TECHNICAL PREQUALIFYING REQUIREMENT OF BIDDERS FOR WIND TUNNEL STUDY OF CHIMNEY

DOCUMENT NO. PE-TS-511-600-C031

BHARAT HEAVY ELECTRICALS LIMITED
Project Engineering Management
PPEI BUILDING, HRD & ESI COMPLEX
Plot No. 25, Sector 16A
NOIDA, U.P. – 201301

Project Title	:	3X800 MW NLC TALABIRA TPP EPC	
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Rev. No.	Particulars	Prepared By	Checked By	Approved By	Remarks
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	Sign				
	Date	**07.01.2025**	**07.01.2025**	**07.01.2025**	

TECHNICAL PREQUALIFYING REQUIREMENT FOR WIND TUNNEL STUDY OF CHIMNEY

1. Bidder should have successfully executed Wind Tunnel model and testing on aero-elastic model of a structure, of minimum height 100m, for any one of the following in the last seven years from the latest date of bid submission

   a) One (1) work of value not less than 20,00,000 Rs (twenty lakh rupees) Ex-works price.

   OR

   b) Two (2) works each of value not less than 12,50,000 Rs (twelve lakh fifty thousand rupees) Ex-works price.

   OR

   c) Three (3) works each of value not less than 10,00,000 Rs (ten lakh rupees) Ex-works price.

2. Bidder should have their own Wind tunnel testing facility which shall be suitable for testing on model having a scale not less than 1:250.

3X800 MW NLC TALABIRA TPP EPC

TECHNICAL SPECIFICATIONS FOR WIND TUNNEL TEST OF RCC CHIMNEY

DOCUMENT NO. PE-TS-511-620-C001
(REVISION 00)

BHARAT HEAVY ELECTRICALS LIMITED
Power Sector, Project Engineering Management
BHEL Sadan, Plot No. 25, Sector 16A, Noida (U.P.)-201301

SECTION 'C'

SPECIFIC TECHNICAL REQUIREMENTS

1. General Requirement

1.01. Bidder shall conduct wind tunnel study with a scaled down model of chimney in an established wind tunnel to study the along and across behaviour of the subject chimney under wind loading for the cases as mentioned in Table-1.

Table-1

Sl. No.	Cases
1	STAND ALONE CHIMNEY, WITHOUT FLUE LINER
2	STAND ALONE CHIMNEY, WITH FLUE LINER
3	INTERFERENCE CASE WITH ADJACENT STRUCTURES, WITHOUT FLUE LINER
4	INTERFERENCE CASE WITH ADJACENT STRUCTURES, WITH FLUE LINER

2. Subject project consists of one RCC chimney of 150m height and one RCC chimney of 180m height.

2.01. For every case of wind tunnel study, following parameters shall be derived and furnished in a detailed report.

I. Natural frequency

II. Bending Moment (at minimum four elevations)

III. Shear Force (at minimum four elevations)

IV. Deflection (at peak)

2.02. Dimensional analysis of subject chimney vis a vis the model, shall be conducted to find the various dimensional parameters.

This dimensional analysis shall be furnished in the detailed study report.

3. Wind Loading:

Wind loading will be in accordance with Indian Standard Code IS: 875 (Part 3) for a basic wind speed of 44 m/sec (K1-1.07, Terrain Cat-2). Across-wind loads due to vortex shedding shall be considered in study as per velocity range defined in IS 4998-2015.

4. Material of construction

   The bidder shall prepare an aero-elastic model of the chimney with fibre reinforced plastic or any other suitable material reflecting dynamic properties of subject chimney, whose properties may be dimensionally correlated with the grade of concrete of the subject chimney.

5. Bidder shall simulate the subject terrain in the wind tunnel, as per that given in IS 875 Part (III). Aero elastic model of chimney along with rigid model of all major structures (for interference case only) which are within the distance of “20 times the diameter of the chimney at the 2/3 height of the chimney” all around shall be considered in the study.

6. The bidder shall simulate inside the wind tunnel actual prototype flow conditions for the study. The scale of the model shall be such that the boundary conditions (side wall and roof) in the wind tunnel shall not alter the targeted flow conditions. However, the scale of the model shall not be less than 1:250

7. Report

   After conducting the wind tunnel test, Bidder shall submit the detailed study report (in soft copy) for review of BHEL/Customer. Final detailed study report after incorporation of BHEL/Customer observations shall be submitted by the bidder (in soft copy and 3 hard copies).

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SECTION-V

GENERAL SPECIFICATION AND DESIGN CRITERIA OF RCC CHIMNEY [CIVIL & STRUCTURAL WORKS]

1.00.00 GENERAL

1.01.00 SCOPE OF WORK

The Works as detailed hereinafter pertaining to RCC Single and Bi-Flue Chimney for the Coal based Thermal Power Plant to be constructed as (3 x 800 MW) near Kumbhari & Tareikela villages, Jharsuguda District, Odisha

- All civil and structural works for RCC Chimney with internally lined (borosilicate) steel flue enclosed by RCC Wind Shield to suit MOEF norms with Rack & Pinion Elevator. RCC Single flue Chimney height shall be as per statutory norms (MOEF) or minimum 150m, whichever is higher. RCC Bi-flue Chimney height shall be as per statutory norms (MOEF) or minimum 180m whichever is higher.

- Other Auxiliaries, Internal Steel Platforms, External RCC Platforms, ladders, Rack &Pinion elevator etc.

- Structural steel staircase upto the topmost internal platform and from there cage ladder to roof of the chimney

- Duct supporting arrangements as per functional requirements

- RCC Approach Roads / Paving (as required) along with Street Lighting.

- RCC grade Slab & Service Drains as necessary.

One number of Reinforced Concrete Single-flue Stack for Unit 1 shall comprise of one no. internally lined (with Borosilicate) steel flue enclosed by a wind shield of reinforced concrete shell to suit MOEF norms with R&P Elevator

.One number of Reinforced Concrete Bi-flue Stack for Unit 2 &3 shall comprise of two no. internally lined (with Borosilicate) steel flue enclosed by a wind shield of reinforced concrete shell to suit MOEF norms with R&P Elevator

This specification shall be read along with Tender drawing 18A03-DWG-C-0004. Sht 1 and Sht-2 for Single Flue and Bi-Flue Chimney.

The steel flue shall be vertically supported at top & at intermediate levels (minimum four platforms for Single flue and minimum five platforms for Bi-flue

chimney) and horizontally restrained on steel platform at intervals satisfying all functional requirements. The steel platforms shall be supported on reinforced concrete shell wind shield. The suspended position of the steel flues shall be connected to the bottom supported position of the flues by expansion compensator so as to compensate for the large thermal movements of steel flue.

The scope of this work shall consist of, but not limited to, the design and construction of reinforced concrete windshield, foundations with associated pipe work, Borosilicate lining, stairs, cage ladders, rack & pinion type elevator, external and internal platforms, walkways as specified or required for operation and maintenance, access doors, handrails, steel fittings, fixtures, inserts including fabrication, galvanizing wherever required and erection of associated steel work and other chemicals on the completed structures etc. all complete as per functional requirements and as per directions of Owner.

The scope of work under this specification shall include providing engineering design and drawings, all labour, supervision, materials, shuttering and scaffolding including slip-form, construction equipments including cranes, hoists, batching plants etc. tools and plant, supply and transportation of all incidental items not shown or specified but reasonably implied for successful completion of the work. The nature of the work shall generally involve foundation, excavation, dewatering, shoring and strutting, backfilling around underground structures and plinth filling, sand filling, disposal of surplus soil outside plant boundary and as directed by the Engineer in charge, concreting of grade as specified, formwork including automatic climb form, fabrication, galvanizing (wherever required) and erection of steel structures and inserts, finishing anchor bolts etc. as required.

The successful bidder shall furnish the Slip form design including all detailing and analysis for Owner / Consultant for approval before taking up the shell work at site.

The scope shall include design, engineering, construction of RCC Chimney (one number single flue and one number Bi-flue) including all manufacture, assembly / pre-assembly, tests at manufacturer's works, shop painting, seaworthy packing, complete with all accessories, auxiliaries as specified hereinafter and as required for safe and trouble free continuous commercial operation

The scope of this specification also includes but not limited to erection / installation, supervision, including unloading, storage and handling at site, site testing, commissioning, other erection services to ensure trouble free operation and commissioning of the plant as per mechanical requirement.

The Successful bidder shall carryout, at his own cost, model test of chimney in wind tunnel in an approved laboratory to investigate the aerodynamic behavior of the chimney. Effect of adjoining structures such as boilers, cooling tower and future expansion structures etc. on magnifying wind loading on the chimney shall be studied in a wind tunnel before the designs are finalized. A provision of 10% increase in the wind load forces (due to dynamic interference effect) as calculated based on relevant codes, shall be considered in the initial designs. Worst of the forces calculated as per as per codal requirements and forces obtained from wind tunnel study shall be considered as design forces for final

design of shell and foundation. .

the study report shall be got approved by the owner / Consultant. The model test shall be duly witnessed by the owner and the Consultant.

The flue ducts shall be entering as per FGD mechanical layout requirement.

1.02.00 **General parameters of the chimney**

Total height or the chimney above FFL.	:	As mentioned in Clause No. 1.01.00

One number . RCC Wind shield (shell) enclosing One steel flue for Unit 1 Boiler. and one number RCC Wind shield (shell) enclosing two steel flue for Unit 2 & 3 Boilers

No. of Boilers.	:	Three

Flue liner sizing shall be done based on for volume of gas (to be estimated by bidder, when firing the specified worst coal at BMCR load, considering 25% excess air at economizer outlet, 15% Air heater in leakage & 2%duct and 1% ESP leakage as a minimum.) for FGD in operation case ,as well as for FGD by pass case. However flue liner shall with stand gas temperature without FGD operation condition.

Stack Exit velocity	:	Maximum 18.3 m/s (With Borosilicate block lining as per EPRI guidelines)
Inlet-duct center line elevation.	:	During Detail Engg. Stage
Duct opening Dimensions.	:	
Minimum top internal shell diameter.	:	To be decided by Bidder
Minimum bottom internal shell diameter	:	To be decided by Bidder

** The bidder shall use Geotechnical recommendations available in the tender document for various locations, depths and widths for reference for estimation purpose. Moreover, bidder is at liberty to carryout suitable number of borehole tests at site to assess the Net Safe Bearing Capacity/pile capacity values for design of foundation prior to quote. After contract award, the successful bidder shall conduct detailed Geo-technical investigation. After completion of detailed Geo-technical investigation, the draft Geo-technical investigation report shall be submitted to