

Specification for

**Wrought magnesium
alloys for general
engineering
purposes —
Bars, sections and
tubes including
extruded forging stock**

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
- Association of Consulting Engineers, Incorporated
- Board of Trade
- 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 Research Association*
- Copper Development Association
- Crown Agents for Oversea Governments and Administrations
- 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 Dept)
- Ministry of Defence (Navy Dept)
- National Brassfoundry Association
- Non-ferrous Metal Stockists*
- Post Office
- Royal Institute of British Architects
- Society of Motor Manufacturers and Traders Limited*
- Tin Research Institute
- Zinc Development Association
- Individual manufacturers

This British Standard, having been approved by the Non-ferrous Metals Industry Standards Committee, was published under the authority of the Executive Board on 30 October 1970

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The 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:

- Institute of Sheet Metal Engineering
- Ministry of Technology

Amendments issued since publication

Amd. No.	Date	Comments

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Foreword

This standard makes reference to the following British Standards:

BS 18, *Methods for tensile testing of metals — Part 1: Non-ferrous metals*.

BS 1499, *Sampling non-ferrous metals*.

BS 1957, *Presentation of numerical values (finesness of expression; rounding of numbers)*.

BS 3907, *Methods for the analysis of magnesium and magnesium alloys*.

This British Standard is one of a series for magnesium alloys in various wrought forms, first issued in 1947 (as BS 1350-57) and revised in 1961 (as BS 3370-74).

This edition is the first revision of the standard in metric terms, the preparation of which was authorized by the Non-ferrous Metals Industry Standards Committee.

Others in the series are:

BS 3370, *Plate, sheet and strip*.

BS 3372, *Forgings and cast forging stock*.

With the introduction of this revision the series has been reduced to three separate standards:

BS 3370 has been combined with BS 3374 which formerly covered plate.

BS 3372 covering forgings now includes provision for cast forging stock.

BS 3373 has been combined with BS 3371 which formerly covered extruded tube and now additionally includes provision for extruded forging stock.

In preparing this metric specification regard has been paid to the recommendations of the International Organization for Standardization. Alloy compositions and properties have been brought into line with ISO Recommendations where this has been practicable. In the case of compositions, since ISO Recommendations have not yet been published for the whole range of alloys included, compositional designations which use chemical symbols and are internationally recognized have been listed following the British Standard designation for the alloy. In the compositional designation system the basis metal symbol is first shown, followed by those for the essential alloying elements in order of diminishing content. Such elements where essential but less than 1 % have no following number; others are followed by a number indicating the percentage of the element to the nearest 0.5 %.

e.g. British Standard Alloy Designation MAG-111 (Compositional Designation Mg-Al3Zn1Mn) Magnesium base alloy containing nominally:

Aluminium 3 %

Zinc 1 %

Manganese less than 1 % and within the specified limits.

The condition or temper symbols now cited are also those proposed by ISO.

The former procedure of allocating alloy numbers to each material prefixed by the letters MAG, the same alloy numbers being used throughout the series, has been retained. Between the letters MAG and the alloy number and separated by hyphens the following symbols are now adopted to indicate form.

S = plate, sheet and strip (BS 3370).

F = forgings (BS 3372).

E = extruded bars, sections and tubes (BS 3373).

Cast forging stock is to be referred to only by the British Standard reference BS 3372 and the relevant alloy designation.

The ISO Recommendations require that proof stress values should now be specified as 0.2 % values in place of 0.1 % values in earlier editions.

Elongations on extruded products are normally measured on a gauge length of $5.65 \sqrt{S_0}$ (where S_0 is the cross-sectional area). Alternatively on material up to 12.5 mm thick, elongation may be measured on a gauge length of 50 mm where flat test pieces are employed.

Full details of chemical composition and mechanical properties, listed in relation to alloy, form and condition or temper, are now given in a single table instead of on separate specification sheets as in the previous edition.

In this series a new alloy MAG-131 (Mg-Zn2Mn1) has been introduced.

The following changes relating to composition have been introduced in this edition.

- 1) Deletion of the note relating to “available” zirconium.
- 2) Deletion of the reference to “determination” or “verification” analytically of the constituents or impurities in the chemical composition of the alloy.
- 3) Deletion of the appendix relating to the method of analysis for zirconium.
- 4) Restriction of the upper limit for manganese in MAG-111 material (Mg-A13Zn1Mn) to bring it into line with ISO requirements.

All tables of tolerances have been revised and metric values in accordance with latest production practices are now cited.

Appendix A shows available forms for all materials in the complete series.

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 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 requirements for magnesium alloy extruded bars, sections and tubes made from seven alloys. It also covers extruded forging stock¹⁾ in these materials.

2 General

The extruded bars, sections and tubes shall comply with the general requirements set out in the following clauses and with the appropriate requirements given in Table 3–Table 14.

3 Definitions

For the purposes of this British Standard the following definitions apply:

3.1

purchaser

the party, whether user, retailer, wholesaler or corporate body, or their agent(s) as appropriate, responsible for ordering the material standardized

3.2

batch

an inspection batch should normally consist of products

- of the same alloy
- of the same form
- of the same nominal dimensions
- of the same condition where applicable
- and of a size defined in Clause 8.

3.3

section

any extruded shape generally delivered in straight lengths

3.4

hollow section

a section which completely encloses a void or voids

3.5

bar

a solid section which is round, oval, rectangular or regular polygonal in shape

3.6

regular section

a solid extruded section, not otherwise covered by the definition of bar, which can be conveniently divided into approximate rectangles with measurable dimensions, e.g. angles, channels, tees etc. The ratio of maximum to minimum thickness of such regular sections does not exceed 4 : 1

3.7

tube

a hollow section which is round, oval, rectangular or regular polygonal in shape

3.8

extruded forging stock

extruded material for the production of forgings

4 Freedom from defects

The material shall be free from defects prejudicial to its use.

¹⁾ Cast forging stock is covered by BS 3372.