

Specification for

Wrought steels for mechanical and allied engineering purposes —

**Part 2: Requirements for steels for the
manufacture of hot formed springs**

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The preparation of this British Standard was entrusted by the Iron and Steel Standards Committee (ISM/-) to Technical Committee ISM/31, upon which the following bodies were represented:

- British Chain Manufacturers' Association
- British Coal
- British Forging Industry Association
- British Industrial Fasteners Federation
- British Rail
- British Steel Industry
- Cold Rolled Sections Association
- Department of Trade and Industry (National Physical Laboratory)
- Engineering Industries' Association
- Federation of British Engineers' Tool Manufacturers
- Institution of Production Engineers
- Lloyds Register of Shipping
- Ministry of Defence
- National Association of Steel Stockholders
- Road Vehicle Spring Society
- Society of British Aerospace Companies Limited
- Society of Motor Manufacturers and Traders Limited
- Stainless Steel Fabricators' Association of Great Britain

The following bodies were also represented in the drafting of the standard, through sub-committees and panels:

- Spring Research and Manufacturers' Association

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Foreword

This Part of BS 970 has been prepared under the direction of the Iron and Steel Standards Committee.

It forms Part 2 of a restructured BS 970 and is a revision of BS 970-5:1972, incorporating the requirements of BS 24-3A:1959. Both these standards are withdrawn.

The restructured BS 970 consists of three Parts. Part 1 specifies general inspection and testing procedures and specific requirements for carbon, carbon manganese, alloy and stainless steels and was published in 1983. BS 970-4 was published in 1970 and specifies requirements for valve steels.

New steels have been introduced in this Part of BS 970 to reflect changes in spring manufacture, the need for fine-grained steels and, for certain applications, closely controlled hardenability. Requirements have also been introduced for average maximum levels of non-metallic inclusions for all types of bar and for depths of decarburization and surface defects on hot rolled or drawn bar.

The dimensional and decarburization tolerances in this Part of BS 970 apply only to material supplied directly to the spring maker and not to intermediate products.

The carbon steels for general applications have been removed in this revision as they are already covered in Table 2 of BS 970-1:1983 (grades 080A67 and 060A78).

A number of ordering options is listed in appendix A. These should be called up by the purchaser as required.

Assessed capability. Users of this British Standard are advised to consider the desirability of assessment and registration of a supplier's quality systems against the appropriate Part of BS 5750 by a third party certification body.

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.

1 Scope

This Part of BS 970 specifies requirements for steelmaking, chemical composition, physical properties, dimensional tolerances and testing procedures for hot-rolled flats and rounds and drawn or turned (or peeled) or ground rounds for the production of hot formed and heat treated springs. The requirements apply to eleven grades of steel supplied to restricted chemical analysis ranges and twelve grades of steel supplied to hardenability limits.

Special ordering options, to be called up, as required, by the purchaser, are included in appendix A.

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

2 Definitions

For the purposes of this Part of BS 970 the following definitions apply.

2.1

drawn bar

bar of circular cross section obtained, usually after annealing and descaling by drawing of hot-rolled rod on a draw bench (cold deformation without removing material) followed by straightening and cutting. This operation gives the product special features with respect to shape, dimensional accuracy and surface finish but has only a small reducing effect on decarburization and defect depth

2.2

turned (or peeled) bar

bar of circular cross section having the special features of drawn products, concerning shape, dimensional accuracy and bright surface finish produced by turning on a lathe (or peeling), together with the additional benefit of metal removal on decarburization and defect depth

2.3

ground bar

bar of circular cross section having the special features of drawn products, concerning shape, dimensional accuracy and bright surface finish, produced by grinding or grinding and polishing, together with the additional benefit of metal removal on decarburization and defect depth

3 General

The steel products shall comply with the general requirements of this standard and with the specific requirements applicable to the grade concerned. Where any of the options given in appendix A are called up at the time of the enquiry and order, the steel products shall, in addition, comply with the requirements of any such options.

4 Information to be supplied by the purchaser

4.1 General

The following information shall be supplied at the time of enquiry and order.

- a) Details of the form of section, size and quantity (see clause 12).
- b) The grade of steel (see Table 1, Table 2 and Table 7).

4.2 Options

A number of ordering options are given in appendix A. If the purchaser does not specify any of these options at the time of enquiry and order, the manufacturer shall supply in accordance with the basic specification. See option A.11.

5 Steelmaking processes and casting methods

5.1 Steelmaking

Steelmaking shall be by any process except the air or mixed air and oxygen bottom blown basic converter process.

5.2 Casting methods

The steel shall be cast into ingots or continuously cast. See also option A.1.

6 Chemical composition

6.1 Composition ranges

The chemical composition of the steel, based on cast analysis, shall comply with the requirements of the appropriate material specification in Table 1 or Table 2. See also option A.2.

NOTE 1 Table 2 gives the composition ranges for the steels in Table 7.

NOTE 2 The recommended maximum section thickness for each of the steel grades is given in appendix B.

6.2 Residual elements

Elements not quoted in the relevant material specification shall not be added to the steel other than for the purpose of finishing the heat.

Percentages of elements up to the limits given in Table 3 shall be considered as residual.