

# de Havilland Inc.

## Material Specification

<b>TITLE:</b>	<b>FLOOR COVERING, DECORATIVE</b>
<b>SPECIFICATION NUMBER:</b>	<b>DHMS P 1.31</b>
<b>ISSUE:</b>	<b>C</b>
<b>AMENDMENT:</b>	<b>3</b>
<b>DATE:</b>	<b>APRIL 4, 2000</b>
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#### REVISION RECORD

Issue	Page	Description and Reason for Change
B	4	Para. 3.4 Flammability requirement has been revised.
Amd.1	13	Para. 7.3.1 was added regarding MSDS.
	14	Para. 8.0 was revised regarding MSDS.
		Colour number for Type 3 material in QPL has been changed.
B	14	-3 Grey/Beige was added to Type 3 and Type 4 materials.
Amd.2		Grey/Beige colour no. has been changed for Type 4 material.
B	2	Para. 1.1 Areas weight of Type 3 changed.
Amd.3	2	Para. 1.1 Type 5 material added.
	2	Para. 2.3 Part 25 changed to FAR 25.853(a) Amd.32.
	4	Table 1 Type 5 material added.
	4	Para. 3.4 - Amendment 51 changed to Amendment 32.
	15	Added page 15, QPL for Type 5 material.
B	15	QPL - Add "unembossed" for Type 5 material.
Amd.4		
C		This is a complete revised issue. Detail changes have not been noted.
C Amd 1	4	Table 1: DS 82 Code Number has been corrected
Amd. 2	12	QPL: supplier's name has been changed.
Amd.3	1	Revision detail
	2	2.3 Flame test criteria changed
	4	3.4 Flame test criteria changed
	9	6.1.2 Sample size changed
	i	Amd 3 added

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## 1 SCOPE

This specification covers the requirements for a vinyl coated fabric, with or without a foam backing of resilient dosed cell cushioning material, for use as a decorative floor covering.

### 1.1 Classification

The decorative floor covering shall be supplied in one of the following types, as specified on the purchase order.

Type 1 (with foam.backing)	-	Total Weight $31.5 \pm 1$ oz/sq.yd.
Type 2 (with foam backing)	-	Total Weight $38.5 \pm 1$ oz/sq.yd.
Type 3 (with foam backing)	-	Total Weight $48 \pm 1$ oz/sq.yd.
Type 4 (without foam hacking)	-	Total Weight $37 \pm 1$ oz/sq.yd.
Type 5 (with V.P. backing)	-	Total Weight $75 \pm 5$ oz/sq.yd.

## 2 APPLICABLE DOCUMENTS

The following documents, of the issue in effect on the date of the invitation for bids (except as otherwise noted on an individual basis), form a part of this specification to the extent defined herein. In the event of conflicting requirements between this and the specifications listed below, the requirements of this specification shall take precedence.

### 2.1 Aerospace Material Specifications

AMS 3635A	-	Plastic Sheet, Cellular, Shock Absorbing
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### 2.2 Test Method Standards

ASTM D-1056	-	Flexible Cellular Materials
Fed. Test Method Std. 191	-	Textile Test Methods

### 2.3 Federal Aviation Regulations

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

### 2.4 de Havilland Specifications

DS82	-	Materials, Interior, with Colour/Texture Identification
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### 3 REQUIREMENTS

#### 3.1 Preproduction Samples

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, colours, and texture. One sample shall be designated as the Master Standard; the remaining four shall be used as Working Standards. DHI will assign a Design Standard Number to these samples.

#### 3.2 Construction

##### 3.2.1 Basic Construction (Applicable to all Types)

3.2.1.1 Base Fabric - The base fabric shall be a woven glass fabric coated to meet the requirements as specified herein.

3.2.1.2 Coating - A flexible type vinyl resin shall be firmly adhered to one side of the base fabric to a thickness of 18-22 mils.

##### 3.2.2 Foam Backing (Applicable to Types 1, 2 and 3 only)

3.2.2.1 Cushioning Material - The cushioning material shall be a 1/8" thick, closed cell, vinyl foam, conforming to AMS 3635A, except that the rate of return and rebound requirements are not mandatory. When tested in accordance with **Table 2**, the foam shall not absorb water or moisture such that the weight increases in excess of 0.032 pound per square foot.

3.2.2.2 Bonding Material - When an adhesive is used to bond the coated fabric to the cushioning material, the adhesive shall be resistant to the migratory action of plasticizers present in the vinyl coated fabric. The adhesive shall not stain the fabric when submitted to the shrinkage test, as noted in **Para.3.11**. adhesion of the vinyl foam backing to the vinyl coated fabric shall be such that, when the material is tested in accordance with **Para.4.9**, the adhesive failure is cohesive.

#### 3.3 Appearance

3.3.1 The material shall have design, colour and texture to match the approved sample, when tested as per **Para.4.1**.

3.3.2 Where the drawing or purchase order calls for a specific colour, the colour shall be cross-referenced by the colour dash number to the applicable DS82 code number and the DHMS P1.31 type number as indicated in **Table 1**. The colour dash number is also cross-referenced with the manufacturer's product identification in the Qualified Products List.

**Table 1:**

Colour Dash Number	Colour	DHMS P1.31 Type Number	DS 82 Code Number (reference only)
-1	Brown Tritweed	Type 2	-02-170-001
-1	Brown Tritweed	Type 4	-02-170-024

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**Table 1:**

<b>Colour Dash Number</b>	<b>Colour</b>	<b>DHMS P1.31 Type Number</b>	<b>DS 82 Code Number (reference only)</b>
-2	Blue Tutweed	Type 2	-02-670-002
-2	Blue Tutweed	Type 4	-02-670-025
-3	Grey / Beige	Type 3	-02-891-068
-3	Grey / Beige	Type 4	-02-891-069
-3	Grey / Beige	Type 5	-02-891-170
-4	Grey / Beige	Type 5	-02-870-122

### **3.4 Flammability**

The material shall meet the requirements of FAR 25.853(a), APP. F, PART I(a)(1)(ii), Amd. 25-86.

### **3.5 Colourfastness**

Subsequent to testing in accordance with **Para.4.2.1** and **Para.4.2.2**, the specimen shall be compared with the approved colour control sample and shall be subjected to de Havilland's review.

### **3.6 Weight**

When tested in accordance with the requirements of **Table 2**, the material shall weigh no more than that specified in **Para.1.1**.

### **3.7 Cleanability**

The material shall be capable of being cleaned without adverse effect, when tested as per **Para.4.3**.

### **3.8 Stain Resistance**

The material shall not stain when tested as per **Para.4.4**.

### **3.9 Compression Deflection (Applicable to Types 1, 2 and 3 only)**

The material shall meet the compression deflection requirement of **Table 2**.

### **3.10 Permanent Set (Applicable to Types 1, 2 and 3 only)**

The surface of the vinyl floor covering shall exhibit no permanent deformation or imprint when tested in accordance with **Para.4.5**.

### **3.11 Shrinkage**

Shrinkage of a 6-inch square specimen of the vinyl floor covering to be qualified, shall not exceed 3

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percent of its area after a 24 hour exposure to 160°F ± 5°F, or 11 percent after a 168 hour exposure to 160°F ± 5°F. The specimen shall not show any form of delamination during these tests. In addition, specimens of Type 1, 2 or 3 vinyl floor coverings shall show no evidence of staining or discolouration of the vinyl coated fabric attributable to the bonding adhesive, if used, or to the cushioning material, after the specimen cools to room temperature.

### **3.12 Wear Resistance**

When tested in accordance with **Para.4.6**, the wear factor of the vinyl coated fabric shall not be less than 650 cycles per mil of vinyl thickness.

### **3.13 Temperature Resistance**

The vinyl coated fabric shall withstand prolonged exposure to temperatures ranging from -20°F ± 5°F to +160°F ± 5°F without becoming tacky, cracking, breaking, or losing any of its elasticity. The material shall also meet the requirements of **Para.4.7**.

### **3.14 Fluid Resistance**

The vinyl coated fabric shall not exhibit any loss of colour or material deterioration after testing as per **Para.4.8**.

### **3.15 Width and Length**

Unless otherwise specified, the material shall have a width and length as specified in the purchase order with tolerances of +1 inch -1/2 inch.

### **3.16 Workmanship**

The vinyl coated fabric shall be processed in accordance with the best practice for the manufacture of a high quality, self-extinguishing, coated fabric floor covering. The vinyl surface shall be free of lumps, streaks, wrinkles (other than surface texture), unbonded areas, foreign matter, or any other imperfections that would adversely affect its appearance or serviceability. When adhesive is used to join sections of the cushioning material on Types 1, 2 and 3 vinyl floor coverings, the joints shall not be visible from the surface and shall not exhibit hardness along the bond line.

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## 4 TEST METHODS

Table 2:

Test	Paragraph	Method		
		ASTM	Fed. Std. 191	AMS
*Water Absorption	<a href="#">Para.3.2.2.1</a>	D1056	---	---
Weight	<a href="#">Para.3.6</a>	---	Method 5041	---
*Compression Deflection	<a href="#">Para.3.9</a>	---	---	3635

\*Applicable to Types 1, 2, and 3 only.

### 4.1 Appearance

Comparison shall be made by placing the new sample side by side with the control sample in a Macbeth Industrial Colour Matching Unit, or equivalent. The direction of illumination shall be normal to the surfaces being compared. Both "North Sky Daylight (75000K)" and "Horizon Sunlight (2300K)" shall be used to compare colours.

### 4.2 Colourfastness

4.2.1 Colourfastness to Light - The material shall be exposed to 50 Standard Fading Hours in a single arc Fadeometer unit, operating in accordance with Federal Test Method Standard #191, Method 5660. The sample shall be compared with the control sample using a Macbeth Industrial Colour Matching Unit, as per [Para.4.1](#).

4.2.2 Colourfastness to Elevated Temperature - A sample of the material shall be exposed in an air circulating oven at 220°F ± 10°F for ten minutes. After cooling, the heated sample shall be compared with a control sample, using a Macbeth Industrial Colour Matching Unit, as per [Para.4.1](#).

### 4.3 Cleanability

Samples of the material shall be cleaned using (a) mild detergent or (b) a solution of equal amounts of butyl cellosolve and fresh tap water. The samples shall be visually observed for any adverse effects.

### 4.4 Stain Resistance

Small particles of asphalt shall be soaked in naphtha until the solvent becomes black. The asphalt residue and solvent shall be placed on the decorative surface of a sample of floor covering 4 inches by 8 inches. An area approximately 3 inches square shall be covered. The specimen shall then be placed in an air circulating oven at 110°F for 72 hours. After removal from the oven, the specimen shall be cooled to room temperature and then wiped with a clean cloth saturated with naphtha until the residue is completely removed. The Specimen shall be visually, examined for staining.

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#### 4.5 Permanent Set (applicable to Types 1, 2 and 3 only)

Apply a 6 pound load to the vinyl face of a specimen by using a metal ring 3 inches nominal in diameter by 0.10" wall thickness for 7 hours. After the load is removed, no permanent deformation or imprint shall be visible on the vinyl surface after a recovery period of 1 hour.

#### 4.6 Wear Resistance

The wear resistance of the vinyl coated fabric shall be determined as per Federal Test Method Standard 191, Method 5306, using a Number CS-10 Calabrese wheel, or equivalent, loaded with 1,000 grams.

#### 4.7 Temperature Resistance

Three 1 inch by 4 inch specimens shall be cut from the warp direction and three from the fill. The specimens shall then be exposed to  $-20^{\circ} \pm 5^{\circ}\text{F}$  for 4 hours. While being maintained at this temperature, the specimens shall be individually bent, face out, around a 1/8 inch diameter rod in such a manner that the specimen's back touches within 1/8 inch from the rod. The test shall be repeated at  $160^{\circ} \pm 5^{\circ}\text{F}$  after exposing the specimens at this temperature for 4 hours.

#### 4.8 Fluid Resistance

Three 1-inch by 4-inch specimens shall be immersed in an aliphatic hydrocarbon for one hour at  $75^{\circ}\text{F} \pm 5^{\circ}\text{F}$ . Repeat test using a mild commercial soap and water solution at  $75^{\circ}\text{F} \pm 5^{\circ}\text{F}$ .

#### 4.9 Bond Strength (Applicable to Types 1, 2 and 3 only)

A 1" x 6" strip of the vinyl coated fabric shall be prepared by separating the fabric layer from the vinyl cushioning at the bond line for a distance of one inch, using a sharp knife. The fabric and sponge ends shall then be pulled apart slowly by hand. Separation shall be caused by cohesive failure of the adhesive.

### 5 QUALITY ASSURANCE

#### 5.1 Qualification

5.1.1 A supplier is responsible for the performance of all qualification testing, as specified in **Table 3** of this specification.

5.1.2 A supplier desiring qualification shall submit to de Havilland Quality Assurance Department one copy of a report showing actual qualification data and a sufficient quantity of product for evaluation tests.

As noted in **Para.3.1**, preproduction samples from each new combination of materials (resulting in a new colour, pattern, texture, or other appearance factor) shall be submitted for DHI Engineering approval of construction, appearance, texture and colourfastness to light, prior to furnishing material to this specification.



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- 5.1.3 Upon review of supplier's data and de Havilland tests, the supplier will be advised either of product qualification or reasons for failure.
- 5.1.4 Products that are qualified will be listed in the Qualified Products List of this specification.
- 5.1.5 No changes in the method of manufacture and/or formulation shall be made without notification and prior written approval of Materials Technology Department of de Havilland Inc.
- 5.1.6 Requalification of the product may be requested by the purchaser for any changes in the method of manufacture and/or formulation.

## 5.2 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.

## 5.3 Acceptance Tests

- 5.3.1 The Quality Assurance Department of de Havilland Inc. shall determine the frequency of Acceptance Tests.
- 5.3.2 Unless otherwise specified in the contract or purchase order, the supplier is responsible for all Acceptance Tests, as specified in **Table 3** of this specification.
- 5.3.3 The supplier, performing acceptance tests per **Para.5.3.1**, 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 3**. The report shall include the supplier's lot or batch identification.
- 5.3.4 de Havilland 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.

## 5.4 Definitions

- 5.4.1 Batch - 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 facility.
- 5.4.2 Lot - defined as the total quantity of product in a shipment taken from the same batch.

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**Table 3:**

<b>Test</b>	<b>Reference</b>	<b>Qualification</b>	<b>Acceptance</b>
Sampling	<b><u>Para.3.1</u></b>	x	x
Construction	<b><u>Para.3.2</u></b>	x	x
Appearance	<b><u>Para.3.3</u></b>	x	x
Flammability	<b><u>Para.3.4</u></b>	x	x
Colourfastness	<b><u>Para.3.5</u></b>	x	
Weight	<b><u>Para.3.6</u></b>	x	
Cleanability	<b><u>Para.3.7</u></b>	x	
Stain Resistance	<b><u>Para.3.8</u></b>	x	
Compression Defection	<b><u>Para.3.9</u></b>	x	
Permanent Set	<b><u>Para.3.10</u></b>	x	
Shrinkage	<b><u>Para.3.11</u></b>	x	
Wear Resistance	<b><u>Para.3.12</u></b>	x	
Temperature Resistance	<b><u>Para.3.13</u></b>	x	
Fluid Resistance	<b><u>Para.3.14</u></b>	x	
Workmanship	<b><u>Para.3.16</u></b>	x	x

## **6 ORDERING DATA**

### **6.1 Prerequisite**

6.1.1 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.

6.1.2 Prior to shipment of each batch of material, a 15"X15" sample, taken from the lot of material to be shipped, shall be forwarded to DHI for lot approval.

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## 6.2 Procurement Documents

Procurement documents shall specify the following:

- Title, Number, Type, Dash Number, Issue and Amendment Number of this Specification
- DS82 Number
- Width and Length of Roll, or Number of Sheets
- Total Quantity
- Acceptance Test Report (when required).

## 7 PREPARATION FOR DELIVERY

### 7.1 Preservation and Packing

The decorative floor covering shall be packaged in such a manner as to ensure that the product will not be damaged or distorted during shipment and storage and will be protected against damage from exposure to weather or any normal hazard.

### 7.2 Marking

Each roll or package shall be permanently and legibly marked with the following information:

- Floor Covering, Decorative
- DHMS P1.31, Type, Dash Number, Colour
- DS82 Number
- Manufacturer's Name and Product Identification
- Date of Manufacture - Sheet or Roll Size
- Purchase Order Number - Lot Number
- Quantity

### 7.3 Shipping Documentation

The shipping document shall show:

- de Havilland Purchase Order Numbers
- Specification Number, Type, Dash Number, Colour
- DS82 Number
- Number of Rolls or Sheets - Lot Number
- Total Quantity
- Acceptance Test Report (when requested).

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

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## 8 HEALTH AND SAFETY DATA

When supplying samples for qualification per **Para.5.1.2**, 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 require a re-submission of the Material Safety Data Sheet.

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### QUALIFIED PRODUCTS LIST

MANUFACTURER'S NAME AND ADDRESS	MANUFACTURER'S PRODUCT IDENTIFICATION NO.	MATERIALS SAFETY DATA SHEET NO.	DE HAVILLAND QUALIFICATION SHEET NO.	DATE OF PRODUCT APPROVAL
	<b>Type 2</b>	N/A		
Schneller Inc., 6019 Powdermill Road, Kent, Ohio USA 44240 Ph: (216) 673-1400	Aermat 27RNS-8V <u>Colours</u>  -1 Brown Tritweed 2189/160/1006/3295 Pattern 11  -2 Blue Tutweed 478/1006/2479 Pattern 11		PQS #1	Oct. 26, 1976
	<b>Type 3</b>	N/A		
	Aermat 31R-8V <u>Colours</u>  -3 Grey/Beige 2944/3194/3184/20R/54		PQS #3	Feb. 14, 1984
	<b>Type 4</b>	N/A		
	Aermat 37RNS <u>Colours</u>  -1 Brown Tritweed 2189/160/1006/3295 Pattern 11  -2 Blue Tutweed 478/1006/2479 Pattern 11		PQS #2	Feb. 14, 1984

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	Aermat 31R <u>Colours</u>	N/A	PQS #3	Feb.14, 1984
	-3 Grey/Beige 2944/3194/3184/20R/54 <b>Type 5</b>	N/A		
	Aermat 45RNS-VP-(Unem- bossed) <u>Colours</u>		PQS #4	March 23, 1988
	-3 Grey/Beige 2944/3194/3184/20R/54			
	-4 Grey/Black 1016/2928/6295/20R/54			