Corrigendum No. – 8

22-03-2022

Tender Enquiry No- TPSODL/OT/2021-22/071

Work Description - System Improvement Works under the Elephant Corridor Program, on 'turnkey' basis.

Content of the corrigendum

- Revised Dates in Calendar of events.
- Reply to Technical and Commercial Pre-Bid Queries.
- Tentative Work Location.
- Technical Specification of the following items
  i) Civil work for VCB
  ii) FENCING OF S/S (INCLUDING SUPPLY OF MATERILAS)
  iii) LT Distribution box for 100/63/25 KVA S/S
  iv) Spike for HT/LT pole
  v) Covered Conductor

Note: -Rest of the tender document remains unchanged.

Regards,

Rajkishore Tripathy | Contracts

Mob +91 9437967673 | Web www.tpsouththernodisha.com

TP SOUTHERN ODISHA DISTRIBUTION LIMITED
(A Tata Power and Odisha Government Joint Venture)

Courtpeta | Berhampur | Ganjam | Odisha - 760 004

Note-This document does not require signature

Clause 1.3: Dates in Calendar of events revised as below

(a)	Last Date of receipt of Tender Fee	Not Applicable
(b)	Date & Time of Pre-Bid Meeting (If any)	Not Applicable
(c)	Last Date of receipt of pre-bid queries, if any	Not Applicable
(d)	Last Date of Posting Consolidated replies to all the pre-bid queries as received	Not Applicable
(e)	Last date and time of receipt of Bids	04.04.2022 up to 15:00 Hours
(f)	Date & Time of opening technical bids & EMD	04.04.2022 up to 16:00 Hours
(g)	Date & Time of opening of Price of qualified bids	Will be notified to the successful bidders through our website / e-mail.

Reply to Technical and Commercial Pre-Bid Queries.				
TPSODL/OT/21-22/071				
Rate Contract for System Improvement Works under the Elephant Corridor Program, on 'turnkey' basis.				
Sr. No.	Detailed Reference to TPSODL Technical Document. Please specify Document No / Clause No / Page No	Description as per Bid Document	Remarks - Query / Clarification	TPSODL Response
1	2	3	4	5
1	BOQ item no. 1 PSC pole 8,9 & 10 meter pole (AED-1)	8, 9 & 10 MTR LONG 300 KG PSC POLE	Specification & drawing is required by manufacturer	Refer REC drawing & specification
2	BOQ item no.3 MS Channel & Angle(AED-1)	100X50X6 mm MS CHANNEL (9.2 KG / MTR)	Approved vendor and drawing for fabrication required	Refer REC drawing & specification
3	BOQ item no.4 MS Channel & Angle(AED-1)	75x40x6 mm MS CHANNEL (6.8 KG / MTR)	Approved vendor and drawing for fabrication required	Refer REC drawing & specification
4	BOQ item no.5 MS Channel & Angle(AED-1)	50x50x6 mm MS ANGLE (4.5 KG / MTR)	Approved vendor and drawing for fabrication required	Refer REC drawing & specification
5	BOQ item no.22,23,24 LT Distribution box(AED-1)	LT Distribution box for 100/63/25 KVA S/S	Approved vendor and technical specification required	Attached
6	BOQ item no.29, (AED-1)	FENCING OF S/S (INCLUDING SUPPLY OF MATERILAS)	Drawing is reqiured and Unit should be in sq. meter	Attached
7	BOQ item no.30 (AED-1)	SUNDRIES	Please confirm the items covered under this item	Paint, Danger Board, Anti Climbing device, Binding tape etc.
8	BOQ item no.34	11 KV VCB	Make for 11KV VCB and technical specification required	To be excluded from BOQ, to be supplied to agency by OSM
9	BOQ item no.35	Civil work for VCB	Detailed drawing required	Attached
10	BOQ item no.47 BNED	Sand and Metal spreading	Please clarifty the item, approx. qty. should be mentioned	Sand & metal spreading in distribution substation, Qty already mention in Tender BOQ.
11	BOQ item no.32 AED-II	11 KV XLPE 100 MM2 INSULATED AAA CONDUCTOR	Is it ACSR conductor or single core cable, please clarify	Single core All Aluminium Alloy Insulated conductor
12	BOQ item no.33 AED-II	11 KV XLPE 70 MM2 INSULATED AAA CONDUCTOR	Is it ACSR conductor or single core cable, please clarify	Single core All Aluminium Alloy Insulated conductor
13	BOQ item no.38 AED-II	Supply and fixing of spike for HT/LT pole(04 set per pole)	Spike drawing & its fixing arrangement required	Drawing attached
14	BOQ item no.18 AED-II	80sqmm AAA Conductor	Is it ACSR conductor, please clarify	All Aluminium Alloy Conductor
15	BOQ item no.37 AED-II	Clamp, Connector and Jumpering Material	Please confirm approx. qty along with sizes	Sizes same as the conductor size.Qty already mention in Tender BOQ.
16	ANNEXURE I Schedule of Items LOT-1 AED-II Item No. 31	Boundary Wall as per drawing enclosed	Kindly provide drawing and specification and dimension details of the walls and also mention the purpose of it.	Boundary wall may be replaced with Fencing of S/S & drawing of Fencing is attached.
17	ANNEXURE I Schedule of Items LOT-1 AED-I Item No. 29	FENCING OF S/S (INCLUDING SUPPLY OF MATERILAS)	Kindly provide drawing and dimension details of the Fencing and also confirm the specification of fencing wire.	Drawing & specification is attached.
18	ANNEXURE I Schedule of Items LOT-1 AED-II Item No. 37	Clamp, Connector and Jumpering Material	The Unit of measurement is in Lumpsum with quantity as 17. Kindly explain what does the quantity mentioned here (i.e.17) refer to? The cable and conductor accessories are to be in numbers and not in Lumpsum. Kindly change.	LS may be read as Each for 17 nos. of DP/ Substations
19	ANNEXURE I Schedule of Items LOT-1 AED-II Item No. 38	Supply and fixing of spike for HT/LT pole (04 set per pole)	Kindly provide the dimension and design of the spike which will help in determining the weight of each spike as per your requirement.	Drawing & specification is attached
20	ANNEXURE I Schedule of Items LOT-2 BNED Item No. 47	Sand and Metal spreading	The Unit of measurement is in Lumpsum with quantity as 2. Please Clarify what does the quantity refer to? Instead , please change unit to M3.	LS may be read as Each for 2 nos. of DP/ Substations with size 2'x2'

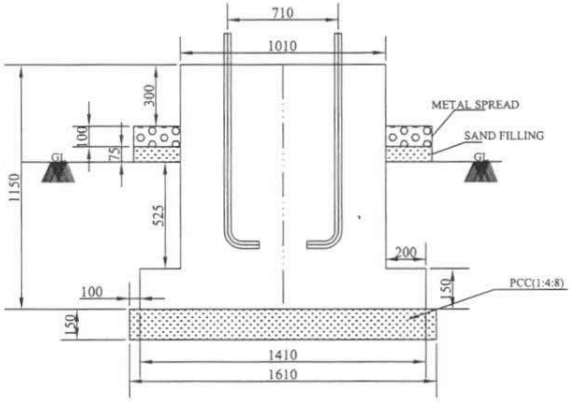
Sr. No.	Detailed Reference to TPSODL Technical Document. Please specify Document No / Clause No / Page No	Description as per Bid Document	Remarks - Query / Clarification	TPSODL Response
21	ANNEXURE I Schedule of Items LOT-2 BOED Item No. 21	Dismentaling and transportation of line materials (existing bare conductor,polesetc) & upto nearest departmental store	The Unit of measurement is in Lumpsum with quantity as 1.4. Please Clarify what does the quantity refer to? Please change qty to km	Unit may be read Span with quantity as 24 spans
22			Resolution of ROW issues, if any, will be in Contractor's scope or TPSODL's scope. Kindly confirm.	Contractors scope
23			In context to the statutory clearance from Forest Department, there is no such clarity. Any liability towards statutory clearance from Forest Department will be in Contractor's scope or TPNODL's scope. Kindly confirm.	TPSODL scope
24			CKT. KM clarity(Whether the Unit of Conductor is,"CKM or KM")	Km
25			whether Concreting is Including or not in the Erection rate of POLE in Price BID.	Not included in errection rate of Pole
26			In BOQ Mentioned 11 KV XLPE 100 MM2 and 99 MM2 INSULATED AAA CONDUCTOR(Un-armored) Seperately please clarify the same separate items or any changes in cable size a)11 KV XLPE 100 MM2 INSULATED AAA CONDUCTOR(Un-armored) Km 59.637 40 b) 1 KV XLPE 99 MM2 INSULATED AAA CONDUCTOR(Un-armored) Km 42.024	Both are 99mm2 Single core XLPE AAA Consuctor
27	BOQ		In the BOQ for price bid preparation of LOT-I & LOT-II we found there is an item "Dismantling and transportation of line materials (existing bare conductor, poles etc) & upto nearest departmental store" has available in the BOQ for Packages of PED, BoED, GNED, PSED where in other packages like AED-I, AED-II, BNED the same item is missing. Accordingly, please clarify us.	This Clause will be applicable for AED-I ,AED-II and BNED also.
28	BOQ		In BOQ, There are some mismatch in quantity of No of poles corresponding to the no of Pole concreting, kindly clarify in this regard	Along with new Poles, some exsting old poles needs to be concreting/ couping, the difference is old existing poles
29	7.2 Payment Terms (Page no-15)	90% (Ninety percent) of each RA bill along with taxes and duties shall be paid progressively for each completed items of work (location wise) as certified by EIC of TPSODL within 30 days of submission of claim subject to submission of all required documents/certificates	it is to seek your kind clarification with brief elaboration on payment terms of RA bill, work completion & before work bill for better understanding.	No change in payment term and as per description in the Bid document. DFO/ Electrical Inspector joint certification is also required for processing of RA bills
30	2. COMPLETION AND COMPLETENESS OF THE EQUIPMENT:- (Page no-40)	work shall be completed within 6 (Six) months from the date of issue of work order.	as per considering the various aspects including safety precautions, dependency on shutdown availability, difficulties in Rainy season, ROW issues at paddy field areas, the Six-month completion period is not seemed suitable. Hence, the completion period may be changed to at least 10 months instead of 6 months.	No change in work completion period
31	BOQ	11 KV XLPE 70 MM2 INSULATED AAA CONDUCTOR	Accessories like Insulated Tie(Top),Mid Span Joint,Dead End Clamp for covered conductor,Bare to Cover Conductor connect are not mentioned in the BOQ. Necessary Clarification may be given to quote the price including these or not.	The cost of accessories as required for installation of insualted conductor should be included in the installation cost of conductor

Sr. No.	Detailed Reference to TPSODL Technical Document. Please specify Document No / Clause No / Page No	Description as per Bid Document	Remarks - Query / Clarification	TPSODL Response
32	BOQ	100x116 mm Rs Joist (23.6 Kg/Mtr)9 Mtr	Detail Specifacation to be given as we have to consider GI or MS	MS
33	BOQ	Boundary Wall as per drawing enclosed	Drawing of The Boundary wall is not Enclosed for considering exact pricing	Boundary wall may be replaced with Fencing of S/S & drawing of Fencing is attached
34	BOQ	FENCING OF S/S (INCLUDING SUPPLY OF MATERILAS)	Exact No of DP Mounted S/S and Plinth Mounted S/S to be clafied for Every Package.	Drawing & specification is attached
35	BOQ	Regarding GST	In the BOQ format, we have to put the GST %age but is has not mentioned anywhere in the tender notice the exact %age of GST wheather it is 12% or 18% ! Please clarify !	GST @18%
36		A.B Cable accessories is not available in the BOQ(Erection and supply), please clarify.		AB Cable accessories are alredy available in tender BOQ.
37		In clause no.2 of evaluation criteria it is mentioned as “In case a new bidder is not registered with TPSODL, factory inspection and evaluation shall be carried out to ascertain bidder’s manufacturing capability and quality procedures.” Kindly clarify this point as we are the new bidder and we are not clear with the point given.		In case a new bidder is not registered with TPSODL, factory inspection and evaluation shall be carried out to ascertain bidder’s manufacturing capability and quality procedures. However, TPSODL reserves the right to carry out factory inspection and evaluation for any bidder prior to technical qualification. In case a bidder is found as Disqualified in the factory evaluation, their bid shall not be evaluated any further and shall be summarily rejected. The decision of TPSODL shall be final and binding on the bidder in this regard.

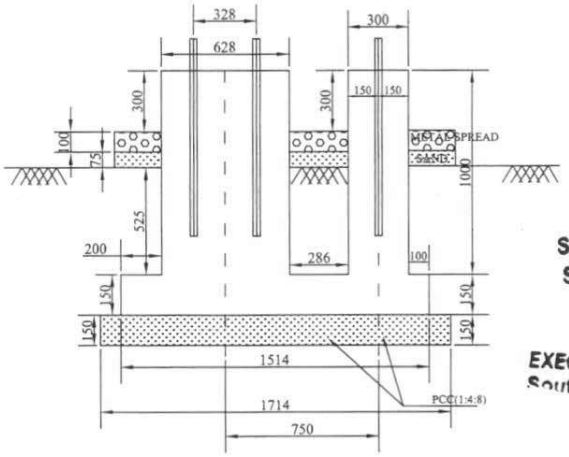
Drawing No-12(A)

FOUNDATION DESIGN OF 11 KV VCB(**schneider make**) AT BHISMAGIRI UNDER PACKAGE GSED

Any deviation to the work order at the time of execution should be approved from this end.



(ELEVATION) VIEW A-A



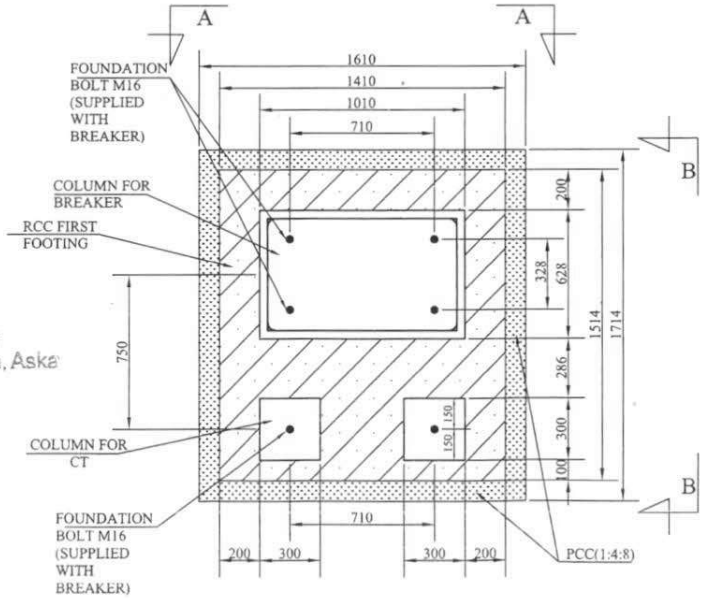
(ELEVATION) VIEW B-B

APPROVED

Senior General Manager
SOUTHCO., Berhampur

EXECUTIVE ENGINEER (CAPEX)
Southco Utility, Berhampur

Assistant Engineer (Capex)
South Co, Berhampur



PLAN

Executive Engineer
Construction Division, Aska

Asst. Engineer
Construction Division, Aska

NOTE:-
ALL DIMENSIONS ARE IN MM.

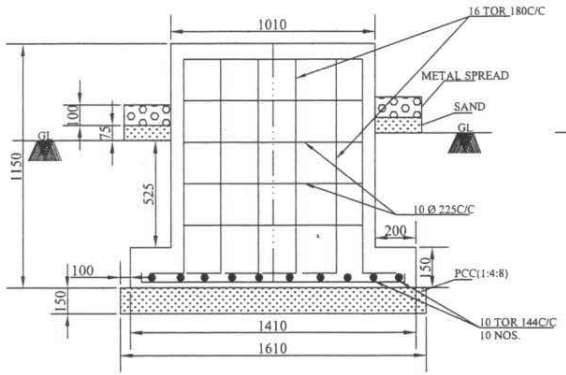
GAYATRI AGENCY CUTTACK

M/S Gayatri Agency,
Plot no-1581,Mahanadivihar,Cuttack

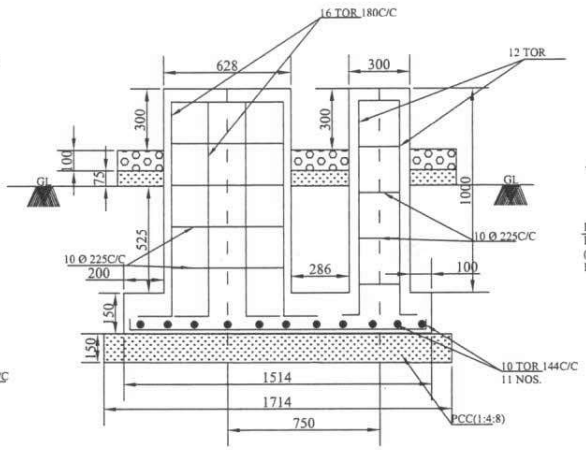
PROJECT	*Installation of New 33/11 KV Primary Substation under CAPEX PROGRAMME GSED*				
CLIENT	*Southern Electricity Supply Company Of Odisha Ltd.* (SOUTHCO)				
ORDER NO	6388 dt 18.05.16				
TITLE	11 KV BREAKER FOUNDATION				
DRAWN BY		Drg.No	CP/2016-17/SC 05(05)	Rev No	
DESIGNED BY	*S.Mohapatra*	Date	18-06-2016	Sheet No.	*1 of 2*
CHECKED BY	*S.Biswal*			Scale	NTS

Drawing NO-12(B)

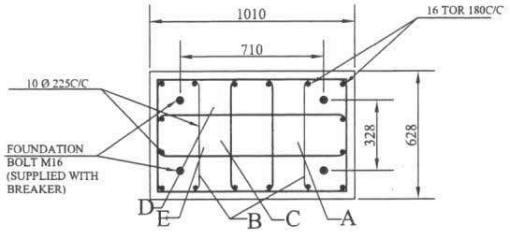
FOUNDATION DESIGN(ROD DETAILS) OF 11 KV VCB(**schneider make**) FOR PACKAGE GSED



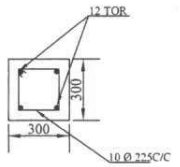
FRONT VIEW(ELEVATION)
VCB FOUNDATION



SIDE VIEW(ELEVATION)
VCB & CT



PLAN VCB



PLAN CT

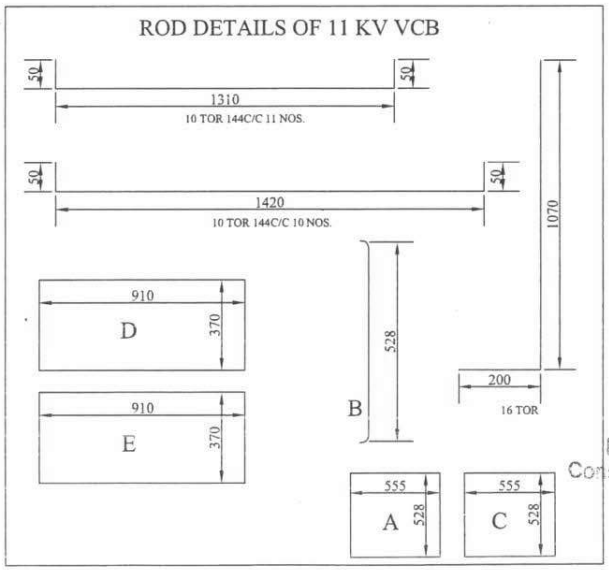
Any deviation to the work orders at the time of execution should be get approved from this end.

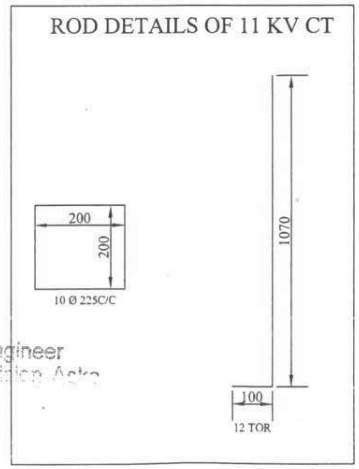
APPROVED

Assistant Engineer (Capex)
South Co, Berhampur

EXECUTIVE ENGINEER (CAPEX)
Southco Utility, Berhampur

Senior General Manager
SOUTHCO., Berhampur





Executive Engineer
Construction Division, Aska

NOTE:-
ALL DIMENSIONS ARE IN MM.

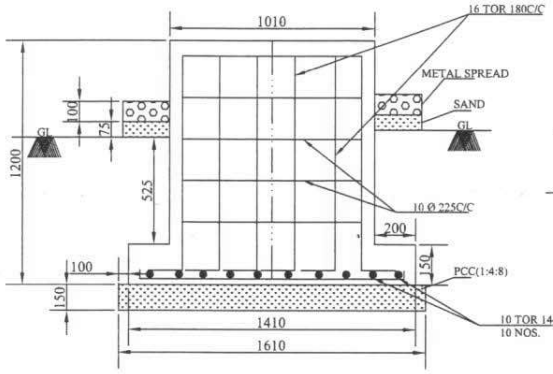
GAYATRI AGENCY

	M/S Gayatri Agency, *Plot no-1581,Mahanadivihar,Cuttack*				
PROJECT	*Installation of New 33/11 KV Primary Substation under CAPEX PROGRAMME GSED*				
CLIENT	*Southern Electricity Supply Company Of Odisha Ltd.* **(SOUTHCO)**				
ORDER NO	**6388 dt 18.05.16**				
TITLE	**11 KV BREAKER FOUNDATION**				
DRAWN BY		Drg.No	CP/2016-17/SC 05(05)	Rev No	
DESIGNED BY	*S.Mohapatra*	Date	18-06-2016	Sheet No.	*2 of 2*
CHECKED BY	*S.Biswal*			Scale	NTS

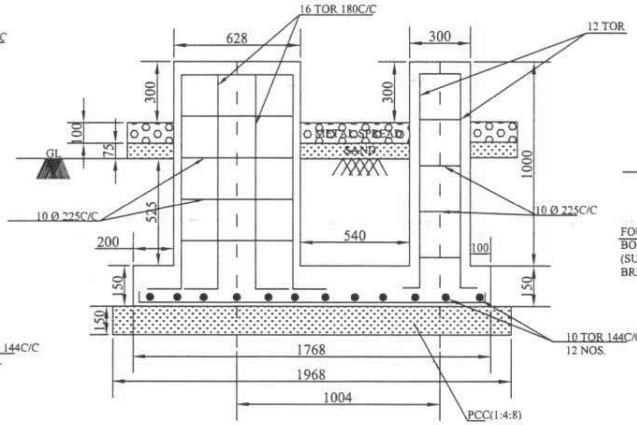
Drawing - 13(A)

FOUNDATION DESIGN(ROD DETAILS) OF 33 KV VCB(**schneider make**) FOR PACKAGE GSED

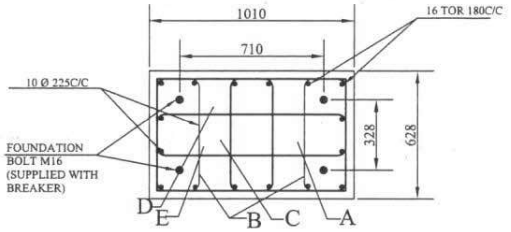
Any deviation to the work order at the time of execution should be approved from this end.



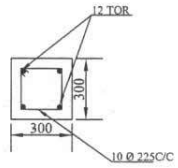
FRONT VIEW(ELEVATION)
VCB FOUNDATION



SIDE VIEW(ELEVATION)
VCB & CT



PLAN OF VCB



PLAN OF CT

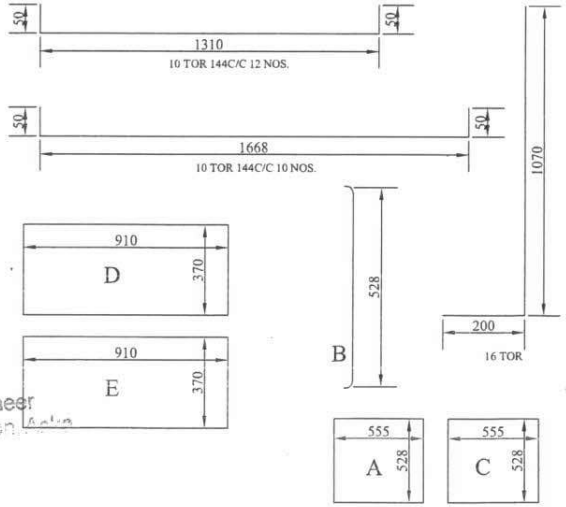
APPROVED

Assistant Engineer (Capex)
South Co, Berhampur

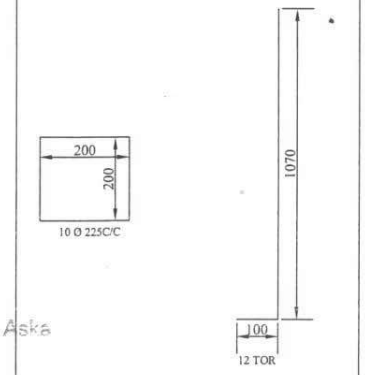
EXECUTIVE ENGINEER (CAPEX)
Southco Utility, Berhampur-4

Senior General Manager
SOUTHCO., Berhampur

ROD DETAILS OF 33 KV VCB



ROD DETAILS OF 33 KV CT



NOTE:-
ALL DIMENSIONS ARE IN MM.

GAYATRI AGENCY CUTTACK

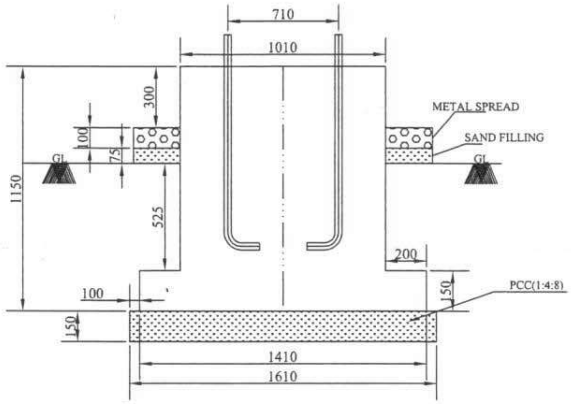
Executive Engineer
Construction Division, Aska

Asstt. Engineer
Construction Division, Aska

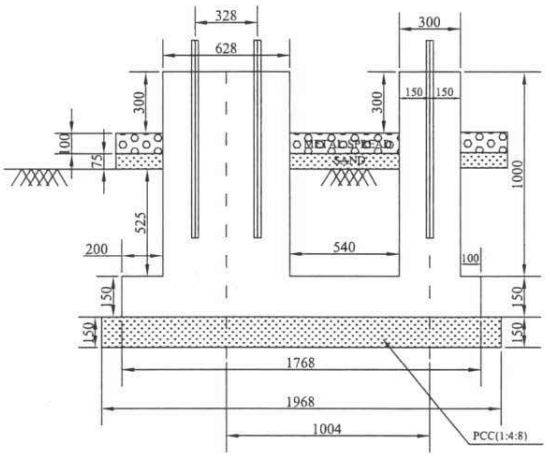
	M/S Gayatri Agency, *Plot no-1581,Mahanadivihar,Cuttack*				
PROJECT	*Installation of New 33/11 KV Primary Substation under CAPEX PROGRAMME GSED*				
CLIENT	*Southern Electricity Supply Company Of Odisha Ltd.* **(SOUTHCO)**				
ORDER NO	**6388 dt 18.05.16**				
TITLE	**33 KV BREAKER FOUNDATION**				
DRAWN BY		Drg.No	CP/2016-17/SC 05(04)	Rev No	
DESIGNED BY	*S.Mohapatra*	Date	18-06-2016	Sheet No.	*2 of 2*
CHECKED BY	*S.Biswal*			Scale	NTS

Drawing NO - 13(B)

FOUNDATION DESIGN OF 33 KV VCB(**schneider make**) AT BHISHMAGIRI UNDER PACKAGE GSED



(ELEVATION) VIEW A-A



(ELEVATION) VIEW B-B

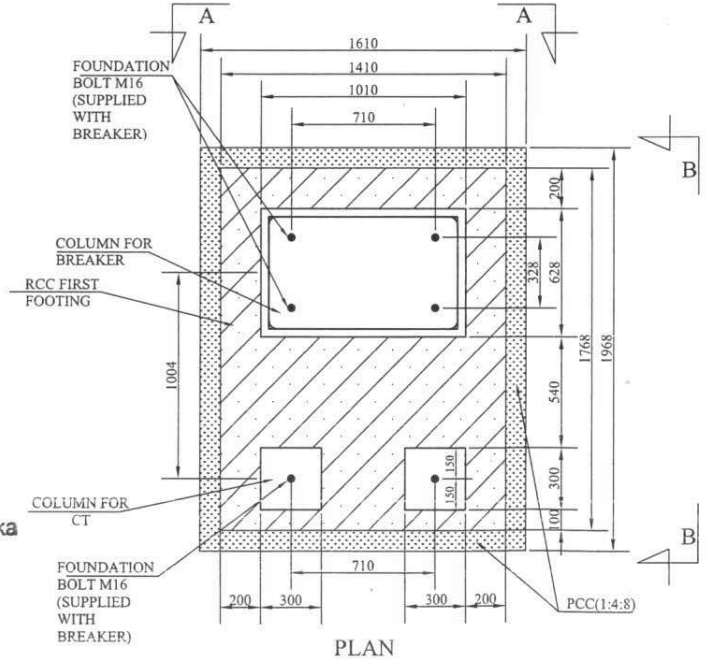
Any deviation to the work order at the time of execution should be approved from this end.

APPROVED

Senior General Manager
SOUTHCO.,Berhampur

EXECUTIVE ENGINEER (CAPEX)
Southco Utility, Berhampur-1

Assistant Engineer (Capex)
South Co, Berhampur



PLAN

Asst. Engineer
Construction Division, Aska

Executive Engineer
Construction Division, Aska

NOTE:-
ALL DIMENSIONS ARE IN MM.

GAYATRI AGENCY CUTTACK

	M/S Gayatri Agency, *Plot no-1581,Mahanadivihar,Cuttack*				
PROJECT	*Installation of New 33/11 KV Primary Substation under CAPEX PROGRAMME GSED*				
CLIENT	*Southern Electricity Supply Company Of Odisha Ltd.* **(SOUTHCO)**				
ORDER NO	**6388 dt 18.05.16**				
TITLE	**33 KV BREAKER FOUNDATION**				
DRAWN BY		Drg.No	CP/2016-17/SC 05(04)	Rev No	
DESIGNED BY	*S.Mohapatra*	Date	18-06-2016	Sheet No.	*1 of 2*
CHECKED BY	*S.Biswal*			Scale	NTS

STANDARD TECHNICAL SPECIFICATION OF 11KV COVERED CONDUCTOR

CONTENTS

1.0 SCOPE

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing and forwarding, supply, unloading of 11 kV 70 Sq. mm AAA Covered (XLPE) Insulated Conductor at TPSODL stores/sites along with all fittings, accessories and associated auxiliary equipment, mandatory spares which are required for efficient and trouble-free operation.

2.0 APPLICABLE STANDARDS

'Insulated Conductor' covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest revisions of relevant Indian Standards /IEC/ International Standards and shall conform to the regulations of local statutory authorities.

Indian/International Standard (IS/IEC)	Title
SS424 08 13 & SS 424 08 14 & IS 398 - IV	Aluminium conductors for overhead transmission purposes, Aluminium alloy stranded conductors.
IS 10418	Specification for Drums for Electric cables
IS 7098 - 2	Cross-linked Polyethylene Insulated Thermoplastic Sheathed Cables
IS 8130	Conductors for insulated Electric cables and Flexible Cords
IEC 61284	Overhead lines – Requirements and tests for fittings
IEC 60587	Test methods for evaluating resistance tracking and erosion of electrical insulating materials used under ambient conditions
IEC 60811	Methods of tests
ICEA T 31-610	Test method for conducting longitudinal water penetration resistance tests on blocked conductors
EN 50182	Conductors for overhead lines – Round wire concentric lay stranded conductors
EN 50356	Method for spark testing for cables
HD 605	Electric cables - additional test methods
EN-50397-1	Insulated Conductors for Overhead Lines for rated voltages above 1 kV A.C. and not exceeding 36 kV A.C.
EN 50397- 2	Insulated conductors and the related accessories for rated voltages above 1kV and not exceeding 36 kV.
EN 50397- 3	Insulated conductors and the related accessories -Guide to use

*In case of any conflict on any technical particular in the specification, the stricter requirement mentioned in the relevant standard shall be valid.

3.0 CLIMATIC CONDITIONS OF THE INSTALLATION

The service shall be as follow:

1. Maximum altitude above sea level 1,000m
2. Maximum ambient air temperature 50°C
3. Maximum daily average ambient air temperature 35°C
4. Minimum ambient air temperature 0°C
5. Maximum temperature attainable by an object exposed to sun 60°C

6. Maximum relative humidity 95%
7. Average number of thunderstorm per annum 70
8. Average number of rainy days per annum 120
9. Rainy months June to October
10. Average annual rainfall 150cm
11. Maximum Wind velocity 200 km/hr
12. Earthquakes of an intensity in horizontal direction - equivalent to seismic acceleration of 0.3g
13. Earthquakes of an intensity in vertical direction - equivalent to seismic acceleration of 0.15g
    (g being acceleration due to gravity)

Environmentally, some of the regions, where the work will take place includes hilly areas, subject to high relative humidity, which can give rise to condensation. Atmosphere is generally laden with mild acid and dust due to industrial activities. Some places are in heavily industrial polluted areas. On occasions, the combination of humid, acidic and dust condensation may create pollution conditions for outdoor equipments. Therefore, outdoor materials and equipment's shall be designed and protected for use exposed, heavily polluted, acidic, corrosive, tropical and humid atmosphere.

4.0 GENERAL TECHNICAL REQUIREMENTS

Sr. No.	Description of Materials	Unit	70 Sq mm
1	Name of Manufacturer		To be provided by the bidder
2	Make of cable		To be provided by the bidder
3	Voltage grade of cable	KV	11KV
4	Rated Operating Voltage	KV	12KV
5	Type of Cable		HT XLPE Covered OverheadConductor
6	Applicable Standard		IS 398 - PT - IV, & EN 50397-1-2006
7	Conductor Material	Type	Aluminum-Alloy Wires(IS:398:Part-4/1994)
8	Shape of Conductor		Stranded Non-CompactedCircular
9	No. of strand in each conductor	Nos.	7/3.57
10	Nominal cross section area	Sq.mm	70
11	Conductor Diameter (bare conductor)	Mm	10.71
12	Total Diameter (Over Covering)	Mm	15.1-17.0
13	Maximum DC resistance at 20^0C	Ohm/Km	0.445
14	Resistance temp. coefficient	Deg. C	0.00360
15	Ultimate tensile strength of conductor	KN	18.6 KN
16	Material	Type	Semi Conducting Compound
17	Inner semi-conductor layer, thickness, nominal	Mm	0.3

	INSULATION:		
18	Inner XLPE covering, thickness, nominal	mm	1.2
	Outer UV - resistance XLPE covering, thickness, nominal	mm	1.1
19	Lightening impulse withstand strength(XLPE layer)		75 KV for 1.2/50microsecond
20	Insulation PI value		> 1.5
21	High Voltage Test	KV	28kV for 1 min.
22	Maximum Contineous OperatingTemperature	Deg. C	90
23	Max. Short Ckt. Current for 1 sec.(Conductor)	KA	7.1
24	Max. Conductor Temperature duringShort Ckt.	Deg. C	250
25	Weight	Kg./Km	316

5.0 GENERAL CONSTRUCTIONS

Covered Conductor shall be manufactured and tested strictly in line with SS-EN 50397-1 (latest edition) and relevant IEC/International standards and its latest amendments.

5.1 CONDUCTORS

1. The Conductor shall be stranded, round and should be Non-Compacted. Non-Compacted Conductors shall comply with all the requirements of EN 50397-1-2006. The D.C. Resistance of the conductor shall not exceed that given in EN 50397-1-2006 by more than 5%.

2. Filling (Water blocking) :

a) The Stranded Conductor shall be longitudinally water blocked by means of a water blocking material incorporated during the extrusion process. The use of grease / water swellable tape / water swellable powder etc. is not permitted

b) The water blocking material shall be stable at maximum operating conductor temperature 90 Deg. Centigrade.

c) The water blocking compound shall be compatible with the conductor material as well as the semi conducting polymer screen layer above it and not adversely affect its electrical or mechanical properties.

3. **Cleanliness and Uniformity** :

   a) Before stranding, the cross-section of the Aluminium conductor shall be circular, and shall have uniform smooth surface, free from sharp edges and free from any defects.
   b) Stranded Conductor shall be free from oil traces & aluminium dust.
   c) Traces of aluminium dust on conductor or conductor screen shall not be acceptable.

4. **Tolerance on nominal sizes**: No negative tolerance shall be permitted on the nominal diameter of aluminium wires used in the manufacture of Insulated Conductor. Positive tolerance in this respect shall be as provided in IS: 398 latest editions.

5. **Raw material Supplier :** Conductor raw material shall be procured from reputed suppliers viz., BALCO/ HINDALCO/ NALCO/ Vedanta / APAR only.

6. **Freedom from defects:** The wires shall be smooth and free from all imperfections such as spills, splits, slag, marks, scratches, projections, looseness, overlapping of strands, chipping of aluminium layers etc. and all such other defects which may hamper the mechanical and electrical properties of the conductor. Special care should be taken to keep away dirt, grit etc. during stranding.

7. **Joints in wire** : The wires shall be drawn in continuous length, without joints and Lay ratio shall comply as per IS 398 part 4, latest edition.

8. **Lay Ratio :** The lay ratio shall comply as per IS 398 part 4, latest edition.

5.2 INSULATION

1. **Material:** Three layers of material details below

   a) **1st layer :** Semiconducting compound for conductor screen
   b) **2nd Layer :** Super cleaned XLPE compound for Insulation
   c) **3rd Layer :** Black UV & Non- Tracking XLPE compound for outer covering

2. The Semi conducting Screen, Inner Insulation and Outer Insulation should be extruded in one step i.e. **Triple extrusion** to ensure a good, permanent bond between the three layers and also with the conductor.

3. It shall be possible to remove the Semi conducting Screen, Inner and outer Insulation layers without damage to the conductor, but there shall be no slippage between the layers.

4. Maximum elongation of XLPE under loading (Hot set test) shall be 100%. Whereas Maximum residual elongation (Hot set test) shall be 10% and Eccentricity of insulation shall not exceed 15%.

5. **Raw material supplier :**

   a) XLPE compound shall be super cleaned and procured from reputed raw material suppliers viz., Dow/Borealis/Hanwa only.

b) Both XLPE and semi conductive compounds shall be used from same raw material supplier.

6. **Thermal stability :** The insulation properties shall be stable under thermal conditions arising out of continuous operation and short circuiting condition as per EN 50397 -1

7. **Cleanliness and uniformity** : Interfacial region between all layers shall be uniform. Protrusion/convolution/ other defects are not acceptable. insulated conductor shall be free from void and contamination.

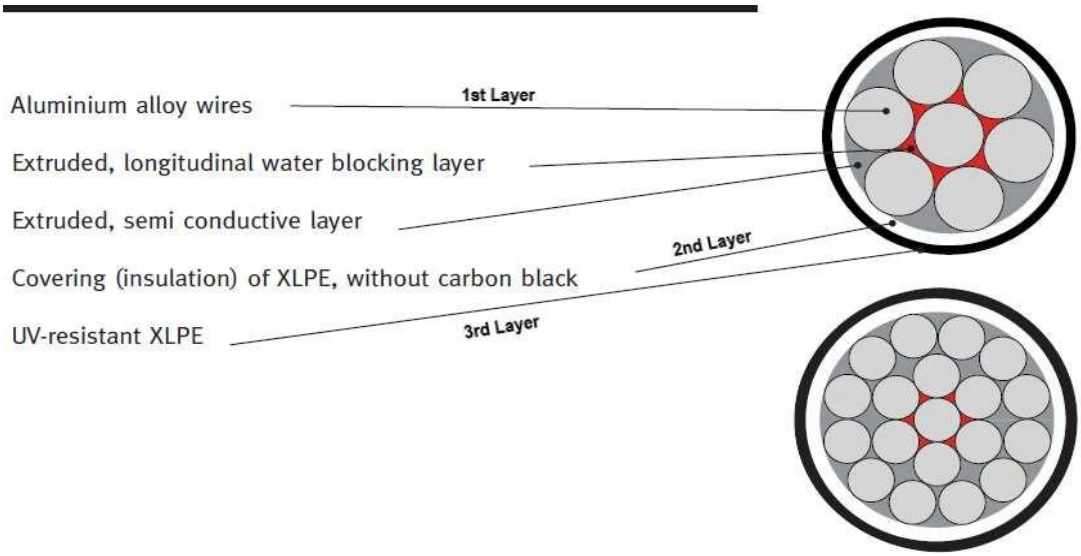


Figure shows the Cross Section of a Covered Conductor with AAAC Conductor

5.3 SEALING END CAP

S.No.	Parameter	Requirement
1	Material	Adhesive coated polyolefin heat shrinkable
2	Configuration	Adhesive coated polyolefin heat shrinkable end cap shall beprovided at both ends of the cable.
3	Additional requirements	2 nos. additional cable end caps shall be provided with each drum and placed in the drum.

5.4 OTHER DOCUMENTS

S.No.	Parameter	Requirement
1	Overall diameter of insulated conductor	To be provided by bidder
2	Weight of Overall insulated conductor	To be provided by bidder
3	Current rating of insulated conductor in air @40°C ambient temperature	To be provided by bidder

6 NAME PLATE AND MARKING

The insulated Conductor shall be wound on non-returnable wooden/steel drums conforming to IS 10418. Drum shall be free from sharp edges and visual defect. Stencil plate on one flange side of the drum and laminated paper sheet on other side flange of drum. insulated Conductor length on one drum shall be 1000 meters max. +/- 5%.

1. Following details shall be provided on flanges of drum.

a) Manufacturer's name
b) Type & size of insulated Conductor
c) Voltage Grade
d) Length of the insulated conductor on drum (in m)
e) Direction of rotation of the drum
f) Net weight of the conductor (in kg)
g) Gross weight of the conductor (in kg)
h) Month/Year of manufacture
i) P.O number and date
j) Guarantee period
k) Drum number
l) Country of manufacture
m) ISI Certification mark
n) Property of TPSODL

2. Following details shall be embossed/ printed on the outer sheath:

a) Sequential meter marking shall be printed. All other details mentioned below shall be embossed/ printed. Embossing shall be clearly visible. **At an interval of every 1 meter, following details to be embossed:**
b) Property of TPSODL
c) ISI Certification mark
d) Manufacturer name
e) Month & Year of Manufacture
f) Voltage grade
g) Size of the conductor
h) P.O number
h) Cable code

7.0 TEST

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by TPSODL authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessary conducted on the insulated conductors in additions to others specified in the IS/ IEC/ANSI standards:

7.1 TYPE TESTS

S.No	Test	Specific value		Test method	
		Clause No.	Reference standard	Clause No.	Reference standard
Tests on covering					
1	Tensile strength & Elongation at break (before ageing)	Table 1	EN 50397-1	9.1	IEC 60811-1-1
2	Tensile strength & Elongation at break (after aging)	Table 1	EN 50397-1	8.1	IEC 60811-1-2
3	Tests for thickness of insulation	5.B1	IEC 60811-1-1	8.1	IEC 60811-1-1
4	Eccentricity and Ovality of insulation	5.B1	IEC/ IS 7098-part 2	Annexure A	IEC/ IS 7098-part 2
5	Hot set test	Table 1	EN 50397-1	9	IEC 60811-2-1
6	Shrinkage test	Table 1	EN 50397-1	10	IEC 60811-1-3
7	Pressure test	Table 1	EN 50397-1	8.1	IEC 60811-3-1
8	Gravimetric test (Water absorption)	Table 1	EN 50397-1	9.2	IEC 60811-1-3
9	Shore Hardness on outer layer	Table 1	EN 50397-1	2.2.1	HD605
Tests on conductor					
10	Tensile strength of conductor	Table A.1	EN-50397-1	5.5	EN 50182
Tests on complete insulated conductor					
11	High Voltage test	Table 2	EN-50397-1	3.1.1	HD 605
12	Conductor Resistance test	Table 2	EN-50397-1	3.2.2.2	HD 605
13	Spark Test on the covering	Table 2	EN-50397-1		EN 50356
14	Leakage current	Table 2	EN-50397-1		Annexure-B EN-50397-1
15	Tracking resistance	Table 2	EN-50397-1		Annexure-C EN-50397-1
16	Conductor water penetration test	ICEA T-31-610	ICEA T-31-610		ICEA T-31-610
17	Test of compatibility including Strand filling water tight compound compatible test	Table 2	EN-50397-1	Sub clause 8.1.5	IEC 60811-1-2
18	Slippage test	Table 2	EN-50397-1	11	Annexure-D EN-50397-1
19	UV resistance test	Table 2	EN-50397-1	2.4.23	ASTM G 154

7.2 ROUTINE TESTS

S.no	Tests on complete insulated conductor				
1	High Voltage test	Table 2	EN-50397-1	3.1.1	HD 605
2	Conductor Resistance test	Table 2	EN-50397-1	3.2.2.2	HD 605
3	Spark Test on the covering	Table 2	EN-50397-1		EN 50356

7.3 ACCEPTANCE TEST

All acceptance tests mentioned below shall be witnessed by TPSODL'srepresentative during inspection stage.

S.No	Test	Specific value		Test method	
		Clause No.	Reference standard	Clause No.	Reference standard
Tests on covering					
1	Tensile strength & Elongation at break (before ageing)	Table 1	EN 50397-1	9.1	IEC 60811-1-1
2	Tests for thickness of insulation	5.B1	IEC 60811-1-1	8.1	IEC 60811-1-1
3	Eccentricity and Ovality of insulation	5.B1	IEC/ IS 7098-part 2	Annexur e A	IEC/ IS 7098 part 2
4	Hot set test (Max. Elongation under load & Max. residual elongation)	100% & 10%	IEC 60811-2-1	9	IEC 60811-2-1
5	Shore Hardness on outer layer	Table 1	EN 50397-1	2.2.1	HD605
Tests on conductor					
6	Breaking load of conductor	Table A.1	EN-50397-1	5.5	EN 50182
Tests on complete insulated conductor					
7	High Voltage test	Table 2	EN-50397-1	3.1.1	HD 605
8	Conductor Resistance test	Table 2	EN-50397-1	3.2.2.2	HD 605
9	Spark Test on the covering	Table 2	EN-50397-1		EN 50356
10	Leakage current	Table 2	EN-50397-1		Annexure B EN-50397-1
11	Tracking resistance	Table 2	EN-50397-1		Annexure C EN-50397-1
12	Conductor water penetration test	ICEA T-31-610	ICEA T-31-610		ICEA T-31-610
13	Slippage test up to 240 sqmm conductor size	Table 2	EN-50397-1	11	Annexure D EN-50397-1
14	Slippage test above 240 sqmm conductor size	Greater than 15KN			

*In case of any conflict on any technical particular in the specification, the stricter requirement mentioned in the relevant standard shall be valid.

8.0 TYPE TEST CERTIFICATES

1. The bidder shall furnish the type test certificates as mentioned above as per the corresponding standards.
2. All the tests shall be conducted at CPRI / ERDA as per the relevant standards.
3. Type tests should have been conducted in certified Test laboratories during the period not exceeding 5 years from the date of opening the bid.

4. In the event of any discrepancy in the test reports i.e. any test report not acceptable same shall be carried out without any cost implication to TPSODL.
5. Bidder shall submit the Test Reports for the Tree Retardant properties of the insulation.

9.0 PRE-DESPATCH INSPECTION

1. Material shall be subject to inspection by a duly authorized representative of TPSODL.
2. Inspection may be made at any stage of manufacture at the option of the purchaser and the equipment if found unsatisfactory as to workmanship or material, the same is liable to rejection.
3. Bidder shall grant free access to the places of manufacture to TPSODL's representatives at all times when the work is in progress.
4. Inspection by TPSODL or authorized representatives shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications.
5. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPSODL.
6. Following documents shall be sent along with material:
   a) Test report
   b) MDCC issued by TPSODL
   c) Invoice in duplicate
   d) Packing list
   e) Drawings & catalogue AA
   f) Guarantee / Warrantee card
   g) Brought out (raw) material test certificates
   h) Delivery Challan
   i) Other Documents (as applicable)

10.0 INSPECTION AFTER RECEIPT AT STORE

The material received at TPSODL, Odisha store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to "Network Engineering planning and I& QA" department.

11.0 GUARANTEE:

1. Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract.

2. In the event any defect is found by the TPSODL, up to a period of at least 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract, whichever is later, (the time scale of 12/24 months could be enhanced subject to mutual agreements). Bidder shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges(@ 20% of expenses incurred), from the Bidder or from the " Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for **'free replacement'** for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.

12.0 PACKING

1. The insulated Conductor shall be wound on non-returnable steel / wooden drums without any extra cost to TPSODL as per IS 10418 and its latest amendments. Both ends of the Insulated Conductor shall be sealed by means of heat shrinkable polyolefin end caps.
2. The insulated Conductor shall be supplied in continuous **standard length** of 1000 running meters with +/- 5% tolerance. The number of pieces if in the drum shall be indicated on the conductor drum.
3. Insulated Conductor drums shall be so constructed as to have required mechanical strength so that the drum flanges and other components do not break during transport, in actual use or in storage. The flanges and the outside surface of the barrel shall be free from protruding materials/projections/ unevenness/ sharp edges that can damage the Insulated Conductor or hands of the operator during rotation of drums. A metal preservation shall be applied to the entire drum.
4. Bottom end of Insulated Conductor should be clamped on drum by jute or nylon rope.
5. All ferrous metal parts used shall be treated with a suitable rust free finish or coating to avoid rusting during transit or storage. The drums shall withstand normal handling and transport.
6. Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.
7. Packaging shall be as per climate change perspective Insulated Conductor wound on drum shall be covered by recyclable PVC sheet for dust proof. TPSODL encourages to use environment friendly packaging.
8. Each consignment shall be accompanied by a detailed packing, list containing the following information:-
   a) Name of the consignee.
   b) Details of consignment.
   c) P.O Number

d) Destination
e) Total weight of consignment.
f) Handling and unpacking instructions.
g) Bill of material indicating contents of each package

The supplier shall ensure that the packing list and bill of material are approved by the purchaser before dispatch bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport so as to protect the equipment from damage in transit.

13.0 TENDER SAMPLE

Bidder shall submit the sample of material with the offer at TPSODL Engineering Department (in case of first supply toTPSODL).

14.0 TRAINING

Not available

15.0 QUILITY CONTROL

The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. TPSODL's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

REJECTION AND RE-TEST

i. During inspection if any one of the test pieces first selected fail to pass the tests, three further samples from the same batch shall be selected as per IS, one of which shall be from the length from which the original test sample was taken, unless that length has been withdrawn by the supplier.
ii. If all of the three test pieces from these additional samples satisfy the requirements of the tests, the batch represented by these samples shall be deemed to comply with the standard.
iii. In case, the test pieces from any of the three additional samples fail, the batch represented shall be deemed not to comply with the standard.

16.0 MINIMUM TESTING FACILITIES

Bidder shall have adequate in house testing facilities for carrying out all routine tests, acceptance tests and pre-dispatch inspection as per relevant International / Indian standards.

17.0 MANUFACTURING ACTIVITIES

The successful Bidder will have to submit the bar chart and drawing of Insulated Conductor for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order. Manufacturing mass quantity to start only after getting approved drawings or as per intimation from TPSODL.

18.0 SPARES, ACCESSORIES ND TOOLS

Not Applicable

19.0 DRAWINGS AND DOCUMENTS

Following drawings and documents shall be prepared based on TPSODL specifications and statutory requirements and shall be submitted with the bid:

a. Completely filled in in Technical Particulars

b. General drawing arrangements of Insulated conductor.

c. Bill of material

d. Type Test certificates.

e. Brought out (raw material) test certificates

f. Experience List

g. All the Documents and Drawings shall be in English Language.

After the award of the contract four (4) copies of drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy of all the drawing, GTP, Test certificates shall be submitted after the final approval of the same to purchaser.

20.0 GUARANTEED TECHNICAL PARTICULARS

11 kV 70 Sq. mm AAA XLPE Insulated Conductor

Sr. No.	Description of Materials	Unit	To be provided by the bidder
1	Name of Manufacturer		
2	Make of cable		
3	Voltage grade of cable	kV	
4	Rated Operating Voltage	kV	
5	Type of Cable		
6	Applicable Standard	IS	
7	Conductor Material	Type	
8	Shape of Conductor		
9	No. of strand in each conductor	Nos.	
10	Nominal cross section area	Sq.mm	
11	Conductor Diameter (bare conductor)	mm	
12	Total Diameter (Over Covering)	mm	
13	Maximum DC resistance at 20^0C	Ohm/Km	
	Individual strand	mm	
	Conductor	mm	
14	Resistance temp. coefficient	Deg. C	
15	Ultimate tensile strength of conductor	kN	
16	Lay Ratio of Conductor		
	CONDUCTOR SCREENING:		
17	Material		
18	Nominal thickness	mm	
	INSULATION :		
19	Material		
20	Nominal thickness, Min.	mm	
	INSULATION SCREENING:		
21	Material	Type	
22	Nominal Thickness	mm	
23	Lightening impulse withstand strength (XLPE layer)	Microsecond	
24	Insulation PI value		
25	High Voltage Test	kV	
26	Maximum Contineous Operating Temperature	Deg. C	
27	Max. Short Ckt. Current for 1 sec. (Conductor)	KA	
28	Max. Conductor Temperature during Short Ckt.	Deg. C	
29	Weight	Kg./Km	

Signature: Seal of the Company

Designation Date:

21.0 SCHEDULE OF DEVIATIONS

(TO BE ENCLOSED WITH THE BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

S.No.	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Signature: Seal of the Company

Designation Date:

STANDARD TECHNICAL SPECIFICATION OF 11KV COVERED CONDUCTOR

CONTENTS

1.0 SCOPE

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing and forwarding, supply, unloading of 11 kV 99 Sq. mm AAA Covered (XLPE) Insulated Conductor at TPSODL stores/sites along with all fittings, accessories and associated auxiliary equipment, mandatory spares which are required for efficient and trouble-free operation.

2.0 APPLICABLE STANDARDS

'Insulated Conductor' covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with the latest revisions of relevant Indian Standards /IEC/ International Standards and shall conform to the regulations of local statutory authorities.

Indian/International Standard (IS/IEC)	Title
SS424 08 13 & SS 424 08 14 & IS 398 - IV	Aluminium conductors for overhead transmission purposes, Aluminium alloy stranded conductors.
IS 10418	Specification for Drums for Electric cables
IS 7098 - 2	Cross-linked Polyethylene Insulated Thermoplastic Sheathed Cables
IS 8130	Conductors for insulated Electric cables and Flexible Cords
IEC 61284	Overhead lines – Requirements and tests for fittings
IEC 60587	Test methods for evaluating resistance tracking and erosion of electrical insulating materials used under ambient conditions
IEC 60811	Methods of tests
ICEA T 31-610	Test method for conducting longitudinal water penetration resistance tests on blocked conductors
EN 50182	Conductors for overhead lines – Round wire concentric lay stranded conductors
EN 50356	Method for spark testing for cables
HD 605	Electric cables - additional test methods
EN-50397-1	Insulated Conductors for Overhead Lines for rated voltages above 1 kV A.C. and not exceeding 36 kV A.C.
50397- 2	Insulated conductors and the related accessories for rated voltages above 1kV and not exceeding 36 kV.
EN 50397- 3	Insulated conductors and the related accessories -Guide to use

*In case of any conflict on any technical particular in the specification, the stricter requirement mentioned in the relevant standard shall be valid.

3.0 CLIMATIC CONDITIONS OF THE INSTALLATION

The service shall be as follow:

1. Maximum altitude above sea level 1,000m
2. Maximum ambient air temperature 50°C
3. Maximum daily average ambient air temperature 35°C
4. Minimum ambient air temperature 0°C
5. Maximum temperature attainable by an object exposed to sun 60°C

6. Maximum relative humidity 95%
7. Average number of thunderstorm per annum 70
8. Average number of rainy days per annum 120
9. Rainy months June to October
10. Average annual rainfall 150cm
11. Maximum Wind velocity 200 km/hr
12. Earthquakes of an intensity in horizontal direction - equivalent to seismic acceleration of 0.3g
13. Earthquakes of an intensity in vertical direction - equivalent to seismic acceleration of 0.15g
    (g being acceleration due to gravity)

Environmentally, some of the regions, where the work will take place includes hilly areas, subject to high relative humidity, which can give rise to condensation. Atmosphere is generally laden with mild acid and dust due to industrial activities. Some places are in heavily industrial polluted areas. On occasions, the combination of humid, acidic and dust condensation may create pollution conditions for outdoor equipments. Therefore, outdoor materials and equipment's shall be designed and protected for use exposed, heavily polluted, acidic, corrosive, tropical and humid atmosphere.

4.0 GENERAL TECHNICAL REQUIREMENTS

Sr. No.	Description of Materials	Unit	99 Sq mm
1	Name of Manufacturer		To be provided by the bidder
2	Make of cable		To be provided by the bidder
3	Voltage grade of cable	KV	11KV
4	Rated Operating Voltage	KV	12KV
5	Type of Cable		HT XLPE Covered OverheadConductor
6	Applicable Standard		IS 398 - PT - IV, & EN 50397-1-2006
7	Conductor Material	Type	Aluminum-Alloy Wires(IS:398:Part-4/1994)
8	Shape of Conductor		Stranded Non-CompactedCircular
9	No. of strand in each conductor	Nos.	7/4.26
10	Nominal cross section area	Sq.mm	99
11	Conductor Diameter (bare conductor)	Mm	12.75
12	Total Diameter (Over Covering)	Mm	17.1-19.1
13	Maximum DC resistance at 20^0C	Ohm/Km	0.318
14	Resistance temp. coefficient	Deg. C	0.00360
15	Ultimate tensile strength of conductor	KN	29.26kN
16	Material	Type	Semi Conducting Compound
17	Inner semi-conductor layer, thickness, nominal	Mm	0.5

	INSULATION:		
18	Inner XLPE covering, thickness nominal	mm	1.2
	Outer UV - resistance XLPE covering, thickness, nominal	mm	1.1
19	Lightening impulse withstand strength(XLPE layer)		75 KV for 1.2/50microsecond
20	Insulation PI value		> 1.5
21	High Voltage Test	KV	28kV for 1 min.
22	Maximum Contineous OperatingTemperature	Deg. C	90
23	Max. Short Ckt. Current for 1 sec.(Conductor)	KA	10
24	Max. Conductor Temperature duringShort Ckt.	Deg. C	250
25	Weight	Kg./Km	490

5.0 GENERAL CONSTRUCTIONS

Covered Conductor shall be manufactured and tested strictly in line with SS-EN 50397-1 (latest edition) and relevant IEC/International standards and its latest amendments.

5.1 CONDUCTORS

1. The Conductor shall be stranded, round and should be Non-Compacted. Non-Compacted Conductors shall comply with all the requirements of EN 50397-1-2006. The D.C. Resistance of the conductor shall not exceed that given in EN 50397-1-2006 by more than 5%.

2. Filling (Water blocking) :

a) The Stranded Conductor shall be longitudinally water blocked by means of a water blocking material incorporated during the extrusion process. The use of grease / water swellable tape / water swellable powder etc. is not permitted

b) The water blocking material shall be stable at maximum operating conductor temperature 90 Deg. Centigrade.

c) The water blocking compound shall be compatible with the conductor material as well as the semi conducting polymer screen layer above it and not adversely affect its electrical or mechanical properties.

3. **Cleanliness and Uniformity** :

   a) Before stranding, the cross-section of the Aluminium conductor shall be circular, and shall have uniform smooth surface, free from sharp edges and free from any defects.
   b) Stranded Conductor shall be free from oil traces & aluminium dust.
   c) Traces of aluminium dust on conductor or conductor screen shall not be acceptable.

4. **Tolerance on nominal sizes**: No negative tolerance shall be permitted on the nominal diameter of aluminium wires used in the manufacture of Insulated Conductor. Positive tolerance in this respect shall be as provided in IS: 398 latest editions.

5. **Raw material Supplier :** Conductor raw material shall be procured from reputed suppliers viz., BALCO/ HINDALCO/ NALCO/ Vedanta / APAR only.

6. **Freedom from defects:** The wires shall be smooth and free from all imperfections such as spills, splits, slag, marks, scratches, projections, looseness, overlapping of strands, chipping of aluminium layers etc. and all such other defects which may hamper the mechanical and electrical properties of the conductor. Special care should be taken to keep away dirt, grit etc. during stranding.

7. **Joints in wire** : The wires shall be drawn in continuous length, without joints and Lay ratio shall comply as per IS 398 part 4, latest edition.

8. **Lay Ratio :** The lay ratio shall comply as per IS 398 part 4, latest edition.

5.2 INSULATION

1. **Material:** Three layers of material details below

   a) **1st layer :** Semiconducting compound for conductor screen
   b) **2nd Layer :** Super cleaned XLPE compound for Insulation
   c) **3rd Layer :** Black UV & Non- Tracking XLPE compound for outer covering

2. The Semi conducting Screen, Inner Insulation and Outer Insulation should be extruded in one step i.e. **Triple extrusion** to ensure a good, permanent bond between the three layers and also with the conductor.

3. It shall be possible to remove the Semi conducting Screen, Inner and outer Insulation layers without damage to the conductor, but there shall be no slippage between the layers.

4. Maximum elongation of XLPE under loading (Hot set test) shall be 100%. Whereas Maximum residual elongation (Hot set test) shall be 10% and Eccentricity of insulation shall not exceed 15%.

5. **Raw material supplier :**

   a) XLPE compound shall be super cleaned and procured from reputed raw material suppliers viz., Dow/Borealis/Hanwa only.

b) Both XLPE and semi conductive compounds shall be used from same raw material supplier.

6. **Thermal stability :** The insulation properties shall be stable under thermal conditions arising out of continuous operation and short circuiting condition as per EN 50397 -1

7. **Cleanliness and uniformity** : Interfacial region between all layers shall be uniform. Protrusion/convolution/ other defects are not acceptable. insulated conductor shall be free from void and contamination.

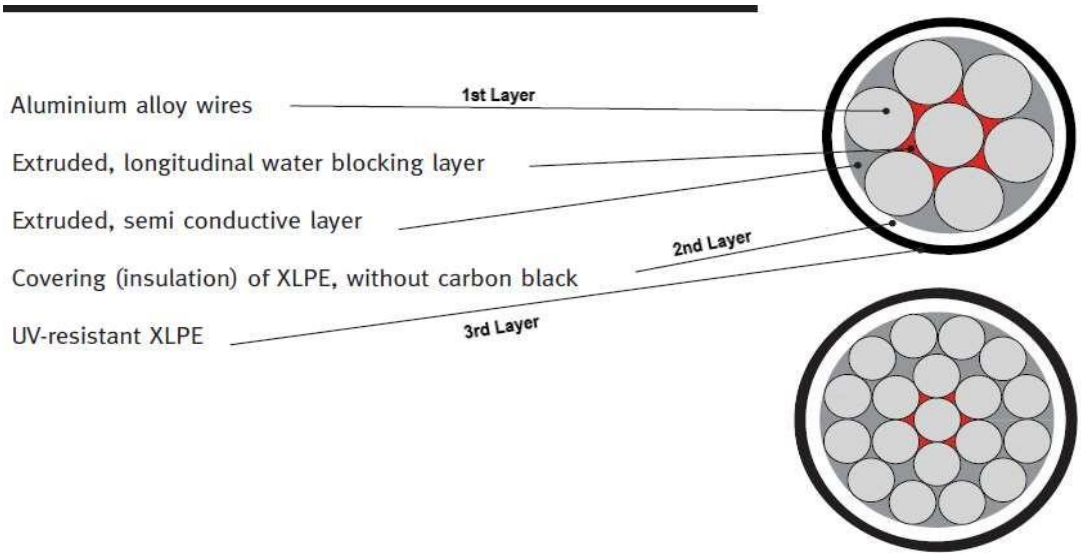


Figure shows the Cross Section of a Covered Conductor with AAAC Conductor

5.3 SEALING END CAP

S.No.	Parameter	Requirement
1	Material	Adhesive coated polyolefin heat shrinkable
2	Configuration	Adhesive coated polyolefin heat shrinkable end cap shall beprovided at both ends of the cable.
3	Additional requirements	2 nos. additional cable end caps shall be provided with each drum and placed in the drum.

5.4 OTHER DOCUMENTS

S.No.	Parameter	Requirement
1	Overall diameter of insulated conductor	To be provided by bidder
2	Weight of Overall insulated conductor	To be provided by bidder
3	Current rating of insulated conductor in air @40°C ambient temperature	To be provided by bidder

6 NAME PLATE AND MARKING

The insulated Conductor shall be wound on non-returnable wooden/steel drums conforming to IS 10418. Drum shall be free from sharp edges and visual defect. Stencil plate on one flange side of the drum and laminated paper sheet on other side flange of drum. insulated Conductor length on one drum shall be 1000 meters max. +/- 5%.

1. Following details shall be provided on flanges of drum.

a) Manufacturer's name
b) Type & size of insulated Conductor
c) Voltage Grade
d) Length of the insulated conductor on drum (in m)
e) Direction of rotation of the drum
f) Net weight of the conductor (in kg)
g) Gross weight of the conductor (in kg)
h) Month/Year of manufacture
i) P.O number and date
j) Guarantee period
k) Drum number
l) Country of manufacture
m) ISI Certification mark
n) Property of TPSODL

2. Following details shall be embossed/ printed on the outer sheath:

a) Sequential meter marking shall be printed. All other details mentioned below shall be embossed/ printed. Embossing shall be clearly visible. **At an interval of every 1 meter, following details to be embossed:**
b) Property of TPSODL
c) ISI Certification mark
d) Manufacturer name
e) Month & Year of Manufacture
f) Voltage grade
g) Size of the conductor
h) P.O number
h) Cable code

7.0 TEST

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by TPSODL authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessary conducted on the insulated conductors in additions to others specified in the IS/ IEC/ANSI standards:

7.1 TYPE TESTS

S.No	Test	Specific value		Test method	
		Clause No.	Reference standard	Clause No.	Reference standard
Tests on covering					
1	Tensile strength & Elongation at break (before ageing)	Table 1	EN 50397-1	9.1	IEC 60811-1-1
2	Tensile strength & Elongation at break (after aging)	Table 1	EN 50397-1	8.1	IEC 60811-1-2
3	Tests for thickness of insulation	5.B1	IEC 60811-1-1	8.1	IEC 60811-1-1
4	Eccentricity and Ovality of insulation	5.B1	IEC/ IS 7098-part 2	Annexure A	IEC/ IS 7098-part 2
5	Hot set test	Table 1	EN 50397-1	9	IEC 60811-2-1
6	Shrinkage test	Table 1	EN 50397-1	10	IEC 60811-1-3
7	Pressure test	Table 1	EN 50397-1	8.1	IEC 60811-3-1
8	Gravimetric test (Water absorption)	Table 1	EN 50397-1	9.2	IEC 60811-1-3
9	Shore Hardness on outer layer	Table 1	EN 50397-1	2.2.1	HD605
Tests on conductor					
10	Tensile strength of conductor	Table A.1	EN-50397-1	5.5	EN 50182
Tests on complete insulated conductor					
11	High Voltage test	Table 2	EN-50397-1	3.1.1	HD 605
12	Conductor Resistance test	Table 2	EN-50397-1	3.2.2.2	HD 605
13	Spark Test on the covering	Table 2	EN-50397-1		EN 50356
14	Leakage current	Table 2	EN-50397-1		Annexure-B EN-50397-1
15	Tracking resistance	Table 2	EN-50397-1		Annexure-C EN-50397-1
16	Conductor water penetration test	ICEA T-31-610	ICEA T-31-610		ICEA T-31-610
17	Test of compatibility including Strand filling water tight compound compatible test	Table 2	EN-50397-1	Sub clause 8.1.5	IEC 60811-1-2
18	Slippage test	Table 2	EN-50397-1	11	Annexure-D EN-50397-1
19	UV resistance test	Table 2	EN-50397-1	2.4.23	ASTM G 154

7.2 ROUTINE TESTS

S.no	Tests on complete insulated conductor				
1	High Voltage test	Table 2	EN-50397-1	3.1.1	HD 605
2	Conductor Resistance test	Table 2	EN-50397-1	3.2.2.2	HD 605
3	Spark Test on the covering	Table 2	EN-50397-1		EN 50356

7.3 ACCEPTANCE TEST

All acceptance tests mentioned below shall be witnessed by TPSODL'srepresentative during inspection stage.

S.No	Test	Specific value		Test method	
		Clause No.	Reference standard	Clause No.	Reference standard
Tests on covering					
1	Tensile strength & Elongation at break (before ageing)	Table 1	EN 50397-1	9.1	IEC 60811-1-1
2	Tests for thickness of insulation	5.B1	IEC 60811-1-1	8.1	IEC 60811-1-1
3	Eccentricity and Ovality of insulation	5.B1	IEC/ IS 7098-part 2	Annexur e A	IEC/ IS 7098 part 2
4	Hot set test (Max. Elongation under load & Max. residual elongation)	100% & 10%	IEC 60811-2-1	9	IEC 60811-2-1
5	Shore Hardness on outer layer	Table 1	EN 50397-1	2.2.1	HD605
Tests on conductor					
6	Breaking load of conductor	Table A.1	EN-50397-1	5.5	EN 50182
Tests on complete insulated conductor					
7	High Voltage test	Table 2	EN-50397-1	3.1.1	HD 605
8	Conductor Resistance test	Table 2	EN-50397-1	3.2.2.2	HD 605
9	Spark Test on the covering	Table 2	EN-50397-1		EN 50356
10	Leakage current	Table 2	EN-50397-1		Annexure B EN-50397-1
11	Tracking resistance	Table 2	EN-50397-1		Annexure C EN-50397-1
12	Conductor water penetration test	ICEA T-31-610	ICEA T-31-610		ICEA T-31-610
13	Slippage test up to 240 sqmm conductor size	Table 2	EN-50397-1	11	Annexure D EN-50397-1
14	Slippage test above 240 sqmm conductor size	Greater than 15KN			

*In case of any conflict on any technical particular in the specification, the stricter requirement mentioned in the relevant standard shall be valid.

8.0 TYPE TEST CERTIFICATES

1. The bidder shall furnish the type test certificates as mentioned above as per the corresponding standards.
2. All the tests shall be conducted at CPRI / ERDA as per the relevant standards.
3. Type tests should have been conducted in certified Test laboratories during the period not exceeding 5 years from the date of opening the bid.

4. In the event of any discrepancy in the test reports i.e. any test report not acceptable same shall be carried out without any cost implication to TPSODL.
5. Bidder shall submit the Test Reports for the Tree Retardant properties of the insulation.

9.0 PRE-DESPATCH INSPECTION

1. Material shall be subject to inspection by a duly authorized representative of TPSODL.
2. Inspection may be made at any stage of manufacture at the option of the purchaser and the equipment if found unsatisfactory as to workmanship or material, the same is liable to rejection.
3. Bidder shall grant free access to the places of manufacture to TPSODL's representatives at all times when the work is in progress.
4. Inspection by TPSODL or authorized representatives shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications.
5. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPSODL.
6. Following documents shall be sent along with material:
   a) Test report
   b) MDCC issued by TPSODL
   c) Invoice in duplicate
   d) Packing list
   e) Drawings & catalogue AA
   f) Guarantee / Warrantee card
   g) Brought out (raw) material test certificates
   h) Delivery Challan
   i) Other Documents (as applicable)

10.0 INSPECTION AFTER RECEIPT AT STORE

The material received at TPSODL, Odisha store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to "Network Engineering planning and I& QA" department.

11.0 GUARANTEE:

1. Bidder shall stand guarantee towards design, materials, workmanship & quality of process/ manufacturing of items under the contract for due and intended performance of the same, as an integrated product delivered under this contract.

2. In the event any defect is found by the TPSODL, up to a period of at least 12 months from the date of commissioning or 24 months from the date of last supplies made under the contract, whichever is later, (the time scale of 12/24 months could be enhanced subject to mutual agreements). Bidder shall be liable to undertake to replace/rectify such defects at his own costs. within mutually agreed timeframe, and to the entire satisfaction of the Purchaser, failing which the Purchaser will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges(@ 20% of expenses incurred), from the Bidder or from the " Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Purchaser.

12.0 PACKING

1. The insulated Conductor shall be wound on non-returnable steel / wooden drums without any extra cost to TPSODL as per IS 10418 and its latest amendments. Both ends of the Insulated Conductor shall be sealed by means of heat shrinkable polyolefin end caps.
2. The insulated Conductor shall be supplied in continuous **standard length** of 1000 running meters with +/- 5% tolerance. The number of pieces if in the drum shall be indicated on the conductor drum.
3. Insulated Conductor drums shall be so constructed as to have required mechanical strength so that the drum flanges and other components do not break during transport, in actual use or in storage. The flanges and the outside surface of the barrel shall be free from protruding materials/projections/ unevenness/ sharp edges that can damage the Insulated Conductor or hands of the operator during rotation of drums. A metal preservation shall be applied to the entire drum.
4. Bottom end of Insulated Conductor should be clamped on drum by jute or nylon rope.
5. All ferrous metal parts used shall be treated with a suitable rust free finish or coating to avoid rusting during transit or storage. The drums shall withstand normal handling and transport.
6. Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.
7. Packaging shall be as per climate change perspective Insulated Conductor wound on drum shall be covered by recyclable PVC sheet for dust proof. TPSODL encourages to use environment friendly packaging.
8. Each consignment shall be accompanied by a detailed packing, list containing the following information:-
   a) Name of the consignee.
   b) Details of consignment.
   c) P.O Number

d) Destination
e) Total weight of consignment.
f) Handling and unpacking instructions.
g) Bill of material indicating contents of each package

The supplier shall ensure that the packing list and bill of material are approved by the purchaser before dispatch bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport so as to protect the equipment from damage in transit.

13.0 TENDER SAMPLE

Bidder shall submit the sample of material with the offer at TPSODL Engineering Department (in case of first supply toTPSODL).

14.0 TRAINING

Not available

15.0 QUILITY CONTROL

The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. TPSODL's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

REJECTION AND RE-TEST

i. During inspection if any one of the test pieces first selected fail to pass the tests, three further samples from the same batch shall be selected as per IS, one of which shall be from the length from which the original test sample was taken, unless that length has been withdrawn by the supplier.
ii. If all of the three test pieces from these additional samples satisfy the requirements of the tests, the batch represented by these samples shall be deemed to comply with the standard.
iii. In case, the test pieces from any of the three additional samples fail, the batch represented shall be deemed not to comply with the standard.

16.0 MINIMUM TESTING FACILITIES

Bidder shall have adequate in house testing facilities for carrying out all routine tests, acceptance tests and pre-dispatch inspection as per relevant International / Indian standards.

17.0 MANUFACTURING ACTIVITIES

The successful Bidder will have to submit the bar chart and drawing of Insulated Conductor for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order. Manufacturing mass quantity to start only after getting approved drawings or as per intimation from TPSODL.

18.0 SPARES, ACCESSORIES ND TOOLS

Not Applicable

19.0 DRAWINGS AND DOCUMENTS

Following drawings and documents shall be prepared based on TPSODL specifications and statutory requirements and shall be submitted with the bid:

a. Completely filled in in Technical Particulars

b. General drawing arrangements of Insulated conductor.

c. Bill of material

d. Type Test certificates.

e. Brought out (raw material) test certificates

f. Experience List

g. All the Documents and Drawings shall be in English Language.

After the award of the contract four (4) copies of drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval and shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy of all the drawing, GTP, Test certificates shall be submitted after the final approval of the same to purchaser.

20.0 GUARANTEED TECHNICAL PARTICULARS

11 kV 99 Sq. mm AAA XLPE Insulated Conductor

Sr. No.	Description of Materials	Unit	To be provided by the bidder
1	Name of Manufacturer		
2	Make of cable		
3	Voltage grade of cable	kV	
4	Rated Operating Voltage	kV	
5	Type of Cable		
6	Applicable Standard	IS	
7	Conductor Material	Type	
8	Shape of Conductor		
9	No. of strand in each conductor	Nos.	
10	Nominal cross section area	Sq.mm	
11	Conductor Diameter (bare conductor)	mm	
12	Total Diameter (Over Covering)	mm	
13	Maximum DC resistance at 20^0C	Ohm/Km	
	Individual strand	mm	
	Conductor	mm	
14	Resistance temp. coefficient	Deg. C	
15	Ultimate tensile strength of conductor	kN	
16	Lay Ratio of Conductor		
	CONDUCTOR SCREENING:		
17	Material		
18	Nominal thickness	mm	
	INSULATION :		
19	Material		
20	Nominal thickness, Min.	mm	
	INSULATION SCREENING:		
21	Material	Type	
22	Nominal Thickness	mm	
23	Lightening impulse withstand strength (XLPE layer)	Microsecond	
24	Insulation PI value		
25	High Voltage Test	kV	
26	Maximum Contineous Operating Temperature	Deg. C	
27	Max. Short Ckt. Current for 1 sec. (Conductor)	KA	
28	Max. Conductor Temperature during Short Ckt.	Deg. C	
29	Weight	Kg./Km	

Signature: Seal of the Company

Designation Date:

21.0 SCHEDULE OF DEVIATIONS

(TO BE ENCLOSED WITH THE BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

S.No.	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Signature: Seal of the Company

Designation Date:

CONTENTS

1. SCOPE:

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing; forwarding, supply and unloading at store/ site of Single and Three phase MCCBs with Distribution box of the ratings as mentioned in the specification below. The MCCBs shall be complete with all accessories for efficient and trouble free operation.

2. APPLICABLE STANDARDS:

The equipment covered by this specification shall confirm to the requirements stated in latest editions of relevant applicable Indian/IEC Standards and shall conform to the regulations of local statutory authorities.

a)	IS 13947-1-1993 / IEC 60947-1-1988	:	Specification for LV Switchgear & Control gear - General Rules
b)	IS 13947-2-1993 / IEC 60947-2-1989	:	Specification for LV Switchgear & Control gear - Circuit Breakers
c)	IEC 60529 -1989	:	Degree of Protection provided by Enclosures
d)	IS 8623 (Pt.2)-1993 / IEC 60439/2-1987	:	Specification L.V. switchgear & control gear assemblies – Particular requirements for bus bar trunking systems (bus ways)
e)	IS 2551 - 1982	:	Danger Notice Plates
f)	IEC 60664	:	Insulation co-ordination within low voltage systems including clearances & creepage distances for equipment
g)	IEC 61140	:	Installations through door of Class-II Switchboards / Enclosures
h)	IS 14772-2000	:	General requirements for enclosures for accessories for household and similar fixed electrical installation.

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

The service conditions shall be as follows:

1. Maximum altitude above sea level 1,000m
2. Maximum ambient air temperature 50°C
3. Maximum daily average ambient air temperature 35°C
4. Minimum ambient air temperature 0°C
5. Maximum relative humidity 95%
6. Average number of thunderstorm days per annum (isokeraunic level) 70
7. Average number of rainy days per annum 120
8. Average annual rainfall 150cm
9. Earthquakes of an intensity in horizontal direction - equivalent to seismic acceleration of 0.3g
10. Earthquakes of an intensity in vertical direction - equivalent to seismic acceleration of 0.15g
(g being acceleration due to gravity)
11 .Wind velocity: 300 km/hr, 200 km/hr and 160 km/hr.

Environmentally, some of the regions, where the work will take place includes coastal areas, subject to high relative humidity, which can give rise to condensation. Onshore winds will frequently be salt laden. On occasions, the combination of salt and condensation may create pollution conditions for outdoor insulators. Some places are in heavily industrial polluted areas.

Therefore, Outdoor material and equipment shall be designed and protected for use in exposed, heavily polluted, salty, corrosive and humid coastal atmosphere

The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1 g.

4. GENERAL TECHNICAL REQUIREMENTS :

S no.	DESCRIPTION	REQUIREMENT			
1	Type of MCCB	Fixed type Manually Operated (mounted in outdoor type Distribution Box)			
2	Type of Releases	Thermal magnetic or Fully magnetic			
3	Rating (A)	40, 63 & 100A	40, 63 & 100A	160, 250 & 400 A	500 & 630 A
4	Over Load Release setting	Fixed	0.8-1 In	0.8-1 In	0.8-1 In
5	No. of Poles	Single	Three	Three	Three
6	Rated Voltage	230V	415V	415V	415V
7	Rated ultimate short circuit breaking capacity (Icu)	10kA rms	25 kA rms	35kA rms	50kA rms
8	Rated service short circuit breaking capacity (Ics)	50% of Icu	100% of Icu	100% of Icu	100% of Icu
9	Utilization Category	A			
10	Rated Insulation Voltage	690 V			
11	Rated Impulse withstand voltage	8 kVP			
12	Material of Busbar	Aluminium			
13	Max. current Density of busbar	1.00 A/mm² - should be compliant to Rated Breaking Capacity of MCCB			
14	Max. Permissible temp. rise	80^0C at terminals with an ambient temperature not exceeding 40^0C			
15	Min. Clearance b/w phases	25 mm			
16	Min. Clearance b/w phase to earth	20 mm			
17	Degree of Protection of enclosure	IP 66			

5. GENERAL CONSTRUCTION

5.1 ENCLOSURE OF DISTRIBUTION BOX

The MCCB shall be housed in an enclosure made of 2mm thick sheet steel and shall be dust and vermin proof. The enclosure shall be provided with robust construction & an overall canopy on top for smooth draining of rain water. The enclosure shall be suitable for outdoor installation with IP 66 Degree of Protection. The MCCB mounted inside the enclosure shall be provided with extended insulated Aluminum links for tapping off multiple outgoing connections, designed for use on 230V, 1-phase and 415V, 3-phase, 4wire, 50Hz supply system. The pockets of aluminum links shall be sealed properly to avoid ingress of the moisture.

The enclosure shall have single door arrangement with concealed hinges so that door is not easily removable to avoid pilferage. It shall be so designed that when it is opened and other protective means, if any are removed, all parts requiring access for installation and maintenance, as prescribed by the manufacturer, are readily accessible. Sufficient space shall be provided inside the enclosure for the accommodation of external conductors from their point of entry into the enclosure to the terminals to

ensure adequate connection. All parts shall be manufactured in accordance with latest relevant IS / IEC Standards. In case of equipment with conductive enclosures, means shall be provided if necessary to ensure electrical continuity between exposed conductive parts of the equipment and the metal sheathing of connecting conductors. The removable parts of the enclosure shall be firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations. Enclosures shall be so designed as to allow the covers to be opened with the use of tools, but means shall be provided to prevent loss of the fastening devices.

Doors of all MCCB enclosure shall have one panel type lock & one padlock at the front of the door. Single Master key shall be provided for all door locks. For mounting the enclosure, the mounting clamps shall be on top & side of the enclosure and shall be of minimum thickness of 5mm. All the hardware used shall be hot dipped Galvanized or Electro-Zinc plated.

For 3-Phase MCCB boxes the phase sequence shall be B-Y-R-N from the left, when viewed from the front of the MCCB box. However, for 1-Phase boxes (which are to be mounted back to back with the transformer), the configuration shall be Ph-N from the left, when viewed from the front of the MCCB. The mounting arrangement of MCCB shall such that for a given rating of MCCB, same rating MCCB of any TPSODL approved manufacturer can be installed / replaced easily at site without making any changes in bus bar arrangement.

All the bus-bars shall be of Electrolytic grade Aluminum duly sleeved with heat shrinkable PVC sleeves with 1.1kV insulation. Bus bar sizes shall be chosen by considering all the safety factors and area reduced due to hole cut on the bus. The hole sizes on the bus bar shall be provided in line with the lug sizes used in TPSODL system by maintaining appropriate clearance between all lugs for proper cable termination. The outgoing three phase bus bars with neutral shall be horizontally aligned & suitable for providing adequate connections. The distance from gland plate to bottom bus bar (neutral) shall be indicated in the drawing. Non hygroscopic, non-combustible type Bus bar insulators of material such as SMC/DMC shall be used. A minimum 2 Nos. of Bus bars insulators (At both ends of phase & neutral bus) shall be used in all the MCCB boxes so that the bus bars shall be rigidly mounted. Panel Builder shall furnish a type-test certificate from CPRI/ERDA in support of Bus-bars system of MCCB Distribution Box, having short-circuit withstand capacity equal to respective MCCB short-ckt. Breaking capacity used in that Distribution Box. A Cable box shall be provided at the back side of the MCCB box for incoming cable connection.

5.2 MCCBs :

MCCBs shall comply to latest standards of IS-13947-2 / IEC-60947-2. These MCCBs shall have high Mechanical & Electrical Endurance. All 3-pole MCCBs shall be suitable for 'ISOLATION' with positive contact indication for safety of Operating Personnel. Each current path and operating contact system of 3-pole MCCBs shall be of encapsulated design with double break contacts on incoming and outgoing side of the current path. These MCCBs shall be of Current Limiting design to reduce impact of thermal stresses on Cables and down the line Electrical Distribution system, while opening on high fault currents.

All MCCBs shall have well defined and identified ON, OFF, & Trip Positions marked on front face of the MCCB in accordance with Indian and International standards. MCCBs shall have a 'Push to Trip' test button on front face to test healthiness of Trip unit. Phase Barriers shall be provided on all 3-pole MCCBs to prevent travel of arc between phases during any short circuit fault, for maximum insulation between phases at power terminals and to maximize creepage distance between phases. MCCBs shall also be provided with suitable spreaders for easy termination of Aluminium bus bar links on them so as to save MCCBs from any damage. Phase Barriers & Spreaders shall be original part of approved MCCB makes. Test report to be provided of material used for phase barriers and spreader from MCCB supplier. Local similar phase barriers & spreaders shall not be accepted for superior connections between MCCB terminal with Distribution Box bus bars.

5.3 GLAND PLATES :

Detachable CRCA sheet steel gland plates of 3mm thickness shall be provided for accommodating I/C & O/G cables. Rubber seal for all the holes shall be provided separately. The gland plate for each MCCB DB shall be provided with holes (knock out type) suitable for the brass glands in accordance with XLPE insulated, armoured cables for I/C & O/G mentioned in the table below. Details of the no. of holes that should be drilled in the gland plate for particular ratings of MCCB Distribution Box along with incoming and outgoing cables sizes are as given below and shall be adhered to by the supplier of the MCCB DBs.

	Knockout type openings required in MCCB Box											
S.no.	TRF. Rating	MCCB Rating	Incoming Cables		Outgoing cables/Service lines to consumers from MCCB					Total no. of openings in incoming base plate	Total no. of openings in outgoing base plate	
			4Cx150 sq mm	4Cx300 sq mm	2Cx16 sq mm (1ph Only)	2Cx25 sq mm (1ph Only)	4Cx25 sq mm	4Cx95 sq mm	4Cx 150 sq mm	3-Phase	1-Phase	3-Phase
1	10kVA - SP	40A, 10kA - SP	Directly mounted on Trf.		4	0	0	0	0	Directly mounted on Trf.	4	0
2	16kVA - SP	63A, 10kA - SP	Directly mounted on Trf.		4	0	0	0	0	Directly mounted on Trf.	4	0
3	25kVA - SP	100A, 10kA - SP	Directly mounted on Trf.		4	2	0	0	0	Directly mounted on Trf.	6	0
4	25kVA - TP	40A, 35kA - TP	Directly mounted on Trf.		4	2	2	0	0	Directly mounted on Trf.	6	2
5	63kVA - TP	100A, 35kA - TP	1	0	0	0	3	2	0	1	0	5
6	100kVA - TP	160A, 35kA - TP	1	0	0	0	4	2	0	1	0	6
7	160kVA - TP	250A, 35kA - TP	0	1	0	0	2	3	0	1	0	5
8	250kVA - TP	400A, 35kA - TP	2	0	0	0	0	4	1	2	0	5
9	315kVA - TP	500A, 50kA - TP	0	2	0	0	0	3	2	2	0	5
10	400kVA - TP	630A, 50kA - TP	0	2	0	0	0	4	3	2	0	7

5.4 TERMINALS & CONNECTIONS :

Current carrying parts shall have the necessary mechanical strength and current carrying capacity for their intended used. All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength. Terminal connections shall be such that the conductors may be connected by means of screws bolts, spring washers or other equivalent means so as to ensure that the necessary contact pressure is maintained. Standard sizes of bolts, screws, pipe and other fittings shall be used and number of sizes to be kept minimum. Terminals shall be so constructed that the conductors can be clamped between suitable surfaces without any significant damage either to conductors or terminals. Terminals shall not allow the conductors to be displaced or be displaced themselves in a manner detrimental to the operation of equipment and the insulation voltage shall not be reduced below the rated values. Terminals for connection to external conductors shall be readily

accessible during installation. The number of termination points on the bus bar shall be in accordance with the number of outgoings as stated in the table above.

All mechanism shall be made of such material as to prevent corrosion due to sticking of dust. All connections and contacts shall be of ample cross-section and surface area for carrying continuously the specified current without undue heating and shall be secured rigidly & locked in position. The manufacturer shall state the type (rigid/ stranded/ flexible), the minimum and the maximum cross sections of conductors for which the terminal is suitable and, if applicable, the number of conductors simultaneously connectable to the terminal. The incoming cable shall be terminated at back side of the bottom of the MCCB distribution box and outgoing cable shall be terminated from front of the bottom of the box.

5.5 INSULATION SUPPORT :

The bidder shall use fire retardant material (not Bakelite) for Insulation and seal the gap near the bus-bars with sealing agent, to prevent the inrush of dust and moisture from the back side of enclosure. Phase barrier of the same material shall also be provided. If, in order to provide safety to the operating personnel, Bakelite separator shall be provided in front of Incoming bus-bars.

5.6 PROTECTIVE MEASURES :

The design shall incorporate every reasonable precaution and provision for the safety of all those concerned in the operation and maintenance so that there is no possibility of the operator experiencing a shock during normal operation. All apparatus, connections and cabling shall be designed / arranged to minimize risks of fire and any damage which might cause in the event of fire.
Bakelite impregnated / non impregnated should not be used internally or externally. All apparatus shall be so designed and constructed as to obviate the risks or short circuits of the live parts by lizards / rodents.

When the operating person is opening the door, at any circumstances he should not be able to access the live bus directly. Insulated barriers shall be provided on live incoming side terminals of MCCB, so as to ensure that no accidental contact is possible. Each MCCB box shall be provided with a Danger Plate of Aluminium sheet embossed / engraved or Screen Printed on Enclosure, with 415V AC and danger mark in English and Hindi also effectively secured..

5.7 PROTECTIVE EARTHING :

The fixed parts of a metal enclosure shall be electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor. The exposed conductive parts (e.g. chassis, framework and fixed parts of metal enclosures) other than those which cannot constitute a danger shall be electrically interconnected and connected to a protective earth terminal for connection to an earth electrode or to an external protective conductor. Under no circumstances shall a removable metal part of the enclosure be insulated from the part carrying the earth terminal when the removable part is in place.
The MCCB Box shall be provided with an Aluminium Earth bus suitable for the Rated short circuit current of the breaker. Two nos. body earthing studs shall be provided on side of boxes for body earthing. Provision of one other stud shall be provided for neutral earthing in those boxes which are directly mounted on the transformer. Earthing bolt should be welded in the box and not to be fixed. Neutral earthing should be separated from body with separate studs. The earth terminals/ studs shall be of a suitable size to accommodate the earth conductor and shall be corrosion protected. The earth terminals shall be identified by means of the earthing sign marked in a legible and indelible manner on or adjacent terminals. The earthing studs shall be welded from inside the enclosure and shall be covered from top so as to prevent access for theft. The protective earth terminal shall be readily accessible and so placed that the connection of the equipment to the earth electrode or to the protective conductor is maintained when the cover or any other removable part is removed.

5.8 PAINTING:

The paint shall be applied on clean, dry surface under suitable atmospheric conditions by seven tank process followed by powder coating. The paint shade shall be RAL 7032 with thickness of the powder coating not less than 70 microns.

6. NAMEPLATE & MARKINGS :

All the components and operating devices of the MCCB and Distribution Box shall be provided with durable and legible nameplates OR Screen printed, containing all technical parameters. MCCB and Distribution Box name plate & markings shall be in accordance with IS-13947-2 / IEC-60947-2 along with the following information:

i) Manufacturer's Name
ii) Type designation & serial no.
iii) Reference No. of the relevant standard
iv) Utilization category
v) Rated Operational Voltage
vi) Rated current
vii) Rated frequency
viii) Rated service short circuit breaking capacity (Ics)
ix) Rated ultimate short circuit breaking capacity (Icu)
x) Line and load terminals
xi) Neutral pole terminals in MCCB DB
xii) Protective earth terminal markings on MCCB DB
xiii) Indication of Open and Closed positions on MCCB
xiv) Terminal Marking

The Name Plate on MCCB Distribution Box shall be embossed OR Screen Printed with PO NO., Date, "PROPERTY OF TPSODL, BERHAMPUR", "MATERIAL CODE No.", and name of Manufacturer. A danger plate of appropriate size shall be provided on the enclosure OR Screen Printed. Apart from this, 'Suitable for _____ kVA Transformer shall be also printed in order to identify as to which rating of transformer the corresponding MCCB box is designed for. Also 'No current-call center no- 011-66404040' shall be dully printed on the front of the MCCB box.

7. TESTS :

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS / IEC Standards. Routine / Acceptance tests may be witnessed by the purchaser / his authorized representative, if so desired. All the components as applicable shall be type tested as per the relevant standards. Following tests shall be necessarily conducted on the equipment in addition to the others specified in IS / IEC.

Type Tests for MCCBs :

a) Tripping Limits & Characteristics
b) Operational & Overload Performance Capability
c) Short Circuit Breaking/Making capacities
d) Dielectric Properties test

Type Tests for Enclosure :

a) Temperature Rise Test
b) Dielectric Properties test
c) Degree of Protection of enclosure.

Routine Tests for MCCB:

a) Mechanical & electrical Operation
b) Calibration of Releases.
c) Continuity of circuit.
d) Dielectric withstand.

Routine Tests for Enclosure:
a) Dielectric tests
b) Verification of clearances
c) Dimensional Checks

8. TYPE TESTS CERTIFICATES :

The bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI / ERDA accredited test Labs, as per the relevant standards. Type test should have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. However, Type Test certificated which are older than 5 years from date of bid opening, may be accepted as a special case, provided there is no change in corresponding IS / IEC standards or MCCB design. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPSODL.

9. PRE-DISPATCH INSPECTION :

Equipment shall be subject to inspection by a duly authorized representative of the TPSODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPSODL's representatives at all times when the work is in progress. Inspection by the TPSODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPSODL.
Following documents shall be sent along with material
a) Test reports
b) MDCC issued by TPSODL
c) Invoice in duplicate
d) Packing list
e) Drawings & catalogue
f) Guarantee / Warrantee card
g) Delivery Challan
h) Other Documents (as applicable)

10. INSPECTION AFTER RECEIPT AT STORE :

The material received at TPSODL, Berhampur, Odisha store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Project Engineering department

11. GUARANTEE :

Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the Company up to a period of at least 12 months from the date of commissioning or 24 months from the date of supply of each Lot made under the contract whichever is earlier, (the time scale of 12/24 months could be enhanced subject to mutual agreements) Associates shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified

at Associate's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the Associate or from the " Security cum Performance Deposit" as the case may be.

Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the Company.

12. PACKING :

Bidder shall ensure that all equipment covered under this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit.

13. TENDER SAMPLE :

Not applicable

14. QUALITY CONTROL :

The bidder shall submit with the offer Quality Assurance Plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's/ Consultant's engineer shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

15. MINIMUM TESTING FACILITIES :

Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

16. MANUFACTURING ACTIVITIES :

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

17. SPARES, ACCESSORIES & TOOLS :

Bidder shall provide a list of recommended spares with quantity and unit prices for 3 years of operation after commissioning. The bidder shall provide a list of complete set of accessories and tools required for erection & maintenance along with the installation procedure.

18. DRAWINGS :

Following drawings & Documents shall be prepared based on TPSODL specifications and statutory requirements and shall be submitted with the bid:

a) Completely filled-in Guaranteed Technical Parameters.
b) General description of the equipment and all components including brochures
c) General arrangement drawings
d) Single Line Diagram
e) Bill of material
f) Type Test Certificates
g) Experience List
h) Foundation fixing drawings.
i) Manufacturing schedule and test schedule

Drawings/documents to be submitted after the award of the contract:

S. No.	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	General Arrangement drawings	√		√
3	Dimensional drawings	√		√
4	Schematic Diagram	√		√
5	Bill of Material	√		√
6	Foundation Plan/ Mounting details	√		√
7	Manual/Catalogues/drawings for ACB		√	
8	Installation Instructions		√	√
9	Instruction for Use		√	√
10	Transport/ Shipping dimension drawing		√	√
11	QA &QC Plan	√	√	√
12	Routine, Acceptance and Type Test Certificates	√	√	√

Bidder shall subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, Test certificates shall be submitted after the final approval of the same to TPSODL.

All the documents & drawings shall be in English language.

Instruction Manuals: Bidder shall furnish two softcopies (CD) and four (4) hard copies of nicely bound manuals (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices.

19. GUARANTEED TECHNICAL PARTICULARS

S.No.	Particulars	Units	As furnished by vendor
A	**MCCBs**		
1	Type of MCCB		
2	Type of releases		
3	Make of MCCB offered	Nos.	
4	Rated Current	A	
5	Rated Operational Voltage	V AC	
6	Rated Insulation Voltage(Ui)	V	
7	No. of Poles	Nos.	
8	Utilization Category	A	
9	Rated Impulse- withstand voltage (U imp)	kV	
10	Rated Ultimate Short Ckt. Breaking capacity : Icu (kA rms)	kA	
11	Rated Service Short Ckt. Breaking capacity : Ics (kA rms) - 100 % of Icu	kA	
12	Overload release setting	%	
13	Typical Opening Time	m.sec	
14	Typical Closing Time	m.sec	
15	Electrical and Mechanical Operating cycles		
16	Spreaders & Phase Barriers	Yes	
B	**Distribution Box**		
17	Material of Bus bar		
18	Minimum Current Density of bus bar	A/mm²	
19	Max. permissible temperature rise		
20	Min. Clearance between phases	mm	
21	Min. Clearance between phase to earth	mm	
22	Terminal shrouds		
23	Degree of Protection for Enclosure	IP 66	
24	Overall Dimensions	mm	

20. SCHEDULES OF DEVIATIONS:

The Bidders shall set out all deviations from this specification, Clause by Clause in this schedule. Unless **specifically** mentioned in this schedule, the tender shall be deemed to confirm the purchaser's specifications.

SCHEDULE OF DEVIATIONS

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

S.No.	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

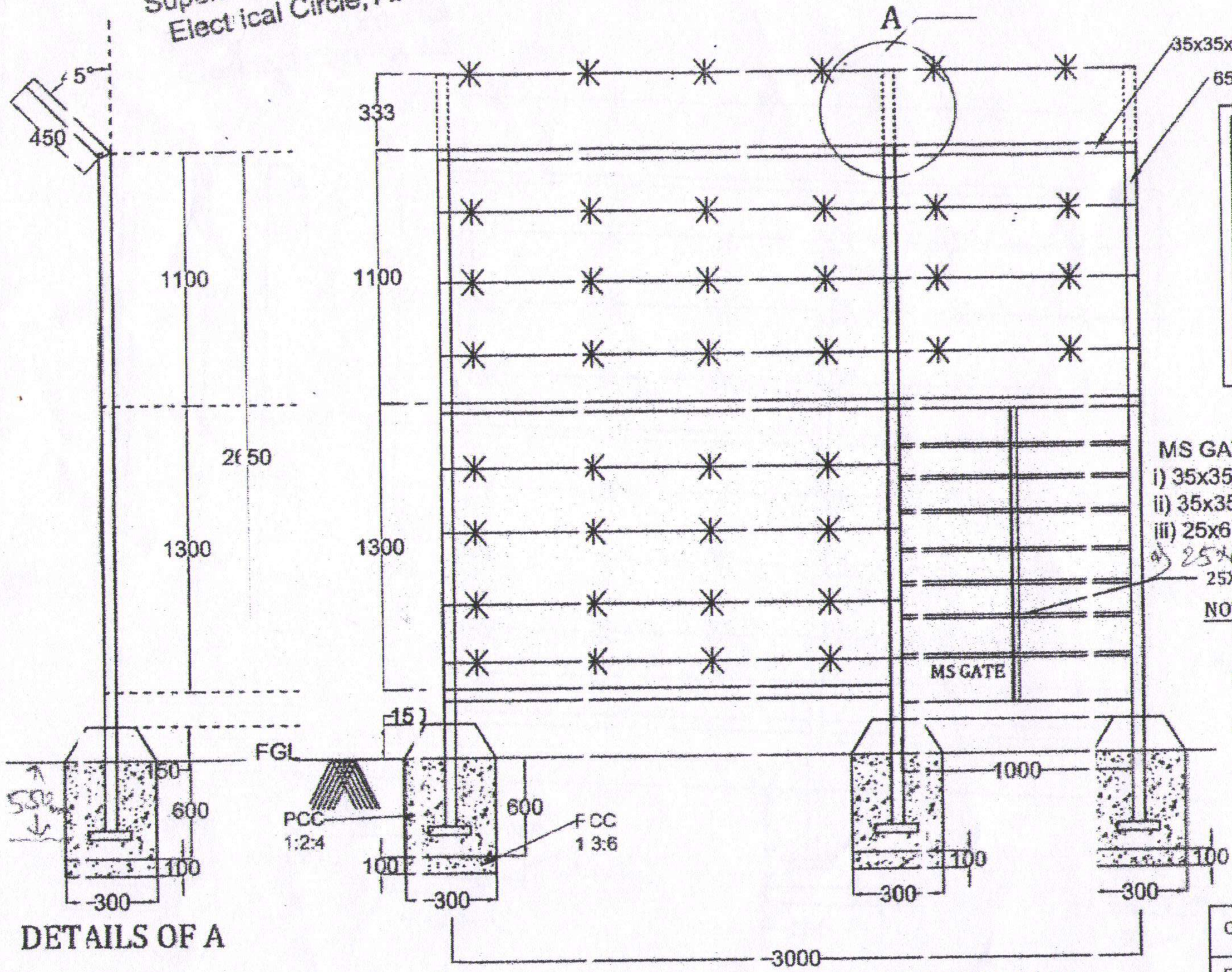
Seal of the Company:

Signature

Designation

APPROVED SUBJECT TO COMMENTS

Superintending Engineer
Electrical Circle, Aska.



DETAILS OF A

ELEVATION OF FENCE OF FRONT SIDE

MS GATE
i) 35x35x6 mm MS Angel=1.5mtrx2=3mtr
ii) 35x35x6 mm MS Angle=1.0mtr x 2=2 mtr
iii) 25x6 Flat 1.0mtr x 6 =6m tr ~~4 mtr~~
~~iv) 25x6 Flat 1.5 mtr x 4 nos~~ = 6 mtr.

NOTE:
1. ALL DIMENSION ARE IN MM ONLY, UNLESS OTHERWISE SPECIFIED.
2. DO NOT SCALE OUT THIS DRG.FOLLOW ONLY THE WRITTEN DIMENSIONS.
3. Periphery of fencing shall be provided with non-treated earth pit at distance 3M long.
4. Continuous running earth by 25X4 GI Flats to be provided.

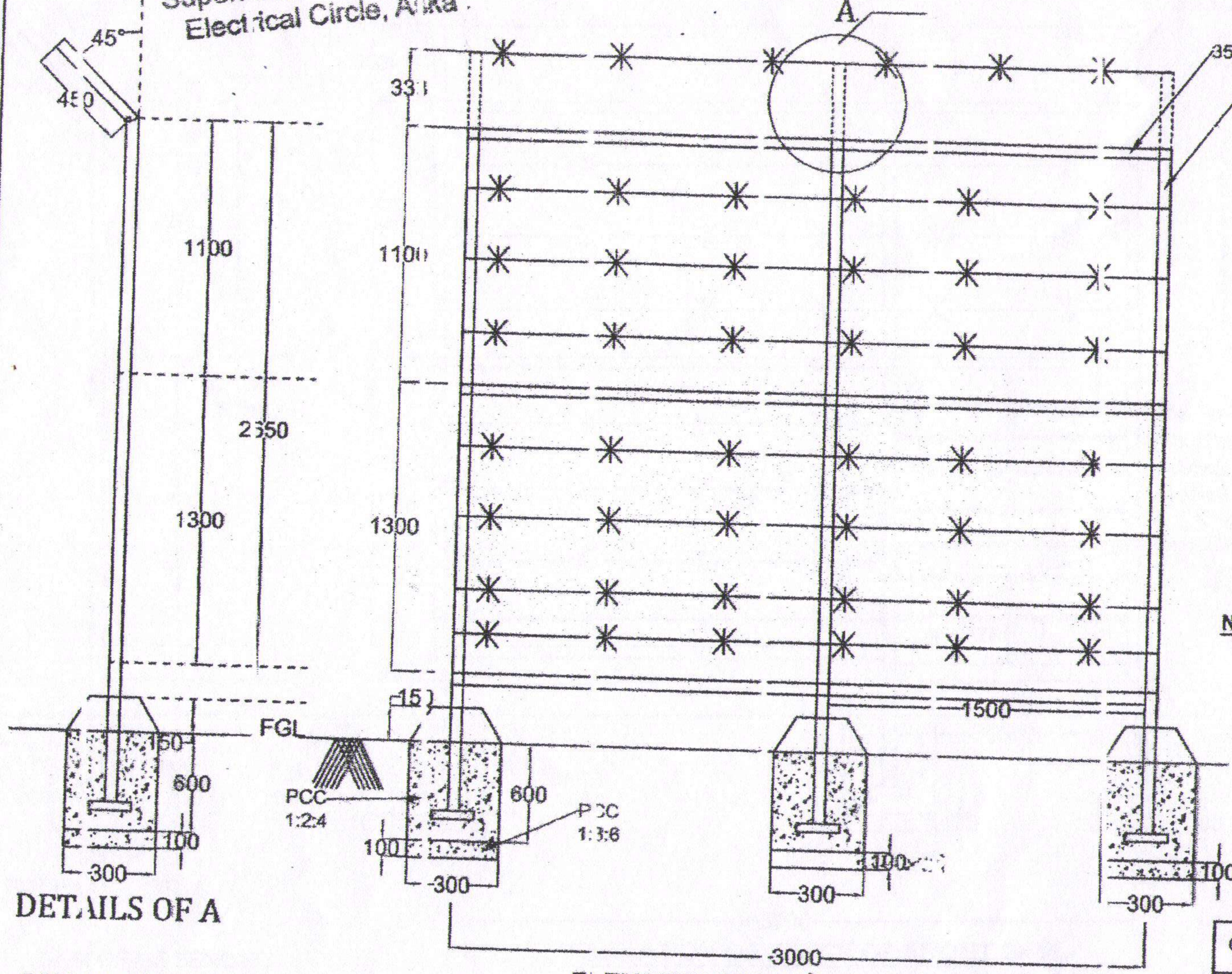
BOM OF MS FENCING
i) 65x65x6 mm MS Angel =3.65mtr x 8 = 29.20mtr, 5.3 kg/mtr = 171 kg.
ii) 35x35x6 mm MS Angle =3.0mtr x 12 =36.0 mtr, 3.45 kg/mtr = 165 kg.
iii) Barbed wire- 12mtr x 15nos 180 = 48
iv) ~~25x6 Flat 3 mtr x 4nos~~
v) Painting with 2Coat

Technical Assistant
Electrical Circle, Aska

CUSTOMER:-	SOUTHCO UTILITY
PROJECT NAME:-	SYSTEM STRENGTHENING WORKS IN ELEPHANT CORRIDOR & ELEPHANT MOVEMENT AREAS UNDER GED
TITLE:-	SWITCHYARD FENCING DRAWING FRONT SIDE SHEET-1
CONTRACTOR:-	R ASSOCIATES INFRASTRUCTURE PVT LTD. BHUBANESWAR

APPROVED SUBJECT TO COMMENTS

Superintending Engineer
Electrical Circle, Anka



DETAILS OF A

ELEVATION OF FENCE FOR THREE SIDE

BOM OF MS FENCING

i) 65x65x6 mm MS Angle =3.65mtr x 8 = 29.20mtr, 5.8 kg/mtr = 170 kg
ii) 35x35x6 mm MS Angle =3.0mtr x 12 = 36.0 mtr, 3.5 kg/mtr = 168 kg
iii) Barbed wire- 12mtr x 15nos
iv) ~~25x6 Flat- 3 mtrs 4nos~~
v) Painting with 2Coat

NOTES:

1. ALL DIMENSION ARE IN MM ONLY, UNLESS OTHERWISE SPECIFIED.
2. DO NOT SCALE OUT THIS DRG.FOLLOW ONLY THE WRITTEN DIMENSIONS.
3. Periphery of fencing shall be provided with non-treated earth pit at distance 3M long.
4. Continuous running earth by 25X6 GI Flats to be provided.

Technical Assistant
Electrical Circle, Anka

CUSTOMER:-	SOUTHCO UTILITY
PROJECT NAME:-	SYSTEM STRENGTHENING WORKS IN ELEPHANT CORRIDOR & ELEPHANT MOVEMENT AREAS UNDER GSD
TITLE	SWITCHYARD FENCING DRAWING-OF THREE SIDE SHEET -2
CONTRACTOR:-	SF ASSOCIATES INFRASTRUCTURE PVT LTD

INDUSTRIAL FORGING INDUSTRIES PVT. LTD

CIN NO. U74900WB2016PTC209531. GSTIN NO.- 19AAECI0779F1Z

NAME OF MANUFACTURE	INDUSTRIAL FORGING INDUSTRIES (P) LTD JALAN COMPLEX, GATE NO.-1, BIPARNAPARA, HOWRAH - 711411. W.B.

GUARANTEED TECHNICAL PARTICULARS GI SPIKE CLAMP

01.	Item Description	Hot Dip Galvanized MS Flat
02.	Grade of Steel	Grade – A
03.	Steel Standard	IS:2062 Gr.A & Relevant Specification
04.	Fabrication Standard	As per IS:226 & 1852-1973
05.	Welding Standard	As per IS:823, IS:814 & IS: 815
	No. & size of Spike	14 Nos. 8mm x 8" long
06.	Dimensions	As per Approved Drawings
07.	Steel Section Utilized	MS Flat 50mmx5mm
08.	Steel Tensile Strength	410 Mpa
09.	Galvanization Standard	IS:2629& IS:2633 610gm / sqm
10.	General Tolerance	± 5% (as per IS Standard)

Industrial Forging Industries Pvt. Ltd.

SOUTHCO UTILITY
CONTRACTOR- M/S SR ASSOCIATES INFRASTRUCTURES PVT LTD
PROJECT- System strengthening works in Elephant Corridor & Elephant Monument Areas under GSED
TITLE- CONCRETE (PCC) FOUNDATION DETAILS FOR PSC POLE
WO NO - 7819(6) Dated 28.08.2020

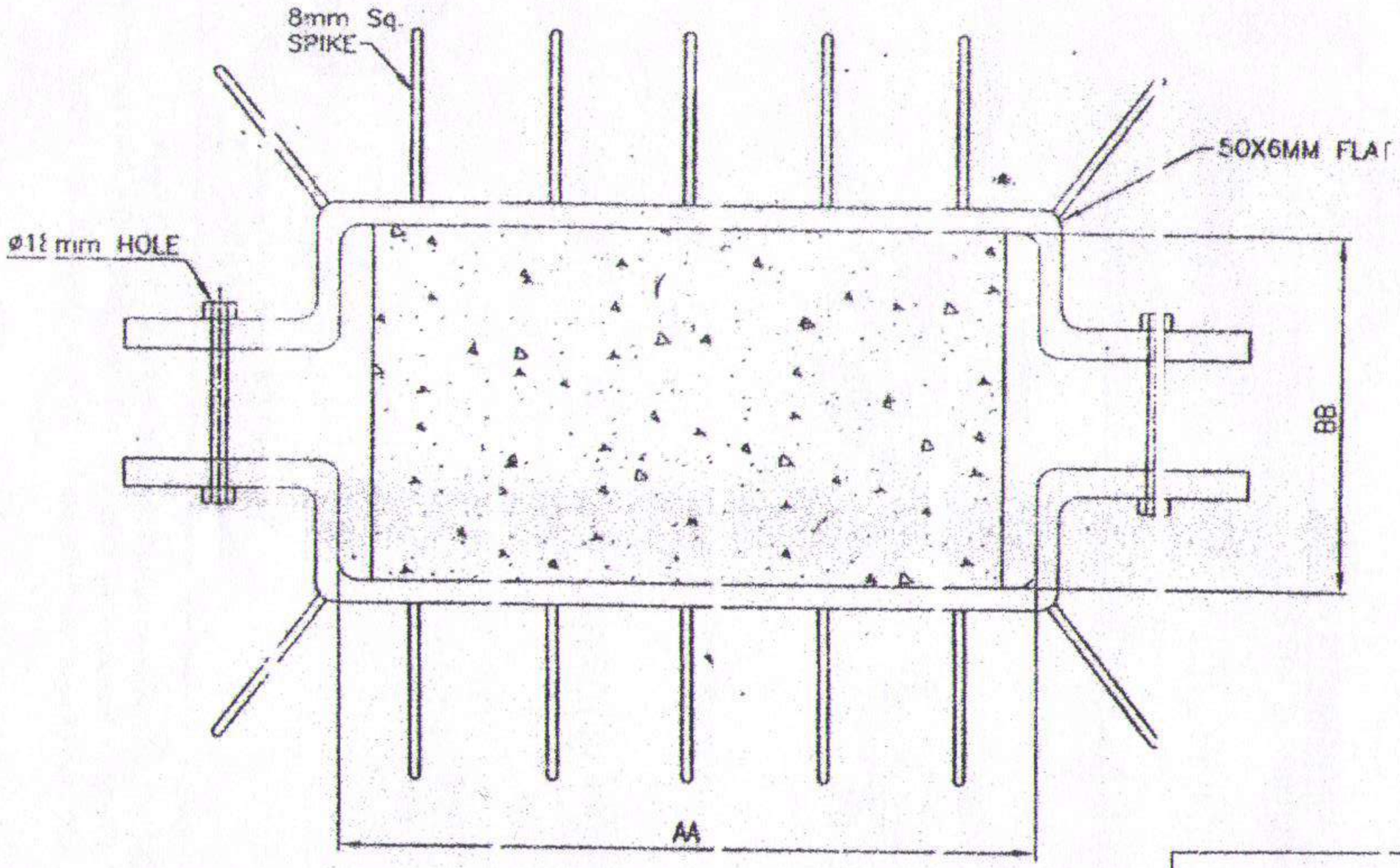
APPROVED SUBJECT TO COMMENTS

Superintending Engineer
Electrical Circle, Aska

SR Associates Infrastructure Pvt. Ltd.

Technical Assistant
Electrical Circle, Aska

Head Office : Makardah Road, Dasnagar, Howrah - 711 105, West Bengal, India.
Factory Address : Jalan Complex, Gate No. 1, Biparnapara, Howrah - 711 411, West Bengal, India. ☎ +91 8232090024
E-mail : amit@dagagroup.com · mnandit@dagagroup.com Web - http://www.IF-India.com



SIZE	SPIKE CLAMP		AA(in mm)	BB(in mm)	No. of spikes
300Kg. PSC Pole	1st. point at	m concrete level	310	90	14
	2nd. point at 7	Height	280	90	14

GENERAL NOTES:-

ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE MENTIONED
MANUFACTURING TOLERANCE ±5%
ALL FABRICATED ITEMS SHALL BE HOT DIP GALVANISED

APPROVED SUBJECT TO COMMENTS

Technical Assistant
Electrical Circle, Asansol

Superintending Engineer
Electrical Circle, Asansol

Industrial Forging Industries Pvt. Ltd. Howrah

SOUTHCO UTILITY

CONTRACTOR- M/S SR ASSOCIATES INFRASTRUCTURES PVT LTD

PROJECT- System strengthening works in Elephant Corridor & Elephant Movement Areas under GSED

TITLE- CONCRETE (PCC) FOUNDATION DETAILS FOR PSC POLE

WO NO - 7819(6) Dated 28.08.2020

Industrial Forging Industries Pvt. Ltd.
JALAN COMPLEX, GATE NO.-1, BIPARNA PARA, HOWRAH-711411
TELE NO.:+918232050024 Mail: amit@dagagroup.com

ITEM : SPIKE CLAMP

DRG. NO IF-436 REVISION 0 1 2 3 4 5 6 7 8