MINISTRY OF TECHNOLOGY

D.T.D. 5202

January, 1968

Aerospace Material Specification

0·5 PER CENT MOLYBDENUM - BORON STEEL

(60 hbar)
(Limiting ruling section 63 mm)

NOTE 1. This specification is one of a series issued by the Ministry of Technology to meet a limited requirement not covered by any existing British Standard for aerospace material.

NOTE 2. Where metric units are stated these are to be regarded as the standard. The conversions of metric units to British units are approximate and more accurate conversions should be based on B.S. 350: "Conversion factors and tables".

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1. Inspection and testing procedure

1.1 This specification shall be used in connection with the relevant sections of British Standard 3S.100 as follows:

Bars for machining delivered in the finally heat treated condition	Sections One and Three
Billets and bars for forging	Sections One and Five
Forgings	Sections One and Six
Parts heat treated after machining ...	Sections One and Seven

1.2 *Sulphur printing or deep etching tests.* Samples shall be selected in accordance with British Standard 3S.100, Section One, Clause 7.2.2.

2. Process of manufacture

2.1 The steel shall be manufactured by an oxygen, open hearth or electric process.

3. Chemical composition

3.1 The steel shall contain:

Element	Per cent	
	min.	max.
Carbon	0·10	0·14
Silicon	—	0·40
Manganese	0·45	0·70
Phosphorus	—	0·040
Sulphur	—	0·040
Boron (soluble) ...	0·0015	0·0050
Molybdenum	0·40	0·60
†Titanium	0·030	0·080

†The titanium shall be added to the melt before the boron is introduced. If agreed between the manufacturer and the purchaser and stated on the order, zirconium, aluminium or other nitrogen stabilizing elements may be added instead of or together with titanium.

NOTE. Soluble boron is defined as that portion of the boron which is dissolved when a sample of the material is decomposed in an 8N sulphuric acid solution at 80°C.

4. Surface dressing

4.1 The steel shall be overall dressed in accordance with the requirements of British Standard 3S.100, Section One, Clause 5.1.

5. Condition

5.1 Unless otherwise agreed between the manufacturer and the purchaser, in which case the condition of supply shall be stated in the order, the steel shall be supplied in the normalized condition.

6. Heat treatment

6.1 *Normalizing.* Heat at a temperature between 950°C and 980°C and cool in still air.

NOTE. Precautions shall be taken to ensure that each item is freely cooled in air.

6.2 *Post-weld heat treatment.* Heat for 30 minutes at a temperature between 685°C and 695°C and cool in still air.

6.3 Alternatively to Clause 6.1, forgings and parts may be heat treated in accordance with the requirements of the drawing or order as provided for in British Standard 3S.100, Section Six, Clause 4.1, or Section Seven, Clause 3.1.

7. Mechanical properties

7.1 *Tensile.* Except where they are required by British Standard 3S.100 to be agreed between the manufacturer and the purchaser, the tensile properties obtained from test pieces selected and prepared in accordance with the relevant requirement of British Standard 3S.100 shall be:

0·2 per cent proof stress		Tensile strength				Elongation on $5{\cdot}65\sqrt{So}$
hbar	tonf/in²	hbar		tonf/in²		per cent
min.	min.	min.	max.	min.	max.	min.
47	30	60	75	38	48	18

7.2 *Hardness.* The hardness of the finally heat treated material shall be:

179 min/255 max HB

or

190/min/270 max HV

8. Weldability

8.1 If weldability is critical, special tests may be agreed between the manufacturer and the purchaser*.

Approved for issue,

E. W. RUSSELL,

Director of Materials Research and Development/Aviation.

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* The purchaser is responsible for securing the concurrence of the parent design firm.

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