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British Standard Specification for

Wrought steels for mechanical and allied engineering purposes

Part 2. Requirements for steels for the manufacture of hot formed springs

Aciers corroyés pour usages mécaniques et industriels connexes — Spécifications
Partie 2. Aciers pour la fabrication des ressorts formés à chaud — Exigences

Schmiedstähle für mechanische und verwandte technische Zwecke
Teil 2. Stahl für warmgeformte Federn

British Standards Institution

Contents

Specification

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 tables 1, 2 and 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 tables 1 or 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.

Table 1. Steels to restricted chemical composition ranges. Chemical composition

	Grade	Carbon C	Silicon Si	Manganese Mn	Phosphorus P	Sulphur S	Chromium Cr	Molybdenum Mo	Vanadium V
		% *m/m*	% *m/m*	% *m/m*	% *m/m* (max.)	% *m/m* (max.)	% *m/m*	% *m/m*	% *m/m*
Silico-manganese steels	251A58	0.55 to 0.60	1.80 to 2.10	0.80 to 1.00	0.035	0.035	0.15 to 0.30	0.10 max.	—
	251A60	0.57 to 0.62	1.80 to 2.10	0.80 to 1.00	0.035	0.035	0.25 to 0.40	0.12 max.	—
Alloy steels	525A58	0.55 to 0.60	0.20 to 0.35	0.80 to 0.95	0.035	0.035	0.70 to 0.85	0.10 max.	—
	525A60	0.57 to 0.62	0.20 to 0.35	0.85 to 1.0	0.035	0.035	0.80 to 0.95	0.06 min.	—
	525A61	0.57 to 0.63	0.20 to 0.35	0.85 to 1.0	0.035	0.035	0.85 to 1.00	0.08 to 0.15	—
	685A57	0.55 to 0.60	1.20 to 1.60	0.70 to 0.90	0.035	0.035	0.60 to 0.85	—	—
	704A60	0.57 to 0.62	0.20 to 0.35	0.85 to 1.0	0.035	0.035	0.80 to 0.95	0.15 to 0.25	—
	705A60	0.57 to 0.62	0.20 to 0.35	0.85 to 1.0	0.035	0.035	0.85 to 1.00	0.25 to 0.35	—
	735A51	0.48 to 0.54	0.20 to 0.35	0.70 to 1.0	0.035	0.035	0.90 to 1.20	—	0.10 to 0.20
	735A54	0.52 to 0.57	0.20 to 0.35	0.90 to 1.15	0.035	0.035	1.05 to 1.20	—	0.12 to 0.20
	925A60	0.55 to 0.65	1.70 to 2.10	0.70 to 1.00	0.035	0.035	0.20 to 0.40	0.20 to 0.30	—

Table 2. Composition of steels to hardenability requirements. Chemical composition

	Grade	Carbon C	Silicon Si	Manganese Mn	Phosphorus P	Sulphur S	Chromium Cr	Molybdenum Mo	Nickel Ni	Vanadium V
		% *m/m*	% *m/m*	% *m/m*	% *m/m* (max.)	% *m/m* (max.)	% *m/m*	% *m/m*	% *m/m*	% *m/m*
Silico-manganese steels	251H60	0.56 to 0.64	1.60 to 2.20	0.70 to 1.00	0.035	0.035	0.40 max.	0.12 max.	—	—
Alloy steels	525H60	0.55 to 0.64	0.15 to 0.40	0.65 to 1.00	0.035	0.035	0.60 to 1.00	0.15 max.	—	—
	685H57	0.54 to 0.62	1.20 to 1.60	0.50 to 0.80	0.035	0.035	0.50 to 0.80	—	—	—
	704H60	0.55 to 0.64	0.15 to 0.40	0.65 to 1.10	0.035	0.035	0.60 to 1.00	0.15 to 0.25	—	—
	705H60	0.55 to 0.64	0.15 to 0.40	0.65 to 1.10	0.035	0.035	0.60 to 1.00	0.25 to 0.35	—	—
	735H51	0.47 to 0.55	0.15 to 0.40	0.70 to 1.10	0.035	0.035	0.90 to 1.20	—	—	0.10 to 0.25
	805H60	0.55 to 0.64	0.15 to 0.40	0.65 to 1.05	0.035	0.035	0.35 to 0.65	0.15 to 0.25	0.35 to 0.75	—

Table 3. Limits on residual elements	
Element	**Less than or equal to**
	% *m/m*
Nickel (Ni)	0.40
Copper (Cu)	0.35
Tin (Sn)	0.035
NOTE. See also option **A.3**.	

6.3 Product analysis and permitted deviations

Product analysis may differ from the cast analysis (see tables 1, 2 and 3) due to heterogeneity arising during casting and solidification. Table 4 shows the deviations from the range specified for cast analysis permitted on product analysis.

The deviation may occur either above or below the individual element ranges but shall not apply both above and below the specified range for any one element in any one cast of steel.

Test specimens for product analysis shall be taken in accordance with the appropriate method of BS 6200 : Part 3 or BS Handbook 19. See option **A.4**.

7 Freedom from defects

The procedures for casting, working, reheating and cooling and the amount of working shall ensure that the product is free from piping, central unsoundness and harmful segregation.

8 Surface condition

8.1 Surface defects

Hot-rolled or drawn bar shall be free from transverse defects and from longitudinal defects deeper than those given in table 5. Turned (or peeled) or ground bar shall not exhibit surface defects.

Currently established in-process methods for the inspection of hot-rolled bar may not detect all defects resulting in some bars in a consignment containing defects in excess of the maximum acceptable depth. Bars exhibiting such defects on later processing shall be deemed not to comply with this standard.

8.2 Surface texture of turned (or peeled) or ground bars

When assessed in accordance with BS 1134 : Part 1, bars shall exhibit a maximum R_a of 3.2 μm. See also option **A.6**.

Table 4. Permitted deviations from specified range on product analysis			
Element	**Range in which maximum of specified element falls**	**Deviation from specified range**	
	%	Over max. %	Under min. %
Carbon C	Over 0.25 up to and including 0.50	0.02	0.02
	Greater than 0.50	0.03	0.03
Silicon Si	Up to and including 0.45	0.03	0.03
	Greater than 0.45	0.05	0.05
Manganese Mn	Over 0.70 up to and including 1.0	0.04	0.04
	Over 1.0 up to and including 2.0	0.05	0.05
Phosphorus P	Up to and including 0.035	0.004	–
Sulphur S	Up to and including 0.035	0.004	–
Chromium Cr	Up to and including 0.60	0.03	0.03
	Over 0.60 up to and including 1.25	0.04	0.04
Molybdenum Mo	Up to and including 0.50	0.02	0.02
Nickel Ni	Up to and including 1.0	0.03	0.03
Vanadium V	Up to and including 0.30	0.03	0.03

Table 5. Maximum acceptable depth for longitudinal defects on hot-rolled or drawn bar	
Thickness/diameter	**Maximum acceptable depth**
mm	
Up to and including 25	0.25 mm
Over 25 up to and including 50	1 % of thickness
Over 50 up to and including 63.5	0.50 mm
Over 63.5 up to and including 80	0.60 mm

8.3 Decarburization

Complete decarburization shall not be present.

The maximum depth of functional decarburization on hot-rolled or drawn bars shall be as follows, when measured in accordance with BS 6617 : Parts 1 or 2.

(a) For flats, the requirements of table 6 shall be met when measured in the areas defined in figure 1.

(b) For rounds, the maximum depth of decarburization shall be 1.5 % of the actual bar diameter for silico-manganese steels and 1.25 % of the actual bar diameter for alloy steels.

Turned (peeled) or ground bars shall not exhibit decarburization.

9 Condition of material on despatch

Bar ends shall be free from splits.

NOTE. For the avoidance of shearing and machining problems, a maximum hardness of 321 Brinell Hardness Number (BHN) is recommended. Subcritical annealing may be required to ensure freedom from shearing and machining problems and may also be necessary in the case of rod material requiring decoiling and cutting for the production of rounds in straight lengths. When subcritical annealing is employed, the maximum recommended hardness is 277 BHN.

See also option **A.5**.

10 Physical properties

10.1 Hardenability

Steels to hardenability requirements shall comply with the hardness values at the positions specified in table 7.

See also option **A.7**.

10.2 Grain size

Steels in both table 1 and table 7 shall exhibit a grain size of 5 to 8 (see BS 4490).

See also option **A.8**.

NOTE. This applies to the grain size assessment on a laboratory test (see **11.3**) and to the developed grain size in the heat-treated spring. For the latter, the austenitizing temperature used for the dual hot-forming/hardening operation should not exceed 1000 °C.

10.3 Inclusion content

Steels shall comply with the requirements in table 8 for the level of freedom from non-metallic inclusions.

See also options **A.9** and **A.10**.

11 Selection and testing of specimens

11.1 General

Where options **A.7**, **A.8** or **A.9** are invoked, testing shall be carried out in accordance with the relevant subclause.

11.2 Hardenability

One test sample selected to represent each cast shall be reduced by forging or rolling to a size not greater than 38 mm in diameter, which shall represent the full cross section of the material. This test sample shall also be of sufficient size to ensure the removal of decarburization in machining to the standard test specimen of 25 mm diameter. Normalizing and austenitizing temperatures for the hardenability test shall be as given in table 9. Tests shall be carried out in accordance with method 1 of BS 4437.

Table 6. Maximum levels of functional decarburization for hot-rolled or drawn flats			
Thickness		**Maximum functional decarburization**	
Silico-manganese steels	**Alloy steels**	**Flat surface**	**Edge**
mm	mm	mm	mm
Up to and including 7	Up to and including 15	0.25	0.35
Over 7 up to and including 10	Over 15 up to and including 25	0.30	0.40
Over 10 up to and including 14	Over 25 up to and including 35	0.35	0.45
Over 14	Over 35 up to and including 45	0.40	0.50
–	Over 45	0.45	0.55

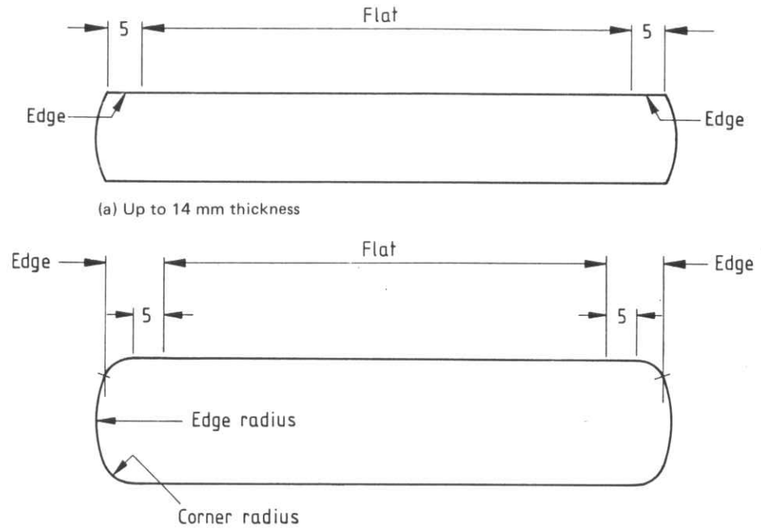
Table 7. Steels to hardenability requirements

	Grade	Distance from quenched end (mm)														
		1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
		Rockwell Hardness Number (scale C) (HRC)														
Silico-manganese steels	251H60-H	max. 66	66	66	65	65	64	63	61	55	47	45	43	42	41	40
		min. 60	59	58	56	52	46	42	38	34	31	29	28	27	26	25
	251H60-M	max. 66	66	66	65	65	64	63	61	55	47	45	43	42	41	40
		min. 60	59	58	57	56	52	45	42	36	33	31	30	29	28	27
Alloy steels	525H60	max. 66	66	66	65	65	65	65	64	64	63	63	62	62	61	60
		min. 60	60	60	59	57	55	51	45	40	36	35	34	33	32	31
	525H60-M	max. 66	66	66	65	65	65	65	64	64	63	63	62	62	61	60
		min. 60	60	60	59	59	58	57	55	48	43	38	37	36	33	32
	525H60-H	max. 66	66	66	65	65	65	65	64	64	63	63	62	62	61	60
		min. 60	60	60	59	59	59	58	57	55	50	45	42	40	38	36
	685H57	max. 66					65			64						
		min. 60					58			53						
	704H60	max. 66	66	66	66	66	65	65	65	65	64	64	63	63	63	63
		min. 60	60	60	60	60	59	59	59	59	57	55	51	49	46	44
	705H60	max. 66	66	66	66	66	65	65	65	65	64	64	64	64	64	64
		min. 60	60	60	60	60	59	59	59	59	58	58	57	57	56	55
	735H51	max. 65	65	64	64	63	62	62	61	60	58	57	55	54	53	52
		min. 57	56	55	54	53	52	50	48	44	41	37	35	34	33	32
	805H60	max. 66	66	66	66	66	66	66	66	66	66	65	64	63	62	61
		min. 60	60	60	60	59	58	55	52	47	43	39	37	36	35	35
	805H60-M	max. 66	66	66	66	66	66	66	66	66	66	65	64	63	62	60
		min. 60	60	60	60	60	59	58	56	51	47	43	40	38	37	36
	805H60-H	max. 66	66	66	66	66	66	66	66	66	66	65	64	63	62	61
		min. 60	60	60	60	60	60	60	59	58	55	49	46	42	41	40

Table 8. Average maximum inclusion levels

	Type B		Type C		Type D	
	Fine series	Thick series	Fine series	Thick series	Fine series	Thick series
Silico-manganese steels	3	1½	2½	1½	2	1½
Alloy steels	3	1½	1½	1	2	1½

NOTE. Requirements are based on the description of inclusions given in ISO 4967.



All dimensions are in millimetres.

Figure 1. Positions for decarburization measurements

Table 9. Normalizing and austenitizing temperatures for hardenability tests

Grade	Normalizing temperature	Austenitizing temperature
	°C	°C
251H60	900	870
525H60	870	845
685H57	900	870
704H60	870	845
705H60	870	845
805H60	870	845

11.3 Grain size

One specimen shall be selected to represent each cast. Tests shall be carried out in accordance with the McQuaid Ehn method given in BS 4490.

11.4 Inclusion assessment

A minimum of six specimens per cast shall be selected. Specimens shall be prepared and examined in accordance with ISO 4967 and the average maximum levels shall comply with the requirements of table 8.

12 Form of section

12.1 Flats

12.1.1 *General.* The section shall be rectangular and free from rhomboidal effects. The edge profile shall meet one of the following criteria which are illustrated in figure 2.

NOTE. Unless otherwise ordered by the purchaser, the normal section profiles will be supplied.

12.1.2 *Normal sections*

(a) For thicknesses below 14 mm, the edge radius shall be approximately equal to the thickness of the material.

(b) For thicknesses of 14 mm and above, the edge radius shall be approximately equal to the thickness of the material. The corners shall have localized radii equal to a quarter of the thickness.

12.1.3 *Special sections*

(a) For certain large applications and sizes generally above 40 mm thick, a profile shall have a square edge and radiused corners. The corner radius shall be within the range 6 mm to 12 mm with a tolerance of $^{+2}_{-0}$ mm.

(b) The edge radius shall be equal to half the material thickness.

12.1.4 *Rib and groove profile.* Ribs and grooves shall be to the dimensions detailed in figure 3. Their centre lines shall be coincidental with each other and shall not deviate from the centre line of the bar by more than 0.73 mm.

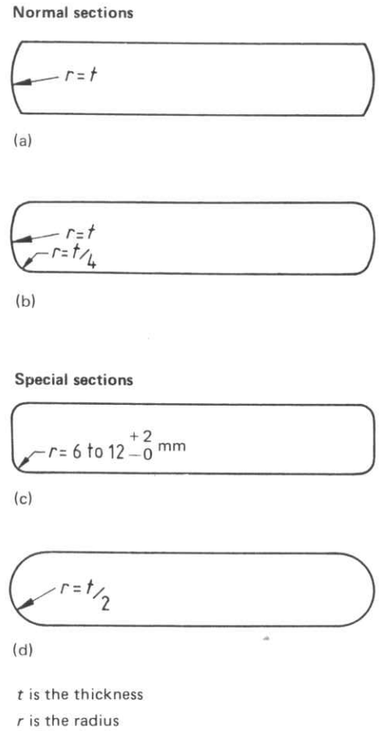


Figure 2. Edge profiles for flats

12.2 Rounds

Bars shall be round within dimensional tolerances (see table 12).

12.3 Dimensional tolerances

12.3.1 *Flats.* Tolerances on flat shall be in accordance with tables 10 and 11.

12.3.2 *Rounds.* Tolerances shall be in accordance with table 12.

12.4 Straightness

12.4.1 Flats shall be straight to within 3 mm in any 1500 mm length with localized straightness within 0.2 % of any length assessed.

12.4.2 Rounds supplied unstraightened shall be straight to within 6 mm in any 1500 mm length. Straightened bars shall be straight to within 1 mm in any 1500 mm length and shall be free from kinks or local bends.

13 Marking

Each bundle of bars shall be tagged to provide the following information:

(a) the number and date of this British Standard, i.e. BS 970 : Part 2 : 1988*;

(b) the size;

(c) the grade;

(d) the cast number;

(e) the mass.

See also option **A.12**.

Table 10. Tolerances on width and thickness for flats

Nominal width	Width tolerance	Thickness tolerance				
		Up to 13 mm thick	Over 13 mm up to 20 mm thick	Over 20 mm up to 30 mm thick	Over 30 mm up to 40 mm thick	Over 40 mm up to 60 mm thick
	mm	mm	mm	mm	mm	mm
Up to 50 mm	± 0.40	± 0.13	± 0.18	± 0.20	± 0.30	± 0.40
Above 50 mm Up to 75 mm	± 0.50	± 0.15	± 0.20	± 0.20	± 0.30	± 0.40
Above 75 mm Up to 100 mm	± 0.50	± 0.15	± 0.20	± 0.30	± 0.40	± 0.50
Above 100 mm Up to 160 mm	± 0.70	± 0.20	± 0.25	± 0.30	± 0.40	± 0.50

*Marking BS 970 : Part 2 : 1988 on or in relation to a product is a claim by the manufacturer that the product has been manufactured in accordance with the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility.

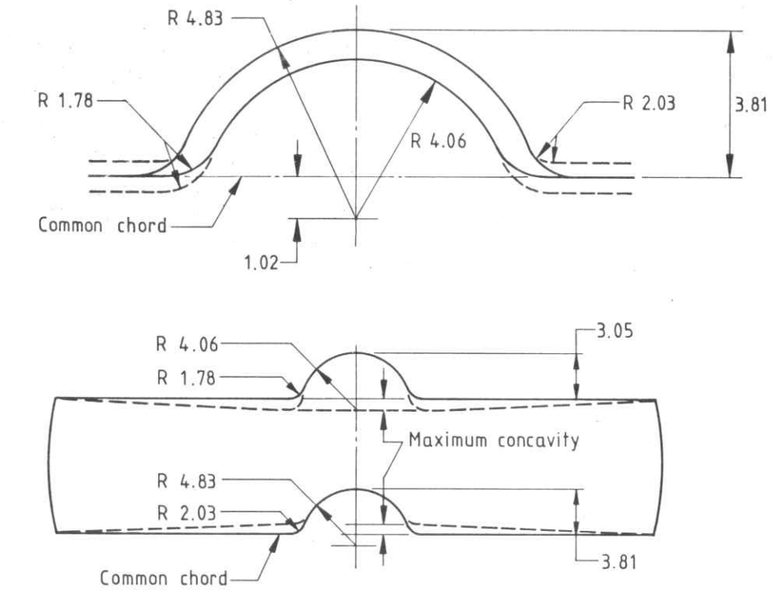


Figure 3. Dimensions of rib and groove spring steel for plates 9.52 mm thick and over

Table 11. Tolerances on concavity, convexity and parallelism across the width for flats

Nominal width	Total concavity maximum	Total convexity maximum	Thickness difference between the two edges, maximum
	mm	mm	mm
Up to and including 50 mm	0.10	0	0.05
Over 50 mm up to and including 75 mm	0.10	0	0.08
Over 75 mm up to and including 100 mm	0.15	0	0.10
Over 100 mm up to and including 160 mm	0.20	0	0.13

Table 12. Diameter and ovality tolerance for round bars

	Hot-rolled rounds	Drawn or turned (or peeled) or ground rounds
Size (diameter)	The greater of $^{+0.25}_{-0}$ mm or $^{+1.5}_{-0}$ %, up to a maximum of 0.50 mm	Up to 15 mm dia: ± 0.03 mm Above 15 mm Up to 25 mm dia: ± 0.05 mm Above 25 mm dia: ± 0.07 mm
Ovality	Maximum of 75 % of the size tolerance band	Maximum of 40 % of the size tolerance band

Appendices

Appendix A. Options

For certain purposes additional options may be required by the purchaser. These should be specified on the order.

A.1 A minimum reduction ratio of 8:1 shall be applied for continuously cast steels.

A.2 Total aluminium shall be quoted in the cast analysis supplied to the purchaser.

A.3 The maximum residual levels shall be restricted to:

(a) Cu 0.20 % *m/m*

(b) Ni 0.20 % *m/m*

(c) Sn 0.02 % *m/m*

NOTE. One or more of the above options may be selected.

A.4 A product analysis shall be supplied.

A.5 The bars shall be supplied in the annealed condition.

NOTE. This option is to meet the purchaser's further processing requirements and not for the alleviation of shearing and/or machining problems (see clause **9**).

A.6 A smoother surface texture than that specified in **8.2** shall be agreed between the purchaser and the manufacturer.

A.7 A hardenability test shall be carried out on each batch in accordance with **11.2** and the results issued on a test certificate.

A.8 A grain size assessment shall be carried out on each batch in accordance with **11.3** and the results issued on a test certificate.

A.9 An inclusion assessment shall be carried out on each batch in accordance with **11.4** and the results issued on a test certificate.

A.10 An inclusion assessment shall be carried out on continuously cast steels in accordance with DIN 50 602 at levels agreed between the purchaser and the supplier.

A.11 A test certificate shall be supplied containing the following information:

(a) size and form of section;

(b) steel grade;

(c) cast analysis;

(d) the results of any further tests selected by the purchaser from appendix A.

A.12 The purchaser shall agree marking requirements in addition to those in clause **13** with the manufacturer.

Appendix B. Recommended maximum dimensions for flats and rounds

The recommended maximum dimensions for flats and rounds are as given in table 13.

Table 13. Recommended maximum dimensions for flats and rounds

Grade	Flats (thickness)	Rounds (diameter)
251A58 251A60	mm 19	mm 25
525A58 525A60 525A61	28.5	54
685A57	–	40
704A60 705A60	60	80
735A51 735A54	30	54
925A60	–	80

NOTE 1. The values for the hardenability grades are the same as those quoted for the equivalent analysis grades.

NOTE 2. The actual grade within a steel type is subject to agreement based on the requirement that 80 % martensite at the centre of the section is achieved by oil quenching.

Publications referred to

BS 970* Specification for wrought steels for mechanical and allied engineering purposes
Part 1 General inspection and testing procedures and specific requirements for carbon, carbon-manganese, alloy and stainless steels
Part 4 Valve steels
BS 1134 Method for the assessment of surface texture
Part 1 Method and instrumentation
BS 4437 Method for determining hardenability of steel by end quenching (Jominy test)
BS 4490 Methods for the determination of the austenitic grain size of steel
BS 5750* Quality systems
BS 6200 Sampling and analysis of iron, steel and other ferrous metals
Part 3 Methods of analysis
BS 6617 Determination of decarburization in steel
Part 1 Methods for determining decarburization by microscopic and micro-hardness techniques
Part 2 Methods for determining decarburization by chemical and spectrographic analysis techniques
Handbook 19 Methods for sampling and analysis of iron, steel and other ferrous metals
ISO 4967 Steel – Determination of content of non-metallic inclusions – Micrographic method using standard diagrams
DIN 50 602 Microscopic examination of special steels using standard diagrams to assess the content of non-metallic inclusions

*Referred to in the foreword only.

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The following BSI references relate to the work on this standard:
Committee reference ISM/31 Draft for comment 87/36929 DC

Committees responsible for this British Standard

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

Amendments issued since publication

Amd. No.	Date of issue	Text affected

AMD 6942

Amendment No. 2
published and effective from 28 February 1992
to BS 970 : Part 2 : 1988

Specification for wrought steels for mechanical and allied engineering purposes
Part 2. Requirements for steels for the manufacture of hot formed springs

Revised text

AMD 6942
February 1992

Table 13. Recommended maximum dimensions for flats and rounds

Delete the existing table 13 and substitute the following.

Table 13. Recommended maximum dimensions for flats and rounds

Grade	Flats (thickness)	Rounds (diameter)
	mm	mm
251A58	12.7	16
251A60	19	25
525A58	14.5	25
525A60	20	40
525A61	28.5	54
685A57	–	40
704A60	36.5	80
705A60	60	–
735A51	20	40
735A54	30	54

NOTE 1. The values for the hardenability grades are the same as those quoted for the equivalent analysis grades.

NOTE 2. The maximum dimensions for each grade are based on the requirement that 80 % martensite at the centre of the section is achieved by oil quenching.