.

5.3.2 Smoking is prohibited within 50 feet of the area where oxygen is being discharged. Display suitable “NO SMOKING” signs during such operations.

5.3.3 With the bottle safely secured or held, open the shut-off valve (where fitted) or remove cap from the low pressure relief valve on the side of the pressure reducer. Ensure that discharge orifice is held away from operator during discharging procedure. High discharge pressure can cause oxygen bubbles to be introduced into the blood stream if directed against the skin.

5.3.4 On completion of discharging, immediately close the cylinder shut-off valve or replace the low pressure relief cap, as applicable.

5.3.5 Unless otherwise specified, leave a residual pressure of 50 - 100 psi in a discharged or empty oxygen cylinder to prevent moisture accumulating within the cylinder.

5.3.6 If an oxygen cylinder has been discharged to a residual pressure of less than 25 psi for more than 2 hours, purge the cylinder as follows before re-using:

Step 1. Fully charge cylinder according to section 5.2.

Step 2. Discharge cylinder according to section 5.3.

Step 3. Re-charge cylinder according to section 5.2 and re-install in the aircraft.

5.4 Shipping Procedure

5.4.1 Handle all aircraft oxygen bottles which are to be shipped according to the applicable I.A.T.A. regulations.

5.5 Storage

5.5.1 Store aircraft oxygen cylinders as received from the supplier according to QDI-15-02.

6 Requirements

6.1 Aircraft oxygen systems or cylinders must only be charged with aviators breathing oxygen to MIL-O-27210.

6.2 The maximum charge pressure for oxygen systems or cylinders must be as stamped on the cylinder or placarded on the system access panel.

6.3 The rate of charging must not exceed 500 psi pressure rise per minute.

6.4 If the aircraft oxygen system pressure has been reduced to less than 25 psi for more than 2 hours, purge the system according to paragraph 5.2.7 before use.

6.5 If an oxygen cylinder has been discharged to a residual pressure of less than 25 psi for more than 2 hours, purge the cylinder according to paragraph 5.3.6 before use.

7 Safety Precautions

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

7.2 Oxygen cylinders must be secured from falling or rolling at all times.

7.3 Carry out charging or discharging of oxygen systems and cylinders in well ventilated areas at least 50 feet from flammable materials such as solvents, paints and aerosols.

7.4 Smoking is prohibited within 50 feet of areas where oxygen charging and discharging operations are being carried out.

7.5 Keep aircraft oxygen cylinders and oxygen system fittings, lines and connections clean and free from contamination by grease or oil. Oil or grease exposed to oxygen may result in an explosion.

7.6 PTFE lined flexhoses are susceptible to ignition under certain conditions. Refer to paragraph 5.1.3 for precautions and guidance to be observed during oxygen charging operations.

7.7 Take care during discharging of oxygen cylinders to ensure that the discharge orifice is pointed away from the operator, as high pressures can cause oxygen bubbles to be introduced into the bloodstream if directed against the skin.

7.8 Permit only operators familiar with the necessary safety precautions to be taken when working with oxygen to carry out any operations on oxygen equipment or systems.

7.9 Refer to PPS 31.17 for the safety precautions for handling and using solvents.

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.