

Amendment Slip No. 2 01  
effective from 22-09-1997  
to CEB Standard 002 : 1993

Specification for Aluminium-Magnesium-Silicon  
Alloy Wire

REVISED TEXT

September 1997

1. Clause 3.0 PRICE VARIATION

Sub Clause 3.2 Basis of the offer

*To amend the first sentence of the para (b) to read as;*

***"The Base Price shall be the midday official price of the Aluminium Alloy at London Metal Exchange (LME) in US Dollars on the day of the closing of Bids or previous working day if the day of closing of Bid is a non working day at LME".***

Sub Clause 3.3 Contract Price

*To amend the fourth line of the para (a) to read as;*

***B' - "Midday official price of Aluminium Alloy in US Dollars per MT at the LME on the first working day immediately after the day of award".***

2. Clause 5.0 MANUFACTURE AND WORKMANSHIP

*To add the following sub-clause;*

***"5.4 Quality Assurance***

***The Manufacturer of Aluminium-Magnesium-Silicon Alloy Wire shall have obtained Quality Assurance Certification Conforming to ISO 9001 for the manufacture of Aluminium-Magnesium-Silicon Alloy Wire and he shall furnish documentary evidence in proof of this with his offer".***

3. Annex A SCHEDULE OF PARTICULARS (to be filled by the Bidder)

*To add the following;*

***"12 Whether the Manufacturer has obtained Quality Assurance Certification Conforming to ISO 9001 for the manufacture of Aluminium-Magnesium-Silicon Alloy Wire Yes/No -***

***If yes, then whether the relevant document is furnished. Yes/No -"***



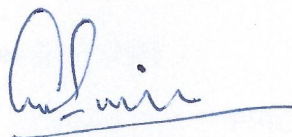
3. Annex A SCHEDULE OF PARTICULARS (to be filled by the Bidder)

To add the following;

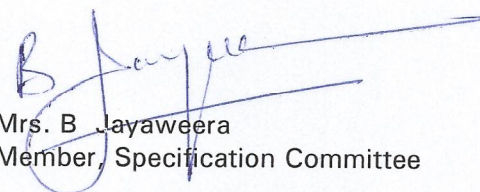
"12 Whether the Manufacturer has obtained Quality Assurance Certification Conforming to ISO 9001 for the manufacture of Aluminium-Magnesium-Silicon Alloy Wire Yes/No -

If yes, then whether the relevant document is furnished. Yes/No -"

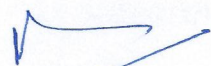
We recommend the above amendments to the CEB Standard 002 : 1993 Specification for Aluminium-Magnesium-Silicon Alloy Wire.



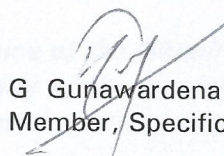
A M Tissera  
Chairman, Specification Committee



Mrs. B. Jayaweera  
Member, Specification Committee



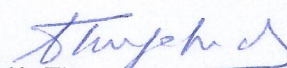
R J Gunawardena  
Member, Specification Committee



G Gunawardena  
Member, Specification Committee

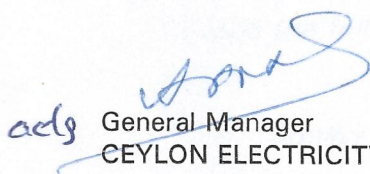


K K A C Samarasinghe  
Member, Specification Committee



K Thayaparendran  
Convenor, Specification Committee

The above amendments to the existing CEB Standard 002 : 1993 Specification for Aluminium - Magnesium - Silicon Alloy Wire is approved.



General Manager  
CEYLON ELECTRICITY BOARD

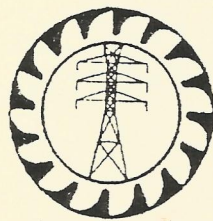
Date : 22.09.97

CEB STANDARD 002 : 1993

*Specification*

*for*

**ALUMINIUM - MAGNESIUM - SILICON ALLOY WIRE**



CEYLON ELECTRICITY BOARD

SRI LANKA



*Specification*

*for*

**ALUMINIUM - MAGNESIUM - SILICON ALLOY WIRE**

CEB Standard 002 : 1993

CEYLON ELECTRICITY BOARD

No. 50, Sir Chittampalam A. Gardiner Mawatha, Colombo 2.  
Sri Lanka

Telephone: 324471-8    Telex : 21368 CE    Facsimile: 94-1-449572

## CONTENTS

	Page
1. Scope	2
2. Applicable Standards	2
3. Price Variation	2
4. Material Requirement & Wire Properties	4
5. Manufacture & Workmanship	4
6. Additional Requirements	5
7. Information to be Supplied with the Offer	6
8. Inspection & Testing	7
9. Sample	8
10. Schedule of Particulars	8

## SPECIFICATION FOR ALUMINIUM - MAGNESIUM - SILICON ALLOY WIRE

### 1.0 SCOPE

This specification covers the Manufacture, Test and Supply of Aluminium, Magnesium, Silicon Alloy wire (heat treated, cold drawn and artificially aged) used for the manufacture of stranded conductors for overhead power transmission and distribution systems.

### 2.0 APPLICABLE STANDARDS

- 2.1 The material shall conform in general to the following standard and the latest amendments thereof.

ANSI/ASTM B 398 M - 86 - Aluminium Alloy 6201 - T 81 wire for electrical purposes (Metric).

IEC 104 - 1987 - Aluminium-Magnesium-Silicon Alloy wire for overhead line conductors

- 2.2 Material conforming to other National Standards which are equal to or higher but not less rigid than the Standards and Specifications stipulated could be offered.

When such alternative Standards are used reference to such standards shall be quoted and English language copies of such standards shall be provided with the offer.

### 3.0 PRICE VARIATION

- 3.1 The Bidders shall forward their offers on the basis of the Price Variation stipulated in Clause 3.2.

- 3.2 Basis of the offer:

- (a) Suppliers of All Aluminium Alloy wires are required to make their offers on the basis of a Base Price plus or minus a Fixed Price margin.
- (b) The Base Price shall be the midday official price of the Aluminium High Grade 99.7% at London Metal Exchange (LME) in US Dollars on the day of the closing of Bids or the previous working day if the day of closing of Bid is a non working day at the LME. The Fixed Price margin may be quoted in the currency of choice of the Bidder.

Accordingly the price quoted shall be in the form:

$$(B_0 \pm FP) \times MT$$

where  $B_0$  - Base price per MT in US Dollars on the fixed date (Clause 3.2 (b)).

FP - Fixed Price margin per MT in the currency of choice.

MT - Quantity in Metric Tons

### 3.3 Contract Price :

(a) The Contract Price (CP) shall be computed as follows.

$$CP = (B_1 \pm FP) \times MT$$

where CP - Contract Price

$B_1$  - Midday official price of Aluminium High Grade 99.7% in US Dollars per MT at the LME on the first working day immediately after the day of award.

MT - Quantity in Metric Tonnes

FP - Fixed Price margin in the currency of choice.

(b) Intimation of the award will be faxed/telexed to the successful Bidder and or his agent in Sri Lanka.

### 3.4 Conversion of Currency :

a) For the purpose of the evaluation the Price  $B_0$  in US Dollars and the Fixed Price margin (FP) in the currency of choice of the Bidder will be converted to Sri Lanka Rupees at the official Selling Exchange Rate of the Central Bank of Sri Lanka prevailing on the day of opening of Bids.

b) The payment for the supply will be made to the Supplier at the contract price in the currency quoted for the Fixed Price Margin (FP). The base price  $B_1$  in US Dollars will be converted to the currency of the FP at the exchange rates indicated in the Bulletin of the LME applicable on the first working day immediately after the date of the award of the offer; where such exchange rate is not available for the currency of the FP in the Bulletin the selling rate at the Central Bank of Sri Lanka shall be applicable.



## 4.0 MATERIAL REQUIREMENT AND WIRE PROPERTIES

The Aluminium-Magnesium-Silicon Alloy used for the manufacture of the wire shall have the conductivity of 52.5% IACS.

### 4.1 Chemical Composition

The alloy used for the manufacture of the wire shall have the following chemical composition.

Element	Percentage Composition
Cu	0.10 (Max)
Fe	0.50 (Max)
Si	0.5 - 0.9
Mn	0.03 (Max)
Mg	0.6 - 0.9
Zn	0.10 (Max)
Cr	0.03 (Max)
B	0.06 (Max)
Other elements, each	0.03 (Max)
Other elements, total	0.1 (Max)
Aluminium	Remainder

### 4.2 Mechanical and Electrical Properties of Wire

#### 4.2.1 Diameter and Cross-section

The diameter of the wire shall be expressed in millimetres to two decimal places.

The mean diameter of the wire shall not depart from the specified nominal diameter by more than  $\pm 0.03$  mm for wires of nominal diameter upto 3.00 mm and by more than  $\pm 1\%$  for wires of nominal diameter above 3.00 mm.

#### 4.2.2 Tensile Strength and Elongation

Samples of heat treated, drawn and artificially aged wire, when tested according to test method given in the applicable standard should have the following minimum tensile and elongation properties.



WIRE DIAMETER mm	TENSILE STRENGTH AT BRAKE MINIMUM, MPa	ELONGATION IN 250 mm FOR INDIVIDUAL TESTS, MINIMUM %
above 3.5mm	315	3.0
Upto and including 3.5mm	325	3.0

When it is desired by the Purchaser, tension tests shall also be made on specimen containing joints made in the wire after heat treatment and before final drawing. The results shall not be less than 90% of the values shown below for individual tests, for acceptance of the material.

### 4.3 Bending Properties

The wire shall be free from brittleness and shall be capable of being wrapped around a wire or a mandrel of its own diameter without a fracture.

## 5.0 MANUFACTURE AND WORKMANSHIP

### 5.1 Manufacture

The Aluminium Alloy wire shall be manufactured from Aluminium Alloy Rods or by continuously cast alloy bars at the Manufacturers' works. In either case, the material and its chemical composition shall conform to standard specified. After intermediate wire drawing and heat treatment, the final drawing of the wire to the nominal diameter must be by hard drawn process.

### 5.2 Workmanship

The finished wire shall be smooth and free from imperfections such as pipes, laps, cracks, kinks, bends, twists, seams, excessive oil and other injurious defects.

### 5.3 Joints

Joints may be made in the drawing stock and in wire after heat treatment but before final drawing. No joints shall be made during final drawing or in the finished wire.

## 6.0 ADDITIONAL REQUIREMENTS

### 6.1 Supply

The wire shall be supplied in one length in each coil without any joints. The weight of each coil before packing shall be 50 kg +/- 10% unless otherwise specified. The gross weight of each coil shall not exceed 60 kg.

## 6.2 Packing

The material shall be shipped in coils on pallets fitted on one circular face area of the coil in such a manner that the coils are suitable for storage with the face area in horizontal position. The pallets shall be strong enough to allow the storage of four (04) coils stacked together one on top of the other.

The coil shall be wrapped with polythene pre-shrunk on coils to enable storage under high humid tropical weather conditions. A minimum of six (06) strappings shall be used on a coil. The quality and the application of the wrapping shall be adequate to protect the wire from damage incident to normal handling, shipment and storage.

## 6.3 Labelling

Each Coil shall bear two tags indicated the following. One tag shall be enclosed inside the polythene, wrapping and the other tag shall be attached on the outside.

- a) CEYLON ELECTRICITY BOARD Contract No. ....
- b) Nett Weight
- c) Gross Weight
- d) Total length of the Conductor
- e) Conductor material/size and temper
- f) Manufacture's name or trade mark
- g) Manufacture's Batch Number

The above information given on the tag shall also be written on the outside face of the polythene wrapping using indelible ink to be clearly visible from the outside.

## 7.0 INFORMATION TO BE SUPPLIED WITH THE OFFER

The Bidders shall enclose the following documents with the offers.

- 7.1 The following test reports from a recognized independent testing authority pertaining to a recent manufacture of wire of standards similar to specified herein shall be furnished with the offer. In addition Mill Certificates of the Tests specified shall also be furnished.



- 1) Chemical Composition
- 2) Electrical Resistivity Test
- 3) Elongation Test
- 4) Wrapping Test
- 5) Tensile Test
- 6) Tolerances on diameter

- 7.2 A list of orders executed by them for supply of Aluminium Alloy wire in the past five years with full details of the purchaser, order number, wire size, quantity supplied.
- 7.3 Plant facilities, Annual Reports or Financial Statements indicating capital invested, turnover, profit etc. shall also be submitted.
- 7.4 Failure to furnish the sample as stipulated in the Clause No. 9.0 and the particulars requested in the Clause Nos. 7.1, 7.2 and 7.3 will result in the offer being rejected.

## 8.0 INSPECTION AND TESTING

### 8.1 Inspection

The manufacturer shall be responsible for the performance of all inspection and test requirements specified in this specification, at his own cost. The manufacturer shall provide all reasonable facilities to the purchaser's representative in the performance of tests and to satisfy himself that the material conforms to this specification.

### 8.2 Testing

- 8.2.1 The following tests shall be witnessed by the Purchaser during inspection of the finished goods.

1. Chemical Analysis
2. Electrical Resistivity Test
3. Elongation Test
4. Bending Test (Wrapping Test)
5. Tensile Test
6. Diameter

- 8.2.2 Chemical Analysis shall be made on one sample selected at random from each heat treatment batch, for all the elements either at the manufacturers' works or at any other approved laboratory.

- 8.2.3 Records of such tests must be maintained at the manufacturers' works and produced for inspection by the purchaser.

### 8.3 Selection of Test Samples

Samples for test specified in this specification shall be taken at least 10% of coils offered for inspection at any one time.

### 8.4 Number of Tests and Retests

- 8.4.1 If tensile strength of a sample from any coil of wire does not conform to the minimum values specified for individual tests in Clause 4.2.2 two additional samples shall be tested and the average of the three tests shall determine the acceptance or rejection of the coil.

- 8.4.2 If a sample taken from a coil does not satisfy the bending properties specified in clause 4.3, two additional samples from the same coil shall be tested and if both the samples confirm to the requirements of clause 4.3, the coil may be accepted.

### 8.5 Place of Testing

All tests may be carried out at the manufacturers' works if suitable facilities are available. Where such test facilities are not available at the manufacturers' works, tests may be carried out at a laboratory approved by the Purchaser.

## 9.0 SAMPLE

A sample piece of Alloy wire of length 3.5 Meters manufactured to the Specifications stipulated in this standard shall be supplied with the offer. The Bidder's identity shall be punched or marked with indelible ink on the sample wire.

## 10.0 SCHEDULE OF PARTICULARS

Schedule of Particulars for Alloy wire which has to be filled by the Bidder is given in Annex A.



## Annex A

**SCHEDULE OF PARTICULARS**

(To be filled by the Bidder)

- |     |                           |   |                                   |
|-----|---------------------------|---|-----------------------------------|
| 1.  | Applicable Standard       | : |                                   |
| 2.  | Name of Manufacturer      | : |                                   |
| 3.  | Country of Manufacturer   | : |                                   |
| 4.  | Chemical Composition      | : |                                   |
| 5.  | Temper/Type               | : | 721                               |
| 6.  | Diameter of Wire          | : | 3 mm                              |
| 7.  | Tolerance on the Diameter | : | + 0.03% for nominal diameter upto |
| 8.  | Tensile Strength          | : | +/- 1% for nominal diameter above |
| 9.  | Resistivity at 20°C       | : |                                   |
| 10. | Jointing Technique        | : |                                   |
| 11. | Weight of Coil (approx.)  | : |                                   |

## Annex A

**SCHEDULE OF PARTICULARS**

(To be filled by the Bidder)

1. Applicable Standard :
2. Name of Manufacturer :
3. Country of Manufacturer :
4. Chemical Composition :
5. Temper/Type :
6. Diameter of Wire :
7. Tolerance on the Diameter :
8. Tensile Strength :
9. Resistivity at 20°C :
10. Jointing Technique :
11. Weight of Coil (approx.) :



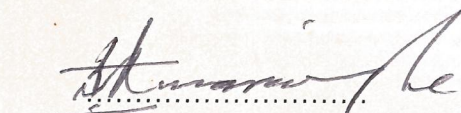
## APPROVAL OF CEB STANDARDS

CEB Standard No. : *CEB Standard 002 : 1993*

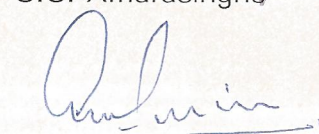
Title of the Standard : *Specification for Aluminium-Magnesium-Silicon Alloy Wire*

Date of Approval : *Oct. 1993*

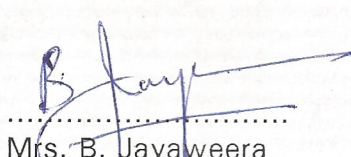
This is to certify that the above Standard has been approved by us.

  
.....  
S.C. Amarasinghe

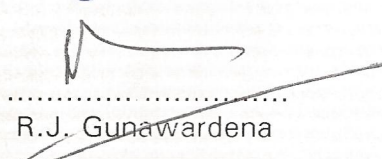
Chairman Specification Committee

  
.....  
A.M. Tissera

Member Specification Committee

  
.....  
Mrs. B. Jayaweera

Member Specification Committee

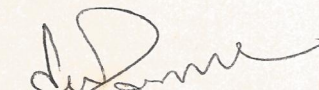
  
.....  
R.J. Gunawardena

Member Specification Committee

  
.....  
K. Thayaparendran

Convenor Specification Committee

***CEB Standard 002 : 1993 - Aluminium - Magnesium - Silicon Alloy Wire*** is approved for adoption in the CEB.

  
.....  
General Manager,  
Ceylon Electricity Board.

**Ceylon Electricity Board**

Date : *9/11/17*