



METRIC AND INCH UNITS
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(Superseding British Standard S.516)

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BRITISH STANDARD: AEROSPACE SERIES
SPECIFICATION FOR

CARBON-MANGANESE STEEL SHEET AND STRIP
(93/116 hbar)

NOTE: Sheet and strip of the same composition at a higher strength level are covered by British Standard 2 S.517.

1. INSPECTION AND TESTING PROCEDURE

- 1.1 This British Standard shall be used in conjunction with the relevant sections of British Standard 2 S.500, as follows:
 - Sheet and strip delivered in the softened condition for use in the Sections 1 and 3 hardened and tempered condition
 - Sheet delivered in the hardened and tempered condition Sections 1 and 4
 - Strip delivered in the hardened and tempered condition Sections 1 and 5
 - Finally heat treated parts Sections 1 and 8

1.2 The thickness of the material shall be in accordance with British Standard 2 S.500, Table 1, for material which has been finally hot rolled prior to softening or hardening and tempering, or in accordance with Table 2 for material which has been finally cold rolled prior to softening or hardening and tempering.

1.3 Sulphur printing or deep etching tests. Samples shall be selected in accordance with British Standard 2 S.500, 1.8.2.2.

2. PROCESS OF MANUFACTURE

The material shall be manufactured by an oxygen, open hearth or electric process, unless otherwise agreed between the manufacturer and the purchaser in accordance with British Standard 2 S.500, 1.3.1.

3. CHEMICAL COMPOSITION

The steel shall contain:

Element	Per cent	
	min.	max.
Carbon	0.42	0.50
Silicon	0.10	0.35
Manganese	1.3	1.7
Phosphorus	-	0.040
Sulphur	-	0.040

4. SURFACE DRESSING

The material shall be locally dressed in accordance with the requirements of British Standard 2 S.500, 1.5.2.

Price 4/- net

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5. CONDITION

5.1 The material shall be supplied in one of the following conditions after final hot or cold rolling:

- (1) Softened
- (2) Hardened and tempered

5.2 The condition required shall be stated on the order. Unless otherwise agreed the method of rolling shall be at the option of the manufacturer but shall be stated in the release note.

5.3 Finished parts shall be supplied finally heat treated.

6. FINAL HEAT TREATMENT

The final heat treatment shall be:

- (1) Harden in oil or water from a temperature between 840 °C and 860 °C.
- (2) Temper at a temperature of not less than 500 °C.

7. MECHANICAL PROPERTIES

7.1 Tests in the softened condition

(1) *Hardness*. The hardness of the material shall be not more than 197 HB or 210 HV.

(2) *Single bend test*. The test piece shall be bent without cracking through an angle of 180° over a former with a radius equal to the nominal thickness of the sheet or strip.

7.2 Tests in the hardened and tempered condition

(1) *Tensile test*. The mechanical properties obtained from test pieces selected and prepared in accordance with the relevant requirements of British Standard 2 S.500 shall comply with the following Table. The values in hectobars are to be regarded as the standard:

0.2 % proof stress	Tensile strength				Elongation on thickness			
	hbar	tonf/in ²	hbar		Less than 1.6 mm	1.6 to 2.4 mm	Over 2.4 mm	
			min.	max.				min.
min.	min.	min.	max.	min.	min.	min.		
77	50	93	116	60	75	6	7	8

NOTE. Conversion factors: 1 hbar = 10⁷ N/m² = 0.6475 tonf/in² = 1.02 kgf/mm². Information on SI units is given in BS 350; 'Conversion factors and tables', and PD 5686, 'The use of SI units'.

(2) *Hardness test for finally heat treated parts*. The hardness of the material shall be:

- 277 min./341 max. HB, or
- 280 min./355 max. HV.

This British Standard, having been approved by the Aerospace Industry Standards Committee, was published under the authority of the Executive Board of the Institution on 24 February, 1969.

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 references relate to the work on this standard:
Committee reference ACE/15 Draft for comment 67/13801