de Havilland Inc.

Material Specification

TITLE:	**ALUMINUM ALLOY EXTRUSION, D54S**
SPECIFICATION NUMBER:	**DHMS M2.06**
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1 SCOPE

This specification covers the requirements for D54S Aluminum Alloy Extrusion.

2 INTRODUCTION

The clauses of this specification are written under the following headings:

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3 APPLICABLE SPECIFICATIONS

3.1 Standards

Federal Test Standard No. 151

4 REQUIREMENTS

4.1 Composition

D54S Aluminum Alloy Extrusion shall be composed of the following elements in percent by weight:

Magnesium	4.0 - 4.9
Manganese	0.50 - 1.0
Iron	0.40
Chromium	0.05 - 0.25
Silicon	0.20
Copper	0.10
Other Elements, Each	0.05
Other Elements, Total	0.15
Aluminum	Remainder

NOTE: Except where a range is shown, the percentages are maximum values.

4.1.1 The subcontractor shall furnish an analysis of each lot showing the percentage of each of the elements shown above.

4.1.2 Analysis shall be made regularly only for the elements specifically mentioned above. If, however, the presence of other elements is indicated in the course of routine analysis, further analysis shall be made to determine that these other elements are not present in excess of the limits specified herein.

4.2 Condition

The material shall be available in the H11A tempered condition.

4.3 Mechanical Properties

The mechanical properties in the direction of extrusion shall be as follows:

Ultimate Ten. Stg.	40 ksi min
Yield Strength	24 ksi min.
Elongation (%)	12 min.

4.4 Tolerances

4.4.1 The tolerances of this material shall be as negotiated between De Havilland Aircraft of Canada and the supplier, as shown on applicable drawings. Except where otherwise specified on the drawing, commercial tolerances for straightness and angularity shall apply.

4.5 Workmanship

4.5.1 The material shall be uniform in quality and condition, clean sound and free from foreign materials and from internal and external defects detrimental to fabrication or to performance of parts.

4.5.2 Rework of surface defects such as scratches, abrasions, regulator marks, and die lines is acceptable if the defects are of a sufficiently superficial nature to subsequently blend with the overall appearance of the length of extrusion. Such spot removal of defects by the supplier shall be permitted only where such removal does not reduce the metal thickness below the minimum dimension allowed by this specification.

4.5.3 Blisters and inclusions are cause for rejection unless extremely light in depth and size.

4.5.4 Speed cracks, gouges or heavy scratches are not acceptable.

5 IDENTIFICATION

5.1 Unless otherwise specified, each shape shall be marked with the manufacturer' name or trade mark, the alloy number, the number of this specification DHMS M2.06, batch identification letters and the temper in which furnished. The characters shall be clearly legible and shall be applied to the material by suitable marking fluid, which cannot be obliterated by normal handling, at intervals of not more than 15-18" between each repeated series. These markings shall be capable of being removed by solvent wiping or vapour degreasing. Where it is not practicable to mark as specified above because of size or shape of the material, oil proof cloth or metal tags marked by ink and impression stamping respectively and showing the above information shall be securely fastened to each bundle.

6 TESTING

6.1 Tensile test specimens shall be taken from each lot and tested in compliance with the requirements of Federal Test Standard Number 151. Whenever practicable, the material shall be tested in full section. For material less than 1/2 inch in section thickness and of suitable width, which is not tested in full section, a test specimen of type 5 shall be used. For material 1/2 inch or more in section thickness, which is not tested in full section, a test specimen of type 1 or 4 shall be used. For shapes from which a standard test specimen cannot be taken and which cannot be tested satisfactorily in full section, a strip taken from the section shall be tested. Test specimens shall meet the requirements laid down in Section 4.3.

7 MACRO INSPECTION

7.1 A sample section one inch long shall be removed from the final end of the extrusion (Ref. 5.3) as received from the supplier and submitted to the laboratory for examination. This sample shall be suitably identified with the receiving slip number of the material and with an identification number relating to the extrusion from which it was taken.

7.2 The samples shall meet the requirements of Table I for coarse grain envelope.

Table I Coarse Grain Ring Standard (Maximum)

Minor Dimension (inches)	Major Dimensions (inches)				
	.375 to 1"	1" to 2"	2" to 3"	3" to 5"	5" to 7"
.250 to 1"	3/32"	3/32"	3/32"	1/8"	1/8"
1" to 2"		3/32"	1/8"	1/8"	3/16"
2" to 3"		3/16"	3/16"	3/16"	3/16"
3" to 5"				1/4"	1/4"
5" to 7"					1/4"

7.3 Extrusions with a minor dimension less than 3/8" and exhibiting a coarse grain envelope in excess of 25% of this minor dimension shall be accepted subject to meeting other requirements.

7.4 In cases where the coarse grain envelope exceeds the limits of 7.2 and 7.3, but as a result of subsequent machining operations will be reduced to within the above limits, the material may be passed as satisfactory.

7.5 Any indication of "Coring" found during the examination of the extruded material will be cause for rejection.

NOTE: The Macro examination is waived when a release note is received from the supplier stating that the material meets the requirements laid down for the coarse grain envelope.

8 PACKAGING

8.1 Unless otherwise specified, material shall be preserved and packed in substantial commercial containers of the type, size and kind commonly used for the purpose in such a manner as to ensure acceptance by carrier for transportation and to afford maximum protection from normal hazards of transportation and handling.

9 ORDERING DATA

9.1 Procurement documents should specify the following:

- Title, number and issue of this specification
- Temper
- Die number and length

10 REJECTIONS

10.1 Material not conforming to this specification or to authorized modifications will be subject to rejection.