BRITISH STANDARD AEROSPACE SERIES

**BS 2L 99:1972**

*(Superseding BS L 99 and D.T.D. 5028) Incorporating Amendment Nos. 1 and 2*

## Specification for

# Ingots and castings of aluminium-silicon-magnesium alloy —

## (Solution treated and precipitation treated) (Si 7, Mg 0.3)

Confirmed December 2009

UDC 629.7:669.715'782'721-412-14

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 and 2 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.

This British Standard, having been approved by the Aerospace Industry Standards Committee, was published under the authority of the Executive Board of the Institution on 30 March 1972



The following BSI references relate to the work on this standard:
Committee reference ACE/27
Draft for comment 70/16281

**ISBN 0 580 07080 8**

**Amendments issued since publication**

| Amd. No. | Date of issue | Comments |
|---|---|---|
| 3739 | September 1981 | |
| 6543 | March 1991 | Indicated by a sideline in the margin |
| | | |
| | | |

# Contents

*blank*

## 1 Inspection and testing procedure

The ingots and castings shall be inspected and tested in accordance with the relevant requirements of BS L 101 as follows:

| | |
|---|---|
| Ingots | Sections 1 and 2 |
| Castings not subject to cut-up testing | Sections 1 and 3 |
| Castings subject to cut-up testing | Sections 1 and 4 |

## 2 Chemical composition

### 2.1 Ingots

**2.1.1** The chemical composition of the ingots shall be:

| Element | % | |
|---|---|---|
| | min. | max. |
| Copper | — | 0.10 |
| **Magnesium** | **0.25** | **0.45** |
| **Silicon** | **6.5** | **7.5** |
| Iron | — | 0.15 |
| Manganese | — | 0.10 |
| Nickel | — | 0.10 |
| Zinc | — | 0.10 |
| Lead | — | 0.05 |
| Tin | — | 0.05 |
| Titanium | — | 0.20 |
| Others each | — | 0.05 |
| Others total | — | 0.15 |
| **Aluminium** | — | **The remainder** |

**2.1.2** The ingot shall be grain refined with titanium or with titanium and boron. The ingot maker shall declare the grain refining element(s) used.

**2.2 Castings.** The chemical composition of the castings shall be:

| Element | % | |
|---|---|---|
| | min. | max. |
| Copper | — | 0.10 |
| **Magnesium** | **0.20** | **0.45** |
| **Silicon** | **6.5** | **7.5** |
| Iron | — | 0.20 |
| Manganese[a] | — | 0.10 |
| Nickel[a] | — | 0.10 |
| Zinc[a] | — | 0.10 |
| Lead[a] | — | 0.05 |
| Tin[a] | — | 0.05 |
| Titanium[a] | — | 0.20 |
| **Aluminium** | — | **The remainder** |

[a] The proportion of casts in which this element is determined may be reduced, subject to the discretion of the Inspecting Authority, to not less than one in five of those analysed.

NOTE Specific modifying elements may be added in sufficient quantities to provide the necessary casting material quality.

## 3 Heat treatment

**3.1** The castings and test samples shall be heat treated together as follows:

1) Heat at a temperature of 540 ± 5 °C for not less than 12 hours.

2) Quench into water at a temperature of not less than 65 °C or in a polymer quenchant at a temperature not greater than 30 °C.

NOTE The use of a polymer quenchant as an alternative to water should be agreed by the purchaser.

3) Re-heat at a temperature of 155 ± 5 °C for not less than 4 hours.

4) Cool in air.

**3.2** Where a polymer quenchant has been used in **3.1** 2) the nature of the quenchant shall be defined on the certificate of conformity for the castings.

# 4 Mechanical properties

## 4.1 Tensile test

NOTE The tensile test values specified for test pieces machined from separately cast test samples may not be realized in certain portions of castings.

**4.1.1 Separately cast test samples.** The mechanical properties obtained from separately cast test samples, selected and prepared in accordance with the relevant requirements of BS L 101, shall be not less than the following values:

| Test sample | 0.2 % proof stress | Tensile strength | Elongation |
|---|---|---|---|
| | N/mm² | N/mm² | % |
| Sand cast | 185 | 230 | 2 |
| Chill cast | 200 | 280 | 5 |

**4.1.2 Cut-up test samples.** Unless otherwise agreed between the supplier and the purchaser and stated in the Inspection Schedule in accordance with BS L 101, the mechanical properties obtained from cut-up test samples, selected and prepared in accordance with the relevant requirements of BS L 101, shall be not less than the following values:

| Position of test samples | 0.2 % proof stress | Tensile strength | Elongation |
|---|---|---|---|
| | N/mm² | N/mm² | % |
| Designated locations | 200 | 260 | 5 |
| Other locations | 180 | 225 | 3 |

NOTE 1 N/mm² = 1 MN/m² = 0.102 kgf/mm² = 0.1 hbar = 0.065 tonf/in². Information on SI units is given in BS 3763, "*The International System of units (SI)*"; see also BS 350, "*Conversion factors and tables*".

**4.2 Hardness test.** The hardness of castings heat treated with unrelated test samples, in accordance with clause **3**, shall be not less than the following values:

Sand cast 75 HB
Chill cast 80 HB

*blank*

# BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

**Revisions**

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

**Buying standards**

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

**Information on standards**

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

**Copyright**



BSI
389 Chiswick High Road
London
W4 4AL