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CEB
STANDARD

GALVANIZED STEEL WIRE

CEYLON ELECTRICITY BOARD
SRI LANKA

Specification

for

GALVANIZED STEEL WIRE

CEB Standard 012: 1998

CEYLON ELECTRICITY BOARD

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

Telephone: 24471-8 Telex : 21368 CE Facsimile: 94-1-449572

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SPECIFICATION FOR GALVANISED STEEL WIRE

1.0 SCOPE

This Specification covers the manufacture and testing of Galvanized Steel Wire of Stranded and Solid type for application as stay wire ropes for line supports (poles) and line earth conductors in Electricity Distribution Networks.

2.0 SYSTEM PARAMETERS

Overhead Systems		33kV	11kV	0.4kV (3ph. & N)
a)	Nominal Voltage	33kV	11kV	0.4kV
b)	System Highest Voltage	36kV	12kV	0.44kV
c)	System frequency	50Hz	50Hz	50Hz
d)	Method of earthing	Non Effectively Earthed	Effectively Earthed	Effectively Earthed
e)	System fault level	13.1kA	13.1kA	25kA

3.0 SERVICE CONDITIONS

a)	Annual average ambient temperature	-	30°C
b)	Maximum ambient temperature	-	40°C
c)	Maximum relative humidity	-	90°C
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 Galvanised Steel Wire Strand.
(b)	BS 182 1972/(1988)	-	Galvanized Iron-wire for tele-graph and tele-phone purposes.
(c)	BS 443 1982/(1990)	-	Testing Zinc coatings on steel wire and for quality requirements.
(d)	BSEN 10218	-	Steel Wire and wire products, General
	BSEN 102018-1	-	Test Methods
	BSEN 102018-2	-	Wire Dimensions and Tolerances

5.0 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 Galvanised Steel Wire for Stay Wire Application

Suitably manufactured and constructed for guying (staying) LV and HV distributionline supports (poles) at angle / section / terminal poles of the line, stranding shall be done in accordance with Table 3 of BS 183 (1972).

The number of strands, size of wires and the grade of steel are as given below. The breaking strength of the G.S. Wire shall be within the limits as stipulated in Clause 5.9 below.

i) 7 Strand of 4.00 mm Diameter Wire of Grade 700,

ii) 7 Strand of 3.25 mm Diameter Wire of Grade 700

iii) 7 Strand of 2.65 mm Diameter Wire of Grade 700

iv) 7 Strand of 2.00 mm Diameter Wire of Grade 700

b) Stranded Galvanised Steel Wire for Earth Wire Application

Suitably manufactured and constructed for use as over head tower line earth wire (ground wire) and the stranding shall be done in accordance with Table 3 of BS 183 (1972).

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

i) 7 Strand of 3.25 mm Diameter Wire of grade 1000

ii) 7 Strand of 3.25 mm Diameter Wire of grade 1150

iii) 7 Strand of 3.25 mm Diameter Wire of grade 1300

c) Solid Single Galvanized Steel Wire for Earth Wire Application

The wire shall be suitably manufactured for use as earth conductor (ground wire) for LV and HV (up to 33KV) distribution pole lines and for binding purposes.

The size of wires and the grade of steel are as given below. The breaking strength of the G.S. Wire shall be within the limits as stipulated in Clause 5.9 below.

i) Diameter 5.0 mm Grade 700
ii) Diameter 4.0 mm Grade 480

d) Solid Single Galvanized Steel Wire for Binding Wire Application

The wire shall be suitably manufactured for use as binding wire

The size of wires and the grade of steel are as given below. The breaking strength of the G.S. Wire shall be within the limits as stipulated in Clause 5.9 below.

i) Diameter 2.0 mm Grade 350

ii) Diameter 1.5 mm Grade 350

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 conforming to BS 183.

5.5 Galvanising

The wire shall be galvanised by hot dip process and the galvanized coating thickness shall conform to BS 443.

5.6 Tolerance on Diameter

The Tolerance on the diameter of the Galvanized Steel Wire shall be in accordance with the Table I of BS 183.

5.7 Elongation

Elongation shall conform to Clause 9.3 of BS 183.

5.8 Freedom from defects

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

5.9 Technical Requirements

The Galvanised Steel Wire Shall conform to the following technical requirements;

i)	Strand Lay	Right Hand
ii)	Galvanising coating Thickness	As per BS 443
iii)	Tolerance on diameter	As per Table 1 of BS 183
iv)	Elongation	As per Table 2 of BS 183
v)	Number of wires, Grade of steel Wire and Breaking load	

a) Stranded Galvanised Steel Wire for Stay Wire Application

1) 7 Strand of 4.00 mm Diameter Wire of Grade 700,
Breaking Load Minimum 62.0 kN
Maximum 74.0 kN

2) 7 Strand of 3.25 mm Diameter Wire of Grade 700
Breaking Load Minimum 41.0 kN
Maximum 49.0 kN

3) 7 Strand of 2.65 mm Diameter Wire of Grade 700
Breaking Load Minimum 27.0 kN
Maximum 32.0 kN

4) 7 Strand of 2.00 mm Diameter Wire of Grade 700
Breaking Load Minimum 16.0 kN
Maximum 19.0 kN

b) Stranded Galvanized Steel Wire for Earth Wire Application

7 Strand of 3.25 mm Diameter Wire of;

1) Grade 1000
Breaking Load Minimum 60.0 kN

2) Grade 1150
Breaking Load Minimum 67.0 kN

3) Grade 1300
Breaking Load Minimum 76.0 kN

c) Solid Single Galvanized Steel Wire for Earth Wire Application

1) Diameter 5.0 mm Grade 700
Breaking Load Minimum 14.0 kN
Maximum 16.0 kN

2) Diameter 4.0 mm Grade 480
Breaking Load Minimum 9.0 kN
Maximum 10.0 kN

d) Solid Single Galvanized Steel Wire for Binding Wire Application

1) Diameter 2.0 mm Grade 350
Breaking Load Minimum 2.2 kN
Maximum 2.6 kN

2) Diameter 1.5 mm Grade 350
Breaking Load Minimum 1.23 kN
Maximum 1.50 kN

6.0 QUALITY ASSURANCE

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

7.0 ADDITIONAL REQUIREMENTS

7.1 Packing

a) Coil

The wire strand of grade 700 and the solid single wire of grades 700, 480, 350 shall be supplied in continuous lengths uniformly wound in coils of 100 kg.

The diameter of eye of coils shall be as given in Table 4 of BS 183. Each coil shall be securely bound with four separate binders of galvanised steel wire of not less than 2 mm. diameter or greater than 3.75 mm.

These coils shall be treated and wrapped in hessian or synthetic material so as to withstand corrosion against water or contamination with any other chemicals during transport in ship, transit in docks and storage.

b) Drum

The wire strand of grade 1000, 1150 and 1300 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 ± 2%.

7.2 Labelling

Each coil / 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 or single solid wire as the case may be)

(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 BS 183.

i) Tensile & Elongation Test

ii) Wrapping Test

iii) Tolerances on Diameter

iv) Galvanizing 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 five metre length of the offered galvanised steel wire strand/solid single wire 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 despatch 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 BS 183 and BS 443 shall be carried out.

i) Tensile Test

ii) Elongation Tests

iii) Wrapping Test.

iv) D.C. Resistance Tests

v) Galvanizing Test

vi) Tolerance on diameter, and Lay length.

10.3 Routine Test Certificates

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

11.0 ANNEX A

Schedule of Particulars - to be filled by the Bidder

ANNEX A

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

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.	Guaranteed Breaking Load	kN	;
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.	Whether the timber used in the drum is of treated type	Yes/No	;
18.	Weather the Type Test Certificates conforming to the Clause 7.0 (d) furnished	Yes/No	:
19.	Weather the Quality Assurance Certification conforming to ISO 9001 furnished	Yes/No	:

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Seal and Signature of the Manufacturer and date