BRITISH STANDARD AEROSPACE SERIES

BS 3L 63: 1971

(Superseding BS 2L 63)

Specification for

Tube of aluminium-copper-magnesium-silicon-manganese alloy —

(Solution treated and precipitation treated)
(Cu 4.4, Mg 0.5, Si 0.7, Mn 0.8)

Confirmed January 2011

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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 31 August 1971

The following BSI references relate to the work on this standard:
Committee reference ACE/24
Draft for comment 69/23023

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Amendments issued since publication

Amd. No.	Date	Comments

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NOTE 1 Attention is drawn to the necessity for special precautions, both during and after manufacture, to protect the tubes from intercrystalline corrosion to which they are particularly susceptible.
NOTE 2 Attention is drawn to the warning contained in Clause 6.1.
NOTE 3 Other forms of material of similar composition are covered by British Standards as listed in Appendix A.

1 Inspection and testing procedure

This British Standard shall be used in conjunction with Sections 1 and 11 of BS L 100.

2 Quality of material

The material shall be made from aluminium and alloying constituents, with or without approved scrap, at the discretion of the manufacturer.

3 Chemical composition

The chemical composition of the material shall be:

Element	%	
	min.	max.
Copper	**3.9**	**5.0**
Magnesium	**0.20**	**0.8**
Silicon	**0.50**	**0.90**
Iron	—	0.5
Manganese	**0.40**	**1.2**
Nickel[a]	—	0.2
Zinc[a]	—	0.2
Lead[a]	—	0.05
Tin[a]	—	0.05
Titanium plus Zirconium[a]	—	0.2
Chromium[a]	—	0.10
Aluminium	—	**The remainder**

[a] Subject to the discretion of the Inspecting Authority, determination of these elements need be made on a small proportion only of the samples analysed.

4 Condition

Unless otherwise agreed in accordance with BS L 100, Section 11, the material shall be supplied solution treated, drawn and subsequently precipitation treated.

5 Heat treatment

The material shall be heat treated as follows:

1) Solution treat by heating at a temperature of 505 ± 5 °C and quenching in water at a temperature not exceeding 40 °C.

2) Precipitation treat by heating uniformly for the requisite period at a temperature between 160 °C and 190 °C.

NOTE The following temperatures and times at temperature have been found appropriate:

Temperature	Time at temperature
°C	hours
165	12 to 18
175	9 to 12
185	3 to 6

6 Mechanical properties

6.1 Tensile test[1]**.** The mechanical properties obtained from test pieces selected and prepared in accordance with the relevant requirements of BS L 100 shall be not less than the following values:

0.2 % proof stress	Tensile strength	Elongation on gauge length of 50 mm
N/mm²	N/mm²	%
370	450	7

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)*" and in PD 5686, "*The use of SI units*". See also BS 350, "*Conversion factors and tables*".

6.2 Hardness test. The value of *X* shall be as shown in the following table:

Tensile strength of test piece	Value of *X*
N/mm²	%
450 to less than 465	5
465 to less than 480	7.5
480 to less than 495	10
495 and over	12.5

[1] **WARNING. Tube re-heat treated in accordance with Clause 5 without cold drawing after solution treatment may be expected to have the following minimum properties:**
0.2 % proof stress 325 N/mm²
Tensile strength 415 N/mm²

Appendix A British Standards covering other forms of material of similar composition

Form	Solution treated and aged at room temperature	Solution treated and precipitation treated	Supplied for solution treatment by the user
Bars and extruded sections (not exceeding 200 mm diameter or minor sectional dimension)	BS L 102	BS L 65	—
Forging stock and forgings	BS L 103	BS L 77	—
Hexagonal bars for nuts, couplings and hollow machined parts (free from peripheral and asymmetric coarse grain)	—	BS L 87	—
Sheet and strip	BS L 70	BS L 104	BS L 106[a]
Aluminium-coated sheet and strip	BS L 72	BS L 73	BS L 107[a]
Close toleranced sheet and strip (aluminium-coated)	BS L 89	BS L 90	BS L 108[a]
Tube (not exceeding 10 mm wall thickness)	BS L 105	—	—
Wire for solid, cold-forged rivets (not exceeding 10 mm diameter)	—	—	BS L 37
Plate: controlled stretched	—	BS L 93	—
Plate: not controlled stretched	—	BS L 94	—

[a] In course of preparation.

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