



TRANSMISSION CORPORATION OF TELANGANA LIMITED
VIDYUT SOUDHA::HYDERABAD – 82

From
The Chief Engineer (P&MM),
TSTRANSCO,
Vidyut Soudha,
Hyderabad – 500 082.

To
M/s BHEL Regional Operations Division.,
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PO.No.4500003060/CE/P&MM/SE(P&MM)/DE13/TSPMM12-09/2021/BHEL/D.No.39.,Dt. 13-10-2021

Sirs,

Sub: TSTRANSCO- Tender Specification no. TSPMM12-09/2021 - Supply, erection, testing and commissioning of 1 No. 80MVA, 420 kV Bus Reactor and 1 No. 63 MVA 420kV Switchable Line Reactor(with NGR) under PSDF Scheme - Detailed Purchase Order – Issued – Reg

Ref: 1) Tender Specification No. TSPMM12-09/2021.
2) Your offer against Tender Specification No. TSPMM12-09/2021.
3) Lr.No.ROD/SEC/CO/PT/CM/NE/04, dt:12.08.2021
4) LOI. No.CE/P&MM/SE(P&MM)/DE13/ TSPMM12-09/2021/BHEL/D.No.28., Dt.04-09-2021
5) Lr.No.ROD-21E-TSTRANSCO,dt:18.09.2021

* * *

I, acting for and on behalf and by the order and direction of Transmission Corporation of Telangana Limited (hereinafter called the TSTRANSCO), accept the prices offered by you against Specification No. TSPMM12-09/2021 through e-procurement, for supply, erection, testing and commissioning of the equipment detailed in Clause-2 below, with the terms and conditions as per Specification TSPMM12-09/2021. This Purchase order is issued in confirmation of Letter of Intent issued under reference (4) cited, accepted by you vide your letter under ref (5) cited.

1.0. SCOPE OF CONTRACT:

The scope of the Contract covers design, engineering, manufacturing, type testing, delivery at site, erection, testing and commissioning of 1 No. 80MVA, 420 kV Bus Reactor and 1 No.63 MVA 420kV Switchable Line Reactor(with NGR) under PSDF Scheme against Tender Specification No. TSPMM12-09/2021 complete with all accessories and fittings, auxiliaries with control cabinets, marshalling boxes, first fill of insulating oil in non-returnable containers, tools and tackles, terminal connectors. The scope covers packing, forwarding, handling, loading, delivery at site, including unloading of 1 No. 80MVA, 420 kV Bus Reactor and 1 No.63 MVA 420kV Switchable Line Reactor(with NGR).

The scope also includes supply of 1 No. intelligent online continuous Gas-in-Oil Incipient Fault Monitoring device for the 1 No. 80MVA, 420 kV Bus Reactor and 1 No. 63 MVA 420kV Switchable Line Reactor(with NGR) , water PPM and shall include an Intelligent Transmitter with no moving parts, or pumps, to detect and continuously monitor the evaluation of the values of 8 gases i.e hydrogen, carbon monoxide, acetylene, ethylene and water ppm etc.. through a gas permeable membrane include a communications controller, to provide remote and local communications, dual level visual alarm indicators and continuous display and a heat dissipater shall be mounted between the valve and the transmitter. The intelligent on-line detection and monitoring sensor shall be located on the cooler return pipe or at another by the sensor manufacturer accepted location at the reactor. It should work for both AC/DC. It should not fail for high voltage induction(400kv switch yard) or for any voltage fluctuations communication protocols shall be of open protocols. It shall be provided with analysis software and latest laptop. Provision for load compensation shall be included.

DGA device--for on line detection of gases in the transformer and 8 gases are CO, CO₂, methane, ethylene, ethane, acetylene, H₂, O₂, N₂(additional) and Moisture content. It should evaluate as per load i.e load compensation facility shall be included. Analog inputs, digital outputs, communication interfaces RS485, FO, RJ45 with modbus, IEC61850 protocols. It shall work with 220VAC/

DGA ANALYSIS SOFTWARE WITH LATEST LAPTOP SHALL BE SUPPLIED

Supply, Erection of all the required interface cables/LIU's etc and SAS integration support for DGA shall be in Reactor supplier scope. However integration of DGA device with SAS shall be in Substation/bay construction contractor scope.

2.0 SCHEDULE OF SUPPLY, ERECTION, TESTING AND COMMISSIONING:

2.1 a) Schedule of Quantities and Prices for supply:

The total prices for 1 No. 80MVA, 420 kV Bus Reactor and 1 No. 63 MVA 420kV Switchable Line Reactor(with NGR) and first fill of oil are indicated as follows and this purchase contract award order is governed by the terms and conditions as stipulated therein and shall be read with specifications against Tender Specification No. TSPMM12-09/2021 .

Supply, Erection, Testing and Commissioning of 1 No. 80MVA, 420 kV Bus Reactor and 1 No.63 MVA 420kV Switchable Line Reactor(with NGR):

| Sl. No. | Description | Unit | Unit Ex-works Price (Rs.) | Unit Freight (Rs.) | Packin g and Forwarding | Unit Insuranc e (Rs.) | Unit prices for supply without GST | GST on supply portion @ 18%) | Unit FADs price for supply portion with GST | Unit Erection, testing & commissioni ng charges without GST | GST @ 18% on Erection, testing & commission ing portion | Sub-Total for Erection with GST | Unit Landed cost with GST (10+ 13) | TOTAL FAD Price (Col.15=(3) X (14) (Rs) |
|---|--|------|---------------------------|--------------------|-------------------------|-----------------------|------------------------------------|------------------------------|---|---|---|---------------------------------|------------------------------------|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1 | Design, Engineering, Manufacture, assembly, shop testing, supply and delivery at sites including packing, forwarding, handling at port of embarkation, local freight, insurance and unloading at site of complete set of. | | | | | | | | | | | | | |
| a) | 80MVA _r , 420 kV Bus Reactor with NIFPS, all accessories, fittings including Gas-in-oil incipient fault monitor, maintenance tools, tackles and terminal connectors etc. as per Technical Specifications and including insulating Oil in Non-returnable containers for first filling required for 80MVA _r , 420 kV Bus Reactor | 1 | 5,71,80,000.00 | 20,00,000.00 | 0.00 | 0.00 | 5,91,80,000.00 | 1,06,52,400.00 | 6,98,32,400.00 | 15,00,000.00 | 2,70,000.00 | 17,70,000.00 | 7,16,02,400.00 | 7,16,02,400.00 |
| b) | 63 MVA _r 420kV Switchable Line Reactor(with NGR)with NIFPS,all accessories, fittings including Gas-in-oil incipient fault monitor, maintenance tools, tackles and terminal connectors etc. as per Technical Specifications and including insulating Oil in Non-returnable containers for first filling required for 63 MVA _r 420kV Switchable Line Reactor(with NGR) | 1 | 5,14,50,000.00 | 20,00,000.00 | 0.00 | 0.00 | 5,34,50,000.00 | 96,21,000.00 | 6,30,71,000.00 | 15,00,000.00 | 2,70,000.00 | 17,70,000.00 | 6,48,41,000.00 | 6,48,41,000.00 |
| Total Contract value for supply erection testing & commissioning of 1 No. 80MVA _r , 420 kV Bus Reactor and 1 No.63 MVA _r 420kV Switchable Line Reactor(with NGR): | | | | | | | | | | | | | Rs. 13,64,43,400.00 | |
| (Rupees Thirteen Crore Sixty Four Lakhs Forty Three Thousand Four Hundred Only) | | | | | | | | | | | | | | |

Chief Engineer/P&MM

- b) The prices accepted above are for delivery at destination of substation site/ stores. The ex-works prices for Reactor with oil are variable as per IEEMA with a ceiling of 50% on positive side and without any ceiling limit on negative side. The date of bid opening is 21-06-2021. The base indices will be as prevailing on 1-05-2021. The applicable IEEMA PVC formulae are indicated in Annexure.
- c) It is your responsibility to arrange transit insurance and settle the insurance claims if any. The transit insurance shall be at least for an amount equal to 100% of the cost of the goods and cover a storage period of 45 days thereafter.
- d) The price is inclusive of all incidental charges such as packing, forwarding, handling, loading and unloading at site, besides providing drawings and instruction manuals etc.
- e) You shall claim prices indicated in Contract Award Order in your regular bills. The price variation bills shall be paid separately after approval of relevant price variation claims and after deduction of recoveries/penalties if any against the supplies made. The penalty if any, arising due to delay in supplies over the contract delivery period should be deducted invariably at the rate indicated in Penalty clause of this order while raising bills for the supplies made.
- f) The Ex-works Prices accepted above are exclusive of GST which will be paid extra at the rates ruling on the date of dispatch for dispatches within the stipulated delivery indicated in this contract award order. For dispatches beyond the stipulated delivery period, the rates ruling at the time of actual dispatches or the rates ruling during specified delivery period whichever is less will be applicable.
- g) The present rate of GST @18% is applicable.
All Taxes shall be first paid by the supplier which will be reimbursed by TSTransco, at actual on submission of documentary evidence limiting to the respective amounts indicated in Clause No.2.1(a). However statutory variations as specified below.
- i) Any variation up or down in statutory levy or new levies introduced after tender calling date under this specification will be to the account of TSTransco provided that in cases where delivery schedule is not adhered to by the supplier and there are upward variation / revision after the agreed delivered date the supplier will bear the impact of such levies and if there is downward variation / revision the TSTransco will be given credit to that extent.
- ii) GST and any other levies payable by the contractor in respect of the transaction between the contractor and their vendors/sub-suppliers while procuring any components, subassemblies, raw materials and equipment are included in the bid price and no claim on this behalf will be entertained by the Purchaser.
- h) The supplier shall be liable and responsible for payment of Taxes such as Indian Income Tax, Surcharge/cess on Income Tax and any other corporate tax, if attracted under provision of the Law. The Purchaser as directed by the Concerned Department will make deduction towards Income Tax and other taxes at source.
- i) **TCS:** "TCS at prevailing rates is applicable on any payment made (not applicable on ETC charges), if company's aggregate sales consideration during the relevant financial year exceeds rupees fifty lakhs and total sales, gross receipts or total turnover including GST if any exceeds Rupees Ten Crores in the financial year immediately preceding the financial year of subject sales. The Payment of TCS shall be subjected to furnishing of necessary documents. The PAN No. of TSTransco is "AAFCT0166J". The stipulated conditions are to be verified by the DDOs while processing the bills.
- j) Vendor approval shall be obtained for all bought out items and shall be submitted along with Quality Plan and Drawings for approval. For the purpose of verification of the equipment, detailed bill of materials for each Equipment shall be furnished. The equipments shall be supplied in complete shape as per the Contract Award order, correspondence cited and the Tender Specification No.TSPMM12-09/2021.

2.2 Schedule for Erection, Testing and Commissioning:

- a) The quantities and prices for erection are indicated as below: This Contract Award Order is governed by the terms and conditions as stipulated in clause 1.0 to clause 50.0.

| Description | Qty. in Nos. | Unit Erection, testing & commissioning charges without GST (Rs.) | GST @ 18% on Erection, testing & commissioning portion (Rs.) | Unit Erection, testing & commissioning with (Rs.) | Total Price incl. Taxes Coln. (2) x (5) (Rs.) |
|---|--------------|--|--|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) |
| Total cost of supply to site/stores, storage, Handling, Erection, Testing & Commissioning of 80MVar, 420 kV Bus Reactor with all accessories and fittings including insurance during storage and erection and all others as specified in the tender specification. | 1 | 15,00,000.00 | 2,70,000.00 | 17,70,000.00 | 17,70,000.00 |
| Total cost of supply to site/stores, storage, Handling, Erection, Testing & Commissioning of 63 MVar 420kV Switchable Line Reactor(with NGR) with all accessories and fittings including insurance during storage and erection and all others as specified in the tender specification. | 1 | 15,00,000.00 | 2,70,000.00 | 17,70,000.00 | 17,70,000.00 |
| | | | | | |
| TOTAL | | | | | 35,40,000.00 |

(Rupees Thirty Five Lakhs, Forty Thousand only)

- b) **PRICES:** The prices indicated above are FIRM and no price adjustment what so ever is payable. No claim for idle period resulting from any 'Force Majeure' condition shall be entertained by the purchaser.
- c) The prices are inclusive of handling charges, transportation to the site and insurance (as per Clause No.29.0, Section-VIII "General Conditions for Erection" of Tender specification No.TSPMM12-09/2021) to cover the transport to site/stores and storage at site/stores.
- d) **INCOME TAX:** Income Tax at source will be deducted at the prevailing rate as per statutory variations on gross value of contract.
- e) Any variation up or down in statutory levy or new levy introduced after tender calling date of contract shall be to the account of the TSTRANSCO provided that in cases where delivery schedule is not adhered to by the Bidder and there is upward variation/ revision after the agreed delivery date, the supplier shall bear the impact of such levies and if there is downward variation/ revision the TSTRANSCO shall be given credit to that extent.

3.0 **Delivery Schedule:**

- a) **For Supply:** To supply 1 No. 80MVA_r , 420 kV Bus Reactor and 1 No 63 MVA_r 420kV Switchable Line Reactor(with NGR) including all accessories within Five months from the date of issue of Letter of Intent.
- b) **Erection, Testing and Commissioning:** to be completed within 2 months from the date of supply/readiness of site The readiness of the sites will be intimated separately by TSTransco field officers.

Accordingly, the delivery schedule of Supply & Erection, Testing and Commissioning of Reactors is as follows:

| Sl No. | Supply schedule date | Erection, Testing & Commissioning schedule date |
|---|----------------------|--|
| 80MVA _r , 420 kV Bus Reactor | 03.02.2022 | To be completed within 2 months from the date of supply/readiness of site(s) |
| 63 MVA _r 420kV Switchable Line Reactor(with NGR) | 03.02.2022 | |

You are also requested to advance the deliveries as these Reactors are urgently required for ongoing works. As soon as dispatch is effected, the details with serial Nos. of Reactors shall be sent within a week.

4.0 **TERMS OF PAYMENT:**

4.1 **For supply of material / equipment:**

- a. 80% payment towards the equipment cost will be arranged within 45days for the Material/equipment supplied in complete shape subject to their delivery as per the schedule of work and on its receipt in good condition at the destination/stores in good condition (i.e., from check measurement date in Form-13). The supplier will have to predefine the Bank Account details after receipt of LOI and before entering into contract for electronic transfer of payment.
- b. 10% payment will be made after erection of equipment/material.
- c. Balance 10% payment along with the total erection & commissioning charges will be made after commissioning of equipment/material.

4.2. **For Erection:**

- a) 90% of payment of the erection charges agreed will be released against the submission of bills for the portion of the works completed. Out of the balance 10% amounts, 5% payments will be released after completion of all the works & submission of Material Accounts.
- b) The final 5% payments of erection charges agreed will be released after the completion of 'Guarantee period' or on submission of BG for the equivalent value, which shall be valid for the Guarantee period and also provide two months claim period thereafter. The date of commissioning/energizing the equipment will not be considered for reckoning the performance guarantee period. The date of completion of all the works and commissioning & energizing will only be considered for reckoning the performance guarantee period.

The release of payment mentioned above is subject to submission of performance security as per Clause No.39 of the Tender Specification by the supplier.

- c) By way of Electronic Fund Transfer (EFT) with RTGS the details of Bank Account to be furnished by M/s BHEL, is as below.

| | | | |
|-----|---------------------------|---|--------------------|
| 1. | Name of the Bank | : | CANARA BANK |
| 2. | Name of the Branch | : | SAROJINI DEVI ROAD |
| 3. | Branch code | : | 0845 |
| 4. | City | : | SECUNDERABAD |
| 5. | Account No. | : | 0845201000269 |
| 6. | MICR No. | : | 500015026 |
| 7. | IFSC No. | : | CNRB0000845 |
| 8. | Income Tax PAN Number | : | AAACB4146P |
| 9. | GST Registration Number | : | 23AAACB4146P1ZN |
| 10. | Date of GST Registration | : | 01-07-2017 |
| 11. | Place of GST Registration | : | Bhopal |

The Bank details as above are final and shall not be revoked under any circumstances. The Bank Charges will be made to the account of M/s. BHEL Regional Operations Division., Secundrabad

- d) The supplier should invariably submit test certificates and other documents, the purchaser specifies as soon as dispatch is made so that they can be checked and approved well in advance.
- e) The performance guarantee to be executed in accordance with this specification will be furnished on a stamp paper of value Rs.100/-. The Bank Guarantee will be extended if required suitably. In accordance with the provisions of Clause in the Specification.
- f) If the supplier has received any over payments by mistake or if any amounts are due to TSTransco due to any other reason, when it is not possible to recover such amounts under the contract resulting out of this specification, the TSTransco reserves the right to collect the same from any other amount and / or Bank Guarantees given by the company due to or with TSTransco.
- g) When the supplier does not at any time, fulfill his obligations in replacing / rectifying etc. of the damaged / defective materials in part or whole promptly to the satisfaction of the TSTransco Officers, the TSTransco reserves the right not to accept the bills against subsequent dispatches made by the supplier and only the supplier will be responsible for any demurrages, wharfages or damage occurring to the consignments so dispatched.
- h) Any incidental charge such as stamp duty, bank charges etc, shall be to the suppliers account and any charges in relation there to shall not be included in the bills submitted to the TSTransco.
- i) All payments will be made in non-convertible Indian Rupees.
- j) The Bank details as above are final and shall not be revoked under any circumstances.

5.0 PENALTY FOR LATE DELIVERY:

5.1 Supply:

The time for and the dates for delivery mentioned in the contract will be deemed to be the essence of the contract. Subject to force majeure Clause of the specification, if the Supplier fails to deliver any or all of the Materials / equipment or to perform the Services within the period(s) specified in the Contract, the Purchaser will, without prejudice to its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to 0.5% per week on the undelivered portion subject to a maximum of 5% of the total value of the contract.

Once the maximum is reached the Purchaser may consider termination of the contract.

The check measurement date in Form-13 i.e., the date of receipt of materials at destination stores in good condition will be taken as the date of delivery. Materials/ Equipment which are not of acceptable quality or are not confirming to the specification would be deemed to be not delivered. For penalty, the number of days would be rounded off to the nearest week and penalty calculated accordingly.

The penalty specified above will be levied and would be adjusted against subsequent pending bills.

5.2 For Erection, Testing and Commissioning:

The time stipulated in the contract for the execution and completion of the works shall be deemed to be the essence of the contract. In the event contractor fails to execute, complete and deliver the works within the time specified in the contract, then contractor shall pay to owner as and by way of liquidated penalty an amount equal to 0.5 % of the not delivered works / incidental services not performed within the prescribed time limit for every week of delay or part thereof, subject to a maximum of 5(Five) % of the total value of the contract. Purchaser may, without prejudice to any method of recover, deduct the amount for such penalty from any amount due or which may become due to contractor. In the event of extension of time being granted by owner in writing for completion of the work, stated in relevant Clause of the specification, this clause will be applicable after the expiry of such extension period.

6.0 FORCE MAJEURE:

- 6.1 "Force Majeure" means an event beyond the control of the contractor and not involving the contractor's fault or negligence and not foreseeable. Such events may include, but are not restricted to wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.
- 6.2 If a force majeure situation arises, the contractor shall promptly notify the Purchaser in writing of such condition and cause thereof. Unless otherwise directed by the Purchaser in writing, the contractor shall continue to perform obligations under the contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the force majeure event. **No price variance will be allowed during the period of force majeure.**
- 6.3 The contractor or the purchaser shall not be liable for delays in performing his obligations resulting from any Force Majeure cause as referred to and/or defined above.

7.0 PERFORMANCE SECURITY:

Performance security shall be furnished in the name of TSTransco for an amount of 3% (i.e for Rs. **40,93,302/-**) of the contract value for proper fulfillment of the contract, which will include the warranty period and completion of performance obligations including Warranty obligations. The Performance security will cover 60 days beyond the date of completion of performance obligations including Warranty obligations.

In the event of any correction of defects or replacement of defective material during the warranty period, the warranty for the corrected/replaced material will be extended to a further period of 30 months and the Performance Bank Guarantee for proportionate value will be extended 60 days over and above the extended warranty period.

It is entirely your responsibility to extend the validity of this Bank Guarantee to cover the period of guarantee well before its expiry. **Bank Guarantees for insufficient Period/ insufficient Value will not be accepted.**

The Performance security will be

- (a) A bank guarantee issued by **State Bank of India or its associate Banks/ Nationalised Banks** acceptable to the Purchaser, in the form provided in the bidding documents.
- (b) A banker's cheque or crossed DD or Pay Order payable at the Head quarter of the Purchaser in favour of the Purchaser drawn on State Bank of India or its associate Banks/ Nationalised Banks.

8.0 FREIGHT:

M/s. BHEL must dispatch the equipment freight pre-paid and claim reimbursement from TSTransco limiting the prices indicated in Clause No.2.1(a) as indicated in the price schedule of this Contract Award Order.

9.0 INSURANCE:

- a) The Materials / equipment supplied under the Contract will be fully insured against loss or damage incidental to manufacture or acquisition, transportation and delivery and also storage for 45 days at destination stores/sites before taking into stock.
- b) The insurance will be in an amount equal to 100% FADS value of Materials / equipment on all risks basis. The policy will have a provision for extension to cover further storage if necessary at destination stores / site at TSTRANSCO's cost, the beneficiary shall be TSTransco.
- c) The Bidder shall a) Initiate and pursue insurance claim till settlement and b) Promptly arrange for repair and or replacement of any damaged items in full irrespective of settlement of insurance claim by the under writers. (c) All costs because of insurance liabilities covered under the contract will be to supplier's account. The supplier shall provide the Purchaser with a copy of all insurance policies and documents taken out by him in pursuance of 'Contract'. Such copies of documents shall be submitted to the purchaser immediately after such insurance coverage. The supplier shall also inform the Purchaser in writing at least sixty (60) days in advance, regarding the expiry, cancellation and /or change in any of such documents and ensure revalidation/renewal etc., as may be necessary well in time.
- d) The risks that are to be covered under the insurance shall be comprehensive and shall include but not limited to, the loss or damage in transit, storage, due to theft, pilferage riot, civil commotion, weather conditions, accident of all kinds, fire, flood, war risk (during ocean transportation) bad or rough handling etc. The scope of such insurance shall cover the entire contract value.

10.0 PACKING AND FORWARDING:

- 10.1 The equipment shall be packed suitable for vertical/horizontal transport as the case may be and suitable to withstand handling during transport and outdoor storage during transit. You shall be responsible for any damages to the equipment during transit, due to improper and inadequate packing. The easily damageable equipment/material shall be carefully packed and marked with the appropriate caution symbol. Wherever necessary proper arrangement for lifting such as lifting hooks etc., shall be provided. Any equipment/material found short inside the packing cases shall be supplied by you without any extra cost. The replacement of damaged equipment will not be linked with settlement of insurance claim.
- 10.2 In general each package shall be marked to indicate the following information.
 - a) Name of the supplier
 - b) Details of items in the package
 - c) Name of the consignee
 - d) Contract Award Order Number
 - e) Cost of the Consignment
 - f) Gross, net and tare weight of the items
 - g) Destination
 - h) The items and quantity so far supplied including the present package.
 - i) Handling, storage and unpacking instructions. Bill of materials of each package.
 - j) Sign showing top/bottom side of the crate.

- 10.3 M/s. BHEL (contractor) shall despatch the Reactors filled with dry air at positive pressure. M/s. BHEL shall ensure that the packing and bill of material are approved by the Purchaser before dispatching. The Reactor has to be transported either oil filled or filled with nitrogen gas according to the standard practice of the supplier. **If the Reactor is filled with inert gas, detailed instructions must be given for checking the gas pressure and tightness of gasket, as soon as the reactor arrives at site.** Weight of the Reactor shall be so designed, so that the Reactor can be transported by road. During transportation, impact recorder shall be installed to assess the impact of shocks on coils, core etc., during transit.
- 10.4 All removable external accessories and other components susceptible to damage if transported mounted on the equipment shall be dismantled, adequately packed and shipped separately. All openings thus resulted shall be sealed by means of temporary steel plates secured properly to avoid loosening during transit or storage.
- 10.5 Packing shall be sturdy and adequate to protect all assemblies, components, auxiliary devices and accessories from injury by corrosion, dampness, heavy rains, breakage and vibration encountered at the plant site.
- 10.6 Spare parts shall be packed separately and clearly marked and shall be delivered along with the main equipment.
- 10.7 Delivery documents as detailed in relevant clause of Section 'Special Conditions of Contract' of the Specification shall be enclosed along with certificate of insurance and proof of payment for the insurance premium.

11.0. TERMINATION FOR DEFAULT:

- a) The Purchaser, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, may terminate this Contract in whole or in part:
- i) If the Supplier fails to deliver any or all of the Materials / equipment within the period(s) specified in the Contract, or within any extension thereof granted by the Purchaser.
- ii) If the Supplier fails to perform any other obligation(s) under the Contract. If the Supplier, in the judgment of the Purchaser has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.
- b) In the event the Purchaser terminates the Contract in whole or in part, the Purchaser may procure, upon such terms and in such manner, as it deems appropriate, Materials / equipment or services similar to those undelivered, and the Supplier will be liable to the Purchaser for any excess costs for such similar Materials / equipment or Services. However, the Supplier will continue performance of the Contract to the extent not terminated.

12.0. TERMINATION FOR CONVENIENCE:

- a) The Purchaser, by written notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination will specify the termination is for the Purchaser's convenience, the extent to which performance of the supplier under the Contract is terminated, and date upon which termination becomes effective.
- b) However the Materials / equipment that are complete and ready for shipment within thirty (30) days after the supplier's receipt of notice of termination will be accepted by the Purchaser at the Contract terms and prices.

13.0. GOODS AND SERVICES TAX:

The Goods and Services Tax is payable on Ex-works + Freight+Insurance+Packing and forwarding and Erection, Testing and Commissioning charges.

14.0. STATUTORY VARIATIONS:

Any variation up or down in statutory levy or new levies introduced after tender calling date under this specification will be to the account of TSTransco provided that in cases where delivery schedule is not adhered to by the supplier and there are upward variation / revision after the agreed delivered date the supplier will bear the impact of such levies and if there is downward variation / revision the TSTransco will be given credit to that extent.

Statutory variation if any allowed, it is allowed only once during delivery period i.e., at the time of delivery of goods at factory".

In case of sub-vendor items, taxes & duties are inclusive in tender price. No statutory variation is applicable.

In cases where the bidder assumes less tax rates and become lowest, upward variation of taxes will not be considered. In case of the bought out items for which the prices are quoted all inclusive of taxes, statutory variation shall not be applicable.

15.0. DESPATCH INSTRUCTIONS:

The dispatch instructions for the equipment will be furnished separately on satisfactory scrutiny of acceptance test certificates.

The prices indicated in Clause (2) above shall remain unaltered whatever be the destination.

The manufacturers serial No. of the Reactor shall be punched on the Yoke with 25mm size no. punch near yoke HV R phase. The no. may also be punched on lifting lugs before offering for inspection.

16.0. INSPECTION AND FACTORY TESTS:

- 16.1 The supplier will keep the Purchaser informed in advance of the time of the starting and the progress of manufacture of equipment in its various stages so that arrangement could be made for inspection. The accredited representative of the TSTransco will have access to the supplier's or his subcontractor's work at any time during working hours for the purpose of inspecting the materials during manufacturing of the materials / equipment and testing and may select test samples from the materials going into plant and equipment. The supplier will provide the facilities for testing such samples at any time including access to drawings and production data at no charge to Purchaser. As soon as the materials are ready the supplier will duly send intimation to TSTransco by Regd. Post and carry out the tests in the presence of representative of the TSTransco.
- 16.2 The TSTransco may at its option get the materials inspected by the third party if it feels necessary and all inspection charges in this connection will be borne by the supplier.

- 16.3 The dispatches will be effected only if the test results comply with the specification. The dispatches will be made only after the inspection by the TSTransco officer is completed to the TSTransco satisfaction or such inspection is waived by the competent authority.
- 16.4 The acceptance of any quantity of materials will in no way relieve the supplier of its responsibility for meeting all the requirements of this specification and will not prevent subsequent rejection if such materials are later found to be defective.
- 16.5 The supplier will give 15days advance intimation to enable the Purchaser depute his representative for witnessing the acceptance and routine tests.
- 16.6 Should any inspected or tested materials / equipment fail to conform to the specification, the Purchaser may reject the materials and supplier will either replace the rejected materials or make alterations necessary to meet specifications requirements free of costs to the Purchaser.

17.0. TESTS AND TEST CERTIFICATES:

- 17.1 The Reactors supplied against this contract shall be completely factory tested for routine, additional routine, type, additional type and special tests before dispatch in accordance with the relevant IS as specified. 80MVAR Reactor and 63MVAR Reactor with NGR shall be tested for type tests, additional type tests and special tests as specified in tender documents and 6 numbers of copies of test certificates shall be furnished besides conducting routine and acceptance tests as per the clauses of relevant IS/IEC specified Also type and routine tests shall be conducted on all relevant associated equipment.
- 17.2 As specified in 'schedule of quantities and prices', the type tests shall be conducted at the rates specified therein (Free of Cost for 80MVAR Reactor and 63MVAR Reactor with NGR). Claim has to be made for the actual tests conducted only. For such of those for which M/s. BHEL Regional Operations Division., Secundrabad have submitted test certificates for the tests conducted on similar equipment supplied, nevertheless TSTransco asks to repeat them, shall be paid at the charges indicated in the above schedule. Tests for which certificates are not furnished & Tests not conducted earlier shall be conducted free of cost. Also tests for which charges are not quoted shall be conducted at free of cost. Type tests as indicated in relevant clause of Section-V of Technical Specification shall be conducted on 80MVAR Reactor and 63MVAR Reactor with NGR at free of cost.
- 17.3 6 (six) sets of certified test certificates and oscillograms shall be submitted for evaluation prior to dispatch of the equipment. The supplier shall also evaluate the test results and shall correct any defect indicated by his evaluation or TSTransco 's evaluation of the test without any charge to TSTransco. The test certificates shall be got approved by TSTransco before dispatch of the material.
- 17.4 TSTransco or its authorized representative reserves the right to witness any or all the tests including those done on bought out items.
- 17.5 After Final approval, the Test Reports shall be submitted as follows:
 - a) Type Test Reports - Six (6) copies
 - b) Routine Test Reports - Six (6) copiesAll the Test Reports must be submitted in bound form clearly indicating the name of the package, location, Contract Award Order Number and Serial Number of the Reactor on the top (Hard) cover for easy reference.
- 17.6 Before the commissioning of the Reactor all the relevant tests/checks as per relevant Clause of Section-V "Technical Specification" are to be conducted at site and reports are to be submitted to that effect.

17.7 Guaranteed Losses and Penalty.

| Reactor Rating | Total Losses |
|---|--------------|
| 420kV 80 MVar Bus Reactor | 115kW |
| 420kV 63 MVar Switchable Line Reactor(with NGR) | 100 kW |

The total losses in kilowatts at rated output, rated voltage and rated frequency at 75°C shall be within the guaranteed losses. It may be noted that the actual losses shall not exceed the guaranteed losses by the bidder during final testing of the Reactor under any circumstances. During the testing if actual losses are higher than the specified loss levels, the material will be rejected.

18.0. QUALITY ASSURANCE PROGRAMME:

Supply:

M/s. BHEL Regional Operations Division., Secundrabad shall furnish detailed quality assurance plan and programme along with relevant technical data including possible customer inspection points/hold points and get them approved by the purchaser which will form the basis for stage by stage inspection of the Reactor during the manufacture and testing. In case TSTransco opts for a third party inspection, third party as a representative of TSTransco will participate in all the above inspections and discussions along with TSTransco officials in finalizing the quality assurance/control programs.

For Erection, Testing and Commissioning:

You shall submit quality assurance plan for the works to be carried out like pre-commissioning tests, indicating the procedures and quality control activities. However, this shall not relieve you of any of your contractual responsibilities under the contract. Before the commissioning of the Reactor all the relevant tests/checks as per “Field Quality Plan” are to be conducted at site and reports are to be submitted to that effect.

19.0. INSTRUCTION MANUALS:

You must submit the erection and O&M manuals of all the equipment covered under this contract within four (4) months before commencement of supply of the first equipment to TSTransco. **The manuals shall contain full details like step by step procedures for the erection / assembly of all the equipment furnished, including testing and commissioning procedures and all approved drawings.** These manuals shall be submitted in 12 copies.

20.0. COMPLETENESS OF EQUIPMENT:

All fittings and accessories which may not be specifically mentioned in the specification but which are useful or necessary for the equipment supplied for its efficient, economic and safe operation and for proper connection to others shall be specified and shall be deemed to have been included in the Contract Award Order and shall be furnished by you without extra charges. All the equipment shall be complete in all details whether such details are mentioned in the Contract Award Order or not.

21.0. WARRANTY:

21.1 Supply:

- a) The supplier will warrant for the satisfactory functioning of the material / equipment as per specification for a minimum period of **60 months** from the receipt of the material / equipment at TLC Stores or site in good condition.
- b) The Supplier warrants that the Materials / equipment supplied under the Contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the Contract. The supplier further warrants that all Materials / equipment supplied under this Contract will have no defect, arising from a design and / or materials as required by the Purchaser's specifications or from any act of omission of the Supplier that may develop under normal use of the supplied Materials / equipment.
- c) All the material will be of the best class and will be capable of satisfactory operation in the tropics under service conditions indicated in clause 23.1 of tender specification without distortion or deterioration. No welding filling or plugging of defective parts will be permitted, unless otherwise specified, they will conform to the requirements of the appropriate Indian, British or American Standards. (Where a standard specification covering the material in question has not been published, the standards of the American Society for testing of Materials should be followed).
- d) The entire designs will be capable of withstanding the severest stresses likely to occur in actual service and of resisting rough handling during transport.
- e) Unless otherwise specified the warranty period will be 60 months from the date of acceptance of the Materials / equipment. The Supplier will, in addition, comply with the performance guarantees specified under the contract. If, for reasons attributable to the Supplier, these guarantees are not attained in whole or in part, the supplier will at its discretion either, make such changes, modifications, and/or additions to the Materials / equipment or any part thereof as may be necessary in order to attain the contractual guarantees specified in the contract at its own cost and expense and to carry out further performance tests as per the relevant standards.
- f) The Purchaser will promptly notify the supplier in writing of any claims arising under this warranty.
- g) "Upon receipt of such notice, the Supplier will within 30 days repair or replace the defective Materials / equipment or parts thereof, free of cost at the ultimate destination. The supplier will take over the replaced parts/Materials/equipment at the time of their replacement. No claim whatsoever will lie on the Purchaser for the replaced parts/Materials/equipment thereafter". In the event of any correction of defects or replacement of defective material during the warranty period, the warranty for the corrected/replaced material will be extended to a further period of 30 months.
- h) If the Supplier, having been notified, fails to remedy the defect(s) within the above period, the Purchaser may proceed to take such remedial action as may be necessary, at the Supplier's risk and expense duly deducting the expenditure from subsequent bills / bank guarantee and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.

21.2 For Erection, Testing and Commissioning:

The works shall not be considered as completed until Purchaser has certified in writing that they have been virtually completed and the defect liability period shall commence from the date of such certificate. In case any defects in the work, due to bad materials, and/or bad workmanship, develop in the work before the expiry of the period, contractor, on notification by owner shall rectify or remedy the defects at his own cost and he shall make his own arrangements to provide materials, labour, equipment and any other appliances required in this regard. The performance security will be returned to contractor only after the expiry of this defect liability period. In case even on due notification by owner, contractor fails to rectify or remedy the defects, owner shall have the right to get this done by the other agents and recover the cost incurred by deductions from the retention amount due to contractor, in case this cost is within the value of the performance security, and if not, contractor shall be liable to pay to owner the balance amount.

22.0. PAINTING:

The painting procedure for Reactor Tank, Conservator Tank, Radiators, Marshalling Box, Accessories and other fittings shall be submitted along with Quality Plan (both soft copy & hard copy) for approval by TSTransco.

23.0. CONTRACT DRAWINGS:

- 23.1 Within 30 days of this Contract Award Order, you shall furnish all drawings detailing the list of drawings fulfilling the requirements in accordance with the Technical specification with time schedule which shall match the work schedule prepared.
- 23.2 You shall submit for approval, as per the above schedule, five sets of assembly drawings, erection/construction drawings to demonstrate fully that the apparatus furnished and erection/construction work carried out shall conform to the provision and intent of the specification. Detailed drawings or design data proving the adequacy of the contractor's designs/calculations shall be submitted for approval by TSTransco.
- 23.3 The design data and drawings submitted by the contractor will be reviewed by the TSTransco as far as practicable within four (4) weeks of their receipt and shall be modified by you if any modifications/corrections are required by the TSTransco. You shall incorporate such modifications/corrections and submit the final drawings for approval. Any delays arising out of failure by the contractor to rectify the drawings in reasonable time shall not alter the contract completion date.
- 23.4 When revised drawings are submitted for approval, the changes from the previous submission shall be clearly identified on the drawings with every revision made during the life of the contract shown by number, date and subject, in a revision block and a notification shall be given in the drawing margin. The drawings shall be clear and legible in all respects.
- 23.5 The TSTransco shall have the right to require the contractor to make any changes in the design which may be necessary in the opinion of the TSTransco to make equipment construction cum erection work conform to the provisions and intent of these specifications without additional cost to the TSTransco. One set of the drawings marked "Approved" will be returned to the contractor. You shall there upon furnish the TSTransco with ten sets of prints (including one set of Soft copy of all approved drawings) after incorporating all corrections.
- 23.6 All manufacturing fabrication work and construction/erection in connection with the equipment prior to the approval of the drawings shall be at the contractor's risk. The contractor may make any changes in the design which are necessary to make the equipment's construction/erection

conform to the provisions and intent of the contract and such changes will again be subject to approval by the TSTransco.

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- 23.7 Approval of drawings by the TSTransco shall not relieve the contractor of any part of his obligation to meet all the requirements stipulated in the specification of the responsibility for correctness.
- 23.8 The contractor shall furnish 2sets of reproducible of all reference drawings and documents/designs, after approval a set of soft copy of the approved drawings and 20 sets of copies of all as approved drawings. He shall also furnish 20 sets of "as built" drawings along with reproducible/soft copy to this office.
- 23.9 Each drawing shall be complete with bill of materials and legends. It shall contain technical requirements.
- 23.10 Revisions, corrections, additions to drawings and schedules shall not be considered to change the scope of work.
- 23.11 Further work by the contractor shall be in strict accordance with these drawings and no deviation shall be permitted without the written approval of the purchaser, if so required.
- 23.12 In addition the contractor shall furnish soft copy of the all approved drawings and quality plan in addition to full size prints.

24.0. TECHNICAL PARTICULARS:

The technical particulars of Reactor shall be in accordance with the specification and information furnished in your offer and subsequent correspondence. The fittings and accessories shall also conform to specification except where any deviation is specifically accepted.

25.0. INTER CHANGEABILITY:

All similar parts, particularly removable ones shall be inter changeable with each other.

26.0. MATERIAL AND WORKMANSHIP:

- 26.1 All materials shall be of the best class and shall be capable of satisfactory operation in the tropical, under service conditions indicated in the specification without distortion or deterioration. All parts shall be manufactured true to drawings dimensions. All tolerances shall be defined on contractor's drawings for both manufacturing and installation purposes. Holes shall be drilled full size or under size and reamed during shop assembly. Punched holes will only be permitted in plates 20 mm or less in thickness, provided all such holes are subsequently reamed full size during shop assembly.
- 26.2 The materials used in the construction of the equipment shall be new, of high quality and selected particularly to meet the duties required of them. The material specification shall be indicated in contractor's detailed drawings. The use of materials liable to attack by termites or other insects shall not be allowed.
- 26.3 Materials and workmanship shall conform to the latest editions of relevant IS/IEC Standards and as per Technical specification of bid No.TSPMM12-09/2021.
- 26.4 The entire design and construction shall be capable of withstanding the severest stress likely to occur in actual service and for resisting rough handling during transport.

27.0. CO-ORDINATION AND CO-OPERATION:

- 27.1 Contractor shall exchange with other manufacturers of item not covered in this specification or alternatively covered in these specifications but forming partial supply of other, all necessary drawings, templates, gauges and other information required to ensure the complete and proper design and co-ordinate manufacture of all connecting or related parts of the various equipment.
- 27.2 The Contractor shall co-operate with the TSTransco to co-ordinate with all other manufactures involved in design, control and instrumentation system which will perform the role contemplated without any problem. There shall be no extra cost payable for performing this role.

28.0 STORAGE AT SITE:

The entire storage of the equipment at site including site handling until TSTransco takes over, the responsibility lies entirely with the Contractor.

29.0 PAYING OFFICER /CONSIGNEE DETAILS:

The Paying Officer and Consignee details will be informed at the time of issue of dispatch instructions/ at the time of intimation of readiness of site.

30.0 CORRESPONDENCE:

All correspondence regarding dispatches, payments and other field matters shall be addressed to the concerned Superintending Engineer given under dispatch instructions. Copies of such correspondence shall be marked to all other concerned. Copies of the correspondence regarding payments should also be marked to the Executive Director/Finance TSTransco, Vidyut Soudha, Hyderabad-500 082.

31.0 TRAINING:

You have to give training at your works to 4Nos. Engineers of TSTransco at free of cost regarding O&M of the material supplied. TSTransco will bear the cost of journey. M/s. BHEL Regional Operations Division., Secundrabad shall provide accommodation, Boarding and Local transportation at free of cost. The programme of Training shall be submitted along with submission of Quality Assurance Plan for approval of the TSTransco.

32.0. APPLICABLE LAW:

The contract shall be interpreted in accordance with the laws of the Purchaser's Country.

33.0. FIRE PROTECTION:

All apparatus connections and cabling FRLS be designed and arranged to minimize the risk of fire and any damage which may be caused in the event of fire. The recommendations specified in IEEE Std 979 and NFPA shall be considered in the layout and design of the Reactor and associated equipment/accessories.

34.0. PURCHASER'S RIGHT TO VARY QUANTITIES DURING THE CONTRACT:

The purchaser reserves the right increase (or) decrease by upto 50% of the quantity ordered and services specified with the same price and other terms and conditions, during the execution of the order / contract.

35.0. GENERAL CONDITIONS OF CONTRACT:

Except in so far as it is provided otherwise in this contract, you shall abide by the General and Financial Conditions and prices, deliveries etc. of the Bid No.TSPMM12-09/2021 and also the other terms and conditions indicated in the said specification. Also referred in various clauses pertain to the above specification.

All other terms and conditions which are not covered in the Contract Award Order shall be abide by the terms and conditions of Specification.

36.0. OVERALL RESPONSIBILITY:

The overall responsibility of supply cum erection in case of above Reactors will rest with M/s. BHEL Regional Operations Division., Secundrabad as Contract Award Order is being placed for Supply and Erection, Testing & Commissioning of the 1 No. 80MVA, 420 kV Bus Reactor and 1 No.63 MVA 420kV Switchable Line Reactor(with NGR). It is the responsibility of M/s. BHEL Regional Operations Division., Secundrabad to supply equipment, the proper storage at site and erection, testing and commissioning of the Reactors. All the incidental charges which are likely to be incurred up to commissioning period are to be borne by M/s. BHEL Regional Operations Division., Secundrabad.

37.0. FITTINGS AND ACCESSORIES:

The following fittings shall be supplied with Reactor covered in this Contract Award order:

1. Conservator for reactor main tank with filling hole and cap, drain valve, isolating valve, vent pipe and magnetic oil level gauge with low level alarm contacts.
2. Air release devices.
3. Dehydrating breather complete with first fill of activated silicagel.
4. Inspection openings and covers.
5. Rating & diagram plate for reactors and current shunt reactors. These plates shall be of material capable of withstanding continuous outdoor service.
6. Terminal marking plate conforming to IEC-60289 / IS:5553
7. Two earthing terminals each on shunt reactor tank, radiators & marshalling box, SA structures etc.
8. Ladder to climb up to the reactor tank cover with suitable locking arrangement to prevent climbing during charged condition.
9. Double float/reed type Buchholz relay with alarm and trip contacts.
10. Bottom oil sampling valve and drain valves.
11. Filter valves at top and bottom.
12. Shut off valves on the pipe connection between radiator bank and reactor tank.
13. Shut off valves on both sides of Buchholz relay at accessible height.
14. Sampling gas collectors for Buchholz relay at accessible height.
15. Four jacking pads.
16. Lifting lugs or eyes for the cover.
17. Suitable terminal connectors for ACSR moose conductor on bushings (Shunt reactor shall be in manufacturer scope.
18. Under carriage with provision for flanged bi-directional wheels, set of flanged bi-directional wheels, set of flanged bi-directional rollers/trolley for transportation.

19. Drain valves/plugs shall be provided in order that each section of pipe work can be drained independently.
20. Pressure relief devices with alarm/trip contacts.
21. Bushing with metal parts and gaskets to suit the termination arrangement.
22. Winding temperature indicators for local and remote mounting (only for shunt reactor).
23. Oil temperature indicator
24. Protected type mercury or alcohol in glass thermometer.
25. Marshalling box .
26. Haulage lugs.
27. Bushing CTs
28. One set of hand tools of reputed make packed in a carry bag/box broadly comprising of double ended spanners (open jaws, cranked ring, tubular with Tommy bar each of sizes 9mm to 24mm, one set each), adjustable wrenches (8&12 inch one set), gasket punches (of different sizes used - one set), pliers (flat nose, round nose & side cutting one of each type), hammer with handle (one), files with handle (two), knife with handle (one), adjustable hacksaw (one), and cold chisel (one), bushing handling and lifting tools with nylon rope/belt, chain block (2 Nos.) and D-Shackle shall be supplied per Reactor.
29. Suitable galvanized iron tray for cabling on main tank for better aesthetics.
30. Air cell for conservator with rupture relay.
31. One number of Sudden Pressure relay with alarm or trip contacts shall be provided on tank of reactor. Operating features and size shall be reviewed during design review. Suitable canopy shall be provided to prevent ingress of rain water. Pressurised water ingress test for Terminal Box (routine tests) shall be conducted on Sudden Pressure Relay
32. NIFPS System
The fittings listed above are only indicative and any other fittings which generally are required for satisfactory operation of the reactors are deemed to be included/supplied at no extra cost.

38.0. SPECIFICATION OF INSULATING OIL:

Virgin” high grade inhibited, confirming to latest IEC-60296 (Inhibited oil) for 420kV Class Reactors.

Annexure-Unused inhibited Insulating Oil Parameters

| Sl.No. | Property | Test Method | Limits |
|-------------------|---|--|---|
| A Function | | | |
| 1a | Viscosity at 100degC | ISO 3104 or ASTM D445or ASTM D7042 | (Max.) 3 mm ² /s |
| 1b. | Viscosity at 40degC | ISO 3104 or ASTM D445 or ASTM D7042 | (Max.)12 mm ² /s |
| 1c. | Viscosity at -30degC | ISO 3104 or ASTM D445 or ASTM D7042 | (Max.)1800 mm ² /s |
| 2. | Appearance | A representative sample of the oil shall be examined in a 100 mm thick layer, at ambient temperature | The oil shall be clear and bright, transparent and free from suspended matter or sediment |
| 3. | Pour point | ISO 3016 or ASTM D97 | (Max.)- 40degC |
| 4. | Water content a) for bulk supply b) for delivery in drums | IEC 60814 or ASTM D1533 | (Max.) 30 mg/kg 40 mg/kg |
| 5. | Electric strength (breakdown voltage) | IEC 60156 | (Min.)50 kV(new unfiltered oil) /70 kV (after treatment) |
| 6. | Density at 20 deg C | ISO 3675 or ISO 12185 or ASTM D 4052 | 0.820 - 0.895 g/ml |

| | | | |
|----|--|---------------------------------------|--|
| 7. | Dielectric dissipation factor (tan delta) at 90 deg C | IEC 60247 or IEC 61620 Or ASTM D924 | (Max) 0.0025 |
| 8. | Negative impulse testing KVp @ 25 deg C | ASTM D-3300 | 145 (Min.) |
| 9. | Carbon type composition (% of Aromatic, Paraffins and Naphthenic compounds) | IEC 60590 and IS 13155 or ASTM D 2140 | Max.Aromatic : 4 to12% Paraffins : <50% & balance shall be Naphthenic compounds. |

B Refining/Stability

| | | | |
|----|---------------------------------|--|--|
| 1. | Acidity | IEC 62021-1 or ASTM D974 | (Max) 0.01 mg KOH/g |
| 2. | Interfacial tension at 27degC | ISO 6295 or ASTM D971 | (Min) 0.04 N/m |
| 3. | Total sulphur content | BS 2000 part 373 or ISO 14596 or ASTM D 2622 | 0.05 % (Max.) (before oxidation test) |
| 4. | Corrosive sulphur | IEC 62535 Non-Corrosive on copper and paper ASTM D1275B | Non-Corrosive |
| 5. | Presence of oxidation inhibitor | IEC 60666 or ASTM D2668 or D4768 | 0.08% (Min.) to 0.4% (Max.) Oil should contain no other additives . Supplier should declare presence of additives, if any. |
| 6. | 2-Furfural content | IEC 61198 or ASTM D5837 | 25 Microgram/litre(Max.) |

C Performance

| | | | |
|----|---|---|--|
| 1 | Oxidation stability -Total acidity -Sludge - Dielectric dissipation factor (tan delta) at 90degC | IEC 61125 (method c) Test duration 500 hour IEC 60247 | Max 0.3 mg KOH/g Max 0.05 % Max 0.05 |
| 2. | Oxidation stability 220 | ASTM D2112 (a) | Minutes (Min.) |

D Health, safety and environment (HSE)

| | | | |
|----|-------------|-------------------------|-----------------------------------|
| 1. | Flash point | ISO 2719 | (Min.)135deg C |
| 2. | PCA content | BS 2000 Part 346 | Max 3% |
| 3. | PCB content | IEC 61619 or ASTM D4059 | Not detectable (Less than 2mg/kg) |

E Oil used (inhibited) for first filling, testing and impregnation of active parts at manufacturer's works shall meet parameters as mentioned below:

| | | | |
|----|--------------------------|--|----------------|
| 1. | Break Down voltage (BDV) | | 70kV (min.) |
| 2 | Moisture content | | 5 ppm (max.) |
| 3 | Tan-delta at 90°C | | 0.005 (max) |
| 4 | Interfacial tension | | 0.04 N/m (min) |

| | | | |
|----------|---|--|--|
| F | Each lot of the oil shall be tested prior to filling in main tank at site for the following: | | |
| 1 | Break Down voltage (BDV) | | 70 kV (min.) |
| 2 | Moisture content | | 5 ppm (max.) |
| 3 | Tan-delta at 90°C | | 0.0025 (Max) |
| 4 | Interfacial tension | | More than 0.04 N/m |
| G | After filtration & settling and prior to energisation at site oil shall be tested for following: | | |
| 1 | Break Down voltage (BDV) | IS:1866 / IEC 60422 | 70 kV (min.) |
| 2 | Moisture content at hot condition | | 5 ppm (max.) |
| 3 | Tan-delta at 90°C | | 0.005 (Max) |
| 4 | Interfacial tension | Test method as per IEC 61125 method C, Test duration: 500hour for inhibited oil | More than 0.04 N/m |
| 5 | *Oxidation Stability | | |
| | a) Acidity | | 0.3 (mg KOH /g) (max.) |
| | b) Sludge | | 0.05 % (max.) |
| | c) Tan delta at 90 °C | | 0.05 (max.) |
| 6 | *Total PCB content | | Not detectable (less than 2 mg/kg total) |
| | * Separate oil sample shall be taken and test results shall be submitted within 45 days after commissioning for approval of EMPLOYER. | | |

Note: The Transformer oil shall be tested during inspection of material. The oil delivered at site will also be tested and the values compared with the inspected report for Acceptance.

39.0. TOOLS & TACKLES:

M/s. BHEL shall supply the following Tools & Tackles along with each of the Reactors:

One set of hand tools of reputed make packed in a carry bag/box broadly comprising of double ended spanners (open jaws, cranked ring, tubular with Tommy bar each of sizes 9mm to 24mm, one set each), adjustable wrenches (8&12 inch one set), gasket punches (of different sizes used - one set), pliers (flat nose, round nose & side cutting one of each type), hammer with handle (one), files with handle (two), knife with handle (one), adjustable hacksaw (one), and cold chisel (one), bushing handling and lifting tools with nylon rope/belt, chain block (2 Nos.) and D-Shackle shall be supplied.

40.0. JURISDICTION:

All and any disputes or differences arising out of or touching this order shall be decided only by courts or tribunals situated in Hyderabad / Secunderabad cities. No suit or other legal proceedings shall be instituted elsewhere.

41.0. INDEMNITY BOND:

For all materials/equipment to be provided by the Purchaser, the contractor shall take delivery of materials after executing an indemnity bond in the proforma to be approved in favour of the Purchaser against loss, damage and any risks involved, for the full value of the materials/equipment. This indemnity bond shall be valid till the scheduled date of testing, commissioning and handing over of the equipment and balance material to the TSTRANSCO.

42.0. RISK:

The risk in the property is entirely yours till the goods are received in good condition at the destination.

43.0. PACKING:

Each of the equipment shall be securely packed separately in such a manner as to withstand rough handling during rail and road transit upto site and as per latest IS/BSS/IEC. There shall be separate packing for each item.

44.0. MAXIMUM WEIGHTS & DIMENSIONS OF PACKAGES:

You are responsible for obtaining prior information of the facilities that exist for road transport upto the destination station, such as maximum weight and size of packages and crane lift, etc.

45.0. MATERIALS:

The materials to be supplied by the Purchaser shall be taken delivery by the contractor at the departmental stores/site. The contractor shall arrange transportation of all materials to be supplied by the purchaser from the departmental stores/site stores to work spots free of cost. The contractor shall submit particulars of additional materials required if any for the completion of the equipment erection, over and above the materials already available in the site stores, within a reasonable period. The loading and unloading, transport, insurance and proper storage of those materials shall be to the cost of the contractor. This may be read with Clause No.58, GCE of Tender Specification.

The contractor shall be responsible for the proper handling and storage of these materials from the time of their receipt upto the time of taking over of the completed equipment by the Purchaser. Yards and stores provided by the contractor for stacking and storage of materials shall be open for inspection by the Purchaser as and when required. The cost of handling and storage shall be to contractor's account.

46.0. SURPLUS MATERIALS:

On completion of works, all the surplus materials left over after erection shall be returned to the Engineer by and at the expense of the contractor in the Purchaser's store(s) itself. Refer clause 59, GCE of Tender Specification.

The contractor within two (2) months from the date of completion of the equipment (ready for charging) shall return and account for the surplus materials, failing which necessary recoveries will be made from the outstanding bills of the contractor for the cost of materials left unaccounted as decided by the Engineer.

47.0. SPARES:

You shall supply any spares required for the equipment that will be supplied under this order, whenever called upon to do so at fair prices and at the TSTRANSCO's standard terms of payment within a period not exceeding the deliveries accepted therein.

48.0. OWNER'S LIEN OF EQUIPMENT:

The Purchaser shall have lien on all equipment including those of the CONTRACTOR brought to the 'Site' for the purposes of erection, testing and commissioning of the equipment. The Purchaser shall continue to hold the lien on all such equipment throughout the period of 'Contract'. No material brought to the 'Site' shall be removed from the 'Site' by the CONTRACTOR and/or his SUB-CONTRACTORS without the prior written approval of the PURCHASER/ ENGINEER.

49.0. TIME FOR COMPLETION AND EXTENSION OF TIME:

Please refer the relevant Clause of General Conditions for Erection (GCE) of bidding documents.

50.0. ACKNOWLEDGEMENT:

This order is sent to you in duplicate, please acknowledge the receipt of this order with your confirmation of its acceptance by you and the duplicate copy enclosed may please be returned with your signature with Company's Seal in token of your acceptance.

Encl: Annexure (PV Clause) & GTP

Yours faithfully,

CHIEF ENGINEER/P&MM
(Acting for and on behalf of TSTRANSCO)

WE ACCEPT THE TERMS AND CONDITIONS OF THIS PURCHASE ORDER

SIGNATURE OF THE CONTRACTOR
WITH SEAL AND DATE

Copies to:

The Chief Engineer/400kV /TSTRANSCO/Vidyut Soudha/Hyderabad.*

The Chief Engineer/Transmission /TSTRANSCO/Vidyut Soudha/Hyderabad*

The Chief Engineer/400kV /TSTRANSCO/Warangal.

The Chief Engineer/Warangal Zone, TSTRANSCO, Warangal

The Executive Director/FinanaceTSTRANSCO/Vidyut Soudha/Hyderabad.

The FA & CCA (Accounts)/TSTRANSCO/Vidyut Soudha/Hyderabad.

The SAO (Pay & Accounts) /TSTRANSCO/Vidyut Soudha/Hyderabad.

The Superintending Engineer/400KV Construction/Warangal **

* It is requested to take necessary action to inform the PSDF, as this Purchase Order is placed exclusively for attending the Protection Audit Remarks pointed out by CEC & to arrange to get grant from PSDF.

** It is requested to arrange to prepare the bills as per the Clause (4) of this Purchase Order duly apportion between PSDF and TSTRANSCO..

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ANNEXURE

PRICE VARIATION CLAUSE FOR REACTOR

$$P = \frac{P_o}{100} \left(10 + 29 \frac{C}{C_o} + 27 \frac{ES}{ES_o} + 7 \frac{IS}{IS_o} + 5 \frac{IM}{IM_o} + 7 \frac{TO}{TO_o} + 15 \frac{W}{W_o} \right)$$

Wherein

P = Price payable as adjusted in accordance with the above formula

Po = Price quoted/confirmed

Co = Average LME settlement price of copper wire bars (refer notes)
This price is as applicable for the month, ONE month prior to the date of tendering.

ESo = Price of CRGO Electrical Steel Lamination (refer notes)
This price is as applicable on the 1st working day of the month, ONE month prior to the date of tendering.

ISo = Average price of steel plates 10mm thick (refer notes)
This price is as applicable for the 1st working day of the month, ONE month prior to the date of tendering.

IMo = Price of Insulating Materials (refer notes)
This price is as applicable on the 1st working day of the month, ONE month prior to the date of tendering.

TOo = Price of Transformer Oil (refer notes)
This price is as applicable on the 1st working day of the month, ONE month prior to the date of tendering.

Wo = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2001=100)
This price is as applicable on the 1st working day of the month, THREE months prior to the date of tendering.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA (PVC)/TRF(R-1)/_one month prior to the date of tendering.

C = Average LME settlement price of Copper wire bars (refer notes)
This price is as applicable for the month, TWO months prior to the date of delivery.

ES = Price of CRGO Electrical Steel Lamination (refer notes)
This price is as applicable on the 1st working day of the month, TWO months prior to the date of delivery.

IS = Average price of steel plates 10mm thick (refer notes)
This price is as applicable for the 1st working day of the month, ONE month prior to the date of delivery.

IM = Price of Insulating Materials (refer notes)
This price is as applicable on the 1st working day of the month, TWO months prior to the

date of delivery.

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TO = Price of Transformer Oil (refer notes)
This price is as applicable on the 1st working day of the month, ONE month prior to the date of delivery.

W = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2001=100)

This index number is as applicable on the 1st working day of the month, THREE months prior to the date of delivery.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA (PVC)/TRF(R-1)/_/_one month prior to the date of delivery.

The “date of delivery” is the date on which the equipment is notified as being ready for inspection/dispatch (in the absence of such notification, the date of manufacturer’s dispatch note shall be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever shall be earlier.

Irrespective of the increase in the prices of raw materials the price variance (increase) will be limited to a maximum of 50% over the original quoted price and no ceiling for negative variation.

The proportionate taxes and duties on such increase or decrease in the price is to the TSTransco’s account, as per actual on production of the gate pass relating to the consignments for which price variation is claimed.

If the date of delivery as defined in the P.V. formula is beyond the contracted delivery date the scheduled delivery date or Notified date of Inspection or the actual delivery date whichever is advantageous to the Purchaser will form the basis for calculation of price variation.

GUARANTEED TECHNICAL PARTICULARS

| I. | Description | 80MVAR Bus Reactor | 63MVAR-Line Reactor |
|--|-------------|-------------------------------|---------------------|
| 1. Manufacturer's Name & Country | | | |
| i) Reactor | | BHEL, India | |
| ii) Bushings | | BHEL,India | |
| iii) Oil | | APAR/SAVITA/RAJ | |
| 2. Governing Standards | | | |
| i) Reactor | | IEC 60076-6 | |
| ii) Bushings | | IEC 60137 | |
| iii) Oil | | IEC 60296-2000 | |
| 3. Type of Reactor | | Gapped Core ONAN | |
| 4. Type of Cooling | | Star with neutral brought out | |
| 5. Connection | | Gapped Core ONAN | |
| 6. Reactive Power for (MVAR) continuous operation/ | | | |
| a) At rated voltage | | 80 MVAR | 63 MVAR |
| b) At highest voltage MVAR) (i.e. 5% higher than rated) | | 88.2 MVAR | 69.46 MVAR |
| 7. Rated Voltage (kV) | | 420 kV | |
| 8. Temperature rise of oil above ambient temperature (Deg. C) (indicate ambient tempt. Also) | | 40 ⁰ C | |
| 9. Temperature rise of winding by resistance method above ambient temperature (Deg. C) (indicate ambient tempt. Also) | | 45 ⁰ C | |
| 10. Rated frequency (HZ) | | 50 Hz | |
| 11. Number of Phases | | 3 Phase | |
| 12. Amount of unbalanced current in each when connected to symmetrical voltage. | | ±2 % | |
| 13. Harmonic content in phase current | | <=3% | |
| 14. Guaranteed maximum I2R loss (in kW) at 75°C and at rated current. | | 115 kW (max) | 100 kW(Max) |
| 15 a) Impedance | | | |
| i) Positive Sequence (Ohms) | | 2205 Ohms | 2206 Ohms |
| ii) Zero Sequence (ohms) | | 2095-2205Ohms Approx) | 2520- 2800 Ohms |
| iii) Tolerance on Impedance | | -5% to 0% | |
| b)Short time rating for 1 Second (KA) | | 50 kA | |
| 16. Range of voltage upto which impedance will be constant & magnetization curve upto 2.5 p.u.(Impedance values at 1.3 p.u.,1.5 p.u.,2.0 p.u.,2.5p.u.) | | 1.5 pu | |
| 17. XO/XI | | 0.9 to 1.0 | |
| 18. Maximum permissible duration (Hrs.) of service at 110% of rated voltage, starting from cold without exceeding permissible temperature rise. | | 8 hrs. (Approx) | |
| 19. Capacitance value (Phase to (pico farads) | | 9000 (Approx) | |

| | | |
|-------|--|--|
| | ground) | |
| 20. | Noise level and reference standard and (ab)distance at which measurement done. | 81dB (As per NEMA TR-1) |
| 21. | Vibration level | |
| i) | Peak to peak | 200 micron meter |
| ii) | Average | 60 micron meter |
| iii) | Maximum stress at any point in tank (kg/cm ²) | 2 kg/mm ² |
| 22. | Test voltage (for winding) | Bus /Line end (For 80MVAR and 63 MVAR) |
| | | Neutral end (For 80MVAR and 63 MVAR) |
| i) | Lightning impulse (kv peak) (1.2/50 Micro-secs.) with stand voltage. | 1300 |
| ii) | Power frequency withstand Voltage (kV rms) | 550 |
| iii) | Switching surge withstand Voltage (KV rms) | 230 |
| | | 1050kVp |
| 23. | Partial discharge level | 100pC(max) |
| 24. | i) Type of core | 4 limbed gapped core |
| | ii) Justification for type of core adopted | To obtain XO/X1 equal to 1 approx |
| | iii)Technical details of the core | 3 main limbs & 2 side limbs |
| 25. | Type of oil preservation system | Air cell |
| 26. | Conservator: | |
| a. | Total volume | 4245 Liters (Approx.) |
| b. | Volume between highest and Lowest visible oil levels. | 3000 Liters (Approx.) |
| c. | Type of conservator (Air cells type Oil sealing / any other type) | 2600 Liters (Approx) |
| | | Atmoseal type |
| 27. | Bushings: | Line |
| | | Neutral |
| i) | Make and type | BHEL/Reputed make, OIPCondenser type bushing |
| ii) | Rated current | 1250 Amps |
| iii) | Lightning impulse withstand Voltage (KV Peak) | 1250 Amps |
| iv) | Power frequency withstand Voltage (wet and dry) (KVrms) | 1425 |
| v) | Switching surge withstandVoltage (kV peak) | 550 |
| vi) | Visible corona dischargeVoltage (KV rms) | 630 |
| vii) | Partial discharge level(pico-coulomb) | 275 |
| viii) | Radio interference voltage for Bushing (MV) | 1050 |
| ix) | Creepage distance in air (mm) | NA |
| x) | Quantity of oil in bushing and Specification of oil used (litres) | NA |
| xi) | Weight and dimensions of assembled bushings (kg) | 10 pC(max) at 420 kV |
| xii) | Are bushing dimension's as per Specification (Yes / No) | 10 pC(max) at 145 kV |
| xiii) | Cantilever strength (KN) | 3625 |
| | | 160 L |
| | | 8500mm(approx.) |
| | | 5500mm(approx.) |
| | | Yes |
| | | Yes |
| | | 2.5 |
| | | 1.6 |

| | |
|---|---|
| 28. Bushing type current transformer: i) Voltage class (volts) ii) Number of cores iii) Ratio iv) Accuracy class v) Burden (VA) vi) Accuracy limit factor vii) Knee point voltage (volts) viii) Maximum resistance of Secondary winding (Ohms) ix) Current rating of secondary's (Amps) | As per rating and approved drawing. |
| 29. Tank | |
| i) Type (Bell type tank / conventional Type with welded cover at top) | Conventional with flat welded cover at the top |
| ii) No. of repeat welding permissible | As per fabrication requirement |
| iii) Material and thickness of plate for tank construction | Low Carbon Commercial grade Structural Steel. Tank Base Thickness : 50mm Tank Cover Thickness : 20mm Tank Wall Thickness : 8mm |
| iv) Vacuum to which the (torr) tank can be subjected without distortion. | torr |
| v) Continuous internal pressure over Normal hydrostatic pressure of oil (KN/Sq.m) | 35 KPa |
| vi) Number of bi-directional wheels provided | 4 Set (only for S/S movement) |
| vii) Short circuit forces (supporting Calculation may be furnished) | N/A being a 100% impedance device |
| viii) Track gauge required for wheels (mm) | 1676mm |
| ix) Pressure relief device provided or not | YES |
| x) Operating pressure of pressure relief device. | 7+/-1 psi |
| 30. Clearance | |
| a. Phase to Phase (mm) | 4000 mm |
| b. Phase to Ground (mm) | 3500 mm |
| c. Neutral to Ground (mm) | 1050 mm |
| 31. Gasket | |
| i) Material | Synthetic Rubber Bonded Cork |
| ii) Temperature withstand capability | 110 °C |
| 32. Temperature Indicator | |
| a) OTI & WTI | Perfect Control/Precision Measure |
| Make | OTI : 20 — 140 |
| Range (deg.C) | WTI : 30 — 150 |
| Accuracy | + 1.5 % |
| b) RWTI | |
| Make | Perfect Control/Precision Measure |
| Range (deg.C) | 30 - 150 |

| | | |
|---|--|---|
| Accuracy | + 1.5 % | |
| Auxiliary supply required | 220 V DC | |
| Signal transmitter provided or not | Yes, 4-20 mA Analog signal | |
| 33. Weights and Dimensions | | |
| i) Weights | | |
| a. Core | 74000 kg (approx.) | 59410 (Approx) |
| b. Winding | | |
| c. Tank & fittings | 33333 kg (approx.) | 31445(Approx) |
| d. Oil | 38767 kg (approx.) | 35290 (Approx) |
| e. Total weight | 146100 kg (approx.) | 126145 (Approx) |
| ii) Dimensions (metres) | | |
| a. Over all height above track | 8.59m (approx.) | 8.585 m (Approx) |
| b. Overall length | 14.30 m (approx.) | 14.05 m (Approx.) |
| c. Over all breadth | 8.7 m (approx.) | 9.21 m (Approx) |
| iii) Weight of the heaviest package of the line reactor arranged for transportation (kg) | 80000 kg (approx.) 75000 kg (Approx) | 80000 kg (approx.) 75000 kg (Approx) |
| iv) Dimensions of the largest package of the shunt reactor arranged for transportation (mm x mm x mm) | 6800x3400x3350 | 6500x3400x3380 |
| 34. Quantity of first fill of oil (litres) | 45200 Liters (approx.) | 40560 L(Approx) |
| 35. Parameter's of oil supplied | As per specification | |
| a) Maximum moisture content (ppm) | | |
| b) Maximum tan-delta value at 90 deg.C | | |
| c) Minimum break down voltage (kv) | | |
| New untreated oil | | |
| After treatment | | |
| d) Resistivity at 27 deg.C. (min.) (ohm-cm) | | |
| e) Minimum interfacial tension (N/M) | | |
| D. Neutralisation value (Max.), KHV/gm | | |
| 36. Oil Preservation System | | |
| a). Type of oil preservation system | Air cell type. | |
| b). Material of air cell | Nitrile rubber reinforced with nylon cloth | |
| 37. Minimum height clearance for lifting core and winding above tank (mm) | 9600 mm (approx.) | |
| 38. Lifting jacks (Mechanical Screw Jacks) | As per clause 39 of PO(Tools and Tackles) | |
| i) Governing standard | | |
| ii) Number of jacks included in one set | | |
| iii) Type and Make | | |
| iv) Capacity | | |
| v) Pitch | | |
| vi) Lift | | |
| vii) Height in closed position | | |
| 39. Degree of protection of Marshalling Box | IP:55 | |

Technical Particulars / Parameters of Neutral Grounding Reactor (NGR) with supporting structure and terminal connectors

The neutral grounding reactors are generally used in Line Reactor between the neutral end of the Reactor and ground to limit the secondary arc current and the recovery voltage to a minimum value.

Following are the Technical particulars/ parameters envisaged for NGR:

| Sl. No. | Description Parameters | Technical Parameters |
|--|---|---|
| 1 | Rated Power | 170KVAR |
| 2 | Rated voltage | 145kV |
| 3 | Rated Current | 10A |
| 4 | Frequency: | 50HZ |
| 5 | Impedance: | 1700 Ohm |
| 6 | 10 Sec Rating: | 6120 KVAR |
| 7 | Rated Choke Volts: | 17kV |
| 8 | 10 Sec Rating: | 60A |
| 9 | Connection | Between neutral of reactor and ground |
| 10 | Cooling System | Natural oil cooling: (ONAN) |
| 11 | Cooling medium | Insulating oil |
| 12 | No of Phases : | 1(SINGLE) |
| 13 | Service | Outdoor |
| 14 | Type | Oil filled outdoor application |
| 15 | Insulation | Graded |
| 16 | Rated impedance at rated short time and continuous current | As specified in section project |
| 17 | Max. temperature rise over ambient temperature of 50øC at rated voltage | |
| i) | of winding measured by resistance | Deg C 50 |
| ii) | of top oil measured by thermometer | Deg C 45 |
| 18 | <u>Insulation level for winding</u> | |
| Lightning Impulse withstand Voltage | | |
| i) | Line side kVp | 550 |
| ii) | Ground side kVp | 95 |
| 19. One Minute Power Frequency withstand Voltage | | |
| i) | Line side kVrms | 230 |
| ii) | Ground side kVrms | 38 |
| 20 | <u>Bushing</u> | |
| | Rated Voltage | |
| i) | Line side kV | 145 |
| ii) | Ground side kV | 24 |
| Lightning Impulse withstand Voltage kVp | | |
| iii) | Line side | 650 |
| iv) | Ground side | 125 |
| One Minute Power Frequency withstand Voltage | | |
| v) | Line side kVrms | 305 |
| vi) | Ground side kVrms | 50 |
| | Creepage (total minimum) | |
| vii) | Line side mm | 3625 |
| viii) | Ground side mm | 600 |
| 21. | Method of grounding | Solidly connected between neutral of shunt reactor and earth. |
| 22. | Whether neutral is to be brought out | Yes (through 24kV Porcelain bushing |