



TECHNICAL SPECIFICATION OF MIST ELIMINATOR - DADRI (2X490MW)

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S.No	Description
	documents. All stencil marks on the outside of cases are either to be made in waterproof material or protected by shellac or varnish to prevent obliteration in transit.
15.	The packing slip shall contain the following information:- Customer name, Name of the equipment, Purchase Order number with Date, Address of the delivery site, Name and Address of the Sender, Serial Number of Mist Eliminator & accessories, BHEL item Code, Gross Weight and Net weight of Supplied items.
16.	Prior to transport from manufacturer's work to destination, components of the unit shall be completely cleaned to remove any foreign particles. Flange faces and other machined surfaces shall be protected by an easily removable rust preventive coating followed by suitable wrapping.
17.	All necessary painting, corrosion protection & preservation measures shall be taken as specified in painting schedule. Supplier shall consider the coastal environment zone which is defined as "very severe" during final finishing/shipping.
18.	Successful bidder shall furnish the detail packing /shipment box details with information like packing box size, type of packing, weight of each consignment, sequence no. of dispatch, no. of consignment for each deliverable item against each billing break up units/ billable blocks. Without these details the BBU shall not be approved during detail engineering. Also, complete billing break-up with above mentioned details shall be submitted within 10days of LOI.
19.	All items/equipment shall be dispatched in properly packed condition (i.e. no item shall be dispatched in loose condition such that it becomes difficult to store/identify its location at site at a later stage).
20.	Cases which cannot be marked as above shall have metal tags with the necessary markings on them. The metal tags shall be securely attached to the packages with strong steel binding wire. Each piece, Skid, Case or package shipped separately shall be labelled or tagged properly.
9.0	SUPERVISION OF ERECTION, TESTING AND COMMISSIONING
	ERECTION
1.	The erection of Mist Eliminator and washing system will be done by owner as per Erection Manual and check List. However, the bidder shall make one visit per boiler 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.
2.	There will be one visit per boiler and totally there will be 2 visits for 2 boilers. The bidder will be informed well in advance for the visit. Bidder shall include 4 working days

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	per visit in the offer with minimum 2 visits.
3.	TA/DA, boarding and lodging shall be borne by the bidder and shall be inclusive in supply portion.
	DROPLET MEASUREMENT AT SITE
1.	Bidder to measure residual droplet at Mist eliminator outlet for both the units at site. The bidder will be informed well in advance for the visit.
2.	Number of visits shall be Two (2). Bidder to complete the test for both the units. TA/DA, boarding and lodging shall be borne by the bidder and shall be inclusive in supply portion.
10.0	EXCLUSION
	The following work associated with the Mist Eliminator will be by BHEL: a. Mist Eliminator wash Pumps b. Piping from ME Wash pumps to Absorber wall at Mist eliminator elevation. c. Motorized operated valves d. ME Support beams
11.0	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 for review by BHEL/NTPC prior to manufacture. Inspection of above mentioned tests by BHEL representative at bidder's works is envisaged.
2.	The Bidder shall furnish performance test procedure along with measurement standard. The procedure will be reviewed and approved by the BHEL/NTPC.
3.	Final inspection and release by the BHEL/NTPC is a mandatory requirement unless specially waived.
4.	Acceptance tolerance of actual versus guaranteed performance for Droplet removal efficiency and Pressure drop shall be as per applicable standard.
5.	Mist Eliminator shall not be released for shipment, until shop tests data have been approved by Owner.
6.	Bidder should furnish performance guarantee as per applicable standard guarantee for the design, manufacture, material and safe operation of the equipments.
7.	BHEL/NTPC shall witness the test at Bidder's works and a notice of minimum three (3)



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	weeks shall be given for attending the inspection.
8.	Bidder to arrange all calibrated gauges, Instruments during inspection.
9.	Bidder to arrange Instruments and all accessories for the measurement at site using Impact method.
10.	The performance test & droplet measurement may be carried out at site for Guarantee conditions and shall be converted to the design condition.
12.0	SPARES,TOOLS & TACKLES
12.1	START UP & COMMISSIONING SPARES
	Start-up & Commissioning Spares shall be part of the main supply of the Mist Eliminator & sub system. 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 Mist Eliminator and accessories. 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 equipments are energized.
12.2	SPECIAL TOOLS & TACKLES:
	Any special tools & tackles required for the entire equipment to disassemble, assemble or maintain the units, they shall be included in the quotation and furnished as part of the initial supply. 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.
13.0	PERFORMANCE GUARANTEE
a.	All performance tests for Mist Eliminators shall be carried out in accordance with any latest international codes/standards. 1) The mist eliminator outlet droplet content shall be guaranteed to be $\leq 20 \text{ mg/Nm}^3$-dry @ 6% O₂ dry at absorber outlet measured over a period of 24 hrs continuous operation. 2) Mist outlet-droplet content shall be measured as per applicable clauses in VDI Norm 3679 and the Contractor shall carry out the tests as per the test procedure approved by the Employer. 3) Bidder shall furnish Performance guarantee for the design, manufacture, material, safe and trouble-free operation of the Mist Eliminator and its accessories



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	4) Maximum Pressure drop across M/E at Design Point condition i.e. 20 mm H₂O (G) is to be guaranteed. It shall be measured at Guarantee point conditions in site and shall be converted to the design condition. 5) The Bidder shall ensure a design of the equipment to achieve an average target availability of 98% for 120 days and average target availability of 95% for 1 year 6) Noise level ≤85 dB (A) at 1m horizontal distance from equipment/enclosures and 1.5m above operating floor is to be guaranteed. 7) 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.
14.0	WARRANTY
1.	The warranty period shall begin on the date of taking over by NTPC or date of issuance of the provisional acceptance certificate for the unit (whichever occurs first) and shall end after twenty-four (24) months. Provided that the successful bidder shall extend the provisions of this warranty to cover all repaired and replacement parts furnished under the 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.
2.	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.
15.0	FIRST FILL OF CONSUMABLES:
1.	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.
2.	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 within 2 months of placement of Order. On completion of erection complete list of bearings/equipment giving their location and identification marks shall be furnished to BHEL 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



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	three equivalent lubricants manufactured by alternative companies.
16.0	TRAINING
	Successful bidder shall provide comprehensive training for NTPC/BHEL Engineering, O&M, Erection & Commissioning staffs at site covering all aspects of the GDS system - Operation & Maintenance, Troubleshooting etc.
17.0	CONFLICT
	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 BIFPCL 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 diminished or extinguished due to its meeting the requirements of the Specification.
18.0	DOCUMENTATION
A	DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER
	The Bidder shall submit all documents, drawings, diagrams and all such information, which are necessary to fully understand the offer for techno – commercial evaluation. As a minimum requirement, the documents in Annexure: V shall be furnished to fully describe the scope of work and services offered. The above documents are required for proper evaluation purpose and vendors are requested to comply with above in all respect.
B	DOCUMENTS TO BE SUBMITTED AFTER AWARD OF CONTRACT
	The Successful bidder shall submit necessary data, documents and drawings for review, approval with requirements specified here under. However as minimum the documents in Annexure: V shall be submitted. 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



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	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 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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19.0 ANNEXURES

ANNEXURE – I

a) REFERENCE LIST as per format shown below. (at least One (1) reference plant details)

S. No.	Project Name , Customer & Plant capacity	Coal fired Yes/ No	Wet Limestone Based FGD Yes/No	Model	Flue gas flow Nm ³ /hr	Size	Outlet Mist Concentration mg/Nm ³	Year of Commg	Qty

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ANNEXURE – II- TECHNICAL DATA SHEET

Sl. No	Description	Data
1.0	GENERAL	
	a. Client	: BHEL-Ranipet
	b. Project	: Dadri 2x490 MW
	c. Ultimate Customer	: NTPC
	d. Location	: Uttar Pradesh, India
	e. Service	: Continuous
	f. Installation	: In-door
	g. Total number of Mist Eliminators	: 1 no. (Complete ME & Washing system) for Unit - 1 1 no. (Complete ME & Washing system) for Unit - 2
2.0	MANUFACTURER DETAILS	
	a. Model	: Bidder to Provide
	b. Type	: Bidder to Provide
	c. No of stages	: Bidder to Provide
	d. Vane type for Coarse & Fine separators	: Bidder to Provide
	e. Pitch details for Coarse & Fine separators	: Bidder to Provide
	f. Weight data	: Bidder to Provide
	g. Flushing system details	: Bidder to Provide
3.0	OPERATING CONDITION	: Refer Clause: 5.0 , S.No-4
4.0	PERFORMANCE DATA	
	a. Face Velocity m/s	: Bidder to Provide
	b. Pressure Drop hPa(G)	: Bidder to Provide
	c. Limit Drop Size Micron	: Bidder to Provide
	d. Temperature resistance of ME System Deg C	: Bidder to Provide
	e. Performance curve	: Bidder to Provide
	f. Washing sequence & Valve List	: Bidder to Provide
	g. Utility list & required Pump Capacity	: Bidder to Provide
5.0	MATERIALS	
	a. ME Panel	: Bidder to Provide
	b. Washing Pipe	: Bidder to Provide
	c. Washing Nozzles	: Bidder to Provide
	d. Hardwares	: Bidder to Provide



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6.0	INSPECTION AND TESTING		
	a. Material Test certificates	:	[R] [O]
	b. Dimensional & visual inspection	:	[R] [W]
	c. Droplet measurement at site	:	[R] [W]
	[R]: Required, [W]: Witnessed by BHEL/NTPC, [O]: Observed		

7.0 WASHING ARRANGEMENT

7.1	Washing water condition	
a.	Flow rate - Average	
b.	Flow rate – Instantaneous Allowable Max	
c.	Feed Pressure (at inlet of Washing Nozzle)	

7.2	Washing Method						
		First Stage		Second Stage		Third Stage	
		Front Surface	Back Surface	Front Surface	Back Surface	Front Surface	Back Surface
a.	Total Washing Area m ²	9.9 x 20.4	9.9 x 20.4	9.9 x 20.4	9.9 x 20.4	9.9 x 20.4	9.9 x 20.4
b.	Washing Water Source						
c.	Washing Water Average Flow rate m ³ /h	*	*	*	*	*	*
d.	Instantaneous Max Water Flow rate m ³ /h	*	*	*	*	*	*
e.	Duration of One washing for One Divided Section Sec	*	*	*	*	*	*
f.	Time of One washing Cycle (min)	*	*	*	*	*	*
	* Bidder to fill the value Note. 3 rd stage back surface washing - only for Maintenance						

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ANNEXURE III- SCHEDULE OF GUARANTEES

Sl. No	Description	Data
1.	Mist eliminator outlet droplet content mg/Nm ³ at absorber outlet measured over a period of 24 hrs continuous operation.	: Bidder to Provide
2.	Total Pressure drop across M/E at hPa(G) design point condition	: Bidder to Provide
3.	Noise level at a distance of 1.0 meter horizontally from the equipment at site and 1.5 m above operating floor dB(A)	: Bidder to Provide
4.	Equipment Availability (%)	: Bidder to Provide
	Equipment Availability for 120 days %	: Bidder to Provide
	Equipment Availability for 1 year %	: Bidder to Provide

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ANNEXURE – IV- LIST OF DEVIATIONS/EXCEPTIONS TO THE ENQUIRY DOCUMENT

Sl No	Clause No	Page No	Description of Deviation

Note: Enlarge the table to incorporate items

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**TECHNICAL SPECIFICATION OF MIST ELIMINATOR - DADRI (2X490MW)****DADRI:FGD:ME:R00****ANNEXURE –V****A) DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER:**

Sl. No.	Description	No of copies With proposal
1.	Specification	1
2.	Price Sheet	1
3.	Washing Sequence & Valve list	1
4.	Data Sheet	1
5.	Performance curve	1
6.	Proforma Packing List	1
7.	Shortest Manufacturing Time	1
8.	Approximate weight of each skid	1
9.	Reference plant details	1
10.	Utility List & Required Pump Capacity	1
11.	Deviation List	1
12.	General Assembly Drawing	1
13.	Support beam details and loading data	1
14.	Cross-sectional Drawing	1
15.	Sub-Vendor List	1
16.	Scope of Supply	1
17.	Quality Plan	1
18.	Spare List	1
19.	Start-up & Commissioning Spares	1
20.	List of Special Tools	1
21.	Delivery Schedule	1
22.	Droplet Measurement procedure	1
23.	WPS & PQR arrangement	1
24.	Man-holes, Sampling ports & Wash Pipe flange location & details	1
25.	P & I Diagram	1
26.	Catalogue	1
27.	Terminal Point details	1
28.	Bill of Materials along with material and code	1
29.	Sub Supplier questionnaire format –Annexure-VI	1

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30.	Equipment Maintenance schedules	1
31.	Training program and schedule for BHEL/NTPC personnel	1
32.	Erection, O&M Manual	1

B) DOCUMENTS TO BE SUBMITTED AFTER CONTRACT:

Sl. No.	Description	No of copies After award of contract	Delivery Time
1.	Utility List & Required Pump Capacity	1	2 weeks after contract
2.	Washing Sequence & Valve list	1	2 weeks after contract
3.	Performance curve	2	2 weeks after contract
4.	GA drawings of each equipment	1	1 month after contract
5.	Cross section detail drawing	1	1 month after contract
6.	Data Sheet	1	2 weeks after contract
7.	Lubricating oil list	1	2 months after contract
8.	Special tools list	1	2 months after contract
9.	Installation and assembly procedure	1	4 months after contract
10.	Inspection and Test Procedure	1	1 month after contract
11.	Inspection & Test record	1	In 2 weeks after test
12.	Inspection Certificate	1	In 2 weeks after test
13.	Sub vendors List	1	2 weeks after contract
14.	Manufacturing Schedule	1	2 weeks after contract
15.	Progress report	1	Every month
16.	Proforma Packing List	1	2 months prior to shipping
17.	Approximate weight of each	1	2 months after contract
18.	Support beam drawing & loading data	2	2 weeks after contract
19.	Strength & performance Calculation	1	2 weeks after contract
20.	Material Test Certificates	2	In 2 weeks after test
21.	Pre Commissioning Check List	2	4 months after contract
22.	Scope of Supply	2	2 weeks after contract
23.	Quality Plan	4	1 month after contract

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Sl. No.	Description	No of copies After award of contract	Delivery Time
24.	Operation and Maintenance Manual	• 10 hardcopies and 5 electronic copies in English	4 months after contract
25.	Spare List	1	1 month after contract
26.	Start-up & Commissioning	2	1 month after contract
27.	List of Special Tools	1	1 month after contract
28.	Delivery Schedule	1	2 weeks after contract
29.	Droplet Measurement	2	1 month after contract
30.	WPS & PQR	2	2 weeks after contract
31.	P & I Diagram	2	2 weeks after contract
32.	Catalogue	2	2 weeks after contract

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ANNEXURE –VI

TECHNICAL SPECIFICATION FOR SEAWORTHY PACKING

Refer to Specification No: PE-TS-888-100-A001 for detailed specification on Seaworthy packing.

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ANNEXURE-VII

INSPECTION & TESTING

Refer to all clauses for Inspection & testing requirements.

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ANNEXURE-VIII

HEALTH & SAFETY MANAGEMENT MANUAL

Refer to all clauses for Health & Safety requirements.

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PART –II

O&M Services and O&M Spares For 10 years



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21	O & M SERVICES FOR 10 YEARS OPERATION –ANNUAL MAINTENANCE CONTRACT (AMC).
	O&M Services of Mist Eliminator System to be taken up by Bidder at DADRI Site. The O&M services will be for a period of 10 years. <u>SCOPE OF O & M(AMC) Services:</u> <u>A) Annual Maintenance Contract (AMC):</u> 1. The Bidder to carry out maintenance of Mist Eliminator System supplied for a period of 10 years. The contract shall cover both preventive maintenance & Minor / Major Overhauls. 2. All services call shall be attended at the earliest. 3. All spare parts required for the upkeep of the equipment's (Mist Eliminator System) to be stocked in advance or arranged within 2 - 3 days' time to ensure trouble free operation & to meet the availability as per specification. 4. The Bidder has to take necessary approval from site In-charge for carrying out necessary maintenance operation. 5. The bidder shall provide qualified technicians for carrying out the AMC at site. Necessary site support will be provided by BHEL. TA/DA, boarding and lodging of such technicians attending to AMC requirements shall be borne by the bidder and shall be included in AMC scope.
22	O & M SPARES FOR 10 YEARS OPERATION
	<u>SCOPE OF O & M SPARES:</u> <u>B) O & M Spares:</u> 1. All spares required for the upkeep of the equipment for 10 years operation is in the scope of the bidder. 2. The bidder will submit a separate list of spares required for AMC from a) 3- 4 years operation. b) 5-7 years operation. c) 8- 10 years operation Note: 0 -2 years covered in warranty clause. 3. Bidder to quote the price for the above three categories separately. 4. The following is the minimum spare parts along with their break up price to be stocked by the bidder, if applicable.



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d) Mist Eliminator Washing Nozzles- 10% of each type.

5. Bidder to quote the price for the above three categories separately.

C) GENERAL

1. The AMC (A) & O&M Spares (B) are part of the scope for 10 years up keep of the equipment.
2. Maintenance charges – AMC (A) & O&M Spares (B) together will be paid yearly on a pro-rata basis for 10 years.
3. The AMC (A) & O&M Spares (B) rate to be quoted separately with the main offer.
4. The Price offer for supply of Mist Eliminator System & 10 years AMC (A) & O&M Spares (B) of Mist Eliminator System will be considered for Evaluation.
5. All spares to be used during AMC under this contract shall be strictly inter-changeable with the parts for which they are intended for replacements