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BRITISH STANDARD : AEROSPACE SERIES
SPECIFICATION FOR
CARBON STEEL WIRE AND SPRINGS
(High duty unground wire—hardened and tempered)



NOTE. Wire to this specification is suitable for springs that are subject to exacting service conditions. It is not suitable for high duty dynamically stressed springs, for which wire to British Standard S. 204 should be used, when hardened and tempered springs are required.

1. INSPECTION AND TESTING PROCEDURE

1.1 General. This British Standard shall be used in conjunction with British Standard 3S. 100, Sections One and Ten.

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

2. PROCESS OF MANUFACTURE

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

3. CHEMICAL COMPOSITION

The steel shall contain:

Element	Per cent	
	min.	max.
Carbon	0.70	0.85
Silicon	0.10	0.35
Manganese	0.65	0.80
Sulphur	—	0.030
Phosphorus	—	0.030

4. SURFACE DRESSING

The material from which the rods are rolled shall be locally dressed in accordance with the requirements of British Standard 3S. 100, Section One, Clause 5.2.

S. 203, August, 1967

(Superseding Ministry of Technology Specification D.T.D. 239B)

5. CONDITION

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.

Material	Condition of supply
Rod for the manufacture of wire	As rolled
Wire for the manufacture of springs	Annealed or annealed and lightly drawn
Springs	Finally heat treated

6. FREEDOM FROM DEFECTS

Samples selected and prepared for examination in accordance with British Standard 3S. 100, Section Ten, Clause 1.3.2 or Clauses 2.3.2 and 2.3.3 shall be immersed in a 50 per cent solution of concentrated hydrochloric acid in water at a temperature of not less than 85°C (185°F). The time of immersion shall be approximately 2 seconds for every 0.025 mm (0.001 in) of diameter, but shall be not less than 2 minutes nor more than 10 minutes.

7. FINAL HEAT TREATMENT

The final heat treatment of the springs, the tensile test pieces for the rod, wire and springs and the reverse bend test pieces shall be:

- (1) Harden in oil from a temperature between 820°C and 850°C (1510°F and 1560°F).
- (2) Temper at a temperature not less than 250°C (480°F) to give the mechanical properties specified in Clause 8.

8. MECHANICAL PROPERTIES

8.1 Tensile tests. The tensile properties of test pieces selected and prepared in accordance with British Standard 3S. 100, Section Ten, Clauses 1.5, 2.5 and 3.6, and heat treated in accordance with Clause 7 shall be:

Metric units				British units			
Nominal wire diameter		Tensile strength		Nominal wire diameter		Tensile strength	
Over	Up to and including	Min.	Max.	Over	Up to and including	Min.	Max.
mm	mm	kgf/mm ²		in	in	tonf/in ²	
0.61	1.22	181	213	0.024	0.048	115	135
1.22	1.63	173	197	0.048	0.064	110	125
1.63	2.03	165	180	0.064	0.080	105	115
2.03	3.25	157	173	0.080	0.128	100	110
3.25	4.88	150	165	0.128	0.192	95	105
4.88	7.62	142	158	0.192	0.300	90	100
7.62	12.70	126	142	0.300	0.500	80	90

8.2 Reverse bend test (wire only—2.2 mm (0.087 in) diameter or thickness and greater). The test pieces, selected in accordance with British Standard 3S. 100, Section Ten, Clause 2.5, shall be heat treated in accordance with Clause 7 and shall then be tested in accordance with British Standard 3S. 100, Section Ten, Clause 2.6.2.2. or 2.6.3. For round wire, each test piece shall be bent over suitable formers having radii not exceeding three times the nominal wire diameter and shall withstand, without cracking, three complete bends.

8.3 Single bend test (wire only—2.2 mm (0.087 in) diameter or thickness and greater). The test pieces, selected in accordance with British Standard 3S. 100, Section Ten, Clause 2.5, shall be taken from the wire in the condition as delivered and shall not be heat treated before being tested. They shall be tested in accordance with British Standard 3S. 100, Section Ten, Clause 2.6.2.3 or 2.6.3 over a radius equal to half the diameter or minor sectional dimension of the wire.

8.4 Wrapping test (wire only—less than 2.2 mm (0.087 in) diameter or thickness). The test pieces, selected in accordance with British Standard 3S. 100, Section Ten, Clause 2.5, shall be taken from the wire in the condition as delivered and shall not be heat treated before being tested. They shall be tested in accordance with British Standard 3S. 100, Section Ten, Clause 2.6.2.4 or 2.6.3.

9. EXAMINATION FOR DECARBURIZATION

9.1 Microscopical examination of rod, wire and springs shall be made in accordance with British Standard 3S. 100, Section Ten, Clauses 1.4, 2.4 and 3.8 respectively.

9.2 The section shall show no completely decarburized zone. The maximum amount of identifiable decarburization shall not exceed 1½ % of the diameter or minor sectional dimension of the rod or wire.

This British Standard, having been approved by the Aerospace 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 24th August, 1967.

The Institution desires to call attention to the fact that this standard is intended to include the technical provisions necessary for the supply of the material herein referred to, but does not purport to comprise 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 BSI references relate to the work on this standard:

Committee reference ACE/15

Draft for comment D65/12019