

Specification for

Pre-hardened and tempered carbon and low alloy round steel wire for springs for general engineering purposes

UDC 62 – 272:669.14 – 426:669.14.018.27 – 156/ – 157

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Cooperating organizations

The Iron and Steel Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

British Cast Iron Research Association	Institute of Marine Engineers
British Constructional Steelwork Association	Institute of Quality Assurance*
British Internal Combustion Engine Manufacturers' Association	Institution of Mechanical Engineers
British Ironfounders' Association	Institution of Production Engineers
British Railways Board	Institution of Structural Engineers
British Shipbuilders	International Tin Research Institute
British Steel Industry*	Lloyd's Register of Shipping
British Steel Industry (Wire Section)*	Ministry of Defence
Concrete Society Limited	National Association of Drop Forgers and Stampers
Council of Ironfoundry Associations	Oil Companies Materials Association
Department of Industry (National Physical Laboratory)	Process Plant Association
Electricity Supply Industry in England and Wales	Royal Institute of British Architects
Engineering Equipment Users' Association*	Society of Motor Manufacturers and Traders Limited*
Federation of Civil Engineering Contractors	Steel Casting Research and Trade Association
Greater London Council	Water-tube Boilermakers' Association

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

British Wire Netting Association	Society of Chain Link Fencing Manufacturers
Fencing Contractors' Association	Spring Research and Manufacturers' Association
Furnishing Spring Makers' Federation	
Music Wire Export Association	
Patented Steel Wire Association	

This British Standard, having been prepared under the direction of the Iron and Steel Standards Committee, was published under the authority of the Executive Board and comes into effect on 30 September 1980

© BSI 03-1999

First published December 1956
First revision September 1980

The following BSI references relate to the work on this standard:
Committee reference ISM/26
Draft for comment 78/76876 DC

ISBN 0 580 11424 4

Amendments issued since publication

Amd. No.	Date of issue	Comments
5044	February 1986	Indicated by a sideline in the margin

Contents

	Page
Cooperating organizations	Inside front cover
Foreword	ii
Section 1. General	
1 Scope	1
2 References	1
3 Information to be supplied by the purchaser	1
4 Manufacture	1
5 Selection of test pieces	1
6 Mechanical testing	2
7 Dimensions and tolerances	2
8 Examination for defects	3
9 Retests	3
10 Packing and identification	3
Section 2. Specific requirements for carbon steel wires	
11 General	4
12 Production range and quality codes for carbon steel wires	4
13 Chemical composition of carbon steels	4
14 Standard sizes and tensile strengths for carbon steel wires	4
15 Decarburization, surface and internal defects in carbon steels	5
Section 3. Specific requirements for low alloy steel wires	
16 General	6
17 Production range and quality codes for low alloy steel wires	6
18 Chemical composition of low alloy steels	6
19 Standard sizes and tensile strengths for low alloy steel wires	6
20 Decarburization, surface and internal defects in low alloy steels	6
Appendix A Product analysis and permitted variations	9
Table 1 — Tolerances on diameter and ovality	2
Table 2 — Tolerances on length of straight lengths	2
Table 3 — Production range and quality codes for carbon steel wires	4
Table 4 — Chemical composition of carbon steel wires	4
Table 5 — Standard sizes and tensile strengths for carbon steel wires	4
Table 6 — Decarburization limits for carbon steel wires	5
Table 7 — Surface defect limits for carbon steel wires	6
Table 8 — Production range, grades and quality codes for low alloy steel wires	6
Table 9 — Chemical composition of low alloy steel wires	6
Table 10 — Standard sizes and tensile strengths for low alloy steel wires	7
Table 11 — Decarburization limits for low alloy steel wires	8
Table 12 — Surface defect levels for low alloy steel wires	8
Table 13 — Permitted variations of product analysis from specified ranges	9
Publications referred to	Inside back cover

Foreword

This edition of BS 2803, prepared under the direction of the Iron and Steel Standards Committee, has been very extensively revised and is now retitled and fully metricated. BS 2803:1956 is now withdrawn.

For the convenience of the user, separate sections cover the requirements for carbon and low alloy steel wires.

Provision has been made for the supply of wire according to the type of duty for which the manufactured springs are intended and to which appropriate grade designations are allocated.

Standard and preferred sizes of wire have been added to the specification. The size ranges listed may not be available, however, from every manufacturer without restriction.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1 Scope

This British Standard specifies the requirements for pre-hardened and tempered plain carbon and low alloy round steel wire, supplied in coils or straight lengths, suitable for the manufacture of mechanical springs for static and dynamic applications. It is generally applicable to wire sizes in the range from 0.25 mm to 12.5 mm.

NOTE Pre-hardened and tempered wire is defined as wire which has been hardened and tempered by a continuous process to produce a structure of tempered martensite so that it needs no further hardening and tempering after spring forming.

2 References

The titles of the publications referred to in this standard are listed on the inside back cover.

3 Information to be supplied by the purchaser

3.1 The following information shall be given on the enquiry or order.

- a) The number of this British Standard i.e. BS 2803.
- b) The wire designation (see **3.2**).
- c) The nominal diameter of the wire (see Table 5 and Table 10).
- d) The tensile strength range if grade 685A55 is ordered (see Table 10).
- e) Any applicable requirements from the appropriate clauses for:
 - 1) condition of wire (see **4.4**);
 - 2) non-destructive testing (see **8.4**);
 - 3) packing and identification (see clause **10**).
- f) Any other special requirements.

3.2 The wire shall be designated by the number of this British Standard, a six digit number corresponding to the chemical composition of the steel, together with the two letters corresponding to the quality code as given in Table 3 and Table 8.

Example: BS 2803, 730A65, HS, 2.80 mm. (High duty static low chromium vanadium spring wire of 2.80 mm diameter.)

4 Manufacture

4.1 Steelmaking process. The steel may be made by any process except that air and mixed air-oxygen bottom blown converter processes shall not be used. In the case of the oxygen process, the nitrogen content of the steel shall not exceed 0.008 %.

4.2 Chemical composition. The chemical compositions of the steels specified in sections 2 and 3 are based on cast analysis. On request, the wire manufacturer shall supply the cast analysis for the specified elements. Any subsequent analytical checks shall take into consideration the heterogeneity normal to the steel (see Appendix A).

4.3 Freedom from defects

4.3.1 The ingots, blooms or billets shall be so prepared as to remove surface imperfections which might produce defects in the wire made from them.

4.3.2 The rod from which the wire is drawn shall be free from harmful surface defects, pipe and other flaws (see also **4.4** for finished wire).

4.3.3 Should it be necessary to grind the wire to meet the specified defect and decarburization limits given in Table 6, Table 7, Table 11 and Table 12, the grinding shall be at a stage during manufacture such that all residual grinding marks are completely eliminated by subsequent drawing.

4.4 Condition of finished wire

4.4.1 Wire shall be supplied in the pre-hardened and tempered condition.

4.4.2 The wire shall be free from harmful surface defects. If required, the level of non-metallic inclusions present in the wire and the method used to assess the level shall be agreed by the purchaser and supplier at the time of the enquiry and order.

4.4.3 Wire supplied in coil, unless otherwise agreed between the manufacturer and purchaser, shall run out straight from the coil. Attention is drawn to the need for precautions when releasing the binders.

4.4.4 The straightness of wire supplied in lengths shall conform to tolerances to be agreed between the manufacturer and the purchaser.

5 Selection of test pieces

5.1 All tests shall be carried out on the material in the condition in which it is to be supplied to the user. Apart from straightening the test pieces prior to testing if necessary, they shall not be treated in any way which may make them unrepresentative of the batch of which they are a sample.

5.2 Test pieces for mechanical tests shall be taken from each end of every coil. Wire supplied in straight lengths shall be grouped in such a manner as to be clearly identified with the coil from which the lengths have been cut. Two test pieces selected at random from the lengths shall then be considered to be representative of that coil of wire.