



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
Bharat Heavy Electricals Limited
(A Government of India Undertaking)
इंडस्ट्रियल सिस्टम्स ग्रुप
INDUSTRIAL SYSTEMS GROUP

फोन/Phone : 080 22184090,
फैक्स/Fax : 080 23562713
ई-मेल/e-mail : sv@bhelisg.com;

प्रो. सी एन आर राव सर्कल
पो बॉक्स सं 1249, आईआईएससी पोस्ट,
बेंगलूर - 560 012
Prof. CNR Rao Circle
P B. No.1249, IISc post
Bangalore-560 012

NOTICE INVITING TENDER

Ref: 77/11/6277/SV

Date: 09-12-2011

Subject: Tender for Supply of 6 sets of Transport / Conveying Air Compressors for Ash Handling Plant of 2X520MW HNPCL, Vizag TPP
Tender Ref.No.77/11/6277/SV

Please submit your lowest quotation subject to our Terms & Conditions for the tender referred above. The following documents can be downloaded from Website www.bhelisg.com or www.bhel.com or <http://tenders.gov.in>

Sl.No.	Description	Document Ref
01	NIT & Qualifying Criteria, Commercial Terms & Conditions etc.	Volume – 1
02	Project Synopsis, Technical Specifications, Scope of Supply etc.	Volume – 2
03	Price Bid Format	Volume – 3

**Senior Deputy General Manager
Materials Management (BG-1B)**

**ISO 9001
UNIT**

Regd. Office : "BHEL House" Siri Fort, New Delhi – 110 049.





ISG, BANGALORE

PROJECT:
2X520MW HNPCL,VIZAG TPP



SUPPLY OF TRANSPORT / CONVEYING AIR
COMPRESSORS FOR AHP OF 2X520MW
HNPCL,VIZAG TPP

CONTENT SHEET

VOL-1

CONTENT SHEET

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ISG BANGALORE

PROJECT:
2X520MW HNPCL,VIZAG TPP



SUPPLY OF TRANSPORT /
CONVEYING AIR
COMPRESSORS FOR AHP OF
2X520MW HNPCL,VIZAG TPP

NIT & QUALIFYING CRITERIA**VOL-I , SEC-1****NOTICE INVITING TENDER (NIT) & QUALIFYING CRITERIA**

1	Tender inviting officer / Authority, Designation and Address.	Sr. Deputy General Manager /MM / BG 1B BHEL-ISG, Prof.CNR Rao Circle, IISc Post, Malleswaram, Bangalore- 560 012
2	Item Description	Supply of 6 sets of Transport / Conveying Air Compressors for AHP of 2 x 520 MW, HNPCL, Vizag TPP
3	Tender Reference no.	77/11/6277/SV
4	Delivery Period	By 31-03-2012
5	Due date, Time and place for submission of tender.	23-12-2011 Up to 02.00 PM BHEL- ISG Tender box (Reception of ISG & EPD). BHEL-ISG, Prof CNR Rao Circle, IISc Post, Malleswaram, Bangalore- 560 012
6	Place, Date and time of Tech. Bid opening	BHEL-ISG office. Techno-commercial offers will be opened at 03.00 PM on due date in the presence of the vendors who choose to be present. Price bids of technically, commercially accepted and customer approved vendors will be opened subsequently and the date for the same shall be intimated separately.
7	Pre-Qualification Criteria	The bid is open for participation to those bidders who satisfy the following requirements:- 7.1 Bidder should have designed, engineered, manufactured, supplied, erected, tested and commissioned at least two (2) conveying air compressors of MINIMUM 50 m³ / min at 3 Kg/cm² rating for Ash Handling plant of thermal power stations and these compressors should be in successful operation in India for a period of at least Two (2) years in the preceding 5 years on the date for submission of bid. 7.2 Bidder should have Indian Agent and assembly/ testing facilities in India and same shall be indicated in the offer. 7.3 Bidder shall provide documentary evidence in support of his claim for having experience in design,

Tender Ref No.77/11/6277/SV**REV. R0****PAGE 1 of 2**



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NIT & QUALIFYING CRITERIA

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		manufacture, supply, erection, testing and commissioning of oil free screw type conveying air compressors for Ash Handling Plants which are in operation on the date of submission of bid.
8	Mode of Submission of tender	The Tender shall be submitted duly signed & stamped in Two parts as below in separate sealed envelopes super- scribed with Tender Reference and Due date. PART-1 : Technical documents , Commercial Terms & conditions, Deviation Format , Un-priced price bid format etc. PART-2 : Price Bid The above Two sealed envelopes should be put in another sealed cover. This outer cover should be super-scribed with the Tender Reference Due Date etc. and should reach us latest by 2-00 PM on due date.



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PROJECT:
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SUPPLY OF TRANSPORT /
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HNPCL,VIZAG TPP

**Commercial Terms & Conditions
(CTC)**

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COMMERCIAL TERMS & CONDITIONS

Sl.No.	Clause	BHEL REQUIREMENT	SUPPLIERS ACCEPTANCE/REMARKS
1.0	Price Basis	Firm for entire period of contract , FOR Site Basis, inclusive of all taxes, packing, forwarding and freight charges. Insurance by BHEL. Any new taxes/duties imposed by Government after placement of PO shall be reimbursed as per actuals on documentary evidence. The project is eligible for Deemed Export and Mega power project benefits. HNPCL/ BHEL will issue necessary documents for availing these benefits.	
2.0	Excise Duty / Customs Duty	Customs Duty is Nil as this is a Deemed export project. Excise Duty is exempted as this is also Mega power project. Necessary documents shall be issued by HNPCL / BHEL to avail these benefits. Vendor to quote taking these benefits in to account. Vendor to indicate total CIF Value considered in their offer separately for imported items if any .	
3.0	Sales / Other Taxes	To be included in the price. However, rate considered along with the amount included in the price to be indicated separately in the price bid. Sales tax shall be paid extra at actuals as per prevailing rate at the time of dispatch. Vendor shall submit E1 form after receipt of "C" Form from BHEL .	
4.0	Freight	Lumpsum Freight Charges to be indicated in the price bid . This shall be paid on pro-rata basis against dispatches and limited to the freight charges indicated in the price bid.	



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**Commercial Terms & Conditions
(CTC)**

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COMMERCIAL TERMS & CONDITIONS

Sl.No.	Clause	BHEL REQUIREMENT	SUPPLIERS ACCEPTANCE/REMARKS
5.0	Terms of Payment	<u>For Supply</u> (a) 90% direct payment against dispatch documents and submission of invoice (original + 3 Copies). (b) Balance 10% direct payment against receipt of material at site. Invoice to be submitted with Receipted LR or Receipted Delivery Challan and all technical documents as per PO for claiming this payment. <u>For Supervision of Erection & Commissioning:</u> 100% payment for the services rendered on man-day rate basis along with applicable Service tax against submission of invoice and certification from BHEL Engineer.	
6.0	Delivery Period	By 31-03-2012	
7.0	Liquidated Damages	Any delay in PO delivery will attract LD @0.5% of the order value per week of delay and pro-rata for a part of week subject to maximum of 5% of the total order value . Date of inspection call along with internal Test certificates will be taken as delivery date for LD purpose , provided the material is found ready and acceptable during inspection.	
8.0	Performance Bank Guarantee	PBG for 10% of total order value is to be submitted by the successful vendor and shall be kept valid up to the guarantee period with an additional claim period of 3 months there after. This PBG is to submitted along with first invoice or earlier by the vendor from the list of BHEL Consortium Banks as per BHEL PBG Format & Annexure to PBG enclosed.	



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**Commercial Terms & Conditions
(CTC)**

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COMMERCIAL TERMS & CONDITIONS

Sl.No.	Clause	BHEL REQUIREMENT	SUPPLIERS ACCEPTANCE/REMARKS
9.0	Inspection	Inspection shall be carried out by Customer/ Consultant / BHEL/ Third party as the case may be. Vendor to give minimum of 7 days notice for inspection along with internal test certificates. In case the items are not found ready after the inspection call , then the expenses incurred by customer/BHEL for travel, stay etc shall be recovered from the supplier/vendor bill.	
10.0	Guarantee Period	12 months from the date of Commissioning or 24 months from the date of last dispatch which ever is earlier.	
11.0	Transit Insurance	By BHEL. Advance intimation with dispatch details to be given by the supplier to the underwriter at the time of dispatch with a copy to BHEL.	
12.0	Drawing Submission	Drawings/Data sheet and QAP shall be submitted by the Supplier within one week of PO, for obtaining approval from customer/consultant/BHEL. Drawing approval shall be accorded within two weeks there after.	
13.0	Validity of offer	90 Days from the date of Techno-commercial bid opening.	
14.0	Risk Purchase	In case of default/late delivery, purchaser reserves the right to make alternate arrangement for procurement at suppliers risk and cost.	
15.0	Arbitration	Subject to Bangalore Jurisdiction only, based on the Indian Arbitration & Conciliation Act 1996 with latest amendments if any.	
16.0	Quantity Variation	Price quoted by the Vendor shall be valid for ordering additional quantities up to 25% within delivery period of PO.	



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**Commercial Terms & Conditions
(CTC)**

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COMMERCIAL TERMS & CONDITIONS

Sl.No.	Clause	BHEL REQUIREMENT	SUPPLIERS ACCEPTANCE/REMARKS
17.0	Consignee Address	Will be intimated later.	
18.0	Contract No of BHEL	IS-1-10-2001	
19.0	Reverse Auction	BHEL reserves the right to go in for Reverse Auction instead of opening the submitted sealed price bid, which will be decided after techno- Commercial evaluation and vendor approval from customer. In case the reverse auction could not be conducted due to any reasons, BHEL reserves the right to open the sealed price bids in public and finalize the placement of order accordingly. Non acceptance of this clause by the vendor shall be liable for rejection of their offer.	
20.0	ECS Payment	Payment will be made by e-payment only and for which the vendors are to provide the following information along with their offers in their letter head dully signed i) Bank name and address ii) bank phone no iii) bank IFSC code (NEFT)iv) Bank account no v) PAN no vi)Service tax no vii) TIN no viii) E mail ID.	
21.0	Bills Submission	1) All invoices against our order are required to be sent in a sealed envelope addressed to BHEL-ISG VENDOR BILLS BOX, BHEL INDUSTRIAL SYSTEMS GROUP, OPP. IISc, PROF.C.N.R. RAO CIRCLE, MALLESWARAM, BANGALORE - 560 012. The envelope shall be super-scribed with Project Name/PO No and the bill/Invoice Numbers & Contact person. 2) Bills/Invoices which are brought personally by vendors to ISG are to be dropped in the "BHEL-ISG Vendor Bill Box" kept near Tender Box at the reception office in main entrance.	



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**Commercial Terms & Conditions
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COMMERCIAL TERMS & CONDITIONS

Sl.No.	Clause	BHEL REQUIREMENT	SUPPLIERS ACCEPTANCE/REMARKS
22.0	Rejection of Offer	BHEL reserves the right to reject the offer, in case the bidders past performance in any of the BHEL's previous contracts is not found satisfactory.	
23.0	Banned Suppliers / Contractors in BHEL	The offers of the bidders who are on the banned list as also the offer of the bidders , who engage the services of the banned firms , shall be rejected. The list of the banned firms is available on BHEL web site www.bhel.com .	
24.0	Price bid opening	Price bids of technically and commercially qualified and customer approved vendors only shall be opened for evaluation.	
	<u>Note</u>		
	All the clauses of the above format should be filled and submitted with the Techno Commercial Bid (Part-1). The filled in BHEL Commercial terms & Conditions format submitted with technical bid, responding to all the clauses duly signed with seal only shall be considered . Any other Commercial terms & conditions of bidders entered else where in their offer shall not be considered and are liable for rejection.		

Signature of the bidder with Seal & Date



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DEVIATION FORMAT

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DEVIATION FORMAT

1.1 TECHNICAL

Following are the DEVIATIONS from Enquiry Specifications :

TECHNICAL SPECIFICATIONS				
Sl. No.	Page No.	Clause No.	Clause	Deviation

We confirm that all other clauses of Technical Specifications are fully acceptable.

SIGNATURE OF BIDDER WITH SEAL



PROJECT:
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DEVIATION FORMAT

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1.2 COMMERCIAL TERMS & CONDITIONS

Following are the DEVIATIONS from enquiry Terms & Conditions

COMMERCIAL TERMS & CONDITIONS

Sl. No.	Page No.	Clause No.	Clause	Deviation

We confirm that all other clauses of Commercial terms & conditions are fully acceptable.

SIGNATURE OF BIDDER WITH SEAL



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HNPCL,VIZAG TPP**

**Special Instructions to
Bidders**

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SPECIAL INSTRUCTIONS TO BIDDERS

1. Offer should conform to our Technical Specification, Commercial Terms & Conditions (CTC). Any deviation on Technical specification & Commercial Terms & Conditions shall be explicitly highlighted in the Deviation Format enclosed. In case of "No Deviation", the Bidder should write "No Deviation" in the Deviation Format (both in Technical and Commercial terms & conditions) and submit the same with Techno-Commercial Bid (Part-1).
2. Acceptance/Remarks Column of BHEL CTC should be filled against all CTC Clauses, duly Signed, Stamped and submitted with Techno-Commercial Bid (Part-1). The filled in BHEL Commercial terms & Conditions format submitted with technical bid, responding to all the clauses duly signed with seal only shall be considered. Any other Commercial terms & conditions of bidders entered else where in their offer shall not be considered and are liable for rejection.
3. Un-priced price bid format to be filled and submitted along with Techno-Commercial Bid (Part-1) indicating "Quoted" against the respective item/column duly signed and stamped . Un-priced bid format not complied with the above shall be liable for rejection.
4. All prices should be quoted both in figures & words as per Commercial terms & conditions of NIT. In the event of discrepancy between the figures and words in the Price Bid, the amount entered in WORDS would be taken into consideration for evaluation and finalisation of the order.
5. The Tender shall be submitted in Two parts as follows, in separate sealed envelopes super-scribed with Tender Reference and Due date.

PART-1 : Technical documents , Commercial Terms & conditions, Deviation Format , Un-priced price bid format etc.

PART-2 : Price Bid

The above Two sealed envelopes should be put in another cover. This outer cover should be super-scribed with the Tender Reference Due Date etc. and should reach us latest by 2-00 PM on the due date.

6. BHEL reserves the right to extend the due date for submission of tender without assigning any reasons.



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**Special Instructions to
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7. Offers not complied with NIT requirement shall be liable for rejection.
8. All the pages of Tender documents shall be duly signed, stamped and submitted along with offer as a token of Acceptance.
9. The Rates quoted should be valid for 90 days from the date of opening of Techno-Commercial Bid .
10. Tender shall be deposited in the BHEL-ISG Tender box located at the Reception of BHEL, Malleswaram Complex and tender opening will be done at the Reception of ISG entrance at 3.00 pm on due date.
11. Late tenders shall not be accepted.
12. Price bids of technically and commercially qualified and customer approved vendors only shall be opened for evaluation and finalisation of tender.



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PBG FORMAT WITH ANNEXURE

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(To be stamped in accordance with Stamp Act)

PERFORMANCE BANK GUARANTEE

This deed of Guarantee made this _____ day of _____ Two Thousand _____ between _____ (Bank Name & Address) (hereinafter called "THE GUARANTOR" (which expression shall unless repugnant to the context or meaning thereof be deemed to include its successors and assigns) of the ONE PART and Bharat Heavy Electricals Limited (a Government of India Undertaking), a Company incorporated under the Companies Act, 1956, having its Registered Office at BHEL House, Siri Fort, New Delhi 110 049, through its Unit / Division at ISG, Bangalore (hereinafter called "THE COMPANY") (which expression shall unless repugnant to the context or meaning thereof be deemed to include its successors and assigns) of the OTHER PART.

WHEREAS M/s _____ (Vendor Company name) (hereinafter referred to as the "SUPPLIER / CONTRACTOR") have entered into a contract No. _____ dated _____ (hereinafter called the "CONTRACT" for supply / construction of _____ with the COMPANY.

AND WHEREAS the CONTRACT inter-alia provides that the CONTRACTOR / SUPPLIER shall furnish to the COMPANY a sum of Rs, _____ (Rupees _____ only) towards security deposit for due and faithful performance of the CONTRACT in the form and manner specified therein.

AND WHEREAS the CONTRACTOR / SUPPLIER has approached the GUARANTOR and in consideration of the arrangement arrived at between the CONTRACTOR / SUPPLIER and the GUARANTOR, the GUARANTOR has agreed to give the Guarantee as hereinafter mentioned in favour of the COMPANY.

NOW THIS DEED WITNESSESS AS FOLLOWS –

1. The Guarantee do hereby guarantee to the COMPANY the due and faithful performance, observance or discharge of the CONTRACT by the CONTRACTOR / SUPPLIER and further unconditionally and irrevocably undertake to pay to the COMPANY without demur and merely on a demand, to the extent of Rs. _____ (Rupees _____ only) and claim In made by the COMPANY on them for any loss, damage, costs, charges and



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expenses caused to or suffered by the COMPANY by reason of the CONTRACTOR / SUPPLIER making any default in the performance, observance or discharge of the terms, conditions, stipulations or undertakings or any one of them as contained in the CONTRACT.

2. The decision of the COMPANY whether any default has occurred or has been committed by the the CONTRACTOR / SUPPLIER in the performance, observance or discharge of any of the terms, conditions, stipulations or undertakings or any one of them as contained in the CONTRACT and / or as to the extent of loss or damage costs. Charges and expenses caused to or suffered by the COMPANY by reason of the CONTRACTOR / SUPPLIER making any default in the performance, observance or discharge of any of the terms, conditions, stipulations or undertakings or any one of them shall be conclusive and binding on the GUARANTOR, irrespective of the fact whether the CONTRACTOR / SUPPLIER admits or denies the default or questions the correctness of any demand made by the COMPANY in any Court, Tribunal or Arbitration Proceedings or before any other Authority
3. The COMPANY shall have the fullest liberty without affecting in any way the liability of the GUARNATOR under this Guarantee from time to time to vary any of the terms and conditions of the CONTRACT or extend time of performance by the CONTRACTOR / SUPPLIER or to postpone for any time and from time to time any of the powers exercisable by it against the said CONTRACTOR / SUPPLIER and either to enforce or forbear from enforcing any of the said terms and conditions governing the said CONTRACT or the advance or securities available to the COMPANY and the GUARANTOR shall not be released from its liability under these presents by any exercise by the COMPANY of the liberty with reference to the matters aforesaid or by reason of time being given to the CONTRACTOR / SUPPLIER or any other forbearance, act or omission on the part of the COMPANY or any indulgence by the COMPANY to the said CONTRACTOR / SUPPLIER or of any other matter or thing whatsoever which under the law relating to sureties, would, but for this provision have the effect of so releasing the GUARANTOR from its liability under this GUARANTEE.
4. The GUARANTOR further agree that the GUARANTEE herein contained shall remain in full force and effect during the period that would be taken for the performance of the CONTRACT and its claims satisfied of discharged and till _____ certifies that the terms and conditions of the CONTRACT have been fully and properly carried out by the CONTRACTOR / SUPPLIER and accordingly discharges this GUARANTEE subject, however, that the COMPANY shall have no claim under this GUARANTEE after _____ years from the date of completion of the CONTRACT, as the case may be, unless a notice of the claim under this GUARANTEE has been served on the GUARANTOR before the expiry of the said period in which case the same shall be enforceable against



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the GUARANTOR notwithstanding the fact that the same is enforced after the expiry of the said period.

5. The GUARANTOR undertake not to revoke this GUARANTEE during this period it is in force except with the previous consent of the COMPANY in writing, and agree that any liquidation or winding up or dissolution or any change in the constitution of the CONTRACTOR / SUPPLIER or the GUARANTOR shall not discharge the GUARANTOR's liability hereunder.
6. It shall not be necessary for the COMPANY to proceed against the CONTRACTOR before proceeding against the GUARANTOR and the GUARANTEE herein contained shall be enforceable against them notwithstanding any security, which the COMPANY may have obtained or obtain from the CONTRACTOR / SUPPLIER shall, at the time when proceedings are taken against the GUARANTOR hereunder be outstanding or unrealized.
7. The GUARANTOR hereby declares that it has power to execute this GUARANTEE under its Memorandum and Articles of Association and the executant has full powers to do so on its behalf under the Power of Attorney dated _____ granted to him by the proper authorities of the GUARANTOR.

IN WITNESS whereof _____ (Bank Name & Address) and Bharat Heavy Electricals Limited, have hereunto set and subscribed their respective hands the day, month and year first above written.

WITNESS :

1

2

Signed for and on behalf of the BANK



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PBG FORMAT WITH ANNEXURE

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“ANNEXURE TO PBG”

PERFORMANCE BANK GUARANTEE SUBMISSION GUIDELINES

Performance Bank Guarantee is to be submitted as per following guidelines :

01	List of BHEL consortium Bank Names are enclosed (29 Banks). Bank guarantees of BHEL consortium banks are only acceptable.
02	In case of Bank Guarantees issued by non-consortium PSU banks the same are to be enforceable in Bangalore.
03	In case BGs issued by Foreign Banks the same may be confirmed by our consortium bank in India.
04	BGs to be submitted should be sent to BHEL-ISG Attn: DGM/MM/BG-IB directly by the issuing bank under Registered Post (A.D). On receipt of the PBG the same will be preliminarily checked by the receiving officer and in case of any corrections PBG will be returned to the issuing Bank for necessary action.
05	Bank Guarantee to be submitted in the prescribed format enclosed and shall be same verbatim as per the format. Bank Guarantee shall be submitted on right value of stamp paper and for correct value of contract.
06	Performance Bank Guarantee shall be extended within the expiry dates wherever activities as per contract are not completed in all respects.



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PBG FORMAT WITH ANNEXURE

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LIST OF CONSORTIUM BANKS

- 1 STATE BANK OF INDIA
- 2 PUNJAB NATIONAL BANK
- 3 HDFC BANK
- 4 SYNDICATE BANK
- 5 CANARA BANK
- 6 INDIAN BANK
- 7 ST. BANK OF HYDERABAD
- 8 ICICI BANK
- 9 STANDARD CHARTERED BANK
- 10 UCO BANK
- 11 KOTAK MAHINDRA
- 12 ORIENTAL BANK OF COMMERCE
- 13 STATE BANK OF TRAVANCORE
- 14 CENTRAL BANK
- 15 IDBI BANK
- 16 FEDERAL BANK
- 17 HSBC LTD
- 18 DEUTSCHE BANK
- 19 CORPORATION BANK
- 20 CITI BANK
- 21 BANK OF BARODA
- 22 ABN AMRO BANK
- 23 UNITED BANK OF INDIA
- 24 VIJAYA BANK
- 25 UNION BANK OF INDIA
- 26 PUNJAB & SIND BANK
- 27 ANDHRA BANK
- 28 BANK OF INDIA
- 29 AXIS BANK

BHEL- ISG, BANGALORE 	HINDUJA NATIONAL POWER CORPORATION LIMITED 2X520MW TPP HNPCL-VIZAG-AHP Technical Enquiry Specification For Ash Transport/Conveying Air Compressor For Ash Handling System	DOCUMENT NUMBER IS-01-10-2001/001 ENQUIRY NO. 77/11/6277/SV
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VOLUME - 2

TECHNICAL ENQUIRY SPECIFICATION OF ASH TRANSPORT/CONVEYING AIR COMPRESSOR FOR ASH HANDLING SYSTEM

BHEL- ISG, BANGALORE 	HINDUJA NATIONAL POWER CORPORATION LIMITED	DOCUMENT NUMBER IS-01-10-2001/001
	2X520MW TPP HNPCL-VIZAG-AHP Technical Enquiry Specification For Ash Transport/Conveying Air Compressor For Ash Handling System	ENQUIRY NO. 77/11/6277/SV

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	2X520MW TPP HNPCL-VIZAG-AHP Technical Enquiry Specification For Ash Transport/Conveying Air Compressor For Ash Handling System	ENQUIRY NO. 77/11/6277/SV

1.0 PROJECT INFORMATION:

Project information for the 2X520 MW HNPCL, Vizag project is as per enclosed Annexure – I (Sheet 1-1).

2.0 SCOPE OF SUPPLY:

The scope of supply includes design, manufacture, testing at shop, delivery at site and supervision of erection & commissioning, PG test & handing over of screw type ash transport/conveying air compressors as per this Specification and Data Sheet enclosed herewith.

Screw type ash transport/conveying air compressor complete with drive motors ,intercoolers, after coolers (if applicable), intake air filter cum silencer, discharge valve with non return valve, relief valve, all necessary instrumentation for supplying air to the system and all other accessories, which are not mentioned specifically but are essential for sound performance of the equipment.

Note: Bidder to note that vendor's responsibility doesn't limit only to the supply of compressors at site. But, also to depute a concerned E&C engineer who shall be made available to our AHP package vendors at respective project sites for system integration with the ash handling plant as and when required.

3.00 SPECIFICATION FOR ASH TRANSPORT/CONVEYING AIR COMPRESSORS:

3.01	Type	:	Oil free Screw type compressor.
3.02	Applicable codes	:	IS : 6206; IS 5727: BS726
			ASME Power test code PTC 9, IS: 5456.
			ISO: 1217 (1996) for acceptance test.
			Any other relevant International / DIN standard.
3.03	Performance	:	Ash transport/conveying Air

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	Parameters		Compressor
A)	For HNPCL TPP Unit 1 & 2 (2x 520MW)- AHP		
i)	Capacity	:	66 m ³ / min
ii)	Rated Discharge Pressure at Package outlet Flange	:	2.5 kg/cm ² (g) and unload pressure as 3.25 kg/cm ²
iii)	Quantity	:	6 Nos.
3.04	Duty	:	To be designed for continuous duty
3.05	Design Conditions	:	50 deg C and 100% Relative Humidity
3.06	Site Data	:	Refer Annexure-I
4.00	Material of Construction	:	
i)	Air End Casing	:	FG300, IS210 Grey iron casting
ii)	Rotor	:	AISI SAE 1046
iii)	Timing Gears	:	EN19, BS709, M40 Cr. Mo Steel
iv)	Viscos –type seal	:	Bronze casting
v)	Gear casing	:	FG250, IS210, Grey iron Casting
vi)	Bull Gear	:	EN19, BS709, M40 Cr-Mo Steel
vii)	Pinion Gear	:	EN353, BS 815 M17 Ni. Cr Steel (Case hardening)
5.00	Design & Construction Features:		
5.01	Transport/conveying Air Compressor shall be designed for continuous operation with high efficiency to satisfy the system requirement. Satisfactory operation in parallel shall be ensured without any uneven load sharing, undue vibration & noise.		
5.02	Each compressor shall have inlet filter to protect the compressor. The filter inlet area should be large enough to ensure that frequent filter changes are not required.		
5.03	The safety valve (s) should be capable to bleed off the full capacity of the compressor.		

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5.04	Rotors shall be Dynamically balanced.
5.05	Life of oil lubricated anti-friction type bearings shall be at least 40,000 running hours.
5.06	A direct driven positive displacement type oil pump connected to the main drive shaft to be provided / splash lubricated oil system.
5.07	The lubrication system to include oil pump, oil filter, oil cooler and oil tank / sump (if required).
5.08	Water cooled compressor Cooling system as well as the oil coolers as required should be designed to withstand the maximum pressure of the cooling water circuit i.e. 10 kg / cm ² (g).
5.09	To provide suitable arrangement for cleaning of the cooling water-jackets during maintenance of compressor (if applicable).
5.10	The inlet and /or outlet silencer for each compressor unit shall be provided such that the noise level requirement as stated below can be complied with:- "Maximum noise level shall not exceed 85 dB (A) when measured at 1m away from noise emission source. Maximum noise level from its source within the premises shall not exceed 70 dB (A) as per Environment Protection Rules, 1986, schedule III, 'Ambient Air Quality Standards' in respect of Noise. Any Statutory changes in stipulations regarding noise limitation that may occur in future according to West Bengal Pollution Control Board or Central Pollution Control Board or Environment & Forest regulation during tenure of the Contract, the Supplier shall comply with the requirement"
5.11	Drive shall be directly coupled with constant speed squirrel cage induction motor and shall be of Indian origin.
5.12	Vibration level of each Compressor shall be limited to as per the stipulations prescribed in relevant standards.
5.13	The electronic microprocessor based integral controller (if provided) shall be provided with all necessary hardware & software facilities.

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5.14 Necessary Capacity control arrangements (Compressor Load – Unload) shall have to be included in each of the Transport/Conveying Air Compressors and bidder shall furnish in the offer details regarding steps of control, type of control, mechanism for achieving the same.

6.00 ACCESSORIES:

Each compressor to include following minimum accessories as part of each compressor

- Drive motor Refer Annexure II(Sheet 1-9) for HNPCL TPP.
- **Companion flanges along with nuts and bolts shall be supplied for air discharge flange, cooling water inlet flange and cooling water outlet flange of the compressors.**
- **Bidder to submit unit rates of essential spares as indicated in clause no 16.0 of this specification. The price shall be valid till three years from the date of LOI placed or for one year from date of commissioning of the compressors whichever is later.**
- **Firstly, Lubricating oil present in compressor shall be drained during pre-commissioning visit of the bidder's executive. During commissioning of the compressors, fresh oil supplied by bidder shall be filled in presence of BHEL during commissioning of compressor at site.**
- Dry type intake air filter
- Silencer at suction and discharge
- Safety relief valve (s) (for full capacity of compressor)
- **Non-return valve at discharge**
- Base frame, coupling guard. Foundation bolt, nuts, anti-vibration pads, eye bolts etc. as required for the compressor
- Acoustic hood with necessary ventilation system (comprising of ventilation fan with motor)
- All necessary instruments to ensure smooth and satisfactory operation

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	of the Compressor and also for the safe and reliable operation of the Compressor • Instruments for effecting automatic Load – Unload operation of the compressor • Locally mounted Control panel • Load Hour run meter • Service Hour run meter operation and maintenance tools & all other accessories required for complete unit of compressor	
	Please note that Bidder should include in their offer all required accessories /instruments in addition to those indicated above as may be necessary for monitoring & operational safety of the offered compressors.	
7.00	INTAKE FILTER AND SILENCER	
7.01	Intake Air Filter and Silencer shall be complying with the following requirements.	
7.02	Filtering efficiency minimum 99% down to 10 microns.	
7.03	Pressure drop across air filter at design flow rate will be as minimum as possible.	
7.04	Design air flow rate will be corresponding to compressor air flow rate.	
7.05	Quantity	: One per compressor
7.06	Type / Design	: Heavy duty type.
7.07	To provide densely packed, replaceable type paper as filtering media.	
7.08	Filter to be designed to have sound suppressing characteristics.	

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8.00	Enclosure Ventilation System:
	In case the noise level of the equipment exceeds the limit of required noise level as per cl. no. 5.10 above, the compressor package should be acoustically insulated. Necessary ventilation system has to be provided to maintain the temp. inside the acoustic enclosure within the designed limit. Interlock should be there so that compressor can be started after starting of ventilation fan and when ventilation systems fan stop compressor will also trip automatically.
9.00	Vendor shall furnish the following along with the offer.
9.01	Duly filled in Bidder's Data Sheet.
9.02	Catalogues for the offered model.
9.03	Minimum 2 Nos. installations of similar type/rating of compressors in Thermal Power Plant to be indicated by the bidder in their offer.
10.00	Successful bidder shall furnish the following after receiving L.O.I.
10.01	Sectional assembly drawings complete with bill of material.
10.02	Agreed and finalized P & I diagram.
10.03	Control Write – up.
10.04	Wiring diagram of Control Panel indicating Terminal details, component identification, make & rating.
10.05	Power distribution diagrams for the drives.
10.06	Operational and maintenance manual.
10.07	Lubrication schedule.
10.08	QAP for BHEL/Customer/customer's Consultant approval.
10.09	Painting Schedule.
10.10	Any other relevant document which may be felt necessary during execution of Contract.

11.0 TECHNICAL DATA SHEET TO BE FILLED BY THE BIDDER

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Sl.No.	Description	TRANSPORT/CONVEYING AIR COMPRESSOR
1.00.00	GENERAL	
1.01.00	Manufacturer	:
1.02.00	Model No.	:
1.03.00	Type	:
1.04.00	Numbers offered	:
1.05.00	Design standard	:
1.06.00	Testing standard	:
2.00.00	GUARANTEED PERFORMANCE	
2.01.00	Free air delivery of each compressor [m ³ /hr]	
2.02.00	Discharge pressure at package outlet flange [bar,g]	
2.03.00	Compressor Rated Speed, rpm	:
2.04.00	Power required at Motor Shaft at rated duty Point, kW [without any positive tolerance on declared guaranteed value]	:
3.00.00	DESIGN / TECHNICAL PARAMETERS & CONSTRUCTION FEATURES	
3.01.00	Volumetric Efficiency	:
3.02.00	Air Temperatures at Various stages of Compression	
3.02.01	At 1 st stage discharge/intercooler inlet	

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3.02.02	At intercooler discharge/2 nd stage inlet		
3.02.03	At 2 nd stage discharge/after cooler inlet		
3.02.04	At after cooler outlet		
3.03.00	Noise Level	:	
3.04.00	Main Bearings		
3.04.01	Make	:	
3.04.02	Expected life of bearings in hrs.	:	
3.05.00	Type of lubrication of bearings	:	
3.06.00	Gear Box Details		
3.06.01	Type and make	:	
3.06.02	Gear ratio	:	
3.06.03	Service factor for Gear Box selection	:	
3.06.04	Drive transmission efficiency	:	
3.07.00	Air / Water Connection details		
3.07.01	Air Outlet size and flange drilling standard	:	
3.07.02	Cooling Water Inlet size and flange drilling standard	:	
3.07.03	Cooling Water Outlet size and flange drilling standard	:	
3.08.00	No. of male & female lobe/ flute.	:	

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3.09.00	Timing Gears	:	
3.10.00	Type of Shaft Seal	:	
3.11.00	No. of air intake filter / Particle removal efficiency	:	
3.12.00	Capacity Control		
3.12.01	Nos. of Steps and type	:	
3.12.02	Please enclose a descriptive literature for the Load – Unload System for the Compressors	:	
3.13.00	Guaranteed Noise Level	:	
3.14.00	Guaranteed Vibration level		
3.16.01	Nos. of relief Valve provided for each Compressor	:	
3.16.02	Capacity of each Relief Valve	:	
3.16.03	Make	:	
3.16.04	Material of Construction	:	
3.16.05	Whether full capacity relief possible through the valves	:	
4.00.00	COMPRESSOR COOLING SYSTEM		
4.01.00	Total cooling water (DM /clarified) requirement	:	
4.02.00	Break – up of Cooling Water requirement		
4.02.01	Compressor Jacket – Stage I	:	
4.02.02	Compressor Jacket – Stage	:	

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	II		
4.02.03	Intercooler	:	
4.02.04	After cooler		
4.04.03	Minimum cooling water supply pressure required at cooling water inlet flange of Compressor, in kg/cm ² (g)		
4.04.04	Maximum allowable cooling water pressure for safe operation of the compressor and coolers, in kg/cm ² (g)	:	
4.04.05	Outlet Water temperature	:	
4.05.00	Water Pressure loss across Compressor inlet and outlet flange	:	
5.00.00	MATERIAL OF CONSTRUCTION		
5.01.00	Compressor chamber	:	
5.02.00	Rotors/Screws	:	
5.03.00	Timing Gears		
5.04.00	Inlet throttle valve housing	:	
5.05.00	Safety valve	:	
5.06.00	Non return valves	:	
6.00.00	COMPRESSOR COOLERS	INTER COOLER	AFTER COOLER

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6.01.00	Numbers provided in each Compressor	:		
6.02.00	Type of cooler	:		
6.03.00	Air pressure drop across the cooler	:		
6.04.00	Water pressure drop across the cooler	:		
6.05.00	Operating pressure	:		
6.05.01	Air side	:		
6.05.02	Water side	:		
6.06.00	Design pressure	:		
6.07.00	Material of Construction	:		
6.07.01	Shell	:		
6.07.02	Tubes	:		
6.07.03	Tubes sheets	:		
6.07.04	Tube support plates	:		
6.08.00	Auto drain trap provided for the coolers	:		
6.08.01	Auto-drain trap body & trim material	:		
7.00.00	COMPRESSOR ACCESSORIES :			
7.01.01	Air Intake filter type	:		
7.01.02	Filtering media/element	:		
7.01.03	Rated Capacity, m3/hr	:		
7.01.04	Filtering area,m2	:		
7.01.05	Velocity across filter	:		
7.01.06	Pressure loss across filter under dirty condition	:		
7.01.07	Estimated working life	:		

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7.01.08	Whether replaceable type	:		
7.02.00	Nos. Silencers/Compressor	:		
7.03.00	Enclosure Ventilation Fan, Nos./Compressor & kW rating.			
7.04.01	Any Pump provided for lubrication System			
7.04.02	If yes, please furnish drive mechanism of the Pump [furnish motor rating if Motor driven]			
7.05.01	Non return Valve at discharge, size, mm NB			
7.05.02	Material of Construction of the NRV			
7.06.01	Moisture traps/Water separators/Auto Drain traps provided for the Compressors – Nos. off			
7.06.02	Please confirm that Water separators etc. are rated for twice the Compressor flow at 1 bar above max. operation pressure			
7.06.03	Water separators etc. are provided with flanged connections			
8.00.00	DRIVE SYSTEM DETAILS:			
8.01.01	Recommended Motor rating, kW			

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8.01.02	Motor Speed, rpm (Syn.)		
8.02.00	Type of Coupling between Motor Shaft and Equipment Shaft		
9.00.00	PAINTING:		
9.01.00	Please indicate type of paint used / total paint DFT / Final RAL color shade of outside surface.	:	
10.00.00	TESTING & INSPECTION		
10.01.00	Please confirm that testing and Inspection will be carried out as per approved QAP to be forwarded during execution.	:	
11.00.00	Weight of each complete Compressor assembly excluding drive Motor	:	
11.00.01	Weight of heaviest Component for the compressor		

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12.0 INSPECTIONS & TESTING:

Inspection and testing shall be carried out in presence of BHEL-ISG and customer / customer's consultant (M/s HNPCL/Mott Mac Donald for 2X520 MW TPP, Vizag) representatives. The vendor shall furnish inspection & testing procedure & QAP for due approval from BHEL/Customer/customer's Consultant. Vendor is responsible for getting the Inspection & Test procedures and Quality Assurance Plans approved from the main Customer. Inspection & Test procedure, QAP will be furnished by vendor along with their offer.

All Quality plans shall be submitted in soft and hard copy (5nos.) for BHEL/Customer/customer's Consultant approval. As per the hold points mentioned in QAP, Vendor shall submit the inspection calls by E-mail with clear notice of 10-15days followed by hard copy to be sent by courier so as to reach BHEL desk within 3-4 days from the date of E-mailing of the document. BHEL shall inform within 7-10 days of receipt of inspection call whether inspection shall be carried out or waived off. After completion of inspection the material will be treated as cleared for dispatch by BHEL/Customer/customer's Consultant inspector, if inspection is OK as observed by Inspection Engineers.

Vendor shall maintain strict quality norms and standards for Bought out/self manufactured items through its wide network of quality departments throughout the country who carryout stage and final inspection of the product as per quality standards agreed by engineering/quality specialists.

13.0 TECHNICAL INPUTS TO BE FURNISHED/ CONFIRMED ALONG WITH THE OFFER:

Following documents are to be necessarily enclosed for each type of Compressor by the Bidder as a part of the Offer:

- Manufacture's QAP shall be submitted for approval.
- Compressor P& ID diagram.
- List of Instruments provided for each Compressor along with makes of the Instruments.

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- d) List of accessories to be included with each Compressor.
- e) Compressor General Arrangement.
- f) Performance Curve.
- g) Gd^2 Value of all rotating Parts for verifying the selection of Motor.
- h) Torque Speed Curve for verifying the selection of Motor.
- i) List of Power Supply connections required at Compressor end which will be arranged by Purchaser.
- j) List of Control Supply connections required at Compressor end which will be arranged by Purchaser.
- k) Descriptive write – up for Compressor Load Unload System.
- l) Descriptive Write – up of Lubrication System.
- m) Bidder shall submit signed copy of all the pages of enquiry specification.

14.0 OPERATION & MAINTENANCE MANUAL:

O & M manual shall contain the following.

1. Principle of operation of the equipment.
2. Details of preventive / repair maintenance for equipment and accessories used.
3. Details about the general specifications, design capacities of equipment, their function.
4. Equipment Bidder's address, telephone nos., contacts person details to be furnished.
5. Required Dismantling devices, tools etc.,
6. List of DO's and DO NOT's.
7. Test certificates.
8. All drawings.
9. Calculations.
10. Storage and erection instructions.
11. Proper procedures & sequence of operation.
12. Details of consumable.

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Note: a) All manual shall be supplied in proper bound books or in folders, preferably in A4 size. b) The volume and section number shall be intimated by the Bidder.

c) Prospective Bidder will submit the regular progress reports for self manufacturing & their bought out items equipment ordering /manufacturing status, drgs status once in fifteen days.

d) Bidder shall directly send O&M Manuals to BHEL-ISG HQ as per distribution schedule given below in Clause –8.0 with covering letter copy to Project Manager, BHEL-ISG, Bangalore. BHEL Project Manager shall co-ordinate and ensure submission to Customer/customer's Consultant for the equipments as per BHEL standard practice.

15.0 DISTRIBUTION OF DRGS/ DOCUMENT DURING DETAIL ENGINEERING:

a) Distribution of drawings/ documents

i) For Approval and Information category drgs :

Initial submission – 6 copies + Soft copy (AutoCAD version)

Commented copies back to the sender- 1 nos.

Resubmission of revised drg –6 copies + Soft copy (AutoCAD version).

Final approved drgs (except scheme drgs) – 15 copies,

Design documents –Bidder shall submit soft copies and 6 no. hard copies

ii) Erection Drgs

5 copies to BHEL HQ.

iii) Instruction Manuals/ O & M Manuals

5 hard bound copies to BHEL HQ and soft copy also.

iv) Test Certificates

5 copies to BHEL HQ

b) BHEL / Customer / customer's Consultant shall review and furnish their comments/approval within 15 days from the date of receipt of drawings/documents. M/s BHEL/Customer/customer's Consultant will furnish

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Comments /approval to the Vendor after review of each drawing/document in one of the following categories.

Category- : Approved (Copies for Final distribution)

1

Category- : Approved with comments (Bidder can proceed for manufacture/Construction parallelly taking in to consideration BHEL/Customer/customer's Consultant comments) Resubmission required. Inspection can be carried out with the drg but dispatch clearance shall be given after resubmission of revised drg.

2

Category- : Not Approved. See Comments. Resubmission required.

3

- c) Considering the criticality of the project requirement, all out efforts shall be made to re-submit the drawings/documents as early as possible. However, the commented drawings shall be re-submitted by successful Bidder within 12 days from the date of receipt of commented drawings/ documents from BHEL/Customer/customer's Consultant.
- d) Drawings approved under Cat-2 shall hold good for construction/execution subject to taking care of comments of M/s BHEL/Customer/customer's Consultant.
- e) In case, successful Bidder does not agree with any specific comments, successful Bidder shall furnish the explanation for the same to M/s BHEL/Customer/customer's Consultant within the framework of contractually agreed specification for consideration, acceptance and formal approval under Category 1, as per specifications.
- f) For Category 3, BHEL/Customer/customer's Consultant will send two copies of marked up drawings for further action by successful Bidder.
- g) Final distribution of copies of all Category 1 approved drawings/documents shall be submitted by successful Bidder to BHEL/Customer/customer's Consultant as per distribution schedule given above.

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16.0 ESSENTIAL SPARES: Required for initial 3 years period of operation

Quantities as specified in the below table shall be applicable for HNPCL TPP.

TRANSPORT/CONVEYING AIR COMPRESSOR		
1.	Complete Gear Box	1 set for each type
2.	Bearing (DE & NDE)	1 set for each type
3.	Seal Kit	1 set for each type
4.	Coupling (Motor to Gear Box & Gear Box to Compressor)	1 set for each type
5.	Complete Set of Motor	1 set for each type

17.0 COMMISSIONING SPARES:

The required commissioning spares shall be included in bidder's scope. List for part of Commissioning spares for TAC shall be furnished separately along with offer for reference of BHEL.

18.0 CONTROL PHILOSOPHY:

Operation Of Transport/ Conveying Air Compressor:

The Starting/ Running Permissive for REMOTE operation of the compressors shall be obtained through PLC by ensuring the following:

- The isolation valves on selected conveying path are open & "THROUGH".
- Cooling water supply pressure for compressor is "NORMAL".
- Cooling Water flow is adequate.

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19.0 ELECTRICAL SCOPE OF WORK

The following are the Electrical terminal points for TAC.

- 1) BHEL will provide only required rating of HT feeder up to each compressor panel Power JB.
- 2) BHEL will provide only (one number) required rating of LT Power supply (415 V) to each compressor panel Power JB. Required Power supply rating shall be furnished by vendor.
- 3) All the required local control/monitoring system shall be in vendor scope. Further, vendor shall terminate the required control signals (for PLC system) at compressor panel. BHEL will collect these required signals to PLC I/O panel.
- 4) Vendor shall furnish the required documents/ drawings for their scope of work in line with specification for approval.
- 5) The offered electrical equipment/ components shall be as per approved vendors list and specification enclosed (Annexure-II).

Any other item which is not specifically mentioned but required for completing the job shall come under vendor's scope

ANNEXURE- I
PROJECT INFORMATION 2x520 MW HNPCL,VIZAG

PROJECT TITLE

Hinduja National Power Corporation Ltd (HNPCL) is setting up a Coal fired Vizag Thermal Power plant at Visakhapatnam, Andhra Pradesh. The capacity of the proposed Thermal power project is 1040 MW with **2 X 520 MW** configurations with sub – critical steam parameters.

Plant location.

The Proposed Plant will be located at the coastal site near village Pavalavasa, Coast of Bay of Bengal, approximately 22.5 km southwest of Visakhapatnam in the state of Andhra Pradesh.

Access to Site.

Approach to the site by road is from Yelamanchali-Gajuwaka highway & by rail to the broad gauge Kolkata-Chennai line via a spur at Duvvada station.

The site is close to Visakhapatnam steel which is along the coast to the North-East & the nearest airport is at Visakhapatnam located at a distance of 30 kms from the Project site.

Site Data

Longitude / latitude	83°07'30" E/ 17°34'30"N
Average elevation Mean Sea Level	RL (+) 9 m approximately) for main plant block.
Maximum Monthly average temperature	44.4 deg C
Minimum monthly temperature	12.8 Deg C
Design Ambient Temperature	50° C
Maximum Relative Humidity	84 %
Minimum Relative Humidity	68 %
Design Relative Humidity	80 %
Annual Mean Wind speed	10.8 m/ sec
Design wind Speed	50 m / Sec
Maximum Rainfall	293.3 mm in 24 hrs
Ambient Air Quality	Laden with Coal dust, Fumes, & Chemical gases.

Topographical survey

The terrain of the proposed plant site is undulating. The level of natural ground generally varies between reduced level RL (+) 1 mtr to RL (+) 17 mtrs

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1.0 System Concept and Design Criteria

Service conditions

The motors and actuators will be installed in hot, humid and tropical atmosphere, highly polluted at places with coal dust and/or fly ash.

For motor installed outdoor and exposed to direct sunrays, the effect of solar heat shall be considered in the determination of the design ambient temperature.

(i) AC motors

The motors shall be general purpose, constant speed, squirrel cage, three/single phase, induction type.

All motors shall be rated for continuous duty. They shall also be suitable for long period of inactivity. The motors shall be selected for three voltage levels viz., 11000V, 3300V, 415V.

All motors above 1000 kW rating shall be connected to 11 kV system and motors below 1000 kW and up to 160 kW shall be connected to 3.3 kV System.

The motor name plate rating at 50°C shall have at least 10% margin over the input power requirement of the driven equipment at rated duty point unless stated otherwise in driven equipment specification or in general electrical specification.

The motor characteristics shall match the requirements of the driven equipment so that adequate starting, accelerating, pull up, break down and full load torques are available for the intended service. LT motors shall be energy efficient type.

1.1 Performance .

(i) Running requirements

The motor shall run continuously at rated output over the entire range of voltage and frequency variations specified.

The motor shall be capable of operating satisfactorily at full load for 5 minutes without injurious heating with 75% rated voltage at motor terminals.

(ii) Starting requirements

The motor shall be designed for direct on line starting at full voltage. Starting current shall not exceed 6 times full load current for all auxiliaries except for boiler feed pump where the starting current shall be limited to 4.5 times, subject to IS tolerance.

The motor shall be capable of withstanding the stresses imposed if started at 110% rated voltage. Motor shall start with rated load and accelerate to full speed with 80% rated voltage at motor terminals .

(a) The motor shall be capable of three equally spaced starts in an hour, the motor initially being at a

temperature not exceeding the rated load operating temperature.

(b) The motor shall be capable of two starts in succession with coasting to rest between starts and the motor initially at rated operating temperature.

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The HT motors shall be suitable for switching on/ off through Vacuum circuit breakers

(iv) Locked rotor withstand time

The locked rotor withstand time under hot condition at 110% rated voltage shall be more than motor starting time by at least 2.5 seconds for motors up to 20 seconds starting time and by 5 seconds for motor with more than 20 seconds starting time.

Starting time mentioned above is at minimum permissible voltage of 80% rated voltage.

Hot thermal withstand curve shall have a margin of at least 10% over the full load current of the motor to permit relay setting utilising motor rated capacity.

1.2 Specific Requirement

Construction features of motors

(i) Enclosure All motor enclosures shall conform to the degree of protection IP 55 unless otherwise specified. Motor for outdoor or semi outdoor service shall be of weather proof construction and shall be at least IPW56 rated. Motors for circulating water pumps of large output ratings, located indoor and not directly exposed to coal dust or fly ash, shall have, at least screen protected drip proof enclosure conforming to IP 23. Flame proof motors shall be used for oil applications (fuel oil/transformer oil, etc.) For hazardous area approved type of increased safety enclosure shall be furnished.

(ii) Cooling

The motor shall be self ventilated type, either totally enclosed fan cooled (TEFC) or closed air circuit air-cooled (CACA).

For large capacity motors, closed air circuit water cooled (CACW) may be considered for acceptance.

(iii) Winding and insulation

All insulated winding shall be of copper.

All motors shall have class F insulation but limited to class B temperature rise.

Windings shall be impregnated to make them non hygroscopic and oil resistant.

(iv) Tropical protection

All motors shall have fungus protection involving special treatment of insulation and metal against fungus, insects and corrosion.

All fittings and hardware shall be corrosion resistant.

(v) Bearings

The motor shall be provided with antifriction bearings, unless sleeve bearings are required by the motor application.

Vertical shaft motors shall be provided with antifriction bearing which are not suitable to take external thrust. Thrust bearing of tilting pad type (Mitchel or Kingsbury) is preferred.

Bearings shall be provided with seals to prevent leakage of lubricant or entrance of foreign matters like dirt, water etc. into the bearing area.

Sleeve bearings shall be split type, ring oiled, with permanently aligned, close running shaft sleeves.

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Grease lubricated bearings shall be pre-lubricated and shall have provisions for in service positive lubrication with drains to guard against over lubrication.

Oiled bearing shall have an integral self cooled oil reservoir with oil ring inspection ports, oil sight glass with oil level marked for standstill and running conditions and oil fill and drain plugs.

Forced lubricated or water cooled bearing shall not be used without prior approval of Owner.

Lubricant shall not deteriorate under all service conditions. The lubricant shall be limited to normally available types with IOC equivalent.

Bearings shall be insulated as required to prevent shaft current and resultant bearing damage. Bearing will be insulated at NDE side if shaft voltage is greater than 350mV. NDE bearing of all 11kV motors shall be insulated.

(vi) Noise and vibration

The noise level shall be as per statutory acceptance.

The peak amplitude of the vibration shall be within IS specified limits.

(vii) Motor terminal box

The terminal box shall be capable of being turned 360 Deg. in steps of 90 Deg., unless otherwise approved.

The terminal box shall be split type with removable cover with access to connections and shall have the same degree of protection as motor.

The terminal box shall have sufficient space inside for termination/connection of XLPE insulated armoured aluminium cables.

Terminals shall be stud or lead wire type, substantially constructed and thoroughly insulated from the frame.

The terminals shall be clearly identified by phase markings, with corresponding direction of rotation marked on the non driving end of the motor.

The terminal box shall be capable of withstanding maximum system fault current for duration of 0.25 sec.

For 11000V and 3300V motor, the terminal box shall be phase-segregated type. The neutral leads shall be brought out in a separate terminal box (not necessarily phase segregated type) with shorting links for star connection.

Motor terminal box shall be furnished with suitable cable lugs and double compression brass glands to match with cable used.

The gland plate for single core cable shall be non magnetic type.

(viii) Grounding

The frame of each motor shall be provided with two separate and distinct grounding pads complete with tapped hole, GI bolts and washer. The grounding connection shall be suitable for accommodation of ground conductors as follows: Motor above 90 kW : 50 x 6 mm GS Flat Motor above 30 kW up to 90 kW : 35 x 6 mm GS Flat Motor above 5 kW up to 30 kW : 25 x 3 mm GS Flat Motor up to 5 kW : 8 SWG GI Wire The cable terminal box shall have a separate grounding pad.

(ix) Accessories

☐ General

- Accessories shall be furnished, as listed below, or if otherwise required by driven equipment specification or application.

☐ Space Heater

- Motor of rating 30 kW and above shall be provided with space heaters, suitably located for easy removal or replacement.

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- The space heater shall be rated 240 V, 1-phase 50 Hz and sized to maintain the motor internal temperature above dew point when the motor is idle.
- A space heater shall be included in the limit switch compartment suitable for 240V, 1-phase, 50 Hz supply
- Temperature Detectors
 - All 11000V and 3300V motors shall be provided with six (6) duplex or twelve (12) nos. simplex type winding temperature detectors, four (4) nos. per phase.
 - 11000V and 3300V motor bearing shall be provided with duplex type temperature detectors.
 - The temperature detector mentioned above shall be resistance type, 3 wire, platinum wound, 100 Ohms at 0 °C.
 - Leads of all simplex type motor winding RTDS and motor bearing RTDS shall be wired up to respective switchgear metering & protection compartment. From which one set of RTDS will be connected to numerical protection relay and another set shall be kept free for DCS connectivity. If the protection logic is implemented inside DCS then all the RTDs has to be connected to marshalling box of DCS.

1.3 Labeling and Name Plate

Nameplates shall be provided for each panel and for each equipment/device mounted on it. The material shall be anodised aluminium/lamicaid, 3 mm thick, with white letters on black background.

Nameplates shall be held by self tapping screws. The size of nameplates shall be approximately 20 mm x 75 mm for equipment and 40 mm x 150 mm for panels. However, size of nameplates will be decided at the time of detailed engineering.

Nameplates for panels shall be provided both on the front rear and also inside of the panels.

Control and meter selection switches shall have integral nameplates. Nameplates for all other devices shall be located below the respective devices both inside & outside of panel.

Instruments and devices mounted on the face of the panels shall also be identified on the rear with the instrument/ device number. The number may be painted on or adjacent to the instrument or device case.

Caution notice on suitable metal plate shall be affixed at the back of each panel.

1.9 List of Vendors

Makes of all items / equipments/ Instruments etc shall be as per List Of Vendors below:

SLNO	ITEM DESCRIPTION	SUPPLIER DETAILS (M/S)
1	LT AC MOTORS	JYOTI, VADODARA
		BHARAT BIJLEE, MUMBAI
		ABB, FARIDABAD
		MARATHON/ALSTOM, KOLKATA
		SIEMENS

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SLNO	ITEM DESCRIPTION	SUPPLIER DETAILS (M/S)
		KEC, BANGALORE
		CROMPTON GREAVES, MUMBAI
2	HT MOTORS	KEC, BANGALORE
		CROMPTON GREAVES, MUMBAI
		SIEMENS
		BHEL
		Marathon Kolkatta

2.1 Codes and Standards

All motors shall conform to the latest applicable IS, IEC and CBIP Standards/Publications except when otherwise stated herein or in the driven equipment specification.

Major standards, which shall be followed, are listed below. Other applicable Indian Standards for any component part even if not covered in the listed standards shall also be followed:

Sl.No.	Codes	Description
1	IS: 325	Three phase Induction motors
2	IS: 12615	Energy efficient Induction motors – 3 phase squirrel cage
3	IS: 9334	Electric motor operated actuators
4	IS: 996	Single phase small AC and Universal electric motors
5	IS: 4722	Rotating electric machines -Specifications
6	IS: 3177	Code of practice for EOT cranes and Gantry cranes other than steel work cranes
7	IEC: 60034	Rotating electric motors

If there are additional standards not covered above but are applicable to the equipment, system and works specified herein, the same shall be stated in the Bid, provided these standards/codes are in accordance with following :

In addition to the codes and standards specifically mentioned above all equipment parts, systems and works covered under this specification shall comply with all applicable statutory regulations and safety codes of the Republic of India as well as of the locality where they will be installed, including the following:

- a) Bureau of Indian Standards (BIS)
- .(b) Indian Electricity Act
- .(c) Indian Electricity Rules
- .(d) Indian Explosives Act

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- .(e) Indian Factories Act and State Factories Act
 - .(f) Indian Boiler Regulations (IBR)
 - .(g) Regulations of the Central Pollution Control Board, India
 - .(h) Regulations of the Ministry of Environment & Forest (MoEF), Government of India
 - .(i) Pollution Control Regulations of Department of Environment, Government of India
 - .(j) State Pollution Control Board,
 - .(k) Any other statutory codes, standards and regulations, as may be applicable.
- Unless covered otherwise by Indian codes & standards and where not specifically mentioned elsewhere in the specifications, the latest editions of the codes and standards given below shall also apply:

- .(a) Japanese Industrial Standards (JIS)
- .(b) American National Standards Institute (ANSI)
- .(c) American Society of Testing and Materials (ASTM)
- .(d) American Society of Mechanical Engineers (ASME)
- .(e) American Petroleum Institute (API)
- .(f) Standards of the Hydraulic Institute, U.S.A.
- .(g) International Organisation for Standardisation (ISO)
- .(h) Tubular Exchanger Manufacturer's Association (TEMA)
- .(i) American Welding Society (AWS)
- .(j) National Electrical Manufacturers Association (NEMA)
- .(k) National Fire Protection Association (NFPA)
- .(l) International Electro-Technical Commission (IEC)
- .(m) Institute of Electrical and Electronic Engineers (IEEE)
- (n) Expansion Joint Manufacturers Association (EJMA)

2.9 Inspection and testing plan

A quality assurance programme detailing specific control procedure proposed to be adopted for controlling the quality characteristics relevant to each item of equipment shall be submitted for approval of the Owner.

Upon completion, each motor shall be subject to standard routine tests in presence of customer representative in accordance with relevant IS standard. In addition, any special test called for in the driven equipment specification shall be performed.

Type test certificate for LV Motor shall be furnished for approval.

Type test certificate on any equipment, if so desired by the Owner, shall be furnished. Otherwise, the equipment shall have to be type tested, free of charge, to prove the design.

The actuator and all components thereof shall be subject to tests as per relevant Standards. In addition, if any special test is called for in equipment specification, the same shall be performed

The following type tests shall be performed on a representative sample of 11000V and 3300V motor of each type & rating in presence of customer representative, even if type test certificates of these tests are submitted by the Bidder for Owner's approval:

- .(a) Measurement of stator resistance (and rotor resistance on slip ring motors).

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- .(b) No load running of motor and reading of voltage, current, power input and speed.
- .(c) Locked rotor reading of voltage, current, power input and values of torque of motor.
- .(d) Full load reading of voltage, current, power input and slip.
- .(e) Temperature rise test.

In addition, following tests shall have to be carried out on the motors in presence of Owner's representative.

- (a) Impulse test by 1.2/50 micro sec. On sample coil of stator winding insulation as type test as per draft IEC-671 July 1985 test voltages as under:

Voltage rating of motor Impulse Test Voltage

3.3 kV 18.2 kV peak 11 kV 49 kV peak

- .(b) Tan delta, charging current and dielectric loss measurements on each phase of motor stator winding as routine test.
- .(c) Polarization Index Test as per IS: 7816 as routine test.
- .(d) Test for suitability of IPW – 55 as per IS 4691 as type test. Type test certificate for first numeral shall be acceptable in lieu to test, provided the test motor is identical to motor being supplied. Second numeral test shall be carried out on the motors as routine test.
- .(e) Fault Withstand Test for main terminal box as type test. Type test certificate shall be acceptable, if the test is conducted on exactly identical terminal box.
- .(f) Test for noise level as routine test.
- .(g) Test for vibrations as routine test.
- .(h) Tan delta measurement on coils.
- .(i) Surge withstand test for inter turn insulation.
- .(j) Test to diagnose rotor bar failure during manufacture.

Tests indicated at (h), (i), (j) shall be carried out during manufacture of the coils and shall be furnished for verification.

VOLUME -3

**PRICE FORMAT FOR CONVEYING AIR COMPRESSORS FOR HINDUJA TPP-VIZAG-AHP 2X520 MW
REV. 0**

Enquiry no. : 77/11/6277/SV

ITEM : OIL FREE SCREW TYPE CONVEYING AIR COMPRESSOR FOR ASH HANDLING PLANT

PROJECT : HINDUJA TPP-VIZAG-AHP, 2 X 520 MW

All prices in Rupees

SL. NO.	Description	Unit	Qty	Unit Rate	Total Ex-works price	CST	Service tax including Cess	VAT (as applicable)	Freight charges	Total FOR site price
A	SUPPLY: Design, engineering, manufacture, testing, inspection at manufacturer's works and supply of Oil Free Screw type Ash Transport / Conveying air compressors with drive motors, intercoolers, after coolers (if applicable), intake air filter cum silencer, discharge valve with non return valve, relief valve, all necessary instrumentation, machine mounted panels, all interconnecting power and control cabling and required commissioning spares and all other accessories.	SETS	6							

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PRICE FORMAT FOR CONVEYING AIR COMPRESSORS FOR HINDUJA TPP-VIZAG-AHP 2X520 MW
REV. 0

SL. NO.	Description	Unit	Qty	Unit Rate	Total Ex works price	CST	Service tax including Cess	VAT (as applicable)	Freight	Total FOR site price
B	Charges for Supervision of Erection & Commissioning: To depute concerned specialist who shall be made available to BHEL's AHP package vendors at project site during system integration with the ash handling plant (3 trips of 8 man days each).	MANDAYS	24							
	TOTAL (A+B) Rs. (Rupees)									
	CIF Content (if any) included in the above									

Notes:

- 1) Above quoted price should be inclusive of all the equipments & items, accessories, hardware, foundation Bolts etc. including vendor supplied electrical & instrumentation, items required for installing the compressors for Ash handling system.
- 2) Above quoted price should be inclusive of the supply of all consumables, first fill of oil. Supplier to furnish the quantity required for each compressor & type of oil to BHEL.
- 3) The rates for supervision shall include travelling expense up to site and stay at site.
- 4) The rate for supervision for erection and commissioning shall be valid till end of contract i.e. 31.12.2013.