DE HAVILLAND AIRCRAFT
OF CANADA LIMITED

de Havilland
Material Specification

TITLE:	**ACRYLIC-POLYVINYL CHLORIDE THERMOPLASTIC SHEET MATERIAL**
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de Havilland **Material Specification** **ACRYLIC-POLYVINYL CHLORIDE THERMOPLASTIC SHEET MATERIAL**	**DHMS:** P 1.09 **ISSUE:** G **AMD.:** -- **DATE:** June 14, 2019 **PAGE:** i of i

REVISION RECORD

Issue	Page	Description and Reason for Change	
E	4	Flammabi1ity requirement	was : DHMS G9.01 now : FAR 25.853(b) Amd.25-23.
	5.6	Paragraph 4.0 - Quality Assurance has been revised.	
	8	Para.6.3.2 and 7.0 have been added.	
	9	Supplier's address and PQS No. have been revised.	
F		This is a complete revised issue. Detailed changes have not been noted.	
Amd.1	8	QPL: Rohm & Haas Canada Ltd. has been deleted from the QPL. Kleerdex Company has been added as a manufacturer. Commercial Plastics (C.P.) Inc. has been added as a distributor.	
G		This is a complete revised issue.	
	3	Added thickness Tolerance Table 1	
	3	Para. 3.6 Added alternative colour measuring using CWF2	
	5	Para. 4 Material Qualification Requirement updated - Standard wordings	
	6	Para. 5 Quality Assurance Requirement updated- Standard wordings	
	6	Table 4 Clarified Acceptance tests for supplier and purchaser.	
	8	Revised section 8 Health and Safety Data	
	9	QPL: Manufacturer name changed. Was: " Kleerdex Company". Is:" SEIKISUI POLYMER INNOVATIONS LLC."	

Material Specification

ACRYLIC-POLYVINYL CHLORIDE THERMOPLASTIC SHEET MATERIAL

1 SCOPE

This specification covers the requirements for self-extinguishing thermoplastic sheet material manufactured from a blend of acrylic-polyvinyl chloride.

2 APPLICABLE DOCUMENTS

The following specifications, standards or publications of issue in effect on the date of invitation for bids form a part of this specification. In the event that certain requirements of the specifications listed below conflict with requirements of this specification, the requirements at this specification shall govern.

2.1 Specifications

ASTM D543	-	Test Method for Resistance of Plastics to Chemical Reagents
ASTM D638	-	Test Method for Tensile Properties of Plastics
ASTM D648	-	Test Method for Deflection Temperature of Plastics Under Flexural Load
ASTM D792	-	Test Method for Specific Gravity (Relative Density) and Density of Plastics by Displacement
FAR 25.853(a) APP. F, Part I (a)(1) (ii)	-	Flammability Requirements

3 REQUIREMENTS

3.1 Material

The thermoplastic sheet material shall be manufactured from a blend of acrylic-polyvinyl chloride, uniformly coloured as required in Para.3.6.

3.2 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, colour and texture. One sample shall be designated as the Master Standard, the remaining four samples shall be used as Working Standards. De Havilland Engineering will assign a DHI Standard Number to these samples.

3.3 Workmanship

Unless otherwise specified, the acrylic-polyvinyl chloride sheets shall have a surface finish as specified in Para.. The finished sheets shall be free from surface blisters, waviness, visual bubbles, foreign inclusions, and scratches which make definite indentations in the surface. The sheets shall be uniform, flat, and free from internal or external imperfections that would be detrimental to fabrication or performance.

3.4 Sheet Thickness

The sheet thickness shall be within tolerances specified in Table 1.

Table 1: Thickness Tolerance

Nominal Thickness (in)	Tolerance (± in)	Nominal Thickness (in)	Tolerance (± in)
0.028	0.005	0.125	0.009
0.040	0.006	0.156	0.011
0.050	0.007	0.187	0.013
0.060	0.008	0.220	0.015
0.078	0.008	0.250	0.018
0.080	0.008	0.312	0.019
0.093	0.009	0.325	0.019
0.100	0.009	0.375	0.019
0.110	0.009	0.425	0.021
0.120	0.009	0.500	0.022

3.5 Physical Properties

The sheet material shall conform to the physical properties specified in Table 2:

Table 2: Physical Properties

Property	Values	Test Method
Specific Gravity	1.38 max.	ASTM D-792
Tensile Strength psi	5000 (min) psi	ASTM D-638
Deflection Temp. ^{o}F at 66 psi	140^{o}F (min) for 0.125" Sheet or Thinner Gauges	ASTM D-648
Flammability	Flame Resistant	FAR 25.853(a) APP. F, Part I (a) (1) (ii)

3.6 Colour

The sheets shall have an even colour density and shall match the master standard noted in Para.3.2. Comparison shall be made by placing the 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 (7500K) and "Horizon Sunlight (2300K) shall be used to compare colours.Alternatively, the colour measurement can be conducted in Cool White Fluorescent (CWF2).

3.6.1 Where the drawing or purchase order calls up a specific colour, the colour shall be cross referenced by the applicable

colour code noted in Table 3 and the Qualified Products List.

Table 3: Colour Code

DASH NO.	Colour	DASH NO.	Colour
-1	Red	-12	Dark Grey
-2	Sand	-13	Grey
-3	Yellow	-14	Polar White
-4	Laurel Green	-15	Ivory
-5	Aqua	-16	Parchment
-6	Sky	-17	Brick Red
-7	Green	-18	Olive Grey
-8	Cadet Blue	-19	Beige
-9	Blue	-20	Chocolate
-10	Calcutta Black	-21	Mushroom
-11	Pewter Grey	-22	Cocoa

3.7 Surface Finishing

Sheet Material shall have a hair cell finish on one side and a smooth finish on the other side.

3.8 Flammability

The sheet material shall meet the requirements of Table 2 when tested per FAR 25.853(a) APP. F, Part I (a)(1) (ii).

3.9 Chemical Resistance

The sheet material supplied to this specification shall exhibit chemical resistance to the following fluids, when tested in accordance with ASTM D-543, Procedure 2.

1. MIL-H-5606 - Hydraulic Oil
2. MIL-L-7808 - Lubricating Oil, Synthetic Base
3. MIL-L-23699 - Lubricating Oil, Synthetic Base
4. JP4 - Aviation Fuel
5. JP5 - Aviation Fuel

4 MATERIAL QUALIFICATION REQUIREMENTS

4.1 Request For Qualification

All requests for qualification to this specification shall be addressed to de Havilland Materials Technology (MT)

department for approval.

All material qualification shall be site specific.

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

4.2 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.

4.2.1 A sample shall be submitted for testing at the discretion of de Havilland MT for evaluation.

4.3 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 specification where the requirements are similar to this specification.

4.4 Qualification Approval

4.4.1 Upon review of supplier's data, and de Havilland's tests, the supplier will be advised either of product qualification or reasons for not qualifying the product.

4.4.2 Products that are qualified will be listed in the Qualified Products List of this specification.

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

4.4.4 Re-qualification of the product may be requested by the de Havilland MT Engineering if there are any changes in the method of manufacture and/or formulation.

5 QUALITY ASSURANCE REQUIREMENTS

5.1 Supplier Batch/Lot Acceptance Tests

5.1.1 The manufacturer/supplier is responsible for the performance of all sampling, inspection and testing of each batch/lot as specified in **Table 4.**

5.1.2 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 4**. The report shall include the supplier's batch identification, materials specification and date of testing.

5.1.3 De Havilland MT 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.

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

5.2 Purchaser Batch/Lot acceptance tests

5.2.1 The purchaser/user is required to perform of all sampling, inspection and testing of each batch/lot as specified in Table 4.

Table 4: Qualification and Acceptance Tests

Test	Paragraph	Qualification (Manufacturer)	Acceptance	
			Manufacturer/ Supplier	Purchaser/User
Specific Gravity	Table 2	x		
Tensile Strength	Table 2	x		
Deflection Temperature	Table 2	x		
Flammability	Table 2	x	x	
Colour	Table 3 Para.3.6	x	x	
Workmanship	Para.3.3	x	x	x
Surface Finishing	Para.3.7	x	x	x
Chemical Resistance	Para.3.9	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.

6.2 Procurement Documents

Procurement documents shall specify the following:

- Title, Number, Issue and Amendment Number of this Specification
- Finish, Colour and the Thickness Required
- Size of Sheets
- Total Quantity

- Manufacturer's Product Identity

7 PREPARATION FOR DELIVERY

7.1 Preservation and Packing

The acrylic-polyvinyl chloride sheets shall be packed in such a manner as to assure that, during shipment and storage, the product will be protected against damage from exposure to hazards which would affect adversely the property conformance to **Section 3** of this specification.

7.2 Marking

Each container shall be legibly marked with the following information:

- Acrylic-Polyvinyl Chloride Sheet (conforms to DHMS P1.09)
- Manufacturer’s Name and Product Identification (Trade Name or Code Number)
- Quantity
- Date of Manufacture
- Batch or Lot Number.

7.3 Shipping Documentation

7.3.1 The shipping document shall show:

- Purchase Order Number
- Specification Number and Colour Code
- Quantity
- Number of containers or packages
- Batch or Lot Number.

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

8 HEALTH AND SAFETY DATA

When supplying samples for qualification per **Para.5.2.1**, the supplier shall submit a Safety Data Sheet (SDS) complying with Workplace Hazardous Material Information System (WHIMIS) 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 supplied with a completed EHS-FO-025 "Application To Introduce A New Material" form to the Material Safety Review Committee.

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

8.1 Environmental Compliance

Materials and ingredients use in manufacturing the product shall comply to environmental regulations such as REACH, EPA, CPA. Prohibited substances or restricted from certain uses under an Environmental Regulation shall not be used for the specified prohibited applications.

Supplier shall notify de Havilland Materials Technology if the product contains targeted substances.

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QUALIFIED PRODUCTS LIST

MANUFACTURER'S NAME AND ADDRESS	MANUFACTURER'S PRODUCT IDENTIFICATION NO.		Colour Code	MATERIAL SAFETY DATA SHEET NO.	DE HAVILLAND QUALIFICATION SHEET NO.	DATE OF PRODUCT APPROVAL
Manufacturer:	Kydex 100			195	PQS #1	July 5, 1973
SEKISUI POLYMER INNOVATIONS, LLC. 6685 Low Street, Bloomsburg, PA 17815 USA	-l	Red	1200			
	-2	Sand	22005			
	-3	Yellow	22007			
	-4	Laurel Green	32000			
	-5	Aqua	32001			
	-6	Sky	32003			
	-7	Green	32024			
	-8	Cadet Blue	42000			
	-9	Blue	42031			
	-10	Calcutta Black	52000			
	-11	Pewter Grey	52001			
	-12	Dark Grey	52002			
	-13	Grey	52004			
	-14	Polar White	62000			
	-15	Ivory	62015			
	-16	Parchment	72000			
	-17	Brick Red	72002			
	-18	Olive Grey	72003			
	-19	Beige	72005			
	-20	Chocolate	72010			
	-21	Mushroom	72020			
	-22	Cocoa	72047			