

Specification for

Steel castings for general engineering purposes

Committees responsible for this British Standard

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- Associated Offices Technical Committee
- BEAMA Ltd.
- British Gas plc
- British Railways Board
- British Steel Industry
- British Valve and Actuator Manufacturers' Association
- Electricity Supply Industry in England and Wales
- Engineering Equipment and Materials Users' Association
- Institute of British Foundrymen
- Institution of Mechanical Engineers
- Lloyds Register of Shipping
- Ministry of Defence
- Nickel Development Institute
- Process Plant Association
- Steel Castings Research and Trade Association
- Coopted member

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Foreword

This British Standard has been prepared under the direction of the Iron and Steel Standards Policy Committee and is a revision of BS 3100:1976 which is withdrawn.

This revision includes seven additional steels and ten steels have been deleted.

The designation system for carbon and alloy steels used in this standard consists of one or two letters followed by a number. The first letter consists of one of the following:

- A for carbon and carbon manganese steels
- B for low alloy steels

The second letter (if appropriate) consists of one of the following:

- No letter for general purpose use
- L for low temperature toughness
- W for wear resistance
- T with higher tensile strength (low alloy steels only)
- M with specified magnetic properties (carbon steels only)

These letters are followed by a number which is arbitrary.

For corrosion resisting, heat resisting and high alloy steel castings, wherever possible the first three digits correspond to the AISI stainless steel designation. The letter C as the fourth character denotes casting and the last two digits are arbitrary.

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 14, 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 British Standard specifies chemical composition, heat treatment and mechanical properties for steel castings intended for general engineering purposes. A number of steels are given to cover elevated temperature, low temperature, abrasive and corrosive service conditions.

Appendix A gives requirements for information to be supplied by the purchaser.

Appendix B lists additional options which may be specified by the purchaser.

Appendix C gives test procedures for sampling and testing.

NOTE 1 While steel castings complying with this standard may be used for pressure containing parts, reference should be made to BS 1504, for steels with elevated temperature properties.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

2.1

ruling section

that combination of dimensions of a casting which has the greatest influence on the rate of cooling and hence on the mechanical properties developed in the casting

2.2

melt

one melting furnace charge of steel

2.3

cast

a ladle of liquid steel consisting of one or more melts

3 Information to be supplied by the purchaser

3.1 General

Information to be supplied by the purchaser is given in appendix A.

3.2 Options

A number of options are specified in appendix B. In the event that the purchaser does not indicate his wish to implement any of these options and specify his requirements at the time of enquiry and order, the manufacturer shall supply the purchaser with steel castings in accordance with the base specification.

4 Chemical composition

4.1 Composition ranges

The chemical composition of the steel shall be determined by cast analysis and shall comply with Table 1 or Table 2. Deviations on check analysis are given in Table 3 and Table 4. The deviations, other than where maxima only are specified, apply either above or below the specified limits of the range but not both above and below for the same element from different samples for the same cast. If a product analysis is required see option **B.1**.

For steels 302C25, 304C12, 304C15, 347C17, 316C12, 316C16, 317C16 and 318C17, a free cutting steel may be specified (see option **B.2**). In this case, the properties given for these steels in Table 4 shall not apply.

4.2 Residual elements

Elements designated as residual elements in the individual specifications shall not be intentionally added to the steel. See also option **B.3**.

5 Mechanical properties

NOTE The mechanical properties given in Table 5 and Table 6 apply to separately cast or attached test blocks and not to the castings themselves. See also option **B.4**.

5.1 Tensile properties

Tensile properties of test pieces, when prepared and tested in accordance with appendix C, shall comply with Table 5 or Table 6.

5.2 Impact properties

Impact properties of test pieces, when prepared and tested in accordance with appendix C, shall comply with Table 5 or Table 6.

5.3 Bending

The bend test piece shall comply with Table 5 when prepared and tested in accordance with appendix C. The test piece shall have no cracks or other open defects exceeding 3 mm in any direction on the convex surface after bending.

NOTE For steels A1, A2, B1, B2, B3, B4 and B5, a bend test is carried out unless the purchaser specifies an impact test in which case a bend test is not carried out. See appendix A.

5.4 Hardness

Where hardness properties are given in the material specification the hardness of the casting shall comply with Table 5 or Table 6 when tested in accordance with appendix C. For steels A4, A5, A6, B2, B3, B4, BS, B6, 410C21, 420C28, 420C29, 425C12 and 425C11, see option **B.5**.

Table 1 — Chemical composition limits^a for the cast analysis of carbon, carbon manganese and low alloy steel castings

Steel	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Nb	Sn	V	Total residuals max.
	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)	%(m/m)
<i>Carbon and carbon-manganese steels</i>													
A1 ^b	0.25	0.60	0.90	0.050	0.050	0.30 ^c	0.15 ^c	0.40 ^c	0.30 ^c	—	—	—	0.80
A2 ^b	0.35	0.60	1.0	0.050	0.050	—	—	—	—	—	—	—	—
A3 ^b	0.45	0.60	1.0	0.050	0.050	—	—	—	—	—	—	—	—
A4	0.18 to 0.25	0.60	1.2 to 1.6	0.050	0.050	—	—	—	—	—	—	—	—
A5	0.25 to 0.33	0.60	1.2 to 1.6	0.050	0.050	—	—	—	—	—	—	—	—
A6	0.25 to 0.33	0.60	1.2 to 1.6	0.050	0.050	—	—	—	—	—	—	—	—
<i>For use at low temperatures</i>													
AL1 ^d	0.20	0.60	1.1	0.040	0.040	0.30 ^c	0.15 ^c	0.40 ^c	0.30 ^c	—	—	—	0.80
AL2 ^e	0.25	0.60	1.2	0.040	0.040	0.30 ^c	0.15 ^c	0.40 ^c	0.30 ^c	—	—	—	0.80
AL3 ^e	0.25	0.60	1.2	0.040	0.040	0.30 ^c	0.15 ^c	0.40 ^c	0.30 ^c	—	—	—	0.80
BL2	0.12	0.60	0.80	0.030	0.030	—	—	3.0 to 4.0	—	—	—	—	—
<i>High magnetic permeability</i>													
AM1	0.15	0.60	0.50	0.050	0.050	0.30 ^c	0.15 ^c	0.40 ^c	0.30 ^c	—	—	—	0.80
AM2	0.25	0.60	0.50	0.050	0.050	0.30 ^c	0.15 ^c	0.40 ^c	0.30 ^c	—	—	—	0.80
<i>For case hardening</i>													
AW1	0.10 to 0.18	0.60	0.60 to 1.0	0.050	0.050	0.30 ^c	0.15 ^c	0.40 ^c	0.30 ^c	—	—	—	0.80
<i>Resistance to wear and for surface hardening</i>													
AW2	0.40 to 0.50	0.60	1.0	0.050	0.050	0.30 ^c	0.15 ^c	0.40 ^c	0.30 ^c	—	—	—	0.80
AW3	0.50 to 0.60	0.60	1.0	0.050	0.050	0.30 ^c	0.15 ^c	0.40 ^c	0.30 ^c	—	—	—	0.80