

CONFIRMED
AUGUST 1985

Specification for

Zinc alloys for die casting and zinc alloy die castings

Co-operating organizations

The Non-ferrous Metals Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

- Aluminium Federation
- Association of Bronze and Brass Founders
- British Bronze and Brass Ingot Manufacturers' Association
- British Electrical and Allied Manufacturers' Association
- British Lead Manufacturers' Association
- British Non-ferrous Metals Federation*
- British Non-ferrous Metals Federation — High Conductivity Copper Group
- British Non-ferrous Metals Research Association*
- Copper Development Association
- Department of Trade and Industry (Marine Division)
- Electric Cable Makers' Confederation
- Institute of British Foundrymen
- Institute of Metals*
- Institution of Mechanical Engineers (Automobile Division)
- Institution of Mining and Metallurgy
- Institution of Production Engineers
- Institution of Structural Engineers
- Lead Development Association
- Light Metal Founders' Association
- London Metal Exchange*
- Magnesium Industry Council
- Ministry of Defence, Army Department*
- Ministry of Defence, Navy Department
- National Brassfoundry Association
- Non-ferrous Metal Stockists
- Post Office
- Royal Institute of British Architects
- Society of Motor Manufacturers and Traders Ltd.*
- Tin Research Institute
- Zinc Development Association*
- Individual manufacturers

The Government department and scientific and industrial 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 Steel Industry
- Institute of Iron and Steel Wire Manufacturers
- Institute of Sheet Metal Engineering
- National Institute of Hardware
- Zinc Alloy Die Casters' Association

This British Standard, having been approved by the Non-ferrous Metals Industry Standards Committee, was published under the authority of the Executive Board on 14 September, 1972

© BSI 02-1999

First published, January, 1942
First revision, March, 1955
Second revision, September, 1972

The following BSI references relate to the work on this standard:
Committee references NFE/8, NFE/8/1
Draft for comment 70/37637

ISBN 0 580 07237 1

Amendments issued since publication

Amd. No.	Date	Comments
2777	April 1979	
4733	February 1985	Indicated by a sideline in the margin

Contents

	Page
Co-operating organizations	Inside front cover
Foreword	ii
1 General	1
1.1 Scope	1
2 Alloy ingot metal	1
2.1 General	1
2.2 Chemical composition	1
2.3 Marking	1
2.4 Certificate of compliance	1
2.5 Independent test	1
3 Die castings	1
3.1 Manufacture	2
3.2 Chemical composition	2
3.3 Independent test	2
3.4 Condition	2
3.5 Freedom from defects	2
3.6 Dimensions	2
3.7 Tests for compliance	2
3.8 Determination of minimum weight	2
3.9 Marking	3
3.10 Inspection samples	3
Appendix A Properties of Alloys A and B	4
Appendix B Stress and energy unit conversions	6
Table 1 — Dimensional changes after die casting	4
Table 2 — Dimensional changes after stabilizing	4
Table 3 — Mechanical properties of pressure die cast specimens	5

Foreword

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 5 000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook, which may be purchased from BSI Sales Department. It may also be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

BS 3436, *Ingot zinc*.

BS 3630, *Methods for the sampling and analysis of zinc and zinc alloys*.

This British Standard was originally issued together with BS 1003, "High purity zinc", at the request of the Zinc Development Association in 1942 when the development of dependable zinc alloys of good mechanical properties had resulted in a rapid increase in the use of zinc alloy die castings for engineering purposes.

The formulation of these alloys was the result of much research and the specified compositions were chosen as those giving the optimum balance of properties. Subsequent experience showed that some allowance should be made for loss of aluminium and magnesium during casting and in the 1955 revision of this standard therefore, their limits were slightly modified.

The presence in these alloys of certain impurities, particularly tin, lead and cadmium, the last two of which are usually found in zinc ores, may cause liability to intercrystalline corrosion with resultant dimensional instability and loss of strength. The basic zinc used for the manufacture of these alloys must therefore be such that these impurities are strictly limited.

In the 1955 revision of BS 1004 other impurities previously included under the heading "traces" were given definite limits, although the specification did not require an analysis to be made for these elements. This was made clear in the new layout of the chemical composition clause. Similar limits were included for the alloys, as the impurities will persist. Indium was included under this heading as investigations had shown that it might be particularly detrimental.

In 1962 BS 1003 was withdrawn as zinc of the same chemical composition was being included as grade Zn 1 of BS 3436, "Ingot zinc", and an amendment to BS 1004:1955 was issued detailing the consequent change to this specification.

In this revision of BS 1004 a maximum limit has been included for nickel in the ingot alloys as this element may enter the alloys from the melting equipment and a higher maximum limit has been included in the castings to allow the limited use of plated scrap material under close control.

In addition the limits for iron in the ingot alloys have been tightened in line with ISO/R 301, "Zinc alloy ingots", published in 1963.

The analytical methods previously included in BS 1005, "Sampling and analysis of high purity zinc and zinc alloy die castings", and the polarographic methods previously included in BS 1225:1945, are now being superseded by methods issued as Parts of BS 3630, "Methods for the sampling and analysis of zinc and zinc alloys", and when the series is complete it will include methods for all elements for which limits are set in BS 1004 and BS 3436, "Ingot zinc". BS 1005 will then be withdrawn. A new edition of BS 1225 has also been issued which relates to spectrographic analysis only.

Arrangements made in 1955 for the use of the BSI certification mark in connection with this standard continue. Manufacturers who hold a licence from the BSI to use this mark are required to ensure that the whole of their production of zinc alloy die castings complies with the requirements of Section 2 of BS 1004 except that permission may be given for the production of castings with a higher copper content than that specified for Alloy B of BS 1004, provided the impurity limits of Alloy B are observed. The use of material containing inserts and of plated scrap material is permitted so long as the remelt derived there-from is of such a quality that die castings made from it comply with the chemical composition set out in Section 2 of BS 1004. The patching, plugging or welding of castings is entirely disallowed.

In Appendix A the mechanical properties of pressure die cast specimens are given in SI units which are calculated equivalents of the properties given in the 1955 edition. The conversion factors used are shown in Appendix B.

The SI System of units (Système International d'Unités) is a newly rationalized selection of units in the metric system, involving the newton as the unit of force, which has been adopted by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

Recommendations on the design and production of zinc alloy pressure die castings are to be found in CP 3001, "Code of Practice for zinc alloy pressure die casting for engineering".

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 to iv, pages 1 to 8, 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.