

See
3 S. 95

2 S. 95 January, 1964

(Replacing British Standard S.95)

BRITISH STANDARDS INSTITUTION

BRITISH STANDARDS HOUSE, 2 PARK STREET, LONDON, W.1

INCORPORATED BY ROYAL CHARTER

Telephone: MAYFAIR 9000

Telegrams: STANDARDS, AUDLEY, LONDON

**BRITISH STANDARD SPECIFICATION
FOR AIRCRAFT MATERIAL**

**1½ PER CENT NICKEL-CHROMIUM-MOLYBDENUM
STEEL**

(55/65 tonf/sq in: limiting ruling section 4 in)

NOTE 1. Where metric equivalents are stated the figures in British units are to be regarded as the standard. Where Fahrenheit equivalents are stated, the temperatures in degrees Celsius are to be regarded as the standard. The conversions are approximate. More accurate conversions should be based on the tables in B.S. 350, 'Conversion factors and tables'.

NOTE 2. In place of the customary, but incorrect use of the pound, ton or kilogramme as units of force, the units called pound-force (abbreviation lbf), ton-force (abbreviation tonf) or kilogramme-force (abbreviation kgf) have been used in this standard. These are the forces which, when acting on a body of mass one pound, one ton or one kilogramme respectively, give it an acceleration equal to that of standard gravity.

1. Inspection and testing procedure.

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

Bars for machining delivered in other than the finally heat treated condition. (See Clause 5.1)

Sections One and Two.

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 3 S.100, Section One, Clause 7.2.1.

2. Process of manufacture.

The material shall be manufactured by the acid open hearth or an electric process, unless otherwise agreed between the manufacturer and the purchaser in accordance with British Standard 3 S.100, Section One, Clause 3.1.

2 S. 95 January, 1964

(Replacing British Standard S.95)

3. Chemical composition.

The steel shall contain:

Element	Per cent	
	min.	max.
Carbon	0.35	0.45
Silicon	0.10	0.35
Manganese	0.45	0.7
Nickel	1.3	1.7
Chromium	1.0	1.4
Molybdenum	0.20	0.35
Sulphur	—	0.045
Phosphorus	—	0.040

4. Surface dressing.

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

5. Condition.

5.1 The material shall be supplied in the appropriate condition stated below unless otherwise agreed between the manufacturer and the purchaser in which case the condition in which the material is to be supplied shall be stated on the order.

Designation	Material	Condition of supply
S.95B	Black bars for machining	Finally heat treated
S.95D	Bright bars for machining	Finally heat treated and cold drawn } before or or cold rolled } after final or machined } heat or ground } treatment
S.95A	Billets and bars for forging	Softened
S.95C	Forgings	Finally heat treated

5.2 Parts shall be supplied finally heat treated.

5.3 Parts made from forgings or bars in other than the finally heat treated condition shall be finally heat treated after being machined to as near finished size as practicable.

6. Final heat treatment.

6.1 Except as provided in Clause 6.3, the final heat treatment shall be:

- a. Harden in oil from a temperature between 820°C and 850°C (1510°F and 1560°F).
- b. Temper at a suitable temperature between 560°C and 660°C (1040°F and 1220°F).

6.2 Hardened and tempered bars which have been subjected to a cold straightening or cold rolling operation shall be given a stress relieving treatment which shall be sufficient to restore the proof stress.

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

7. Mechanical properties.

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

0.1 per cent proof stress		Tensile strength				Elongation per cent on gauge length		Impact
tonf/sq in	kgf/mm ²	tonf/sq in		kgf/mm ²		5.65 $\sqrt{S_0}$	4 $\sqrt{S_0}$	ft lbf
min.	min.	min.	max.	min.	max.	min.	min.	min.
43	68	55	65	87	102	13	18	40

7.2 *Hardness.*

- a. The hardness of softened material shall be not more than 277 HB.
- b. The hardness of finally heat treated material and parts shall be not less than 248 HB nor more than 302 HB.

This British Standard, having been approved by the Aircraft Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council of the Institution on 31st January, 1964.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following B.S.I. references relate to the work on this standard:
Committee reference ACE/15. Draft for comment D62/3645.