de Havilland Inc.

Material Specification

TITLE:	**FOAM, FLEXIBLE, OPEN CELL, FIRE RESISTANT, POLYETHER URETHANE**
SPECIFICATION NUMBER:	**DHMS P 1.17**
ISSUE:	**C**
AMENDMENT:	**---**
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PAGE:	**1 of 8**

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REVISION RECORD

Issue	Page	Description and Reason for Change
B	11	This is a complete revision and detail changes have not been noted.
C		This is a complete revised issue. Detail changes have not been noted.

1 SCOPE

This specification covers the requirements of a flexible, open cell, fire-resistant, polyether urethane foam, that may be skinned with a 0.0025" ± 0.001" impervious film on one or two surfaces, according to the requirement.

1.1 Classification

The material furnished shall be a combination of a grade, type, and form, specified herein.

Grade

Grade 1 - 1.5 pcf density

Grade 2 - 4 pcf density

Type

Type 1 - Standard, flexible, open cell, fire-resistant, polyether urethane foam.

Form

A - Sheet

B - Strip

C - Molded

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 U.S. Government Specifications

2.1.1 Federal Aviation Administration

FAR 25.853(a) App. F, Part I (1) (i) Amd. 25. 86 - Flammability Requirements

2.2 American Society for Testing & Materials

ASTM D412	-	Rubber Properties in Tension
ASTM D3574	-	Flexible Cellular Materials - Slab, Bonded and Molded Urethane Foam
ASTM E597	-	Single-Number Rating of Airborne Sound Isolation for Use in Multi-Unit Building Specifications, Practice for Determining

3 REQUIREMENTS

3.1 General

3.1.1 Surface - All surfaces of Form A sheet material shall have a cut finish unless otherwise specified.

3.1.2 Quality - The product shall be uniform in quality and condition, and clean and free from foreign materials and imperfections that are detrimental to fabrication, appearance, or performance of parts.

3.1.3 Colour - Unless otherwise specified, the material shall be furnished in its natural color.

3.1.4 Toxicity - The foam shall be nontoxic and shall not cause any harmful effects when in prolonged contact with the skin.

3.1.5 Odour - The intensity or character of the odour shall not be objectionable or offensive.

3.1.6 Tolerances - Thickness tolerances must meet the following requirements.

Sheet and ± 1/16 inch of nominal thickness for all types strip form:

Molded form: Shall conform to drawing tolerances.

3.2 Physical and mechanical Properties

3.2.1 Density - When tested in accordance with ASTM D3574, a 0.5 cubic foot specimen of Grade 1, Type 1 material shall be 1.5 ± 0.15 pounds per cubic foot and grade 2, Type 1 material shall be 4 ± 0.40 pounds per cubic foot.

3.2.2 Pore Openings - The pore count shall be 60 ± 10 pores per lineal inch visually determined at 10 power magnification. Photographs taken with a superimposed grid may be used to facilitate the measurement of the number of openings.

3.2.3 Compression Set - When tested in accordance with ASTM D3574 at 50% deflection, the permanent set from compression shall not exceed 10%.

3.2.4 Elongation - When tested in accordance with ASTM D3574, the material shall have a minimum elongation of 135% for Grade 1 and 200% for Grade 2 material.

3.2.5 Tensile Strength - When tested in accordance with ASTM D3574, the material shall have a minimum tensile strength of 15 psi for Grade 1 and 25 psi Grade 2.

3.2.6 Elevated Temperature Resistance - The compression set, tensile strength and elongation when aged in an uncompressed state at 140^{o}C for 22 hours, and then compressed for 22 hours at 70^{o}C and tested per ASTM D3574, shall not deviate from the values determined at ambient condition, by more than 25%.

3.2.7 Die-Cutting Resistance - The material shall show no tendency to fuse when die cut as per ASTM D412. It shall recover at least 95% of original thickness in not more than 5 minutes after being cut.

3.2.8 Tear Resistance - When tested in accordance with ASTM D3574, the tear resistance shall not be less than 2.5 lbs/inch for Grade 1, and 3.0 lbs/inch for Grade 2.

3.2.9 Sound Attenuation - The material described herein, shall be capable of acoustic attenuation of at least 10 dB in the frequency range of 250 to 2000 Hz when tested per ASTM E597.

3.2.10 Flammability - The material shall meet the requirement of FAR 25.853(a) and 25.855(d) App.F, Part I (a)(1) (ii) and (a)(2) - (12 seconds vertical).

3.2.11 Workmanship - The flexible, open cell, fire-resistant, polyether urethane foam shall be a product manufactured by such processes as to meet all the requirements of this specification.

4 QUALITY ASSURANCE

4.1 Qualification

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 copy of a report showing actual qualification test data and a sufficient quantity of product for de Havilland evaluation tests.

4.1.3 Upon review of supplier's data and de Havilland tests, the supplier will be advised either of product qualification or reasons for disqualification.

4.1.4 Products that 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 and prior written approval of Materials Technology and Quality Assurance Departments of de Havilland Inc.

4.1.6 Requalification of the product may be requested by the purchaser if there are 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 batch of product one copy of an Acceptance Test Report showing actual test data conformance to the acceptance tests specified in **Table 1**. The report shall include the supplier's batch identification.

4.3.3 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.

Table 1: Qualification and Batch Acceptance Tests

Property	Paragraph	Qualification	Acceptance
Density	Para.3.2.1	x	x
Pore Openings	Para.3.2.2	x	
Compression Set	Para.3.2.3	x	
% Elongation	Para.3.2.4	x	
Tensile Strength	Para.3.2.5	x	
Elevated Temperature Resistance	Para.3.2.6	x	
Die Cutting Resistance	Para.3.2.7	x	
Tear Resistance	Para.3.2.8	x	
Sound Attenuation	Para.3.2.9		
Flammability	Para.3.2.10	x	x

5 ORDERING DATA

5.1 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.

5.2 Procurement Documents

Procurement documents shall specify the following:

- Title, Number, Issue and Amendment Number of this specification.
- Grade, Type, Form, Thickness, Width and Length of material.
- Manufacturer's Material Designation
- Total Quantity.

6 PREPARATION FOR DELIVERY

6.1 Identification

Each shipment shall be legibly marked with the following information:

- Foam, Flexible, Open Cell, Fire Resistant, Polyether Urethane
- DHMS P1.17 (Enter Grade, Type and Form)
- Manufacturer's Material Designation
- Purchase Order Number
- Quantity
- Date of Manufacture.

6.2 Packaging

The material shall be packed in such a manner as to assure that, during shipment and storage, it cannot be damaged by sharp objects nor compressed.

6.3 Shipping Documentation

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:

- Foam, Flexible, Open Cell, Fire Resistant, Polyether Urethane.
- DHMS P1.17 (Enter Grade, Type and Form)
- Manufacturer's Material Designation
- Purchase Order Number
- Quantity
- Date of Manufacture.

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

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 require a re-submission of the Material Safety Data Sheet.

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
Vitafoam Products, Canada Limited, 150 Toro Road Downsview, Ontario M3J 2A9 (416) 630-6633	**Grade 1, Type 1** Vitafoam R.B.R.2318	2518	PQS #1	June 6, 1988

Distributor:

Engineered Foam
Products Canada Ltd
12 Kenhar Drive
Weston, Ontario
M9L 1N1

(416) 746-7334

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