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CEB
SPECIFICATION

ACCESSORIES FOR LOW VOLTAGE AERIAL BUNDLED CONDUCTORS

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CONTENTS

SPECIFICATION OF ACCESSORIES FOR LOW VOLTAGE AERIAL BUNDLED CONDUCTORS

1.0 SCOPE

This specification covers the general requirements of the design, manufacture and testing of following accessories for Low Voltage Aerial Bundled Conductors (ABC).

1. Suspension Small Angle Assembly for 54.6 / 70 mm^2 messenger wire.
2. Dead End Assembly for 54.6 / 70 mm^2 messenger wire.
3. Large Angle Assembly for 54.6 / 70 mm^2 messenger wire.
4. Piercing connectors for 16 /50 /54.6 /70 /95 mm^2 ABC to 16 /50 /54.6 /70 /95 mm^2ABC/PVC/Bare.
5. Pre-insulated sleeves for 16 /50 /54.6 /70 /95 mm^2 AAC/ AAAC XLPE insulated conductors.
6. Pre-insulated Bi-Metallic Lugs for 16 /50 /54.6 /70 /95 mm^2 AAC/ AAAC XLPE insulated conductors.
7. Insulated binding strap.
8. Insulation cap.
9. Stainless steel straps and buckles.

2.0 SYSTEM PARAMETERS

(a)	Nominal voltage (U)	400/230 V
(b)	System highest voltage (U_m)	440 V
(c)	System frequency	50 Hz
(d)	Method of earthing	Effectively earthed
(e)	System fault level	25 kA

3.0 SERVICE CONDITIONS

(a)	Annual average ambient temperature	30 °C
(b)	Maximum ambient temperature	40 °C
(c)	Maximum relative humidity	90%
(d)	Environmental conditions	Humid tropical climate with heavily polluted atmosphere
(e)	Operational altitude	From M.S.L. to 1900 m above M.S.L.
(f)	Isokeruanic (Thunder days) level	100 days
(g)	Solar Radiation (Maximum)	4.5 kWh/m^2/day

4.0 APPLICABLE STANDARDS

The Aerial Bundled Conductor Accessories supplied shall be in accordance with the latest editions of the standards specified below and amendments thereof.

(a)	French NFC Standards	
(i)	NFC 33 040:2013	Insulated Cables And Their Accessories For Power Systems - Suspension Equipments For Overhead Distribution With Bundle Assembled Cores, Of Rated Voltage 0,6/1 kV
(ii)	NFC 33 041:2013	Insulated Cables And Their Accessories For Power Systems - Anchoring Devices For Overhead Distribution With Bundle Assembled Cores Of Rated Voltage 0,6/1 kV
(iii)	NFC 33 020: 2013	Insulated Cables And Their Accessories For Power Systems - Insulation Piercing Branch-Connectors For Overhead Distributions And Services With Bundle Assembled Cores, Of Rated Voltage 0,6/1 kV

(iv)	NFC 33 021: 2013	Insulated Cables And Their Accessories For Power Systems - Pre-Insulated Compression Type Connecting Equipment For Overhead Distributions And Services With Bundle Assembled Cores, Of Rated Voltage 0,6/1 kV
(v)	NFC 33 209:1996	Insulated Or Protected Cables For Power Systems - Bundle Assembled Cores For Overhead Systems Of Rated Voltage 0,6/1 kV
(vi)	NFC 33 004:1998	Insulated Cables And Their Accessories For Power Systems - Connecting Equipment For Overhead Distributions And Services Of Rated Voltage 0,6/1 kV With At Least One Insulated Core - Electrical Ageing Test
(b)	European Standards	
(i)	EN 50483-1:2009	Test Requirements for Low Voltage Aerial Bundled Cable Accessories – Part 1: Generalities
(ii)	EN 50483-3:2009	Test Requirements for Low Voltage Aerial Bundled Cable Accessories – Part 3: Tension and Suspension Clamps for Neutral Messenger System
(iii)	EN 50483-4:2009	Test Requirements for Low Voltage Aerial Bundled Cable Accessories – Part 4: Connectors
(iv)	EN 50483-5:2009	Test Requirements for Low Voltage Aerial Bundled Cable Accessories – Part 5: Electrical Aging Test
(v)	EN 50483-6:2009	Test Requirements for Low Voltage Aerial Bundled Cable Accessories – Part 6: Environmental Testing
(c)	IEC Standards	
(i)	IEC 61089:1991	Round wire concentric lay overhead electrical stranded conductors.

The supplier may offer Aerial Bundled Conductor Accessories manufactured to any other international standard equivalent or not less stringent than the standards stipulated above. Offers of items manufactured to any other internationally recognized equivalent standards, shall be accompanied by an English translation of such standards.

However in the event of discrepancy, the details given in this CEB specification supersedes above standards.

5.0 BASIC FEATURES

All the accessories for ABC shall have the electrical and mechanical characteristics conforming to the relevant standards specified in clause 4 and shall be suitable with the following ABC system/s as specified in CEB Specification 018-1:2018 (or latest).

	Configuration	Minimum breaking strength of the messenger (kN)	Insulated messenger outside diameter
(a)	1x 50 mm^2+ 1x 54.6 mm^2	16.60	Max: 13.0 mm Min: 12.3 mm
(b)	3x 70 mm^2 + 1x 54.6 mm^2	16.60	
(c)	3x 70 mm^2+ 1x 54.6 mm^2 + 1x 16 mm^2	16.60	
(d)	3x 95 mm^2 + 1x 70 mm^2	20.50	Max:13.6 mm Min: 12.9 mm
(e)	3x 95 mm^2 + 1x 70 mm^2+ 1 x 16 mm^2	20.50	

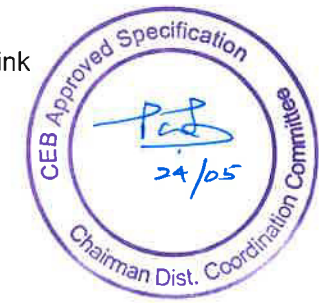
The accessories for ABC are as specified below and they shall satisfy all the loadings and tests as stipulated therein.

CEB Approved Specification 24/05

5.1. Clamps and assembly

The clamps and assembly for ABC specified below shall satisfy the requirements as stipulated therein.

5.1.1 Suspension Small Angle Assembly
  5.1.1.1 Suspension Bracket
  5.1.1.2 Suspension clamp and movable Connecting (articulated) link
5.1.2 Dead End Assembly
  5.1.2.1 Tension Bracket
  5.1.2.2 Wedge type Tension (Dead End) Clamp
5.1.3 Large Angle Assembly



5.1.1. Suspension small angle assembly

Suspension assembly shall be suitable for use on overhead lines of rated voltage 0.6/1kV with bundled insulated conductors stretched between poles. Suspension assemblies shall be installed on the insulated neutral messenger

The assembly shall also be suitable for use on 'out of aligned' poles with angles of deviation such that the maximum angle is 45° for salient angles and 27° for re-entrant angles [see Figure 1:Annex B] as per NFC 33 – 040.

The dimensions of the components shall be such that the suspension clamp does not touch the pole at re-entrant angle locations.

The assembly shall consist of the following three components.

Component Description	**For 54.6 mm^2 Messenger (NFC reference-ESF 54)**	**For 70 mm^2 Messenger (NFC reference-ESF 70)**
One number suspension bracket	CS	CS
One number movable connecting (articulated) link	LM 54	LM 70
One number suspension clamp	PS 54	PS 70

5.1.1.1. Suspension bracket

Suspension bracket shall be made of Aluminium Alloy suitable for attachment to a concrete pole by single 16 mm galvanized iron bolt. The bracket shall ensure a distance (d_0) [see Figure 2: Annex B] not less than 140 mm (tolerance – 0, + 10) from the pole face to the center of the bracket eye from which the clamp is hung as per NFC 33-040.

Provision shall be available on the bracket such that the suspension clamp does not allow the attached neutral conductor to swing closer than 60 mm towards the pole and 45° up the horizontal plane as shown in the Figure 2: Annex B.

5.1.1.2. Suspension clamp and movable connecting (articulated) link

The suspension clamp and the movable connecting link shall be made of weather resistant and mechanically strong insulating material without any steel component.

Internal shape of the suspension clamp shall allow the neutral messenger to a turning angle not less than 45° inside the clamp.

Clamping of the neutral messenger shall be of control slippage. This device shall have the capacity for suspension and tightening the neutral messenger conductor.

The movable connecting link shall act as a mechanical fuse in the case of overloading on the bundled conductor (when breaking, suspension assembly relieves the network of loading and preserves dead ending) with the mechanical requirement as per the NFC 33-040.

Bolts shall not be used to clamp the neutral messenger conductor to the suspension clamp.

5.1.2. Dead end assembly

Dead end assembly shall be suitable for anchoring of overhead lines of rated voltage 0.6/1 kV with bundled insulated conductors stretched between poles. Dead end assembly shall be installed on the insulated neutral messenger.

The assembly shall consist of the following two components.

Component Description	**For 54.6 mm^2 Messenger (NFC reference-EA 1500)**	**For 70 mm^2 Messenger (NFC reference EA 2000)**
One number tension bracket	CA 1500	CA 2000
One number wedge type tension clamp	PA 1500	PA 2000

Each component shall have a nominal force of 1500 daN or 2000 daN as per the mechanical requirements given in NFC reference EA 1500 or EA 2000. Those components shall be delivered as assemblies to ensure compatibility of the components.

5.1.2.1. Tension bracket

Tension bracket shall be made of Aluminium Alloy suitable for attachment to the concrete or wood pole by a 16 mm galvanized iron bolt.

The mechanical requirements of the assembly and components shall be as per NFC reference EA 1500 or EA 2000 depending on the messenger wire size. The distance between the pole and the tension clamp fixing point shall be 100±20 mm (see Figure 3: Annex B).

5.1.2.2. Wedge type tension (Dead end) clamp

Wedge type tension clamps shall be of self-tightening type suitable to anchor the bundled conductor on the neutral messenger.

Housing of the wedge type tension clamp shall be made out of mechanical and weather resisting material (Aluminium Alloy or Insulating material), All components shall be tightly fixed in place. In all cases, it shall be possible to install the cable in the clamp without using any tool.

No special tools shall be required for installation of the clamp in the field. To ease the torsional movement involved in the ABC system, the clamp shall be supplied with a flexible attachment to the above bracket by means of a stainless steel

flexible braid. The braid shall be such that the distance between the fixing point of the bracket and the housing of the clamp shall be not less than 200 mm (see Figure 4: Annex B).

The wedge shall be exclusively made of weather resistant Insulating material and shall be designed to withstand the relevant breaking load of the neutral messenger without slipping. The mechanical requirements of the assembly and components shall be as per NFC reference EA 1500 or EA 2000 depending on the messenger wire size. Provision shall be available for the two wedges to prevent any relative movement when fitting into the clamp housing.

All the components of the material shall be made of corrosion resistant materials.

5.1.3. Large angle assembly

Each assembly shall include:

(a) One number Tension bracket
(b) Two numbers Wedge type Tension clamp

Description of sub components of the large angle assembly are the same as for the dead end assembly described in clause 5.1.2 above, but two wedge type tension clamps shall be supplied instead of one wedge type tension clamp as in the dead end assembly.

5.2. Piercing connectors

The piercing connectors for ABC are specified below and they shall satisfy the requirements as stipulated therein.

5.2.1 Insulation Piercing Connectors
5.2.1.1 Tap off Insulation Piercing Connectors
5.2.1.2 Branch Service Insulation Piercing Connectors

5.2.1. Insulation piercing connectors

Insulation piercing connectors are required for tap-offs of bundled conductors and for connection of service conductors to bundled conductors. These connectors shall be of insulation piercing type both on the main and tap conductors.

The connectors shall be of waterproof design. To achieve the required water tightness a special rubber seal shall be provided around the teeth of the connector and the connector shall be greased with neutral grease in order to prevent moisture penetration.

The housing shall be made entirely of mechanical and weather resistant plastic insulation material and no metallic part outside the housing is acceptable except for the tightening bolt.

It is absolutely necessary that none of the energized parts of the connector can be reached directly by the operator during installation of piercing connector on live lines.

Bolts of the piercing connector shall be provided with over torque shear head which shall allow adequate clamping torque to achieve proper connections. Nut/s shall be embedded to the piercing connector housing rigidly.

The number and the length of the teeth shall be adequate enough to penetrate the relevant bundled conductor insulation to establish proper contact without any contact resistance and without stripping the conductor insulation.

To ensure good electrical contact 1 bolt connector shall be provided with minimum of two lower and upper contact teeth and 2 bolt connectors with minimum of 3 lower and upper contact teeth. Connecting metal piece shall be tin plated copper alloy and teeth shall be hard enough not to bend when tightening.

The bolt and washers shall be of corrosion resistant type (either stainless steel or aluminium alloy).

The connector shall have a removable end cap enabling tapping and branching on either side of the connector. The end cap shall be of slide type enabling easy positioning. End cap shall be locked to the housing after sliding completed and be fully filled with grease.

The current rating of the connectors shall be the same as the rating of the relevant size of the main cable.

5.2.1.1. Tap off insulation piercing connector

Tap off piercing connectors are used to tap off a branch ABC line from either an Aerial Bundled line (ABC) or a bare conductor line. Tap off piercing connectors are used to tap off a street line from a bundled street line.

Identification Code	Cross section of conductors (mm^2)			No of Bolts	Application
	Main		Tap		
	Insulated Conductors / Cables	Bare	Insulated Conductors / Cables		
a	70-95	-	54.6 - 70	2	ABC - ABC
b	70-95	-	70-95	2	ABC - ABC
c	70-95		54.6-50	2	ABC - ABC
d	54.6 - 70	-	54.6 - 70	2	ABC - ABC
e	54.6-70		54.6-50	2	ABC - ABC
f	54.6-50		54.6-50	2	ABC - ABC
g	-	22 - 75	70-95	2	Bare - ABC
h	-	22 - 75	54.6-70	2	Bare - ABC
i	-	22 - 75	54.6-50	2	Bare - ABC
j	6 - 25	-	6 - 25	1	ABC street line - ABC street line
k	-	22-75	6 – 25	1	Bare – ABC street line

5.2.1.2. Branch service insulation piercing connector

Branch Service piercing connector is a Tap off connector dedicated to connect one or more customers or street lighting equipment to a low voltage distribution network. It shall be capable to tap aluminium insulated service cable ranges given below.

Identification Code	Cross section of conductors (mm^2)		No of Bolts	No of Taps	Application
	Main	Tap (Insulated)			
	Insulated Conductors / Cables	Aluminium			
a	70-95	10 – 25	1	1	ABC – 1 x Service wire
b	70-95	10 – 25	2	2	ABC – 2 x Service wire
c	70-95	10 – 25	4	4	ABC – 4 x Service wire
d	54.6 - 70	10 – 25	1	1	ABC – 1 x Service wire
e	54.6 - 70	10 – 25	2	2	ABC – 2 x Service wire
f	54.6 - 70	10 – 25	4	4	ABC – 4 x Service wire
g	54.6-50	10 – 25	1	1	ABC – 1 x Service wire

h	54.6-50	10 – 25	2	2	ABC – 2 x Service wire
i	54.6-50	10 – 25	4	4	ABC – 4 x Service wire

5.3. Sleeves and other accessories

The sleeves and other accessories (other than clause 5.1 and 5.2) for ABC are specified below and they shall satisfy the requirements as stipulated therein.

5.3.1 Pre-insulated Sleeves and Bi-metallic Lugs
5.3.1.1 Pre-insulated Sleeves for 50/70/95 mm^2 AAC Phase XLPE, 54.6/70 mm^2 AAAC Neutral XLPE Insulated and 16 mm^2 Street Lamp Core
5.3.1.2 Pre-insulated Bi-Metallic Lugs for XLPE insulated 50/70/95 mm^2 AAC Phase, 54.6/70 mm^2 AAAC Neutral and 16 mm^2 Street Lamp Core
5.3.2 Insulating Binding strap
5.3.3 Insulation Cap
5.3.4 Stainless Steel Straps and Buckles

5.3.1. Pre-insulated sleeves and Bi-metallic lugs (Palm copper and barrel aluminium)

The joints shall be of pre-insulated type i.e. the compression is directly made over the insulation but crimping shall not deteriorate the insulation of the sleeve.

The pre-insulated jointing sleeves and Bi-metallic lugs shall be of waterproof type. For this purpose the pre-insulated sleeve and Bi-metallic lugs shall be equipped with a suitable rubber gasket to prevent ingress of water.

The pre-insulated sleeves and Bi-metallic lugs shall be pre-filled with any suitable oxide inhibiting compound or silicon grease and their current ratings shall be equivalent to the respective cable/messenger.

For easy identification pre-insulated sleeves and Bi-metallic lugs shall have markings indicating size of conductor applicable (or colour coded as per NFC 33-021), sequence and location of hexagonal compression indents and die to be used. Also insulation stripping length shall be indicated on the sleeves and Bi-metallic lugs.

The current rating of the pre-insulated sleeves and Bi-metallic lugs shall not be less than that of the relevant ABC system specified in 5.0.

The temperature rise in the joint shall not be more than that of the conductor stipulated in the relevant standard specified.

Compression of all pre-insulated sleeves and Bi-metallic lugs for both phase and messenger neutral shall be achieved by means of using a single die.

The grove reference of the sleeves and barrel of the lugs and the "Across Flat Dimension" of the die to be used shall be as indicated below;

	Conductor Type	**Size of the conductor (mm^2)**	**Across Flat Dimension of the Die to be used (mm)**	**Groove reference**
(a)	Phase Conductor	50/70/95	17.3	E173
(b)	Neutral Messenger	54.6/70	17.3	E173
(c)	Street Lamp wire	16	14.0	E140

5.3.1.1. Pre-insulated sleeves for 50/70/95 mm^2 AAC Phase XLPE, 54.6/ 70 mm^2 AAAC Neutral XLPE Insulated and 16 mm^2 Street Lamp Core

The pre-insulated sleeves shall be suitable for making mid-span joints and the mechanical requirements of pre-insulated sleeve after compression shall be as follows.

(a)	For 50/70/95 mm^2 AAC phase cable and for 16 mm^2 street lamp wire	60% of conductor U.T.S.
(b)	For 54.6/70 mm^2 (min) AAAC neutral	95% of neutral messenger U.T.S

5.3.1.2. Pre-insulated Bi-Metallic Lugs for 50/70/95 mm^2 AAC Phase XLPE, 54.6/70 mm^2 AAAC Neutral XLPE Insulated and 16 mm^2 Street Lamp Core

The pre-insulated Lugs shall be of friction welded bi-metallic type and the barrel of which is in insulated aluminium and the palm of which has contact faces in bare copper, suitable for making connections between the aerial bundled conductors and copper terminals of the equipment effectively.

The palm of Bi-metallic Lugs used for phase conductor and neutral messenger shall be provide with a 12.8 mm diameter hole and for street lamp core it shall be 10.5 mm.

5.3.2. Insulating binding strap

The binding strap shall be used for binding the cable at different locations with the dead end clamp and suspension clamp.

The strap shall be made of polyamide having a total length of 215 mm and a clamping capacity of 62 mm. The width of the straps shall not be less than 9 mm.

There shall be titled grooves on one side of the strap and the top of the strap shall have a locking and releasing facility.

5.3.3. Insulation cap

The insulation cap shall consist of 2, 4 or 5 nos. of end caps for each conductor of the bundle (depending on the type of ABC i.e. as indicated in the schedule of prices) and an overall cover for effectively terminating the ABC.

The inner diameter of the cap shall be such that it will tightly fit to the individual conductors of the relevant ABC system specified, to prevent entry of moisture.

The overall cover shall be of heat shrinkable type, made of black colour EPDM suitable for use with the ABC systems specified in clause 5.0 with or without 16 mm^2 street lamp core as indicated in the schedule of prices.

5.3.4. Stainless steel straps and buckles

Stainless steel strap is used to fix the bracket to poles as and when required.

Stainless steel strap shall be of grade 18/8, width 20 mm and thickness 0.7 mm approximately. The edges shall be smooth and free from burrs.

The buckles used for strapping shall be made of stainless steel suitable for use with the stainless steel strap specified above.

6.0 QUALITY ASSURANCE

The manufacturer shall possess ISO 9001:2008 or latest Quality Assurance Certification for the manufacture of XLPE Insulated low voltage Aerial Bundle Conductor Accessories for the plant where manufacturing is being done. The Bidder shall furnish a copy of the ISO certificate certified as true copy of the original by the manufacturer, along with the offer.

7.0 ADDITIONAL REQUIREMENTS

7.1. Manufacturing Experience

The manufacturer shall have minimum of ten (10) years experience in manufacturing XLPE Insulated low voltage Aerial Bundle Conductor Accessories. In addition, minimum of five (5) years experience shall be in manufacturing for orders from outside the country of the manufacturer. The product offered has to be in same voltage range of offered item and shall have been used in service utilities over past 5 years.

Manufacturer shall furnish a list of purchasers with year and quantity of the product offered with the offer to prove his manufacturing experience.

7.2. Packaging and delivery

The accessories for ABC shall be packed as indicated below. Name of Item and the quantity shall be clearly marked on each packing.

Relevant to items in Clause 5.1

i. The complete Suspension Small Angle Assembly shall be delivered in a single pack in a suitable bag.

ii. The complete Dead End Assembly shall be delivered in a single pack in a suitable bag.

iii. The complete Large Angle Assembly shall be delivered in a single pack in a suitable bag.

Relevant to items in Clause 5.2

i. Each Piercing Connector shall be packed in a suitable sealed bag to avoid moisture penetration during transport and storage and 10 numbers of such bags shall be packed in a card board box.

Relevant to items in Clause 5.3

(a)

i. Each Pre-Insulated Sleeve shall be packed in a suitable sealed bag to avoid moisture penetration during transport and storage and 25 numbers of such bags shall be packed in a card board box.

ii. Each Pre-Insulated Bi-metallic Lug shall be packed in a suitable sealed bag to avoid moisture penetration during transport and storage and 25 numbers of such bags shall be packed in a card board box.

(b) Insulating Binding Strap shall be packed in suitable bags and each bag shall contain 100 numbers of Insulating Binding Straps.

(c) A set of Insulation End Caps with overall cover shall be packed in a suitable sealed bag to avoid moisture penetration during transport and storage and 10 numbers of such bags

shall be packed in a card board box.

(d)

i. The Stainless steel Buckles shall be supplied in packs of 100

ii. The Stainless Steel Straps shall be supplied in carton rolls of 50 meters each.

8.0 INSPECTION AND TESTING

8.1. Type Test

The equipment/items subjected to the following Type Tests as per standards specified in clause 4.0, shall have a proven design.

Type Tests Relevant to items in Clause 5.1

i) For Suspension, Large Angle and Dead End Assembly,

(a) Mechanical Test
   I. Tensile tests on brackets
   II. Tensile tests on sub-assemblies
   III. Slippage test on the clamp of the suspension assemblies

(b) Voltage tests on sub-assembly suspension clamp & moveable link
(c) Climatic ageing Test for complete unit
(d) Corrosion test for complete unit

Type Tests Relevant to items in Clause 5.2

i) For Piercing Connectors

(a) Mechanical tests
(b) Voltage and water tightness test
(c) Installation tests at Low temperature
(d) Climatic ageing test
(e) Corrosion test
(f) Electrical ageing test
(g) Temperature rise and over current tests

Type Tests Relevant to items in Clause 5.3

i) For Pre-insulated Sleeves and Bi-metallic Lugs

(a) Mechanical tests
   I. Crimping ability test
   II. Tensile tests
(b) Voltage & water tightness test
(c) Installation tests at low temperature
(d) Current Carrying capacity
(e) Climatic ageing test, Electrical ageing test
(f) Corrosion test
(g) Endurance test under mechanical & thermal stresses

ii) For Insulation Cap

(a) Voltage and water tightness tests

(b) Ageing test

iii) Stainless Steel Strap and Buckle

(a) Mechanical loading test
(b) Chemical composition(manufacturer's mill certificate is acceptable)

Type Test Certificates should clearly indicate the relevant standard, Items concerned, showing the manufacturers identity, type No. /catalogue No. and basic technical parameters.

Test certificates referred to shall be from an **accredited independent testing laboratory acceptable to the CEB**. Proof of accreditation by a national/ international authority shall be forwarded with the offer. Test reports shall be complete including all the pages as issued by the testing authority. Type test reports shall be in English language. Parts of test reports shall not be acceptable.

8.2. Routine Test

While manufacturing each batch of equipment/item shall be subjected to the routine tests conforming to the standard specified and shall be furnished with the equipment.

8.3. Inspection

The Successful bidder shall make necessary arrangements for inspection by an Engineer appointed by the CEB and also to carry out in his presence necessary Acceptance tests on equipment and material. CEB may waive off the inspection with the condition of witnessing the acceptance tests by an independent testing authority acceptable to CEB. In such a situation a notice of waive off will be issued in advance to the supplier.

8.4. Acceptance Test

The following Acceptance /Sample test shall be witnessed by the engineer appointed by the CEB.

Acceptance/Sample Tests Relevant to items in Clause 5.1

i) For Suspension, Large Angle and Tension Assembly,

(a) Mechanical Test
   I. Tensile tests on brackets
   II. tensile tests on sub-assemblies
   III. Slippage test on the clamp of the suspension assemblies

(b) Voltage tests on sub-assembly suspension clamp & moveable link

Acceptance/Sample Tests Relevant to items in Clause 5.2

i) For Insulation Piercing Connectors

(a) Voltage and water tightness test
(b) Temperature rise and over current tests
(c) Mechanical tests

Acceptance/Sample Tests Relevant to items in Clause 5.3

i) For Pre-insulated Sleeves and Bi-metallic Lugs

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(a) Mechanical Tests;
(b) Voltage & water tightness test
(c) Current Carrying capacity
(d) Temperature Rise after crimping

ii) For Insulation Cap

(a) Voltage and water tightness test

iii) Stainless Steel Strap and Buckle

(a) Mechanical loading Test
(b) Chemical composition Test (manufacturer's mill certificate is acceptable).

9.0 SAMPLE STUDY

Two samples of all accessories offered shall accompany the bid to facilitate analysis and evaluation.

10.0 INFORMATION TO BE FURNISHED WITH THE OFFER

The selected bidder shall supply all relevant drawings, technical literature, hand books etc. in English, in order to facilitate proper installation.

Routine test certificates confirming to the clause 8.2 shall be furnished with the equipment.

The bid shall be accompanied with the following also;

(a) English version of catalogues describing the equipment and indicating the type/model number.

(b) Technical literature in English describing the constructional and operational features, relevant drawings, etc of the equipment.

(c) The standard to which the goods have been manufactured and English version of the standard

(d) Recommended current carrying capacity of the connectors, sleeves and lugs.

(e) Dimensioned drawings of the conductor accessories.

(f) Packing details.

(g) Completed schedule of particulars as per annex A.

(h) Type test certificates for the following items conforming to clause 8.1.

(i) Documents to prove manufacturer's experience in accordance with Clause 7.1.

(j) ISO 9001:2008 or latest Quality Assurance Certificate in accordance with clause 6.

11.0 ANNEX

Annex –A: Schedule of Technical Requirements and Guaranteed Technical Particulars

Annex – B: Drawings

Annex – C: Non-Compliance Schedule

Annex- A

SCHEDULE OF TECHNICAL REQUIREMENTS AND GURANTEED TECHNICAL PARTICULARS

(Following Information shall be furnished with the offer for each different configuration required)

			CEB Requirement	Offered
1.	Name of manufacturer			
2.	Country of manufacture			
3.	Applicable Standards		As per clause 4.0	
4.	Material			
	(a) Suspension small angle assembly			
	I. Suspension bracket		Aluminium Alloy	
	II. Movable articulated link		Weather resistant insulating material	
	III. Suspension clamp		Weather resistant insulating material	
	IV. Binding straps		Polyamide as per clause 5.3.2	
	(b) Large angle / Dead End assembly			
	I. Binding straps		Polyamide as per clause 5.3.2	
	II. Tension bracket		Aluminium Alloy	
	III. Dead end clamp housing		Weather resistant insulating material	
	IV. Flexible braid		Stainless steel	
5.	Strength of			
	(a) Suspension clamp	daN	As per clause 5.1.1	
	(b) Suspension bracket	daN	As per clause 5.1.1	
	(c) Dead end assembly	daN	As per clause 5.1.2	
	(d) Dead end bracket	daN	As per clause 5.1.2	
	(e) Large angle assembly	daN	As per clause 5.1.3	
	(f) Pre-insulated Sleeves after compression of;			
	I. Phase cable	daN	60% of conductor U.T.S	
	II. Street lamp wire	daN	60% of conductor U.T.S	
	III. Neutral messenger	daN	95% of neutral messenger U.T.S	
6.	Current rating of the pre-insulated sleeves / bi metallic lugs			
	(a) Phase cable	A		
	(b) Street lamp wire (if applicable)	A		
	(c) Neutral messenger	A		
7.	Description of Dies : Across flat dimension of dies to be used for			
	(a) Phase cable	mm^2	17.3	
	(b) Street lamp wire	mm^2	17.3	
	(c) Neutral messenger	mm^2	14.0	
8.	Piercing Connectors			
	(a) Current rating of the insulation piercing connectors	A		
	(b) Shear head torque			

9.	Whether a certified copy of ISO 9001:2008 or latest furnished with the offer?		As per clause 6	
10.	Whether information requested in clause 10 provided with the offer?	Yes/ No	As per clause 10	

....

Signature and seal of the Manufacturer **Date**

I/We certify that the above data are true and correct

....

Signature and seal of the Bidder **Date**

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Chairman Dist. Coordination Committee

Annex- B

Drawings

a: Salient angle

b :Re - entrant angle

Figure 1: Salient angle and Re – entrant angle

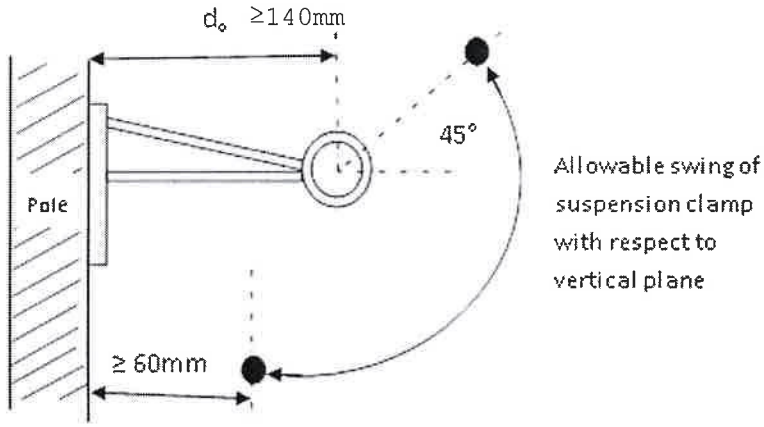

Figure 2: Suspension bracket

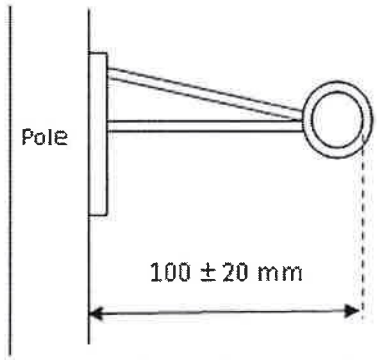

Figure 3: Tension bracket

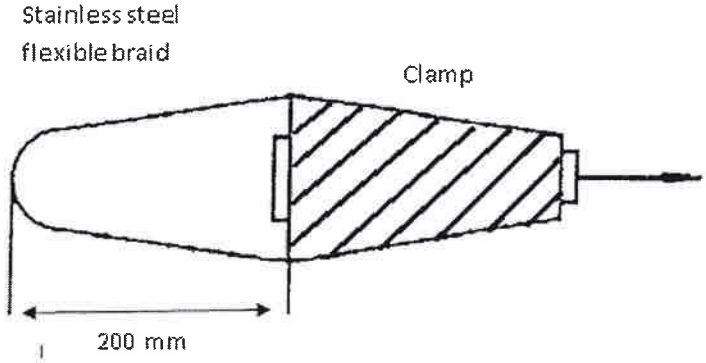

Figure 4: Tension clamp

Annex – C

Non-Compliance Schedule

On this schedule the bidder shall provide a list of non-compliances with this specification, documenting the effects that such non-compliance is likely to have on the equipment life and operating characteristics. Each non-compliance shall be referred to the relevant specification clause.

Clause No.	Non-Compliance

.....
Signature of the Manufacturer

.....
Date

I/We certify that the above data are true and correct

.....
Signature of the Bidder and seal

.....
Date

CEB Approved Specification
24/05
Chairman Dist. Coordination Committee