

# de Havilland Material Specification

<b>TITLE:</b>	<b>FABRIC, AIRCRAFT UPHOLSTERY</b>
<b>SPECIFICATION NUMBER:</b>	<b>DHMS F 5.05</b>
<b>ISSUE:</b>	<b>D</b>
<b>AMENDMENT:</b>	<b>--</b>
<b>DATE:</b>	<b>DECEMBER 5, 2005</b>
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**REVISION RECORD**

<b>Issue</b>	<b>Page</b>	<b>Description and Reason for Change</b>
Iss.B Amd.4	11	QPL page added.
B Amd.5	3	Para. 4.4 - Clarify flammability requirement after 10 dry cleanings.
	10	Para. 8.0 Health & Safety Data revised
C		This is a complete revised issue. Detailed changes have not been noted.
D	QPL	Added product F2041P0074S2. Changed company logo.

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**1 SCOPE**

This specification covers the requirements for aircraft interior upholstery fabric for seat covers and decorative material.

**1.1 Classification**

The fabric shall be supplied in the following class:

Class 1 - Satisfy Flammability criterion to FAR 25.853(a), APP.F, PART I(1)(ii), Amd. 25-86

**2 APPLICABLE DOCUMENTS**

The following documents, of the issue in effect on the date of the invitation for bids, form a part of this specification, to the extent specified herein.

**2.1 Government Specifications**

- |             |   |
|-------------|---|
| CGSB 4-GP-2 | - Canadian Government Specification Board     |
| CCC-T-191b  | - Federal Specification: Textile Test Methods |

**2.2 American Society for Testing and Materials**

- |            |  |
|------------|--|
| ASTM D3776 | - Test Method for Mass per Unit Area (Weight) of Woven Fabric                          |
| ASTM D4157 | - Test Method for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder Method) |
| ASTM D4158 | - Test Method for Abrasion Resistance of Textile Fabrics (Uniform Abrasion Method)     |

**2.3 Federal Aviation Administration**

- |                                      |                             |
|--------------------------------------|-----------------------------|
| FAR 25.853(a), APP. F, PART I(1)(ii) | - Flammability Requirements |
| Amd.25-86                            |                             |

**3 REQUIREMENTS**

For qualification purposes, the vendor shall submit five 6.5" x 10.5" samples (of the initial batch of material manufactured to this specification) for approval of design, colour and texture. One sample shall be designated as the Master Standard; the remaining four samples shall be used as Working Standards. De Havilland (DHI) will assign a Design Standard Number to these samples.

**3.1 Materials**

The fabric shall be manufactured from yarns of animals, vegetables, or synthetic fibers, or combination thereof. The type of weave and fibers used shall be the same as the sample approved by the purchaser.

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**3.2 Finish**

The design, colour and texture shall be compared with the previously submitted and approved sample retained by the purchaser. When viewed side by side with the approved sample in a MacBeth Industrial Colour Matching Unit, or equivalent, the two specimens shall match. The direction of illumination shall be normal to the surfaces being compared. Both "North Sky Daylight (7500K)" and "Horizon Sunlight (2300K)" shall be used.

**3.3 Mildew Resistance**

The material shall not support mildew growth and shall not have a noticeable odour when tested as specified in the following paragraphs:

3.3.1 A 2" x 2" sample of fabric shall be placed in a suitable 100 cc container with a tight lid and 10 cc of distilled water shall be added to saturate the specimen.

3.3.2 The tightly closed container shall be incubated at 100° F for 45 days.

3.3.3 After the 45 days the specimen shall be removed and examined for odour and mildew growth.

3.3.4 Report "mildew" results as:

Satisfactory - no visible growth of mildew

Unsatisfactory - any visible growth of mildew

3.3.5 Report "odour" results as:

None - no objectionable odour

Slight - a barely detectable odour

Noticeable - an easily detectable objectional odour

Severe - an extremely objectionable odour.

**3.4 Flammability**

Class 1 material shall meet the requirements of FAR 25.853(a), APP. F, PART I (1)(ii), Amd.25-86 when tested as received and after 10 dry cleanings.

**3.5 Cleanability**

3.5.1 The fabric shall have a rating of "good" when dry cleaned using the solvent and procedures specified in CCC-T-191b, method 5621, but eliminating the water rinse.

3.5.2 The fabric rating shall be established as follows:

- Good No appreciable change in colour; no staining of the colour transfer fabric.

- Fair Appreciable, but not objectionable change in colour; slight, but not objectionable staining of transfer fabric.

- Poor Objectionable change in colours; considerable staining of colour transfer fabric.

3.5.3 If the fabric has been back-sized, the fabric shall show no unraveling or appreciable deterioration of the backing material after ten dry cleanings per **Para.3.5.1.**

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3.5.4 Ten dry cleanings shall not affect the flame resistance properties noted in **Para.3.4.**

### **3.6 Perspiration Resistance**

The fabric shall have a colour fastness rating of "good" when tested as per CCC-T-191b, method 5682, or CGSB 4-GP-2, Method 23, and shall be rated as per **Para.3.5.2.**

### **3.7 Shrinkage Resistance**

The fabric shall have a maximum dry cleaning shrinkage of 2.0% in either warp or fill direction, when tested in accordance with CCC-T-191b, Method 5580.

### **3.8 Wear Resistance**

The fabric shall be capable of withstanding at least 1000 Taber revolutions and shall show no appreciable or objectionable wear when tested in accordance with CCC-T-191b, Method 5306, or ASTM D4157/ 4158. A load of 1000 grams shall be used with CS-10 Calibrase abrasion wheels.

NOTE: Failure to meet the above test is not necessarily cause for rejection of the material. Results should be submitted to de Havilland Quality Assurance for Engineering approval.

### **3.9 Weight**

The conditioned weight of the fabric shall not exceed 12 oz/sq. yd., as determined per ASTM D3776 or CCC-T-191b, Method 5041. An 18" square specimen, or larger, shall be used.

### **3.10 Colour fastness to Light**

The quality of the dyes used for dyeing the yarns, and the method of application, shall be such that the finished fabric shall have a rating of at least L-5, when tested for colour fastness to light in accordance with CGSB 4-GP-2, Method 18.1, or CCC-T-191b, Method 5660. In cases of dispute, or where the above artificial tests cannot be applied, the Daylight Test Method 18.2 will become the referred test, based on an L-5 rating.

### **3.11 Tensile Strength**

The tensile strength of the fabric shall not be less than 100 lbs/inch in either direction when tested per CCC-T-191b, Method 5100 or CGSB 4-GP-2, Method 9.2.

### **3.12 Tear Strength**

The fabric shall have a minimum tear strength of 15 lbs. in the warp direction and 5 lbs. in the fill direction, when tested in accordance with CCC-T-191b, Method 5132 or CGSB 4-GP-2, Method 12.2.

### **3.13 Pilling**

The fabric shall not pill (i.e. shall have a standard 1 rating) when tested per CGSB 4-GP-2, Test Method for Resistance to Pilling, Method 51.1.

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**3.14 Corrosion**

The metal in contact with the fabric shall have a rating of 1 (as in [Para.3.14.4](#)), or better, when tested under the following humidity and temperature conditions.

- 3.14.1 Three panels of 2024-T3 clad aluminum, 2" x 4", and 0.040" in thickness, shall be individually brought in contact with the backing of fabric pieces of the same size.
- 3.14.2 20 ml of distilled water shall be used to wet the backing and each composite specimen shall be sandwiched and clamped between glass plates in order that intimate contact is made between the metal surface and the fabric backing.
- 3.14.3 The specimens shall then be placed in a humidity cabinet at 100°F ± 5°F and 95-100% relative humidity for three days.
- 3.14.4 After exposure, separate the metal specimens and rinse the contact surface in warm distilled water; dry and examine each panel under 10 X magnification and rate according to the following:
- 0 - no visible discolouration or corrosion
  - 1 - slight discolouration
  - 2 - slight corrosion
  - 3 - moderate corrosion
  - 4 - extensive corrosion

**3.15 Fraying**

The woven fabric shall strongly resist unraveling at any cut edge such that binding of edges will not be required.

**3.16 Crocking Resistance**

The fabric shall have a rating of "excellent", when tested in accordance with CCC-T-191b, Method 5650, for 50 cycles at 2 pounds. The results of both wet and dry crocking shall be reported.

**3.17 Sewability**

The fabric shall have a minimum seam of 16 lbs filling-wise when tested in accordance with CCC-T-191b, Method 5110, using 16/4 thread, appropriate needle size and 8-10 stitches per inch.

**3.18 Stiffness**

The material shall have an average bending length of 1.00 to 4.00 inches when tested in accordance with CCC-T-191b, Method 5206.1. Record the average bending length for the warp and fill directions.

**3.19 Colour, Pattern, and Texture**

The colour, pattern, and texture shall be as specified by the purchaser and shall match the standard approved sample retained by the purchaser, when viewed as in [Para.3.2](#).

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## **4 QUALITY ASSURANCE PROVISIONS**

### **4.1 Qualification Tests**

- 4.1.1 A supplier is responsible for the performance of all qualification testing, as specified in **Table 1** of this specification.
- 4.1.2 A supplier desiring qualification shall submit one (1) copy of a report showing actual qualification test data and sufficient quantity of product for de Havilland Inc. evaluation tests.
- 4.1.3 Upon review of the supplier's data and de Havilland Inc. tests, the supplier will be advised either of product qualification or reasons for failure.
- 4.1.4 Products which are qualified will be listed in the Qualified Products List of this specification.
- 4.1.5 No changes in the method of manufacture and/or formulation shall be made without notification prior written approval of Materials Technology Department of de Havilland Inc.
- 4.1.6 Requalification of the product may be requested by de Havilland Inc. for any changes in the method of manufacture and/or formulation.

### **4.2 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 specification where the requirements are similar to this specification.

### **4.3 Acceptance Tests**

- 4.3.1 Unless otherwise specified in the contract or purchase order, the supplier is responsible for all Acceptance Tests, as specified in **Table 1** of this specification.
- 4.3.2 The supplier, performing acceptance tests per **Para.4.3.1** shall furnish, with each lot of product, one copy of the Acceptance Test Report showing actual test data conformance to the acceptance tests specified in **Table 1**. The report shall include the supplier's lot identification.
- 4.3.3 de Havilland Inc. 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.

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**Table 1: Qualification and Acceptance Tests**

Test	Paragraph	Qualification	Acceptance
Finish	<b><u>Para.3.2</u></b>	x	x
Mildew Resistance	<b><u>Para.3.3.4</u></b>	x	
Odour	<b><u>Para.3.3.5</u></b>	x	
Flammability	<b><u>Para.3.4</u></b>	x	x
Cleanability	<b><u>Para.3.5</u></b>	x	
Perspiration Resistance	<b><u>Para.3.6</u></b>	x	
Shrinkage Resistance	<b><u>Para.3.7</u></b>	x	
Wear Resistance	<b><u>Para.3.8</u></b>	x	
Weight	<b><u>Para.3.9</u></b>	x	
Colour Fastness to Light	<b><u>Para.3.10</u></b>	x	
Tensile Strength	<b><u>Para.3.11</u></b>	x	
Tear Strength	<b><u>Para.3.12</u></b>	x	
Pilling	<b><u>Para.3.13</u></b>	x	
Corrosion	<b><u>Para.3.14</u></b>	x	
Fraying	<b><u>Para.3.15</u></b>	x	
Crocking Resistance	<b><u>Para.3.16</u></b>	x	
Sewability	<b><u>Para.3.17</u></b>	x	
Stiffness	<b><u>Para.3.18</u></b>	x	
Colour, Pattern & Texture	<b><u>Para.3.19</u></b>	x	x



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## **5 ORDERING DATA**

### **5.1 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.

### **5.2 Procurement Documents**

Procurement documents shall specify the following:

- Title, Number, Class, Issue and Amendment Number of this Specification
- Quantity (in yards)
- Width
- Manufacturer's Identification.

5.2.1 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.

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

## **6 PREPARATION FOR DELIVERY**

Prior to the shipment of material, a 6.5" x 10.5" sample, taken from the lot of material to be shipped, shall be forwarded to de Havilland Inc. for lot approval.

The fabric shall be tightly rolled around a tube of no less than 1" in diameter, with the face of the fabric towards the core. It shall be packaged in such a manner as to ensure that the product, during shipment and storage, will be protected from exposure to weather and normal transportation hazards.

### **6.1 Marking**

Each fabric roll shall be permanently marked on the backing in such a way that the marking will be plainly visible when the fabric is unpackaged in rolled form. The marking shall show the following information:

- de Havilland Product Specification and Class
- Manufacturer's Name and Product Identification
- Width and Length of Fabric
- Batch Number.

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**6.2 Shipping Documentation**

The shipping document shall show:

- de Havilland Inc. Purchase Order Number
- Specification Number
- Width and Length of Fabric
- Number of Rolls or Containers
- Acceptance Test Report
- Batch Number

Each shipment shall contain a copy of the Material Safety Data Sheet.

**7 HEALTH AND SAFETY DATA**

When supplying samples for qualification per **Para.4.1.2**, the supplier shall submit a Material Safety Data Sheet (MSDS) 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, reactivity data, physical properties, preparation information and procedures for storage and disposal.

This (MSDS) must then be supplied with a completed DH 4339 "Application to Introduce a New Material" form to the Material Safety Committee.

Upon receipt of DH 4340 "Recommendation" form that approves the use of the material it can then be included on the Qualified Products List.

NOTE: Any changes in the formulation of the material requires a resubmission of the Material Safety Data Sheet.

# BOMBARDIER

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### QUALIFIED PRODUCTS LIST

MANUFACTURER'S NAME AND ADDRESS	MANUFACTURER'S PRODUCT IDENTIFICATION NO.	MATERIALS SAFETY DATA SHEET NO	PRODUCT QUALIFICATION SHEET NO.	DATE OF PRODUCT APPROVAL
	<b>Class 1</b>			
Lantal Textiles	13488/314GG Brown/Orange Stripe	N/A	PQS #1	December 11,
1300 Langenthal Drive	13488/905WW Grey/Brown Stripe			1987
PO Box 965	13488/575DD Blue/Red Stripe			
Rural Hall	13467/908 Blue/Green "Dash"			
NC 27045	13467/909 Purple "Dash"			
	13467/575 Dark Blue "Dash"			
	13408/46 Beige "Acorn"			
	13466/456 Red "Acorn"			
	13408/906 Grey "Acorn"			
	F2041P0074S2 Grey "Honeycomb"			