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CEB
SPECIFICATION

**GALVANIZED HIGH STRENGTH STEEL
SHEILDING WIRE
(TOWER LINE APPLICATIONS)**



CEYLON ELECTRICITY BOARD
SRI LANKA



Specification
for

**GALVANIZED HIGH STRENGTH STEEL SHIELDING WIRE
(TOWER LINE APPLICATIONS)**

CEB Specification 121: 2011

Note: - This specification supersedes the CEB specification 012:1998 GALVANIZED STEEL WIRE; 5.2.b "Stranded Galvanized Steel Wire for Earth Wire Application"

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SPECIFICATION FOR GALVANISED HIGH STRENGTH STEEL SHIELDING WIRE (TOWER LINE APPLICATIONS)

1.0 SCOPE

This Specification covers the manufacture and testing of Galvanized Steel Wire of high strength, used as a shielding conductor of 33kV Distribution tower lines.

2.0 SYSTEM PARAMETERS

Overhead Systems	33kV
(a) Nominal Voltage	33kV
(b) System Highest Voltage	36kV
(c) System frequency	50Hz
(d) Method of earthing	Non Effectively Earthed
(e) System fault level	17.5kA

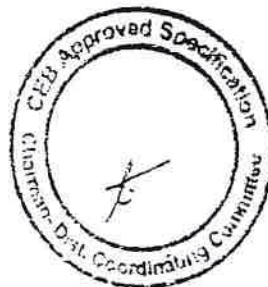
3.0 SERVICE CONDITIONS

(a) Annual average ambient temperature	-	30°C
(b) Maximum ambient temperature	-	40°C
(c) Maximum relative humidity	-	90%
(d) Environmental condition	-	Humid tropical climate with polluted atmosphere

4.0 APPLICABLE STANDARDS

The material supplied shall be in accordance with standards specified below or later edition and/or amendments thereof.

(a) BS 183 1972/ (1982)	-	General Purpose Galvanized Steel Wire Strand.
(b) IEC 60888 (1987)	-	Zinc coated steel wires for stranded conductors



BASIC FEATURES**5.1 Design of Wire**

The Wire shall be drawn from steel by a suitable process and shall conform to BS 183. It shall be of uniform quality, circular cross section, clean and smooth.

5.2 Construction**(a) Stranded Galvanized Steel Wire for Earth Wire Application**

Suitably manufactured and constructed for use as overhead tower line shield wire (ground wire) and the stranding shall be done in accordance with BS 183 (1972).

The number of strands, size of wires and the grades of steel as stipulated in Clause 5.9 are presented below.

- i) 7 Strand of 2.00 mm Diameter Wire of high strength steel
- ii) 7 Strand of 3.25 mm Diameter Wire of high strength steel

5.3 Joints during manufacture

No joints shall be made while drawing, galvanizing and stranding the wire.

5.4 Strand Lay

The outer wires of the Stranded Galvanized Steel Wire shall have a right-hand lay.

5.5 Galvanizing

The wire shall be galvanized by hot dip process conforming to IEC 60888. The minimum mass of zinc coating shall be

- i) 7 Strand of 2.00 mm Diameter Wire 430 g/m²
- ii) 7 Strand of 3.25 mm Diameter Wire 490 g/m²

(Class 2 Zinc coating) in accordance with the Table II of IEC 60888. The zinc coating shall be reasonably smooth, of uniform thickness and consistent with good commercial practice.

5.6 Tolerance on Diameter

The Tolerance on the diameter of the Galvanized Steel Wire shall be

- i) 7 Strand of 2.00 mm Diameter Wire (class 2 Zinc coating) ± 0.05 mm
- ii) 7 Strand of 3.25 mm Diameter Wire (class 2 Zinc coating) ± 0.07 mm

in accordance with the Table IV of IEC 60888.

5.7 Elongation

Elongation shall be

- i) 7 Strand of 2.00 mm Diameter Wire (class 2 Zinc coating) 2.5% for 250mm gauge length
- ii) 7 Strand of 3.25 mm Diameter Wire (class 2 Zinc coating) 3.0% for 250mm gauge length

in accordance with the Table IV of IEC 60888.



5.8 Freedom from defects

The finished wire should be free from harmful defects, splinter irregularities and brittle places.

5.9 Technical Requirements

The Galvanized Steel Wire Shall conforms to the following technical requirements;

- i) Strand Lay Right Hand
- ii) Galvanizing coating Thickness As per Table II of IEC 60888
- iii) Tolerance on diameter As per Table IV of IEC 60888
- iv) Elongation As per Table IV of IEC 60888
- v) Number of wires, Grade of steel Wire and Breaking load
 - (a). 7 Strand of 2.00mm Diameter Wire of High strength steel;
Minimum UTS \geq 1380MPa
 - (b). 7 Strand of 3.25mm Diameter Wire of High strength steel;
Minimum UTS 1340MPa

6.0 QUALITY ASSURANCE

The Manufacturer shall have obtained ISO 9001 Certification for the manufacture of Galvanized Stranded Steel Wire and the manufacturer shall furnish documentary evidence with the offer to prove this.

7.0 ADDITIONAL REQUIREMENTS

7.1 Packing

(a) Drum

The wire shall be supplied in continuous length not less than 2000m wound in wooden drums. The drums shall be made of timber, pressure impregnated against fungal and insect attack. A polythene lining shall be provided to prevent any damage to the wire from the chemical used for preservation of timber. Length of wire shall not vary more than $\pm 2\%$.

7.2 Labeling

Each drum shall carry a label marked with the following particulars. The label shall be weather proof and corrosion proof.

- (a) Number and year of standard adopted
- (b) Configuration of strand
- (c) Number of wires and grade
- (d) Size of wires
- (e) Breaking load (for wire strand)
- (f) Net weight of the coil to the nearest half kilogram
- (g) The word "CEB" and the "Bid No....."
- (h) The name of manufacturer and country of origin



8.0 INFORMATION TO BE SUPPLIED WITH THE OFFER

The following information shall be supplied for each of the wire strand and the solid single wire concerned.

- (a) Complete mechanical properties including the following.
 - i) Minimum Breaking load
 - ii) Maximum Breaking load
 - iii) Modulus of elasticity
 - iv) Co-efficient of linear thermal expansion.
- (b) Electrical characteristics including D.C. resistance value at 20°C, co-efficient of variation of resistance.
- (c) The Test Certificates for the following conforming to IEC 60888
 - i) Tensile & Elongation Test
 - ii) Wrapping Test
 - iii) Stress at 1% extension
 - iv) Tolerances on Diameter
 - v) Zinc coating Test

The test certificates referred to shall be from a **recognized independent testing authority acceptable to CEB.**

- (d) Quality Assurance Certification conforming to ISO 9001.
- (e) A list of names and address of five utilities, giving the time of delivery and the quantities supplied in the recent past.
- (f) Duly completed Schedule of particulars Annexure - A.

Failure to furnish above mentioned particulars and Sample as per Clause 8.0 will result in the offer being rejected.

9.0 SAMPLE STUDY

One prototype sample of minimum of 5 m length of the offered galvanized steel earth wire strand concerned shall accompany the Bid to facilitate analysis and evaluation.

While analysing samples, Purchaser reserves the right to check dimensions, inspect workmanship and perform essential tests as prescribed in relevant standards.



10.0 INSPECTION AND TESTING

10.1 Inspection

The selected Bidder shall make necessary arrangement for inspection by an Engineer appointed by the CEB during manufacture and before dispatch and also to carry out in his presence necessary Acceptance / Routine tests of the materials offered.

10.2 Testing (Acceptance / Routine)

The following Acceptance Tests conforming to IEC 60888

- i) Tensile Test
- ii) Elongation Tests
- iii) Stress at 1% extension
- iv) Wrapping Test.
- v) Zinc coating Test
- vi) Tolerance on diameter, and Lay length.

and D.C. Resistance Tests shall be carried out.

10.3 Routine Test Certificates

Acceptance /Routine tests shall be witnessed by the Engineer appointed from CEB. Extra copies of these test certificates shall also be supplied with the item.

10.4 Experience

Manufacturer should provide a list of names and address of utilities, giving the time of delivery and the quantities of similar product supplied in the recent past

12.0 ANNEX A

Schedule of Particulars - to be duly filled by the Bidder & should submit with the offer.



SCHEDULE OF PARTICULARS
(To be filled by the Bidder for each item offered)

ANNEX A

1.	Name of Manufacturer and Country of origin -	:
2.	Number and diameter of wire	No/mm :
3.	Overall diameter of wire strand	mm :
4.	Lay direction and length	:
5.	Grade of Steel	:
6.	Minimum UTS	MPa :
7.	Weight per km	kg/km :
8.	% Elongation	:
9.	Tolerance in diameter	mm :
10.	Modulus of Elasticity	kg/mm ² :
11.	Co-efficient of linear expansion	/ °C :
12.	Maximum calculated DC resistance per km at 20 deg. C.	Ω/km :
13.	Form of supply	Drum/Coil :
14.	Length of wire in a drum/coil	m :
15.	Weight of drum/coil (gross)	kg :
16.	Diameter of drum (OD) / eye of coil	mm :
17.	Minimum mass of Zinc coating	g/m ² :
18.	Whether the timber used in the drum is of treated type	Yes/No :
19.	Whether the Type Test Certificates conforming to the Clause 8.0 (c) furnished	Yes/No :
20.	Whether the Quality Assurance Certification conforming to ISO 9001 furnished	Yes/No :

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Seal and Signature of the Manufacturer and date

