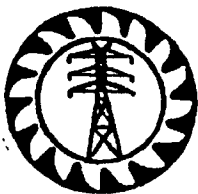


085 : 2005

CEB
STANDARD

COPPER BONDED STEEL EARTH ROD



CEYLON ELECTRICITY BOARD
SRI LANKA

Specification

for

COPPER BONDED STEEL EARTH ROD

CEB Standard 085 : 2005

CEYLON ELECTRICITY BOARD

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SPECIFICATION FOR COPPER BONDED STEEL EARTH ROD

1.0 SCOPE

This Specification covers the general requirements of the design, manufacture and testing of copper bonded steel earth rods and connecting clamps for use in the power distribution earthing systems of the CEB.

2.0 APPLICABLE STANDARDS

The items and components supplied shall be in accordance with the latest editions of the standards specified below and amendments thereof.

- | | | | |
|----|---------------|---|------------------------------------------------------------------------------------|
| a) | BS 6651:1999 | - | Code of practice for protection of structures against lightning |
| b) | BS 4360: 1990 | - | Specification for weldable structural steels |
| c) | BS 2874: 1986 | - | Specification for Copper & Copper Alloy Rods & Sections (other than forging stock) |

3.0 BASIC FEATURES - COPPER BONDED EARTH ROD

Copper Bonded earth Rod shall have a Core made of high tensile-low carbon steel of quality not inferior to grade 43E complying with BS 4360(1990) with a tensile strength not less than 580N/mm². The copper bonding shall be of 99.90% purity electrolytic copper bonded to the steel core. The radial thickness of the copper bonding shall not be less than 250 Micron.

The Steel Rod shall have a rust free smooth surface without cavities, cracks and other imperfections before applying the copper bonding.

The copper bonding shall not have any cracks, holes, cavities etc. preventing exposure of the steel core to the soil and moisture.

The diameter of the copper bonded earth rod shall not be less than 17mm and the tolerance shall be ± 0.05 mm and shall be suitable for use with the 17mm exothermic welding moulds. The length shall not be less than 1200mm and the tolerance shall be ± 10 mm. Bottom end of the Earth Rod shall be tapered off to a smaller diameter.

The Copper Earth Rods shall be as per the drawing No.DS&S/2005/85a.

Copper Bonded earth Rod would be used with clamps exceptionally at line earthing (i.e. where G.I. earth wire to be connected with the earth Rod).

3.1 BASIC FEATURES – CLAMP

The clamp shall be made of tinned copper. It shall be suitable for effectively connecting the 5mm galvanized steel wire (earthing lead) to Copper Bonded Earth Rod (17mm diameter).

The clamp shall be able to make good electrical contact between earth rod and the earthing lead and the connection shall not loosen off in use.

Clamp shall comprise of the following,

- a) U shaped device for making contact with the Cu bonded earth rod.
- b) Means of tightening the device on to the copper bonded earth rod (eg. two bolts).
- c) Means of attaching the earthing lead to the device as shown in the diagram No.DS&S/2005/85b.

4.0 QUALITY ASSURANCE

The manufacturer shall have obtained Quality assurance certification conforming to ISO 9001:2000 for the manufacturer of Copper bonded Earth Rods. Bidders shall furnish documentary evidence to prove this.

5.0 ADDITIONAL REQUIREMENTS

5.1 Marking Marking of Components

Every component shall bear the following information and they shall be engraved or embossed on the external surface.

- a) The manufacturer's name or trade mark, and the year of manufacture.
- b) Length and the diameter (in mm), of the rod.
- c) Letters "C.E.B."

5.2 Packing

Each copper bonded earth rod shall be enclosed in a polythene cover to prevent any damage to the copper bond during transport and handling and the earth rods shall be packed in suitable wooden boxes in such a manner that each box contains twenty five rods. The box shall be marked with the following information.,

- a) Manufacturers name and address
- b) Name of Item and dimensions
- c) Quantity
- d) Gross weight

6.0 INFORMATION TO BE SUPPLIED WITH THE OFFER

The following information shall be furnished with the offer

- a) Manufacturer's Name and address
- b) Applicable Standard for Steel
 - i) Grade of steel & Quality
 - ii) Tensile Strength
 - iii) Chemical composition

- c) Dimension before copper bonding
 - i) Diameter & tolerance
 - ii) Length & tolerance
- d) Dimension after copper bonding
 - i) Diameter & tolerance
 - ii) Length & tolerance
- e) Purity of copper (furnish mill certificate)
- f) Method of bonding adopted
- g) Minimum thickness of copper bonding.
- h) No. of quantities sold during last 05 years indicating the No. of rods, buyer and the year of sale.

7.0 SAMPLES

Two samples of Copper Bonded Steel Rod and two samples of clamps shall accompany with the offer to facilitate analysis and evaluation

8.0 INSPECTION & TESTING

8.1 Inspection

The selected Bidder shall make necessary arrangements for inspection by an Engineer appointed by the Purchaser and also to carry out in his presence necessary routine/sample tests on the materials offered.

The Items shall be stored in such a manner for easy selection of samples to carry out Sample/Acceptance Tests as given below.

8.2 Sampling

For every batch of 1,000 Nos. of Copper bonded Earth Rods 20 Nos of Rods, & 20 Nos of Clamps shall be selected randomly to carry out sample/acceptance test as per Clause 8.3

8.3 Testing (Sample/Acceptance Tests)

The following Sample /Acceptance Tests shall be witnessed by the Engineer appointed by the Purchaser.

- i) Verification of Dimensions
- ii) Adherence of Copper bonding to Steel Core
- iii) Thickness of Copper bonding
- iv) Current carrying Capacity
- v) Mechanical Strength.

9.0 ANNEX

- Annex - A - Drawing No. DS&S/2005/085a
- Annex - B - Drawing No. DS&S/2005/085b
- Annex - C - Schedule of guaranteed technical particulars

ANNEX - C**SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS**

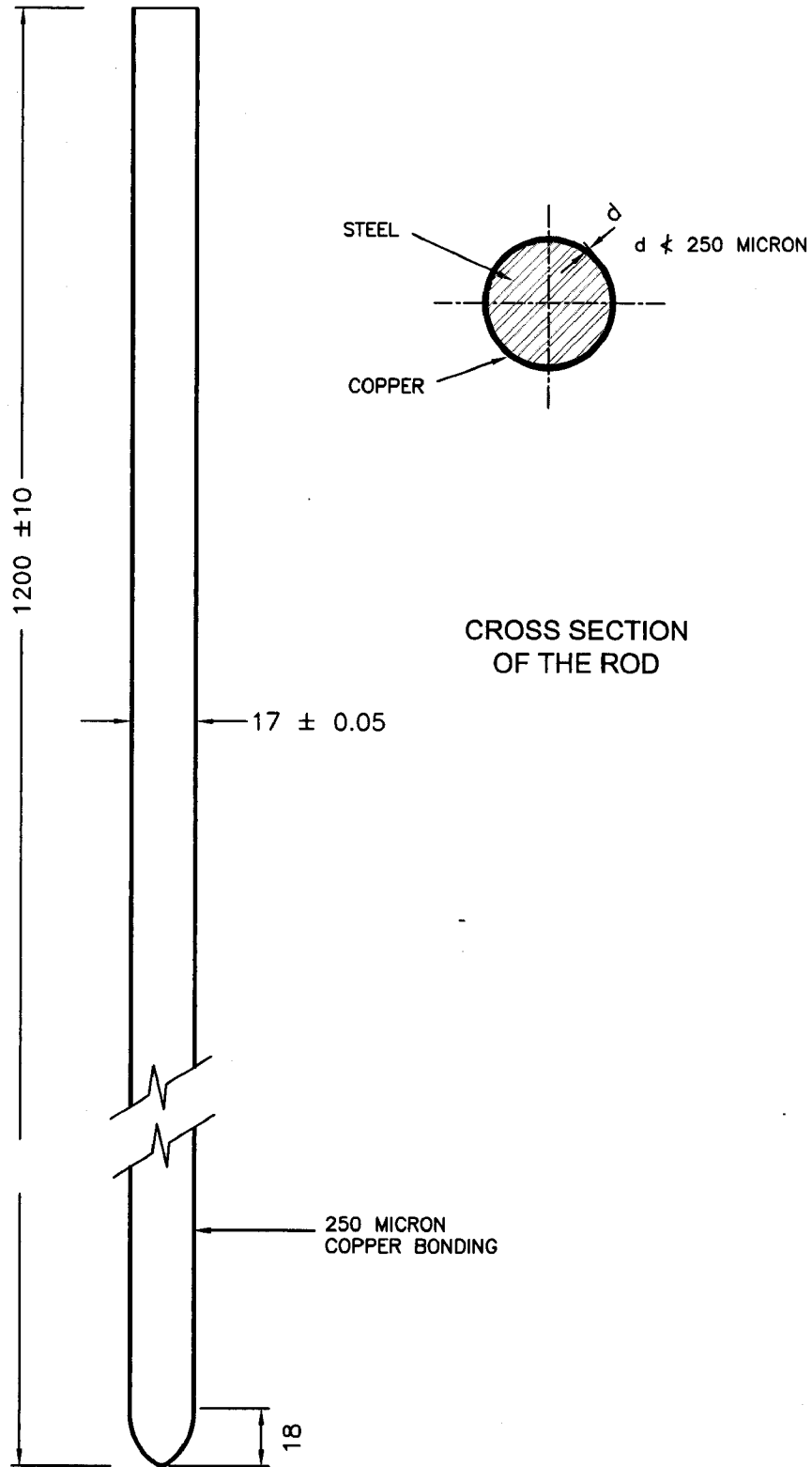
(To be filled by the Bidder)

a)	Manufacturer's Name and address		-
b)	Place of manufacture		-
c)	Production capacity (monthly)	Nos	-
d)	Applicable Standard for Steel		-
	i) Grade & quality of steel		-
	ii) Tensile Strength		-
	iii) Chemical composition		-
e)	Dimension before copper bonding		
	i) Diameter & tolerance	mm	-
	ii) Length & tolerance	mm	-
f)	Dimension after copper bonding		
	i) Diameter & tolerance	mm	-
	ii) Length & tolerance	mm	-
g)	Purity of copper	%	-
h)	Whether the mill certificate for the purity of copper furnished	Yes/No-	
i)	Method of bonding adopted		-
j)	Minimum thickness of copper bonding.	mm	-
k)	Weight		
	i) Before copper bonding	kg	-
	ii) After copper bonding	kg	-


Clamp

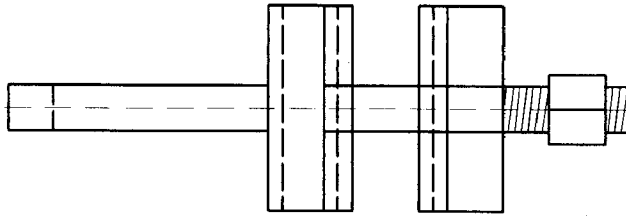
l) Material of Clamp -

SEAL AND SIGNATURE OF THE BIDDER / DATE

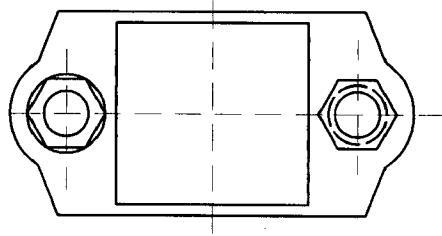


All dimensions are in mm.

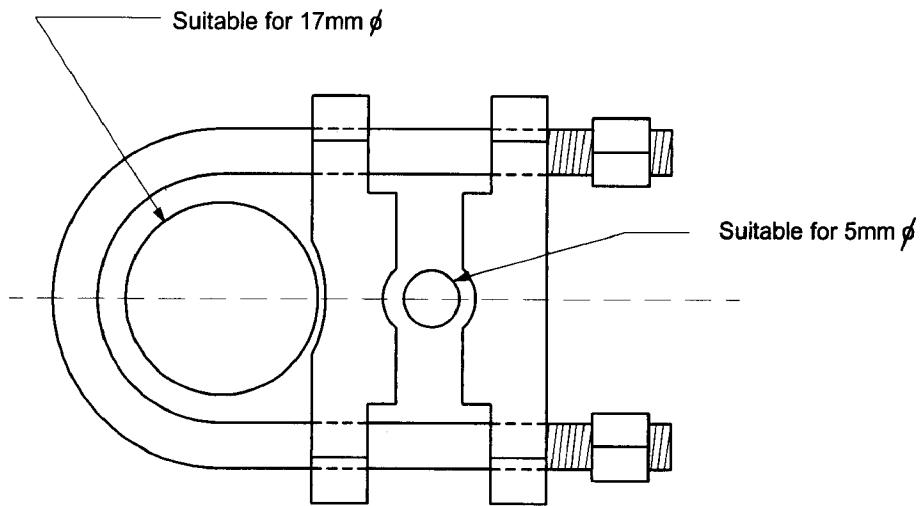
 <p>CEYLON ELECTRICITY BOARD</p>	DISTRIBUTION STANDARDS & SPECIFICATION		SCALE : NOT TO SCALE
	<p>COPPER BONDED STEEL ROD FOR CONCRETE BLOCK EARTH ELECTRODE</p>		DRAWN : LALANI
DESIGNED BY	APPROVED BY	DATE : Sep., 2005	
		DRG. NO : DS&S/2005/085a	
DIST. PLANNING BRANCH	CHIEF ENGINEER (DS & S)	CHAIRMAN, SPECIFICATION COMMITTEE	CAD NO :



FRONT ELEVATION




SIDE ELEVATION



PLAN


All dimensions are in mm.

 <p>CEYLON ELECTRICITY BOARD</p>	DISTRIBUTION STANDARDS & SPECIFICATION		SCALE : NOT TO SCALE
	CONNECTING CLAMP FOR COPPER BONDED STEEL ROD		DRAWN : KUMARI
	DESIGNED BY	APPROVED BY	DATE : Sep., 2005
			DRG. NO : DS&S/2005/085b
			CAD NO :
DIST. PLANNING BRANCH	CHIEF ENGINEER (DS & S)	CHAIRMAN, SPECIFICATION COMMITTEE	


APPROVAL OF CEB SPECIFICATIONS

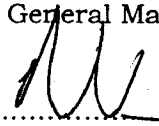
CEB Specification No. : CEB Specification 085 : 2005
Title of the Specification : **Copper Bonded Steel Earth Rod**
Date of Approval : September 2005

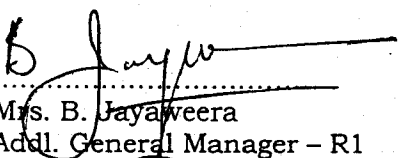
This is to certify that the above Specification has been recommended by Specification Committee for adoption in the CEB.

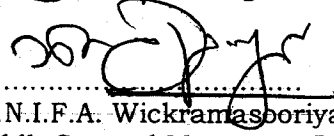

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M.A.L.V. Fernando Chairman Specification Committee

Recommendation made by the Specification Committee to adopt this Specification in the CEB is acceptable.

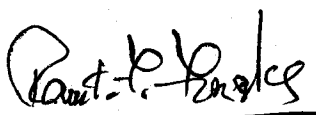

.....
V. Rajendran Chairman Distribution Coordinating Committee
Addl. General Manager - R2


.....
D.R. Pullaperuma Member Distribution Coordinating Committee
Addl. General Manager - R3


.....
Mrs. B. Jayaweera Member Distribution Coordinating Committee
Addl. General Manager - R1


.....
B.N.I.F.A. Wickramasboriya Member Distribution Coordinating Committee
Addl. General Manager - R4

CEB Specification 085: 2005 Copper Bonded Steel Earth Rod is approved for adoption in the CEB.


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General Manager
Ceylon Electricity Board.

Date :