BHEL SPECIAL NIT TERMS & CONDITIONS: - for GeM Portal
Name of Project: - SPS Package for 400kV Switchyard at 4X270 MW Bhadradri TPS
Item: - LOW VOLATGE CABLE- LT CONTROL CABLE

1.	Contact Details :- **For Technical clarification**, :- Mr. Ranajit Dey (Manager-TBEM) / Shri Vivek Kapil (AGM/ TBEM) BHEL, Transmission Business Group 9th Floor, Joy Tower, Sectro-62, Noida-201301, UP, India Phone: +91 (0) 0120- 6748522/8534, Fax: +91 (0) 0120 – 6748580. Mobile:- 07409057002/9818080691 E-mail: ranajitd@bhel.in; vivekk@bhel.in'	For any **commercial clarification:-** Mr. Rajiv Ranjan, Manager (TBMM)/ SH Sunil Kumar, Sr DGM-TBMM BHEL, Transmission Business Group 10thFloor, Joy Tower, Sectro-62, Noida-201301, UP, India Phone: +91 (0) 0120- 6748575/8471, Fax: +91 (0) 0120 – 6748580. Mobile :- 9650299229/09761724520 E-mail: rajiv_ranjan@bhel.in ; sunil.kumar@bhel.in.
2.	**Terms of Payment:**	
For Supply only in scope of the supplier	As per GTC of GeM. However, payment shall be made within **the days mentioned below in Point no. 03** from the date of receipt of complete invoice along with following documents in 3 sets Supplier has to provide the following documents for processing of bills: • GST Compliant Tax Invoice • LR / GR • Packing List • Guarantee Certificate • Copy of Transit Insurance Certificate from underwriters • CRAC (consignee receipt-cum-acceptance certificate) • Copy of Performance Bank Guarantee (PBG) • Material Inspection Clearance certificate issued by BHEL Quality Management.	
3	. **Payment Terms with respect to no. of days for various categories of Bidders**	

Nos of days for payment (For Supply only in scope of the supplier)	Sl No.	Type of Bidder	Payment terms (Number of days)
	1	Micro & Small Enterprises (MSEs)	45 days
	2	Medium Enterprises	60 Days
	3	Non MSME	90 Days

4. **Term of Delivery: (TOD)**

TOD shall be as per GeM. However, unloading at site is not in the scope of bidder. Bidders to quote price accordingly.

5. **Delivery Time:**

IMMEDIATE after approval of drawing and documents and issuance of MFC by BHEL however Break up of delivery period taken (Delay analysis for cases of delivery extension if required, shall be governed as per below schedule)

SL. NO.	ACTIVITY	ACTIVITY TIME IN DAYS
1.	Submission of documents necessary for getting manufacturing clearance like Drawings, data sheet, MQP etc. (In scope of vendor)	03
2.	Review and Approval of documents and issue of manufacturing clearance (In scope of BHEL)	03
3.	Manufacturing Time & offer of Inspection to BHEL (In scope of vendor)	42
4.	Inspection (In scope of BHEL)	07
5.	Issue of MICC (In scope of BHEL)	01
6.	Dispatch (In scope of vendor)	07

BHEL SPECIAL NIT TERMS & CONDITIONS: - for GeM Portal
Name of Project: - SPS Package for 400kV Switchyard at 4X270 MW Bhadradri TPS
Item: - LOW VOLATGE CABLE- LT CONTROL CABLE

Note – 1) Supplier to ensure every revised submission incorporating comments (Complete in all respect) within 02 days from the date of comments by BHEL. 2) Supplier to furnish the advance information (at least 01 weeks) for inspection of the material after ensuring the readiness.	
6.	**Prices:**
The quoted prices shall be on **Firm basis** including packing & Forwarding charges. Vendor has to quote prices on FOR destination basis (Ex-works Price + F & I) including GST as per the price bid format.	
7.	**Liquidated Damage of delayed Delivery:** As per GeM's terms and conditions.
8.	**SCOPE OF SUPPLY , BOQ & QUANTITY VARRIATION :**
APPLICABLE AS PER TECHNICAL SPECIFICATION (REFER ENCLOSED TECHNICAL SPECIFICATION & UN-PRICED BID). **BOQ:** As per the Technical specification no.:- **TB-4-377-510- 051DRev. No.-00 Dated 28.06.2022** , (**Refer Clause no. 3.2**); **Quantity Variation:** The relevant Clause pertains to "The length of each cable type procured may be subject to a change of + 25% before placement of order. Quantity variation on the total ordered quantity shall be + 25% at contract" stands deleted. Same is modified as below***:-*** ***As per Gem; The purchasers reserve the right to increase or decrease the quantity to be ordered up to 25% of bid quantity at the time of placement of contract. The purchaser also reserves the right to increase the ordered by up to 25% of the contracted quantity during the currency of the contract at the contracted rates. Bidders are bound to accept the orders accordingly***. It is also to be noted that any items can be completely/partially deleted during detailed engineering stage.	
9.	**Technical Specification:**
Technical specification no**. TB-4-377-510- 051DRev. No.-00 Dated 28.06.2022**. No permissible Technical Deviation has been envisaged. Bidders to quote as per Technical Specification.	
10.	**Pre-Qualification Requirement:**
Technical Pre-Qualifying Criteria is specified in **NIT as per ANNEXURE_TQR of the** Technical Specification no. **TB-4-377-510-051DRev. No.-00 Dated 28.06.2022.** under head **"TECHNICAL PRE QUALIFICATION REQUIREMENT"**	
11.	**MQP (Manufacturing Quality Plan):**
Inspection shall be carried out as per approved Quality Plan. For the same, Supplier to submit the Quality Plan to BHEL for Customer approval.	
12.	**Inspection:**
Inspection shall be carried out jointly by TSGENCO/BHEL as per approved Quality Plan. Inspection Agency:- TSGENCO/BHEL	
13.	**Location of Plant/ Delivery Address/ Consignee address,**:
Location of Plant: Location: Manuguru, Khammam District, Telangana - 507117. Access by: Road/Rail. Nearest Railway Station: Manuguru. Nearest Airport: Hyderabad. Major Towns/ Cities: Manuguru Pin code -507117. **Delivery Address/Consignee Address:** Chief Engineer (Construction), Bhadradri Thermal Power Station, TSGENCO, Bhadradri Kothagudem Dist. Manuguru - 507117	
14.	**Bill to Address:**
Bharat Heavy Electricals Limited-TBG, 10th Floor, Plot No.C-20/1A/1, Joy Tower, Sector-62, Noida-201301, U.P. **GSTN**-09AAACB4146P2ZC	
15.	**Guarantee Clause (Defect Liability Period):**
The equipment / material supplied and services rendered (if applicable) shall be guaranteed to be free from all defects and faults in design & engineering, material, workmanship & manufacture and in full conformity with the Purchase Order / Contract, Technical Specifications & approved drawings / data sheets, if any**, for 18 months from the date of last delivery or 12 months from the date of commissioning, whichever is earlier**. The defective equipment / material / component shall be replaced free of cost at site. Freight & Insurance during transit shall also be in the scope of the supplier / contractor. Any expenditure for dismantling and re-erection of the replaced equipment / material / component shall be to supplier's / contractor's account. All replacements during the guarantee period shall be delivered at site promptly and satisfactorily within a period not more than 45 days from the date of reporting the defect / rejection etc.	

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In the event of the supplier / contractor failing to replace the defective equipment / material / component within the time period mentioned above, BHEL may proceed to undertake the replacement of such defective equipment / material / component at the risk and cost of the supplier / contractor without prejudice to any other rights under the contract and recover the same from PBG / other dues of this Purchase Order / Contract or any other Purchase Order / Contract executed by the supplier / contractor.	
16.	**Performance Bank Guarantee:**
Supplier shall arrange to submit Performance BG within 15 days of award of contract on GeM . **Performance BG shall be valid for 18 months from the date of last delivery with claim period of 3 months extra over and above 18 months**. "Bidder agrees to submit performance security required for execution of the contract within the time period mentioned. In case of delay in submission of performance security, enhanced performance security which would include interest (SBI rate + 6%) for the delayed period, shall be submitted by the bidder. Further, if performance security is not submitted till such time the first bill becomes due, the amount of performance security due shall be recovered as per terms and conditions defined in NIT / Contract, from the bills along with due interest."	
17.	Bidders to ensure that Third party / customer issued certificates being submitted as proof of PQR qualification should have verifiable details of document / certificate issuing authority such as name & designation of Issuing Authority and its organization contact number and e-mail Id etc. In case the same found not available, Purchaser has right to reject such document from evaluation.
18.	**Acceptance of Offer:**
Acceptance of offer is subjected to following: - Qualification of Technical PQR - Techno-Commercial evaluation by BHEL. - Approval of vendor by ultimate customer i.e. (M/s TSGENCO). - For additional vendor approval by TSGENCO, the bidder has to submit complete credentials (Performance Certificates/ Past experience/ Financial Credentials etc.) alongwith their offer for approval from the ultimate customer M/s TSGENCO	
19.	**Make in India:**
For this procurement, the local content to categorize a supplier as Class-I local supplier / class-II local supplier / Non-Local supplier and purchase preference to Class-I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020, issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT but before opening of part-II bids against this NIT. "*Bidder to specify the percentage of local content as per the format of self-declaration for local content" as per Annexure-B.*" "This tender is not a global tender and only **Class-I supplier**s as defined under the DPIIT order no. P-45021/2/2017-PP (BE-II) dated 04.06.2020 and subsequent PPP-MII order, order ref no.:- A-1/2021-FSC-Part (5) dated 16.11.2021 issued by Govt of India, Ministry of Power, are eligible to bid in this tender. **Bids received from Class II & Non-Local supplier shall be rejected."**	
20.	**Details of Bidder:** Bidder to submit the details as per format as per Annexure-A.
21.	**Deviations:**
a) Technical Deviation: No Technical Deviation is envisaged. (Bidder to be mention NIL Deviation in Annexure- C attached) b) Commercial Deviation: No Commercial Deviation is envisaged.(Bidder to be mention NIL Deviation in Annexure- C)	
22.	**Important Instructions to bidder :-** • Bidder to mention "QUOTED" against every items in their "UN-PRICED BID FORMAT" • Bidder to submit price breakup as per the BOQ (Format Attached) before award of contract. • Evaluation shall be done based on "Total cost to BHEL (i.e Ex work price +F & I + Applicable GST)" quoted by bidders against the overall quantity as per NIT. • All other terms & conditions shall be as per GTC of GeM.
23	**Bidders have to enclosed the Following Documents (Duly filled and signed) along with their technical bid :** *i) UN-PRICED BID FORMAT* *ii) Format for the Breakup of the Prices* *iii) Annexure-A (Contact Details of the Bidder) –Format Attached herewith*

BHEL SPECIAL NIT TERMS & CONDITIONS: - for GeM Portal
Name of Project: - SPS Package for 400kV Switchyard at 4X270 MW Bhadradri TPS
Item: - LOW VOLATGE CABLE- LT CONTROL CABLE

		iv)	*Annexure-B (Self certification regarding Local Content in line with PPP-MII order ref no.:- A-1/2021-FSC-Part (5) dated 16.11.2021 issued by Govt of India, Ministry of Power) – format attached herewith. In case local Content is less than 100%, Vendor to submit sealed and signed copy of Annexure -7 (attached Herewith)*
		v)	Annexure- C Format for NIL Deviation
		vi)	Annexure –D Format of Performance Bank Guarantee

Signature & Seal of Supplier with Date

Unpriced BOQ							
Vendor to be mention "Quoted" for each line items as per this format to BHEL.							
PROJECT : SPS Package for 400kV Switchyard at 4X270 MW Bhadradri TPS							
ITEM : LOW VOLATGE CABLE- LT CONTROL CABLE							
Item Number	Item Title	Item Description	Item Quantity	Unit of Measure	Consignee ID	Zip	Delivery Period (In number of days)
1	SUPPLY- LOW VOLTAGE CABLE : HR-PVC INSULATED, COPPER (PLAIN) CONDUCTOR, PVC TYPE FRLS OUTER SHEATH, 7 CORE X 2.5SQMM ARMOURED CONTROL CABLE	SUPPLY- LOW VOLTAGE CABLE : HR-PVC INSULATED, COPPER (PLAIN) CONDUCTOR, PVC TYPE FRLS OUTER SHEATH, 7 CORE X 2.5SQMM ARMOURED CONTROL CABLE	2500	Meter	con.bhadradri.fgd	507117	63
2	SUPPLY- LOW VOLTAGE CABLE : HR-PVC INSULATED, COPPER (PLAIN) CONDUCTOR, PVC TYPE FRLS OUTER SHEATH, 9 CORE X 2.5SQMM ARMOURED CONTROL CABLE	SUPPLY- LOW VOLTAGE CABLE : HR-PVC INSULATED, COPPER (PLAIN) CONDUCTOR, PVC TYPE FRLS OUTER SHEATH, 9 CORE X 2.5SQMM ARMOURED CONTROL CABLE	2500	Meter	con.bhadradri.fgd	507117	63

FORMAT FOR BREAK UP OF PRICES

Vendor to provide Break Up of prices for each line items as per this format to BHEL.

PROJECT : SPS Package for 400kV Switchyard at 4X270 MW Bhadradri TPS

ITEM : LOW VOLATGE CABLE- LT CONTROL CABLE

S.No.	Description of item.	HSN Code	UNIT for Quantity	QUANTITY	UNIT PRICE EX. WORKS (Rs.)	TOTAL EX. WORKS (Rs.)	GST @ 18% on Total Ex Works (Rs.)	UNIT FREIGHT & INSURANCE UP TO SITE (Rs.)	TOTAL FREIGHT & INSURANCE (Rs.)	GST @ 18% on Total Freight & Insurance (Rs.)	F.O.R. DESTINATION PRICE (Rs.)
1	2	3	4	5	6	7 = 5 * 6	8	9	10 = 5 * 9	11	12 = 7 + 8 + 10 + 11
1	SUPPLY- LOW VOLTAGE CABLE : HR-PVC INSULATED, COPPER (PLAIN) CONDUCTOR, PVC TYPE FRLS OUTER SHEATH, 7 CORE X 2.5SQMM ARMOURED CONTROL CABLE		Meter	2500.00							
2	SUPPLY- LOW VOLTAGE CABLE : HR-PVC INSULATED, COPPER (PLAIN) CONDUCTOR, PVC TYPE FRLS OUTER SHEATH, 9 CORE X 2.5SQMM ARMOURED CONTROL CABLE		Meter	2500.00							
	TOTAL PRICE FOR SUPPLY (in figures)										
	TOTAL PRICE FOR SUPPLY (in words)										

BHEL SPECIAL NIT TERMS & CONDITIONS: - for GeM Portal
Name of Project: - SPS Package for 400kV Switchyard at 4X270 MW Bhadradri TPS
Item: - LOW VOLATGE CABLE- LT CONTROL CABLE

ANNEXURE-A

CONTACT DETAILS OF BIDDER	
Works Address-	
Communication Address-	
Details of contact person for clarification regarding bid:	
Contact Person Name:	
Designation:	
Email Id.:	
Mobile No.:	
Landline No.:	

Signature & Seal of

Supplier

Date:

BHEL SPECIAL NIT TERMS & CONDITIONS: - for GeM Portal
Name of Project: - SPS Package for 400kV Switchyard at 4X270 MW Bhadradri TPS
Item: - LOW VOLATGE CABLE- LT CONTROL CABLE

Annexure-B

Item/Package Name :	**LOW VOLATGE CABLE- LT CONTROL CABLE**
Project:	**SPS Package for 400kV Switchyard at 4X270 MW Bhadradri TPS**
Type of project	**SPS Package for 400kV Switchyard at 4X270 MW Bhadradri TPS**
Percentage of Local Content	***(Bidder to enter the applicable % of local content)***

Format of Self certification regarding Local Content in line with PPP-MII order, order ref no.:- A-1/2021-FSC-Part (5) dated 16.11.2021 issued by Govt of India, Ministry of Power)

Date:……

I _____S/o, D/o, W/o, _____Resident of _____ hereby solemnly affirm and declare as under:

That I will agree to abide by the terms and conditions of the Public Procurement (Preference to Make in India) Order, 2017 (*hereinafter PPP-MII order*) of Government of India issued vide Notification No: P-45021/2/2017-BE-II dated 15/06/2017, its revision dated 04/06/2020 and any subsequent modifications/Amendments**,** if any**.**

That the information furnished hereinafter is correct to the best of my knowledge and belief and I undertake to produce relevant records before the procuring entity/BHEL or any other Government authority for the purpose of assessing the local content of goods/services/works supplied by me for …… *(Enter the name of the Equipment/Item for Project).*

That the local content for all inputs which constitute the said goods/services/works has been verified by me and I am responsible for the correctness of the claims made therein.

That the goods/services/works supplied by me for …… (Enter the name of the Equipment/Item for Project) contains……..% (mention the Local content in %age) Local Content.

That the value addition for the purpose of meeting the 'Minimum Local Content 'has been made by me at …… (*Enter the details of the location(s) at which value addition is made)*.

That in the event of the local content of the goods/services/works mentioned herein is found to be incorrect and not meeting the prescribed supplier class categorization criteria as per said order, based on the assessment of procuring agency (ies)/BHEL/Government Authorities for the purpose of assessing the local content, action shall be taken against me in line with the PPP-MII order and provisions of the Integrity pact/ Bidding Documents.

BHEL SPECIAL NIT TERMS & CONDITIONS: - for GeM Portal
Name of Project: - SPS Package for 400kV Switchyard at 4X270 MW Bhadradri TPS
Item: - LOW VOLATGE CABLE- LT CONTROL CABLE

I agree to maintain the following information in the Company's record for a period of 8 years and shall make this available for verification to any statutory authority.

i. Name and details of the Local Supplier
(Registered Office, Manufacturing unit location, nature of legal entity)

ii. Date on which this certificate is issued

iii. Goods/services/works for which the certificate is produced

iv. Procuring entity to whom the certificate is furnished

v. Percentage of local content claimed and whether it meets the Minimum Local Content prescribed

vi. Name and contact details of the unit of the Local Supplier (s)

vii. Sale Price of the product

viii. Ex-Factory Price of the product

ix. Freight, insurance and handling

x. Total Bill of Material

xi List and total cost value of input used to manufacture the Goods/to provide services/in construction of works

xii. List and total cost of input which are domestically sourced. Value addition certificates from suppliers, if the input is not in-house to be attached

xiii. List and cost of inputs which are imported, directly or indirectly

For and on behalf of…… (Name of firm/entity)

Authorized signatory (To be duly authorized by the Board of Directors)
<Insert Name, Designation and Contact No.>

Annexure-7

Vendor Compliance format in bidder letter head

In view of by order No. 25-111612018-PG, Dated 02.07.2020 of Ministry of Power, GOI

Enquiry No :
Project :
Name of items/Package :

Sl No	Description	Bidder confirmation
1	The vendor should supply all items in strict compliance to directions issued by Ministry of Power, Govt. of India vide order No. 25-111612018-PG dated 02.07.2020.	Agreed / Disagreed / Not Applicable
2	Vendor shall be responsible for conducting all necessary testing in accordance with testing protocol in line with MoP order.	Agreed / Disagreed / Not Applicable
3	All necessary permissions and approvals from Govt of India for import of equipment/ parts/ components shall be submitted, if equipment/ parts/ components are sourced from prior reference countries.	Agreed / Disagreed / Not Applicable

Note: Non-compliance of MoP Order and its subsequent amendment, (if any), by any bidder(s) shall lead for commercial rejection of their bids by BHEL

Bidder's authorized signatory

with stamp & seal

BHEL SPECIAL NIT TERMS & CONDITIONS: - for GeM Portal
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Annexure-C

1) NIL Deviation Format

		Bidder to mention as "NIL deviation"	Remarks if any
1.	Schedule of Commercial Deviation, if any (All terms and conditions shall be as per GeM except as mentioned above)		
2.	Schedule of Technical Deviation, if any (Against Technical Specification)		

2) Further Bidder has to provide the following confirmation with respect to the "terms & Conditions" of the tender:-

The tender documents as appeared in the website (Gem Portal) have not been changed / modified and in case of observance at any stage, it shall be treated as null and void. Further, We have not taken any commercial deviation from tender clauses together with other references as enumerated in the above and we hereby convey our unqualified acceptance to all commercial terms and conditions as stipulated in the tender and NIT.	Bidder to mention as "Confirm"

Note: - If Bidder will not mentioned anything, it will be presumed as "Confirmed ".

BANK GUARANTEE FOR PERFORMANCE SECURITY

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of the Bharat Heavy Electricals Limited [1] (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at BHEL House Siri Fort New Delhi-110049 through its Unit at BHEL, TBG, Noida having awarded to (Name of the Vendor / Contractor / Supplier) having its registered office at_____[2] hereinafter referred to as the 'Contractor/Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No PO No……dated ……[3] valued at Rs……[4] (Rupees ----------)/FC……(in words……..) for ……[5] (hereinafter called the 'Contract') and the Contractor having agreed to provide a Contract Performance Guarantee, equivalent to ……% (…. Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

we, ……, (hereinafter referred to as the Bank), having registered/Head office at ……. and inter alia a branch at …… being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer a maximum amount Rs ---------- (Rupees ----------) without any demur, immediately on a demand from the Employer, .
Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____ _____.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Contractor/ Supplier in any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the contractors/supplier shall have no claim against us for making such payment.

We the ……bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged.

We …….. BANK further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Contractor/Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Contractor/Supplier and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor/Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Contractor/Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

This Guarantee shall remain in force upto and including…….. [6] and shall be extended from time to time for such period as may be desired by Employer.
This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor/Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

Unless a demand or claim under this guarantee is made on us in writing on or before the ……[7]we shall be discharged from all liabilities under this guarantee thereafter.

We …….. BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.
Notwithstanding anything to the contrary contained hereinabove:

a) The liability of the Bank under this Guarantee shall not exceed…… [8]
b) This Guarantee shall be valid up to ……[9]
c) Unless the Bank is served a written claim or demand on or before _____[10] all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

Dated……..

Place of Issue…….

[1] *NAME AND ADDRESS OF EMPLOYER I.e Bharat Heavy Electricals Limited*

[2] *NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.*

[3] *DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE*

[4] *PROJECT/SUPPLY DETAILS*

[5] *BG AMOUNT IN FIGURES AND WORDS*

[6] *VALIDITY DATE*

[7] *DATE OF EXPIRY OF CLAIM PERIOD*

[8] *BG AMOUNT IN FIGURES AND WORDS.*

[9] *VALIDITY DATE*

[10] *DATE OF EXPIRY OF CLAIM PERIOD*

Note:

1. **Units are advised that expiry of claim period may be kept 2/3 months after validity date.**

2. **In Case of Bank Guarantees submitted by Foreign Vendors-**

   a. **From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India)** can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.

   b. **From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor country's Bank)**

   b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks only** will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank (BHEL's Consortium Bank). It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.

   b.2 **In case, Foreign Vendors intend to provide BG from** Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at **sl.no. b.1** will required to be followed.

   b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). In case, of Foreign Vendors, the BG Format provided to them should clearly specify the same.

   b.4 The BG should clearly specify that the demand or other document can be presented in electronic form.

TECHNICAL PRE QUALIFICATION REQUIREMENT

Name of Project : SPS Package for 400kV Switchyard at 4X270 MW Bhadradri TPS

Name of Customer : Telangana State Power Generation Corporation Limited (TSGENCO)

Name of Consultant : ---

Name of Item : LT Control Cables

TECHNICAL PRE QUALIFICATION REQUIREMENT
Sub-Qualifying Requirements for LT Control Cables: Bidder should have manufactured and supplied as on date of Techno-commercial bid opening the following: a. At least 300 km of PVC insulated, PVC sheathed stranded copper conductor 1.1 kV grade cables in one single contract b. At least one (1) km of Flame retardant low smoke cables.

SUPPORTING DOCUMENTS TO BE ATTACHED

Sr	Required Criteria	Supporting Documents to be submitted by bidder along with technical bid
1	Manufacturing	Approved Drawings / GTP / Approved Quality Plan / Factory Inspection Test Report e.t.c
2	Supply	PO / Dispatch clearance / LR / Material Receipt certificate at site / installation or commissioning certificate e.t.c

Notes (General points):

1. Consideration of offer shall be subject to customer's approval of bidder's, if applicable.

2. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self- attested English translated document should also be submitted.

3. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.

4. After satisfactory fulfilment of all the above criteria / requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION PROJECTS ENGINEERING MANAGEMENT

DOCUMENT No.	TB-4-377-510-051D	Rev. No.	0		Prepared	Checked	Approved
TYPE OF DOC.	TECHNICAL SPECIFICATION						
TITLE	LT CONTROL CABLES						
				GROUP	TBEM	W.O. No	
CUSTOMER	TELANGANA STATE POWER GENERATION CORPORATION LTD.						
PROJECTS	SPS PACKAGE FOR 400kV SWITCHYARD AT 4X270 MW BHADRADRI TPS						

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SECTION 1

SCOPE, SPECIFIC TECHNICAL REQUIREMENTS AND QUANTITIES

1.0 SCOPE

This technical specification covers the requirements of design, manufacture, testing at works, packing and dispatch of 1.1kV LT Control Cables. This section covers the specific technical requirements of the cables.

In case of any conflict between the technical details mentioned in this section and the remaining sections of this document, then Section-1 shall prevail and is to be considered as binding requirement.

1.1 The equipment is required for the following Project.

Name of customer : TELANGANA STATE POWER GENERATION CORPORATION LIMITED (TSGENCO).

Name of the Project : SPS PACKAGE 400kV SWITCHYARD AT 4X270 MW BHADRADRI TPS

Refer Section – 2: Equipment Specification.
Section – 3: Project Details and General Specifications.
Section – 4: Standard Technical Data Sheet.
Section – 5: Checklist

2.0 SPECIFIC TECHNICAL PARTICULARS

2.1 PVC Insulated 1.1kV Control cable:

The PVC (70^{o}C) insulated 1100V grade Control shall be of FRLS type conforming to IS: 1554 (Part-I) and its amendments.

S.No	Parameters	Control Cable
1.	Voltage grade of cable	1100 Volts
2.	Material of conductor	Stranded, non-compacted & circular, high conductivity annealed plain copper, conforming to IS: 8130.
3.	Strands	Minimum no. of strands are 7
4.	Conductor insulation.	Extruded HRPVC type-C compound conforming to IS: 5831. The minimum volume resistivity of insulation shall be 3.5 x 10^{14} ohm-cm at 27ºC and 3.5 x 10^{11} OHM-CM at 85 ºC.
5.	Inner Sheath	Extruded HRPVC compound conforming to type ST2 FRLS of IS: 5831 for multicore cables. Single core cables shall have no inner sheath. Filler shall be of same material as of inner sheath i.e. ST2.
6.	Armour**	Galvanised single round steel wire for twin and multicore cables.
7.	Overall sheathing	Extruded FRLSH HRPVC compound conforming to type ST2 of IS: 5831.

(**) Strip armouring method (a) mentioned in Table 5, Page-6 of IS: 1554 (Part 1) - 1988 shall not be accepted for any of the cables

~~**2.2 XLPE insulated Aux. Power cable:**~~

~~The XLPE insulated cable shall be of FRLS type conforming to IS: 7098 (Part-I) and its amendments.~~

~~S.No~~	~~Parameters~~	~~Aux. Power cables~~
~~1.~~	~~Voltage grade of cable~~	~~1100 Volts~~
~~2.~~	~~Material of conductor~~	~~Stranded and compacted plain aluminium of grade H2 and class 2 stranded, high conductivity annealed plain copper for cable sizes up to 2.5 sq.mm conforming to IS: 8130.~~
~~3.~~	~~Conductor insulation.~~	~~Extruded cross linked polyethylene (XLPE) conforming to IS: 7098 (Part-1)~~
~~4.~~	~~Inner Sheath~~	~~Extruded HRPVC FRLS compound conforming to type ST2 of IS: 5831 for multicore cable. Single core cables shall have no inner sheath. Filler shall be of same material as of inner sheath i.e. ST2~~
~~5.~~	~~Armour^^~~	~~Galvanized single round steel wire armour for twin and multicore cables. Non-magnetic hard drawn aluminum single round wire conforming to H4 of IS-8130 latest for single core cables~~
~~6.~~	~~Overall sheathing~~	~~Extruded **FRLSH HRPVC** compound conforming to type ST2 of IS: 5831.~~

~~**(^^) Strip armouring method (a) mentioned in Table 6, Page-6 of IS: 7098 (Part 1) - 1988 shall not be accepted for any of the cables**~~

3.0 BILL OF QUANTITY:

The cable type, size and length requirement shall be as per tables below. ***However, the length of each cable type procured may be subject to a change of + 25% before placement of order. Quantity variation on the total ordered quantity shall be + 25% at contract stage.***

For each size of cables, the standard drum length for control cables shall not be less than 1200 metres (for Drum-1) & **1300 metres (for Drum-2)** ~~& for power cables it shall not be less than 500m~~.Cut lengths for cable marked as (**) below shall be informed during detailed engineering stage. The length per drum shall be subjected to a maximum tolerance of +/- 5% of the standard drum length. ***Some of the cable type might not be ordered at all at contract stage.***

The Employer shall have the option of rejecting cable drums with shorter lengths. For each size, the variance of total quantity, adding all the supplied drum lengths, from the ordered quantity, shall not exceed +/- 2%.

3.1 XLPE insulated 1.1kV Aux Power Cables:

S. No.	Description	Unit	Bhadradri S/s	Kothagudem S/s
1.	2C x 16 sq mm XLPE/ Al. Aux Power Cable	m	0	0
2.	4C x 16 sq mm XLPE/ Al. Aux Power Cable	m	0	0
3.	4C x 35 sq mm XLPE/ Al. Aux Power Cable	m	0	0
4.	3.5C x 70 sq mm XLPE/ Al. Aux Power Cable	m	0	0
5.	3.5C x 95 sq mm XLPE/ Al. Aux Power Cable	m	0	0
6.	3.5 C X 185 Sq.mm XLPE/AL Aux Power Cable**	m	0	0
7.	3.5C x 300sq mm XLPE / Al Aux Power Cable**	m	0	0
8.	1C x 630sq mm XLPE / Al Aux Power Cable **	m	0	0

3.2 PVC insulated 1.1kV Control Cables:

S. No.	Description	Unit	Bhadradri S/s	Kothagudem S/s
1.	2C x 2.5 sq mm HRPVC / Cu. Control Cable	m	0	0
2.	5C x 2.5 sq mm HRPVC / Cu. Control Cable	m	0	0
3.	7C x 2.5 sq mm HRPVC / Cu. Control Cable	m	**2500**	0
4.	9C x 2.5 sq mm HRPVC / Cu. Control Cable	m	**2500**	0
5.	12C x 2.5 sq mm HRPVC / Cu. Control Cable	m	0	0
6.	20C x 2.5 sq mm HRPVC / Cu. Control Cable	m	0	0
7.	4C x 16 sq mm HRPVC / Cu. Control Cable	m	0	0

3.3 Fire survival Power Cables:

S. No.	Description	Unit	Bhadradri S/s	Kothagudem S/s
1.	2C x 35 sq.mm EPR / Cu. FS Power Cable	m	0	0

** Cut length shall be informed during detailed engineering.

4.0 DEVIATIONS:

The bidder shall list all the deviation from the specification separately. Offers without specific deviation will be deemed to be totally in compliance with the specification and NO DEVIATION on any account will be entertained at a later date.

5.0 TESTS:

Tests shall be carried out as per clause 5.00.00 of Section-II.

6.0 TECHNICAL PRE QUALIFYING REQUIREMENT

6.1 Sub-Qualifying Requirements for LT Control Cables:

Bidder should have manufactured and supplied as on date of Techno-commercial bid opening the following:

a. At least 300 km of PVC insulated, PVC sheathed stranded copper conductor 1.1 kV grade cables in one single contract
b. At least one (1) km of Flame retardant low smoke cables.

~~**6.2 Sub-Qualifying Requirement for LT Power Cables**~~

~~Bidder should have manufactured and supplied as on date of Techno-commercial bid opening the following:~~

~~a. At least 100 Kms of aluminium conductor, XLPE insulated, PVC sheathed power cables of 1.1 kV or higher grade in one single contract.~~
~~b. At least 100 km of aluminium conductor, PVC insulated, PVC sheathed power cables of 1.1 kV or higher grade in one single contract.~~
~~c. At least one (1) km of flame retardant low smoke cables.~~
~~d. 1.1 kV or higher grade power cable of minimum 630 sq.mm. Conductor size.~~

Bidder to submit the filled provenness data sheets (attached as Annexure to Section 5: CHECKLIST) along with offer.

7.0 QUALITY PLAN

The contractor shall carry out contract works in accordance with sound quality management principles which shall include such as controls which are necessary to ensure full compliance to all requirements of the specification & applicable international standards. These quality management requirement shall apply to all activities during design, procurement, manufacturing, inspection, testing, packaging, shipping, inland transportation, storage, site erection & commissioning. Contractor shall submit detailed Quality Plan for BHEL / customer's approval.

SECTION-II

CONTENT

TECHNICAL SPECIFICATION FOR CABLES

1.00.00 SCOPE OF SUPPLY

1.01.00 Power and Control Cables shall cover the requirement of entire Plant including the switchyard.

Other cables including special cables, if any, which may be necessary as per proven engineering practice for satisfactory and trouble free operation of the entire cable system of the plant shall also be within the scope of supply. These shall include all such cables for electrical integral with mechanical equipment systems and subsystems.

1.02.00 Cable shall be furnished in accordance with this specification and the following annexures :

a)	11kV & 3.3 kV Power cables	:	Annexure - A
b)	1100V Power Cables	:	Annexure – B
c)	Control Cables	:	Annexure – C
d)	Fire Survival Cables	:	Annexure – D
e)	Flexible Trailing cable	:	Annexure – E

1.03.00 All relevant drawings, data and instruction manuals

2.00.00 CODES & STANDARDS

2.01.00 All cable and materials shall be designed, manufactured and tested in accordance with the latest applicable Indian Standards (IS) and IEC except where modified and/or supplemented by this specification.

2.02.00 Cable and material conforming to any other standard which ensures equal or better quality, may be accepted. In such case, copies of the English version of the standard adopted shall be submitted along with the bid.

2.03.00 The electrical installation shall meet the requirements of Indian Electricity Rules as amended upto date and relevant IS Code of Practice. In addition, other rules and regulations applicable to the work shall be followed.

3.00.00 DESIGN CRITERIA

3.01.00 Cables will be generally laid on ladder type trays or drawn through rigid PVC/GI /HDPE pipe/conduits. Cable tunnels shall be avoided as far as possible, except at locations where overhead trays are not possible, with prior approval of the Owner.

3.02.00 For continuous operation at specified rating, maximum conductor temperature shall be limited to the permissible value as per relevant standard and/or this specification which one is more stringent.

3.03.00 The insulation and sheath materials shall be resistant to oil, acid and alkali and shall be tough enough to withstand mechanical stresses during handling.

3.04.00 Armouring shall be single round wire of galvanized steel for multicore cables and aluminum for single core cable for power and control cables. For fire survival control cable, the armouring over inner sheath shall consist of single layer of wire / round galvanised steel wire as per IS 3975 amended upto date. For Fire survival power cable, Single core cables to be used in A.C. system, the armouring over inner sheath shall consist of single layer of round copper wire, for multi-core cables to be used in A.C. system and single core cables in D.C. System, the armouring over inner sheath shall consist of single layer of round galvanised steel wire.

3.05.00 The outer sheath shall have flame retardant low smoke halogen evolution (FRLSH) characteristics or fire survival characteristics as applicable and shall meet the requirements of additional tests specified for the purpose.

3.06.00 Core identification for multicore cable shall be provided by colour coding.

3.07.00 HT cables shall be manufactured by triple extrusion dry cured (CCV) process using pressurized nitrogen.

4.00.00 SPECIFIC REQUIREMENTS

4.01.00 General Description

All Cables shall be furnished in strict compliance with ratings and requirements and sizes as given in Annexures to this Specification.

4.02.00 Drum Length and Tolerance

The cables shall be supplied in non-returnable packing steel drum for 11 kV & 3.3 kV power cables, wooden drums for 1100V power and control cables, each containing minimum 500 meters length of larger sizes of cable unless specifically asked for. For smaller sizes of cables, each drum shall contain 1000 meters length of cable. Allowable tolerance on individual drum length is $\pm$5%.

4.03.00 Non-Standard Length

Non-standard lengths upto 5% of the total ordered quantity may be accepted. However the Contractor will be required to obtain approval before packing the Cables on drums. Non-standard lengths shall not be less than 100 metres in any case.

4.04.00 Cable identification

Cable identification shall be provided by embossing on every meter on the outer sheath the following :

a) TSGENCO

b) Manufacturer's name or trade mark

c) Voltage grade

d) Year of manufacture

e) Type of insulation, e.g. XLPE/PVC/HR85/IE2 etc.

f) No. of core and size of cables.

g) Type of improved fire performance, e.g. FR/FRLSH/FS

h) IS number

4.05.00 **Packing**

4.05.01 Cables shall be supplied in non returnable drums. The drums shall be of heavy construction. All wooden parts shall be manufactured from seasoned wood. All ferrous parts used shall be treated with suitable rust preventive finish or coating to avoid rusting during transit or storage. Wooden cable drum shall be treated by immersing in copper-nitrate solution.

4.05.02 Cable shall be wound and packed on drums in such a manner that it will be properly sealed and firmly secured to the drum. The ends of each length shall be sealed before shipment.

4.05.03 The cable drums should carry the following details in printed form:

a) TSGENCO

b) Manufacturer's name or trade make

c) Type of cable & voltage grade

d) Year of manufacture

e) Type of insulation e.g. XLPE/HRPVC/IE2

f) No. of core and size of cables

g) Cable code e.g. FRLSH/FS

h) Length of cable on drum

i) No. of length on drum, if more than one

j) Direction of rotation, by arrow

k) Approx. gross mass.

l) IS/IEC number and ISI mark

4.06.00 **Joints and Terminations**

Materials of construction for a joint/termination shall perfectly match with the dielectric chemical and physical characteristics of the associated cables. The material and design concepts shall incorporate a high degree of operating compatibility between the cable and joints. The protective outer covering (jacket) used on the joints/terminations shall have the same qualities as that of the cable outer sheath in terms of ambient/operating temperature withstand capability and resistance to hazardous environments and corrosive elements. Straight through joints and terminations for HT cables shall be heat shrinkable type.

4.07.00 **Selection Criteria**

4.07.01 a) HT and LT power cables shall be selected on the basis of current carrying capacity, short circuit rating and permissible voltage drop.

b) While sizing power cables, following aspects shall be reckoned:

i) Ground/Ambient Air temperature

ii) Depth of Laying.

iii) Power Cables touching each other.

c) Cables, for circuit breaker controlled feeders, shall withstand the short circuit current for the fault clearing time 0.16 Sec. for outgoing feeder, 0.5 Sec. for Tie feeder and 1.0 Sec. for Incomer.

d) HT cables shall be sized based on the following considerations:

Rated current of the equipment and ground/ambient temperature.

Touching/spacing of cable.

Laying on multi-tier racks, trench

Depth of laying.

The voltage drop of the cable , during motor starting condition , shall be limited to 15% and during full load running condition shall be limited to 3 % rated voltage. For BFP motor, the voltage drop during motor starting condition shall be limited to 20% and for Mill motor shall be limited to 10%. Other outgoing feeder / transformer feeder shall be limited to 3% rated voltage.

Short circuits withstand capability

e) For fuse/MCCB/Breaker protected circuits the conductor size shall depend upon full load current subject to voltage drop limited to 3% during running of all feeders and 15% during starting for motor feeders. In addition, transformer regulation shall also be considered for loads fed from 415V PMCC. Incase of other out going line feeder voltage drop shall be limited to 3%.

f) For loads fed from local panels, the total running voltage drop in cable from 415V PMCC to local panel and from local panel to individual motor shall be limited to 3% at full load motor current while the same during starting shall be limited to 15%.

g) As per national electric code (NEC) current rating capacity of motor feeder/cables should be 125% of full load current.

h) For welding receptacle, 3% running drop shall only be considered.

The minimum sizes of L.T cable to be chosen are as below:

AL - 16 mm^2 (3 core) & 16mm^2 (2 core) Cu - 2.5 mm^2

4.07.02 Apart from above, consideration shall also be given to limit the cable to some standard sizes instead of using too many types.

4.07.03 The standard cable sizes, amp capacities, derating factors, as given in IS/IEC will be generally followed.

4.07.04 a) For breaker protected circuits minimum size of the cable shall be as follows:

1100V Power Cable	:	240 Sq mm XLPE AL
3300V Power Cable	:	185 Sq mm XLPE AL
11000V Power Cable	:	240 Sq mm XLPE AL

b) For motor circuits the selection of size will be made ensuring that the cable shall withstand a short circuit fault directly following a second hot start.

4.07.05 For fuse/MCCB protected circuit, the conductor size will depend on full load current subject to voltage drop not exceeding 3%. For practical purposes, the minimum size chosen is as below :

a)	Aluminium	:	6 Sq mm.
b)	Copper	:	2.5 Sq mm.

4.07.06 All control cables shall be 2.5 Sq mm copper cable.

4.07.07 Multicore control cables will generally have spare conductor (s) in accordance with the following chart :

Conductors required	Cables
1 or 2	1-3/C
3 or 4	1-5/C
5 or 6	1-7/C
7 or 8	1-9/C

9 or 10	1-12/C
Above 10	Two or more of above cables

4.07.08 Separate cables for each type of following services/functions as applicable shall be used for each feeder. Same multicore cable using different services shall not be acceptable.

a) Power.

b) Control, interlock and indication.

c) Metering and measuring.

d) Alarm and annunciation.

e) C.T. Cables.

f) V.T. Cables.

4.08.00 **Cable Identification**

Cable identification shall be provided by embossing on the outer sheath the following :

a) Manufacturer's name or trade mark

b) Manufacturer's name or trade mark

c) Voltage grade

d) Year of manufacture

e) Type of insulation, e.g. XLPE, HRPVC & IE2 etc.

f) No. of core & size of cables

g) Type of outer sheath e.g. FRLSH, FS etc.

4.09.00 Selected sizes of power and control cables are given in Annexure-G.

4.10.00 Fire Survival Cables shall be used for important auxiliaries / area as recommended in Standard Technical Specification by CEA for the following services. The fire survival time of these cables shall not be less than 3 hours at 750 deg. C.

i. DC emergency lube oil pump

ii. DC hydrogen seal pump

iii. Turbine lube oil pump/barring gear

iv. DC emergency lighting for main building and service building

v. DC cables for battery to charger & DC distribution boards

vi. Jacking oil pump

vii. Emergency turbine trip in control room

viii. Boiler Turbine : Generator inter trip which include the interconnection between

- Boiler master fuel trip and turbine trip relays
- Generator trip relays & turbine trip relays
- Generator trip relays & generator breaker
- Generator trip relays & field breaker
- Generator trip relays & unit auxiliary transformer breaker
- Incomer cables for DG board, emergency board, DC lighting board etc.

5.00.00 **TESTS**

5.01.00 **Shop Tests**

The Cables shall be subject to shop tests in accordance relevant IS/IEC standards to prove the design and general qualities of the Cables as below:

5.01.01 Routine tests on each drum of cables.

5.01.02 Acceptance Tests on 1 drum out of every 10 drums chosen at random for acceptance of the lot for every size.

5.01.03 Type test on each type and size of cable, inclusive of measurement of armour DC resistance of power cables on one drum out of every 10 drums of cable.

5.02.00 **Additional Tests**

Following additional acceptance tests shall also be performed on each type of cables having outer sheath with improved fire performance (category C1, Type FR/ Category C2, Type FRLSH)

5.02.01 Oxygen index test (both C1 & C2)

The Oxygen index shall not be less than 29.

5.02.02 Temperature Index Test (both C1 & C2)

The measured value of temperature index shall be 21 at a temperature of 250°C for FRLS cables and 350°C for FS cables

5.02.03 Flame Retardance test on single cable and on bunched cables (both C1 & C2)

After the test, there should be no visible damages on the test specimen within 300mm from its upper end.

After burning has ceased, the cables should be wiped clean and the charred or affected portion should not have reached a height exceeding 2.5 meter above the bottom edge of the burner, measured at the front and rear of the cable assembly. 3 Hours fire rating test shall be carried out for FS cable as per IEC-331

5.02.04 Halogen acid gas evolution test (for Category C2)

The level of HCL evolved shall not exceed 20 per cent by weight. HCL evolved shall not be exceed 2% for FS cable.

5.02.05 Smoke density test (for Category C2)

The cables shall meet the requirements of light transmission of minimum 40% after the test. Minimum transmission shall be 80% for FS cable.

5.02.06 Test for specific optical density of smoke

The cables shall meet the requirements of IS/IEC.

5.02.07 Test for rodent & termite repulsion property

The test shall be carried out to note the presence of rodent and termite repelling chemical in PVC compound. Normal procedure is that a few chippings of the PVC compound are slowly ignited in a porcelain dish or crucible in a muffle furnace at about 600°C. The resulting ignited ash is boiled with a little ammonium acetate solution (10%). A drop of aqueous sodium sulphide solution is placed on a thick filter paper and it is allowed to soak. The spot is touched with a drop of above extract. A black spot indicates the presence of anti-termite & rodent compound.

Flammability test shall be carried on finished cables as per following standards-

a) Swedish Chimney test – SS: 424-14-75

b) IEEE std.383 – 1974 latest

c) IEC std. 332-1, 332-3 and IEC 331

6.00.00 DRAWINGS, DATA & MANUALS

6.01.00 Drawings, Data and Manuals shall be submitted with the bid and for approval/ reference and subsequent distribution after the issue of Letter of Intent in quantities and procedures as specified in General condition of contract and/or

6.02.00 **To be submitted with the Bid**

a) Manufacturer's catalogues giving cable construction details and characteristics.

b) Cable current ratings for different types of installation, inclusive of derating factors for ambient temperature, grouping etc.

c) Write-up on Manufacturer's recommended method of splicing, jointing, termination etc. of the cables.

d) Type test reports on 11 KV & 3.3 KV Power, LT FRLSH Power & control, FS power and control cables.

e) Filled-up proposal particulars.

6.03.00 To be submitted for Owner/Purchaser's Approval and Distribution

All relevant drawings and data pertaining to the equipment like GTP, QAP, etc. shall be submitted by the Bidder for the approval of Owner/Owner's consultant. Also refer clause no. 1.19.02(u) of Section-I of Volume – V-A: Technical Specifications for Electrical Equipment & Accessories.

ANNEXURE-A

RATINGS AND REQUIREMENTS
HV POWER CABLES (11 KV & 3.3 KV)

1.0 11000/11000V & 3300/3300V grade 90^{0}C continuous rating under normal condition and 250^{0}C rating under short circuit condition heavy duty XLPE power cable suitable for use in 11000V/3300V non-effectively earthed system conforming to following requirement and in line with IS-7098, IS-8130, IS-5831 & IS-3975, manufactured by Triple Extrusion Dry Cure (CCV) process using pressurized Nitrogen.

1.1	Conductor	:	Stranded and compacted aluminium conductor of grade H2 & class 2 for all sizes, generally conforming to IS: 8130.
1.2	Conductor Screen	:	Extruded semi-conducting compound.
1.3	Insulation	:	Extruded cross linked polyethylene (XLPE) conforming to IS: 7098 (Part-2)
1.4	Insulation Screen	:	Extruded semi-conducting compound with a layer of non-magnetic metallic tape. For single core armoured cables, the armouring shall constitute the metallic part of screening. The semi-conducting tape shall be easily strippable.
1.5	Core Identification	:	By coloured strips applied on (For three core cables) cores.
1.6	Inner Sheath	:	Extruded HRPVC/FRLS compound conforming to type ST2 of IS: 5831 for three core cables. Single core cables shall have inner sheath. Filler material shall also be of type ST2 PVC.
1.7	Armour	:	Galvanised single round steel wire armour for twin and multicore cables. Non-magnetic hard drawn aluminum single round wire conforming to H4 of IS-8130 latest for single core cables
1.8	Overall Sheath	:	Extruded FRLSH HRPVC compound conforming to type ST2 of IS: 5831.
1.9	Drum	:	Steel Drum

ANNEXURE-B

RATINGS AND REQUIREMENTS
LV POWER CABLES [1.1KV (XLPE TYPE)]

1.0 1100 V grade, 90°C continuous rating under normal condition and 250°C under short circuit condition rating, XLPE heavy duty, power cable conforming to following requirement and in line with IS 7098 Part-I. IS 8130 & IS 5831 and IS 3975.

1.1	Conductor	:	Stranded and compacted plain aluminium of grade H2 and class 2 stranded, high conductivity annealed plain copper for cable sizes upto 2.5 mm^2 conforming to IS:8130.
1.2	Insulation	:	Extruded cross-linked polyethylene (XLPE) conforming to IS: 7098 (Part-1)
1.3	Core Identification	:	By color coding
1.4	Inner Sheath	:	Extruded HRPVC FRLS compound conforming to type ST2 of IS: 5831 for multicore cable. Single core cables shall have no inner sheath. Filler shall be of same material as of inner sheath i.e. ST2
1.5	Armour	:	Galvanized single round steel wire armour for twin and multicore cables. Non-magnetic hard drawn aluminum single round wire conforming to H4 of IS-8130 latest for single core cables
1.6	Overall Sheath	:	Extruded FRLSH HRPVC compound conforming to type ST2 of IS: 5831.
1.7	Drum	:	Conforming to IS-10418 (Wooden drum)

ANNEXURE-C

RATINGS AND REQUIREMENTS
CONTROL CABLES

1.0 1100 V grade 85°C continuous rating under normal condition and 160°C under short circuit condition rating HRPVC Control cable (YWY) conforming to following requirement and in line with IS:1554, IS:8130, IS:5831 and IS:3975.

1.1	Conductor	:	Stranded, non-compacted & circular, high conductivity annealed plain copper, generally conforming to IS: 8130.
1.2	Insulation	:	Extruded HRPVC type-C compound conforming to IS: 5831. The minimum volume resistivity of insulation shall be 3.5×10^{14} ohm-cm at $27^{O}C$ and 3.5×10^{11} OHM-CM at $85^{O}C$.
1.3	Core Identification	:	By color coding and numbering at interval of 100mm or less
1.4	Inner sheath	:	Extruded HRPVC compound conforming to type ST2 FRLS of IS: 5831 for multicore cables. Single core cables shall have no inner sheath. Filler shall be of same material as of inner sheath i.e. ST2.
1.5	Armour	:	Galvanised single round steel wire for twin and multicore cables.
1.6	Overall sheath	:	Extruded FRLSH HRPVC compound conforming to type ST2 of IS: 5831.
1.7	Drum	:	Conforming to IS: 10418 (Wooden drum)

ANNEXURE-D

RATINGS AND REQUIREMENTS
(1.1KV GRADE COPPER CONDUCTOR FS POWER CABLES)

1100 V, copper conductor, heat resisting insulation, extruded inner sheath of low smoke and very low halogen content fire resisting material, single layer of copper wire armour for single core/ single layer of round galvanised steel wire for multicore, outer sheath of low smoke and very low halogen content fire resistant material, suitable for minimum temperature of 750 deg.C for 3 hours. The cables shall be in compliance with IEC-60331, Part 11.

RATINGS AND REQUIREMENTS
(1.1KV GRADE COPPER CONDUCTOR FS CONTROL CABLES)

1100 V, copper conductor, heat resisting insulation, extruded inner sheath of low smoke and very low halogen content fire resisting material, single layer of copper wire armour for single core/ single layer of round galvanised steel wire for multicore, outer sheath of low smoke and very low halogen content fire resistant material, suitable for minimum temperature of 750 deg.C for 3 hours. The cables shall be in compliance with IEC-60331, Part 11.

ANNEXURE-E

RATINGS AND REQUIREMENTS
FLEXIBLE TRAILING CABLES

i) 3300 V Unearthed Grade

Flexible trailing cable, annealed plain copper conductor, Class-5 of IS-8130, insulated with EPR, conductor and insulation shielded with EPR, cores screened with ATC wire braiding, cores laid up, HD CSP inner sheathed, proof cotton taped and FRLS HD CSP sheathed overall, conforming to IS:9968. Alternatively PCP sheathing may be acceptable.

ii) 1100 V Grade

1100 V Grade trailing cable shall be plain copper of Class-5 of IS-8130, heat resistant elastomeric compound based on EPR insulation, inner sheath of heat resistant elastomeric compound PCP sheath, nylon cord reinforcement and heat resistant, oil resistant and flame retardant heavy duty elastomeric compound FRLS CSP outer sheath.

ANNEXURE-F

CABLE SIZES

Following sizes are given as a general guideline. Standard sizes as per IEC/IS shall be adopted.

Sl. No.	Cable Size	Conductor	Insulation
1.0	**H. T. CABLES (11kV)**		
1.1	1 core 1000 sq.mm	AL	XLPE (FRLS)
1.1	1 core 630 Sq.mm	AL	XLPE (FRLS)
1.2	3 core 400 Sq.mm	AL	XLPE (FRLS)
1.3	3 core 240 Sq.mm	AL	XLPE (FRLS)
1.4	1 core 70 Sq.mm	AL	XLPE (FRLS)
1.0	**H. T. CABLES (3.3kV)**		
1.1	1 core 630 Sq.mm	AL	XLPE (FRLS)
1.2	3 core 300 Sq.mm	AL	XLPE (FRLS)
1.3	3 core 240 Sq.mm	AL	XLPE (FRLS)
1.4	3 core 185 Sq.mm	AL	XLPE (FRLS)
1.5	1 core 70 Sq.mm	AL	XLPE (FRLS)
2.0	**L. T. POWER CABLES**		
2.1	3 core 2.5 Sq.mm	CU	XLPE (FRLS)
2.2	2 core 16 Sq.mm	AL	XLPE (FRLS)
2.3	3 core 16 Sq.mm	AL	XLPE (FRLS)
2.4	4 core 16 Sq.mm	AL	XLPE (FRLS)
2.5	2 core 35 Sq.mm	AL	XLPE (FRLS)
2.6	3 core 35 Sq.mm	AL	XLPE (FRLS)
2.7	4 core 35 Sq.mm	AL	XLPE (FRLS)
2.8	3 core 70 Sq.mm	AL	XLPE (FRLS)

Sl. No.	Cable Size	Conductor	Insulation
2.9	3.1/2 core 70 Sq.mm	AL	XLPE (FRLS)
2.10	3 core 95 Sq.mm	AL	XLPE (FRLS)
2.11	3.1/2 core 95 Sq.mm	AL	XLPE (FRLS)
2.12	3 core 185 Sq.mm	AL	XLPE (FRLS)
2.13	3.1/2 core 185 Sq.mm	AL	XLPE (FRLS)
2.14	3 core 240 Sq.mm	AL	XLPE (FRLS)
2.15	3.1/2 core 240 Sq.mm	AL	XLPE (FRLS)
2.16	3 core 300 Sq.mm	AL	XLPE (FRLS)
2.17	3.1/2 core 300 Sq.mm	AL	XLPE (FRLS)
2.18	1 core 630 Sq.mm	AL	XLPE (FRLS)
3.0	**CONTROL CABLE**		
3.1	2 core 2.5 Sq.mm	CU	HRPVC (FRLS)
3.2	3 core 2.5 Sq.mm	CU	HRPVC (FRLS)
3.3	5 core 2.5 Sq.mm	CU	HRPVC (FRLS)
3.4	7 core 2.5 Sq.mm	CU	HRPVC (FRLS)
3.5	9 core 2.5 Sq.mm	CU	HRPVC (FRLS)
3.6	12 core 2.5 Sq.mm	CU	HRPVC (FRLS)
3.7	20 core 2.5 Sq.mm	CU	HRPVC (FRLS)
4.0	**FS POWER CABLES**		
4.1	3 core 2.5 Sq.mm	CU	EPR
4.2	2 core 16 Sq.mm	CU	EPR
4.3	3 core 16 Sq.mm	CU	EPR
4.4	4 core 16 Sq.mm	CU	EPR
4.5	2 core 35 Sq.mm	CU	EPR

Sl. No.	Cable Size	Conductor	Insulation
4.6	3 core 35 Sq.mm	CU	EPR
4.7	4 core 35 Sq.mm	CU	EPR
4.8	3 core 95 Sq.mm	CU	EPR
4.9	3.1/2 core 95 Sq.mm	CU	EPR
5.0	**FS CONTROL CABLE**		
5.1	2 core 2.5 Sq.mm	CU	EPR
5.2	3 core 2.5 Sq.mm	CU	EPR
5.3	5 core 2.5 Sq.mm	CU	EPR
5.4	7 core 2.5 Sq.mm	CU	EPR
5.5	9 core 2.5 Sq.mm	CU	EPR
5.6	12 core 2.5 Sq.mm	CU	EPR

SECTION - 3

PROJECT DETAILS AND GENERAL SPECIFICATIONS

GENERAL TECHNICAL REQUIREMENTS

1.0 PROJECT DETAILS

A) Kothagudem TPS

A)

Customer	:	M/s Telangana State Power Generation Corporation Ltd.
Project Title	:	1x800MW Kothagudem Thermal Power Station Stage VII, Unit 12
Project Location	:	Paloncha Village, Khammam District, Telangana
Nearest Railway station	:	Bhadrachalam Road railway station.
Nearest Road Head	:	Khammam 16 km approx., Nearest Highway NH221 (Vijaywada – Jagdalpur Highway).
Nearest Airport	:	Hyderabad (about 200 Km)
Postal Address	:	Chief Engineer (O&M), Kothagudem Thermal Power Station Stage VII, Unit – 12, TSGENCO, Village - Paloncha, Dist. – Khammam, Telangana -507115

B) Bhadradri TPS

Customer	:	M/s Telangana State Power Generation Corporation Ltd.
Project Title	:	4x270MW Bhadradri Thermal Power Station
Project Location	:	Ramanujavaram Village, Khammam District, Telangana
Nearest Railway station	:	Manuguru railway station.
Nearest Road Head	:	Khammam
Nearest Airport	:	Hyderabad (about 345 Km)
Postal Address	:	Chief Engineer (O&M), Bhadradri Thermal Power Station Stage TSGENCO, Village - Ramanujavaram, Dist. – Khammam, Telangana

1.1 SITE CONDITIONS (FOR DESIGN PURPOSES)

1.1.1 SITE CONDITIONS

a). Average rainfall per year : 1124 mm

b). Maximum hourly rainfall intensity : 102 mm

c). Altitude : 1000 m

1.1.2 DESIGN AMBIENT

a). Minimum Temperature : 13.5°C

b). Maximum Temperature : 45°C

c). Design Ambient Temperature : 50 °C

1.1.3 RELATIVE HUMIDITY

a). Maximum :: 85%

1.1.4 WIND PRESSURE (AS PER IS:875-1987)

a). Design wind speed : 44 m/sec.

1.1.5 SEISMIC FACTORS

a). Horizontal Seismic Coefficient : As per latest IS : 1893

b). Vertical Seismic Coefficient : As per latest IS : 1893

} *Zone – III*

1.1.6 ELECTRICAL DATA

		400 kV System	415V AC System	240V AC System	220 V DC System	48 V DC System
1.	Nominal Voltage	400 kV	415 V	240 V	220 V	48 V
2.	Highest System Voltage	420 kV	457 V	264 V	242 V	55 V
3.	No. of phases	3	3	1	NA	NA
4.	Frequency	50 Hz	50 Hz	50 Hz	NA	NA
5.	Voltage variation	± 5%	± 10 %	± 10 %	+10 % to -15%	± 10 %

6.	Neutral Earthing	Effectively Earthed	Solidly Earthed	Solidly Earthed	-	-
7.	Fault Level	50 kA for 1 sec.	50 kA for 1 sec.	50 kA for 1 sec.	15 kA for 1 sec.	-

1.1.7 SYSTEM PARAMETERS

Dry and wet one minute power frequency withstand voltage	630 kVrms
Dry impulse withstand voltage positive and negative	1425 kVpeak
Minimum Total Creepage	25 mm/kV

1.1.8 MINIMUM CLEARENCE (AS PER IS: 10118)

Phase to phase (PP)	4200 mm
Phase to earth (PE)	3500 mm
Section clearance	6500 mm
Minimum ground clearance from plinth level (Plinth level : 300 mm)	8000 mm
Vertical ground clearance to nearest part not at earth potential of an insulator supporting live conductor/ equipment	2440 mm

1.2 INSTRUCTION TO BIDDERS

The bidders shall submit the technical requirements, data and information as per the technical data sheets, provided in Section-4.

The bidders shall furnish catalogues, engineering data, technical information, design documents, drawings etc fully in conformity with the technical specification. It is recognised that the Manufacturer may have standardised on the use of certain components, materials, processes or procedures different than those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered provided such proposals meet the specified designs, standard and performance requirements and are acceptable to the Purchaser. Unless brought out clearly, the Bidder shall be deemed to conform to this specification scrupulously.

1.3 STANDARDS

The works covered by the specification shall be designed, engineered, manufactured, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.

The equipment to be furnished under this specification shall conform to latest issue (with all amendments) of specified standards.

In addition to meeting the specific requirement called for in Sections 1 and 2 of the Technical Specification, the equipment shall also conform to the general requirement of the applicable standards, which shall form an integral part of the specification. The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intended to complement each other. When the specific requirements stipulated in the specifications exceed or differ from those required by the applicable standards, the stipulation of the specification shall take precedence.

Other internationally accepted standards, which ensure equivalent or better performance than that specified in the standards referred, shall also be accepted. The bidder shall submit copies of such standards.

In case governing standard for the equipment is different from IS or IEC, the salient points of difference shall be clearly brought out in the offer along with English language version of standard or relevant extract of the same. The equipment conforming to standards other than IS/IEC shall be subject to Purchaser's / owner's approval. The bidder shall clearly indicate in his bid the specific standards in accordance with which the works will be carried out.

1.4 TYPE TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE

All equipment being supplied shall conform to type tests and shall be subject to routine and acceptance tests in accordance with requirements stipulated under respective sections. Purchaser reserves the right to witness any or all the tests. The Manufacturer shall intimate the Purchaser the detailed programme about the tests at least three (3) weeks in advance in
case of domestic supplies & six (6) weeks in advance in case of foreign supplies. Purchaser reserves the option for getting any or all the type tests repeated on the equipment. The Manufacturer shall also submit type test procedure for approval of the Purchaser.

In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design/manufacturing changes (including substitution of components) or due to non-compliance with the requirement stipulated in the technical specification or any/all additional type tests not carried out without any additional cost implication to the Purchaser.

The price of conducting all tests and additional type tests is deemed to be included in Bid price. In case any bidder indicates that he shall not carry out a particular test, his offer shall be considered incomplete and shall be liable to be rejected.

The purchaser intends to repeat the type tests and additional type tests on cables for which test charges shall be payable as per provision of contract.

The Purchaser, his duly authorised representative and/or outside inspection agency acting on behalf of the Purchaser shall have at all reasonable times free access to the Contractors premises or Works and shall have the power, at all reasonable times to inspect and examine the materials and workmanship of the Works during its manufacture or erection if pert of the Works is being manufactured or assembled at other premises or works, the Manufacturer shall obtain for the Engineer and for his duly authorized representative permission to inspect as if the works were manufactured or assembled on the Manufacturer's own premises or works. Inspection may be made at any stage of manufacture, dispatch or at site at the option of the Purchaser and the equipment if found unsatisfactory due to bad workmanship or quality, material is liable to be rejected.

The Manufacturer shall give the Purchaser/inspector thirty (30) days written notice of any material being ready for testing. Such tests shall be to the Manufacturer's account except for the expenses of the inspector. Unless witnessing of the tests is virtually waived, the Purchaser/ inspector will attend such tests within thirty (30) days of the date of which the equipment is notified as being ready for test/ inspection, failing which the Manufacturer may proceed with the test which shall be deemed to have been made in the Inspector's presence and the Manufacturer shall forthwith forward duly certified copies of test reports in triplicate to the Inspector.

The Purchaser or Inspector shall, within fifteen (15) days from the date of inspection as defined herein, give notice in writing to the Manufacturer, of any objection to any drawings and all or any equipment and workmanship which in his opinion is not in accordance with the Contract. The Manufacturer shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Purchaser/ inspector giving reasons therein, that no modifications are necessary to comply with the Contract.

When the factory tests have been completed at the Manufacturer's works, the Purchaser/ inspector shall issue a certificate to this effect within fifteen (15) days after completion of tests but if the tests are not witnessed by the Purchaser/inspector, the certificate shall be issued within fifteen (15) days of receipt of the Manufacturer's Test certificate by the Engineer/ Inspector. Failure of the Purchaser/inspector to issue such a certificate shall not prevent the Manufacturer from proceeding with the Works. The completion of this test or the issue of the certificate shall not bind the Purchaser to accept the equipment should it, on further tests/ after erection, be found not to comply with the Contract. The equipment shall be dispatched to site only after approval of test reports and issuance of MICC by the Purchaser.

In all cases where the Contract provides for tests whether at the premises or at the works of the Manufacturer or of any Sub-Contractor, the Manufacturer except where otherwise specified shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Purchaser /Inspector or his authorised representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the Purchaser Inspector or to his authorised representative to accomplish testing.

The inspection by Purchaser and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Manufacturer in respect of the agreed quality assurance programme forming a part of the Contract.

The Purchaser will have the right of having at his own expenses any other test(s) of reasonable nature carded out at Manufacturer's premises or at site or in any other place in addition of aforesaid type and routine tests, to satisfy that the material comply with the specification.

The Purchaser reserves the right for getting any field tests not specified in respective sections of the technical specification conducted on the completely assembled equipment at site. The testing equipment for these tests shall be provided by the Purchaser.

1.5 MATERIAL/WORKMANSHIP

1.5.1 GENERAL REQUIREMENT

Where the specification does not contain characteristics with reference to workmanship, equipment, materials and components of the covered Equipment it is understood that the same must be new, of highest grade of the best quality of their kind conforming to best engineering practice and suitable for the purposes for which they are intended.

The design of the Works shall be such that installation, future expansions, replacements and general maintenance may be undertaken with a minimum of time and expenses. Each component shall be designed to be consistent with its duty and suitable factors of safety, subject to mutual agreements and shall be used throughout the design. All joints and fastenings shall be devised, constructed and documented so that the component parts shall be accurately positioned and restrained to fulfil their required function. In general screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from purchaser.

Whenever possible, all similar part of the Works shall be made to gauge and shall also be made interchangeable with similar parts. All spare parts shall be interchangeable with, and shall be made of the same materials and workmanship as the corresponding parts of the Equipment supplied under the Specification. Where feasible, common component units shall be employed in different pieces of equipment in order to minimize spare parts stocking requirements. All equipment of the same type and rating shall be physically and electrically interchangeable.

All materials and equipment shall be installed in strict accordance with the manufacturer's recommendation(s). Only first-class work in accordance with the best modern practices will be accepted. Installation shall be construed as being the erection of equipment at its permanent location. This, unless otherwise specified, shall include unpacking, cleaning and lifting into position, grouting,

levelling, aligning, coupling of or bolting down to previously installed equipment bases/foundations, performing the alignment check and final adjustment prior to initial operation, testing and commissioning in accordance with the manufacturer's tolerances /instructions and the Specification. All factory assembled rotating machinery shall be checked for alignment and adjustments made as necessary to re-establish the manufacture's limits. Suitable guards shall be provided for the protection of personal on all exposed rotating and / or moving machine parts and shall be designed for easy installation and removal for maintenance purpose. The spare equipment(s) shall be installed at designated locations and tested for healthiness.

The Contractor shall apply oil and grease of the proper specification to suit the machinery, as is necessary for the installation of the equipment. Lubricants used for installation purposes shall be drained out and the system flushed through where necessary for applying the lubricant required for operation. The Contractor shall apply all operational lubricants to the equipment installed by him.

All oil, grease and other consumables used in the Works/ Equipment shall be purchased in India unless the Contractor has any special requirement for the specific application of a type of oil or grease not available in India. If such is the case, he shall declare in the proposal where such oil or grease is available. He shall help purchaser in establishing equivalent Indian make and Indian Contractor. The same shall be applicable to other consumables too.

1.5.2 PROVISIONS FOR EXPOSURE TO HOT AND HUMID CLIMATE

Outdoor equipment supplied under the specification shall be suitable for service and storage under tropical conditions of high temperature, high humidity, heavy rainfall and environment favourable to the growth of fungi and mildew. The indoor equipments located in non-air conditioned areas shall also be of same type.

1.6 COLOUR SCHEME AND CODES FOR PIPE SERVICE

The contractor shall propose a colour scheme for those equipment/Items for which the colour scheme has not been specified in the specification for the approval of purchaser. The decision of purchaser shall be final. The scheme shall include:

Finishing colour of Indoor equipment

Finishing colour of Outdoor equipment.

Finish colour of all cubicles.

Finishing colour of various auxiliary system equipment including piping

Finishing colour of various building items.

All steel structures, plates etc. shall be painted with non-corrosive paint on a suitable primer. It may be noted that normally all electrical equipment in switchyard are painted with shade 631 of IS-5. All The indoor cubicles shall be of same colour scheme and for other miscellaneous items, colour scheme will be approved by the purchaser.

1.7 PAINTING

a) All sheet steel work shall be phosphated in accordance with the following procedure and in accordance with IS: 6005 "Code of practice for Phosphating Iron and Steel".

b) Oil, grease, dirt and swerve shall be thoroughly removed from emulsion by cleaning.

c) Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

d) After phosphating, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute bichromate solution and over drying.

e) The phosphate coating shall be sealed by the application of two coats of ready mixed, stoving type zinc chromate primer. The first coat may be "Flash dried" while the second coat shall be stoved.

f) After application of the primer, two coats of finishing epoxy paint shall be applied, each coat followed by stoving. The panel shall have colour conforming to shade 631 of IS-5 for outside and inside of the panel with black colour for base frame.

g) Each coat of primer and finishing paint shall be of a slightly different shade to enable inspection of the painting.

h) Finished painted appearance of panel shall present an asthetically pleasing appearance free from dents and uneven surface.

i) A small quantity of finishing paint shall be supplied for minor touching up required at site after the installation of the panels.

1.8 PROTECTION

a) All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all valves, pipings and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage.

b) All equipment accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion.

c) The parts which are likely to get rusted, due to exposure to weather should also be properly treated and protected in a suitable manner.

d) Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent entry of insects.

1.9 FUNGISTATIC VARNISH

Besides the space heaters, special moisture and fungus resistant varnish shall be applied on the parts, which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where the treatment will interface with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application to the varnish.

1.10 SURFACE FINISH

All interiors and exteriors of tanks, control cubicles and other metal parts shall be throughly cleaned to remove all rust, scales, corrosion, greases or other adhering foreign matter. All steel surfaces in contact with insulating oil as far as accessible shall be painted with not less than two coats of heat resistant, oil insoluble, insulating paints.

All metal surfaces exposed to atmosphere shall be given two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for paintaing shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped or other wise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limit specified. The paint shall not scale off or wrinkle or be removed by abrasion due to normal handling.

1.11 GALVANIZING

All ferrous parts including all sizes of nuts, bolts, Plain and spring washers, support channels, structures, shall be hot dip galvanised conforming to latest version of IS:2629 or any other equivalent authoritative standard. However, hardware less than M12 size shall be electro-galvasized. Minimum weight of zinc coating shall be 610 gm/sq.mm and minimum thickness of coating shall be 85 microns for all items thicker than 6mm. For items lower than 6 mm thickness, requirement of coating shall be as per relevant ASTM.

1.12 AUXILIARY POWER SUPPLY

1.12.1 A.C power supply for auxiliaries will be available at 240 V, 50 C/s 1-phase, 2 wire and 415V, 50 C/s, 3-phase, 4 wire, neutral solidly earthed with variation in frequency of +/-5% and variation in voltage +/-10%

1.12.2 D.C. power supply at 220 V, 2-wire ungrounded will be available 187 V to 242 V.

1.13 INSPECTION AND TESTING

All tests and inspection of the equipment specified shall be performed to the extent and in the manner as stipulated in the relevant standards and in this specification. All type tests/routine tests/acceptance tests as specified shall be conducted in the presence of purchaser. Wherever equipment similar to the one being offered has already been type tested within 5 years from the date

of opening the bid. Type tests done in an independent government laboratory or in the presence of representative of State Electricity Board or other reputed public undertakings, the type test reports of the same shall be submitted for scrutiny /approval. If these are found suitable and technically acceptable, conducting of type tests shall be waived off. Otherwise the subcontractor will have to carry out the type tests without any extra cost and without any delivery implications.

1.14 PACKAGING

Aluminium Tube shall be partially packed with Hessians cloths. Similar items shall be grouped and tied with steel wires/strip for convenient handling during transits.

MARKINGS

The following details are to be clearly indicated in the material forwarding documents:

a) Name and address of the consignee.

b) Purchase order number.

c) Name of supplier/s.

d) Description of equipment / material.
e) Tare weight.

f) Gross weight.

All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. On request of the purchaser, the Contractor shall also submit packing details/associated drawing for any equipment material under his scope of supply, to facilitate the purchaser to repack any equipment/ material at a later date, in case the need arises, while packing all the materials, the limitation from the point of view of availability of Railway wagon sizes in India should be taken account of. The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. Any demurrage wagons and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor. Purchaser takes no responsibility of the availability of the wagons.

1.15 HANDLING, STORING AND INSTALLATION

In accordance with the specific installation instructions as shown on manufacturer's drawings or as directed by the purchaser or his representative, the Contractor shall unload, store, erect, install, wire, test and place into commercial use all the equipment included in the contract. Equipment shall be installed in a neat, workmanlike manner so that it is level, plumb, square and properly aligned and

oriented. Commercial use of switchyard equipment means completion of all site tests specified and energisation at rated voltage.

Contractor may engage manufacturer's Engineers to supervise the unloading, transportation to site, storing, testing and commissioning of the various equipment being procured by them separately. Contractor shall unload, transport, store, erect, test and commission the equipment as per instructions of the manufacturer's supervisory Engineer(s) and shall extend full cooperation to them.

In case of any doubt/misunderstanding as to the correct interpretation of manufacturer's drawings or instructions, necessary clarifications shall be obtained from the purchaser.

Contractor shall be held responsible for any damage to the equipment consequent to not following manufacturer's drawings/instructions correctly.

Where assemblies are supplied in more than one section, contractor shall make all necessary mechanical and electrical connections between sections including the connection between buses. Contractor shall also do necessary adjustments/alignments necessary for proper operation of circuit breakers, isolators and their operating mechanisms. All components shall be protected against damage during unloading, transportation, storage, installation, testing and commissioning. Any equipment damaged due to negligence or carelessness or otherwise shall be replaced by the contractor at his own expenses.

Contractor shall be responsible for examining all the shipment immediately of any damage, shortage, discrepancy etc. for the purpose of Purchaser's information only. The Contractor shall submit to the purchaser every week a report detailing all the receipts during the weeks. However, the Contractor shall be solely responsible for any shortages or damages in transit, handling and/or in storage and erection of the equipment at Site. Any demurrage, pilferage and other such charges claimed by the transporters, railways etc. shall be to the Contractor' account.

The Contractor shall be fully responsible, for the equipment/material until the same is handed over to the purchaser in an operating condition after commissioning. Contractor shall be responsible for the maintenance to the equipment/material while in storage as well as after erection until taken over by Purchaser, as well as protection of the same against theft, element of such nature, corrosion, damages etc.

The Contractor shall be responsible for making suitable indoor storage facilities, to store all equipments which require indoor storage.

The words erection and installation used in the specification are synonymous. Exposed live parts shall be placed high enough above ground to meet the requirements of electrical and other statutory safety codes.

The minimum phase to earth, phase to phase and section clearance along-with other technical parameters for the various switchyard voltage levels to be maintained shall be strictly as per the approved drawings.

The design and workmanship shall be in accordance with the best engineering practices to ensure satisfactory performance throughout the service life. If at any stage during the execution of the Contract, it is observed that the erected equipment(s) do not meet the above minimum clearances, the Contractor shall immediately proceed to correct the discrepancy at his risks and costs.

1.16 TOOLS AND TACKLES

The Contractor shall supply with the equipment one complete set of all special tools and tackles for the erection, assembly, dis-assembly and maintenance of the equipment. However, these tools and tackles shall be separately, packed and brought on to Site.

1.14 EQUIPMENT BASES

A cast iron or welded steel base-plate shall be provided for all rotating equipment, which is to be installed on a concrete base unless otherwise agreed to by the Purchaser. Each base-plate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units shall have a raised lip all around, and shall have threaded drain connections.

1.15 QUALITY

BHEL quality plan to be followed subject to TBEM / customer's approval.

1.16 DOCUMENTATION

1.16.1 DRAWINGS

All drawings shall be prepared in AutoCAD and ultimate documentation would include drawings/documents on CDs. All dimensions and data shall be in SI metric units.

All items of the equipment should be clearly identified by proper part nos. in the contract drawings. Such parts, which are to be dispatched to site from works in dispatchable units and are reassembled at site, should be marked by proper identification marks at works and indicated in the drawings and quantified. The shipping list should be sent along with the general arrangement drawings for engineer's approval. All the items of the shipping list should be identified in the drawing.

The drawing submitted by the supplier shall be reviewed by the purchaser as far as practicable within two weeks of receipt of drawings and shall be modified by the sub-contractor if any modifications and/or corrections are required by the purchaser. The sub-contractor shall incorporate such modifications and / or corrections and submit the final drawings for approval. Any delay arising out of failure of the subcontractor to rectify the drawings shall not alter the contract completion date.

Further work by the subcontractor shall be in strict accordance with these drawings and no deviation shall be allowed without the written approval of the purchaser.

All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings shall be at supplier's risk.

Approval of drawing or work by the purchaser/consultant shall not relieve the subcontractor of any of his responsibilities and liabilities under the contract.

In case of any modifications that may be necessary during erection or commissioning of the equipment, the subcontractor shall carry out modifications in the original drawing & submit 'As Built drawings' and required no. of prints thereof.

1.16.2 INSTRUCTION MANUALS

The supplier shall submit to the purchaser, draft instruction manuals for approval within 30 days of placement of order. The final instruction manuals complete in all respects shall be submitted 60 days before the first shipment of the equipment. The instruction manuals shall contain full details and drawings of all the equipment furnished, the erection procedures, testing, operation & maintenance procedures of the equipment.

If after the commissioning and initial operation of the plant, the instruction manuals require any modification/ addition / changes, the same shall be incorporated and the up- dated final instruction manuals shall be submitted as required.

1.16.3 TITLE BLOCK & DRAWING/ DOCUMENT NUMBERING SCHEME

Title block for drawing / document should be followed as per ANNEXURE-3

1.16.4 DOCUMENTATION SCHEDULE AT CONTRACT STAGE

A.	For approval	No of Copies
	Copies of all drawings with project details, dimension, shipping weights, No. of cases & dimensions, fixing details, tolerance etc.	10
	Copies of type test reports.	5
	Copies of works quality plan & field quality plan.	5

Copies of installation, operation & maintenance manual.	5
Copies of drawings on floppies/CDs	1 set

B. <u>After approval and for information / distribution</u>

Copies of all drawings	15
Copies of installation, operation & maintenance manual including Routine test reports	15
Sets of RTF of drawings	2
CDs of Drgs.	3

C. <u>As Built Drawings</u>

Hard copies of Drawings	15
CDs	3

NOTE:

1. Any revision of drawings / documents shall be submitted in the same no. of copies submitted first time for approval
2. Final drawings / documents shall be submitted in bound volume with customer and project details etc. written on the top.

SECTION 4
CHECK LIST FOR INFORMATION TO BE FURNISHED WITH OFFER RETURN
THIS CHECKLIST AS PART OF THE OFFER DULY SIGNED

The offer may not be considered if the following information and this Checklist are not enclosed with the Offer.

BHEL ENQUIRY. NO:

BIDDER: OFFER REFERENCE:

A) **TECHNICAL PARAMETERS-**

S. No.	Parameters	Data	Confirmation	Remarks
1.	Applicable Standards	Latest IS -1554, 5831, 8130, 3975, 613, ASTM-D2843, ASTM-D2863, IEC60754, IEC60332, IS3961, IS 10418, SS4241475, NEMA WC-70, IEEE-383	Yes	
2.	Rated Voltage	1100V Grade	Yes	
3.	**Construction feature for PVC Control cable**			
3.1	Material of Conductor for Control cables	Stranded, non-compacted & circular, high conductivity annealed plain copper Conductor (with Min. 7 strands)	Yes	
3.2	Conductor Insulation	Extruded HRPVC, Type-C	Yes	
3.3	Inner sheath	Extruded HRPVC, Type ST-2	Yes	
3.4	Armouring for Control Cables	**Galvanised single round steel wire** for twin and multicore cables.	Yes	
3.5	Outer sheath	Extruded **FRLSH HRPVC** compound Type ST-2 For Control cables: Grey colour.	Yes	
~~4.~~	~~**Construction feature for XLPE Aux Power cable**~~			
~~4.1~~	~~Material of Conductor for Power cables~~	~~Stranded and compacted plain aluminium of grade H2 (electrolytic Grade) with min 7 strands; Circular/ Sector shaped~~	~~Yes~~	
~~4.2~~	~~Conductor Insulation~~	~~Extruded cross linked polyethylene (XLPE)~~	~~Yes~~	
~~4.3~~	~~Inner sheath~~	~~Extruded HRPVC FRLS compound conforming to type ST2~~	~~Yes~~	
~~4.4~~	~~Armouring for XLPE Aux Power Cables~~	~~Galvanized single round steel wire Armour for twin and multicore cables. Non-magnetic hard drawn aluminum single round wire conforming to H4 of IS 8130 latest for single core cables~~	~~Yes~~	

S. No	Parameters	Data	Confirmation	Remarks
~~4.5~~	~~Outer sheath~~	~~Extruded **FRLSH HRPVC** compound conforming to type ST2 For Power cables: Black colour.~~	~~Yes~~	
5.	~~**Construction feature for FS Power cable**~~			
5.1	~~Material of Conductor for FS Power cables~~	~~Copper conductor~~	~~Yes~~	
5.2	~~Conductor Insulation~~	~~Heat resisting insulation~~	~~Yes~~	
5.3	~~Inner sheath~~	~~Extruded inner sheath of low smoke and very low halogen content fire resisting material~~	~~Yes~~	
5.4	~~Armouring~~	~~Single layer of copper wire armour for single core/ single layer of round galvanised steel wire for multicore~~	~~Yes~~	
5.5	~~Outer sheath~~	~~Low smoke and very low halogen content fire resistant material, suitable for minimum temperature of 750 deg.C for 3hours.~~	~~Yes~~	
6.	**FRLS properties of Outer sheath**			
6.1	Minimum Oxygen index	29 as per IS 10810 part-58	Yes	
6.2	Minimum Temperature index	250°C	Yes	
6.3	Acid gas emission	Max 20% as per IEC-754-I	Yes	
6.4	Smoke density rating	Max 60% as per ASTDM-2843	Yes	
7.	Allowable Tolerance on overall diameter	**± 2mm**	Yes	
8.	Chemicals added to outer sheath to protect from rodent, vermin and termite attack	Yes	Yes	
9.	Minimum length of each drum of Control Cable	***For Each Size of Cable: Drum-1 : 1200 m; Drum-2 : 1300 m***	Yes	
10.	Tolerance on Cable Length per Drum.	+/-5% of the standard drum length.	Yes	
11.	Overall Tolerance on ordered quantity	+/-2% of total ordered quantity	Yes	
12	Layer of water proof paper shall be applied to surface of the drums and over the outermost cable layer.	Yes	Yes	
13	Minimum bending radius for multicore cables	**12 x D**	Yes	
14	Core Identification / markings		Yes	
14.a	For control cables	By color coding and numbering at interval of 100mm or less	Yes	
~~14.b~~	~~For Power cables~~	~~By color coding~~	~~Yes~~	
15	Filler shall be of same material as of inner sheath i.e. ST2	Yes	Yes	
16	Provenness criteria for LT power & Control cables	Filled provenness data sheets (refer Annexure attached with this checklist) and required doc attached .	Yes	

B) TYPE TESTS

i) Test Shall be carried out as per clause 5.00.00 of section-II **(YES)**

Date:

Signature of the authorized representative of Bidder
Company Seal

Sub-vendor's Name and Address :

To
[Employer's Name & Address]

Dear Sirs,

Sub : Sub-Qualifying Requirement for LT Control Cables

We declare that we have manufactured and supplied the following cables, as on date of LOA I :

(a) Atleast 300 Kms of PVC insulated, PVC sheathed stranded copper conductor 1.1 kV grade control cables in one single contract.

(b) Atleast one (1) km of flame retardant low smoke cables.

(i) The details of above (a) are given as under :

Sl.No.	Particulars
1.	Client name and its address, fax no. & telephone no.
2.	Name & Designation of the responsible person in client's organisation
3.	Name, Address, telephone no. & fax no. of the user of the cables
4.	Name & designation of the responsible person in user's organisation
5.	Contract No. and date

Sl.No.	Particulars	
6.	Details of copper conductor, PVC insulated, PVC sheathed stranded control cables of 1.1 KV grade	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No
	(iii) Rated voltage of cable	..... KV
	(iv) Type of Cable	
	(v) Total Quantity supplied as on date of bid opening in one single contract	..... Km
7.	User's Certificate of Cable enclosed	

(ii) The details of above (b) are given as under :

Sl.No.	Particulars
1.	Client name and its address, fax no. & telephone no.
2.	Name & Designation of the responsible person in client's organisation
3.	Name, Address, telephone no. & fax no. of the user of the cables
4.	Name & designation of the responsible person in user's organisation
5.	Contract No. and date

Sl.No.	Particulars	
6.	Details of Flame Retardant Low Smoke cables	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No
	(iii) Type of Cable	
	(iv) Total Quantity supplied as on date of bid opening	..... Km
7.	User's Certificate of Cable enclosed	

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Note :

1. Continuation sheets of like size and format may be used as per the Sub-vendor's requirement and shall be annexed to this Attachment-~~3A17~~.

2. Sub-vendor is required to attach necessary documents like copies of work order, completion certificates, agreements, drawings etc. in support of the details furnished above.

Annexure-2

Sub-vendor's Name and Address :

To
[Employer's Name & Address]

Dear Sirs,

Sub : Sub-Qualifying Requirement for LT Power Cables

We declare that we have manufactured and supplied the following cables, as on date of LOA :

(a) Atleast 100 Kms of aluminium conductor, XLPE insulated, PVC sheathed power cables of 1.1 kV or higher grade in one single contract.

(b) Atleast 100 km of aluminium conductor, PVC insulated, PVC sheathed power cables of 1.1 kV or higher grade in one single contract.

(c) Atleast one (1) km of flame retardant low smoke cables.

(d) 1.1 kV or higher grade power cable of minimum 630 sq.mm. conductor size.

(i) The details of above (a) are given as under :

Sl.No.	Particulars
1.	Client name and its address, fax no. & telephone no.
2.	Name & Designation of the responsible person in client's organisation
3.	Name, Address, telephone no. & fax no. of the user of the cables

Sl.No.	Particulars	
4.	Name & designation of the responsible person in user's organisation	
5.	Contract No. and date	
6.	Details of aluminium conductor, XLPE insulated, PVC sheathed Power cables of 1.1 KV or higher grade	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No
	(iii) Rated voltage of cable	..... KV
	(iv) Type of Cable	
	(v) Total Quantity supplied as on date of bid opening	..... Km
7.	User's Certificate of Cable enclosed	Yes/No

(ii) The details of above (b) are given as under :

Sl.No.	Particulars
1.	Client name and its address, fax no. & telephone no.
2.	Name & Designation of the responsible person in client's organisation
3.	Name, Address, telephone no. & fax no. of the user of the cables

Sl.No.	Particulars	
4.	Name & designation of the responsible person in user's organisation	
5.	Contract No. and date	
6.	Details of aluminium conductor, PVC insulated, PVC sheathed Power cables of 1.1 KV or higher grade	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No
	(iii) Rated Voltage of Cable	.....KV
	(iv) Type of Cable	
	(v) Total Quantity supplied as on date of bid opening in one single contract	..... Km
7.	User's Certificate of Cable enclosed	Yes/No

(iii) The details of above (c) are given as under :

Sl.No.	Particulars
1.	Client name and its address, fax no. & telephone no.
2.	Name & Designation of the responsible person in client's organisation
3.	Name, Address, telephone no. & fax no. of the user of the cables

Sl.No.	Particulars	
4.	Name & designation of the responsible person in user's organisation	
5.	Contract No. and date	
6.	Details of Flame Retardant Low Smoke cables	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No
	(iii) Type of Cable	
	(iv) Total Quantity supplied as on date of bid opening	..... Km
7.	User's Certificate of Cable enclosed	Yes/No

(iv) The details of above (d) are given as under :

Sl.No.	Particulars
1.	Client name and its address, fax no. & telephone no.
2.	Name & Designation of the responsible person in client's organisation
3.	Name, Address, telephone no. & fax no. of the user of the cables
4.	Name & designation of the responsible person in user's organisation
5.	Contract No. and date

Sl.No.	Particulars	
6.	Details of 1.1 kV or higher grade power cable of aluminium 630 sq.mm conductor size	
	(i) Manufactured	Yes/No
	(ii) Supplied	Yes/No
	(iii) Rated Voltage of Cable	..... kV
	(iv) Size of Cable	..... sq.mm.
7.	User's Certificate of Cable enclosed	Yes/No

Date :

Place :

(Signature).....

(Printed Name).....

(Designation).....

(Common seal).....

Note :

1. Continuation sheets of like size and format may be used as per the Sub-vendor's requirement and shall be annexed to this Attachment-~~3A18.~~

2. Sub-vendor is required to attach necessary documents like copies of work order, completion certificates, agreements, drawings etc. in support of the details furnished above.