

 50 Golden Jubilee 1964-2014 Years ISO 9001, ISO 14001, OHSAS 18001 & SA8000 Certified Company SubContract and Purchase Department.	भारत हेवी इलेक्ट्रिकल्स लिमिटेड (भारत सरकार का उपक्रम) BHARAT HEAVY ELECTRICALS LIMITED (A Govt. of India Undertaking) पावर सेक्टर, उ.क्षे.परिसर, प्लॉट नं.25, सेक्टर-16ए, पोस्ट बॉक्स सं.55, नोएडा-201301, Power Sector-Northern Region, Plot no.25, Sector 16 A, Noida -201301 Ph : 0120-2416548/2416292 , Fax: 0120-2416528 / 2416525 E-mail: rahuldeb@bhel.in ; rajesh.k@bhel.in
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E-TENDER ENQUIRY NO. & DATE	BHEL/PSNR/SCP/RD/E-2954 (E-Tender) & DATE: 09.06.2018
DUE DATE & TIME OF TENDER SUBMISSION	02.07.2018 AT 13:30 HRS
DUE DATE & TIME OF OPENING OF TENDER	02.07.2018 AT 15:30 HRS

TENDER ENQUIRY

BHEL Power Sector, Northern Region invites sealed quotation for the following in **two part bid** system strictly as per Clause No. 2.0 of enclosed "Instruction to Bidders" of GCC of NIT;

BRIFE SCOPE OF WORK	Design, Supply and Expert Supervision for installation works of Borosilicate Glass Block Lining including Wet Stack Flow Model Study for 150 m tall twin flue chimney at 2X490 MW Dadri Thermal Power Plant at Dadri, Gautam Budh Nagar, U.P. India – 201008.
PROJECT NAME	2X490 MW Dadri Thermal Power Plant

Your best quotation/offer for the above requirement, in line with our terms and conditions, should either be delivered in person or sent by COURIER/REGISTERED POST, to the official inviting tender (s). It shall be the responsibility of the bidder to ensure that the tender is delivered on or before the due date & time of tender submission as mentioned above. Part-I bids shall be opened on due date and time as mentioned above, in the presence of authorized representatives of the bidders, who may like to be present.

Note:

1. Please note that Part Supplies offered shall disqualify the bidder's offer.
2. Documents and Credential as per PQR along with Techno Commercial Bids and Price Bids should be submitted separately in separate envelopes.
3. Incomplete offer are liable to be rejected.

TERMS & CONDITIONS:

1. Enquiry No., due date etc. must be legibly superscribed on the sealed envelopes as per clause no. 2.0 of "Instructions to Bidders".
2. Offers should be submitted in two parts in Two separate sealed covers as follows:
 - a) Part-I Bid: - Documents and Credential as per PQR and Techno-Commercial offer.
 - b) Part II Bid: - Price Bid.
3. Following terms and conditions will be made part of NIT:-
 - a) Bidders to submit all documents concerning PQR, Techno-commercial offer along with the un-priced Bid of Technical-Commercial Deviation in a sealed envelope superscripted with heading "Part-I Bid - PQR and Techno-Commercial Offer".
 - b) Bidders to submit their Price Bid ~~and Priced schedule of Technical-Commercial Deviation~~ in a sealed envelope superscripted with heading "Part-II Bid - Price Bid".
 - c) Part I bid will be opened on date & time mentioned in the NIT or subsequent corrigenda/ amendments, if any.
 - d) Techno-commercial offer of only those bidders shall be evaluated who will meet the pre-qualifying requirement of the tender.

Credentials of the bidders meeting the prequalifying requirements and are techno-commercially qualified shall be taken up with customer for approval.
 - e) After finalization of Techno-commercial evaluation, offers of BHEL and Customer approved vendors who have qualified in the Techno-commercial evaluation shall be considered for Price Bid Opening/RA.
4. Bidders shall submit their offers meeting the requirements of the following tender documents (enclosed) and other Terms and Conditions included in this Enquiry Letter:
 - a) **PART – 'A':** PRE-QUALIFYING REQUIREMENTS (PQR).
 - b) **PART – 'B':** TERMS AND CONDITIONS OF CONTRACT (TCC).
 - (a) **ANNEXURE A:** BOQ FOR THE ABOVE WORKS.
 - (b) **ANNEXURE B** - SPEC. NO.: PE-TS-436-142-N102" (TECHNICAL SPECIFICATION FOR WET STACK FLOW MODEL STUDY FOR 2 x 490 MW NTPC-DADRI PROJECT).
 - c) **PART – 'C':** SPECIAL CONDITIONS OF CONTRACT (SCC).
 - d) **PART – 'D':** GENERAL CONDITIONS OF CONTRACT (GCC).
 - e) **PART – 'E':** ANNEXURE FOR INTEGRITY PACT.

All the above Tender Documents shall automatically become a part of the Order/ Contract after its finalisation

5. Vendors shall quote in accordance with the requirements mentioned in the tender documents. Bidder to submit "No Deviation Certificate" as per Annexure-III of general commercial terms & conditions of GCC (Part - D) of NIT. In case of deviations (Technical / Commercial), bidder to clearly mentioned the same with their Techno-commercial offer highlighting separately giving Clause references.

6. Standard pre-printed terms & conditions of the tenderers shall not be considered valid.
7. Validity of offer: Offers should be valid for a period of Six (06) Months from the date of Techno-Commercial bid (Part-I) opening.
8. Unsolicited fresh/revised Price Bids shall not be entertained.
9. Purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any/all tender(s) in part or full without assigning any reason whatsoever.
10. Late tenders will be rejected.
11. Tenders and all correspondence thereof, shall be addressed to the undersigned by name & designation and sent at the following address:

Mr RAHUL DEB, SR ENGR, Purchase Deptt. M/s. Bharat Heavy Electricals Ltd., Power Sector – Northern Region, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida- 201301, U.P., India. E-MAIL: rahuldeb@bhel.in Ph. No. 0120-2416548, Mob. +91-9650652070	Mr Rajesh Kr. Singh, DGM, Purchase Deptt. M/s. Bharat Heavy Electricals Ltd., Power Sector – Northern Region, HRD & ESI Complex, Plot No 25, Sector-16 A, Noida- 201301, U.P., India. E-MAIL: rajesh.k@bhel.in Ph. No. 0120-2416292.
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12. Variation of Contract Value: As per Clause No. 5 of SCC (Part-C) of NIT.
13. Bidders are requested to visit constantly our website to update them self for any technical or commercial change in the NIT.
14. All corrigenda, addenda, amendments, time extensions, clarifications, etc. to the tender will be hosted on BHEL website (www.bhel.com) & Govt. CPP Portal/ website (eprocure.gov.in) only. Bidders should regularly visit websites to keep themselves updated.
15. Bidders to submit their offers strictly in line with the enclosed price format.
16. Foreign bidders quoting along with their Authorised Indian associates to comply with BHEL corporate circular AA:MM:AGENCY dated 06th August 2010 for the guidelines regarding dealings with Indian agents of foreign bidders (as enclosed).
17. **TAXES AND DUTIES :**

A) For Foreign Bidders:

1. For supply of Borosilicate material (serial No.1 of Price Schedule), price quoted should be CIF Mumbai Port.
2. For Supervision & Wet Stack Flow Model study (serial no. 2&3 of Price schedule), GST shall be payable by purchaser on reverse charge mechanism if bidder is not registered under GST Act. If bidders is registered under GST Act, GST as applicable shall be payable extra and all the provisions relating to GST for domestic bidder shall apply mutatis-mutandis.

3. Purchaser shall not be liable towards income tax of whatever nature including variations thereof, arising out of this order/contract, as well as tax liability of the seller/ contractor and his personnel.
4. Deduction of tax at source (TDS/Withholding Tax) at the prevailing rates shall be effected by the purchaser as per applicable Indian Income Tax rules before release of payment. Certificates of Tax deduction will be issued by the purchaser as per statutory provisions.

B) For Domestic Bidders:

1. Price quoted should be inclusive of all applicable Taxes/charges but Excluding GST. The Contractor shall pay all other taxes, fees, royalty, commission etc. which may be levied on the contractor in executing the contract. In case BHEL is forced to pay any of such taxes, it shall be recovered from Contractor's bills or otherwise as deemed fit. GST Shall be payable extra as per following :
2. Contractor/Vendor has to issue invoice indicating HSN/SAC code, Description, Value, Rate, applicable tax and other particulars in compliance with the provisions of relevant GST Act and Rules made thereunder. With the implementation of e-way bill provisions, contractor shall comply with same as applicable.
3. Vendor has to submit GST compliant invoice within seven days from the due date of invoice as per GST Law. In case of delay, BHEL reserves the right of denial of GST payment if there occurs any hardship to BHEL in claiming the input thereof. In case of goods, vendor has to provide scan copy of invoice & GR/LR/RR to BHEL before movement of goods starts. Special care should be taken in case of month end transactions.
4. GST amount claimed in the invoice shall be released on fulfilment of all the following conditions by the Contractor: -
 - i) Supply of goods and/or services have been received by BHEL.
 - ii) Original Tax Invoice has been submitted to BHEL.
 - iii) Respective invoice has appeared in BHEL's GSTR - 2A for the month corresponding to the month of invoice. Alternatively, BG of appropriate value may be furnished which shall be valid at least one month beyond the due date of confirmation of relevant payment of GST on GSTN portal or sufficient security is available to adjust the financial impact in case of any default by the contractor
5. Contractor shall be solely responsible for discharging his GST liability according to the provisions of GST Law and BHEL will not entertain any claim of GST/interest/penalty or any other liability on account of failure of contractor in complying the provisions of GST Law or discharging the GST liability in a manner laid down thereunder
6. In case declaration of any invoice is delayed by the vendor in his GST return or any invoice is subsequently amended/altered/deleted on GSTN portal which results in any adverse financial implication on BHEL, the financial impact thereof including interest/penalty shall be recovered from the Contractor's due payment
7. Any denial of input credit to BHEL or arising of any tax liability on BHEL due to non-compliance of GST Law by the Contractor in any manner, will be recovered along with

liability on account of interest and penalty (if any) from the payments due to the Contactor.

8. The admissibility of GST, taxes and duties referred in this chapter or elsewhere in the contract is limited to direct transactions between BHEL & its Contractor. BHEL is not responsible for any liability that may arise due to any transaction beyond the direct transaction between BHEL & its Contractor.

9. Variation in Taxes & Duties:

i) Any upward variation in GST shall be considered for reimbursement provided supply of goods and services are made within schedule date stipulated in the contract or approved extended schedule for the reason solely attributable to BHEL. However downward variation shall be subject to adjustment as per actual GST applicability.

ii) In case the Government imposes any new levy/tax on the output service/goods after price bid opening, the same shall be reimbursed by BHEL at actual. The reimbursement under this clause is restricted to the direct transaction between BHEL and its contractor only and within the contractual delivery period only

iii) In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer but before opening of the price Bid, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of price bid. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

10. Modalities of Tax Incidence on BHEL:

Where GST law permits more than one option or methodology for discharging liability of tax/ levy/ duty; the contractor shall approach BHEL before choosing any option to discharge his tax liability. BHEL shall have the right to direct the contractor to adopt the appropriate option considering the amount of tax liability on BHEL as well as procedural simplicity with regard to assessment of the liability.

The option chosen by BHEL shall be binding on the contractor for discharging the obligation of BHEL in respect of the tax liability to the contractor.

Road Permit / E-Way bill will be arranged by vendor.

11. Direct Taxes:

Deduction of tax at source (TDS / Withholding Tax) at the prevailing rates shall be effected by the purchaser before release of payment, as a statutory obligation, if applicable. TDS certificate will be issued by the purchaser as per statutory provisions.

18. In case of awarding of new Contract for balance work/supply or Termination of existing Contract as the case may be (as per Clause no. 1.7: General Instructions – Instructions to Bidders/Clause 16.0: Termination – General of Commercial Terms & Conditions of GCC) Risk & Cost amount and Process for Recoveries shall be as below:

Risk and Cost against Balance Work:

Risk & Cost Amount= $[(A-B) + (A \times H/100)]$

Where,

A= Value of Balance scope of Work/ Supply (*) as per rates of new contract

B= Value of Balance scope of Work/ Supply (*) as per rates of old contract being paid to the contractor/ supplier at the time of termination of contract i.e. inclusive of PVC & ORC, if any.

H = Overhead Factor will be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

*(Balance scope of work/ supply)

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work/ Supply for calculating risk & cost amount. Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities. Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose. Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.

The following sequence shall be applicable for recoveries from contractor/ supplier on whom Risk & Cost has been invoked, after informing the Contractor/Supplier of the total proposed recovery:

- a) Dues available in the form of Bills payable to contractor/ supplier, SD, BGs against the same contract.
- b) Demand notice for deposit of balance recovery amount will be sent to contractor/ supplier, if funds are insufficient to effect complete recovery against dues indicated in (a) above.
- c) If contractor/ supplier fails to deposit the balance Risk & Cost amount as per (b) above within the period as prescribed in demand notice, following action shall be taken for balance recovery:
 - i). Dues payable to contractor/ supplier against other contracts in PSNR/BHEL shall be considered for recovery.
 - ii). If recovery cannot be made out of dues payable to the contractor/ supplier as above, balance amount to be recovered, shall be informed to other Regions/Units of BHEL for making recovery from the Unpaid Bills/Running Bills/SD/BGs/Final Bills of contractor/ supplier.
 - iii). In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor/supplier.

19 **Guarantee / Warranty Period:** As per Clause No. 9.0 of SCC (Part-C) of NIT & Clause No. 2.2.1 (C) of TCC (Part- B) of NIT.

20 **Evaluation Criteria:** As per clause No. 4.0 of SCC (Part – C) of NIT.

21 **Payment Terms & Documents Required for Payment:** As per clause No. 6.0 & 7.0 of SCC

(Part-C) of NIT & Clause No. 7 of TCC (Part- B) of NIT. LC opening / negotiation/ confirmation charges will be on Vendors' account.

22 **Inspection Clause:** As per Clause no. 10.0 of SCC (Part-C) of NIT.

23 **Transit Insurance:**

a) For Foreign Vendors Transit Insurance Upto Mumbai Port is in Vendor's Scope and from Mumbai Port to Dadri site is in BHEL's Scope.

b) For Indigenous Vendor Transit Insurance upto Dadri Site shall be in Vendor's Scope.

24 **Delivery / Time Schedule:** As per Clause No. 6.0 of TCC (Part – B) of NIT.

25 **Performance Bank Guarantee:** As per Clause No. 8.0 of SCC (Part-C) of NIT.

26 **Reverse Auction:** Applicable as per clause 9 of Instruction to Bidders of GCC (Part-F) of NIT. Bidder to submit duly filled in copy of Annexure-V of GCC. Guidelines for Reverse Auction are available in www.bhel.com → Tender Notification → Guidelines for Reverse Auction

27 **Liquidated Damages:**

a) LD shall be 0.5% of the total order value per week of delay or part thereof subject to a maximum of 10% of the total order value.

b) In case of any amendment/ revision, the LD shall be linked to the amended/revised PO value.

However, for **Indigenous Supplier**, Receipted LR (Signed & stamped) shall be treated as date of delivery for Levying LD. And for **Foreign Supplier**, Shipped on board date mentioned on the clear Bill of Lading or Air way Bill, shall be treated as the date of Shipment/ Dispatch for all contractual purposes including calculation of LD.

28 **Order Of Precedence:**

In case of contradiction / conflict, the order of precedence shall be in the order as per below;

a) Amendments/Clarifications/Corrigenda/Errata etc., if any, issued in respect of the tender documents by BHEL.

b) NIT

c) Price Schedule

d) Technical Conditions of Contract (TCC).

e) Special Conditions of Contract (SCC).

f) General Conditions of Contract (GCC).

29 **Integrity Pact (IP):**

IP is a tool to ensure that activities and transactions between the Company and its Bidders / Contractors are handled in a fair, transparent and corruption free manner. A panel of Independent External Monitors (IEMs) have been appointed to oversee implementation of IP in BHEL.

The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory who signs in the offer) along with techno-commercial bid. Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification. Details of IEM for this tender is furnished below:

Name : Shri D.R.S. Chaudhary, IAS (Retd.)

Address : E-1/164 Arera Colony
Bhopal 462016.

Email : dilip.chaudhary@icloud.com

Please refer Section-8 of the IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to the IEM mentioned in the tender.

No routine correspondence shall be addressed to the IEM (phone / post / email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification / issues shall be addressed directly to the tender issuing (procurement) department.

For all clarifications/issues related to the tender, contact details are as per Sl. No. 11, above.

Note: Annexure for integrity Pact (Part-E) is enclosed. All Bidders to submit the signed and stamped copy of the same with their Techno-commercial Bid as a mandatory form.

CONSIGNEE (Detail Project Information As Per TCC):

CONSTRUCTION MANAGER, BHEL-SITE OFFICE,
NCTPP DADRI TPP, POST VIDYUT NAGAR,
DISTT.- GAUTAM BUDH NAGAR, UTTAR PRADESH, U.P., INDIA -201008

The Tender Document comprise of following;

1. **PART – ‘A’: PRE-QUALIFYING REQUIREMENTS (PQR).**
2. **PART – ‘B’: TERMS AND CONDITIONS OF CONTRACT (TCC).**
 - a) **ANNEXURE A: BOQ FOR THE ABOVE WORKS.**
 - b) **ANNEXURE B - SPEC. NO.: PE-TS-436-142-N102” (TECHNICAL SPECIFICATION FOR WET STACK FLOW MODEL STUDY FOR 2 x 490 MW NTPC-DADRI PROJECT).**
3. **PART – ‘C’: SPECIAL CONDITIONS OF CONTRACT (SCC).**
4. **PART – ‘D’: GENERAL CONDITION OF CONTRACT (GCC) Rev. – 01**
(Page 1 – 33, Separately enclosed).
5. **PART – ‘E’: ANNEXURE FOR INTEGRITY PACT.**
6. **PART – ‘F’: UNPRICE FORMAT.**
7. **PART - ‘G’: PRICE SCHEDULE.**

PART – 'A'**PRE QUALIFICATION CRITERIA (PQR)****For Borosilicate Glass Block Lining:**

- A. The bidder should have supplied “**Borosilicate Glass Block Lining of 38 mm thickness**” which has successfully performed in at least two (02) chimneys with internal MS flues located at different locations, in coal fired power plants, for a period not less than two (02) years operating as a '**Wet Stack**' on the date of Techno-Commercial bid opening.

Note:

- i. Bidder should be the authorized supplier of OEM (Original Equipment Manufacturer) for “**Borosilicate Glass Block Lining**” as mentioned above.
- ii. A '**Wet stack**' is defined as a chimney that is downstream of a wet limestone FGD system in a coal firing power plant without any reheat after FGD treatment thus carrying completely water saturated flue gas.
- iii. Lining system proposed above should have been tested and approved for fire risk by an independent institute of sufficient knowledge and experience such as FM Global Approvals Standard 4929 for "Chimney and Flue Liner Materials" or equivalent subject to acceptance by project owner.
- iv. Lining system proposed above should have been tested and approved for worker health and safety on an actual large scale installation project by an independent institute of sufficient knowledge and experience subject to acceptance by project owner.

The Bidder shall furnish following supporting documents for assessment of Bidder w.r.t. PQR:

- i. Bidder shall furnish the PO copy / Support documents of at least two executed Contracts as mentioned above at '**A**'.
- ii. Certificate from customer for successful operation of 'Borosilicate Glass Block lining system' as mentioned above at '**A**'.

Note:

- a) Satisfactory Performance feedback certificates for executed contract which has been successfully in use for at least two years indicating salient features like year of commissioning, Operating parameters after FGD (Flow, temperature, moisture content), inspection report, recommendations, project name etc., date of issue of certificate and name/ designation of the certificate issuer).
- b) Purchase order copy, support drgs and documents / technical details etc. are to be submitted along with the bid, for which the bidder intends to furnish the performance feedbacks, for reference purpose only.
- c) Any additional document required in support of the above documents to establish the correlation between the above documents and the supplied items shall be provided by the bidder.
- d) Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.

- e) Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder /collaborators to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
- f) After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

For Wet Stack Flow Model Study:

- A. The bidder should have carried out Wet Stack Flow Study which has successfully performed at least two (2) flow model studies, in separate coal fired power plants, of wet stack installed after wet limestone based FGD Absorber (Without reheating of cleaned flue gas), and based on the studies developed at least two (2) wet stack liquid collection systems which are in successful operation for a period of at least two (2) years reckoned as on the date of consideration for approval.

The Bidder shall furnish following supporting documents for assessment of Bidder w.r.t. PQR:

- i. Bidder's Experience list of Wet Stack Flow Model Study for last 5 years for assessment of bidder for carrying out the study on regular basis.
- ii. Bidder shall furnish the PO copy/ Study reports/ Support documents of at least one executed Contract as indicated in the experience list.

Bidder shall furnish following in support of successful completion of wet stack flow model study and design of the condensate collection system.

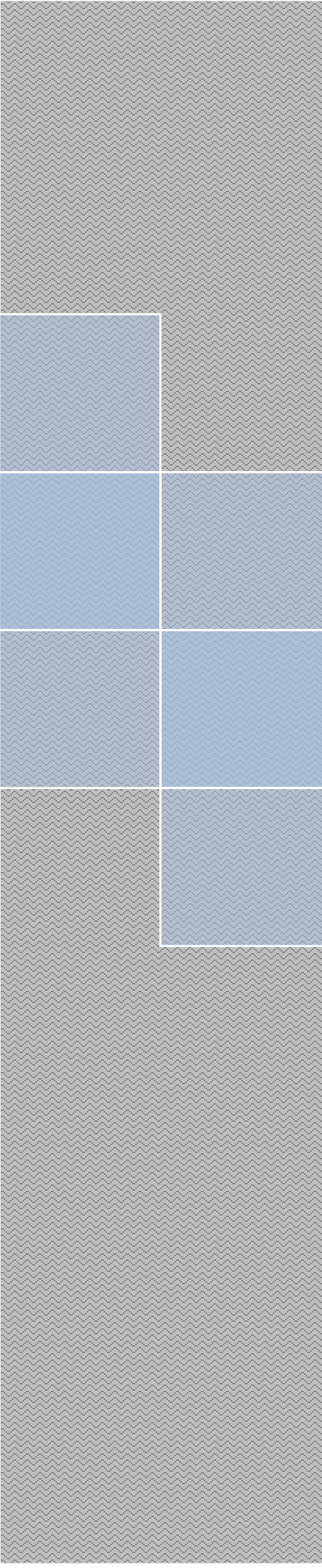
- i. Satisfactory Performance feedback certificates for executed contract which has been successfully in use for at least two years indicating salient features like year of commissioning, Operating parameters after FGD (Flow, temperature, moisture content), inspection report, recommendations, project name etc., date of issue of certificate and name/designation of the certificate issuer).

Note: -

- a) Purchase order copy, support drawings and documents/ technical details etc. are to be submitted along with the bid, for which the bidder intends to furnish the performance feedbacks, for reference purpose only.
- b) Any additional document required in support of the above documents to establish the correlation between the above documents and the supplied items shall be provided by the bidder.
- c) Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self- attested English translated document should also be submitted.
- d) Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder/collaborators to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
- e) After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

PART – 'B'

TERMS AND CONDITIONS OF CONTRACT (TCC)



TERMS AND CONDITIONS OF CONTRACT (TCC)

“Design, Supply and Expert Supervision for installation works of Borosilicate Glass Block Lining including Wet Stack Flow Model Study for 150 m tall twin flue chimney at 2X490 MW Dadri Thermal Power Plant at Dadri, Gautam Buddha Nagar, U.P.”

BHARAT HEAVY ELECTRICALS LIMITED



TERMS AND CONDITIONS OF CONTRACT (TCC)

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B	SPECIFICATION NO PE-TS-436-620-C026 , Section D, Sub-section D26	10 pages
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TERMS AND CONDITIONS OF CONTRACT (TCC)

Project Information (NCTPP Dadri FGD (2X490 MW))

NATIONAL THERMAL POWER CORPORATION (NTPC) has entrusted BHEL an EPC contract to setup Flue Gas Desulphurization (FGD) System Package for NCTPP, DADRI Stage-II (2X490 MW)

Sl. No.	Title	Description
1	Owner	NATIONAL THERMAL POWER CORPORATION (NTPC)
2	Project Title	NATIONAL CAPITAL THERMAL POWER PROJECT (NCTPP)
3	Project Site Location	Dadri, Gautam Buddh Nagar, Uttar Pradesh, India – 201008.
4	Nearest Railway Station	Dadri (8.5 Km.)
5	Nearest Airport	Delhi (70 Km.)
6	Nearest Highway	National Highway- 3 & 24
7	Nearest Water Body	Upper Ganga Canal system
8	Basic Wind Speed	47 meters/second

The Nearest Town, Dadri is about 7 Km from site and is easily accessible by Road/ Railway.

Note:- The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the CONTRACT. All costs for and associated with site visits shall be borne by the bidder.

TERMS AND CONDITIONS OF CONTRACT (TCC)

2.0	GENERAL SCOPE OF WORK
2.1	Scope of this tender covers “Design, Supply and Expert Supervision for installation works of Borosilicate Glass Block Lining including Wet Stack Flow Model Study for 150 m tall twin flue chimney at 2X490 MW Dadri Thermal Power Plant at Dadri, Gautam Buddha Nagar, U.P.”
2.2	<u>Brief Scope of Work:</u>
2.2.1	<u>Supply :</u> The scope of work includes but not limited to design, engineering, supply of material and services required for completion of the work scope as follows: A. Supply of Borosilicate Glass Block Lining of minimum 38 mm thickness material confirming to physical & chemical properties mentioned in specifications, Handling, storage & transportation up to CIF Mumbai (for foreign bidders) /FOR Site (for Indigenous bidder) with adequate packing including Epoxy Primer and Adhesive Membranes etc. all complete, for application of borosilicate glass block lining system over mild steel flue liners. It is bidder’s responsibility to assess and furnish material including wastage etc. necessary to complete the work covered in this scope unless otherwise stated. B. Supply of required adhesives / membrane, epoxy primer and special T&P (as mentioned in clause 2.4.10) exclusively required for installation of Borosilicate Glass Blocks shall also be in the scope of vendor. Nominal adhesive/ membrane thickness shall be minimum 3 mm behind & between each block. A 1.5 mm thick layer should be troweled onto the liner as well as to the sides and back of each block before installation <u>(No extra payment shall be made for Epoxy Primer, Adhesive / Membrane and special T&Ps required for application of borosilicate glass block lining system over mild steel flue liners).</u> C. The bidder shall also provide a ten (10) year full replacement guarantee and bear the cost of replacement including material, manpower and T&P if the lining system would fail to protect the chimney flue from internal deterioration or any other defect found during operation, as per specifications. D. Submission of the drawings and getting it approved from BHEL / NTPC for borosilicate glass block lining system, condensate extraction system.
2.2.2	<u>Supervision:</u> A. Expert Supervision and technical support should be provided by bidder during erection of boro-silicate lining system inside MS flue cans along with demonstration and training to erection agency. Number of supervisors to be deployed and period of deployment should be as per site requirement duly agreed with BHEL. The installation of Borosilicate Glass Lining Blocks, mixing of two components adhesive membrane by automatic mixing machine etc. all complete shall be executed by erection agency under the expert supervision of Borosilicate Glass Lining Blocks supplier.
2.2.3	<u>Wet Stack Flow Model study:</u> The scope of work includes carrying out the Wet stack flow model study for complete duct system from absorber outlet to the top of the stack, design and optimization of gas flow and liquid collection system to mitigate stack liquid discharge (SLD) and shell corrosion, Preparation of final report and recommendations, preparation of drawings/

TERMS AND CONDITIONS OF CONTRACT (TCC)

	documents for execution of collection system, obtaining approval on documents from BHEL/ NTPC, Preparation of BOQ, preparation of bought out item specification, procurement assistance for specialized items, site visit as specified later in the specification & as necessary for completeness in all respects and for efficient & trouble free operation of chimney and liquid collection system for project required for completion of the work scope but not limited to the following: A. Condensation calculations & design of condensate collection system. B. A scale physical flow model for liquid collector system (LCS) design. C. A computational flow model for plume downwash analysis. D. A physical or computational flow model for CEMS elevation flow performance. E. Design of optimum choke geometry if required. F. Review & Approval of liquid collector system construction drawings. G. Site inspection & supervision for 7 days to verify and evaluate LCS system performance prior to commissioning. Note: Wet stack study shall be performed for each unit with a wet stack installation where there does not exist an identical or mirror image installation. The objective of the wet stack study shall be to maximize liquid collection downstream of the mist eliminators and to preclude ground level rainout from the stack by recommending experimentally developed, tested, and optimized liquid collection devices and drainage systems to return collected liquid to the absorber with minimum re-entrainment. The following codes and standard shall be followed for the conductance of this study: I. Revised wet stack design guidelines, 2012 by EPRI. II. ACI 307 (American concrete institute code requirement for RC chimney. III. EPRI report CS-2520 Entrainment in wet stack 1982. IV. EPRI report TR 107099 Wet stack design guide 1996. V. EPRI report TR-109380 guidelines for fluid dynamic design of power plant ducts, 1998. VI. EPRI report GS-6984 FGD mist eliminator system design and specification guide. VII. CICIND, ICAC, US EPA and other international and other latest codes and standards. The study shall be carried out by design methods and tools: (a) Preliminary design review based on experience. (b) Laboratory flow modeling -3-D. (c) Computer flow modelling -3-D. (d) Computer program calculations – 2-D. Note: The results of the complete model study will be incorporated into a final report that includes, but not limited to, sections detailing modeling theory, model development, test procedures, observations, results, and conclusions regarding the condensate calculations, A scale physical model study and a computational flow model.
2.3	The Customer “(NTPC)” and “BHEL” may depute their representative for checking and supervision of important stages of work. The bidder shall be required to provide all facilities for inspection of works at no extra cost to BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the bidder in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL.
2.4	The work under this contract shall be carried out as per BOQ Cum Rate Schedule attached as Annexure-A. The description / specifications as per BOQ (Bill of Quantities) shall be read along

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	with technical specifications. Quantities mentioned in the BOQ cum Rate schedule are approximate only and liable for variation due to change of scope of work / variation in schedule of quantities, changes in design etc. The tenderers shall undertake to execute actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually executed and payments will also be regulated for the same. The quantities indicated against each item may vary to any extent and no compensation will be payable in variation of Individual quantity.
2.5	Any activity which is necessarily required for satisfactory execution of any item of BOQ in line with technical specifications shall be deemed to be included in BOQ item even if it is not described in the item description and no extra payment shall be made against such activity.
2.4	Bidder's scope also includes following:
2.4.1	Bidder will work in close coordination with NTPC / BHEL Engineering Representative. The NTPC / BHEL Representative is authorized to sign off and verify that supply has been performed in accordance with NTPC / BHEL design documents and drawings.
2.4.2	Bidder shall coordinate all Work with the erection contractor and NTPC / BHEL Work Force to ensure maximum efficiency and safety.
2.4.3	Bidder shall perform all interrelated collateral and incidental Work required, but not specifically covered elsewhere to produce the desired intention of this Contract. The intended final result of this project is a sealed chimney liner in which neither flue gas nor moisture can escape in the chimney annulus space.
2.4.5	Bidder shall supply daily project monitoring, inspection reports, other project documentation.
2.4.6	Drawings and additional information pertinent to the work are in the scope of bidder.
2.4.7	For Supervision Work: The schedule of execution of work for required supervision services shall be intimated by BHEL. Normal working shall be 06 days per week.
2.4.10	Special T&Ps Mixing Machine: In order to ensure consistent, high quality mixing of the components of the lining system adhesive, (an) automated mixing machine(s) should be provided using a min. 3,200 W mixer motor, with fail-safe protection against the operator error of mixing the main adhesive component without its hardener. The mixing machine SHALL be CE – approved. The mixing machine SHALL have thermal motor protection to minimize failure and fire risk. - Bidder shall provide all special equipment, tools and instruments required for handling and storage, and for test and maintenance of borosilicate lining system provided under this Contract. Any special tools/tackels, machinery required to maintain the controlled environment during installation of borosilicate glass block shall be in the scope of bidder. Note: No extra payment shall be made for Mixing Machine and special T&Ps required as mentioned above.
3.0	Facilities at site
3.1	BHEL will provide only work cabin at site and storage shed for Borosilicate Glass Lining System free of charge.
4.0	TECHNICAL REQUIREMENTS FOR BOROSILICATE GLASS BLOCK LINING SYSTEM:

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4.1	STANDARDS AND CODES
4.1.1	The borosilicate lining system to be provided under this Specification, including all appurtenances and accessories, shall be designed, fabricated, inspected, tested, stamped and preserved to the extent indicated in said referenced Standards and Codes. Where this Specification does not include such reference, the system, or any of its components, shall be designed, fabricated, inspected, tested and preserved, as applicable, to comply with currently recognized International and/or manufacturer's specification, whichever are tighter and more restrictive.
4.1.2	In all cases Bidder shall adhere to and comply with the requirements of Indian standards, which are found to be more restrictive than those specified herein.
4.2	QUALITY ASSURANCE AND QUALITY CONTROL
4.2.1	The Bidder shall submit upon request a copy of Its Quality Assurance Manual including Quality Procedures.
4.2.2	The Bidder shall conduct an inspection and testing program which shall record and verify the essential properties of the constituent materials and the finished liner.
4.2.3	The Bidder shall conduct test to verify the mechanical properties of borosilicate bricks and adhesive/mortar and the tests shall be documented during the course of design and fabrication, and shall be made available to BHEL / Owner.
4.2.4	Unless otherwise specified the bidder's standard tests shall be performed on all batches of materials furnished. The BHEL may or may not elect to witness tests, but the bidder shall notify the BHEL's Quality Assurance Department no later than 10 days in advance of all scheduled tests.
4.3	SAFETY, NOISE AND ENVIRONMENT REQUIREMENTS
4.3.1	SAFETY The equipment supplied under this Specification shall meet the U.S. "OCCUPATION, SAFETY, AND HAZARD ADMINISTRATION" (OSHA) requirements or equivalent.
4.3.2	Jobsite Safety and Scrap Disposal: Safety programs and procedures shall be within the scope of this Specification, It should be noted that the all materials that are potentially flammable materials and must be handled in keeping with good industry practice.
4.4	Environmental Data
4.4.1	Should the lining system to be furnished by the Bidder have discharge points to the environment and/or generate waste materials that must be discharged to the environment, the Bidder shall provide, upon Purchaser's request, a plan for the treatment of the discharge/waste to meet current regulations of the Indian government/ regulatory authorities.
4.4.2	The Bidder shall submit, within thirty (30) days of demand, additional information on noise and/or other environmental data. All information shall be prepared in a manner acceptable Indian government / regulatory authorities.
4.5	Design parameters

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4.5.1	Liner considerations The borosilicate glass block liner will be designed with a minimum thickness of 38 mm, for all its entire length. Proper provisioning should be made for borosilicate lining system for lining around gas sampling ports, expansion joints, man holes and other appurtenances.
4.5.2	Design operating conditions ➤ Operating conditions shall be as per Annexure-I. ➤ A margin of 15 deg. centigrade above the operating conditions mentioned in Annexure I shall be taken while selecting the appropriate material for design of the lining system.
4.5.3	Performance Requirements ➤ Borosilicate brick lining system will be designed in such a way that it will not require unscheduled outages for repair except for planned and scheduled routine maintenance and inspections. ➤ Borosilicate brick lining system and all of the required components will be designed for a safe, useful life of thirty (30) years (minimum).
4.5.4	The lining system shall be tested for its wet stack surface properties by an independent institute of sufficient knowledge and experience, subject to acceptance by the project owner, and furthermore the lining system supplier has a demonstrable track record of providing technical advice and support to customers for the design of environmentally effective liquid control systems in flue gas ducts and chimneys.
4.5.5	The lining system (borosilicate glass block and adhesive) shall be offered by a supplier with demonstrated capabilities in the area of onsite technical support and QA/QC supervision, who employs QA/QC supervisors with a demonstrated experience of at least 5 years in technical support and QA/QC supervision of the subject lining system.
4.5.6	The lining system (borosilicate glass block and adhesive) has been tested for fire risk by an independent institute of sufficient knowledge and experience, subject to acceptance by the project owner, and it has through this testing demonstrated the ability to protect the steel chimney flues from structural damage for a minimum period of 2 hours, as per ASTM E- 119.
4.5.7	The lining system (borosilicate glass block and adhesive) has been tested for worker health and safety on an actual large scale installation project by an independent institute of sufficient knowledge and experience, subject to acceptance by the project owner, and it has demonstrated through such testing that it can be used by teams of workers safely, without adverse health effects, and such without requiring excessive protective measures.
4.6	Design Requirements General ➤ Design of the borosilicate lining system must be performed by a professional engineer with a minimum of 5 years' experience in the design of such system for chimney flues. ➤ Design requirements of this specification are to be regarded as minimum requirements. If the Fabricator's design and/or experience dictate these minimum requirements should be exceeded, the design should be performed accordingly.
4.7	Materials Requirements: The steel chimney flues, made of minimum 8 mm thick MS steel, shall be internally protected with a lining system consisting of minimum 38 mm thk borosilicate glass blocks, applied with a flexible, chemically resistant adhesive, using a lining system that meets all of the following requirements:
4.7.1	The lining system shall use closed cell borosilicate glass blocks with the following physical properties: a. Density $0.144 \times 10^3 \text{ kg/m}^3$ b. coefficient of linear thermal expansion not greater than $5.5 \times 10^{-6} / ^\circ\text{C}$, c. compressive strength greater than 1.00 Mpa as per ASTM C 165,

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	d. flexural strength greater than 0.62 Mpa as per ASTM C.203/C.240,
4.7.2	The borosilicate glass block system shall use a flexible, chemically resistant adhesive, with the following physical properties: a. tensile strength at 23 °C greater than or equal to 1.0 N/mm ² as per ASTM D.412
4.7.3	The lining system manufacturer shall demonstrate a proven Quality Control system that monitors and documents the key physical properties, as described above.
4.8	Storage
4.8.1	Storage of Materials at site shall be in the scope of BHEL. Any special requirement for storage i.e. dry area, temperature and humidity limits etc. shall be provided by the bidder in advance.

ANNEXURE-I

OPERATING CONDITIONS (Per Boiler)				
Boiler Load		Design Point		Guarantee Point
		VWO		500 MW
Type of Coal		Worst Coal		Worst Coal
Flue Gas Flow	: TPH	2942.61		2715.662
Flue Gas Volume	: m ³ / s (wet)	809.227		726.3639
Flue Gas Temperature	: °C	61.3		57.2
Flue Gas Density	: kg / m ³	1.01009		1.03853
FGD OUTLET-FLUE GAS COMPOSITION % BY VOLUME – (WET BASIS)				
CO ₂	: %	9.5122		9.9347
N ₂	: %	64.1764		67.0584
O ₂	: %	5.6741		5.9355
SO ₂	: %	0.0032		0.0033
H ₂ O	: %	20.6339		17.0679
*DUST SIZE DISTRIBUTION AT CHIMNEY INLET - % MICRONS				
Below 3		94.3	Between 10 - 15	22.19
Between 3 - 5		45.79	Between 15 - 20	15.0
Between 5 - 10		28.8	> 20	10.69

5.0	TECHNICAL SPECIFICATION FOR WET STACK FLOW MODEL STUDY: Refer Document "SPEC. NO.: PE-TS-436-142-N102" attached as Annexure-B
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6.0	TIME SCHEDULE
6.1	SUPPLY: For Foreign Bidder: Borosilicate Glass Block lining material should reach at Mumbai (CIF) within 05 months from PO. For Indigenous Bidder: Borosilicate Glass Block lining material should reach Dadri Site within 06 Months from date of PO. Receipted LR (Signed & stamped) shall be treated as date of delivery for Levying LD.
6.2	SUPERVISION: Schedule of supervision works shall be intimated by BHEL construction manager separately, in advance as per actual site requirement. Supplier shall arrange for deputation of supervisors within 2 weeks of BHEL intimation
6.3	WET STACK FLOW MODEL STUDY: ‘Wet Stack Flow Model Study’ shall start within four weeks of PO and to be completed in 90 days.
6.4	Bidder has to mobilize adequate resources to meet BHEL’s commitments to their customer as indicated from time to time. In the event the bidder fails to respond to these requirements, BHEL shall take appropriate actions to meet customer’s commitments in line with the provisions of Contract.
6.5	The work under the scope of this contract is deemed to be completed in all respects, only when all the works are carried out as per satisfaction of BHEL. The decision of BHEL on completion date shall be final and binding on the contractor.
6.6	In order to meet above schedule in general, and any other intermediate targets set, to meet customer/ project schedule requirements, bidder shall arrange & augment all necessary resources from time to time on the instructions of BHEL without any extra cost to BHEL.

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7.0	TERMS OF PAYMENT
7.1	PAYMENT TERMS: 1. For supply of Borosilicate Glass Block Lining at CIF Mumbai: As per Clause 6.0 of SCC. 2. For Expert Supervision of Borosilicate Glass Block Lining system: Payment shall be made monthly on the basis of consumed man-days certified by BHEL Engineer In Charge at Site 3. For Wet Stack Flow Model study: Payment shall be made after approval of study model report by customer.

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8.1	EXECUTION OF WORK
8.1.1	The work shall be executed in a workman like manner and to the entire satisfaction of the Engineer and as per technical specification issued with tender. In case of conflict, the decision of the Engineer I/c shall be final & binding.
8.2	DISCREPANCIES AND ADJUSTMENT OF ERRORS
8.2.1	In case of discrepancies between schedules of quantities, the specification and / or the drawings, the following order of preference shall be observed. (a) Description in BOQ cum Rate Schedule. (b) Terms and Conditions of Contract. (c) Special Conditions of Contract. (d) General conditions of Contract.
8.2.3	If there are varying or conflicting provisions made in any one document forming part of the contract, the BHEL Engineer shall be the deciding authority with regard to the document.
8.3	PROGRESS REPORTING :
8.3.1	Supplier is required to draw mutually agreed monthly program in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.
8.3.2	The progress report shall indicate the progress achieved against planned , with reasons indicating delays , if any, and shall give the remedial actions which the SUPPLIER intends to take to make good the slippage or lost time , so that further works again proceed as per the original program and the slippages do not accumulate and effect the overall program.
8.4	DRAWING AND DOCUMENTS
8.4.1	The detailed drawings, specifications available with BHEL engineers will form part of this tender specification. These documents will be made available to the contractor during execution of work at site. The contractor will also ensure availability of all drawings / documents at work place.
8.4.2	The data furnished in various annexures enclosed with this tender specification are only approximate and for guidance. However, the change in the design and in the quantity may occur as is usual in any such large scale of work.
8.4.3	Should any error or ambiguity be discovered in the specification or information the supplier shall forthwith bring the same to the notice of BHEL before commencement of work. BHEL's interpretation in such cases shall be final and binding on the contractor.

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8.4.4	Deviation from design dimensions should not exceed permissible limit. The supplier shall not correct or alter any dimension / details, without specific approval of BHEL.
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ANNEXURES:

Annexure-A: BOQ cum Rate Schedule for the Work of "Design, Supply and Expert Supervision for installation works of Borosilicate Glass Block Lining including Wet Stack Flow Model Study for 150 mtrs. tall twin flue chimney at 2X490 MW Dadri Thermal Power Plant at Dadri, Gautam Buddha Nagar, U.P."

Annexure-B: "SPEC. NO.: PE-TS-436-142-N102" (TECHNICAL SPECIFICATION FOR WET STACK FLOW MODEL STUDY FOR 2 x 490 MW NTPC-DADRI PROJECT)