

**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
1	1, 2, 3, 4 & 5	Volume-I, Front Page, & ITB 1.1	Invitation for Bids No.: ICB-PMD-REDNRP-076/77-01 & OCB No.: ICB-PMD-DSAEP-076/77-01 Mentioned on Front page of Vol-I and Invitation for Bids No.: ICB-PMD-REDNRP-076/77-01 & The identification number of the OCB is: ICB-PMD-REDNRP-2076-77-01, Mentioned in the ITB 1.1	Invitation of Bid No. and OCB no. is different on front page of Volume-I but in Bid Data Sheet, ITB 1.1 Invitation of Bid No. and OCB no. is same. Please clarify.	The correct Invitation of Bids No.: is ICB-PMD-REDNRP-2076/77-01. and the correct OCB No.: is ICB-PMD-REDNRP-2076/77-01 as indicated in the BDS.
2	1, 2, 3, 4 & 5	Volume I	Please refer clause No. 21 given in Section 1 (Instructions to Bidders) - Bid Security	We are an India based company, Please confirm whether we can issue the Bank Guarantee from reputed Indian Bank ?	Confirmed. Please follow the instructions and indicated in ITB, BDS with the use of Bidding Forms (Section-4).
3	1, 2, 3, 4 & 5	Volume I	Please refer clause ITB 11 (Vol I, Section 1) Documents Comprising the Bid of ITB, The bidder has to submit two envelope (technical + price) and both envelopes enclosed together in an outer single envelope.	a) Please confirm how many copies of technical and price bid to be submitted in addition 1 original copy ? b) Also, please inform if we can submit our bid via email or any other electronic media, if yes please give provide email ID and procedure specific procedure for submission ?	a) Two copies of technical and price bid shall be submitted along with original copy. The original and copy and shall be clearly marked as ORIGINAL, COPY ONE and COPY TWO. b) There is no any provision of electronic submission.
4	1, 2, 3, 4 & 5	Volume I	Participation in Multiple number of lots	Please confirm if bidder can submit one common technical bid document for all lots w.r.t qualifying criteria alongwith separate price bid for each lot if willing to participate in more than One (1) lot ?	Confirmed. The lot(s) you are participating shall be clearly indicated in the letter of bids and the cover envelope.
5	1, 2, 3, 4 & 5	Volume-I, ITB 2.5 Subcontractors or Manufacturers	Subcontractors/Manufacturers: iv) Must submit the type test report carried out by independent internationally accredited testing laboratory conducted within last seven (7) years for the offered rating (voltage & capacity). If the bidder/manufacturer has not conducted the Type Test of the offered rating (voltage and capacity) then the Bidder/Manufacturer shall submit an undertaking letter stating that the Type Tests shall be conducted in an independent internationally accredited testing laboratory at their own cost.	We understand that Type tests / Type Test Reports from CPRI Bhopal/Bangalore, ERDA Baroda, NABL accredited Laboratories are independent. Hence, Type Tests and Type Tests Reports from these laboratories are acceptable to NEA for all lots (Lot 1, Lot 2, Lot 3, Lot 4 & Lot 5). Please confirm.	Any Type Tests from independent international accredited laboratory is valid. CPRI is one of them.



**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
6	1, 2, 3, 4 & 5	Volume-I, Clause 2.5, Section 3, Subcontractors or Manufacturers	Bidder(s) must submit all the necessary notarized documents required to prove the above specified requirement with legal status, ISO certification, experiences substantiated by end users certificate and type test report.	Generally, all legal document i.e. Bidder's Company Registration Certificate, Power of Attorney, Board Resolution and JV Agreement / JV Power of Attorney if applicable required to be notarized. Except above, all other documents (Manufacturers/Bidders) shall be submitted with sign and stamp by manufacturer and/or Bidder as applicable. It is not possible to notarize all documents of manufacturers/Subcontractors as mentioned in this clause. Please clarify and allow us to submit notarized legal documents only as mentioned above.	Please follow the instructions as stipulated in Clause 2.5, Section 3.
7	1, 2, 3, 4 & 5	Volume I, Section 3. Evaluation & Qualification Criteria, Sub Clause no. 2.5 Subcontractors	For Lot no. 1 & 2 Description of Item No. 7, 10, 12, 13 & 14 For Lot 3, 4 & 5 Description of Item No. 4,5, 9, 10, 11 & 12 Minimum Criteria to be met – - Must submit the type test report of the offered item carried out by independent internationally accredited testing laboratory conducted within last seven (7) years. - Must hold a valid ISO 9001 (including design in scope of registration) certifications	All these items being small items, the vendors may not be having test report from independent internationally accredited testing laboratory & ISO 9001 certification which will restrict the entry of manufacturers. We therefore request to waive off this condition for these items to enable healthy competition.	The items listed here are major items. These provisions are for ensuring the reputed manufacturers. So, these provision cannot be waived.
8		Volume I, ITB-38.1	When comparing Bids, ADB's Domestic Preference Scheme will be applied in accordance with the provisions stipulated in the Bidding Document. Domestic preference shall apply.	We request you please waive off this criteria for healthy competition.	This provision cannot be waived.



**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
9	1, 2, 3, 4 & 5	Volume I, Section 3 - Evaluation and Qualification Criteria/2.4.2 Experience in Key Activities	Section 3- Evaluation and Qualification Criteria/2.4.2 Experience in Key Activities for LOT 1 a) Must have successfully completed the Design, Supply, Installation, Testing and Commissioning of at least six (6) nos. of new 33/11kV or similar voltage class Distribution Substations with Power Transformers within the last seven (7) years, as of the last date of bid submission. b) Must have successfully completed the Design, Supply and Construction of 10-36kV overhead line length of minimum 100 km within the last seven (7) years, as of the last date of bid submission.	a) We do not have 33/11kV work experience but we have executed higher voltage class SS work upto 220kV and TL upto 400kV work experience in India and abroad also. B) we do not have experience of 10-36kV overhead line length of minimum 100km. But we have executed higher voltage class like 132kV, 220kV and 400kV overhead line length of more than 100km in India.  Please clarify/cofirm that we qualify or not.	The bidder should meet the experience requirement as specified in Clause 2.4.1, Section 3 for Contracts of Similar Size and Nature and Clause 2.4.2, Section3 for Experience in Key Activities.If applied for multiple lot(s) they should meet the individual and cumulative requirements to all the lot(s) applied for. Bidder not having the required experience will be disqualified.
10	1, 2, 3, 4 & 5	Volume I	Please refer Clause ITB 1.4 section - III of Volume I : Multiple Contracts	We have three (3) contracts having CUMULATIVE Value of approx. 45 million USD executed in past 7 years with average annual turnover of 30 million USD, Kindly confirm if we can qualify for more than 2 lots w.r.t total value of the contracts ?	These things are clearly mentioned in Section 3, 'Evaluation and Qualification Criteria'. Your information is incomplete. Please refer to the clauses as stipulated in Section 3, 'Evaluation and Qualification Criteria'.
11	1, 2, 3, 4 & 5	Volume-I, ITB 16.1 (b)	The period following completion of plant and services in accordance with provisions of the contract shall be 10 years.	We could not understand what the meaning of this clause is. Please elaborate.	It is to ensure that Spare Parts for the Plant and Servies supplied should be available for at least 10 years after the completion of the project.
12	1, 2, 3, 4 & 5	Volume-I, ITB 7	Personnel Requirements The Bidder shall submit the evidence of possession of the proposed personnel for the project duration along with their Curriculum Vitae	In this clause, it is mentioned that bidders need to provide number of personnel for each lot as mentioned. We request you please allow bidders to submit same personnel (No. of personnel for one lot) for all lots during the bid. We can submit an undertaking confirming that if more than one lot (contract) will be awarded to us we will arrange and deploy required no. of personnel for each lot as per tender.	This provision is to evaluate the capacity of the bidders to execute the multiple lots if they are awarded. Since the evaluation of bid is based upon the cumulative requirement, the bidder must meet the requirements if applied for multiple lot(s).
13	1, 2, 3, 4 & 5	Volume-I, ITB 8	Equipment Requirements The Bidder shall submit the documentary evidence of having above equipment in workable condition	In this clause, it is mentioned that bidders need to provide number of equipment for each lot as mentioned. We request you please allow bidders to submit same equipment (No. of equipment for one lot) for all lots during the bid. We can submit an undertaking confirming that if more than one lot (contract) will be awarded to us we will arrange and deploy required no. of equipment for each lot as per tender.	This provision is to evaluate the capacity of the bidders to execute the multiple lots if they are awarded. Since the evaluation of bid is based upon the cumulative requirement, the bidder must meet the requirements if applied for multiple lot(s).



**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
14	1 & 2	Volume I	Section 6, 1.2	Please clearly the current and future construction scale of each substation.	Please follow Volume IIA of the bidding document. Further discussion if required may be held with the successful bidder after the award of the contract.
15	1 & 2	Volume I	Section 6, 1.2	Please clearly that which substation shall be connected to Mahendranagar.	Dhalkebar Substation (400/220/132/22kV) shall be connected to Mahendranagar.
16	1 & 2	Volume I	Volume I, Section-4, page 4-12	It shows that in the Schedule 4-Installation and Other Service contains the Item 6-STI. STD and HIV/AIDS alleviation program which is not included in the Schedule 4-Installation and Other Service of the Volume III for Lot 1-5 Please confirm: 1. Which of statement and form of price schedule is prevailed? 2. Does the bidder need to list the Item 6-STI. STD and HIV/AIDS alleviation program separately in the price schedule?	This the general health and safety requirements and is deemed to be included in other items of the price schedule. No separate item is provided.
17	1 & 2	Volume I	Volume I, Section-4, page 4-9&10	It shows that bidder need to list the taxies and duties in a separate column in the Schedule 1-Plant and Mandatory Spare Parts Supplied from Abroad and Schdule 2-Plant and Mandatory Spare Paarts Supplied from Within the Employer's Country, however in the Volume III of Lot 1-5 don't have the same requirement. Please confirm: Is it need to list the the taxies and duties in a separate column in the Schedule 1-Plant and Mandatory Spare Parts Supplied from Abroad and Schdule 2-Plant and Mandatory Spare Paarts Supplied from Within the Employer's Country of price schedule?	The taxes and duties need not be listed separately in the Schedule of Prices.
18	1, 2, 3, 4 & 5	Volume I	Volume-I, Section-7&8, GCC&SCC Clause No.14, Taxes and Duties	We request you to provide the detail of taxes and duties as mentioned below: 1. Customs and Import duties applicable on Material Supplied from Foreign Countries (Other Than Employer Country) 2. Any Local Taxes i.e. VAT and / Or Sales Tax applicable on Material supplied from Nepal (Local Supply) 3. Taxes on Installation and Design Services 4. Income Tax (TDS) payable on income earned in Nepal 5. We request you please confirm whether any Tax exemption is applicable in the tender for International Bidders.	For the details of Taxes and Duties, please refer to the websites of the concerned governmental department as below: 1) www.customs.gov.np 2) www.ird.gov.np



**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
19	1	Volume I	Section 6 / 1.2 Scope of Work / 1.2.1 Lot 1	a) The length of 33kV line is 85km. Please clarify why the length is 97km. b) Please clarify which 33kV lines will use underground cable and which WOLF conductor.	a) The scope of works is 97 ckt km in total which includes, single or double circuit in overhead and underground line. b) The final quantity depends on the detail survey and the site requirements. c) Please follow the Schedule of Prices.
20	2	Volume I	Section 6 / 1.2 Scope of Work / 1.2.2 Lot 2	a) Please clarify the number of circuit of Parwanipur-Industrial 33kV Line. b) The length of 33kV line is 206km. Please clarify why the length is 226km. c) Please clarify which 33kV lines will use underground cable and which WOLF conductor.	a) There are four circuits of Parwanipur Industrial line. b) The scope of works is 226 ckt km in total which includes, single and/or double circuit in overhead and/or underground line. c) The final quantity depends on the detail survey and the site requirements. d) Please follow the Schedule of Prices.
21	1 & 2	Volume I		a) Please provide the coordinate of each substation and related line route. b) Please provide the type of pole for each line.	The detail line route and pole type shall be determined after the preconstruction survey which will be carried out by the Contractor upon award of the Contract. Further information required if any, the bidder may visit the site at their own cost.
22	4	Volume I	Section 6 / 1.2 Scope of Work / 1.2.4 Lot 4	a) Please clarify whether there is 230V low voltage line in Lot 4. b) In table 1, all the lines are double circuit, but in table 2 some of the lines are double circuit, others are single circuit. Please clarify this. c) Please clarify number of circuit of the lines with covered conductor. d) Please clarify number of circuit of composite line. Single circuit? e) In table 2 the length of 11kV line is 290km. Please clarify why the length is 360km.	Length of the line indicated are tentative. Exact line length and other details will be determined after the preconstruction survey which will be carried out by the Contractor upon award of the Contract. The type of the line like single or double circuit and conductor type depends upon the site requirements. Please follow the Schedule of Prices.
23	5	Volume I	Section 6 / 1.2 Scope of Work / 1.2.5 Lot 5	a) Please clarify whether there is 230V low voltage line in Lot 5. b) In table 1, all the lines are double circuit, but in table 2 some of the lines are double circuit, others are single circuit. Please clarify this. c) Please clarify number of circuit of the lines with covered conductor. d) Please clarify number of circuit of composite line. Single circuit? e) In table 2 the length of 11kV line is 270km. Please clarify why the length is 340km.	Please refer to the NEA Response in S.N. 22 above.



**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
24	1, 2, 3, 4 & 5	Volume I	Please refer clause ITB 2.5 Section-III Sub-Contractors	With reference to lot 3,4,5 item no. 12 (PSC Poles), In India we are finding difficulty to meet the supply requirements of 11 mtr PSC Poles as desired in tender documents, because these poles are phased out in our country and replaced by Steel Poles. However, some small manufacturer in Nepal are ready to supply 11 mtr poles as per tender specifications, but unable to meet the supply criteria for qualification. In this condition, Please confirm if qualification requirements for 11 mtr poles can be eliminated or deviated from the tender conditions? If unable to deviate, Please suggest name of manufacturers in NEPAL, who can qualify such stringent conditions of supply and operational satisfactory as per tender conditions.	The supply of 11m PSC poles cannot be deviated. We cannot name the individual supplier as such but we would like to inform you that there are many manufacturers in Nepal and India who can meet our requirements.
25	1, 2, 3, 4 & 5	Volume III, Schedule of Rates & Prices	Earthing is not defined for PSS & Lines (33kV,11kV & 400V)	There is no item of earthing in the BOQ. Please define type of earthing used for substations and Distribution Lines. and Distribution Lines. Please Provide specifications/Drawings if any.	The required earthing is included in the scope of works, Schedule 4. The specifications are provided on Volume IIA and IIB.
26	1 & 2	Volume III, Schedule of Rates & Prices	Gantry Structures including Accessories Complete	Whether Gantry Structure is Lattice type or Pole / Channel Type. Please provide specifications for steel channels & Angles.	They are of lattice type. The design criteria has been provided in Specifications, Volume IIA.
27	1 & 2	Volume III		We have not found any equipment and materials related to communication. Is it not necessary to install communication equipment in the 33kV substation?	There is not any requirements of communication equipment.
28	1 & 2	Volume III, Schedule of Rates & Prices	25 sets of 33 kV control and relay panel	Please mention the number of line feeders and transformer feeders as required.	The detail breakdown shall be finalized after the Pre-construction survey.
29	3, 4 & 5	Volume III, Schedule of Rates & Prices	Transformer Platform for 100kVA Transformer including DO & LA Fitting Channels, Clamps, Nut bolts all complete	Please provide specification and drawing/picture.	The contractor has to make the design as per the provided criteria and specifications specified in Volume IIB.
30	3, 4 & 5	Volume III, Schedule of Rates & Prices	Transformer Platform for 300kVA Transformer including DO & LA Fitting Channels, Clamps, Nut bolts all complete	Please provide specification and drawing/picture.	The contractor has to make the design as per the provided criteria and specifications specified in Volume IIB.
31	3, 4 & 5	Volume III, Schedule of Rates & Prices	Supply and Delivery of Materials for 11/0.4kV Distribution Transformer 100kVA	Type of Poles (Tubular or PSC) to be used is not defined in BOQ. Please clarify.	They are supplied from the item 11kV Line (C), not from the item Distribution Transformer (E).



**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
32	1 & 2	Volume IIA	It's mentioned that the protection equipment for the protection relays should be static type in the Clause 9.1.4 in the technical specification of 9.Control and Relay Panel.	Now the microprocessor based relay is widely used worldwide and it is much better than static type.Please clarify that whether the microprocessor based relay is acceptable.	It is acceptable.
33	1 & 2	Volume IIA, C&R Panel	Control and Relay panels shall be more or less of the colour matching with the existing one	Paint shade to be used shall be RAL7032. Please confirm.	It is acceptable.
34	1 & 2	Volume IIA, C&R Panel	Specification mentioned Control and relay panels to be installed in control room. However required degree of protection is IP54.	Kindly note that if indoor panels are required that is the panel if are to be mounted inside a control room, then the offered degree of protection shall be IP4X but as per GTP, it is IP54. Panel shall be of simplex type fabricated with 2mm MS sheet for Side / Top / Rear and with 3mm for Front / Gland plate. Please clarify.	The requirements as mentioned in Specifications and GTP shall be strictly followed. Remaining things may be discussed during design and drawing approval.
35	1 & 2	Volume IIA, C&R Panel	Relay Protection : Non directional Overcurrent and Earth Fault	We shall be using ABB India make REF615/ REF601 relays. The setting ranges shall be as mentioned in our product guide. Kind request for approval.	Equipments meeting the technical specifications as indicated in Volume IIA will be accepted. Remaining things may be discussed during design and drawing approval.
36	1 & 2	Volume IIA, C&R Panel	Relays	Please specify the communication protocol and type of communication port if required.	Please refer to NEA response as in S.N. 35 above.
37	1 & 2	Volume IIA, C&R Panel	Relay Protection : Transformer Differential	We shall be using ABB India make REFT615/ REF601 relays. The setting ranges shall be as mentioned in our product guide. The characteristic for the instantaneous differential protection shall be as stated	Please refer to NEA response as in S.N. 35 above.
38	1 & 2	Volume IIA, 12kV Switchgear	General, Technical	As per BOQ, only Incomer and outgoing feeders are required while as per Specs, there is requirement of trucking chamber. Please clarify where these panels have to be supplied loose or there is pre-defined set up of switchboards	Please refer to NEA response as in S.N. 35 above.
39	1 & 2	Volume IIA, 12kV Switchgear	General, Technical	Please share the SLD for 12kV MV Panels	Please refer to NEA response as in S.N. 35 above.
40	1 & 2	Volume IIA, 12kV Switchgear	General, Technical	For the 12kV switchgear, the relays have to be mounted in the switchgear itself or in a separate CRP Panel. Please clarify.	Please refer to NEA response as in S.N. 35 above.
41	1 & 2	Volume IIA, 12kV Switchgear	General, Technical	Please confirm the Communication protocol for 12kV switchgear relays. It is MODBUS or IEC61850? If IEC 61850 then with RJ45 ports or FO Ports. Please clarify.	Please refer to NEA response as in S.N. 35 above.
42	1 & 2	Volume IIA, 12kV Switchgear	General, Technical	The exact bus bar current requirement is 2000Amps or 1250Amps. Please clarify.	Please refer to NEA response as in S.N. 35 above.
43	1 & 2	Volume IIA, 12kV Switchgear	General, Technical	All the panels will be installed around 3000m or there are feeders/substations which are at less than 1000m altitude.	The installation area is at the altitude <1000m above msl.



**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
44	1, 2, 3, 4 & 5	Volume IIA, Lattice Tower	General, Technical	In reference drawing only shown 4 set tower / pss (1 set= 2nos vertical & 1 no horizontal). It is more convenient and robust if exceed 1 set tower with isolator / pss then will be better from execution point of view.	Please refer to NEA response as in S.N. 35 above.
45	1, 2, 3, 4 & 5	Volume IIA & IIB, Transformer	General, Technical	Permissible level for PTR Losses to be considered is not Defined in GTP. Please mention / Clarify. Kindly specify altitude at which transformers (both Distribution & Power) to be installed.	a) The values of losses for Power Transformers are not specified and is left up to the bidder/manufacturer. But the value of losses are to be capitalized during the bid evaluation. b) The upper limits of the losses of Distribution Transformers have been specified. If the losses exceeds the limits, then the bid(s) shall be rejected. c) The power and distribution transformers shall be installed at the altitude <1000m above msl.
46	1 & 2	Volume IIA, Station Transformer Distribution Box	General, Technical	Technical Specification has not been provided. Requested you to provide the same.	Successful bidder has to submit the detail design following the international standards and practice.
47	1 & 2	Volume IIA	It's mentioned that all distribution boards mounted indoor shall be provided with enclosure protection of IP50 as per IEC in the clause 14.5.1(i) in the technical specification of 14.Low Voltage Distribution Board.	It is not good for the heat dissipation of the internal component inside the distribution boards if required IP50, which may influence in the lifespan of the component. We recommend that IP32 shall be suitable. Please clarify that whether IP32 is acceptable or not.	Please refer to NEA response as in S.N. 35 above.
48	1 & 2	Volume IIA	It's mentioned in the clause 5.1 in the technical specification of surger arrester that the Min power frequency withstand voltage of the wet condition should upto 50kV, the dry condition should upto 70kV, and the impulse withstand (1.2/50usec)voltage should upto 95kV.	According to the IEC standard the Min power frequency withstand voltage value should be 30kV under wet condition and 42kV under dry condition, the impulse withstand (1.2/50usec)voltage should be 85kV. Please clarify whether you accept the value as the IEC standard required.	Values as per IEC are acceptable.
49	1 & 2	Volume IIA	As per clause 30 33 kV Air Break Switch of Vol IIA. it's mentioned that The 33 KV A.B. Switch Set shall be the gang operated rotating single air break type having 4 Nos. of post insulators per phase.	Rotating operated design now is not widely used, we proposed the type as shown in attachment 1, please kindly clarify whether it is acceptable or not.	Please refer to NEA response as in S.N. 35 above.





**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
50	1 & 2	Volume IIA	SECTION – 3 SPECIFICATIONS OF SUBSTATION AND LINE EQUIPMENT FOR 33/11 kV SUBSTATION and 33 kV LINE CONSTRUCTION WORKS	For the 33/11kV, 3ph, 16.6 MVA transformer: Please help to confirm the capacity for ONAN and ONAF, is it 16.6 MVA for ONAF, and the capacity for ONAN is 70% of 16.6 MVA?	ONAN-10 MVA, ONAF-13.3 MVA, ONAF-16.6 MVA
51	1 & 2	Volume IIA	SECTION – 3 SPECIFICATIONS OF SUBSTATION AND LINE EQUIPMENT FOR 33/11 kV SUBSTATION and 33 kV LINE CONSTRUCTION WORKS	1.3.3 Tapping No Load Tap as specified in the appendices shall be provided on the high voltage winding of the Transformers. but in the "1.22 TECHNICAL PARTICULARS" it mentions that "Type of Tap changer--OLTC" please help to confirm the type of Tap changer.	The Tap Changer shall be of Online Tap Changer (OLTC) type.
52	1 & 2	Volume IIA	Substation	Seismic acceleration value of substation construction site area	The seismic design shall be as per the requirements of governing national standards and established methods. The National Building Code can be found at the following link. <a href="https://www.dudbc.gov.np/buildingcode">https://www.dudbc.gov.np/buildingcode</a>
53	1 & 2	Volume IIA	Steel Support Structures	The equipment support and gantry form of Substation (Angle steel lattice or steel pipe, etc.)	It is of Angle Steel Lattice type.
54	1 & 2	Volume IIA	Substation	There are not descriptions about SCADA system and measurement and control devices in the document. Should SCADA system be configured in the 33kV substation? Should the measurement and control devices be configured in the substation?	SCADA system is not applicable.
55	1 & 2	Volume IIA	Substation	Should the data information of the substation be transmitted to the dispatching control center?	Please refer to NEA response as in S.N. 54 above.
56	1 & 2	Volume IIA	C & R Panel	The degree of protection of control panels is not less than IP 54. Generally, degree of protection of panel indoor is IP32. if the IP32 is feasible?	The requirements as mentioned in Specifications and GTP shall be met. Please refer to Volume IIA.
57	1 & 2	Volume IIA	Current Transformer	The accuracy of metering CT is 0.5, which cannot match the accuracy of energy meter 0.2. The accuracy of metering CT would be 0.5s, is it feasible?	The metering CT shall be of 0.2 accuracy class.
58	1 & 2	Volume IIA	Substation	Specify the length of the access road	Successful bidder has to submit the detail design drawings for approval.
59	1 & 2	Volume IIA	Substation	Specify the dimensions of the main gate	Successful bidder has to submit the detail design drawings for approval.
60	1 & 2	Volume IIA	Substation	Provide the Google positioning coordinates of the site	Please refer to the NEA response as in S.N. 21 above.
61	1 & 2	Volume IIA	Substation	Please determine the supply pressure of the public water supply system.	Residual head at tap stand minimum 7m and absolute maximum 50m desirable 15m.
62	1 & 2	Volume IIA	ACSR Conductor	23. ACSR Conductor : GUARANTEED TECHNICAL PARTICULARS Item: ACSR "WOLF" Conductor : 7.1, Wire Diameter : 2.59. 铝线直径是否应为2.5mm?	The values as per the applicable standards IEC/IS/BS/EN are acceptable.



**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
63	1 & 2	Volume IIA	Steel Telescopic pole	Please clarify the load and structure design criteria for steel telescopic pole	Please refer to the specifications as stipulated in Volume IIA.
64	1 & 2	Volume IIA	Steel Telescopic pole	Please clarify the action position of the load in the table	It is 600mm from the top end.
65	1 & 2	Volume IIA	Steel Telescopic pole	Please clarify the foundation types, design standards and foundation material standards of steel telescopic pole	In general, pole foundation is of soil/boulder back fill.
66	1 & 2	Volume IIA	Steel Telescopic pole	Please clarify the connection method between the steel telescopic pole and the foundation	In general, pole foundation is of soil/boulder back fill.
67	1 & 2	Volume IIA	Steel Telescopic pole	Please clarify the type of poles to be used in single circuit and double circuit line.	The specifications for Steel Telescopic Pole (Volume IIA, Section 3, Pages 118-121 of 177) has been slightly revised. Please refer to the attached sheets.
68	1 & 2	Volume IIA	Steel Lattice Towers	Please clarify the design standards of the tower.	Any international standards including the Indian Standards is applicable for the design of tower.
69	1 & 2	Volume IIA	Steel Lattice Towers	Please clarify whether the safety factor 2.0 refers to the safety factor of the load or the safety factor of the structural bearing capacity	If this is over load factor then it has to be multiplied on load or also reduce by this factor at yield stress of steel.
70	1 & 2	Volume IIA	Steel Lattice Towers	Please clarify the tower foundation type, foundation design standard and foundation material standard	The foundation shall be of isolate or raft foundation based on bearing capacity of soil. The requirements and other details shall be discussed and decided with the successful bidder during the design phase.
71	1 & 2	Volume IIA	Steel Lattice Towers	Please clarify the connection method between the foundation and the tower.	The connection shall be via Stub or baseplate.
72	3, 4 & 5	Volume IIB	LT PVC Cables	As per this clause condition is compacted circular. However, cables are 4 core cables and can be offered with shaped conductor with reduced diameter of the cable, Please clarify that cables can be offered with sector shaped conductor.	The conductor shall be of compacted circular. Cables with shaped conductors are not acceptable.
73	1 & 2	Volume IIA	1. As per Specification named as "Power Cable (XLPE) -TS_Lot(1_2)" for Single core cables :	a. As per Cl. 12.3.1 (d) of spec. it mentions The fault current for 1 sec. shall not be less than 15 kA whereas as per the GTP format it mentions SCC shall be > 20kA. Kindly confirm the exact requirement of Fault current	The fault current as per IEC standards will be followed.
74				b. Kindly also confirm whether the above mentioned fault current requirement is through Armour or Conductor	The fault current is through conductor.
75				c. As per our understanding single core cables for Lot 1 & 2 seems to have armour which is acting as metallic screen . Kindly reconfirm	There is copper tape above the insulation screen. Please follow the revised specifications of Underground Cables.



**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
76				d. As per Cl. 12.3.1 (e ) It mentions cable shall have anti termite protection of nonmagnetic metallic barrier. Please note that Anti termite protection is not covered under IEC 60502-2, thus more details are required on the same. Kindly confirm the material of the same & where this layer is required over Copper Tape / over Inner sheath / over armour/ over outer sheath? Since it is not covered in IEC 60502-2 so generally cable manufacturer uses chemical method for anti-termite treatment in which suitable chemical will be added in outer sheath material. Kindly confirm if chemical method is acceptable to NEA.	Please follow the revised specifications of Underground Cables on the attached sheets.
77	1 & 2	Volume IIA	Underground Cable	It is said that "This specification covers the design, manufacture, factory test, supply, delivery, type test, construction, of single core, aluminum conductor, single core cross-linked polyethylene (XLPE)insulated Power Cables to be used for underground line at 33 kV and 11 kV Voltage level includingall its accessories required." in clause 1.1 of 33. Underground Cable. However it is said that" 33kV Underground Power Cable (Al conductor, XLPE insulated, 400 sq.mm., Three core, armoured)" in BOQ. They are contradictory. According to the description of the BOQ list, the cable shall be three core cable, which defines that this specification is applicable to single core cable. Specification does not match manifest. Please provide cable specifications in accordance with the list?	We have rewritten the Specifications for Underground Cable (Volume IIA, Section 3 -pages 166-171 of 177 and Volume IIB, Section 2 - pages 83-90 of 115). Please refer to the attached sheets.
78	1 & 2	Volume IIA	<b>Underground Cable</b> As per clause 33 underground cable of Vol IIA and clause 21 underground cable of Vol IIB, It is mentioned that "The cable shall be cross-linked polyethylene insulated...steel armored..." Also it is mentioned that The armor shall be of hard drawn aluminum wires for mechanical protection of the cable."	The requirements on armor design is conflicting .Please indicate which one shall prevail.	Please refer to the NEA response as in S.N. 77 above.



**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
79	3, 4 & 5	Volume IIB	Underground Cable	a. As per CL. 2.2 of spec. it mentions Aluminium round wire whereas as per 2.1 it mentions steel armoured. Kindly note that Aluminium wire armour shall be applicable in case of single core cable for three core cable Armour shall be of steel. Kindly confirm whether the same has to be round wire or flat wire armour? b. For armoured cable extruded inner sheath is mandatory between copper screen and armour. Thus same shall be applicable as per IEC 60502-2	Please refer to the NEA response as in S.N. 77 above.
80	1 & 2	Volume IIA	Underground Cable	It is said that "The fault current for 1 second shall not be less than 15 kA." in (d) of Clause 12.3.1 12kV power cable, however it is said that Short circuit current for 1.0 sec (minimum kA) in clause 23.2 of GUARANTEED TECHNICAL PARTICULARS. They are contradictory. Please confirm: 1. The value of Short circuit current for 1.0 sec; 2. Is the short-circuit current of metal shield, please confirm.	Please refer to the NEA response as in S.N. 77 above.
81	1 & 2	Volume IIA	Underground Cable	It is said that "Fire Retardant" in clause 31 of GUARANTEED TECHNICAL PARTICULARS. 1: is the test flame retardant according to IEC 60332, please confirm? 2: if it is flame retardant test, is it class C flame retardant specified in IEC 60332, please confirm?	The IEC standards are acceptable.
82	3, 4 & 5	Volume IIB	Underground Cable, 12kV Cables, Clause No. 12.3.1.e	As per this clause which requires an anti-termite covering, UCL propose to offer copper tape with overlap for the purpose. – Please clarify.	Please refer to the NEA response as in S.N. 76 above.
83	1, 2, 3, 4 & 5	Volume IIA & IIB	Underground Cable	Method for Installation of underground cable (open trench or HDD) to be used is not mentioned. We request you please clarify.	Though the method of installation depends upon the site requirements, HDD will be preferred.
84	1, 2, 3, 4 & 5	Volume IIA & IIB	Underground Cable	Junction Boxes to be used in Underground cable installation work have not been specified. We request you please provide clarification and technical specification.	The cable laying shall be continuous with minimum joints. Cable Joining Pits shall be constructed as required for the joining.
85	3, 4 & 5	Volume IIB, Cable Accessories	General, Cable accessories, Technical Clause no 2.1 of Page No 98	As per this clause, the fittings, hardware and equipment shall be fabricated in accordance with International recognized standards such as BS/EN, NFC for Fittings and Associated Apparatus that ensures at least a substantially equal quality to the standard mentioned above, will also be acceptable. The fitting and accessories shall be suitable for 11 kV nominal Amendment asked by vendor is to allow BS/EN for fittings also.	The BS/EN standards are preferable.



**NEPAL ELECTRICITY AUTHORITY**  
**Project Management Directorate**  
**Province No. 2 Electrification Project**

OCB No. ICB-PMD-REDNRP-076/77-01

Rural Electrification and Distribution Network Improvement in Province No. 2

**CLARIFICATION NO. 1**

SN	Lot (s)	Reference in Bid Documents	Description in Tender Documents	Bidder's Query/Comment	NEA Response
86	1, 2, 3, 4 & 5	Volume IIA & IIB, HDPE Pipe	General, Technical	In case of HDPE pipe, please confirm the PE grade as the same has not been mentioned in the BOQ description and neither any technical specification has been provided for the same.	The HDPE pipe shall be of 6kgf/cm <sup>2</sup> as specified in Schedule of Prices.
87	1 & 2	Volume IIA, Control Cable	General, Technical	Type of control cable to be used is not specified clearly. Requested you to provide technical specification.	The Specifications for control cables are provided in Volume IIA.
88	3, 4 & 5	Volume IIB	<b>Fittings for Covered Conductor:</b> Please refer Clause No. 2.1 given in Volume IIB Section-2 – Fittings for Covered Conductor It is mentioned that the The fittings, hardware and equipment shall be fabricated in accordance with International recognized standards such as BS/EN, NFC for Fittings and Associated Apparatus that ensures at least a substantially equal quality to the standard mentioned above, will also be acceptable. The fitting and accessories shall be suitable for 11 kV nominal voltage applications.	As per NFC 33-040 standard, the fittings, hardware and equipment is suitable for upto 1KV voltage applications only. Please consider and suggest on this point ?	The BS/EN standards are preferable. The NFC standards are not suitable for fittings for covered conductors.
89	3, 4 & 5	Volume IIB	Please refer Clause No. 4 given in Volume IIB Section-2 – Aerial Bundled Conductor (ABC)	The technical specification requested for ABC is mentioned as IS:14225 standard. We understand that there is typographical error and corrected will be IS:14255. Please confirm the same ?	Confirmed. It is typographical error and the corrected one is IS 14255.
90	3, 4 & 5	Volume IIB	Please refer Clause No. 2 given in Volume IIB Section-2 – Underground Cable, ABC Cable & Covered Conductor The insulation shall be of XLPE compound with the minimum thickness as specified. The make of XLPE compound shall be from reputed manufacturers like DOW Chemicals (USA), Hanwha Chemical (Korea), Borealis AG (Austria) or Equivalent reputed make.	Can we consider reputed Indian manufacturer for XLPE Compound materials?	The make of XLPE compound shall be from reputed manufacturers like DOW Chemicals (USA), Hanwha Chemical (Korea), Borealis AG (Austria) or Equivalent reputed manufacturer.

**Note:** Since this is a plant contract and the design is also in the scope of contractor, the detail specifications for some of the missing items may be discussed with the successful bidder during the execution of the project.



# **UNDERGROUND CABLE**

## Underground Cable

### 1.1 Scope

This specification covers the design, manufacture, factory test, supply, delivery, type test, construction, of single or three core, aluminum conductor, cross-linked polyethylene (XLPE) insulated, PVC sheathed, armored power cables to be used for underground line at 11 kV voltage level including all its accessories required.

The equipment and installation works specified in this section shall conform to the latest edition of the appropriate IEC specifications and/or other recognized international standards

The XLPE power cable shall be manufactured and tested in accordance with IEC 60502-2 or the latest version thereof or other equivalent international standards that ensures at least a substantially equal quality to the standard mentioned above.

### 2. General Requirements

Cable shall be designed to withstand all mechanical, electrical and thermal stresses under steady state and transient operating conditions. The cable shall be suitable for burying underground in outdoor and/or laying in covered trenches in the climate conditions as specified for project area.

The conductor shall be of EC grade aluminum and shall have flexibility class-2 in accordance to IEC. All conductors shall be stranded, circular and compacted and comply with IEC 60228 or any other equivalent international standards. The maximum conductor temperature shall be 90 deg. C under continuous operation and shall be 250 deg. C during short-circuit condition.

The conductor screen shall be an extruded layer of black, semi-conducting compound. The conductor screen shall be extruded in the same operation as the insulation. The interface between the extruded conductor screen and insulation shall be free of any voids. The semi-conducting screens should be effectively cross-linked to achieve the temperature requirements as specified in IEC.

The insulating material shall be cross-linked polyethylene (XLPE). The insulating material shall have excellent electrical properties with regard to resistivity, dielectric constant and loss factor and shall have high tensile strength and resistance to abrasion. The insulation shall not deteriorate at elevated temperatures, when immersed in water and when exposed to the climatic conditions. The insulation properties shall be stable under thermal conditions arising out of continuous operation at rated conductor temperature and under short circuit conditions. The insulation should have minimum thickness as specified. No tolerance on the negative side shall be acceptable. The insulation compound shall be clean with low levels of contamination. The make of XLPE compound shall be from reputed manufacturers like DOW Chemicals (USA), Hanwha Chemical (Korea), Borealis AG (Austria) or Equivalent reputed manufacturer.

The insulation screen shall be an extruded layer of black semi-conducting compound and shall continuously cover the whole area of the insulation. The contact surface between insulation and insulation screen shall be smooth and free from protrusion and irregularities. The interface between the insulation and insulation screen shall be free of any voids. Insulation screen shall be strippable type. The metallic screen shall consist of a layer of copper tape applied in helical form.

For the multi-core cables, individual core shall be color coded (Red, Yellow and Blue Phase) for proper identification in accordance with the standards. The cores shall be laid together with a suitable right hand lay. The interstices shall be filled with non-hygroscopic material. Further, the compounds used with fillers shall be such as to have no deleterious effect on other components of the cable and to be stable at cable temperatures. The laid up cores shall be provided with inner sheath applied by extrusion process. It shall be ensured that the shape is as circular as possible. It shall be applied to fit closely on to the laid up cores and shall be possible to remove easily without causing any damage to the underlying insulated cores and

screens. The thickness of the inner sheath shall be as per the applicable standards. No tolerance on the negative side shall be acceptable.

The armoring shall be of galvanized steel strip for multi core cables. The armoring shall be applied as closely as practical. The armoring shall be applied such that the minimum area of coverage shall be 90% and the gap between any two armor strips shall not be more than the width of strip. The galvanized steel strip shall comply with the requirements of applicable standards with latest amendments. The direction of lay of the armor shall be opposite to that of the cable cores. In case of single core cable, armoring shall be made of non-magnetic material conforming to IEC. The size of armor shall be as specified in the relevant standards.

The outer sheath shall be designed to afford high degree of mechanical protection. The outer sheath shall consist of extruded tough PVC compound insulation over the armoring suitable for the operating temperature of cable and shall meet the requirements of the IEC Standard. The PVC compound for the outer sheath shall conform to type ST-2. The color of the outer sheath shall be black. The sheath shall be heat, oil, chemical and weather resistant. Common acid, alkalis and sealing solution shall not have adverse effect on the material of PVC sheath which shall also be protected against ants, termites by suitable, reliable and durable measures.

The minimum thickness/size of separation sheath, outer sheath and armor at any point shall not fall below the nominal value. No tolerance on the negative side shall be acceptable.

The supplied cable shall be longitudinal water tight. For this purpose, a layer of suitable water swellable absorbent tape shall be provided over insulation screen.

Rating and features of the cables to be furnished shall be as per the requirements. The short circuit current rating shall be as per IEC.

The outer covering of the cable shall be embossed with the name/brand of the manufacturer, type designation, voltage grade, cable size, year of manufacture, name of the employer, type of insulation at the spacing of each 2 meters. Every meters of outer covering of the cable shall also be embossed with length of the cable.

### 3. Specific Requirements

All materials used in manufacturing of cable shall be new, unused and of finest quality. All materials should comply with the requirements/tests as per applicable IEC specification. The PVC material used in the manufacture of cable shall be of reputed manufacturer. No recycling of PVC is permitted. The employer reserves the right to ask for documentary evidence of the purchase of various materials, (to be used for the manufacture of cable) as per checking of quality control. Quality Assurance plans shall be submitted.

Small cut piece lengths of cables will not be accepted. Cables up to 500 meters in length or as approved by Employer/Employer's Representative shall be of one length shipped in a drum of adequate size. For higher quantities, multiple lengths/drums may be shipped subject to the approval of Employer/Employer's Representative.

**TABLE 1: Rating and Features**

SN	Description	11 kV Line
1	Rated voltage, phase to phase (Uo/U)	6/10 kV
2	Highest voltage of three-phase system (Um)	12 kV
3	Rated lightning impulse withstand voltage	75 kVp
4	Rated power-frequency short duration withstand voltage for one minute	28 kV
5	Insulation	
5.1	Material of Insulation	XLPE
5.2	Thickness of Insulation (minimum)	3.4 mm
6	Conductor	
6.1	Type of Conductor	EC grade aluminum
6.2	Stranded Conductor	yes
7	Number of Cores	
8	Maximum Initial conductor Temperature during	< 90 deg. C





	operation	
9	Maximum Final Conductor Temperature during short circuit	< 250 deg. C

**4. TESTS**

(a) Type Tests

The Type Test from the recognized laboratory shall be conducted.

(b) Routine Tests (Factory Acceptance Tests)

The following tests shall be carried out at the manufacturer's plant before shipment as far as applicable for each type of conductors and cables:

- i) Appearance check
- ii) Conductor resistance measurement
- iii) Capacitance measurement
- iv) Insulation resistance measurement
- v) A.C. withstand voltage
- vi) A.C. long duration withstand voltage
- vii) Impulse withstand voltage
- viii) A.C. long duration breakdown voltage
- ix) Impulse break-down voltage
- x) Dielectric loss tangent
- xi) Temperature-voltage characteristic
- xii) Dimension
  - Conductor outermost diameter
  - Insulation thickness
  - Sheath thickness
  - Over-sheath thickness
  - Thickness of each tape
  - Interval of tape lapping
  - Total diameter
- xiii) Bending withstand characteristic
- xiv) Over-sheath, tensile strength
- xv) - do. - , thermal aging
- xvi) - do. - , oil-proof
- xvii) - do. - , non-inflammability
- xviii) - do. - , thermal deformation
- xix) - do. - , hardness

**5. Packaging**

The conductor shall be supplied in non-returnable drums/reels. The drum/reel shall be made of steel suitably protected against corrosion. Protective external lagging of sufficient thickness shall be provided and fitted closely on the reels. Binder consisting of steel straps shall be provided over the external laggings. The drum shall be new and sufficiently rugged in construction to withstand ocean shipping, road transport, several loading and unloading, storage in tropics, hauling and field erection of cables without distortion or disintegration.



Each reel of conductor furnished shall contain only one (1) length of cable.

All reel shall be legibly marked in paint with the following information:

- a) Voltage grade of Cable
- b) Size of cable
- c) Type of Conductor
- d) Type of insulation
- e) Length in meters
- f) Net weight of cable

## 6. Drawings, Data & Manuals

The following information shall be furnished along with the Tender.

- (a) Manufacturer's leaflets giving constructional details, dimensions and characteristics of different cables.
- (b) Current rating of cables including de-rating factor due to grouping, ambient temperature and type of various installation.
- (c) Write-up with sketches illustrating the manufacturer's recommendation for splicing, jointing and termination of different types of cables.
- (d) Type test report of power cables. The Bidder shall clearly describe the type and routine tests to be performed on cables.
- (e) Drum length for each of cable.

### GUARANTEED TECHNICAL PARTICULARS

(To be completed by the Bidder/Manufacturer)

#### Item: Power Cable (XLPE)

(To be filled separately for each type and rating of cable)

S.N.	Description	Unit	NEA Req.	To be Filled by Bidder/Manufacturer
1	Manufacturer			
2	Country of Origin			
3	Years of Manufacturing Experience			
4	Model No.			
5	Applicable standard		IEC 60502 IEC 60228	
6	Cable Type Designation			
7	Rated Voltage	kV		
7.1	Maximum System Voltage	kV	12	
7.2	Rated Voltage between conductor and screen	kV		
7.3	Rated Voltage between two conductors	kV		
7.4	Power Frequency Withstand Voltage	kV	28	
7.5	Impulse Withstand Voltage (BIL)	kV	75	
8	Conductor			
8.1	Conductor Material		EC grade AL	
8.2	Cross section of the Conductor	sq. mm.		
8.3	Is Conductor Stranded?	(Yes/No)	yes	
8.4	Stranded Conductor			
	i) Number of strands in each core			
	ii) Size of strand	Sq. mm.		
	iii) Maximum DC Resistance at 20 deg. C	Ohm/km		



	iv) Class of Stranding			
9	Number of Cores			
10	Insulation			
10.1	Insulation material and Type Designation		XLPE	
10.2	XLPE Compound manufacturer			
10.3	Minimum thickness of insulation	mm	3.4	
10.4	Minimum volume resistivity at 27 deg. C, 70 deg. C and 90 deg. C	Ohm-cm		
11	Sheath			
11.1	Material for inner sheath, type of sheathing and Type Designation			
11.2	Minimum thickness of inner sheath	mm		
11.3	Material for outer sheath, type of sheathing and Type Designation			
11.4	Minimum thickness of outer sheath	mm		
12	Armor			
12.1	Material			
12.2	Shape			
12.3	Dimension	mm		
13	Conductor Screen			
13.1	Material			
13.2	Thickness	mm		
14	Insulation Screen			
14.1	Material			
14.2	Thickness	mm		
15	Metallic Layer/Screen			
15.1	Type			
15.2	Material			
15.3	Thickness	mm		
16.1	Overall Diameter of the Cable	mm		
16.2	Geometric Mean Radius (GMR) of the Cable/Conductor	mm		
17	Minimum Bending Radius	mm		
18	Insulation Resistance at 27 deg. C	Ohm/km		
19	Capacitive Reactance	Ohm/km		
20	Inductive Reactance	Ohm/km		
21	Conductor Temperature rise during			
21.1	Normal Operation	deg. C	90	
21.2	Short Circuit	deg. C	250	
22	Continuous Current Carrying Capacity			
22.1	Continuous Current Carrying Capacity in air and Corresponding assumptions/Conditions of installation	A		
22.2	Continuous Current Carrying Capacity under ambient temperature	A		
22.3	Continuous Current Carrying Capacity under Cable laid in Covered cable trenches	A		
22.4	Continuous Current Carrying Capacity under 3-6 Cables per tray touching each other in Covered cable trenches	A		
22.5	Continuous Current Carrying Capacity under ambient temperature for Cable laid in ground	A		
23	Short circuit current			
23.1	Short circuit current for 0.1 sec	kA		
23.2	Short circuit current for 1.0 sec (minimum kA)	kA		
23.3	Short circuit current for armor 1.0 sec (minimum kA)	kA		
24.1	Minimum tensile strength of insulation	kg/sq. cm		
24.2	Minimum elongation at break	%		



25.1	Minimum tensile strength of sheath	kg/sq. cm		
25.2	Minimum elongation at break	%		
26.1	Minimum tensile strength of armor	kg/sq. cm		
26.2	Minimum elongation at break	%		
27.1	Weight of Cable per km	kg/km		
27.2	Standard length of Cable per drum	m	min. 500m	
27.3	Net weight of cable in drum	kg		
28	Method of Core identification			
28.1	For Cables up to Five Cores			
28.2	For Cable with more than Five Cores			
29	Details of Anti Termite Covering			
30	Longitudinal water tight	yes/no	yes	
31	Fire Retardant	yes/no	yes	
32	Moisture Resistant	yes/no	yes	
33	Please indicate in YES or NO whether the following tests have been carried out			
33.1	Ageing Test	yes/no	yes	
33.2	Loss of Mass Test	yes/no	yes	
33.3	Cold Impact Test	yes/no	yes	
33.4	Heat Shock Test	yes/no	yes	
33.5	Fire Retardant Test	yes/no	yes	
34	Delivery of equipment following award of contract and approval of drawing			
35	ISO 9001 holder (including design)	yes/no	yes	
35.1	ISO 9001 certificate submitted	yes/no	yes	
36	Type test certificate submitted	yes/no	yes	
36.1	Submitted for the required ratings	yes/no		
36.2	Type test certified by			
37	User's certificate submitted	yes/no	yes	
38	Has exported to third country	yes/no	yes	
39	Copies of relevant standards attached	yes/no	yes	
40	Outline Drawings and associated GA attached	yes/no	yes	
41	Details of Marking on Outer Sheath			

Signed by.....  
 Designation.....  
 As Representative for.....  
 Place.....  
 Date.....  
 Seal of Bidder/Manufacturer .....



## **Cable Termination and Joint Kits**

### **1. Scope:**

This specification covers the design, manufacture, factory test, supply and delivery of cable termination and joint kits for single core, aluminum conductor, XLPE insulated armored power cable used in underground 33 kV and 11 kV distribution system.

### **2. Description:**

- 2.1 All high voltage terminations and jointing kits shall be standard quality type. They shall be factory engineered kits containing all the necessary components to reinstate the cable insulation, metallic shielding of each core, together with the reinstatement of the sheath, of the cable being terminated.
- 2.2 The heat shrinkable termination and joint kit shall be manufactured and tested in accordance latest version of IEC, or any other national or international standard that ensures at least a substantially equal quality to the standard mentioned above will also be acceptable.
- 2.3 The manufacturer of the termination and joint kit (Indoor, outdoor and straight- through) must have been accredited with ISO 9001 quality certification.
- 2.4 The entire termination and joint kit shall be environmentally sealed and capable of preventing the ingress of external moisture and contamination.
- 2.5 Kits shall contain sufficient cleaning solvents and cleaning clothes for the proper making of the joint or termination.
- 2.6 Voltage stress relief shall be provided and this may be inherent in the heat recoverable polymeric material.
- 2.7 The terminating or jointing materials shall not be subjected to storage limitations such as controlled temperature or humidity restrictions, nor have self-life limitations.

### **3. Other Requirements**

- 3.1 The outdoor termination kits shall be suitable for terminating the cable at steel cross arm complete with brackets, terminals, saddles and all necessary materials for fixing the termination. The heat shrinkable termination kit to be supplied and installed under this scope of work shall be capable enough to cope with all the weather change. Terminations that do not require manually built stress relief cones or field pouring compound are preferred.
- 3.2. The straight through joint kit shall be suitable for jointing single core of cables. The termination kits shall include all necessary components to join two alike cables sections together directly buried. Kits that do not require manually built stress relief cones or field pouring of compound are preferred.
- 3.3 Each of the above terminations and joint kits shall be complete in every respect and include clear, detailed instructions in English illustrating steps by step procedure in preparing the cable and applying the termination compounds.
- 3.4 Cross bond or suitable design of earthing shall be employed so that shielding of both sides of each joint shall be connected to the shielding of the other phase, so as to suppress the induced voltage. Necessary materials for such appropriate earthing shall be provided by the Contractor.
- 3.5 The minimum creepage distance of outdoor terminal/sealing-ends shall be as required for heavily polluted atmospheres in line with the appropriate IEC Standard.
- 3.6 Terminating and jointing kit shall be in a separate package, a list of materials indicating quantities and weights and an instruction sheet shall be included in the package.
- 3.6 Accessories shall match the cable test ratings in all respects. The supplied termination and joint kits shall be of suitable for the cables mentioned in Price Schedule

### **4. Testing**

The routine tests of the kits shall be done at manufacturer's plant in accordance with IEC or other equivalent national or international standards including following tests.

- Appearance Test
- Construction Test
- High Voltage Test

**5. Bid Documentation**

1. The Bidder shall provide with the Bid two (2) clear copies of the manufacturer governing Standard of the termination and joints and kits two (2) clear copies of all other relevant standards referenced herein.
2. The Bidder shall provide certified type test results of the termination and joint kits as required by governing standards.
3. The Bidder shall provide complete description, catalogue and drawings of the termination and joint kits.
4. A clause-by-clause commentary on specification, specifying compliance and deviation, if any.
5. All data, drawing, catalogue and other technical documents supplied shall be bound separately from the Bid Document.

**GUARANTEED TECHNICAL PARTICULARS**  
(To be completed by the Bidder/Manufacturer)

**Item: Outdoor Termination Kit and Straight Through Joints (XLPE)**

S.N.	Description	Unit	NEA Req.	To be Filled by Bidder/Manufacturer
1	Manufacturer			
2	Country of Origin			
3	Years of Manufacturing Experience			
4	Applicable standard			
5	Type			
6	Insulation level			
7	Maximum design voltage			
8	Impulse withstand voltage(BIL)			
9	Fire resistance treated	yes/no	yes	
10	Smoke resistance treated	yes/no	yes	
11	Stress relief performed	yes/no	yes	
12	Installation Instruction attached	yes/no	yes	
13	List of Installation Accessories Supplied			
14	ISO 9001 holder (including design)	yes/no	yes	
14.1	ISO 9001 certificate submitted	yes/no	yes	
15	Type test certificate submitted	yes/no	yes	
15.1	Submitted for the required ratings	yes/no		
15.2	Type test certified by			
16	User's certificate submitted	yes/no	yes	
17	Has exported to third country	yes/no	yes	
18	Copies of relevant standards attached	yes/no	yes	
19	Outline Drawings and associated GA attached	yes/no	yes	



### 33. Underground Cable

#### 1.1 Scope

This specification covers the design, manufacture, factory test, supply, delivery, type test, construction, of single or three core, aluminum conductor, cross-linked polyethylene (XLPE) insulated, PVC sheathed, armored Power Cables to be used for underground line at 33 kV and 11 kV Voltage level including all its accessories required.

The equipment and installation works specified in this section shall conform to the latest edition of the appropriate IEC specifications and/or other recognized international standards

The XLPE power cable shall be manufactured and tested in accordance with IEC 60502-2 or the latest version thereof or other equivalent international standards that ensures at least a substantially equal quality to the standard mentioned above.

#### 2. General Requirements

Cable shall be designed to withstand all mechanical, electrical and thermal stresses under steady state and transient operating conditions. The cable shall be suitable for burying under-ground in outdoor and/or laying in covered trenches in the climate conditions as specified for project area.

The conductor shall be of EC grade aluminum and shall have flexibility class-2 in accordance to IEC. All conductors shall be stranded, circular and compacted and comply with IEC 60228 or any other equivalent international standards. The maximum conductor temperature shall be 90 deg. C under continuous operation and shall be 250 deg. C during short-circuit condition.

The conductor screen shall be an extruded layer of black, semi-conducting compound. The conductor screen shall be extruded in the same operation as the insulation. The interface between the extruded conductor screen and insulation shall be free of any voids. The semi-conducting screens should be effectively cross-linked to achieve the temperature requirements as specified in IEC.

The insulating material shall be cross linked polyethylene (XLPE). The insulating material shall have excellent electrical properties with regard to resistivity, dielectric constant and loss factor and shall have high tensile strength and resistance to abrasion. The insulation shall not deteriorate at elevated temperatures, when immersed in water and when exposed to the climatic conditions. The insulation properties shall be stable under thermal conditions arising out of continuous operation at rated conductor temperature and under short circuit conditions. The insulation should have minimum thickness as specified. No tolerance on the negative side shall be acceptable. The insulation compound shall be clean with low levels of contamination. The make of XLPE compound shall be from reputed manufacturers like DOW Chemicals (USA), Hanwha Chemical (Korea), Borealis AG (Austria) or Equivalent reputed manufacturer.

The insulation screen shall be an extruded layer of black semi-conducting compound and shall continuously cover the whole area of the insulation. The contact surface between insulation and insulation screen shall be smooth and free from protrusion and irregularities. The interface between the insulation and insulation screen shall be free of any voids. Insulation screen shall be strippable type. The metallic screen shall consist of a layer of copper tape applied in helical form.

For the multi-core cables, individual core shall be color coded (Red, Yellow and Blue Phase) for proper identification in accordance with the standards. The cores shall be laid together with a suitable right hand lay. The interstices shall be filled with non-hygroscopic material. Further, the compounds used with fillers shall be such as to have no deleterious effect on other components of the cable and to be stable at cable temperatures. The laid up cores shall be provided with inner sheath applied by extrusion process. It shall be ensured that the shape is as circular as possible. It shall be applied to fit closely on to the laid up cores and shall be possible to remove easily without causing any damage to the underlying insulated cores and screens. The thickness of the inner sheath shall be as per the applicable standards. No tolerance on the negative side shall be acceptable.

The armoring shall be of galvanized steel strip for multi core cables. The armoring shall be applied as closely as practical. The armoring shall be applied such that the minimum area of

coverage shall be 90% and the gap between any two armor strips shall not be more than the width of strip. The galvanized steel strip shall comply with the requirements of applicable standards with latest amendments. The direction of lay of the armor shall be opposite to that of the cable cores. In case of single core cable, armoring shall be made of non-magnetic material conforming to IEC. The size of armor shall be as specified in the relevant standards.

The outer sheath shall be designed to afford high degree of mechanical protection. The outer sheath shall consist of extruded tough PVC compound insulation over the armoring suitable for the operating temperature of cable and shall meet the requirements of the IEC Standard. The PVC compound for the outer sheath shall conform to type ST-2. The color of the outer sheath shall be black. The sheath shall be heat, oil, chemical and weather resistant. Common acid, alkalis and sealing solution shall not have adverse effect on the material of PVC sheath which shall also be protected against ants, termites by suitable, reliable and durable measures.

The minimum thickness/size of separation sheath, outer sheath and armor at any point shall not fall below the nominal value. No tolerance on the negative side shall be acceptable.

The supplied cable shall be longitudinal water tight. For this purpose, a layer of suitable water swellable absorbent tape shall be provided over insulation screen.

Rating and features of the cables to be furnished shall be as per the requirements. The short circuit current rating shall be as per IEC.

The outer covering of the cable shall be embossed with the name/brand of the manufacturer, type designation, voltage grade, cable size, year of manufacture, name of the employer, type of insulation at the spacing of each 2 meters. Every meters of outer covering of the cable shall also be embossed with length of the cable.

**3. Specific Requirements**

All materials used in manufacturing of cable shall be new, unused and of finest quality. All materials should comply with the requirements/tests as per applicable IEC specification. The PVC material used in the manufacture of cable shall be of reputed manufacturer. No recycling of PVC is permitted. The employer reserves the right to ask for documentary evidence of the purchase of various materials, (to be used for the manufacture of cable) as per checking of quality control. Quality Assurance plans shall be submitted.

Small cut piece lengths of cables will not be accepted. Cables up to 500 meters in length or as approved by Employer/Employer's Representative shall be of one length shipped in a drum of adequate size. For higher quantities, multiple lengths/drums may be shipped subject to the approval of Employer/Employer's Representative.

**TABLE 1: Rating and Features**

SN	Description	Requirements	
		33 kV Line	11 kV Line
1	Rated voltage (Uo/U)	18/30 kV	6/10 kV
2	Highest voltage of three-phase system (Um)	36 kV	12 kV
3	Rated lightning impulse withstand voltage	170 kVp	75 kVp
4	Rated power-frequency short duration withstand voltage for one minute	70 kV	28 kV
5	Insulation		
5.1	Material of Insulation	XLPE	XLPE
5.2	Minimum Thickness of Insulation	8 mm	3.4 mm
6	Conductor		
6.1	Type of Conductor	EC grade aluminum	EC grade aluminum
6.2	Stranded Conductor	yes	yes
7	Number of Cores		
8	Maximum Initial conductor Temperature during operation	< 90 deg. C	< 90 deg. C





9	Maximum Final Conductor Temperature during short circuit	< 250 deg. C	< 250 deg. C
---	--	--------------	--------------

**4. TESTS**

(a) Type Tests

The Type Test from the recognized laboratory shall be conducted.

(b) Routine Tests (Factory Acceptance Tests)

The following tests shall be carried out at the manufacturer's plant before shipment as far as applicable for each type of conductors and cables:

- i) Appearance check
- ii) Conductor resistance measurement
- iii) Capacitance measurement
- iv) Insulation resistance measurement
- v) A.C. withstand voltage
- vi) A.C. long duration withstand voltage
- vii) Impulse withstand voltage
- viii) A.C. long duration breakdown voltage
- ix) Impulse break-down voltage
- x) Dielectric loss tangent
- xi) Temperature-voltage characteristic
- xii) Dimension
  - Conductor outermost diameter
  - Insulation thickness
  - Sheath thickness
  - Over-sheath thickness
  - Thickness of each tape
  - Interval of tape lapping
  - Total diameter
- xiii) Bending withstand characteristic
- xiv) Over-sheath, tensile strength
- xv) - do. - , thermal aging
- xvi) - do. - , oil-proof
- xvii) - do. - , non-inflammability
- xviii) - do. - , thermal deformation
- xix) - do. - , hardness

**5. Packaging**

The conductor shall be supplied in non-returnable drums/reels. The drum/reel shall be made of steel suitably protected against corrosion. Protective external lagging of sufficient thickness shall be provided and fitted closely on the reels. Binder consisting of steel straps shall be provided over the external laggings. The drum shall be new and sufficiently rugged in construction to withstand ocean shipping, road transport, several loading and unloading, storage in tropics, hauling and field erection of cables without distortion or disintegration.

Each reel of conductor furnished shall contain only one (1) length of cable.



All reel shall be legibly marked in paint with the following information:

- a) Voltage grade of Cable
- b) Size of cable
- c) Type of Conductor
- d) Type of insulation
- e) Length in meters
- f) Net weight of cable

**6. Drawings, Data & Manuals**

The following information shall be furnished along with the Tender.

- (a) Manufacturer’s leaflets giving constructional details, dimensions and characteristics of different cables.
- (b) Current rating of cables including de-rating factor due to grouping, ambient temperature and type of various installation.
- (c) Write-up with sketches illustrating the manufacturer’s recommendation for splicing, jointing and termination of different types of cables.
- (d) Type test report of power cables. The Bidder shall clearly describe the type and routine tests to be performed on cables.
- (e) Drum length for each of cable.

**GUARANTEED TECHNICAL PARTICULARS**  
(To be completed by Bidder/Manufacturer)

**Item: Underground Power Cable**  
(To be filled separately for each type and rating of cable)

S.N.	DESCRIPTION	UNIT	NEA REQ.	To be filled by Bidder/Manufacturer
1	Manufacturer			
2	Country of Origin			
3	Year of manufacturing experience			
4	Model No.			
5	Applicable Standard		IEC 60502 IEC 60228	
6	Cable Type Designation			
7	Rated Voltage	kV		
7.1	Maximum System Voltage	kV		
7.2	Rated Voltage between conductor and screen	kV		
7.3	Rated Voltage between two conductors	kV		
7.4	Power Frequency Withstand Voltage	kV		
7.5	Impulse Withstand Voltage (BIL)	kV		
8	Conductor			
8.1	Conductor Material		EC Grade Aluminum	
8.2	Cross section of the Conductor	sq. mm.		
8.3	Is Conductor Stranded?	yes/no	yes	
8.4	Stranded Conductor			
	v) Number of strands in each core			
	vi) Size of strand	Sq. mm.		
	vii) Maximum DC Resistance at 20 deg. C	Ohm/km		
	viii) Class of Stranding			
9	Number of Cores		One or Three	



10	Insulation			
10.1	Insulation material and Type Designation		XLPE	
10.2	XLPE Compound manufacturer			
10.3	Minimum thickness of insulation	mm		
10.4	Minimum volume resistivity at 27 deg. C, 70 deg. C and 90 deg. C	Ohm-cm		
11	Sheath			
11.1	Material for inner sheath, type of sheathing and Type Designation			
11.2	Minimum thickness of inner sheath	mm		
11.3	Material for outer sheath, type of sheathing and Type Designation			
11.4	Minimum thickness of outer sheath	mm		
12	Armor			
12.1	Material			
12.2	Shape			
12.3	Dimension	mm		
13	Conductor Screen			
13.1	Material			
13.2	Thickness	mm		
14	Insulation Screen			
14.1	Material			
14.2	Thickness	mm		
15	Metallic Layer/Screen			
15.1	Type			
15.2	Material			
15.3	Thickness	mm		
16.1	Overall Diameter of the Cable	mm		
16.2	Geometric Mean Radius (GMR) of the Cable/Conductor	mm		
17	Minimum Bending Radius	mm		
18	Insulation Resistance at 27 deg. C	Ohm/km		
19	Capacitive Reactance	Ohm/km		
20	Inductive Reactance	Ohm/km		
21	Conductor Temperature rise during			
21.1	Normal Operation	deg. C	90	
21.2	Short Circuit	deg. C	250	
22	Continuous Current Carrying Capacity			
22.1	Continuous Current Carrying Capacity in air and Corresponding assumptions/Conditions of installation	A		
22.2	Continuous Current Carrying Capacity under ambient temperature	A		
22.3	Continuous Current Carrying Capacity under Cable laid in Covered cable trenches	A		
22.4	Continuous Current Carrying Capacity under 3-6 Cables per tray touching each other in Covered cable trenches	A		
22.5	Continuous Current Carrying Capacity under ambient temperature for Cable laid in ground	A		
23	Short circuit current			
23.1	Short circuit current for 0.1 sec	kA		
23.2	Short circuit current for 1.0 sec (minimum kA)	kA		
23.3	Short circuit current for armor 1.0 sec (minimum kA)	kA		
24.1	Minimum tensile strength of insulation	kg/sq. cm		
24.2	Minimum elongation at break	%		
25.1	Minimum tensile strength of sheath	kg/sq. cm		



24.2	Minimum elongation at break	%		
26.1	Minimum tensile strength of armor	kg/sq. cm		
26.2	Minimum elongation at break	%		
27.1	Weight of Cable per km	kg/km		
27.2	Standard length of Cable per drum	m	min. 500m	
27.3	Net weight of cable in drum	kg		
28	Method of Core identification			
28.1	For Cables up to Five Cores			
28.2	For Cable with more than Five Cores			
29	Details of Anti Termite Covering			
30	Longitudinal water tight	yes/no	yes	
31	Fire Retardant	Yes	Yes	
32	Moisture Resistant	Yes	Yes	
33	Please indicate in YES or NO whether the following tests have been carried out			
33.1	Ageing Test	Yes/No	Yes	
33.2	Loss of Mass Test	Yes/No	Yes	
33.3	Cold Impact Test	Yes/No	Yes	
33.4	Heat Shock Test	Yes/No	Yes	
33.5	Fire Retardant Test	Yes/No	Yes	
34	Delivery of equipment following award of contract and approval of drawing	months		
35	ISO 9001 holder (including design)	yes/no	yes	
35.1	ISO 9001 certificate submitted	yes/no	yes	
36	Type test certificate submitted	yes/no	yes	
36.1	Submitted for the required ratings	yes/no		
36.2	Type test certified by			
37	User's certificate submitted	yes/no	yes	
38	Has exported to third country	yes/no	yes	
39	Copies of relevant standards attached	yes/no	yes	
40	Outline Drawings and associated GA attached	yes/no	yes	

Signed by.....  
 Designation.....  
 As Representative for.....  
 Place.....  
 Date.....  
 Seal of Bidder/Manufacturer .....



# **STEEL TELESCOPIC POLE**

## 19. Steel Telescopic Pole

### 19.1 Scope

This Specification covers the design, fabrication, testing and supply of Steel Telescopic Poles to be used to support overhead electric lines and equipment.

### 19.2 Description

The poles shall be telescopic, uniformly tapered circular in cross-section. The poles shall be fabricated in sections as specified in Table 2 out of welded tubes of suitable lengths. The diameters of the top and the bottom end of the completely assembled pole shall be as specified therein.

The sections of the steel poles shall be designed such that the butt end of the top section fits on the top end of the second section, the butt end of the second section fits on the top end of the third section and so on. The various sections shall be fitted together by pressed friction joints. The completely assembled telescopic pole shall have the design loads as specified in Table 1. The separate pole cap shall be provided with top section of the pole. The bottom section of the pole shall be provided with a base plate.

### 19.3 Material

The telescopic pole sections and fittings shall be manufactured from standard steel as per BS 4360 Grades 43 C, D, E or 50 C, D, E or 55 C or equivalent national/ international standards.

The steel tubes shall confirm to the requirements of BS 6323 Parts 1 to 8 Steel Tubes. The minimum yield strength of the steel to make Poles for single circuit shall be 370 N/mm<sup>2</sup> and that for double circuit shall be 410 N/mm<sup>2</sup>.

### 19.4 Manufacture

The pole shall be erected by friction joint without involvement of through bolt, site welding or any type of additional device of joint at the time of erection.

It shall be the responsibility of the Bidder to determine the thickness of the tubing adequate to sustain the load and test requirements. The Bidder shall determine the thickness of the tubing to develop the required pole strength in accordance with the Bidder's method of fabrication. However, the thickness of the tubing shall not be less than **2.5 mm**, and the following tolerances shall be maintained:

- a) Tolerance on diameter: +/- 1% from Bidder's data sheet.
- b) Tolerance on telescopic poles: After assembly the telescopic poles shall not exceed +/-75 mm of their stated length in the Technical data sheet.
- c) The out-of-straightness of the assembled pole shall not exceed 1/600 of the height.
- d) Negative tolerances are not acceptable on Thickness and Weight.

All welding of the poles shall be carried out at the manufacturers' plant.

Welds parallel to the longitudinal axis of the poles shall be fillet welds. No circumferential joints/welds of the tubes are permitted. All welds shall be capable of withstanding, without failure or cracking, the stresses in a pole when subjected to its ultimate design loads.

Each section of the pole shall have only one longitudinal weld.

All seam welds on joint mating surfaces shall be ground flush. All high spots in the galvanizing on the mating surface shall be ground and if the galvanizing is damaged in the process, it shall be repaired.

**19.5 Corrosion Protection**

All sections of the pole shall be hot dip galvanized both internally and externally in accordance with ISO 1461 or IS 2629, IS 4736 or equivalent national or international standard. After galvanizing, the external surface of poles below ground level and 500 mm above ground level shall be painted as follows:

- a) Thorough clean brush and solvent degrease, then one coat of phosphoric acid based etch primer both inside and outside followed by,
- b) One coat airless spray of epoxy based bituminous black paint of 1x100 microns dry film thickness inside of the pole base.
- c) Two successive coat airless spray of epoxy based bituminous black paint of 2x100 microns dry film thickness outside of the pole base.

The minimum thickness of the zinc coating shall not be less than 500 g/m<sup>2</sup> (equivalent to 70 microns) of zinc for all surfaces of steel including the base plate and the pole cover.

**19.6 Marking of Pole**

The pole shall have an identification marked with indelible paint on the pole at a position approximately 3.5 m. from the butt end, which is clearly and indelibly marked with:

- a) Date of manufacture and identification mark of manufacture.
- b) Length of pole in meters and its design working loads as defined in this specification.
- c) Contract Number.
- d) Name of the Employer

The pole shall be marked with a permanent horizontal line at a point 1/6th of the pole height from the butt end of the assembled pole. The mating depth of the relevant sections of pole shall also be indelibly marked.

The finished pole shall be marked with the circumferential line for the indication of the overlapping length during the assembly.

**19.7 Earthing Lug, Base Plate and Pole Cap**

Each pole shall be provided with earthing lug at 300 mm below the ground level. Separate pole cap shall be provided for each pole. The plate for pole cap shall be of 3 mm. minimum thickness. The dimension of the base plate shall be as per drawing.

**19.8 Design**

The standard overall length of pole manufactured under this contract shall be as per table 1 below. The plantation depth of the pole shall be 1/6th of the overall length of that pole. **The Bidder shall submit a detailed description of the methods of pole manufacture and detailed calculations for all aspects of design of the pole for NEA approval prior to manufacture.**

The design working loads in transverse and vertical direction shall be as follow:

**Table 1: Design Working Load**

S.No.	Pole Length (m)	Design Working Load (kgf)		Circuit Type
		Transverse	Vertical	
1	11	350	350	Single
2	11	700	700	Double
3	13	350	350	Single
4	13	700	700	Double

The design working load shall be the yield strength reduced by factor of safety of 2.0.

**19.9 Tests**



**Type Test/Prototype Tests**

The design prototype tests or type test must be carried out by the manufacturer/bidder at their own expenses as per the governing standards and acceptable to the Employer. The tests shall be witnessed and approved by the manufacturer before mass production of pole.

**Routine/Acceptance Tests**

The following test(s) shall be performed for the pole furnished. All testing shall be fully documented and certified test reports shall be provided to the Project.

**Permanent set test**

Poles selected for testing shall be a representative sample from each lot.

S.N.	Lot size	No. of poles
1.	Up to 500	5
2.	501-1000	8
3.	1001-2000	13
4.	2001-3000	18
5.	3001 and above	20

**Testing Arrangement:** The pole shall be rigidly supported in vertical position for a distance from the butt end equal to the specified depth of planting of that pole. It shall then be loaded horizontally with a load applied at the distance from the pole top as specified in Table 2, and the deflection recorded. Alternatively, for convenience the pole may be fixed horizontally in a testing arrangement. The testing arrangement shall be provided with sufficient supports to ensure that bending moments developed by the self-weight of the pole are minimal. These supports shall be detailed to give no horizontal resistance to the applied loads. The accuracy of load and deflection measuring equipment shall not be less than +/-2 percent.

The load shall be gradually and uniformly applied in increments of 10 percent of the design-working load up to 120 percent of the design-working load. At each increment of load deflection of the pole tip shall be measured. The 120% loading shall be maintained for 5 minutes. The load shall then be gradually reduced to zero and the amount of permanent deflection of the pole tip shall be recorded.

The test load shall be gradually reapplied up to the design working load and the deflection shall be recorded. The load shall then be increased in 10 percent increments until failure occurs. At each load increment, the load and deflection shall be recorded.

The following particulars shall be recorded:

- a. Manufacturer's name and plant location;
- b. Batch No. of steel plate or tubing;
- c. Test date;
- d. Pole type;
- e. Dimensions of pole;
- f. Increments of load and the deflections at each increment of load;
- g. Permanent deflection;
- h. Load of failure;

The pole shall be considered acceptable if:

- a) The permanent deflection of the tip of the pole does not exceed 4 mm per meter of pole length. (The permanent deflection is the deflection of tip of the pole on removal of load equal to 120% of design working load of pole after 5 minutes of the application of that load.)
- b) The failure load of the pole tested equals or exceeds 200% of design working load.

Should any of the poles first selected fail to pass any of the tests specified above two further poles shall be selected for testing from the same batch i.e. same pole length manufactured on the same day from the same steel plate or tubing in respect of each failure. Should one or both these additional poles fail, the test material represented by the test samples shall be deemed as not complying with this specification.





**19.10 Bid Documentation**

The Bidder shall provide with the Bid two (2) clear copies of the governing standards for selection of tubings, fabrication and testing of Steel Telescopic Poles and two (2) clear copies of all other relevant standards referenced therein.

The Bidder shall provide a complete design, description and certified dimensional drawings of each type of pole.

Two (2) clear certified copies of all type tests performed on similar type of poles and similar working loads.

A clause-by-clause commentary on specification, specifying compliance and deviations, if any.

**Table 2: Pole Attributes**

S.N.	Description	Unit	Value	Value
1	Overall Length of the assembled pole	m	11	13
2	Total Number of Sections	Nos.	can be varied (3-5)	can be varied (4-6)
3	Maximum weight of each section	kg	85	85
4	Diameter of the assembled pole			
4.1	Top Diameter (Pole for Single Circuit)	mm	150	160
4.2	Top Diameter (Pole for Double Circuit)	mm	150	160
4.3	Bottom Diameter	mm		
5	Thickness (Minimum)	mm	2.5	2.5
6	Application of load from top of pole	m	0.6	0.6
7	Depth of Planting	m	1.8	2.1
8	Overlapping between pole pieces		Minimum 1.5 times the inside diameter of outer overlapping piece	

**GUARANTEED TECHNICAL PARTICULARS**

(To be completed by Bidder/Manufacturer)

**Item: Steel Telescopic Pole**

