BOMBARDIER
Toronto Site
PROPRIETARY INFORMATION

PPS 13.13

PRODUCTION PROCESS STANDARD

PERSONAL PROTECTIVE RESPIRATORY EQUIPMENT

Issue 19
- This standard supersedes PPS 13.13, Issue 18.
- Deletions have been made at this issue and, therefore, detail changes have not been noted.
- Direct PPS related questions to christie.chung@aero.bombardier.com or (416) 375-7641.
- This PPS is effective as of the distribution date.

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1 SCOPE

1.1 This Production Process Standard (PPS) specifies the type of protective respiratory equipment to be used by operators working with specific hazardous airborne contaminants.

1.1.1 This PPS complements the engineering drawings that specify its use as an authorized instruction. The procedure specified in this PPS shall 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.

1.2 The materials and equipment as specified in section 4 shall be supplied by a Bombardier Toronto Environment, Health and Safety Department approved vendor.

2 HAZARDOUS MATERIALS

2.1 Before receipt at Bombardier Toronto, all materials shall 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 CSA Standard Z94.4-11 - Selection, Use and Care of Respirators.

3.2 CSA Standard Z180.1-13 - Compressed Breathing Air and Systems.

3.3 EHS-OP-004 - Personal Protective Equipment.

3.4 PPS 13.26 - General Subcontractor Provisions.

4 MATERIALS AND EQUIPMENT

4.1 Materials

4.1.1 3M S504 respirator wipes.

4.2 Equipment

4.2.1 NIOSH approved disposable particulate respirator. Particulate filters are classified by NIOSH based on filter efficiency and resistance to oil, as indicated below:

- N95 - 95% filter efficiency, not resistant to oil mist (3M #8210 N95 and 3M #8511 N95)
- P95 - 95% filter efficiency, resistant to oil mist (3M #8577 P95)

Filter efficiency refers to the ability of a filter to remove particles having a diameter of 3 microns.

4.2.2 NIOSH approved half mask respirator or full facepiece respirator with various cartridges and/or filters, as applicable. The following are examples of acceptable mask/cartridge combinations:

- Half mask respirator or full facepiece respirator with either a particulate filer (3M2097 P100/2), OV (3M6001/2), OV/P100 (3M60921/2) or OV/AG/P100 (3M60923/2) cartridges, as appropriate to circumstances.

4.2.3 Supplied air system, including half and full facepiece dual airline respirators and supplied air hoods. The air purification system to supply breathing air shall meet Canadian Standard Z180.1-00.

5 PROCEDURE

5.1 General

5.1.1 Protective respiratory equipment is used to avoid health hazards from materials in the form of airborne dust, vapour or mist. It is available in three basic types: disposable particulate respirator; re-usable air purifying respirator; and supplied air respirator. The type of protective equipment used is dependant on the type of contamination and the airborne concentrations.

5.1.2 Engineering controls, such as local exhaust ventilation, may eliminate the need for respiratory protection.

5.2 Selection of Protective Respiratory Equipment

5.2.1 Refer to Table I for a listing of the applicable type of respiratory equipment to be used for specific materials, fabrication operations and type of resultant airborne contaminants.

TABLE I - PROTECTIVE RESPIRATORY EQUIPMENT APPLICATIONS

PPS	MATERIAL	FABRICATION OPERATION	TYPE OF CONTAMINATION	RESPIRATORY EQUIPMENT
1.37	Boelube	Drilling using Spacematic or Q-matic drillmotor equipped with automatic spray lubricators	Boelube mist	Particulate respirator P95
2.70	CB200 acrylic adhesive	Installation of Click Bond fasteners	Organic vapour	Half mask respirator OV cartridge
4.24	Leak test fluid Soltrol 220 to MIL-F-38299	Removing residual leak test fluid from fuel tank after draining of leak test fluid	Organic vapour	Half mask respirator OV cartridge
9.05	DHMS S3.05 sealant	Potting electrical connectors	Organic vapour	Half mask respirator OV cartridge
9.12	Urethane encapsulation coating	Spraying printed circuit boards	Isocyanate vapour (Notes 1 & 2)	Supplied air respirator
10.01	Plastic	Sanding or buffing	Dust	Half mask respirator OV/P100 cartridge
10.04	Polyester Resin	Mixing and applying	Organic vapour	Supplied air respirator
10.17	Kevlar Plastic Fibreglass	Grinding	Dust/mist Organic vapour	Half mask respirator OV/P100 cartridge
10.20	All material	Waterjet cutting	Dust/mist	Half mask respirator OV/P100 cartridge
10.22	Mould sealer and mould release agent	Application of mould sealer and mould release agent	Organic vapour	Half mask respirator OV cartridge
10.39	Organic fabrics	Machining organic fabrics	Dust	Half mask respirator OV/P100 cartridge
10.40	Kevlar Plastic Fibreglass	Drilling or abrading	Dust/mist Organic vapour	Half mask respirator OV/P100 cartridge
10.44	DHMS A6.09 adhesive	Application of liquid shims	Organic vapour	Half mask respirator OV cartridge
13.04	Aircraft fuel	Working in fuel tanks (that previously contained fuel) through overwing access cover openings	Organic vapour	Supplied air respirator
16.01	Corrosion preventive compound (F13 Grades 3 & 4)	Spraying inside components and aircraft	Organic vapour	Full face mask respirator OV/P100 cartridge

Notes:
1. Operators using materials containing isocyanate shall participate in the medical surveillance program.
2. Use supplied air respirators if the airborne isocyanate concentration exceeds 0.005 ppm. Otherwise, it is acceptable to wear a half mask respirator with a OV/P100 cartridge. Consult the Bombardier Toronto Environment, Health and Safety Department.
3. Using powered belt or disk sanders.

TABLE I - PROTECTIVE RESPIRATORY EQUIPMENT APPLICATIONS

PPS	MATERIAL	FABRICATION OPERATION	TYPE OF CONTAMINATION	RESPIRATORY EQUIPMENT
16.05	Polyurethane coating (F20)	Painting detail parts and assemblies	Isocyanate vapour (Notes 1 & 2)	Supplied air respirator
	Polyurethane enamel (F24 & F37)	Painting aircraft		
16.08	Polyurethane coating (F20)	Painting detail parts and assemblies	Isocyanate vapour (Note 1 & 2)	Supplied air respirator
16.11	Epoxy coating (F35)	Vapour barrier coating for external surface of integral fuel tank	Organic vapour	Half mask respirator OV cartridge
16.12	Intumescent coating (F38)	Spray application	Organic vapour	Supplied air respirator
		Brush application	Organic vapour	Half mask respirator OV cartridge
16.13	Primer and protective coating	Preparation and application of primer and protective coating	Organic vapour	Half mask respirator OV cartridge
16.18	DHMS C4.04 or Tempo 7600 Series polyurethane clear enamel	Overcoating labels and screen printed markings	Isocyanate vapour (Notes 1 & 2)	Supplied air respirator
16.24	Fluorocarbon dispersion coating (DSC 216-1)	Spraying parts and assemblies	Organic vapour	Half mask respirator OV/P100 cartridge
20.03	Fluorescent penetrant	Spray application	Organic vapour Dust/mist	Supplied air respirator
21.03	Epoxy primer	Priming integral fuel tanks, details and assemblies	Organic vapour	Half mask respirator OV cartridge
	Aircraft fuel	Working in fuel tanks (that previously contained fuel) through overwing access cover openings	Organic vapour	Half mask respirator with supplied air
	Polyurethane primer (F21 Type I)	Priming integral fuel tanks, details and assemblies	Isocyanate vapour (Note 1)	Supplied air respirator
21.05	Tempo 1900 clear epoxy sealant (F32)	Sealing fibre-reinforced parts	Organic vapour	Half mask respirator OV cartridge
21.20	Two-part sealants	Working with two-part sealants	Organic vapour	Half mask respirator OV cartridge
21.21	Spray sealant	Spray application inside components	Organic vapour	Full face mask respirator OV cartridge

Notes:
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3. Using powered belt or disk sanders.

TABLE I - PROTECTIVE RESPIRATORY EQUIPMENT APPLICATIONS

PPS	MATERIAL	FABRICATION OPERATION	TYPE OF CONTAMINATION	RESPIRATORY EQUIPMENT
22.06	Screen printing solvents and inks	Screen printing	Organic vapour	Half mask respirator OV cartridge
22.07	Screen printing solvents and inks	Screen printing	Organic vapour	Half mask respiratorOV cartridge
24.01	Aluminum wire	Metal spraying	Organic vapour Aluminum particles	Full face mask respirator OV/P100 cartridge
25.08	DHMS A6.10 Type II adhesive	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge
25.12	Bostik 1142 adhesive	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge
25.14	DHMS A6.13 adhesive	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge
25.23	DHMS A6.11 Type I Class 1	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge
25.25	DHMS A6.15 fluorosilicone adhesive DSC 584 fluorosilicone adhesive	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge
25.30	DHMS A6.09 epoxy adhesive	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge
25.31	Polyurethane adhesive	Bonding aircraft parts and assemblies	Isocyanate vapour (Note 1 & 2)	Supplied air respirator
25.52	DHMS A6.12 Type I adhesive	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge
	Bonding surfaces	Sanding (Note 3)	Dust/mist	Half mask respirator OV cartridge
25.55	DHMS A6.11 Type II Class 1	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge
25.56	Bonding surfaces	Sanding	Dust	Half mask respirator OV/P100 cartridge
25.63	DHMS A6.11 Type I Class 2	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge
25.65	DSC 479-1 one part urethane adhesive	Bonding aircraft parts and assemblies	Isocyanate vapour (Notes 1 & 2)	Supplied air respirator
25.67	DSC 548-1 Adhesive	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge

Notes:
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2. Use supplied air respirators if the airborne isocyanate concentration exceeds 0.005 ppm. Otherwise, it is acceptable to wear a half mask respirator with a OV/P100 cartridge. Consult the Bombardier Toronto Environment, Health and Safety Department.
3. Using powered belt or disk sanders.

TABLE I - PROTECTIVE RESPIRATORY EQUIPMENT APPLICATIONS

PPS	MATERIAL	FABRICATION OPERATION	TYPE OF CONTAMINATION	RESPIRATORY EQUIPMENT
25.69	EC-3532 Adhesive	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge
25.70	Scotch-Weld DP 805 Acrylic Adhesive	Bonding aircraft parts and assemblies	Organic vapour	Half mask respirator OV cartridge
27.XX	Metal	Grinding & Sanding (Note 3)	Dust/mist	Particulate respirator N95
31.XX 32.XX	Solvents	General cleaning	Chemical vapours/mists	Half mask respirator OV cartridge
	Solution components	Make-up & maintenance of solution tanks	Chemical vapours/mists	Full face mask respirator OV/P100 cartridge
		Processing parts	Chemical vapours/mists	Full face mask respirator OV/P100 cartridge
31.07	DHMS S5.03 paint strippers	Spray Application	Chemical vapours/mists	Supplied air respirator
	Paint strippers	Manual and Immersion Application	Chemical vapours/mists	Full face mask respirator OV/P100 cartridge
34.01	Lacquer paint (F2 & F4)	Painting detail parts and assemblies	Organic vapour	Half mask respirator OV cartridge
34.02	Alkyd Zinc Chromate Primer (F1)	Priming of Countersinks	Organic vapour	Half mask respirator OV cartridge
34.03	Polyurethane enamel (F24 & F37)	Painting aircraft	Isocyanate vapour (Note 1)	Supplied air respirator
34.06	Polyester primer (F17)	Priming magnesium alloy parts	Organic vapour	Half mask respirator OV cartridge
34.07	Primer coating (F14)	Application to thermoplastic surfaces	Organic vapour	Half mask respirator OV cartridge
34.08	Epoxy primer (F19)	Priming detail parts and assemblies	Organic vapour	Half mask respirator OV cartridge
34.11	Paints or primers	Painting aircraft surfaces	Organic vapour	Supplied air respirator
	Aircraft surfaces	Sanding	Dust	Supplied air respirator
34.13	Teflon filled polyurethane enamel (F29)	Priming detail parts and assemblies	Isocyanate vapour (Note 1 & 2)	Supplied air respirator
34.15	Polyurethane enamel (F31 & F34)	Priming detail parts and assemblies	Isocyanate vapour (Note 1 & 2)	Supplied air respirator

Notes:
1. Operators using materials containing isocyanate shall participate in the medical surveillance program.
2. Use supplied air respirators if the airborne isocyanate concentration exceeds 0.005 ppm. Otherwise, it is acceptable to wear a half mask respirator with a OV/P100 cartridge. Consult the Bombardier Toronto Environment, Health and Safety Department.
3. Using powered belt or disk sanders.

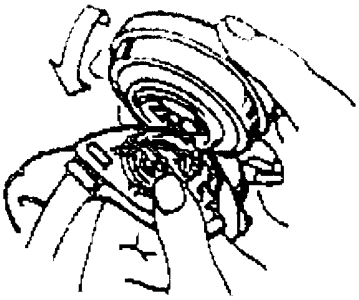
TABLE I - PROTECTIVE RESPIRATORY EQUIPMENT APPLICATIONS

PPS	MATERIAL	FABRICATION OPERATION	TYPE OF CONTAMINATION	RESPIRATORY EQUIPMENT
34.16	Urethane compatible intermediate primer (F23)	Priming aircraft and major assemblies	Isocyanate vapour (Note 1 & 2)	Supplied air respirator
34.18	Polyurethane enamel (F36 & F40)	Painting aircraft	Isocyanate vapour (Notes 1 & 2)	Supplied air respirator
34.19	Epoxy coating (F41 & F43)	Coating exterior composite parts	Organic vapour	Half mask respirator OV cartridge
34.20	Polyurethane enamel (F42)	Painting fibre-reinforced and thermoplastic parts	Isocyanate vapour (Notes 1 & 2)	Supplied air respirator
34.23	DSC 595 Paint Adhesion Promoter	Bare titanium surfaces	Organic vapour	Supplied air respirator
34.24	DSC 596 Paint Adhesion Promoter	Painted surfaces	Organic vapour	Supplied air respirator
34.25	DHMS C4.30 Polyurethane enamel (F47)	Painting aircraft surfaces	Organic vapour	Supplied air respirator
34.34	F33 surface finishing compound	Sanding	Dust	Half mask respirator OV/P100 cartridge
		Surface finishing	Organic vapour	Half mask respirator OV cartridge
34.39	Enamel paint (F5)	Painting detail parts and assemblies	Organic vapour	Half mask respirator OV cartridge
34.41	Enamel paint (F22)	Painting detail parts and assemblies	Organic vapour	Half mask respirator OV cartridge

Notes:
1. Operators using materials containing isocyanate shall participate in the medical surveillance program.
2. Use supplied air respirators if the airborne isocyanate concentration exceeds 0.005 ppm. Otherwise, it is acceptable to wear a half mask respirator with a OV/P100 cartridge. Consult the Bombardier Toronto Environment, Health and Safety Department.
3. Using powered belt or disk sanders.

5.3 Use of the Chemical Cartridge Half Mask Respirator

Step 1. Select the appropriate cartridge/filter for the task. Install cartridge by centering the cartridge connector in the opening of the yoke. Hold the yoke down against the facepiece between thumb and finger. Align cartridge of filter base down onto the connector and turn in a clockwise direction. Continue turning until a “click” is heard. The click indicates a positive installation has been made. Do not continue to turn the cartridge after the click. Visually check the area between the cartridge and facepiece to ensure the cartridge is seated correctly (it will be flush against the facepiece).

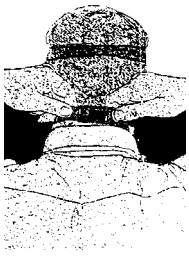


Step 2. Ensure the respirator is assembled correctly and is equipped with the proper filter and/or cartridge.

Step 3. Remove protective eyewear. Place respirator under the chin and over the nose. The narrow part of the facepiece goes over the nose as low as comfortable.

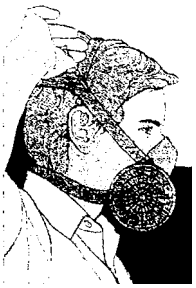
Step 4. Pull the crown straps over the head and position them for comfort. The crown straps are adjustable for different head sizes.

Step 5. Hook the lower headband straps together behind the neck. Adjust the headbands by pulling both ends away from the hook/loop connector.



Step 6. Adjust both upper headbands at the same time by pulling downward from the crown strap. Do not adjust headbands at the yoke. Continue to adjust headbands until a comfortable fit has been achieved. Do not overtighten the respirator to the face.

Step 7. Secure the ends of the upper straps by using the clips molded into the crown straps.



Step 8. Replace protective eyewear.

Step 9. Perform a positive and/or negative pressure fit check.

Positive-Pressure Fit Check - place the heel of the hand over the hole in the exhalation valve cover and exhale with sufficient force to cause a slight positive pressure inside the facepiece. If the facepiece bulges slightly and no air leaks between the face and facepiece are detected, a proper fit has been obtained. If air leakage is detected, reposition the respirator on the face, or re-adjust the tension of the headbands. Repeat the test until a satisfactory seal has been achieved.

Negative-Pressure Fit Check - place the palms of the hands over the cartridge inlets. Inhale for 5-10 seconds with sufficient force to cause a slight collapse of the facepiece. If no air leakage between the facepiece and your face has been detected, a proper fit has been obtained. If air leakage is detected, reposition the respirator on the face, or re-adjust the tension of the headbands. Repeat the test until a satisfactory seal has been achieved.

5.3.1 Do not enter contaminated area if you cannot achieve a proper fit.

5.3.2 Change the filters when increased breathing resistance is noticed.

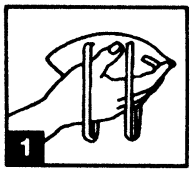
5.3.3 Change the cartridges immediately if a contamination odour is noticed.

5.3.4 Clean and sanitize the mask after each use and store in the plastic bag supplied with the respirator.

5.4 Use of the Disposable Particulate Respirator

5.4.1 Position the disposable particulate respirator as follows:

Step 1. Cup the respirator in your hand, with the nosepiece at your fingertips, allowing the headbands to hang freely below your hand.



Step 2. Position the respirator under your chin with the nosepiece up. Pull the top strap over your head resting it high at the top back of your head. Pull the bottom strap over your head and position it around the neck below the ears.

Step 3. Place your fingertips from both hands at the top of the metal nosepiece. Using two hands, mold the nose area to the shape of your nose by pushing inward while moving your fingertips down both sides of the nosepiece. Pinching the nosepiece using one hand may result in improper fit and less effective respirator performance. Use two hands.

Step 4. Perform a User Seal Check before each use. To check fit, place both hands completely over the respirator and inhale sharply. Be careful not to disturb the position of the respirator. A negative pressure should be felt inside the respirator. If air leaks around nose, readjust the nosepiece as described in Step 3. If air leaks at the respirator edges, work the straps back along the sides of your head.

5.4.2 Replace the mask at the end of each work shift or if breathing resistance increases, whichever occurs first.

5.5 Use of the Supplied-Air Respirator

5.5.1 Use the supplied-air respirator according to the manufacturer's instruction manual.

6 REQUIREMENTS

6.1 All operators carrying out particular fabrication operations on specific materials as listed in Table I shall wear the applicable type of protective respiratory equipment.

6.1.1 Engineering controls, such as local exhaust ventilation, may eliminate the need for respiratory protection.

6.2 Training and “Fit Testing” is required prior to first use of respiratory protection. Consult Bombardier Toronto Environment, Health and Safety Department for the Bombardier Toronto on-site schedule.

6.2.1 Fit Testing is a test performed to ensure that the facepiece respirator is forming an effective seal with the face.

6.3 Replace disposable dust masks when increased breathing resistance is noticed.

6.4 Operate supplied-air respirators according to the manufacturer’s instruction manual.

6.5 Store all protective respiratory equipment in a clean, contamination-free area when not in use.

7 SAFETY PRECAUTIONS

7.1 Observe standard plant safety precautions when performing the procedure specified herein.

7.2 Ensure dust masks and respirator facepieces have a tight but comfortable fit.

7.3 Use supplied air respirators if the airborne isocyanate concentration exceeds 0.005 ppm.

7.4 Operators using materials containing isocyanate or crystalline silica shall participate in the medical monitoring program.

8 PERSONNEL REQUIREMENTS

8.1 Personnel using personal protective respiratory equipment shall have a good working knowledge of the applicable procedure and requirements as specified herein and shall have exhibited their competency to their supervisor.

9 MAINTENANCE OF EQUIPMENT

9.1 Half Mask Cartridge Respirator

9.1.1 Remove the chemical cartridges, filters and inhalation exhaust valves and wash the facepiece using soap and warm water. Rinse in clean warm water and air dry. Do not use solvents to clean the facepiece. Respirator cleaning wipes may also be used to clean the facepiece.

9.1.2 The cartridges trap particles within fibres. As the filters load up, increased breathing resistance will result. Change the filters when this is noticed.

9.1.3 The cartridges absorb potentially hazardous vapours. Change the cartridges as soon as an odour or taste of the contaminant is noticed.

9.1.4 Store the respirator in a clean plastic bag or a suitable clean container when not in use.

9.1.5 Store respirators in a manner to protect it against dust, sunlight, extreme temperatures, moisture and chemicals.

9.2 Supplied-Air Respirator

9.2.1 Refer to the instruction manual included with supplied-air respirators for the proper maintenance procedures.