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de Havilland

Material Specification

TITLE:	**POLYURETHANE COMPRESSION AND REBOUND LANDING GEAR MOULDINGS**
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Prepared by: Approved by:

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POLYURETHANE COMPRESSION AND REBOUND LANDING GEAR MOULDINGS

REVISION RECORD

Issue	Page	Description and Reason for Change
E		This is a complete revised issue. Detail changes have not been noted.
Amd. 1	6	QPL: supplier's address has been changed.
Amd. 2	6	QPL: new qualified supplier added, old supplier deleted.
Amd. 3	6	QPL: Prothane Limited has been reinstated.
F		QPL: Supplier Prothane address changed. Reformat heading.

POLYURETHANE COMPRESSION AND REBOUND LANDING GEAR MOULDINGS

1 SCOPE

This specification covers the requirements for a casting resin system based on polyether type urethane polymers which will produce compression and rebound landing gear moulded blocks.

2 APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent defined herein.

De Havilland Inc. Drawing No. C6U1137-31

De Havilland Inc. Drawing No. C6U1140-33

DHLP 2031	-	Compression Testing
DHLP 3014	-	Durometer Hardness
FAR 23.723	-	Shock Absorption Tests

3 REQUIREMENTS

3.1 Design Requirements

(a)	Required Temperature Range	-	$-40^{o}F$ to $+150^{o}F$
(b)	Resilience	-	Desired High
(c)	Permanent Set	-	Negligible
(d)	Minimum Service Life Under Above conditions	-	3 years

3.2 Materials

Materials used in the manufacture of compression and rebound moulded block shall be of the highest quality and suitable for the intended purpose.

3.3 Identification

Blocks shall be serial numbered and cure dated.

3.4 Workmanship

The block shall display the natural smooth finish characteristic of synthetic rubber mouldings.

The blocks shall be free from cracks, chipped edges, foreign inclusions and scratches which make definite indentation in the surface.

The block shall be visually inspected for internal bubbles and surface blisters as follow:

(a) Bubbles less than 1 mm (0.04 in.) in diameter shall be ignored.

(b) A group of bubbles where the diameter of the group is less than 2.5 mm (0.1 in.) shall be considered as a single defect.

(c) Dimensions shall be based on the visual estimate of an experienced inspector.

The following conditions shall be cause of rejection:

(a) A single bubble or defect greater than 2.5 mm (0.1 in) in diameter.

(b) More than ten bubbles of 1 mm (0.04 in.) or larger.

(c) A bubble located less than 2.5 times its diameter from a vertical surface of the block.

(d) Three or more clusters of bubbles in the block, each cluster containing 3 or more bubbles.

3.5 Hardness

Thirty days after moulding, the cured block shall be tested for hardness in accordance with DHLP 3014 by the supplier and those with Shore A hardness 78-82 shall be shipped to de Havilland for testing per **Para.3.6**. Blocks that do not meet the hardness requirement may be held for a further 30 days and tested again. Blocks which meet the hardness requirement at that time may be shipped then. A 5% random sample of blocks which marginally fail the second hardness test may be submitted for consideration by the Material Review Board.

Note: The hardness test is a guide to the completeness of curing and used to determine when the blocks are ready for deflection testing. Blocks which are otherwise acceptable shall not be rejected on the basis of hardness.

3.6 Deflection

Blocks tested in accordance with DHLP 2031 shall have deflections of 0.87 - 1.18 in.

3.7 Shock Absorber Tests

Blocks supplied to this specification shall meet the requirements of FAR 23.723.

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 a 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 of 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 Department.

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.

TABLE 1. Qualification & Lot Acceptance Tests

Property	Paragraph	Qualification	Acceptance
Permanent Set	Para.3.1 (c)	x	
Workmanship	Para.3.4	x	x
Hardness	Para.3.5	x	x
Deflection	Para.3.6	x	x
Shock Absorber Tests	Para.3.7	x	

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 Manufacturer/supplier performing acceptance tests per Para.4.3.1 shall furnish with each lot 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 Bombardier Aerospace Materials Technology 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 ORDERING DATA

5.1 Prerequisite

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

5.2 Procurement Documents

Procurement documents should specify the following:

- Title, Number, Issue and Amendment Number of this Specification
- Manufacturer's Product Identity
- Total Quantity

6 PREPARATION FOR DELIVERY

6.1 Preservation and packing

The moulded blocks 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 the property conformance to **Section 3** of this specification.

6.2 Marking

Each container shall be legibly marked with the following information:

- Manufacturer's Name and Product Identification (Trade Name or Code Number)
- Quantity
- Batch Number

6.3 Shipping Documentation

The shipping document shall show:

- De Havilland Purchase Order Number
- Specification Number
- Quantity
- Batch Number
- Number of Containers

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QUALIFIED PRODUCTS LIST

MANUFACTURER'S NAME AND ADDRESS	MANUFACTURER'S PRODUCT IDENTIFICATION NO.	MATERIAL SAFETY DATA SHEET NO.	DE HAVILLAND QUALIFICATION SHEET NO.	DATE OF PRODUCT APPROVAL
Prothane Inc, 8219 Esquesing Line, Milton, Ontario L9T 2X9	Prothane #153	1171	PQS #1	Jan. 15, 1973
Brandoflex Limited, 15 Morton Ave. East, Brantford, Ontario. N3T 5M8 Ph: (519) 752-2584	C6-4-1140-22	N/A	PQS #2	July 16, 1986

Note: Acceptance testing to para. 4.3 will be carried out by De Havilland Materials Laboratory.