

TENDER SPECIFICATION

BHEL RUDRAPUR INSTALLATION PACKAGE FOR

Handling at Site Stores / Storage yard, Transportation to Site of Work,
Pre-assy, Erection, Testing and Commissioning of Generator & MV Bus duct

At

NABINAGAR POWER GENERATING COMPANY LIMITED,
Nabinagar, Bihar - 3 x 660 MW (UNIT-03)

TECHNOCOMMERCIAL BID

BOOK-I: -

VOLUME -1A & Volume-II

Rev 04, 01 Nov 2019

Book-I consists of

Notice Inviting Tender,
Volume-IA : Technical Conditions of Contract
Volume- II : Price Bid

Book-II consists of

Volume-IB : Special conditions of Contract,
Volume-IC : General conditions of Contract
Volume-ID : Forms & Procedures



BHARAT HEAVY ELECTRICALS LIMITED

(A Government of India Undertaking)
Component Fabrication Plant,
Rudrapur, Udham Singh Nagar.
Uttarakhand, 263153

ANNEXURE – 1

QUALIFYING REQUIREMENTS

JOB	Handling at Site Stores / Storage yard, Transportation to Site of work, Pre assy., Erection/Installation, Testing and Commissioning of Bus duct package and accessories of Unit-03 at 3X660 MW Nabinagar Power Generating Company Limited, Nabinagar, Bihar.
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SL NO	QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the QR Criteria	
		Name and Description of qualifying criteria	Page no of supporting document. Bidder must fill up this column as per applicability
A	<p><u>Technical</u></p> <p>Bidder must have successfully executed following works in the last seven (7) years as on latest date of bid submission (i.e. Bidder must meet A.1.1 or A.1.2 or A.1.3)</p> <p>A1.1) Executed at least one (1) contract of not less than Rs 29.58 Lakhs (Basic W.O. value) comprising of :-</p> <p>a) Erection & Commissioning of busduct(IP/SP) package OR</p> <p>b) Bus duct (IP/SP) as a part of Electrical C&I Erection & Commissioning work. OR</p> <p>c) Executed at least 100 MT of Aluminium Bus Duct fabrication work.</p> <p style="text-align: center;">OR</p> <p>A1.2) Executed at least two (2) contracts of each not less than Rs 18.49 Lakhs (Basic W.O. value) comprising of :-</p> <p>a) Erection & Commissioning of busduct(IP/SP) package OR</p> <p>b) Bus duct (IP/SP) as a part of Electrical C&I Erection & Commissioning work. OR</p> <p>c) Executed at least 100 MT of Aluminium Bus Duct fabrication work.</p>	Applicable	

Tender specification for NPGCL, Nabinagar Bus duct installation package-
3 X 660 MW

	<p style="text-align: center;">OR</p> <p>A 1.3) Executed at least three (3) contracts of each not less than Rs 14.79 Lakhs (Basic W.O. value) comprising of :-</p> <p>a) Erection & Commissioning of busduct(IP/SP) package OR</p> <p>b) Bus duct (IP/SP) as a part of Electrical C&I Erection & Commissioning work. OR</p> <p>c) Executed at least 100 MT of Aluminium Bus Duct fabrication work.</p>		
B-1	<p><u>Financial TURNOVER:</u></p> <p>Bidders must have achieved an average annual financial turnover (Audited) of Rs 11.09 Lakhs or more over last three Financial Years (FY) i.e. 2016-17, 2017-18, 2018-19 or for 2015-2016, 2016-17, 2017-18, if Annual Accounts for FY 2018-2019 are not audited.</p>	Applicable	
B-2	<p>NETWORTH (only in case of Companies)</p> <p>Net worth of the Bidder based on the latest Audited Accounts as furnished for 'B-1' above should be positive.</p>	Applicable	
C	Valid registration of its Firm/Organisation	Applicable	
D	Goods & Service Tax Registration No	Applicable	
E	Electrical licence No.	Applicable	
F	Provident Fund Registration No	Applicable	
G	ESIC No	Applicable	
	<p><u>Explanatory Notes for the QR (unless otherwise specified in the QR):</u></p> <ol style="list-style-type: none"> 1. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against B-1 above along with all Annexures 2. In case audited financial statements have not been submitted for all the three years as indicated against B-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years i.e total divided by three. 3. B-2:-NETWORTH: Shall be calculated based on the latest Audited Accounts as furnished for B-1 above. Net worth = Paid up share capital + Reserves. (Net worth is required to be evaluated in case of companies) 4. 'EXECUTED' means the Vendor should have achieved the criteria specified in the Technical criteria of QR (as in 'A' above) even if the Contract has not been completed or closed. 		

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| | <p>5. Time period for achievement of the 'Technical' criteria of QR (as in 'A' above) will be the last 7 years ending on the 'latest date' of Bid submission, if specifically, not mentioned.</p> <p>6. For Bidders who have executed Electrical C&I or other contract has to furnish documents to establish that executed value of busduct (IP/SP) erection and commissioning portion is as per the technical criteria of QR (as in 'A' above).</p> |
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NOTE: TENDER NOT ACCOMPANIED BY ANY ONE OR MORE OF THE PRESCRIBED ABOVE APPLICABLE DOCUMENTS ARE LIABLE TO BE REJECTED.

CHAPTER-I

Volume-IA PART-I, PROJECT INFORMATION

1	Project name	Nabinagar Power Generating Company Limited, Nabinagar, Bihar.
2	No. Of units x capacity	3X660 MW
3	Project setting up by	50:50 JV Company- NTPC Ltd & BSEB.
4	Location and approach	Village- Ankora, By Road.
5	Nearest railway station	Dehri- On Son, 63 KM from Plant. Gaya, 126 KM from Plant.
6	Nearest major town & distance from project site	Dehri- On Son, 63 KM from Plant Aurangabad- 36 KM from Plant.
7	Nearest airport	Varansi Airport
8	Distance from airport to project site	150 KM
9	Nearest highway	NH-2 & NH-98.
10	Distance from nearest highway point to the site	33 KM FROM NH98
11	Temperature	40° C (Max extreme recorded) & 9° C (Min. extreme recorded)
12	Transport	By Road, Train & By Air.
13	Project site address	Sivanpur, Ankora RS Post, Dist: Aurangabad, State: Bihar, Pin- 824303

Tender specification for NPGCL, Nabinagar Bus duct installation package-
3 X 660 MW

CHAPTER – II

Volume-IA PART-I, SCOPE OF WORKS

THE SCOPE OF THE WORK WILL COMPRISE OF BUT NOT LIMITED TO THE FOLLOWING:

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

1.2.0. Detail scope of work

Sl no	Description of Work
1	<p>A. Loading and Unloading of BHEL Material for Unit-03 (if any) which is received at site within 12 hours of transporter reaching at site. Upon exceeding, standing charge will be applicable to transporter and same amount will be liable to be deducted from your subsequent bill coming under processing. Before material receiving/signing of GR copy proper physical inspection to be carried out. If any damage is found, intimation to BHEL Representative should be given and proper remarks on GR to be made.</p> <p>B. BHEL Rudrapur has already supplied the Unit-03 material at site and these are available in BHEL Storage yard. Bidder is responsible to taking over the material with proper physical verification before start of Unit-03 erection work at site. If any discrepancy found during the taking over immediately report to BHEL Site in charge at site. Few material may be kept at BHEL PSER Yard which may be shifted as per need of erection.</p>
2	Maintaining & updating the material stock register and in soft copy (excel sheet).
3	Security guards to be appointed for stores security of BHEL material round the clock.
4	Local shifting of material at site. The handling equipment like Crane, Tractor with operator shall be arranged by subcontractor agency. Bidders may visit NPGCL, Nabinagar for accessing the execution work of Generator Bus duct package in Unit-03 before quoting.
5	During the bus duct and structure erection & alignment minor cutting, welding, and modification to be carried out with the permission of BHEL representative.

	Aluminium Zinc rich paint to be applied on modified portion of structure after arrangement of the same to be done by successful tenderer.
6	Subcontractor is responsible for erection of bus duct, structure and other accessories which is necessary for bus duct commissioning like NGC, seal off bushing, wall frame, rubber bellow, NGR, etc. as per Erection Manual, Erection Drawing and Inspection/testing to be carried out as per approved FQP.
11	Subcontractor is responsible for attending all punch point for Unit-03 related to bus duct erection which is raised by BHEL/Customer after commissioning of bus duct.
12	Subcontractor will be responsible for Closing the Contract of Unit-03 with BHEL, Rudrapur and provide required Compliance timely.

1.2.1. The scope of specification covers the installation, testing and commissioning of Bus Duct package along with accessories as detailed in Bill of Quantity - **VOLUME-IA PART – I CHAPTER – VIII.**

1.2.2. If any item or equipment not covered but requires being erected / commissioned, same shall be carried out by the contractor. Equivalent or proportional unit rate for those item or equipment shall be considered wherever possible from the BOQ. The rates quoted by the contractor shall be uniform as far as possible for similar items appearing in rate schedule.

Note:- Detailed BOQ system wise and BHEL unit wise with detailed specification of various equipment's and items are given in the VOLUME- IA PART-I CHAPTER-VIII. The rate schedule is the summary of BOQ i.e. consolidated list of BOQ. Contractor shall go through the detailed BOQ and specification before filling the rate in the rate schedule/price bid.

1.2.3 Preassembly, Erection, Testing, Commissioning and reliability operation of equipment.

1.2.4 Supply of consumables as per clause 1.3.6. Supply of paints and Consumables as per clause 1.3.6.

1.2.5 Final painting including supply of suitable paints, thinner, tools & tackles for painting.

1.2.6 It is not the intent to specify herein all details of material. Any item related to this work not covered, but necessary to complete the system will be deemed to have been included in the scope of the work.

Note:

**FOR FURTHER DETAILED SCOPE OF WORKS REFER
RELEVANT CHAPTERS IN THIS BOOK**

VOLUME-IA PART – I CHAPTER – III

CONSUMABLES & FACILITIES IN THE SCOPE OF CONTRACTOR / BHEL (SCOPE MATRIX)

1.3.3. OPEN SPACE:

Open space for building of temporary office shed and contractor's stores shed(s) will be provided free of charges. Contractor has to make his own arrangements in labour colony.

1.3.4 ELECTRICITY:

1.3.4.1 Electricity for construction purpose shall be provided by NPGCL on free of cost basis. NPGCL will provide one single point to BHEL. Further distribution of electricity with necessary isolator/ELCB etc. shall be arranged by the contractor at his cost.

1.3.4.2 Provision for distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.

1.3.4.3 BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage / frequency or interruptions in power supply.

1.3.5 WATER:

Arranging water and further distribution of water is in the contractor's scope.

1.3.6 MATERIALS / CONSUMABLES TO BE ARRANGED BY THE CONTRACTOR FOR ERECTION AND COMMISSIONING AS PART OF THE SCOPE AT FREE OF COST

- i) All types of welding electrodes, filler wires, Gases and requisite tool & tackle etc.
- ii) Provision for temporary scaffoldings pipes & clamp.
- iii) Insulation & Danger tape.
- iv) Paints required for one final coating.
- v) Protocol / Calibration report sheets as per BHEL Format.
- vi) Panel sealing compound material (for cable entry from bottom / top of Panel).
- vii) Materials required for cable dressing (GI / aluminum flats, PVC ties etc).
- viii) PVC wire marker sleeves and Tag plates
- ix) PVC cable ties
- x) Copper/Aluminium Lugs of different sizes (2/2.5/4/6 sq mm) insulated/ring type.
- xi) Anchor fasteners for wall mounted cable trays / JB's
- xii) Fevicol SR-998 for fixing gasket.
- xiii) Torque Wrench (Required size)

xiv) Spanners, sockets, T handle & hand tools.

VOLUME-IA PART – I CHAPTER – IV

MATERIAL, CONSUMABLES, T&P'S and MMEs TO BE DEPLOYED BY CONTRACTOR

The following minimum major Tools & Plants shall be deployed by the contractor for execution of this contract with in the quoted rate:

Sl no	Description	Capacity	Minimum quantity
1	MIG Welding Machine	--	2 Nos.
2	Arc Welding Machine	--	1 No.
3	HV Test Kit- AC Type- Spec: 100 KV, 300 mAmp	--	1 No
4	Scaffolding Arrangement	--	As required at site
5	Chain Block Pulley	2 Ton & above	5 Nos
6	Zig Saw cutting machine	--	1 No
7	Circular Saw Cutting Machine	--	1 No
8	Ratchet Belts	--	10 Nos
9	Open Trailor for Local shifting, if required	--	1 No.
10	Hydraulic Crane	14 ton or more	1 No.

EQUIPMENT FOR TESTING & COMMISSIONING:

For loading and transportation, all necessary T&P such as Trailers, Cranes, slings, strap belts, hydraulic jacks, ropes etc. are to be arranged by the contractor. All the tools & plants required for this scope of work is to be arranged by contractor. The following testing equipment / T&P shall be brought to site by contractor in sufficient number to carry out the job simultaneously in more than one area.

- 1) Insulation tester:
 - a. Motorised IR Tester - 0 - 1000 - 2000 - 5000V, 0 - 25000 M ohm OR of higher range. OR
 - b. Hand operated IR Tester - 0.5 KV/1.0 KV/2.5 KV, 200 - 100 M ohm OR of higher range.
- 2) Earth resistance tester 0 to 1, 10, 100 ohms
- 3) Torque wrench upto 100 Lb-Ft.
- 4) Multi-meter - Digital : voltage AC & DC - 100mv - 1000 V
Current 10-mA - 10A Resistance - 0-20 M ohms
- 5) HV Test kit of 100 KV AC with 300 mAmp Leakage Current .
- 6) Contact resistance measurement kit
- 7) Micro ohm meter
- 8) Dye Penetrant test kit.
- 9) Radiography test kit for sample testing, if mentioned in FQP for welding test, it will be arranged by contractor.

10) CT Test kit for polarity injection ratio test.

Note for Contractor's Instruments, Tools & Plants:

- a) For loading and transportation, all necessary T&P such as Trailers, Cranes, Winches, welding generators, slings, jacks, sleepers, rails etc., are to be arranged by the contractor.
- b) If crane and trailers are under break down, the contractor immediately has to arrange alternative crane and trailers. Erection progress should not be affected due to this reason.
- c) The contractor shall arrange all the above T&P, equipment and instruments as indicated except testing instruments which are proprietary in nature.
- d) The contractor at his cost shall arrange all cranes and truck / tractor, trailers required for material handling purpose and also cranes required for erection. If contractor fails to arrange required equipment for erection then BHEL will arrange the necessary equipments and the cost of hiring thereof shall be deducted in the upcoming RA bill of contractor.
- e) Necessary accessories for the above shall also be provided by the contractor.
- f) The above instruments / equipment will be sent for testing and calibration from time to time and maintained by contractor as required by BHEL.
- g) All testing instruments shall have calibration certificate issued by recognized / accredited agencies.
- h) List of such agencies and periodicity of calibration required for different instruments will be furnished by BHEL at site.
- i) Contractor shall maintain calibration records as per the BHEL format and produce them whenever called for by BHEL Engineers.
- j) Contractors shall arrange experienced / qualified persons for using these calibration instruments at laboratory and also at work spot.
- k) Wherever frequent calibration is required, contractor shall arrange adequate number of instruments such that the work does not suffer for want of test instruments.

VOLUME-IA PART – I CHAPTER-V TIME SCHEDULE

1.5.1 TIME SCHEDULE

- 1.5.1.1 The entire work of erection testing and commissioning of bus duct of Unit-03 at NPGCL Nabinagar 3x660 MW as detailed in the Tender Specification shall be completed within **15 (Fifteen) months** from the date of commencement of work at site.
- 1.5.1.2 During the total period of contract, the contractor has to carry-out the activities in a phased manner as required by BHEL and the program of milestone events.
- 1.5.1.3 The erection work shall be commenced as per note in commencement of contract period. The decision of BHEL in this regard shall be final and binding of the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

1.5.2 COMMENCEMENT OF CONTRACT PERIOD

The date of commencement of contract period shall be as per the Milestones dates mentioned in 1.5.3. In case of discrepancy the decision of BHEL engineer is final.

1.5.3 MOBILISATION FOR ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING ETC.,

The activities for erection, testing etc shall be started as per directions of Construction manager of BHEL. The contractor has to augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules:

DESCRIPTION	MILESTONES (3x660 MW)	
	UNIT-3	
Mobilisation at site	For Erection of SPBD & IPBD in Unit-3: Within one week after receipt of W.O./ LOL..	
Commencement Date	Within one week from the date of mobilisation in Unit-3.	
Completion Date	Within One Year from commencement date and supply of last material at site whichever is later.	
Contract Closing of bidder With BHEL Rudrapur	Within six months from the date of completion of Unit-3.	

1.5.4 In order to meet above schedule in general, and any other intermediate targets set, to meet customer / project schedule requirements, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

1.5.5 **In case any requirement is there to compress the schedule of activities to achieve project completion, then the additional expenses if any incurred will be discussed mutually and settled. BHEL decision in this regard is final and the issue is not open to arbitration.**

1.5.6 CONTRACT PERIOD

The contract period for completion of entire work under scope shall be 15 **(Fifteen) months** from the "COMMENCEMENT OF CONTRACT PERIOD" as specified earlier.

1.5.7. WARRANTY PERIOD:

1) The Contractor shall be liable to replace /rectify any parts that may fail or show signs of defects in the work done by the contractor under this contract, or from any act or omission of the contractors for a period of 30 Months from the date of taking over certificate (TOC) of works to the satisfaction of the Purchaser.

2) Any part or components of the goods or services forming the unit having defects which is warrantable by BHEL/sub-contractor and corrected by the sub-contractor either by the way of repair or replacement (of BHEL supplied part/component) shall further be warranted by sub-contractor for a period of 12 months from the date of such correction is effected and accepted by owner/owner's representative. Replacement of parts/component in BHEL scope of supply found defective shall be provided at site by BHEL free of cost for replacement in the unit by sub-contractor during the warranty period.

VOLUME-IA PART – I CHAPTER-VI

TERMS OF PAYMENT

1.6.1 Terms of payment:

The progressive payment **against running bills** for erection, testing and commissioning of bus duct package will be released as per scheme mentioned below.

TERMS OF PAYMENT FOR BUS DUCT PACKAGE 3X660 MW, NPGCL, Nabinagar, Bihar

DESCRIPTION OF PAYMENT.				
RA Bill No	Detail		Unit-3	Total
SPBD		ROW No.	→	
↓ 1	DEPUTATION OF QUALIFIED SUPERVISOR AS PER CL. 1.9.41.1.	A	2%	2%
2	TRF- YARD SPBD STRUCTURE ERECTION	B	6%	6%
3	ERECTION OF COMPLETE BUS DUCT	C	12%	12%
4	TERMINATIONS OF BUS DUCT & CONDUCTING TESTS AS PER FQP	D	12%	12%
5	PUNCH POINT CLOSURE	E	5%	5%
6	COMMISSIONING/CHARGING	F	5%	5%
Sub-Total				42%
IPBD				
6	COMPLETE IPBD STRUCTURE ERECTION	G	6%	6%
7	ERECTION & FITMENT OF BUS DUCT	H	15%	15%
8	WELDING OF CONDUCTOR & ENCLOSURE ALONGWITH ITS TESTING (DP/RT) AS PER FQP.	I	12%	12%
9	TERMINATIONS OF BUS DUCT & CONDUCTING TESTING AS PER FQP	J	9%	9%
10	PUNCH POINT CLOSURE	K	6%	6%
11	COMMISSIONING/CHARGING	L	6%	6%
Sub-Total				54%
12	CLOSURE OF CONTRACT	M	4%	4%
GROSS TOTAL				100%

Notes:-

Tender specification for NPGCL, Nabinagar Bus duct installation package-
3 X 660 MW

- 1) Percentage of payment to contractor will be considered on the total basic work order value excluding service tax.
- 2) RA Bill Numbering nomenclature: **RA / "RA BILL NO" / "U#" / "ROW NO"** e.g. after getting handing over certificate from customer for Unit-3, successful bidder can raise invoice numbered as RA/5/3.
- 3) **Security Deposit** shall be deposited before the start of work as per the applicable clause in Vol-IC(GCC), Clause No: 1.10.
- 4) Payment will be made within 45 days from the submission of Invoices along with filled WAM & MB at BHEL, Rudrapur.
- 5) Invoices can be raised only after completion of work mentioned under the head description of payment.
- 6) Invoices raised have to be certified by site representative of BHEL, Rudrapur for work verification.
- 7) Contractor will be required to submit following details as and when desired by BHEL as part of documentation to be submitted with invoice to end customer:
PF Challan, ESI Challan, Wages Record, Labour licensee copy, WC Policy-One Time, Indemnity Bond- One time, Service Tax Challans, Certificate regarding compliance to Labour Act for maintaining records required as per the law, Certificate for compliance to safety norms and other statutory papers, if required. Failure to do so will result in hold of payment of contractor.
- 8) In case of no punch points, corresponding payments will be released upon certification by BHEL site representative.

VOLUME-IA PART – I CHAPTER VII TAXES AND OTHER DUTIES

4.7.0 TAXES

4.7.1 Value Added Tax (VAT) for the works

4.7.1.1 ~~Price quoted shall be inclusive of VAT except service tax.~~

4.7.1.2 Notwithstanding the fact that this is only an erection service contract not involving any transfer of materials whatsoever and not attracting VAT liability, being labour oriented job work, for the purpose of VAT the contractor has to maintain the complete data relating to the expenditure incurred towards wages etc. in respect of the staff/workers employed for this work as also details of purchase of materials like consumables, spares etc., inter alia indicating the name of the supplier, address and VAT Registration No. and VAT paid for the purchases, etc

4.7.1.3 The bidder shall get registered with State VAT authorities and the registration certificate shall be forwarded to BHEL immediately after commencement of work. In case the bidder had already registered under respective State VAT, they must quote their registration Number and forward copy of Registration Certificate while submitting this tender.

4.7.1.4 The bidder shall quote very competitive price after taking into consideration of above points.

4.7.2. Service Tax

4.7.2.1. Price quoted shall be exclusive of Service Tax. The service tax as statutorily liveable and payable by the bidder under the provisions of service tax Law / Act shall be paid by BHEL as per bidder claim through various running bills. The bidder shall furnish proof of service tax registration with Central Excise Department specifying the name of services covered under this contract. Registration Certificate should also bear the endorsement for the premises from where the billing shall be done by the bidder on BHEL for this project. The bidder shall obtain prior consent of BHEL before billing the service tax amount.

4.7.3.0 Other Taxes & Levies

1.7.3.1 Any other taxes and duties (Service Tax) if any, as applicable, viz. Entry Tax, Octroi, Licenses, Deposits, Royalty, Stamp Duty, other charges / levies, etc. prevailing / applicable on the date of opening of technical bids and any variation thereof during the tenure of the contract are in the scope of bidder. In case BHEL is forced to pay any such taxes, BHEL shall have the right to recover the same from the bidder either from running bills or otherwise as deemed fit.

1.7.4.0 New Levies / Taxes

1.7.4.1 In case Government imposes any new levy / tax after award of the work during the tenure of the contract, BHEL shall reimburse the same at actual on submission of documentary proof of payment subject to the satisfaction of BHEL that such new levy / tax is applicable to this contract.

1.7.5.0 Statutory variations

1.7.5.1 Statutory variations are applicable only in the cases of Service Tax. The changes implemented by the Central / State Government in Service Tax during the tenure of the contract viz. increase / decrease in the rate of taxes, applicability, etc. and its impact on upward revision / downward revision are to be suitably paid/ adjusted from the date of respective variation. The bidder shall give the benefit of downward revision in favour of BHEL. No other variations shall be allowed during the tenure of the contract.

1.7.6.0 Direct Tax

1.7.6.1 BHEL shall not be liable towards Income Tax of whatever nature including variations thereof arising out of this contract as well as tax liability of the bidder and their personnel. Deduction of tax at source at the prevailing rates shall be effected by BHEL before release of payment as a statutory obligation, unless exemption certificate is produced by the bidder. TDS certificate will be issued by BHEL as per the provisions of Income Tax Act.

VOLUME-IA PART – I CHAPTER - VIII

BILL OF QUANTITY (BOQ)

SI No.	Description	Unit-3
1	IPBD(Busduct with all relevant accessories)	1 Set
2	SPBD(Busduct with all relevant accessories)	1 Set
1A	24 KV IP BUSDUCT	Length
	<p>Isolated Phase Bus Duct Product Details:</p> <p>a) Voltage: 24 KV, Air natural Cooled</p> <p>b) Current Rating: Main Run-25000 Amps, Delta Run-15000 Amps, Tap Off Run-2250 Amp</p> <p>c) Weight: Main: 500 Kg/mtr, Delta: 380 Kg/mtr, TapOff-220 kg/mtr</p> <p>d) Standard Section Length: 4-5 Mtr</p> <p>e) Degree of Protection: IP-54 & IP-55.</p> <p>f) Finish Paint: Exterior: RAL 5012, Interior: Matt Black</p> <p>g) D.C Resistance 20°C:- 0.6205 $\mu\Omega/m$, 1.1771 $\mu\Omega/m$, 4.2019 $\mu\Omega/m$.</p> <p>h) Shape: & Dimesion: Main: Circular 1030 o/d 15 tk, Delta: Circular 500 o/d 15 tk, Tap-Off: Rectangular 2 X203.</p> <p>i) Method of jointing adjacent sections: Continuous Welding.</p> <p>j) Disconnecting/Shorting links: Material: Al Alloy, Current- 25000 Amps,</p> <p>k) Bolted flexible joint for connection at equipment end: Copper flexible.</p> <p>l) Rubber Bellows</p> <p>m) Seal-Off-Bushings</p> <p>n) Current Transformers</p> <p>o) Voltage Transformer Cubicles.</p> <p>p) Neutral Earthing Cubicle Equipment</p>	<p>MAIN RUN- 185 mtrs,</p> <p>DELTA RUN- 90 mtrs,</p> <p>TAP-OFF RUN- 135 mtrs. (For Unit-03)</p>

Tender specification for NPGCL, Nabinagar Bus duct installation package-
3 X 660 MW

	q) Earthing Transformer r) Earthing Resistor s) Support Structures (Galvanised) for busduct and accessories: Approx 120 MTON (for Both Package) t) Pressurisation Equipment. u) Hot Air Blowing Equipment. v) Neutral Grounding Transformer w) Sunshade on IPBD	
2A	11 KV SP Busducts	Length
	Segregated Phase Bus Duct Product Details: a) Voltage: 11 KV & 3.3 KV, Air natural Cooled, 50 Hz, Current Rating: 2500 Amp, 2000 Amp & 2750 Amp b) Bus Conductor material: Aluminium Alloy, Shape: rectangular, 3 phase system. c) Bus Duct Enclosure: Aluminium Alloy, Dimensions: 450 X 1350 mm & 400 X 1200. d) Type of Joints between Adjacent Sections of Bus Conductor: Bolted. e) Seal-Off-Bushings f) Earthing Conductor: GI Flat g) Steel Structure (Galvanised) : Approx 80000 Kgs (for both package) h) Painting: Bus Conductor: Black Matt i) Bus Enclosure Paint Finishing: Exterior: RAL 5012 j) Interior: Matt Black. k) Space Heater: Inside SPBD Enclosures l) Flexible Expansion Joints. m) Interconnections/Terminations: Copper Flexibles/ Copper Connections. n) Approximate weight of BD : 90kg/m	393 mtrs (For Unit-03) BD-11 = 57.025 Mtrs BD-12 = 54.260 Mtrs BD-V = 33.605 Mtrs BD-VI = 38.425 Mtrs BD-IX = 11.370 Mtrs BD-13 = 83.405 Mtrs BD-14 = 98.404 Mtrs BD-17 = 8.505 Mtrs BD-20 = 8.500 Mtrs

NOTE TO BOQ: The quantity indicated in the BOQ is approximate only and is liable for variation.

Tender specification for NPGCL, Nabinagar Bus duct installation package- 3 X 660 MW