

TD-106-1
Rev.5

Form No.



**PRODUCT STANDARD
TURBINES & COMPRESSORS
HYDERABAD**

TC-6-2780

Rev.No. 01

SHT 1 OF 26

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This job specification shall be completely filled-in, duly signed by supplier and enclosed along with offer.

OFFER FOR 500MW FGD OXIDATION BLOWER

PROJECT: 2 X 500MW NTPC SIPAT

TYPE: _____

REF: _____

Technical Offer

MANUFACTURER: _____

This document is meant for the exclusive purpose of bidding against this specification and shall not be transferred, reproduced or otherwise used for purposes other than that for which it is specifically issued.

Ref. Doc

Rev No. 01	Revisions: Refer to record of revisions	Prepared: DILEEP	Approved: YVRL	Date: 21.03.2020
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1.0 APPLICABLE SPECIFICATIONS : TC52545 (Standard specification of FGD Blowers for NTPC Projects)/ ISO 10816-1/ ISO7919-3. In case of conflicts between standard specification TC52545 and job specification TC62780, job specification prevails.

2.0 PROJECT INFORMATION:

Sipat Super Thermal Power Project (Coal Based) stage-II (2X500MW) is set up in the state of Chhattisgarh, located near Sipat in Bilaspur district. The capacity of the project in Stage-II is 1000 MW comprising of 2 x 500 MW units and the ultimate capacity of the project is 2980 MW (3X660 + 2X500 MW).

The site is located east of the Kurung left bank canal and is bounded by villages Rank, Kaudia and Janji in the Bilaspur district of Chhattisgarh. It is in between latitudes 22°05' & 22°09' North and longitudes 82°16' & 82°18' East. The site is approx. 20 kms. from Bilaspur city and is approachable via the Bilaspur - Sipat state highway which takes off to the North-East from Bilaspur City. The nearest railway station is Jairamnagar on the Nagpur-Raipur-Calcutta mainline. Raipur, which is approximately 140 kms. from the site is the nearest commercial airport.

a.	Owner	NTPC Sipat, Bilaspur
b.	Buyer	BHEL, Hyderabad
c.	Process/Application	Flue Gas Desulphurization

A) SITE CONDITIONS

Guarantee point

1.	Ambient Temperature and Relative Humidity		
	Ambient Temperature	:	27 deg C
	Relative Humidity	:	60 %

Design point

2.	Ambient Temperature and Relative Humidity		
	Ambient Temperature (Design)	:	45 deg C
	Dry Bulb temperature during summer	:	43.9 deg C
	Relative Humidity	:	60 %

Note :

1. Guarantee point site condition shall be applicable for performance test at shop/ site
2. Equipment and material must be suitable for the range of ambient conditions.


B) WATER ANALYSIS

The following water to be used for quenching the oxidation air if discharge temperature is more than 70 deg C.

S.No	Constituents	As	Mg per litre
1.	calcium	CaCo3	256
2.	Magnesium	CaCo3	70
3.	Sodium	CaCo3	125
4.	Potassium	CaCo3	0
5.	Total cations	CaCo3	451
6.	Bicarbonates	CaCo3	178.5
7.	Carbonates	CaCo3	0
8.	Nitrate	CaCo3	0
9.	Chloride	CaCo3	75
10.	Sulphate	CaCo3	197.5
11.	Total anions	CaCo3	451

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S.No	Constituents	As	Mg per litre	
12.	Silica	SiO ₂	55	
13.	Iron	Fe	1.5	
14.	pH value	--	7.8-8.2	
15.	Turbidity	NTU	100	
16.	Total dissolved solids	CaCO ₃	528.05	
17.	Organic matter (Oxygen absorbed from acid permanganate in 4 hrs)	Mg/l	0.25	

3.0 INTENT OF SPECIFICATION

This specification covers the minimum requirements for the complete design, material, manufacturing, shop inspection, testing at the manufacturer's works, supervision of erection & commissioning and performance testing of Oxidation blower along with accessories which is to be furnished in the Flue Gas Desulphurization plant of 2X500MW NTPC Sipat FGD Project. The following points may be noted.

- a. There are two units of 500 MW and each unit is envisaged with one FGD system. Each FGD system will be provided with 2 numbers of Oxidation Blower (1 working + 1 standby) which are located inside the Recirculation Pump & Oxidation Blower shed.
- b. Bidder shall assume full unit responsibility for the entire equipment assembly and make all possible efforts to comply strictly with the requirements of this specification and other specifications/attachments to inquiry/order.
- c. The Bidder shall offer only proven design which meets the Provenness criteria indicated in **Annexure-I of TC62780**. Necessary document evidences as per **Annexure-3K of TC62780** for qualification shall be submitted along with the bid. If the Bidder doesn't meet the specified provenness criteria, then the Bidder will not be allowed to participate in the Tender.
- d. In case, deviations are considered essential by the Bidder (after exhausting all possible efforts), the same shall be separately listed in the Bidder's proposal under separate section, titled as "List of Deviations/Exceptions to the Enquiry as listed in **Annexure I of TC52545**."
- e. Any deviation, not listed under the above section, even if reflected in any other portion of the proposal, shall not be considered applicable.
- f. No deviation or exception shall be permitted without the prior written approval of the purchaser.
- g. Compliance to this specification shall not relieve the Bidder of the responsibility of furnishing equipment and accessories/auxiliaries of proper design, materials and workmanship to meet the specified start up and operating conditions.
- h. In case, the Bidder considers requirement of additional instrumentation, controls, safety devices and any other accessories/auxiliaries essential for safe and satisfactory operation of the equipment, the same shall be recommended along with reasons in a separate section and include the same in scope of supply.
- i. In case of positive displacement blower VFD drive, porta cabin to house VFD panels and transformers shall be included as optional. Porta cabin shall be supplied as per technical specification mentioned in **Annexure X of TC52545**.

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- j. All accessories, items of work, though not indicated but required to make the system complete for its safe, efficient, reliable and trouble-free operation and maintenance shall also be in supplier's scope unless specifically excluded.

4.0 PROVENNESS CRITERIA:

The Bidders are required to meet the Qualification Requirement (QR) for Oxidation Blower as per **Annexure-I of TC62780** & necessary documents evidence requirement as per **Annexure-3K of TC62780** along with necessary supporting documents. Bidder's offer will be rejected if the bidder fails to meet the Qualification criteria.

5.0 TECHNICAL INFORMATION

Sl. No	Description	Requirement		
1.	Quantity	1 No.Working + 1 No standby for each absorber. Total =4 Nos. (2 Absorbers)		
2.	Parameters			
	Operating Points	(1)Design Point	(2)Operating point-1	(3)Guarantee Point
	Blower capacity	9900 Nm³/hr-wet.	5905Nm³/hr-wet.	4344 Nm³/hr-wet.
	Discharge pressure	9350 mmWC	8055 mmWC	6627 mmWC
		72.5 %		
	Relative humidity	60%	60%	60%
	Suction temperature	45.0° C	45.0° C	27.0° C
	Atmospheric pressure	977.7 hPa		
	Discharge temperature	<70° C		
	Type of Blower	2x100% Motor driven, single stage, integrally geared, Single or dual vane centrifugal type oxidation blower complete with integral gearbox, lube oil system, instrumentation and accessories. OR 2x100% Motor driven positive displacement (Helical lobe/Screw) type oxidation blowers complete with VFD drive, lube oil system, instrumentation and accessories. The blower will be used for supplying a variable volume of air to the absorber reaction tank.		
	Duty	Continuous		
3.	Cooling water			
	Inlet temperature	38° C		
	Increase in temperature	Max 10 degrees		
	Pressure loss	<0.05 MPa (Max)		
	Supply pressure	0.5 MPa		
4.	Air Composition (Wet)	Design point	Operating Point	Guarantee point
	H ₂ O	5.87 vol%	5.87 vol%	2.18 vol%
	O ₂	19.81 vol%	19.81 vol%	20.56 vol%
	N ₂	Balance	Balance	Balance
5.	Material of construction			
	Casing	Vendor to provide		
	Shaft	Vendor to provide		
	Impeller	Vendor to provide		

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Sl. No	Description	Requirement
6.	Voltage level for Motors	a) Up to 0.2KW – Single phase 240V AC/ 3phase 415V AC b) Above 0.2 KW and up to 200 KW- 3phase 415V AC c) Above 200 KW and up to 1500 KW- 3phase 3.3kV AC d) Above 1500KW-11 kV
7.	Air filter filtering efficiency	Vendor to provide along with name of vendor supplying the Air Filter
8.	Blower Driver	Motor
9.	Cooling system for reducing the temperature of air at the blower outlet to <70 deg Celsius	Quenching/Cooling arrangement with water injection arrangement to be provided. Heat exchanger should not be provided. Water analysis is given in Table 2 .0 B. Quenching Nozzle back pressure- <1.0 bar(g)
10.	Instrumentation execution	a) All field transmitter like pressure, temperature, flow, level, DP etc. shall be foundation fieldbus or profibus type. The exact type shall be informed during technical offer evaluation. Vendor shall quote foundation fieldbus type transmitter in its base offer. Vendor to include 'price implication' if any, in its commercial offer as a separate line item against heading "Price implication (+ / -) for Profibus type transmitters". In case there is no price implication, vendor to indicate the same in the technical offer. b) Control Valve Actuators: Electrical actuators shall to be of Fieldbus type. c) The following requirements for Transmitter shall overrule relevant requirement specified in standard specifications. a. Accuracy: a) ± 0.060 % of calibrated range (minimum) for calibrated range greater than 400 mmwc. b) ± 0.065 % of calibrated range (minimum) for calibrated range greater than 250 kg/cm2. c) ± 0.10 % of calibrated range (minimum) for calibrated range less than 400 mmwc. b. Turn down (minimum): a) 50:1 for greater than or equal to span of 400mmwcl. b) 20:1 for span below 400mmwcl. c) 10:1 for span greater than 250 kg/cm2. c. Stability: a) 0.25 % of calibrated range for 10 years for calibrated range greater than equal to 400 mmwc on standard conditions of manufacturer. b) 0.2 % of calibrated range for 1 years for calibrated range less than 400 mmwc on standard conditions of manufacturer. c) 0.15% of calibrated range for 5 years for static pressure greater than 250 kg/cm2. d) Rotor Vibration Sensors: 02 nos on DE side and 02 nos on NDE side. e) Bearing Temperature Sensors: 02 nos on DE side and 02 nos on NDE side. f) SPARES LIST / Philosophy – As per Annexure V of TC62780

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11	POWER SUPPLY	
	The following voltage levels shall apply:	
	3.3 kV \pm 6%, 50 Hz	Voltage for motors bigger than 200 KW and for power distribution within the plant.
	415 V \pm 10%, 50Hz	Standard voltage for power supplies to small electric power consumers and motors above 0.2 kW and up to 200 KW.
	Bidder shall design and supply the equipment suitable for satisfactory operation under above mentioned power supply condition.	

6.0 MATERIAL CODES

Var No	Description	Material Code
01	2x100% Single stage, integrally geared, single or dual vane centrifugal type oxidation blowers complete with integral gearbox, lube oil system, instrumentation and accessories. OR 2x100% Motor driven positive displacement (Helical lobe/ Screw) type oxidation blowers complete with VFD drive, lube oil system, instrumentation and accessories.	TC9762780019
02	Impeller Assembly	TC9762780027
03	Set of Bearings (Required 1No. each for complete replacement of all bearings in one Blower)	TC9762780035
04	Commissioning spares	TC9762780043
05	Blower instrumentation spare- (Spare list as per Annexure V Philosophy)	TC9762780051

7.0 PACKING INSTRUCTIONS:

1.	Please see clause 7.0 of TC52545 common specification for detailed packing instructions
2.	Each package or shipping units shall be clearly marked or stenciled on at least two sides as follows. 2X500MW NTPC SIPAT BILASPUR DISTRICT CHHATTISGARH, INDIA EPC CONTRACTOR: BHARAT HEAVY ELECTRICALS LIMITED, INDIA In addition, each package or shipping unit shall have the symbol painted in red on at least two sides of the package, covering one fourth of the area of the side.
8.0	SUPERVISION OF ERECTION, TESTING AND COMMISSIONING
1.	The erection of Oxidation Blower will be done by owner as per Erection Manual and check List. However, the bidder shall make one visit per FGD system for the supervision of erection, pre-commissioning & post-commissioning check-up, start-up, testing and trial runs of all the items covered under the scope of supply.

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	<p>There will be two visits for the two FGD systems. The bidder will be informed well in advance for the visit. Bidder shall include 6 working days per visit in the offer with minimum 2 visit. For 2 unit 12 working days must be included</p> <p>BHEL shall conduct performance test of FGD package at site. Vendor shall provide supervision services for site performance test on per diem basis for each unit.</p>
2.	TA/DA, boarding and lodging shall be borne by the bidder and shall be inclusive in supply portion.
3.	Price comparison for evaluating the lowest bid will be considered all main supply, supervision of E&C charges and mandatory spares price all together.
9.0	INSPECTION AND TESTING
	The General inspection requirements to be considered are as below:
1.	Bidder shall furnish written copies of shop production, fabrication and quality test procedures and drawings to be used on the Blowers for review by BHEL/NTPC prior to manufacture.
2.	The Bidder shall furnish MRT & Performance test procedure in line with international standard. The test procedure will be reviewed and approved by the BHEL/NTPC.
3.	Out of 4 Oxidation Blower, performance test of 1 No will be witnessed by BHEL/ NTPC/ TPI before dispatch of machine at the Bidder's works or where the test facilities are available. A notice of minimum three (3) weeks shall be given for witnessing the test.
4.	The Bidder shall conduct performance test for the remaining blowers and submit the reports.
5.	Final inspection and release by BHEL /NTPC is a mandatory requirement unless specially waived.
6.	A dynamic balancing certificate stating that the rotating assembly has been balanced dynamically shall be sent to BHEL/NTPC/TPI within one (1) week of the successful completion of balancing.
7.	Acceptance tolerance of actual versus guaranteed performance for capacity, Static head, efficiency and power absorbed shall be as per applicable standard.
8.	Vibration levels shall be measured during shop running/performance tests.
9.	Contract shaft seals shall be used during shop tests, unless the seal design is unsuitable for the shop-test condition.
10.	Blower shall not be released for shipment, until shop tests data and performance tests curves have been approved by Owner.
11.	Bidder should furnish performance guarantee as per applicable standard guarantee for the design, manufacture, material and safe operation of the equipment's.
12.	Bidder shall arrange all calibrated gauges, Instruments during testing.
13.	Mechanical running and the performance test shall be carried out. Bidder shall arrange Motor for the shop test and inspection.

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14.	The performance test may be carried out using air at shop and shall be converted to the design condition.
15.	Inspection and testing will be done as per NTPC approved Quality Plan. In case of order placed on foreign Vendor, Vendor shall engage and appoint at their cost of any reputed Third Party Inspection Agencies having international presence for carrying out inspection of equipment's and material at vendor's & sub vendors works. Sample QP(indicative) is attached as Annexure-V of TC52545 .
10.0	PAINTING
1.	Surface Preparation : Blast cleaned conforming to sa2-1/2 swiss standard
2.	PRIMER COAT: Epoxy resin based Zinc phosphate Primer with minimum DFT of 100 μm INTERMEDIATE COAT: Epoxy resin based paint pigmented with titanium dioxide with minimum DFT 100 μm FINISH COAT: One coat of epoxy paint pigmented of DFT of 75 microns. Additionally, Finish coat of polyurethane of minimum DFT of 25 microns. Final shade as per approved quality plan. The above painting is just a tentative schedule. Painting details will be informed during contract stage. <ul style="list-style-type: none">a. Base: To be informed during contract stageb. Lettering: To be informed during contract stage preventive paint after inspection at shop floor before dispatch shall be in bidder's scope
3.	Rust preventive paint after inspection at shop floor before dispatch shall be in bidder's scope
4.	Corrosion protection, coating and galvanizing, painting shall be taken care by the bidder. Bidder shall submit the painting scheme during detail Engg in line with the specification and shall be subject to approval of BHEL / NTPC.
11.0	SPARES, TOOLS & TACKLES
11.1	START UP & COMMISSIONING SPARES
	Start-up & Commissioning Spares shall be part of the main supply of Oxidation blowers. Start-up & commissioning spares are those spares which may be required during the start- up and commissioning of the equipment/system. All spares required for successful operation till commissioning of Oxidation blowers shall come under this category. Bidder shall provide an adequate stock of such start up and commissioning spares to be brought by him to the site for the equipment erection and commissioning. The spares must be available at site before the equipment's are energized. This start-up & commissioning spare part list shall not be included in "Initial Spare Parts List".
11.2	INITIAL SPARE PARTS (MANDATORY SPARES):
	Bidder to quote for below mentioned mandatory spares with break up price: <ul style="list-style-type: none">a. Bearings - 1 no. of each typeb. Impeller assembly - 1 no.c. Blower instrumentation spare - 1 set (As per annexure V of TC62780) Bidder shall quote for the "Initial Spares Part List", and it will be considered for L1 evaluation. Initial spare parts items shall be handed over separately and shall not be mixed with the supply of the main equipment parts. Spares shall be sent in pre-decided lots in containers/secure boxes. All boxes/containers are to be distinctly marked in red color with boldly written "S" mark on each

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face of the containers. Spares shall not be dispatched before dispatch of corresponding main equipment's. Each item shall be labelled in English and be packed against damage and sealed to prevent deterioration from corrosion.

All spares supplied under this contract shall be strictly inter-changeable with the parts for which they are intended for replacements. All the Initial spares shall be manufactures along with the main equipment components as a continuous operation as per same specification and quality plan.

11.3 RECOMMENDED SPARES

Bidders shall also furnish the **Final Spares Part List** (i.e. recommended spares list) along with the offer required for 3 years of normal operation of the plant and should be independent of the list of the mandatory spares. Prices of recommended spares will not be used for evaluation of the bids. The price of these spares will remain valid up to 6 months after placement of Notification of Award for the main equipment.

11.4 SPECIAL TOOLS & TACKLES:

Any special tools & tackles required for the entire equipment to disassemble, assemble or maintain the units (**One set for each unit**), they shall be included in the quotation and furnished as part of the initial supply of the machine. List of special tools & tackles shall be decided by bidder as per his proven practice. When special tools are provided, they shall be packaged in separate, boxes with lugs and marked as "Special Tools for (tag / item number)." Each tool shall be stamped or tagged to indicate its intended usage. Levers and eye bolts for the removal of parts to be serviced shall be submitted with special tools.

12.0 PERFORMANCE GUARANTEE

All performance tests for blowers shall be carried out in accordance with any latest international codes/standards.

- 1) Bidder shall furnish Performance guarantee for the design, manufacture, material, safe and trouble-free operation of the Oxidation Blower and its accessories
- 2) Capacity and head of the blower to be guaranteed as per **Annexure-I of TC62780**.
- 3) The bidder shall guarantee 98% availability of equipment for a continues period of 120 days
- 4) The Bidder shall ensure a design of the equipment to achieve an average target availability of 90%.
- 5) Noise level-≤85 dB (A) at 1m horizontal distance from equipment/enclosures and 1.5m above operating floor is to be guaranteed.
- 6) The overall vibration levels measured on the non-rotating parts of either centrifugal compressor or positive displacement compressor shall be as per ISO 10816-1 Class A/B≤2.3mm/s, however for Integrally geared type centrifugal compressor the shaft vibration shall also be measured and it shall be as per ISO7919-3. The overall shaft vibration for zone A/B shall be as per following equation
 In SI units: $A = 4800/\text{SQRT}(N)$
 Where,
 A = amplitude of unfiltered vibration, in μm true peak to peak,
 N = maximum continuous speed, in rpm.
- 7) Acceptance tests to be carried out as per the procedure defined by the bidder which shall be submitted for NTPC's approval.

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	<p>8) In the event that the performance test is unsuccessful in meeting performance guarantees, bidder shall take necessary remedial action at his cost and the performance test shall be repeated.</p>
13.0	BID EVALUATION CRITERIA FOR POWER CONSUMPTION:
1.	<p>POWER GUARANTEE</p> <p>Bidder to specify the guaranteed Shaft power per blower operating at the Guarantee point (Operating point 3) of clause 5.0 of this specification in their offer. This power value shall be used for loading and penalty criteria.</p>
2.	<p>BID EVALUATION CRITERIA FOR POWER CONSUMPTION:</p> <p>Power consumption quoted by bidder shall be limited to the ceiling value specified below.</p> <p>The Lowest of the power consumption quoted by any qualified bidder shall be taken as the base or ceiling value. Bid prices of other bidders will be loaded for every KW excess over the ceiling value as per the formula given below.</p> <p>In case, Guaranteed Shaft power offered by the bidder exceeds the ceiling value specified above, his bid price will be loaded for excess power consumption as per the formula given below.</p> <p>Adjustment factor for excess power consumption in INR = (GPC-CV) X PL X 4 No's of Blowers</p> <p>GPC- Guaranteed Power Consumption quoted by bidder in KW</p> <p>CV- Lowest of the power consumption quoted by any bidder</p> <p>PL- Power Loading @ INR 107730/KW</p>
14.0	LIQUIDATED DAMAGES FOR POWER CONSUMPTION
1.	<p>If actual Power Consumption of blower during shop PG Test measured at compressor coupling for the Guarantee point exceeds the value guaranteed by the bidder., liquidated damages for shortfall in performance shall be deducted from contract price as per the formula given below</p> <p>Liquidated damage deductible in INR = (GPC-APC) X P X 4 No's of Blowers</p> <ul style="list-style-type: none"> • GPC- Guaranteed Power Consumption quoted by bidder in KW • APC- Actual Power Consumption in KW • P- Penalty @ INR 107730/KW <p>Penalty for shortfall in performance as mentioned above shall be deducted from contract price, however the penalty shall be limited to 25% of contractual value.</p> <p>Since performance test is witnessed for the first blower, LD charges are applicable for remaining 3 No of blowers based on performance result of first blower.</p>
2.	<p>Minimum Acceptance Level: 105% of Functional Guarantee Value. NTPC/BHEL reserves the right to reject the equipment if actual power consumption exceeds the minimum acceptance level.</p>
15.0	WARRANTY/ DEFECT LIABILITY
1.	<p>The warranty period shall be 24 months from the date of supply or 18 months from the date of commissioning whichever is earlier. Provided that the successful bidder shall extend the provisions of this warranty to cover all repaired and replacement parts furnished under the</p>

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	<p>warranty obligations hereunder, subject to the warranty period for the same being for a period of 24 months from the date on which replacement or renewal work is completed.</p> <p>The Defect Liability Period shall be Eighteen (18) months from date of completion of the Facilities (or any part thereof) or twelve (12) months from the date of Operational Acceptance of the Facilities (or any part thereof), whichever first occurs, unless specified otherwise in the SCC.</p> <p>If during the Defect Liability Period any defect should be found in the design, engineering, materials and workmanship of the Plant and Equipment supplied or of the work executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Employer regarding appropriate remedying of the defects, and at its cost, repair, replace or otherwise make good (as the Contractor shall, at its discretion, determine) such defect as well as any damage to the Facilities caused by such defect. The Contractor shall not be responsible for the repair, replacement or making good of any defect or of any damage to the Facilities arising out of or resulting from any of the following causes:</p> <p>(a) improper operation or maintenance of the Facilities by the Employer (b) operation of the Facilities outside specifications provided in the Contract (c) normal wear and tear.</p> <p>At the end of the Defects Liability Period, the contractor liability ceases except for latent defects. The contractor's liability for latent defects warranty shall be limited to a period of five (5) years from the end of Defects Liability Period. For the purpose of this clause, the latent defects shall be the defects inherently lying within the material or arising out of design deficiency which do not manifest themselves during the Defects Liability Period.</p>
2.	<p>In case of failure of the equipment to meet the guarantee, NTPC/BHEL reserves the right to reject the equipment. However, NTPC/BHEL reserves the right to use the equipment until new equipment supplied by bidder meets the guaranteed requirement.</p>
16.0	FIRST FILL OF CONSUMABLES:
1.	<p>Bidder's scope shall also include supply and filling of all chemicals, reagents, resins, lubricants, grease, filters and consumable items for operation up to COD including top up requirements at the time of issuance of PAC/declaration of COD. All lubricants proposed for the plant operation shall be suitable for all operating and environmental conditions that will be met on site consistent with good maintenance procedures as instructed in the maintenance manuals.</p>
2.	<p>Detailed specifications for the lubricating oil, grease, gases, servo fluids, control fluids, chemicals including items qualities and quantities required per month of the plant operation for the NTPC/BHEL's approval herein shall be furnished. On completion of erection complete list of bearings/equipment giving their location and identification marks shall be furnished to NTPC along with lubrication requirements. All types of chemicals, consumables, lubricants and grease shall be readily obtainable locally and the number of different types shall be kept to a minimum. For each type and grade of lubricant recommended, bidder shall list at least three equivalent lubricants manufactured by alternative companies.</p>
17.0	TRAINING
	<p>Successful bidder shall provide comprehensive training for NTPC Engineering, O&M, Erection & Commissioning staffs at site covering all aspects of the Oxidation blower- Operation & Maintenance, Troubleshooting etc. Cost of training is to be included in base price.</p>
18.0	CONFLICT
	<p>Bidder's equipment shall be designed for and shall meet the service, performance and minimum level of quality requirements specified. Bidder shall be solely responsible for advising BHEL in writing of any conflicts between the specifications and Bidder's design, including performance and levels of quality. Bidder agrees that its obligations, liabilities and warranties shall not be</p>

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diminished or extinguished due to its meeting the requirements of the Specification.

19.0 DOCUMENTATION

A DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER

The Bidder shall submit all documents including drawings, diagrams and all such information, which are necessary to fully understand the offer for techno-commercial evaluation. As a minimum requirement, document as per **Annexure-III of TC52545** shall be furnished to fully describe the scope of work and services offered.

The Bidder shall also submit duly filled in Technical data sheets and guarantee schedule as per **Annexure II of TC62780** and **Annexure III of TC62780**.

B DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT

The Successful bidder shall submit necessary data, documents, reports (including lateral analysis report) and drawings for review, approval with requirements specified as per **Annexure-IV of TC52545**.

Drawings that are reviewed by the NTPC/BHEL will be returned to bidder with a transmittal letter with any comments and / or questions marked on the drawings or noted in the letter. All comments and questions must be resolved before a resubmission of drawings / documents. If the design has not developed enough to resolve some of the comments or questions, bidder shall place a “hold” on those items or areas of design.

NTPC / BHEL reserves the right to return drawings unprocessed to bidder if there exists any evidence that bidder has not acknowledged all comments and questions.

All necessary GA drawings, sections, sub-assembly drawings, specifications of main and sub components and necessary set of operation & maintenance manual as asked by NTPC must be furnished by bidder in soft and hard copy forms. For all documents softcopy format shall be searchable pdf, however in addition all drawings, diagrams like P&IDS shall be supplied in ACAD or other editable format and all lists in Excel format. Further break up of technical documents will be discussed during finalization of the purchase contract.

Unless agreed otherwise, ten (10) hard copies and five (05) sets of electronic copies of all documents are to be submitted in the English language. Electronic Copies shall be submitted in primary original data format (e.g. DOC, XLS, DWG) as well as in a printable non-proprietary document format (e.g. PDF). Especially P&IDs shall be submitted as DWG files and PDF files. Bidder to ensure submission of hard copies as per NTPC’s requirement for all engineering drg/doc and for all subsequent revisions along with a soft copy through email to concerned project team. However all the engineering related information shall be furnished in soft form to BHEL.

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20.0 PRICE SCHEDULE					
Sl No	Description	Material Code	Quantity	Unit Price	Total Price
01	2x100% Single stage, integrally geared, single or dual vane centrifugal type oxidation blowers complete with integral gearbox, lube oil system, instrumentation and accessories. OR Positive displacement (Helical lobe/ Screw) type oxidation blowers complete with VFD drive, gearbox, lube oil system, instrumentation and accessories.	TC9762780019	4		
02	Impeller Assembly	TC9762780027	1		
03	Set of Bearings (Required 1No. each for complete replacement of all bearings in one Blower)	TC9762780035	1		
04	Commissioning spares	TC9762780043	4		
05	Blower instrumentation spare- (Spare list as per Annexure V Philosophy)	TC9762780051	1		
06	Pre-commissioning / Commissioning supervision		Per Diem		
07	Porta cabin to house VFD panels and transformers		2 set		
Total price for evaluation					

Remarks:

Vendor shall provide Per Diem rate for supervision of commissioning. This is inclusive of travel, boarding and lodging. 12 no of working days at site will be considered for evaluation purpose. Refer clause no. 8.0 for details. **Optional price for porta cabin shall be provided.**

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21. ANNEXURES

ANNEXURE –I QUALIFICATION REQUIREMENT.

The Bidders are required to meet the Qualification Requirement (QR) for Oxidation Blowers as per criteria stipulated below and necessary documents evidence requirement as per Annexure-3K.

System offered by the bidder shall be only from such manufacturer(s) who has previously designed (either by itself or under collaboration/ licensing agreement), manufactured/ got manufactured the equipment of the type, application and minimum equipment rating as stipulated below such that the equipment should have been in successful operation in at least 1 plant for a period not less than 1 year reckoned as on enquiry floating date.

Sl. No.	Name of Equipment	Type of Equipment	Application	Equipment Rating
(c)	Oxidation Blowers	Single stage integrally geared centrifugal compressor/ Positive displacement blower (helical / Screw type)	Wet Limestone based FGD application in Coal fired power plant or any process application	Flow 7300 Nm ³ /hr Dry Basis (min.) with Head 8500 mmwc (min.) for spray tower process

SIGNATURE OF BIDDER -----

NAME -----

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ANNEXURE –II- TECHNICAL DATA SHEET

Sl. No	Description	Data
1.0	GENERAL	
	a. Client	: BHEL-HPEP Hyderabad
	b. Project	: NTPC Sipat (2X500 MW)
	c. Ultimate Customer	: NTPC
	d. Location	: Bilaspur District Chhattisgarh, India
	e. Service	: Continuous
	f. Installation	: In-door
	g. No of Blowers for each unit	: 1 Working + 1 Standby
	h. Total number of Blowers	: 4 No's
2.0	MANUFACTURER DETAILS	
	a. Model	:
	b. Type	: Single stage integrally geared / Positive displacement type (Helical / screw type)
	c. Type of Driver	: As per specification
	d. Area classification	: Safe
	e. No of Stage	: Applicable/ Not Applicable
3.0	OPERATING CONDITION	
	a. Gas composition % by weight / Mole percent	: Atmospheric air
	b. Solids at suction g/m ³	: As per ambient condition
	c. Relative humidity at suction %	: As per ambient condition
	d. Molecular weight	: As per ambient condition
	e. Specific weight at suction Kg/m ³	: As per ambient condition
	f. Capacity at suction Nm ³ / Hr	: As per clause 5.0
	g. Suction pressure KPa	: As per clause 5.0
	h. Discharge pressure mmWc	: As per clause 5.0
	i. Differential Pressure	: Bidder to confirm
	j. Suction temperature Deg C	: Ambient
	k. Discharge temperature Deg C	: <70
4.0	PERFORMANCE DATA	
	a. Capacity Nm ³ /Hr	: #
	b. Static efficiency %	: #
	c. BKW Normal / Maximum KW	: #
	d. BKW at minimum suction temperature KW	: #
	e. Motor rating KW	: #
	f. Motor Speed rpm	: #
	g. Discharge pressure static (inclusive of losses) mmWc	: #
	h. Differential pressure (inclusive of losses) mmWc	: #
	i. Speed Maximum/ Normal/Minimum	: #
	j. Noise level	: #
	k. Performance curve	: #

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5.0 CONSTRUCTION DATA	
a. Manufacturer	: #
b. Model No.	: #
c. Suction	: Single
d. Suction Rating / Size	: #
e. Discharge Rating / Size	: #
f. Type of rotor	: #
g. Size of rotor Dia mm	: #
h. Journal bearing: Type / Size:	: #
i. Thrust bearing: Type / Size:	: #
j. Bearing cooling required	: Yes / No - Bidder to confirm
k. Cooling water required	: Bidder to confirm the quantity
l. Type of drive	: As per specification
m. Shaft seal	: Packing / Rubber seal
n. Size / Code	: #
o. Type of coupling	: #
p. Service factor	: #
q. GD ² at drive shaft end	: #
r. Rotation viewed from coupling end	: Clock wise / Counter clock wise
s. Fluid Coupling	: Yes / No - Bidder to confirm
t. Fluid Coupling make	: #
u. Fluid Coupling control	: #
v. Suction filter	: Required
w. Degree of filtration	: #
x. Base plate common to Blower. Inboard bearing housing and fluid coupling & Motor	: Yes / No - Bidder to confirm
y. Total weight kg	: #
z. Maximum Erection weight kg	: #
6.0 MATERIALS	
a. Casing	: #
b. Rotor	: #
c. Shaft	: #
d. Packing Seal	: #
e. Suction filter elements/ housing	: #
f. Base frame	: #

Note - Vendor to full up the columns marked with “ # “

SIGNATURE OF BIDDER -----

NAME -----

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ANNEXURE III- SCHEDULE OF GUARANTEES

Sl. No	Description	Data
1.	Rated capacity of Blower Nm³/hr	:
2.	Total head at design capacity mmWc	:
3.	Guaranteed power consumption at rated capacity & head kW	:
4.	Noise level at a distance of 1.0 meter from the equipment at site and 1.5 m above operating floor dB(A)	:
5.	Maximum vibration (peak to peak amplitude at site) microns	:
6.	Equipment Availability (%)	:

SIGNATURE OF BIDDER -----

NAME -----

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ANNEXURE IV- VENDOR TO PROVIDE THE LIST OF COMMISSIONING SPARES

Sl. No.	Description	Quantity
1.		
2.		
3.		
4.		
5.		

Qty will be Number or Set as applicable

- Vendor to identify each and every item which they consider as commissioning spares. Each and every part that is considered to fall under guarantee clause shall be indicated in this list.
- Rubber items which are having a **Shelf-Life** will also be considered as wear item.

SIGNATURE OF BIDDER -----

NAME -----

DESIGNATION -----

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ANNEXURE V- VENDOR TO PROVIDE APPLICABLE MANDATORY INSTRUMENTATION SPARE LIST AS PER FOLLOWING SPARE INSTRUMENTATION PHILOSOPHY:

Vendor shall submit the bill of material of each item on mandatory spare, indicating the quantity used in main as well as spares.

SIGNATURE OF BIDDER -----

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ANNEXURE V-MAIN SPARES

S.NO	OXIDATION BLOWER INSTRUMENT SPARE ITEM DESCRIPTION / SPARE PHILOSOPHY	QTY
1	TRANSMITTERS OF ALL TYPES AND MODEL NO. (FOR MEASUREMENT OF PRESSURE, DIFFERENTIAL PRESSURE, FLOW, LEVEL, TEMP, ETC.). THIS SHALL INCLUDE MAGNETIC	10% OR 1 NO. OF EACH TYPE AND MODEL, WHICHEVER IS MORE.
2	TEMP ELEMENTS ALONG WITH THERMO WELL (EXCEPT WINDING TEMP ELEMENTS OF MOTOR)	10% OR 2 NO. OF EACH TYPE, MODEL & LENGTH, WHICHEVER IS MORE.
3	PROCESS ACTUATED SWITCHES (PRESSURE, DIFFERENTIAL PRESSURE, FLOW, LEVEL, TEMP)	10% OR 2 NO. OF EACH TYPE AND MODEL, WHICHEVER IS MORE.
4	LIMIT SWITCHES (FOR PNEUMATIC AND MANUAL VALVES)	10% OR 2 NO. OF EACH TYPE AND MODEL, WHICHEVER IS MORE.
5	LOCAL GAUGES FOR PRESSURE, DIFFERENTIAL PRESSURE, FLOW, LEVEL, TEMP	5% OR 1 NO. OF EACH TYPE, MODEL AND RANGE, WHICHEVER IS MORE.
6	VALVES OF ALL TYPES AND MODELS	10% OR 1 NO. OF EACH TYPE, CLASS, SIZE AND MODEL WHICHEVER IS MORE.
7	2 WAY, 3WAY, 5WAY VALVE MANIFOLDS	10% OR 1 NO. OF EACH TYPE, CLASS, SIZE AND MODEL WHICHEVER IS MORE.
8	FITTINGS	10% OR 1 PACKET OF EACH TYPE, CLASS, SIZE AND MODEL WHICHEVER IS MORE.
9	PURGE METERS	5% OF EACH MODEL OR 1 NO. WHICHEVER IS MORE.
10	FILTER REGULATORS	20% OF EACH MODEL OR 2 NOS. WHICHEVER IS MORE.
11	PNEUMATIC AND ELECTRO-HYDRAULIC ACTUATOR ASSEMBLY	10% OR 1 NO. OF EACH TYPE, MODEL AND RATING, WHICHEVER IS MORE.
12	VALVE TRIM (INCLUDING CAGE, PLUG, STEM, SEAT RINGS, GUIDE BUSHINGS ETC.)	1 SET FOR EACH TYPE OF CONTROL VALVE.
13	DIAPHRAGMS, O' RINGS, SEALS ETC. OF ALL TYPES MAKE ETC.	100% - 1 No
14	PRESSURE GAUGES OF ALL TYPES, MAKE, RATING ETC.	10% OR 2 NOS. OF EACH TYPE WHICHEVER IS MORE

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15	SOLENOID VALVES (IF APPLICABLE)	10% OR 2 NOS. OF EACH TYPE WHICHEVER IS MORE
16	POSITIONER UNITS (COMPLETE UNIT) & ACCESSORIES (LINK ASSEMBLY)	10% OR 1 NO. OF EACH TYPE WHICHEVER IS MORE
17	PNEUMATIC AIR-FILTER/REGULATOR OF EACH TYPE, MAKE RATING ETC.	10% OR 2 NOS., WHICHEVER IS MORE
18	AIR LOCK RELAYS	10% OR 2 NOS. OF EACH TYPE WHICHEVER IS MORE
19	ACTUATORS	1 NO OF EACH TYPE AND RATING
20	ELECTRONIC PCB OF ALL TYPES	10% OF EACH TYPE & MODEL
21	ABSOLUTE ENCODER (REPLACEABLE PART)	5% OF EACH TYPE & MODEL
22	ELECTRONIC TORQUE SENSOR	5% OF EACH TYPE & MODEL

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ANNEXURE -3K

Provenness Criteria/Qualification Requirement (SUB-QR) for Oxidation Blower

Project Project: NTPC Sipat (2X500 MW)

NTPC Clause No.

4.00.00 **Provenness criteria for critical equipment, auxiliaries, systems and bought out items :**

4.01.00 The Bidder/ Bidder's sub-vendor(s) is required to meet the provenness criteria and/ or Qualification requirement for oxidation blower as per criteria stipulated below:

4.01.01 Booster Fans, Slurry Recirculation Pumps, **Oxidation Blowers**, Wet Limestone Grinding Mills, Slurry Pumps, Agitators & Vacuum Belt Filters for the Wet Limestone based Flue Gas Desulphurisation (FGD) System offered by the Bidder shall be only from such manufacturer(s) who has previously designed (either by itself or under collaboration / licensing agreement), manufactured / got manufactured the respective equipment(s) of the type, application and minimum equipment rating as stipulated below such that the respective equipment(s) should have been in successful operation in at least one (1) plant for a period not less than one(1) year reckoned as on enquiry floating date.

Sl. No.	Name of Equipment	Type of Equipment	Application	Equipment Rating
(b)	Oxidation Blowers	Single stage integrally geared centrifugal compressor / positive displacement (Helical lobe/ screw) type blower	Wet Limestone based FGD application in Coal fired power plant or any process application	Flow 7300 Nm ³ /hr Dry Basis (min.) with Head 8500 mmwc (min.) for spray tower process

4.01.03 A JV / Subsidiary Company formed for manufacturing and supply of equipment(s) as listed at clause no. 4.01.01 above in India, shall also be considered qualified for manufacturing such equipment(s), provided that it has a valid collaboration or licensing agreement for design, engineering, manufacturing of such equipment(s) in India with a qualified equipment manufacturer who meets the requirements stipulated at clause 4.01.01 above (or the technology provider of the qualified equipment manufacturer) for the oxidation blower. Before taking up the manufacturing of such equipment(s), the bidder/ his sub-vendor(s) must create /have created manufacturing facilities at his works as per collaborator's/licenser's design, manufacturing and quality control system for such equipment(s).

Further, in such a case, such qualified equipment manufacturers should have, directly or indirectly through its holding company/ subsidiary company, at least 26% equity participation in the Indian Joint Venture Company/ Subsidiary Company, which shall be maintained for a lock-in period of seven (7) years from the date of incorporation of such Joint Venture/ Subsidiary or up to the end of defect liability period of the contract, whichever is later.

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- 4.01.04 In case the Bidder or the proposed sub-vendor is not manufacturer of proven Oxidation Blowers as per clause 4.01.01(c) above but is a manufacturer of Blowers/compressors for minimum 50 NM³/min capacity, the Bidder or the proposed sub-vendor can also manufacture Oxidation Blowers, provided it has collaboration or valid licensing agreement for design, engineering, manufacturing, supply of such Oxidation Blowers in India with such manufacturer who meet the requirements stipulated at clause 4.01.01(c) above for the Oxidation Blowers. Before taking up the manufacturing of such equipment, the bidder/ his sub-vendor must create /have created manufacturing facilities at his works as per collaborator's /licenser's design, manufacturing and quality control system for such equipments.
- 4.01.08 Before taking up the manufacturing of oxidation blower as per clause 4.01.01, 4.01.03, 4.01.04 above, the Bidder must create (or should have created) manufacturing and testing facilities at its works as per Collaborator / licenser's design, manufacturing and quality control system for such equipments duly certified by the Collaborator / licensor. Further, the Collaborator / Licensor shall provide (or should have provided) all design, design calculation, manufacturing drawings and must provide (or should have provided) technical and quality surveillance assistance and supervision during manufacturing, erection, testing, commissioning of equipments.
- 4.01.09 Bidder shall offer and supply only the type of the above equipment(s) for which he himself / Collaborator(s) / Licenser(s) proposed by the Bidder for the above equipment(s) is qualified.
- 4.01.10 The Employer (NTPC) reserves the right to fully satisfy himself regarding capability and capacity of the bidder and the proposed arrangement and may prescribe additional requirement before allowing manufacture of the equipment listed above for this contract.

Note to clause 1.2

- (1) Whenever the term 'coal fired' is appearing above, "Coal" shall be deemed to also include bituminous coal/brown coal/Anthracite Coal/lignite.

Bidder shall submit the Attachment 3K enclosed along with Supporting Documents. Also, Bidder has to submit Reference list of Plants where Oxidation Blowers have been supplied.

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Oxidation Blowers: We declare that we/ our Sub-vendor, have designed (either by itself or under collaboration/ licensing agreement), *manufactured/ * got manufactured and supplied at least one (1) number of oxidation blower as per clause 4.01.01 which is working in FGD application or any other process application and which has been in successful operation for minimum one (1) year as reckoned as on enquiry floating date as per the details furnished below:

Sl. No.	Description	Reference Work
1.	Name of the reference plant & location:	
2.	Client name and his address: Oxidation	
3.	No. of units and capacity in MW of unit:	
4.	Whether power plant is coal fired	-*Yes/*No
5.	Whether operating in a Wet Limestone based FGD application in Coal fired power plant	-*Yes/*No
6.	Name of equipment manufacturer & address:	
7.	Date of commission of the equipments:	
8.	Model no. of the equipment:	
9.	Brief Technical particulars of the equipments:	
10.	Flow-Nm ³ /h
11.	Head- mmWC
12.	Whether the equipment(s) are in successful operation in atleast one (01) plant for a period not less than one (01) year reckoned as on the date of consideration for approval but not later than six months to award date of contract to the Main bidder	-*Yes/*No
13.	Flue gas Desulphurization system details:	*Technical extract/ *paper letter/ *email/ *Drawing from user or *contract document or *scheme or *any document in public domain enclosed at annexure....to Attachment-3K
14.	Scope of Work:	*Letter of Award or *Contract or *P.O. enclosed at Annexure.....to Attachment-3K
15.	Performance details:	*Certificate/*Letter/*E-mail from End user enclosed at Annexure.....to Attachment-3K

* Strike off whichever is not applicable.

Signature of authorized signatory.....

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