An ISO 9001
Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
MATERIALS MANAGEMENT

TITLE **Three-Lobed Roots Blowers**	Phone: +91 431 2574091/2574119 Fax : +91 431 252 0233 / 0525 Email : baski@bheltry.co.in

	Reference Number: MM/FBC&HRSG/Blowers	**Enquiry Date: 01.10.09**	**Due date for submission of quotation: 31.10.2009**
You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for Budgetary offer and not an order			

BHEL/Trichy is looking for ..... Supply of **Three-Lobed Roots Blowers**

BHEL commercial terms & conditions with Price Bid formats and all annexure can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units) Bharath Heavy Electricals Limited) under reference "**MM/FBC&HRSG/Blowers**"	
Tenders should reach us before 14:00 hours on the due date Technical bid will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present.	Yours faithfully, For **Bharath Heavy Electricals Limited** Dy.Manager / Purchase/ FBC&HRSG

SPECIFICATION FOR THREE-LOBED ROOTS BLOWERS

CONTENTS:

	NAME	SIGNATURE	DATE
PREPARED	SUDHAKAR BEHERA		30.08.2008
CHECKED	V.RAGHAVENDRAN		30.08.2008
APPROVED	M.MADHAPPAN		30.08.2008

SPECIFICATION FOR BLOWER

1. SCOPE:

1.1. Design, manufacture, inspection, testing, painting, packing and supply of positive displacement type **three-lobed roots** blower along with the following accessories:
   a) Common base frame for blower and motor.
   b) Suction and discharge silencer
   c) Non-return flap.
   d) Pressure relief valve.
   e) Foundation bolt (Blowers to be placed on Concrete floor).
   f) Pulleys for both drive and driven side.
   g) Pulley belts with safety hood.
   h) Vibration isolation pad.
   i) Air intake filter with differential pressure switch.
   j) Vacuum indicator for suction side (One no).
   k) Pressure gauge for delivery side (One no)
   l) First fill of lubricant.
   m) Local bearing temperature gauges (If required in design)
   n) Special tools for erection & maintenance.
   o) Commissioning spares.
   p) Any other requirements needed by supplier.

1.2. Supply of recommended spares (optional)

1.3. Erection and commissioning supervision at site (optional)

1.4. Drive motors are not in the scope of vendor. Refer point-3 of Annexure-I E, C&I (Sheet-2/2).

Special Note: All Blowers and its components shall be supplied with CE marking.

2. APPLICATION: The blowers are intended for supplying air for CFBC boiler at the required capacity and pressure as mentioned in Annexure-A.

3. DESIGN CONSIDERATION:

3.1 The sound level & sound pressure level of all individual blower & cumulative sound level & sound pressure level of all operating blowers are to be furnished.

3.2. The heat dissipation of Blowers (individual & cumulative) at design parameters is to be furnished.

3.3. The blower should contain nameplate containing all essential performance data.

3.4. The driving shaft should be sealed with a radial seal ring.

3.5. The contamination level of the intake filter should be read from a maintenance indicator installed at the front side.

3.6. There is no shut-off valve at the inlet and the design shall take care of this.

3.7. The discharge valve should protect the blower from over load.

3.8. Blower shall be designed suitable to function in a sound proof room.

3.9. All the flanged joints should be machined and it should be leak tight.

3.10. Blower shall be designed for 24 hours and 365 days operation.

3.11. Blower should be capable of meeting all requirements as specified in Annexure-A.

3.12. All materials used shall be of tested quality.

4. INSPECTION & TESTING:

4.1. The blower is to be inspected as per the BHEL approved quality plan at vendor's works.

4.2. The blower is to be tested for rated pressure and capacity.

4.3. The blower should be test run at vendor's work as well as at site for a continuous duration of 72Hrs. each.

5. SPARES: Vendor to recommend spares required for 2 years of trouble free operation.

6. DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER
6.1. Point wise confirmation to the Specification.
6.2. General arrangement of blowers with major dimensional details and with sufficient views for clear understanding of the blower indicating the floor space requirement.
6.3. The drawing showing the supporting arrangement on floor including static & dynamic loading details at each support to be submitted for purchaser's information.
6.4. Approximate weight of the blower.
6.5. Noise spectrum for all blowers.
6.6. Design calculation for
6.6.1. Capacity of the blower.
6.6.2. Selection of drive system (drive motor, coupling and rotor)
6.6.3. No-load and full-load power calculation considering the minimum and maximum operating conditions.
6.7. Typical quality Plan as per BHEL format (format enclosed) including material, fabrication, assembly, bought out items, no-load test, etc.
6.8. Filled in data sheets as per Annexure-B.
6.9. List of start up / commissioning spares.
6.10. List of recommended spares.
6.11. Schedule of deviations.
6.12. Checklist.
6.13. Typical O&M manual.
All documents submitted under this heading should be submitted in 2 sets unless otherwise noted.

7. DOCUMENTS TO BE FURNISHED AFTER AWARD OF CONTRACT:

7.1. Detailed dimensional general arrangement drawing of the total system with cross sectional details, bill of materials and weight of individual parts for purchaser's approval. Drawing shall detail the clearance between roots of lobs, roots and casing.
7.2. Torque requirement of blower and selection of drive rating.
7.3. The drawing showing the supporting arrangement on floor including static & dynamic loading details at each support to be submitted for purchaser's approval.
7.4. Specifications for bought out items.
7.5. Erection & commissioning procedures indicating the sequence, dos and don'ts and checklist.

7.6. Operation & Maintenance manual.
7.6.1. O & M manuals shall be submitted to BHEL Trichy, prior to dispatch of equipment.
7.6.2 Manuals generally should contain the following as minimum.
7.6.2.1 Datasheet.
7.6.2.2 Important instructions (dos and don'ts).
7.6.2.3 System description.
7.6.2.4 Installation and storage.
7.6.2.5 Operation.
7.6.2.6 List of illustrations.
7.6.2.7 Maintenance (including lubrication, where necessary) and service
7.6.2.8 Recommended spares.
7.6.2.9 Trouble shooting procedure.
7.6.2.10 Assembly drawings with part list, bill of materials, dimensional drawings and other applicable details.
7.6.2.11Recommended lubrication schedule & scheme.
7.6.2.12 Short term and long term storage instruction manual.
7.6.2.13 Manuals should pertain only to the types or model supplied for the Particular contract.
7.6.2.14 Quality Plan for purchaser's approval.

All documents submitted under this heading should be submitted in CD with hard copy both in English unless noted otherwise.

8. PAINTING: Special painting.

9. PACKING / SHIPPING: Sea worthy packing.

10. GUARANTEE:

Performance (rated flow, head at design point) and power consumption at MCR, noise level at any 1m from the blower shall be guaranteed by the vendor.

11. PENALTY:

For every 1.0 KW increase in power consumption of each blower over and above that specified in the offer at the blower's MCR output as specified in Annexure-B, the supplier shall pay a penalty of Rs.1,11,000/-.

12. EXCLUSION & DEVIATIONS:

Supplier has to indicate clearly the exclusions and deviations in the offer stage itself with specific reasons. Deviation / exclusion will not be entertained after the award of contract.

13. GENERAL:

All drawings shall be prepared using AutoCAD 2006 or later version and submitted in Compact Disk. O& M manual shall be prepared and using Microsoft WORD and submitted in Compact Disk. Running Serial Number shall be given for each of the documents submitted and it should be indexed with a cover sheet.

The extent of scope stated in Section-1 of this specification is not necessarily exhaustive and it shall not relieve the vendor from his responsibility to provide goods and services necessary to satisfy the performance criteria and guarantee specified.

ANNEXURE-A (Design Parameters)

SL No	DESCRIPTION	Unit	VAR 01	VAR 02	VAR 03	VAR 04	VAR 05
1.	Name		PURGE AND SEAL AIR BLOWER	ASH COOLER BLOWER	SEAL POT BLOWER	FBHE BUNDLE CHAMBER BLOWER	FBHE EMPTY CHAMBER BLOWER
2.	Medium to be handled		Atmospheric Air				
3.	Volume per blower Min	Nm3/h	4000	4000	1450	6000	6000
	MCR	Nm3/h	4000	4000	1450	6000	6000
	Design	Nm3/h	4000	4000	1450	6000	6000
4.	Total head developed Min	mbar	900	350	400	500	500
	MCR	mbar	900	350	400	500	500
	Design	mbar	900	500	500	650	650
5.	Suction pressure Min	mbar	1000	1000	1000	1000	1000
	MCR	mbar	1000	1000	1000	1000	1000
	Design	mbar	1000	1000	1000	1000	1000
6.	Discharge pressure Min	mbar	1900	1350	1400	1500	1500
	MCR	mbar	1900	1350	1400	1500	1500
	Design	mbar	1900	1500	1500	1650	1650
7.	Temperature of medium						
	Min	°C	13.2	13.2	13.2	13.2	13.2
	MCR	°C	33.1	33.1	33.1	33.1	33.1
	Design	°C	33.9	33.9	33.9	33.9	33.9
8.	Density of medium at Specified temperature						
	Min	Kg/m3	1.233	1.233	1.233	1.233	1.233
	MCR	Kg/m3	1.118	1.118	1.118	1.118	1.118
	Design	Kg/m3	1.150	1.150	1.150	1.150	1.150
9.	Inlet pipe size(OD)	mm	355.6 x 6.4	323.9 x 4.8	219.1 x 6.4	406.4 x 4.8	406.4 x 4.8
10.	Discharge pipe size(OD)	mm	355.6 x 6.4	323.9 x 4.8	219.1 x 6.4	355.6 x 6.4	355.6 x 6.4
11.	Total Quantity	No.	2	2	3	6	2
12.	No of Blower under operation at a time	No.	1	1	2	4	1

ANNEXURE-B

To be filled & submitted by the vendor along with the offer

TECHNICAL SPECIFICATION DATA

Sl. No	DESCRIPTION		Unit	VAR 01	VAR 02	VAR 03	VAR 04	VAR 05
1.	Name							
2.	Medium to be handled							
3.	Volume per blower							
	Min							
	MCR							
	Design							
4.	Differential Pressure	Minimum						
		MCR						
		Design						
5.	Pressure at Inlet							
	Min							
	MCR							
	Design							
6.	Pressure at Outlet							
	Min							
	MCR							
	Design							
7.	Temp. at inlet	Min						
		MCR						
		Design						
8.	Density of Medium at specified Temperature.							
	Min							
	MCR							
	Design							
9.	Type of Motor(HV/LV)							
10.	Speed of motor.							

Sl. No	DESCRIPTION		Unit	VAR 01	VAR 02	VAR 03	VAR 04	VAR 05
11.	Filter Size							
12.	Ambient Temperature							
13.	Relative Humidity							
14.	Inlet Pipe Size(OD)	Minimum						
		MCR						
		Design						
15.	Out let Pipe Size (OD)							
	Min							
	MCR							
	Design							
16.	Power Consumption							
	Min							
	MCR							
	Design							
17.	Quantity per Boiler							
18.	Noise Level inside the acoustic hood							
19.	Noise level out side the hood at 1m distance							
20.	Noise spectrum with the frequency range							
21.	Sound Level Spectrum of individual Blower							
22.	Cumulative Sound Level Spectrum of all Blowers							
23.	Sound Level of individual Blower (in dB-A)							
24.	Cumulative Sound Level of individual Blower (in dB-A)							

ANNEXURE-C

To be filled and submitted by the vendor along with the offer

CHECKLIST

The following documents should be checked and signed by the authorized signatory. Offers not containing any of the documents will be liable for rejection without any further intimation. Vendor in his judgment may add further information, if required.

S.NO	DESCRIPTION	STATUS
1.	Point wise confirmation on the specification	
2.	General arrangement of blower with major dimensional details	
3.	The drawing showing the supporting arrangement	
4.	Approximate weight of the blower	
5.	Design calculation	
6.	Selection of drive system	
7.	Capacity of the blower calculation	
8.	No load and full load power calculation	
9.	Typical quality plan as per BHEL format	
10.	Filled in data sheets as per Annexure-B	
11.	List of start up / commissioning spares	
12.	List of recommended spares	
13.	Schedule of deviations	
14.	Two sets of above documents	

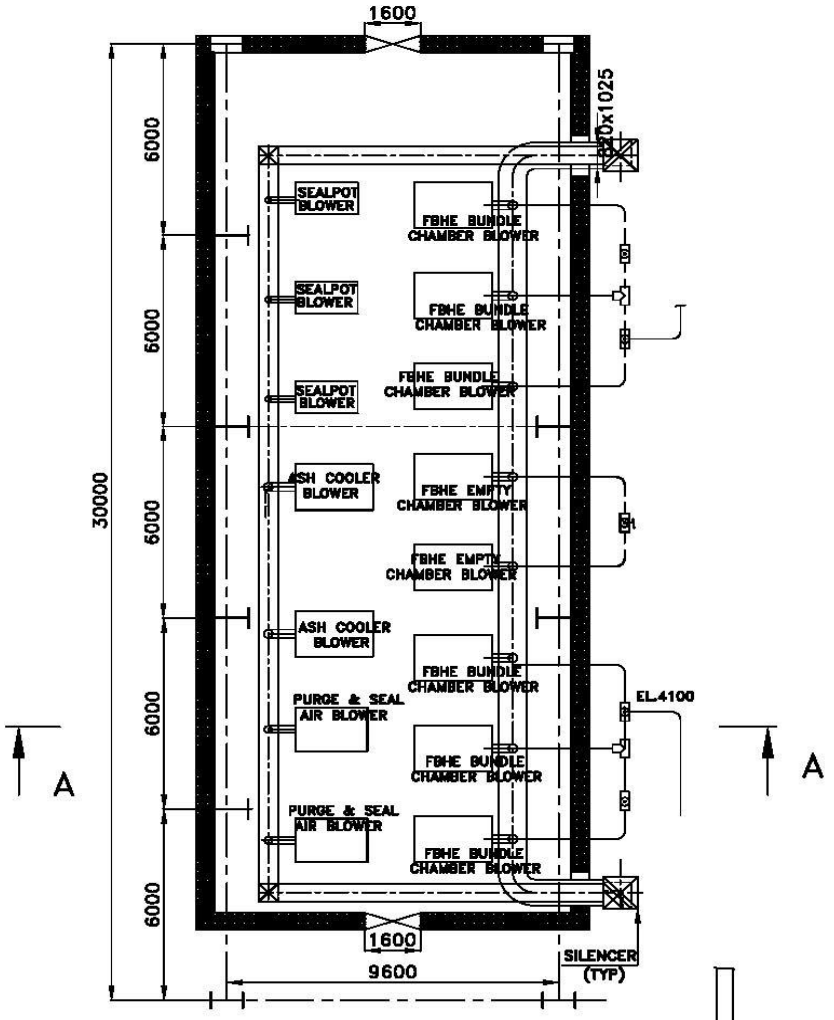
Signature of authorized signatory with office seal.

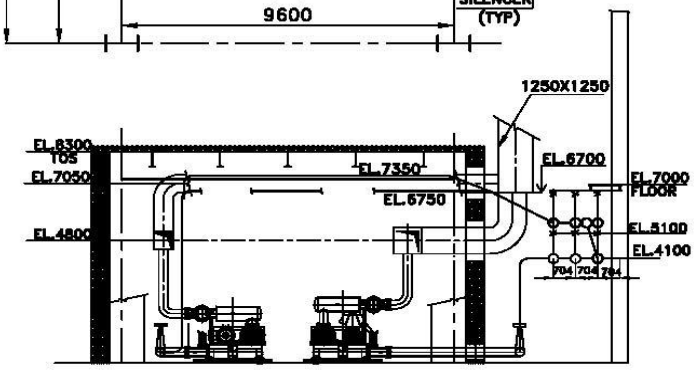
ANNEXURE–D

Sheet 01 of 01

(To the SPEC NO: FBC & HRSG: 48 965: 010:00)

LAYOUT OF BLOWERS





SECTION–AA

NOTE: DIMENSIONS ARE SUBJECTED TO CHANGE.

ANNEXURE –I E,C&I(SPECIFICATION FOR BLOWER)

BHEL -TIRUCHY
FBC&HRSG
ELECTRICALS, CONTROLS & INSTRUMENTATION

REF: FBC&HRSG:CI:5312:BLR1
Rev:00
SH.NO 1 of 2

A. CONTROL AND INSTRUMENTATION

1. Vendor should provided one no. Proximity type zero speed switch to detect the blower not runnin/belt not failed and **limit** switch for safety valve position for process interlock purpose. Proximity switches shall be heavy duty sealed stainless steel IP65 Volt free clean contacts rated for 24V,DC are required.. Switches shall be polarity inversion tolerant, have short-circuit protected output and middle or cross LED to indicate switch status.The output signal of suitable resolution. with 1NO+1NC potential free 2A rating contact output.Any associated controller unit(rail mounted) shall be field mounted adjacent to switch. The controller should be housed in a junction box and Terminal Block (TB) to be provided in the junction box (JB) for terminating input/output external cables with required double compression nickel plated cable glands.
   The make of the proximity switch shall be TRUCK/P&F/E&H. All equipment shall carry the CE Marking (European Conformity), as per the 'Council of the European Communities' Directive.
   The Supplier is responsible for CE Marking conformity.

2. Vendor should provide one no pressure gauge in suction side and one no. pressure gauge in the delivery side to avoid damage due to vibration.The gauges shall be mounted external to the blower ducts suitable mounting brackets.gauge shall be with 2m long SS flexible cappilary

   Vendor should provide one no DP switch and one number DP gauge across suction filter

3. Vendor should submit

   a. Documents along with offer

   (i) Technical leaflet for proximity switch, barrier/controller, pressure gauge DP Switches

   (ii) PID of the blower system offered indicating draft gauges, DP switch, safety relief valve proximity sensor, proximity controller ,temperature sensor etc with unit price

b.Documents required after placement of order

(i) PID of the system.

ANNEXURE-I – ECI (SPECIFICATION FOR BLOWER)

BHEL -TIRUCHY
FBC&HRSG
ELECTRICALS, CONTROLS & INSTRUMENTATION

REF: FBC&HRSG:CI:5312:BLR1
Rev:00
SH.NO 2 of 2

(ii) HOOKUP circuit diagram/wiring diagram indicating safety relief valve proximity sensors, zero speed sensor, controller/amplifier up to terminal box (Junction Box)

B. Blower supplier has to confirm/provide the following along with offer:

1. Speed-Torque characteristic of the blower indicating back pressure during start up, Motor shaft power, recommended motor **K.W** rating, both blower & Motor pulley details, dimensions, weight, no of belts & type, center to center distance between pulleys, profile of pulley, Dynamic force (both radial & axial) acting on shaft, Full load torque of motor, Blower/motor speed,direction of rotation of the motor w.r.t shaft end and location of TB
2. Frame size of the motor will be indicated to blower supplier after ordering the motor, during engg of the blower, based on inputs indicated (1) above.Make of motor shall be ABB.
3. Blower supplier should provide common base frame for blower & motor to suit the selected motor frame size, Dimensions, terminal box location/orientation with out any price.

	Name	Signature	Date
Prepared	NitinMenon		26.04.2008
Checked	A.Swaminathan		26.04.2008
Approved	R.J.Narayanan		26.04.2008

BHARAT HEAVY ELECTRICALS LIMITED
FBC & HRSG / PURCHASE

Ref: MM/FBC&HRSG/Webtender

SPECIAL TENDER CONDITIONS FOR BLOWERS

1. This tender is for the supply as per the enclosed specification

2. Vendors shall have reference for having supplied Seal Pot & FBHE Blower applications for minimum two CFBC boilers of more than 100 MW capacity (at two different sites) and which are in successful operation for more than three years. **Vendors who satisfies this condition alone will be considered for evaluation**

   Apart from above, following will also be the criteria for short-listing the vendors.
   - Evaluation of the dully filled Supplier Registration Forms.
   - Availability of minimum manufacturing, handling, testing and measuring facilities as detailed in the Supplier Registration Form.
   - BHEL will have the right for spot assessment of the facilities.
   - Meeting our techno-commercial requirements of the enquiry.

3. Vendors shall submit their budgetary offers (Techno-Commercial bid and Price bids are to be submitted in separate sealed covers). Also, vendors who are not registered vendor of BHEL, Trichy have to submit the filled in "Supplier Registration Forms" (available in **www.bhel.com** website) along with the technical bid.

4. Indigenous vendor shall quote for FOR/BHEL, Trichy (Tamil Nadu) basis

5. Foreign vendor shall quote for both FOB sea port and CIF, Chennai sea port basis

6. Applicable commercial terms & conditions shall be clearly spelt out in the offer

24/09

Dy. Manager/Purchase/FBC&HRSG