DE HAVILLAND AIRCRAFT OF CANADA LIMITED

De Havilland

Material Specification

TITLE:	**Base Coat / Clear Coat Paint System**
SPECIFICATION NUMBER:	**DHMS C4.30**
ISSUE:	**E**
AMENDMENT:	**--**
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PAGE:	**1 of 19**

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De Havilland **Material Specification**	**DHMS:** C4.30 **ISSUE:** E **AMD.:** -- **DATE:** September 6, 2019 **PAGE:** i of i
Base Coat / Clear Coat Paint System	

REVISION RECORD

Issue	Page	Description and Reason for Change
A	3	Changed Bombardier Aerospace Toronto finish code F46 to F47
	20	Added Mankiewicz qualified products to QPL
B	20	Added Akzo Nobel qualified products to QPL
Amd. 1	20	Added Mankiewicz slow activator thinner for Basecoat to QPL
C		This is a complete revised issue. Changed spec format
	17	Table 5: Removed fluid resistance test from receipt testing. Non volatile content test is required from suppler only Clarified note 1, removing reference to section A
	20	Added Mankiewicz product 902-11 slow activator thinner for Basecoat to QPL Updated column, row format
D	8	Table 3, fixed error. Was: 0 days, Now: 30 days immersion in Hydraulic fluid
	15	Added Section 6. Material Qualification Requirements
	16	Specified supplier and purchaser batch/lot acceptance tests
	18	Changed Table 5 format
	21	Added Akzo Nobel qualified product to QPL
Amd. 1	21	Added Akzo Nobel A9003 Thinner/Activator for Basecoat to QPL
E		Updated Company Name
	9	Added Section 3.2.30. Wet Tape Adhesion
	17	Added Section 10.1. Environmental Compliance
	18	Added Akzo Nobel A9050 Thinner/Activator for Clearcoat to QPL
	18, 19	Added PRC-Desoto Inc. Products to QPL

1. SCOPE

This specification establishes the requirements for a high solids/non-chromate base coat/clear coat (BCCC) paint system for aircraft exteriors which consists of a non-chromate epoxy primer/polyurethane base coat/polyurethane clear coat. This system is identified by De Havilland Aircraft of Canada Limited finish code F47.

The non-chromate epoxy primer can be applied to primed (F19 base primer) or non primed substrates.

1.1 Classification

Not Applicable

2. APPLICABLE DOCUMENTS

The following documents form part of this specification to the extent defined herein. In the event of conflicting requirements between this specification and those listed below, the requirements of this specification shall govern. Where a specific issue of a document is not stated, the current issue shall be used.

2.1 U.S. Government Specifications

QQ-A-250/4 - Aluminum Alloy 2024, Plate and Sheet
QQ-A-250/5 - Aluminum Alloy, Alclad 2024, Plate and Sheet
MIL-A-8625 – Anodic Coatings for Aluminum and Aluminum Alloys
MIL-DTL-5541 - Chemical Conversion Coatings on Aluminum and Aluminum Alloys
MIL-PRF-23699 - Lubricating Oil, Aircraft Turbine Engine, Synthetic Base, NATO Code Number O-156

2.2 Federal Specifications

TT-S-735 - Standard Test Fluids, Hydrocarbon

2.3 American Society for Testing & Materials

ASTM G26 - Light Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials
ASTM E308 - Practice for Computing the Colors of Objects by Using the CIE System
ASTM D387 - Color & Strength of Color Pigment with a Mechanical Muller
ASTM D522 - Mandrel Bend Test of Attached Organic Coatings
ASTM D523 - Specular Gloss
ASTM D1200 - Viscosity of Paints, Varnishes and Lacquers by Ford Viscosity Cup
ASTM D1210 - Fineness of Dispersion of Pigment-Vehicle Systems
ASTM D1535 - Color by the Munsell System
ASTM D1729 - Visual Evaluation of Colour Difference of Opaque Materials
ASTM D2369 - Volatile Content of Coatings

ASTM D2794 - Resistance of Organic Coatings to the Effect of Rapid Deformation (Impact)
ASTM D3359 - Measuring Adhesion by Tape Test
ASTM D3363 - Film Hardness by Pencil Test

2.4 De Havilland Aircraft of Canada Limited Specifications

DHMS S5.01 - Slow Evaporating, Manual Wipe, Degreasing and Cleaning Compounds
DHMS C4.01 - Fluid Resistant, Epoxy Primer

2.5 Other Company Standards

BMS 3-11, Type IV Class 1, Grade A - Hydraulic Fluid, Fire Resistant

3. REQUIREMENTS

3.1 Component Requirements

3.1.1 Materials - Materials used in the manufacture of this product shall be of high quality and suitable for the purpose.

3.1.2 Components - The primer, base coat and clear coat shall each consist of two or three components, packaged separately, and supplied in kit form. The components shall not be batch oriented. Thinner can also be supplied as a part of the kit.

3.1.3 Condition in Container - The base component of each shall be free from lumps, skins, grit and coarse particles and shall show no more settling or caking than can be easily dispersed with a paddle to form a smooth, homogeneous condition. The catalyst component shall be clear and free of contamination and/or suspended particles.

3.1.4 Shelf Life - The previously unopened, packaged product shall meet all the requirements specified herein after a period of at least two years from the date of manufacture stored at 16 to 30oC (60-85oF)

3.1.5 Non-Volatile Content - The non-volatile content of the base and catalyst components (for all 3 parts of the system shall not vary by more than +/- 2% from the value established on the material qualification report when tested per ASTM D2369. These values shall be kept by Materials & Processes Engineering.

3.1.6 Fineness of Grind - The fineness of grind of the mixed base components of the primer and basecoat shall be not less than 5 and not less than 7 for the clear coat when tested per ASTM D1210.

3.2 Mixed Material Requirements

3.2.1 Application of Coating – The primer, base coat, and clear coat shall be prepared for spraying by mixing all components in the ratios and per the procedure specified by the manufacturer. The manufacturer shall supply a written detailed procedure for mixing the coatings when it supplies a sample for qualification.

Mechanically agitate the base component thoroughly just prior to mixing. Agitate for the time required to incorporate all solids that may have settled out during storage.

Add the proper amount of hardener component to the base component while stirring continuously, never the reverse. If required, thin mixed material according to manufacturer's recommendations. Allow the freshly mixed coatings to stand for the induction time specified by the manufacturer. After the induction period, the mixed material shall meet requirements of section 3.2.2.

. **3.2.2 Spraying Properties –** When the base and catalyst components of each part of the system (primer, base coat and clear coat) are mixed according to manufacturer's instructions, the mixed material shall exhibit satisfactory spraying characteristics with acceptable leveling properties. The catalyzed material shall spray satisfactorily with no sagging, running or streaking.

3.2.3 Viscosity – The viscosities of each part of the system, after mixing for 30 minutes, when tested per ASTM D1200, shall be such that they can be sprayed, with or without the addition of a thinner. The required spraying viscosities shall be as specified in Table 1.

Table 1: Viscosity (Sec)

Component	Gardco EZ Zahn Cup#2	ASTM D4212 Gardco Ford Cup #4
Primer	19-30	10-21
Base coat	21-41	14-35
Clear coat	18-27	10-19

3.2.4 Pot Life – A sample of catalyzed material, reduced if necessary, shall show no lumping, seeding, gelling or separation after being stored in a closed container for the time specified below and shall meet the requirements for Viscosity (3.2.3), Spraying Properties (3.2.2), Wet Tape Adhesion (7.3.9), Flexibility (7.3.10), Impact Resistance (7.3.11), and Fluids Resistance (7.3.12, BMS 3-11, Type IV Class 1, Grade A Phosphate Ester Base Hydraulic Fluid immersion for 7 days only): ***3 hours minimum for the primer, and 2 hours minimum for the base coat and the clear coat.***

3.2.5 Surface Appearance – The coating system, after 8 hours drying time, shall be free from streaks, blisters, solvent popping and coarse particles. The dried film shall be free from grit, seeds, craters, blisters or any other surface irregularities.

3.2.6 Colour – When viewed in a MacBeth Daylight Booth, Illuminate C (or equivalent), the colour of the dry-through coating system (primer + basecoat + clearcoat) applied in accordance with section 3.2.1, shall match the colour specified in the Purchase Order in accordance with Federal Standard 595, or other colour standards agreed upon by De Havilland Aircraft of Canada Limited and the manufacturer.

3.2.7 Gloss – When applied in accordance with section 3.2.1, and when tested per ASTM D523, the 60 degrees specular gloss of the dry-through film system shall show a value of 90 minimum.

3.2.8 Drying Time – The manufacturer shall provide a drying times table for the primer, the base coat, and the clear coat (for Production Process Specification guidelines), and when using the associated standard thinner, the system shall meet the drying characteristics per Table 2 when tested in accordance with FTMS 141 Method 4061.

Table 2: Drying Characteristics

Component	Drying Temp/RH	Recoat Time	Dry to Tape
Primer	24 ±3°C/50 ±30%	4hr max.	6hr max.
Base coat	24 ±3°C/55 ±25%	2hr max.	2-4 hr
Clear coat	24 ±3°C/55 ±25%	Dust Free - 3hr Max	Dry to touch – 5hr max Dry through – 7hr max

3.2.9 Flexibility – When tested as specified below, there shall be no separation of the primer from the substrate, no separation of the basecoat from the primer, no separation of the clear coat from the base coat, or any other adhesion failures. Two each of BCCC system coated Type B and Type C panels (per Table 4) shall be bent over a 0.25" mandrel and tested per ASTM D522 Method B.

3.2.10 Low Temperature Flexibility – When tested as specified below, there shall be no cracking, blistering, loss of adhesion (i.e. rating 5B per ASTM D3359), or other film failures.
Two each of BCCC system coated Type B and Type C panels shall be conditioned at -54 ± 3°C (-65 ± 5°F) for 5 ± 0.5 hours. The specimens then shall be rapidly bent over a 4" diameter mandrel that has been conditioned at the same temperature and time as the test specimens per ASTM D522 Method B.

3.2.11 Pencil Hardness – The cured primer and the cured coating system shall have a minimum pencil hardness of F when tested per ASTM D3363.
Test Procedure:
Prepare two panels according paras.4.1 - 4.4 and two panels per paras.4.1 and 4.2 (NC primer only). Use a set of drawing pencils as specified in ASTM D3363. Strip the wood away for about 3/8 inch. Square the end by holding the tip of the pencil in a vertical position and moving the lead back and forth over a piece of 400 grit or finer sandpaper. Square the tip after each trial test. Start

with the softest lead first. Lay the test panel flat and determine pencil hardness by pushing the lead across the surface of the coating at a 45º angle (using a suitable jig/template) until one is found which will cut or scratch the coating. The number of the lead of this pencil shall be used to express the pencil hardness of the coating.

3.2.12 Fluid Resistance – When immersed in fluids per **Table 3**, the BCCC system shall show no blistering, loss of adhesion or other deleterious effects after the specified immersion time. Two each of specimens B and C per **Table 4** shall be tested in each fluid per ASTM D3359 Method B within 30 minutes of removal from the test fluid. After a recovery period of 24 hours, the coating shall have regained its pre-test hardness.

Table 3: Fluid Resistance Test

Test Fluid	Immersion Time	Fluid Temperature
Distilled water	30 days	Ambient
Lubricating oil MIL-PRF-23699	24 hours	250^0F
BMS 3-11 Type IV, Class 1, Grade A. hydraulic fluid	30 days	Ambient
Jet A-1 Fuel	30 days	Ambient

3.2.13 Impact Resistance – The BCCC system shall exhibit no flaking or cracking, when subjected to an impact of 80 in-lb, both forward and reverse (+ve and –ve). Two specimens each of type B and C shall be tested to ASTM D2794. The examination for flaking or cracking shall be performed with the unaided eye.

3.2.14 Wrap Capability – The test specimens, Type F shall be mounted vertically and electrically grounded. The coating system shall be applied per 4.2, 4.3 and 4.4, from one direction only using electrostatic spray equipment. The maximum coating thickness variation for the BCCC system, when determined after 7 days of air cure, shall be 0.0004" for the NC primer, 0.0008" for primer and basecoat, and 0.0012" for the system (primer, basecoat & clearcoat).

3.2.15 Weather Resistance – When tested as specified in 5.1, the gloss retention of the coating system shall be greater than 90%, and there shall be no film deterioration after a minimum of 2000 hours exposure. In addition, the color change (dE) shall be less than 1.0. Furthermore the panels shall maintain an Impact Resistance of 80 in-lb (+ve and –ve) when tested per 3.3.13.

3.2.16 Whirling Arm Rain Erosion Resistance – The coating system shall not peel more than 0.25" from the paint leading edge when tested per paragraph 5.2 using D & E test specimens per **Table 4**.

3.2.17 Corrosion Resistance – When tested as specified below, there shall be no visible corrosion of the metal beyond 1/8 inch from the scribe marks and no evidence of blisters in the coating after exposure to salt spray for 3000 hours.

Test Procedure:

Prepare 3 x MIL-A-8625 anodized 2024 bare aluminum test panels (6"x3") according to sections 4.2, 4.3 and 4.4. Scribe 2 intersecting lines, 1/16th to 1/8th inch (1.6 to 3.2 mm) wide, extending from corner to corner of the panel, through the coating and the pre-treatment, and down to the base metal.

Expose panels to 5% salt spray fog in an apparatus confirming to ASTM B117, with the exception that the panels must be inclined 6 degrees from the vertical, for the time specified above. Examine the panels for evidence of corrosion beyond 1/8 inch from scribe marks and for blisters on the finish system.

3.2.18 Filiform Corrosion – When tested as specified below, there shall be no visible corrosion of the metal beyond 1/8 inch from the scribe marks and no evidence of blisters in the coating.

Prepare 3 x MIL-DTL-5541 Class 1A chemical conversion coated 2024 clad aluminum test panels (6"x3") according to sections 4.2, 4.3 and 4.4. Scribe two intersecting lines, 1/16th to 1/8th inch (1.6 to 3.2 mm) wide, extending from corner to corner of the panel through the coating system and the pre-treatment, and down to the base metal (the scribe must also penetrate through the Alclad layer).

Expose the test panels to vapour from 12 Normal HCl for 1 hour at 75 ± 5°F (24 ± 3°C) by suspending them approximately 2 inches above the liquid level in a closed container similar to the one shown in **Figure 1**. Do not rinse or dry.

At the end of the acid-vapour exposure period, immediately transfer the specimens to a humidity chamber maintained at 95 ± 5°F (35 ± 3°C) and 80% ± 5% relative humidity. Position the panels with the long (6 inch) dimension 6 degrees from the vertical and the short (4 inch) dimension horizontal. After 30 days, examine the panels for corrosion, blisters and other film failures.

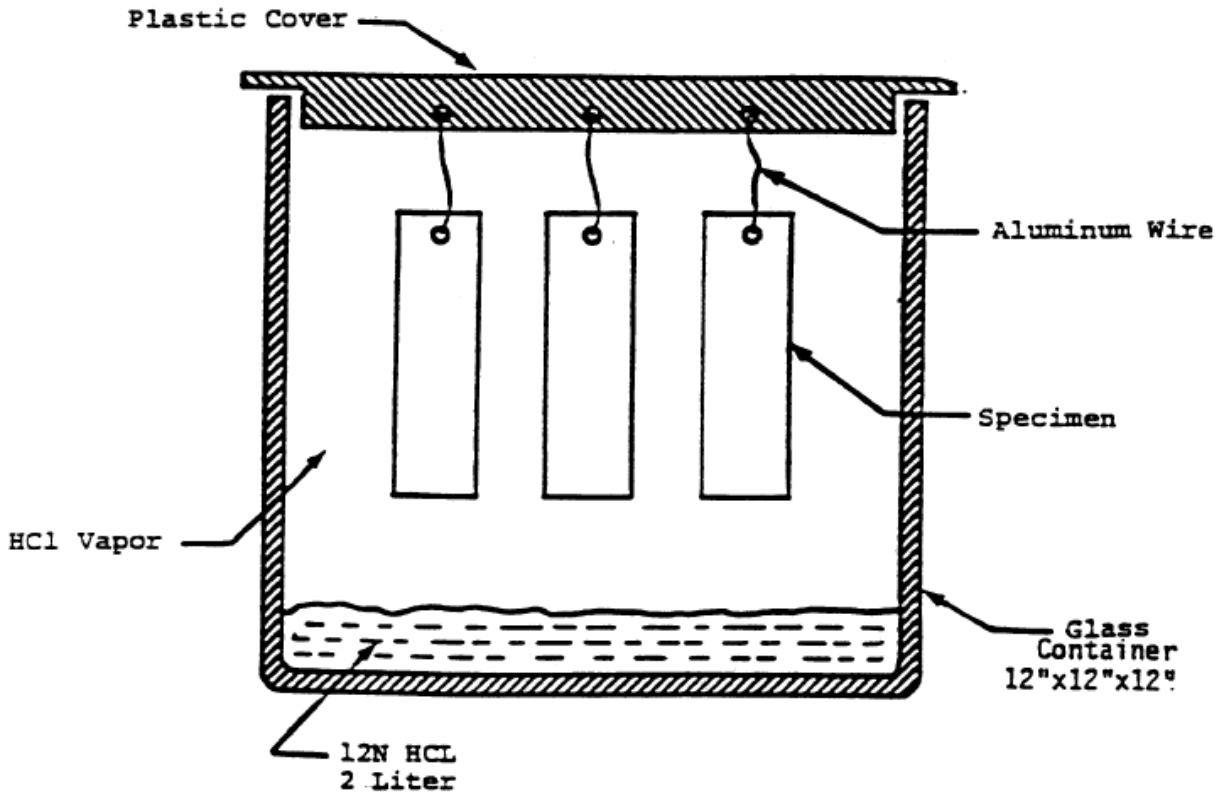

FIGURE 1: ACID-VAPOUR EXPOSURE CHAMBER

3.2.19 Reactivation after Contamination - When tested as specified below, the panels shall be capable of meeting the requirements of each test specified below.

Apply NC primer per para.4.2 to 6 x Type B test panels and 6 x Type C panels, and let cure for 24 hours at 75 ± 5°F (24 ± 3°C). Contaminate 2 x panels each for 7 days at 75 ± 5°F (24 ± 3°C) as follows.

a) Immerse panels in BMS 3-11, Type IV Class 1, Grade A hydraulic fluid.
b) Immerse panels in MIL-PRF-7808 lubricating oil.
c) Cover panels with DHMS C4.12, Type II, Grade 3 compound.

At the end of the contamination period, wipe panels with clean cheesecloth and clean using DHMS S5.01 solvent, wiping off immediately after being applied. Re-activate the surface by scuff sanding using Scotch-Brite pads or with 220grit or finer sand paper. Then, apply base coat and clear coat as described in sections 4.3 and 4.4.

Test for Wet Tape Adhesion per ASTM D3359, Method B. The area evaluated shall show a rating of 4B or better and no blistering, wrinkling or other surface irregularities shall be evident.

3.2.20 Wet Tape Adhesion – Panels B and C (Table 4) shall be immersed in distilled water for 7 days @ 24±3°C. The BCCC system shall show a minimum adhesion rating of 4B as defined in ASTM D3359. No film defects shall be observed.

4. PREPARATION OF TEST SPECIMENS

4.1 Preparation of Test Specimens

Prepare test specimens in **Table 4** as follows:

4.1.1 Test specimen A shall be primed with epoxy primer to DHMS C4.01 Type 2 to a dry film thickness of 0.0004 to 0.0006" and cured for 7 days min. at ambient conditions without aging.

4.1.2 Test specimens B and D shall be primed with epoxy primer to DHMS C4.01 Type 2 to a dry film thickness of 0.0004 to 0.0006" and cured for 7 days min. at ambient conditions. The primer then shall be aged outdoors for 6 months min., or UV aged for 40 hours continuously (Atlas UVcon, Model UC1, using UVA-340 fluorescent lamps, or equivalent).

4.1.3 Test specimens C and E shall be primed with epoxy primer to DHMS C4.01 Type 3 to a dry film thickness of 0.0004 to 0.00006" and cured for 7 days minimum at ambient conditions. The primer then shall be aged outdoors for 6 months min., or UV aged for 40 hours continuously (Atlas UVcon, Model UC1, using UVA-340 fluorescent lamps, or equivalent).

4.1.4 Cleaning of Stored and Primed Test Specimens - After ageing of the specimens, hand scuff primer using 180 grit aluminum oxide abrasive paper to remove approximately 1/2 of the thickness of the aged primer, ensuring that the primer is not penetrated. Clean the test panels using DHMS S5.01 Class 2 and a fine Scotch Brite pad and wipe dry with a clean lint-free cloth. Immediately after cleaning, apply the BCCC system as described in the following sections.

4.2 Primer - The primer shall be applied to the suitably prepared surface of test panels (types shown in Table 3) to achieve a dry film thickness of 0.6 to 0.9 mils. Allow the primer to air cure for a minimum of 4 hours, or for the time recommended by the manufacturer, at 75 ± 5°F (24 ± 3°C) and 50 ± 5% relative humidity before applying the basecoat.

4.3 Base coat - The base coat shall be applied over the primer within 48 hours from its application, to achieve a total dry film thickness of 1.0 to 2.0 mils. Allow the base coat to air cure for a minimum of 3 hours, or for the time recommended by the manufacturer, at 75 ± 5°F (24 ± 3°C) and 50 ± 5% relative humidity before applying the clear coat.

4.4 Clear coat - The clear coat shall be applied over the basecoat within 48 hours from its application, to achieve a total dry film thickness of 1.8 to 2.2 mils. Allow the clear coat to air cure for 7 days at 75 ± 5°F (24 ± 3°C) and 50 ± 5% relative humidity before testing, unless otherwise specified.

4.5 Test Specimen Types – The specimens described in Table 4 shall be coated with the BCCC system for testing, unless otherwise noted.

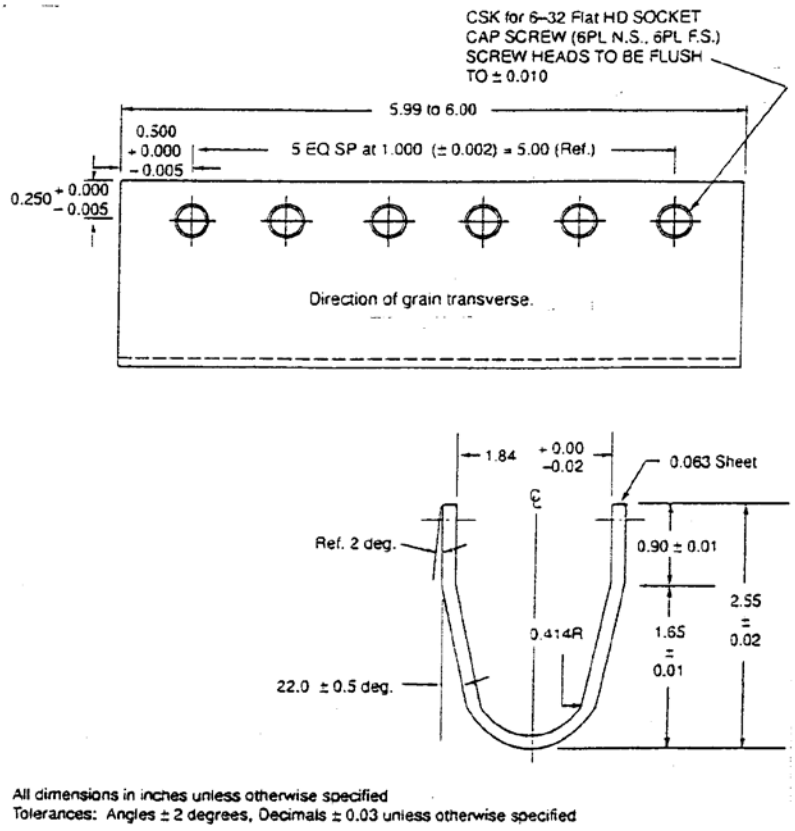

FIGURE 2: WHIRLING ARM TEST SPECIMEN

Table 4: Test Specimen Types

Specimen Type	Lab Drawing	Material	Size	Pre-treatment
A	**062-1C2**	2024T3 Clad to QQ-A-250/5	3" x 6" x 0.032"	Chemical conversion coat to MIL-DTL-5541 Class 1A+ F19 primer to DHMS C4.01 Type 2(Aged)
B	**062-1C2**	2024T3 Clad to QQ-A-250/5	3" x 6" x 0.032"	Chemical conversion coat to MIL-DTL-5541 Class 1A + F19 primer to DHMS C4.01 Type 2(Aged)
C	**062-1C3**	2024T3 Clad to QQ-A-250/5	3" x 6" x 0.032"	Chemical conversion coat to MIL-DTL-5541 Class 1A + F19 primer to DHMS C4.01 Type 3 (Aged)
D	**070-1-2**	2024T3 Clad to QQ-A-250/5	Figure 2 stock size, approx.7" x 8" x .063"	Chemical conversion coat to MIL-DTL-5541 Class 1A + F19 primer to DHMS C4.01 Type 2 (Aged)
E	**070-1-3**	2024T3 Clad to QQ-A-250/5	Figure 2 stock size, approx.7" x 8" x .063"	Chemical conversion coat to MIL-DTL-5541 Class 1A + F19 primer to DHMS C4.01 Type 3 (Aged)
F	**071-1**	Any aluminum alloy tube	1" dia. x 16" long, any wall thickness	Chemical conversion coat to MIL-DTL-5541 Class 1A

5 TEST METHODS

Unless otherwise specified, tests shall be conducted at 18 to 25°C (64 to 77°F) and 30 to 80% relative humidity.

5.1 Weather Resistance

5.1.1 Weatherometer – Prepare 2 x test panels according to 4.1 - 4.4 and Table 4 (Type B). Measure gloss prior to exposure as described in section 3.2.7. Keep one panel as a reference, and expose the other panel to the weatherometer per ASTM G152, ASTM G153, or ASTM G155 Cycle 1 for 2000 hours minimum. Daylight filter shall be used. Wash panels gently with DI water. Allow panel to drain and dry at 75 ± 5°F (24 ± 3°C) without wiping. Measure gloss per section 3.2.7 and

measure color change (dE) after exposure per ASTM E1349 or equivalent procedure, and examine for film deterioration.
Calculate the % gloss retention value as follows: Divide the gloss reading after exposure by the initial gloss reading, and multiply by 100.

5.1.2 UVCON / QUV

Requirement:

When tested as specified below, the gloss retention of the coating system shall be greater than 90%, and there shall be no film deterioration after a minimum of 2000 hours exposure. In addition, the color change (dE) shall be less than 2.5.

Test Procedure:

Prepare 2 x test panels according to 4.1 – 4.4 and Table 4 (Type B).
Measure gloss prior to exposure as described in section 3.2.7. Keep one panel as a reference, and expose the other panel to the Atlas UVCON or Q-Lab QUV (or equivalent) weathering device per ASTM G154, Cycle 2 for 2000 hours minimum. UVB-313 or UVA-340 lamp shall be used. Wash panels gently with DI water. Allow panel to drain and dry at 75 ± 5°F (24 ± 3°C) without wiping. Measure gloss and measure color change (dE) after exposure per ASTM E1349 or equivalent procedure, and examine for film deterioration.
Calculate the % gloss retention value as follows: Divide the gloss reading after exposure by the initial gloss reading, and multiply by 100.

5.2 Whirling Arm Rain Erosion Resistance - Immerse the test specimens (per Figure 2) in water at 24 ± 3°F (75 ± 5°F) for 24 hours prior to testing. Start the test within 1 hour of removal from water. Secure the specimen to the whirling arm fixture. Expose the specimen to 385 miles per hour (at specimen mid point) with 3 to 4" per hour water spray (1 to 4 mm drop size) for 30 minutes. The above test set-up and requirements (para.3.3.16) are applicable to the Boeing Seattle Whirling Arm system. For other test set-up parameters, the exposure time will vary, and the correct correlation must be established before testing and stated in the test report.

6. MATERIAL QUALIFICATION REQUIREMENTS

6.1 Request for Qualification

All requests for qualification to this specification shall be addressed to De Havilland Aircraft of Canada Limited Materials Technology Engineering department for approval.

All material qualification shall be site specific

An audit of the manufacturers and/or test facilities by Materials Technology Engineering may be necessary prior to approval.

6.2 Qualification Testing

Potential suppliers shall submit a written qualification test report based on 3 batches/lots of materials showing compliance with the requirements contained in section 3. The test report shall contain actual numerical test values, average test results as well as failure modes where applicable.

A sample shall be submitted for testing at the discretion of De Havilland Aircraft of Canada Limited Materials Technology for evaluation.

6.3 Qualification by Similarity

Where a product has been qualified to another similar specification, the supplier may submit the qualification data applicable to this specification for consideration. The similar specification may be a government, company, or other aerospace specifications where the requirements are similar to this specification.

6.4 Process Control Document

The manufacturer shall develop and maintain a Process Control Document (PCD). The PCD shall define the manufacturing and quality control requirements and procedures for assuring consistent, uniform and complaint products. The PCD shall identify baseline chemical constituents, in-process test procedures and requirements, and manufacturing procedures. All specifications and test procedures employed during the process shall also be listed and issue/date controlled.

When qualification has been granted, the PCD shall be signed by the supplier and De Havilland Aircraft of Canada Limited Materials Technology Engineering and shall not be changed without prior written approval.

The PCD and all production data shall be available to any De Havilland Aircraft of Canada Limited auditors when requested.

6.5 Qualification

Upon review of supplier's data, PCD and De Havilland Aircraft of Canada Limited tests, the supplier will be advised either of product qualification or reasons for disqualification. Products that are qualified will be listed in the Qualified Products List of this specification.

No changes in the method of manufacture and/or formulation shall be made without notification and prior written approval of the Materials Technology Engineering Department.

Re-qualification of the product may be requested by the De Havilland Aircraft of Canada Limited Materials Technology if there are any changes in the method of manufacture and/or formulation.

7. QUALITY ASSURANCE REQUIREMENTS

7.1 Definitions

Batch is defined as the end product of all the raw materials mixed and/or manufactured at the same time and place. The weight or volume may vary depending upon the capacity of the manufacturer's facilities.

Lot is defined as the total quantity of product in a shipment taken from the same batch.

7.2 Supplier Batch/Lot Acceptance Tests

The manufacturer/supplier is responsible for the performance of all sampling, inspection and testing of each batch/lot as specified in Table 5.

The manufacturer/supplier shall issue with each batch of product one copy of an Acceptance Test Report showing actual test data conformance to the acceptance tests specified in Table 5. The report shall include the supplier's batch identification, materials specification and date of testing. De Havilland Aircraft of Canada Limited Materials Technology Engineering reserves the right to perform any or all of the tests set forth in this specification to ensure that the product continues to meet specification requirements. Any product not meeting the requirements of this specification will be returned to the supplier at the supplier's expense.

The manufacturer/supplier shall certify with a Certificate of Conformance that each batch of each shipment meets the requirements of this specification.

7.3 Purchaser Batch/Lot Acceptance Tests

The purchaser/user is required to perform all sampling, inspection and testing of each batch/lot as specified in Table 5.

Table 5: Qualification and Batch Acceptance Tests

Tests	Para.	Qualification	Acceptance		Shelf Life
			Manuf./Supplier	Purchaser/User	
Condition in the Container [1]	para. 3.1.3	X	X	X	X
Non Volatile Content [1]	para. 3.1.5	X	X		
Viscosity [1]	para. 3.2.3	X	X	X	X
Fineness of Grind	para. 3.1.6	X			
Pot Life	para. 3.2.4	X	X	X	X
Drying Time [1]	para. 3.2.8	X	X		
Surface Appearance	para. 3.2.5	X	X	X	
Colour Match	para. 3.2.6	X	X		
Gloss	para. 3.2.7	X	X		
Flexibility	para. 3.2.9	X			
Low Temperature Flexibility	para. 3.2.10	X			
Hardness	para. 3.2.11	X			
Fluid Resistance [2]	para. 3.2.12	X			
Impact Resistance	para. 3.2.13	X	X	X	
Wrap Capability	para. 3.2.14	X			
Weather Resistance	para. 3.2.15	X			
Rain Erosion Resistance	para. 3.2.16	X			
Corrosion Resistance	para. 3.2.17	X			
Filiform Corrosion Resistance	para. 3.2.18	X			
Reactivation after Contamination	para. 3.2.19	X			
Wet Tape Adhesion per ASTM D3359, Method B	para. 3.2.20		X		

NOTES:

[1] These properties shall be reported individually for the primer, the base coat and the clear coat, and each associated component (e.g. hardener and thinner), as applicable. If components are purchased separately, the tests of **[3]** are required only for the applicable component(s) being purchased.
If primer is purchased separately, the cured film shall be tested both individually (set of panels with primer only) and in conjunction with the associated base coat and clear coat..

[2] For Acceptance Test, only BMS 3-11 Type IV, Class 1, Grade A. hydraulic fluid is required.

[3] All Batch Acceptance Tests are required of the Manufacturer/Supplier.

8. ORDERING DATA

8.1 Prerequisite

Products furnished under this specification for production use shall be qualified and listed on the Qualified Products List prior to issuing of a Purchase Order.

7.2 Procurement documents shall specify the following:
- Title, Number, Issue and Amendment Number of this Specification
- Manufacturer's Name and Product Identification (Trade Name or Code Number)

- Type or Size of Containers
- Total Quantity
- Coating Type
- Acceptance Report
- Safety Data Sheets

9. PREPARATION FOR DELIVERY

9.1 Preservation and Packing

The BCCC system shall be packed in such a manner as to ensure that, during shipment and storage, the products will be protected against damage from exposure to hazards which would adversely affect conformance to the properties per Section 3 of this specification.

9.2 Packaging

The paint system shall be supplied in kits packaged as a unit, or as separate components in bulk form as stated on the Purchase Order, consisting of base components and the required amount of catalyst and thinner to bring each part of the system (NC primer, base coat and clear coat) to spraying consistency.

9.3 Marking

Each container shall be legibly marked with the following information:

- Primer (conforms to DHMS C4.30), Base coat (conforms to DHMS C4.30) and Clear coat (conforms to DHMS C4.30)
- Manufacturer's Name and Product Identification (trade name or code number)
- Date of Manufacture
- Batch Number
- Net Quantity (Imperial, U.S. or metric measure)

9.4 Shipping Documentation

Shipping document shall show:

- De Havilland Aircraft of Canada Limited Purchase Order No.
- Specification DHMS C4.30, issue, Amd.
- Number of Containers
- Batch Number
- Total Quantity (Imperial, U.S. or metric measure)
- Acceptance Test Reports (Certificate of Conformance)
- Safety Data Sheets

10. HEALTH AND SAFETY DATA

When supplying samples for qualification per Para. 6.2.2, the supplier shall submit a Safety Data Sheet (SDS) complying with the "Controlled Products Regulations" of the Hazardous Products Act (also known as W.H.M.I.S. Regulations). The document must state all hazardous ingredients, safe-handling procedures, first-aid measures, fire and explosion data, re-activity data, physical properties, preparation information and procedures for storage and disposal.

This SDS must then be submitted with a completed EHS-FO-025 form, "Application To Introduce A New Hazardous Material", to the EHS Department/Material Safety Committee.

Upon receipt of EHS-FO-025 form, “Recommendation" that approves the use of the material, it can then be included on the Qualified Products List.

NOTE: Any change in the formulation of the material requires a re-submission of the SDS.

10.1 Environmental Compliance

Materials and ingredients used in manufacturing the product shall comply to REACH regulations. Prohibited substances or restricted from certain uses under an Environmental Regulation shall now be used for the specified prohibited applications.

Supplier shall notify De Havilland Aircraft of Canada Limited Materials Technology Engineering department if the product contains targeted substances.

QUALIFIED PRODUCTS LIST

Manufacturer	Product Identification		Qualification Testing	MSDS	Product Approval
SEEVENAX Primer *Mankiewicz Gebr. & Co.* *Georg-Wilhelm-Str 189* *D-21107 Hamburg*	113-44 135-44 902-66	Base Hardener Thinner	Tested as a system (Primer/Basecoat/ Clearcoat) PQS#1	3878 3879 3880	Jan 13, 2012
ALEXIT-H/S-Base Coat 411-22 *Mankiewicz (as above)*	411-22 405-86 902-31 902-21 902-11	Base Hardener Activated Thinner Slow Activated Thinner		3881 3876 3877 3944 4031	Jan 13, 2012 June 17, 2016 Aug 19, 2016
ALEXIT-H/S-Clear Coat 411-14 *Mankiewicz (as above)*	411-14 405-86 901-72	Base Hardener Activated Thinner		3872 3876 3882	Jan 13, 2012
ALUMIGRIP 4101P001 Primer *Akzo Nobel Aerospace Coatings,* *1 East Water Street* *Waukegan, IL 60085* *USA*	4101 CS 4901	Base Curing Solution	Tested as a system (Primer/Basecoat/ Clearcoat) PQS #2	3870 3871	Feb 20, 2012
AERODUR 3001G10009 Base Coat *Akzo Nobel Aerospace Coatings (as above)*	3001 CS 6000 A9002 A9003	Base Curing Soln Thinner/Activator Thinner/Activator		3808 3874 3872 3872	Feb 20, 2012 Feb 11, 2019
AERODUR 3002G00002 Clear Coat *Akzo Nobel Aerospace Coatings (as above)*	3002 CS 6003 A9050 A9055 A9056	Base Curing Soln Thinner/Activator Thinner/Activator Thinner/Activator		3868 3869 N/A 3873 3873	Feb 20, 2012 Sept 6, 2019 Sept 20, 2018
DESOPRIME Primer *PRC-Desoto Inc.* *11601 United Street* *Mojave, CA 93501* *USA*	CF/CA7502EW CA7502EBW CA7502EC CA1805CX	Base Hardener Thinner Reducer	Tested as a system (Primer/Basecoat/ Clearcoat) PCD-M65 Rev. ORG		Sept 6, 2019

Desothane HD **Base Coat** *PRC-Desoto Inc. (as above)*	9008 Series 9008B 9008C, C2, C4	Base Hardener Thinner	PCD-M64 Rev. ORG		Sept 6, 2019
Desothane HS **Clear Coat** *PRC-Desoto Inc. (as above)*	CA9005A CA9005B CA9005C, CR	Base Hardener Thinner			Sept 6, 2019