

de Havilland Inc.

Material Specification

TITLE:	WOVEN GLASS CLOTH
SPECIFICATION NUMBER:	DHMS F 5.04
ISSUE:	B
AMENDMENT:	2
DATE:	August 14, 2002
PAGE:	1 of 11

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REVISION RECORD

Issue	Page	Description and Reason for Change
B	4	Breaking strength has been changed from 100 lb. to 75 lb.
Amd. 1		Weight of the fabric has been changed from 6 ozs/sq.yd. to 5.3 ozs/sq.yd.
Amd. 2	11	Bay Mills name changed to Saint-Gobain Technical Fabrics Canada, ltd. Removed distributor Ciba-Geigy.

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1 SCOPE

This specification covers the requirements for woven glass fabric that has been cleaned and finished for further fabrication into glass fabric reinforced polyester or epoxy resin parts.

1.1 Classification

The fabric shall be of weave Style 144 (Bay Mills)

2 APPLICABLE DOCUMENTS

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

2.1 Federal Standard 191

Method No. 5030 - Determination of Thickness of Textile Materials

Method No. 5050 - Yarns per unit length in Woven Fabric

Method No. 5104 - Strength and Elongation, Breaking of Woven Fabric, Ravel Strip Method

3 REQUIREMENTS

3.1 Material

The fabric shall be manufactured from continuous filament glass yarn of the highest quality and suitable for the intended purpose. The fibres shall be free from any free alkali metal oxides, such as soda or potash, and from foreign particles, dirt and other impurities.

3.2 Construction and Physical Properties

The construction and physical properties of the finished fabric shall conform to the requirements listed in **Table 1**.

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Table 1: Construction and Physical Properties (Untreated Fabric)

Fabric Style	Weave	Construction	Yarn No. and Ply		Min. Breaking Strength Per Inch of Width		Thickness (inches)	Weight (oz./sq/yard)
		Yarns per Inch ± 2	Warp	Fill	Warp	Fill	± 0.001	$\pm 10\%$
144	Plain	18 x 18	ECG** 75-1/2	ECG** 75-1/2	75 lb.	75 lb.	0.009	5.3

* These figures apply to treated fabric.

** Electrical grade, continuous fiber, $G = 3.8 \times 10^{-4}$ in. diameter.

3.3 Dimensions

3.3.1 Width - Unless otherwise specified, the overall width of the fabric shall be 38" or 50" inclusive with tolerance of ± 0.25 ".

3.3.2 Length - Unless otherwise specified, the overall length of the fabric shall be 200 ± 25 yards. No roll shall contain more than 3 pieces and no piece shall be less than 15 yards in length.

3.4 Fabric Content

The construction of the fabric (Warp and Fill) shall be within ± 2 yarns per inch.

3.5 Finish

The fabric shall be cleaned and treated with a finish which will produce the characteristics required of finished glass fabric in this specification. The finish used on the fabric shall be what is known commercially as Volan "A" and is designated -139 finish by the manufacturer. The methacrylate chromium chloride finish (Volan "A") content of the cleaned glass fabric shall be between 0.02 and 0.06 percent by weight.

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3.6 Colour

The colour of the finished fabric shall be uniform and shall be characteristic of the applied finish.

3.7 Workmanship

The finished fabric shall be clean, evenly woven and shall conform to the quality and grade of product established by this specification. The finished fabric shall be free from defects, except to the extent specified herein, and shall be processed as required in accordance with the best practice for a high quality product.

3.7.1 Examination of Cloth

Each roll of glass fabric shall be unrolled so that at least six yards may be visually inspected for defects listed in **Table 2**.

Table 2: Unacceptable Defects

Defects
Holes, Cuts, Tears or Smashes
Spot or Stain Uncleaned * (1/2 inch or more in diameter)
Weak or Thin Place *
Broken or Missing Yarn - two or more adjoining, regardless of length - single, 2 inches or more in length
Areas Untreated with Finish (1/2 inch or more in diameter)
Overall Uncleanliness
Objectionable Odour
Uneven Weaving
Discoloured
Any Hard Embedded Crease

* Clearly Visible at Normal Inspection Distance (3 feet)

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4 TEST METHODS

4.1 Breaking Strength

The material shall be prepared and tested in accordance with Federal Standard 191 Test Method 5104.

4.2 Fabric Thickness

The material shall be prepared and measured in accordance with Federal Standard Test Method 5030.

4.3 Construction

The construction of the material shall be prepared and determined in accordance with Federal Standard Test Method 5050.

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 one copy of a report showing actual qualification test data and a sufficient quantity of product for de Havilland evaluation tests.
- 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 disqualification.
- 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 and Standards Engineering and Quality Assurance Department of de Havilland Aircraft.
- 5.1.6 Re qualification of the product may be requested by the purchaser if there are any changes in the method of manufacture and/or formulation.

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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 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.
- 5.3.2 The supplier, performing acceptance tests per **Para.5.3.1** shall maintain the test results on file for each batch of the product. The test results shall be made available to de Havilland upon request.
- 5.3.3 De Havilland Aircraft 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.
- 5.3.4 The supplier shall supply with each shipment, a Certificate of Compliance stating the actual batch number per **Para.5.3.2**.

Table 3: Qualification and Batch Acceptance Tests

Property	Paragraph	Qualification	Acceptance
Dimension	Para.3.3	x	x
Fabric Count	Para.3.4	x	x
Finish	Para.3.5	x	
Colour	Para.3.6	x	x
Workmanship	Para.3.7	x	x
Breaking Strength	Para.4.1	x	x
Fabric Thickness	Para.4.2	x	x
Construction	Para.4.3	x	

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5.4 Sampling Schedule

5.4.1 Sampling shall be in accordance with **Table 4**.

Table 4: Sampling Schedule

Number of Rolls in Batch	Frequency of Inspection
1 - 10	1 roll
11 - 39	2 rolls
40 and more	3 rolls

5.4.2 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.

6 ORDERING DATA

6.1 Prerequisite

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

6.2 Procurement Documents

Procurement documents shall specify the following:

- Title, Number, Issue and Amendment Number of this Specification
- Type of Cloth
- Manufacturer's Material Designation
- Total Quantity

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7 PREPARATION FOR DELIVERY

7.1 Identification

7.1.1 Each roll of glass fabric shall be identified with a label or marking, securely affixed to the inside of the core or with a removable tag.

7.1.2 The label or removable tag shall use characters of a size such as to be clearly legible and which will not be obliterated by normal handling. Each label or tag shall show the following information:

- Woven Glass Cloth
- DHMS F5.04
- Manufacturer's Material Designation
- Purchase Order Number
- Lot and Roll Numbers
- Quantity
- Date of Manufacture

7.2 Packaging

The fabric shall be wound on spiral or convolute tubes measuring 2 inches, minimum, diameter and one inch longer than the overall width of the fabric. The roll shall be completely wrapped in a citable weight of draft paper sealed with gummed tape or enclosed in a suitable covering to protect the fabric.

7.3 Shipping Documentation

7.3.1 Each shipping container shall have the exterior legibly marked with the following information in such a manner that the markings shall not smear or be obliterated during normal handling or use:

- Woven Glass Cloth
- DHMS F5.04
- Manufacturer's Material Designation
- Purchase Order Number
- Lot and Roll Numbers
- Quantity

7.3.2 Containers shall be prepared for shipment in accordance with commercial practice to assure carrier acceptance and safe transportation to the point of delivery.

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

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 Ontario Occupational Health & Safety Act, RSO 1980, Ch. 321, Section 28(1) (1) or with U.S. OSHA Regulations. The document must state all hazardous ingredients present in the material procedures for safe handling, threshold limit values (where applicable) and procedures for disposal of surplus or damaged material. This requirement is a prerequisite to inclusion of any product on the Qualified Products List.

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	PRODUCT QUALIFICATION SHEET NO.	DATE OF PRODUCT APPROVAL
Saint-Gobain Technical Fabrics Canada, Ltd. 201 Hugel Ave., Midland, Ontario. L4R 4G1 (705) 456-8204	144		PQS #1	December 6, 1971