DE HAVILLAND AIRCRAFT OF CANADA LIMITED

PPS 34.34

PRODUCTION PROCESS STANDARD

PROPRIETARY INFORMATION

Surface Finishing Compounds (F33)

Issue 19
- This standard supersedes PPS 34.34, Issue 18.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- Direct PPS related questions to christie.chung@dehavilland.com or (416) 375-7641.
- This PPS is effective as of the distribution date.

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PPS Group

Approved By: (Stephen Mabee) April 9, 2020

M&P Engineering

Issue 19 - 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 sections of this PPS for detailed procedure and requirements.

- Replaced throughout PPS where “Bombardier” is specified with “De Havilland Aircraft of Canada Limited” or “DHC”.
- Allowed use of the following masking paper and masking tape, when masking is required:
  - Masking paper, non-adhesive (e.g., 3M #06539, 3M #06736 “Scotchblok” or Kraft paper). Secure masking paper in place using the masking tape specified below.
  - Masking tape utilizing rubber based adhesive (e.g., 3M #218 or 3M #8428).
- Deleted DSC 206-2 Huntsman Epibond 156 A/B as it is no longer approved for use under the DSC.
- Replaced all reference to Akzo Nobel with reference to AkzoNobel.
- Replaced references to Akzo Nobel Aerospace Coatings 469-9CA-41B epoxy polyamine putty with reference to AkzoNobel Aerospace Coatings 467-9 composite filler putty; 467-9 composite filler putty is a 2 part compound comprising 467-9 base and CA-41B curing solution.
- Specified that the pot life specified in Table IV is for a 100 gram mix unless otherwise specified. Specified a tolerance for both the application temperature and relative humidity pot life definition.
- Allowed use of DSC 206-2 compound instead of DSC 206-1 compound on aircraft exterior components (i.e., not limit the option to only subcontractors).
- Specified cure times specified in Table V are minimum times and defined room temperature for curing to be 75 ±5°F.
- Added new Disposal of Chemical Waste section.
- Specified to always use the oldest stock first (i.e., first in/first out (FIFO) basis).

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1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for surface finishing composite laminates and sandwich panel assemblies.

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.

1.2 PPS 23.02 identifies the surface finishing specified herein by Protective Treatment Code F33.

2 HAZARDOUS MATERIALS

2.1 Before receipt at De Havilland Aircraft of Canada Limited (DHC), all materials shall be approved and assigned Material Safety Data Sheet (MSDS) numbers by the DHC 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 DHC Environment, Health and Safety Department.

3 REFERENCES

3.1 EHS-OP-005 - Hazardous Materials Management, *DHC internal operating procedure*.

3.2 PPS 10.39 - Machining of Fibre Reinforced Composite Parts.

3.3 PPS 10.40 - Repairs to Laminates & Sandwich Panels.

3.4 PPS 13.26 - General Subcontractor Provisions.

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

3.6 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.7 PPS 23.02 - Protective Treatment and Decorative Surface Finish Code System.

3.8 PPS 31.17 - Solvent Usage.

3.9 PPS 34.08 - Application of Epoxy-Polyamide Primer (F19 & F45).

3.10 QAMTR 012 - Testing of Surface Finishing Compounds.

4 MATERIALS, EQUIPMENT AND FACILITIES

4.1 Materials

4.1.1 Surface finishing compounds (filler), to DSC 206 as listed in Table I. Refer to QAMTR 012 for receipt and shelf life extension testing requirements for surface finishing compounds.

TABLE I - SURFACE FINISHING COMPOUNDS

COMPOUND TYPE	COMPOUND	MANUFACTURER
DSC 206-1	Micro Ultra Filter P-15-3 (Note 1)	Axson Technologies
DSC 206-2	467-9 (i.e., 467-9 base / CA-41B curing solution) composite filler putty	AkzoNobel Aerospace Coatings
	APF 7	Axson Technologies
	Magna Off-White Surfacer 8-W-5/X500	AkzoNobel Aerospace Coatings
	Magna Static Conditioner Filler 28-C-1/X500	AkzoNobel Aerospace Coatings
	Micro Ultra Filter P-15-3 (Note 1)	Axson Technologies
DSC 206-3	Micro Ultra Filter P-15-3 (Note 1)	Axson Technologies
DSC 206-4	Reducer Resin 15-3	Axson Technologies

Note 1. Axson Technologies compound Micro Ultra Filter P-15-3 is qualified to DSC 206-1, DSC 206-2 and DSC 206-3 and may be thinned with DSC 206-4 reducer resin (Axson Technologies Reducer Resin 15-3).

4.2 Equipment

4.2.1 Abrasive paper, aluminum oxide, 120 to 240 grit size.

4.2.2 3M Grade “A” Scotch-Brite nylon web pads.

4.2.3 Lint-free cotton gloves (e.g., DSC 422-1).

4.2.4 Masking paper, non-adhesive (e.g., 3M #06539, 3M #06736 “Scotchblok” or Kraft paper). Secure masking paper in place using the masking tape specified below.

4.2.4.1 Masking tape utilizing rubber based adhesive (e.g., 3M #218 or 3M #8428).

4.2.5 Paperboard Containers, disposable, wax-free (e.g., MELO take-out food containers).

4.2.6 Rubber or nylon squeegee, approximately 4" long.

4.2.7 Rubber gloves (e.g., DSC 422-2).

4.2.8 Sanding blocks, appropriately shaped.

4.2.9 Spatula.

4.2.10 Weighing scales (e.g., triple beam balance type), capable of weighing to ± 0.5 grams.

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 surface finishing of composite laminates and sandwich panel assemblies according to this PPS.

4.3.2 Subcontractors shall direct requests for approval to DHC Quality.

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 shall 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 shall be detailed in the facility report. Based upon the facility report, DHC Engineering may identify additional qualification and/or process control test requirements. During the facility survey, the facility requesting qualification shall be prepared to demonstrate their capability. Once approved, no changes to subcontractor facilities may be made without prior written approval from DHC Quality.

4.3.3.1 For approval of subcontractor facilities to perform surface finishing of composite laminates and sandwich panel assemblies according to this PPS, completion of a test program and submission of suitable test samples representative of production parts is required. Test samples shall meet the requirements specified in section 6.

5 PROCEDURE

5.1 General

5.1.1 Use the surface finishing procedures specified in this PPS for filling surface imperfections or irregularities when the engineering drawing, Engineering Order (EO), or another PPS specifies either “Surface Finish - F33” or “Surface Finish - PPS 34.34” (see Flow Chart 1). This procedure is usually specified only for surfaces that receive an interior decorative paint finish or surfaces that receive the external aircraft paint finish.

5.1.2 The types of imperfections requiring surface finishing according to this standard are listed in Table II. Refer to the applicable fabrication PPS (i.e., PPS 10.35, PPS 10.43, or PPS 10.48) for repair of imperfections which exceed the limits of Table II. Complete the repairs listed in the fabrication PPS before surface finishing according to this PPS.

5.1.3 If masking of part is required, use the masking material as specified in paragraph 4.2.4.

5.1.4 Only finish the surface to be painted, not the back side of the component.

5.1.5 Apply surface finishing compound to surfaces to be metal sprayed (M1) according to PPS 24.01.

5.1.6 In general, DSC 206-1 surface finishing compound is used for small repairs on interior aircraft components, which are subject to flammability requirements, DSC 206-2 surface finishing compound is used for small repairs on exterior components and DSC 206-3 surface finishing compound is used for larger repairs on both interior and exterior aircraft components.

5.1.7 Do not apply F33 to surfaces which are subsequently going to be bonded to another part or structure.

5.1.8 Take care to ensure that only the minimum surface finishing compound required to fill imperfections is used. Remove all excess surface finishing compound.

FLOW CHART 1 - APPLICATION OF SURFACE FINISHING COMPOUNDS

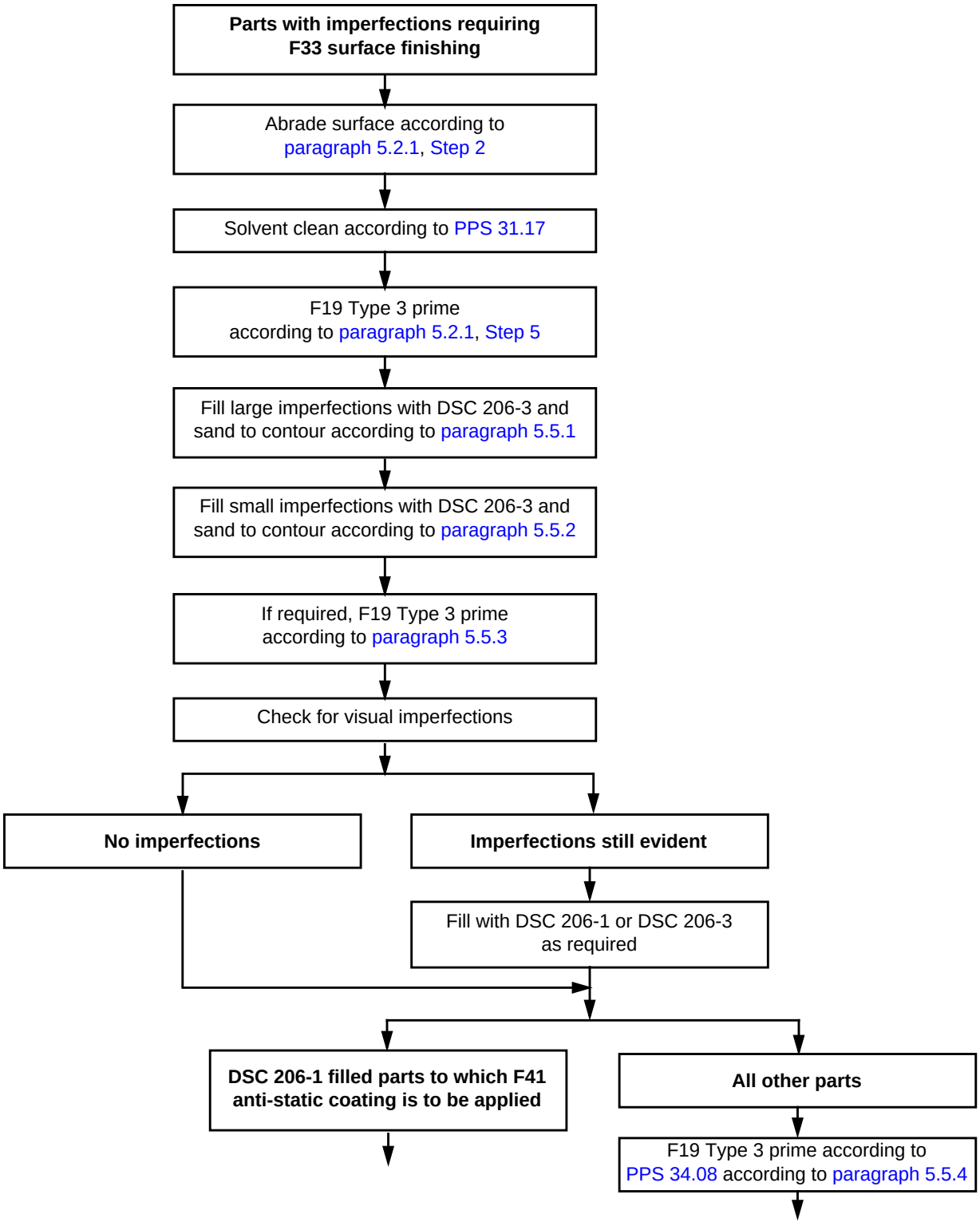
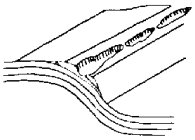
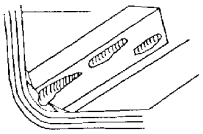
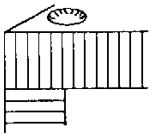
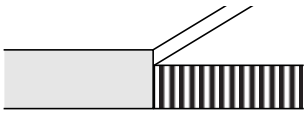
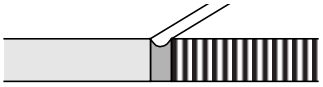
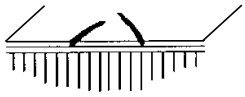


TABLE II - CLASSIFICATION OF IMPERFECTIONS

CLASS	IMPERFECTIONS	DESCRIPTION	ILLUSTRATION	COMPOUND
Large	Excess Resin	• Air bubbles in resin at corners		DSC 206-3
		• Air bubbles in fillets		
	Surface Irregularities	• Depressions at panel pins • Maximum 0.010" deep		
		• Telegraphing of core inserts, edgings, core splices, etc. • Maximum 0.010"		
		• Depressions at core splices • Maximum 0.010"		
		• Dents and dimples • Maximum 0.010" deep • Maximum 1" diameter		
	Surface Scratches (Note 2)	• Fibre damage • First ply only • Maximum depth of 0.005" • Maximum length of 1"		
Small	Surface Scratches (Note 2)	• No fibre damage • Maximum length of 1"		DSC 206-1 for interior parts; DSC 206-2 for exterior parts. (Note 1)
	Wrinkles & Depressions	• Mark-offs from bag folds which do not include a ply in the wrinkle/depression • No fibre damage		
	Pin Holes	• Air bubbles between yarns		

Note 1. Only use DSC 206-2 compound on exterior aircraft parts that have no flammability requirements.
Note 2. Refer surface scratches exceeding 1" in length to DHC MRB or DHC delegated MRB for disposition.

5.2 Preparation of Parts

5.2.1 Prepare parts for surface finishing as follows:

Step 1. Break away any loose resin.

Step 2. Clean and remove the gloss from the indentations by abrading the surface with either 120 to 240 grit aluminum oxide abrasive paper or grade “A” Scotch-Brite nylon web pads. Do not sand through the outer ply of cloth (localized abrasion of the cloth is acceptable). If required, use water as a lubricant.

Step 3. Solvent clean according to PPS 31.17.

Step 4. Protect the cleaned surface from contamination. Wear lint-free clean cotton gloves when handling cleaned parts.

Step 5. Apply a light coat (0.0002" to 0.0004" thick) of F19 Type 3 primer according to PPS 34.08 to aid in detecting small imperfections before surface finishing.

Step 6. Determine the extent of surface imperfections and Type of DSC 206 surface finishing compound to be used to fill.

5.3 Preparation of Surface Finishing Compounds

5.3.1 Two-Part Compounds

5.3.1.1 Prepare two part compounds as follows:

Step 1. Thoroughly stir resin and catalyst to uniform consistencies in separate containers before mixing together.

Step 2. Add the catalyst to the resin in the weight or volume ratio specified in Table III. If mixing by weight, weigh the resin into a disposable paperboard mixing container in even 100 gram increments or fractions thereof (e.g., 1/2 = 50 grams, 2 = 200 grams). Only mix enough surface finishing compound either for the job at hand or to match the amount used within the pot life of the material. Add the required amount of catalyst directly to the base resin on the weigh scale; do not weigh the catalyst into a separate container. It is extremely important that weighing of the finishing compound components be done carefully using an accurate, calibrated weighing scale.

Step 3. Stir the resin and catalyst thoroughly to obtain a homogeneous mix.

TABLE III - MIXING DATA

COMPOUND	COMPONENTS	MIXING RATIO		MANUFACTURER
		PARTS BY WEIGHT	PARTS BY VOLUME	
467-9 composite filler putty	467-9 Base	100	---	AkzoNobel Aerospace Coatings
	CA-41B Curing Solution	2.9	---	
APF 7	Part A - Resin	100	100	Axson Technologies
	Part B - Catalyst	2	2	
Micro Ultra Filter P-15-3 (Note 1)	Part A - Filler Paste	100	100	Axson Technologies
	Part B - White Cream Hardener	2	2	
Magna Off-White Surfacer 8-W-5/X500 (Note 2)	Part A - Resin	---	4	AkzoNobel Aerospace Coatings
	Part B - Catalyst	---	1	
Magna Static Conditioner Filler 28-C-1/X500	1 Part Compound			AkzoNobel Aerospace Coatings

Note 1. If required, thin compound up to 2% by weight or volume with DSC 206-4 reducer resin (i.e., Axson Technologies Reducer Resin 15-3).
Note 2. If required, thin compound up to 2 parts by volume with Laminar X500 Reducer.

5.3.2 One-Part Compounds

5.3.2.1 Thoroughly stir one-part compounds before use. One-part compounds may be applied directly from the container.

5.4 Pot Life

5.4.1 Pot life is the time during which a mixed two-part compound remains suitable for application. The time indicated is for a 100 gram mix unless otherwise specified.

5.4.2 The pot lives specified in Table IV are based on a temperature of 75°F ± 5°F and 50% ± 10% relative humidity. Higher temperature and humidity conditions will shorten the pot life.

5.4.3 Discard excess compound upon expiration of the pot life according to section 9.

TABLE IV - POT LIFE DATA

COMPOUND	MANUFACTURER	POT LIFE
467-9 (i.e,. 467-9 base / CA-41B curing solution) composite filler putty	AkzoNobel Aerospace Coatings	4 hours
APF 7	Axson Technologies	6 minutes
Magna Off-White Surfacer 8-W-5/X500	AkzoNobel Aerospace Coatings	6 to 8 hours
Magna Static Conditioner Filler 28-C-1/X500	AkzoNobel Aerospace Coatings	n/a
Micro Ultra Filter P-15-3	Axson Technologies	4 to 8 minutes

5.5 Application of Surface Finishing Compounds

5.5.1 When substantial contour restoration is necessary (i.e., large imperfections as specified in Table II), use DSC 206-3 surface finishing compound as follows:

Step 1. Using a spatula, apply a small amount of the appropriate surface finishing compound to the repair area and work the compound into the imperfection.

Step 2. After filling the imperfection, remove all excess compound from the surface. Take care to ensure no more surface finishing compound is used than the minimum required to fill the imperfection. Ensure the reworked areas conform to the part contours.

Step 3. Allow the compound to cure according to Table V.

Step 4. Sand the reworked area to the correct contour using 120 to 240 grit aluminum oxide abrasive paper and appropriately shaped sanding blocks.

5.5.2 Fill small imperfections (as specified in Table II) with DSC 206-1 compound as follows. It is acceptable to use DSC 206-2 compound instead of DSC 206-1 compound on aircraft exterior components:

Step 1. Using a nylon or rubber squeegee, work the compound into the imperfection.

Step 2. After filling imperfections, remove all excess compound from the surface. Take care to ensure no more surface finishing compound is used than the minimum required to fill the imperfection.

Step 3. Allow the compound to cure according to Table V.

Step 4. Sand the surface according to PPS 10.39. Take care to prevent sanding residue from entering insert holes.

5.5.3 If more imperfections are suspected after filling, apply a light coat of F19 Type 3 primer (0.0002" - 0.0004" thick) to suspect surfaces according to PPS 34.08. Fill any imperfections which are detected using the above procedure.

5.5.4 After all filling has been completed, apply a final coat of F19 Type 3 primer (0.0004" - 0.0006" thick) as specified in PPS 34.08 to all parts which are not going to be F41 anti-static coated according to PPS 34.19.

TABLE V - CURING DATA

COMPOUND	MANUFACTURER	CURE SCHEDULE
467-9 (i.e., 467-9 base / CA-41B curing solution) composite filler putty	AkzoNobel Aerospace Coatings	6 hours minimum at 75°F ± 5°F (24°C ± 3°C)
APF 7	Axson Technologies	20 minutes minimum at 75°F ± 5°F (24°C ± 3°C)
Magna Off-White Surfacer 8-W-5/X500	AkzoNobel Aerospace Coatings	8 hours minimum at 75°F ± 5°F (24°C ± 3°C)
Magna Static Conditioner Filler 28-C-1/X500	AkzoNobel Aerospace Coatings	4 hours minimum at 75°F ± 5°F (24°C ± 3°C)
Micro Ultra Filter P-15-3	Axson Technologies	15 minutes minimum at 75°F ± 5°F (24°C ± 3°C)

5.6 Clean-Up

5.6.1 Remove uncured surface finishing compound from tools and equipment by solvent cleaning according to PPS 31.17.

6 REQUIREMENTS

6.1 Surfaces shall be smooth and continuous with no evidence of ridges, unevenness, pinholes or voids.

6.2 After surface finishing, parts shall conform to the engineering drawing dimensions.

7 DHC SAFETY PRECAUTIONS

7.1 The safety precautions specified herein are specific to DHC to meet Canadian Federal and Provincial government environmental, health and safety regulations. It is strongly 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 standard plant safety precautions when performing the procedure specified herein.

7.3 Keep surface finishing compounds away from fire and other sources of ignition.

7.4 Do not smoke or eat in surface finishing compound application areas.

7.5 Avoid ingestion of surface finishing compounds. If ingestion occurs, obtain medical attention.

7.6 Avoid prolonged skin contact with surface finishing compounds. Wear protective gloves (see Equipment section, paragraph 4.2.7) when handling the uncured surface finishing compounds or solvents specified herein. Do not wear protective hand cream as it contaminates prepared surfaces.

7.7 Avoid eye contact with surface finishing compound. If eye contact occurs, immediately flush eyes in a directed stream of water for at least 15 minutes while forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissue. Contact the Health Centre and a physician.

7.8 Use sufficient ventilation (i.e., downdraft tables) when applying surface finishing compounds.

7.9 Dispose of used rags in specially marked containers.

7.10 Wear protective respiratory equipment according to PPS 13.13 when sanding or abrading fibre or surface finishing compounds.

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

8 PERSONNEL REQUIREMENTS

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

9 DISPOSAL OF CHEMICAL WASTES

9.1 Dispose of all chemical wastes according to national legislation and local regulations. At DHC, dispose of chemical wastes according to EHS-OP-005.

9.2 At DHC, dispose of chemical contaminated work clothes, rags, etc., into Red Containers labelled “Waste Rags”.

10 STORAGE

10.1 Always use the oldest stock first (i.e., first in/first out (FIFO) basis).

10.2 Store surface finishing compounds and solvents according to the precautions necessary for flammable materials.

10.3 Store surface finishing compounds in a dry area at a temperature of 60°F to 80°F (16°C to 27°C).

10.4 Clearly mark containers with the storage life expiry date.

10.5 Keep containers of surface finishing compounds and solvents tightly closed when not in use.

10.6 Refer to PPS 13.28 for the storage life of two part compounds (resin/catalyst).epi