
TECHNICAL SPECIFICATION

FOR

MIST ELIMINATOR

CONFIDENTIAL

CUSTOMER : NTPC
PROJECT : DADRI 2X490MW
APPLICATION : FLUE GAS DESULPHURIZATION SYSTEM



BHARAT HEAVY ELECTRICALS LIMITED
(A GOVT OF INDIA UNDERTAKING)
Flue Gas Desulphurization Group
Ranipet



TECHNICAL SPECIFICATION OF MIST ELIMINATOR - DADRI (2X490MW)

DADRI:FGD:ME:R00

TECHNICAL SPECIFICATION FOR MIST ELIMINATORS

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PART – I

MAIN SUPPLY



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1.0 PROJECT INFORMATION:

a.	Owner	NTPC
b.	Buyer	BHEL, Ranipet
c.	Process/Application	Flue Gas Desulphurization

A) SITE CONDITIONS

1.	Ambient Temperature and Relative Humidity	
a.	Average Site Condition ASC	
	Ambient Temperature	: 27 deg C
	Ambient Humidity	: 60%
	Design value Outdoor hPa	: 988
2.	Design ambient conditions for Electrical Systems	
a.	Ambient Temperature (Design)	: 45 deg C
b.	Minimum design temperature	: 0 deg C
3.	Plant Elevation	: +209.75 m above sea level
4.	Wind Load	: Average. As per IS 875 part 3.
a.	Basic Wind speed @ 10m above ground	: 47 m/s
5.	Seismic Load	: -

B) PROJECT LOCATION AND APPROACH

a.	State/Division	Uttar Pradesh
b.	District	Gautam Budhha Nagar



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2.0 APPLICABLE CODES & REGULATIONS

The design of Mist Eliminators shall conform to the latest edition of International codes accepted by the Buyer according to good engineering practice.

List of codes/standards recommended: (The list is not exhaustive)

S.No	Description	Material	Design & others
1	Piping	IS, AISI, ASTM, ASME, DIN, EN, BS or Equivalent	IS, AFNOR, ANSI, API, ASME, ASTM, AWWA, BS, DIN, EN, EJMA, Manufacturer's standard
2	Machinery	IS, AISI, ASTM, ASME, DIN, EN, BS or Equivalent	IS, AFNOR, AFBMA, AGMA, ANSI, API, ASTM, AWS, BS, DIN, IEC, HI, HEI, ISO, NEC, NEMA, EN, TEMA, VDI, Manufacturer's standard
3	Instrumentation	IS, AISI, ASTM, ASME, DIN, EN, BS or Equivalent	IS, AFNOR, ANSI, API, ASME, BS, DIN, EN, IEC, IEEE, ISA, ISO, NC, Manufacturer's standard
4	Electrical	AISI, ASTM, ASME, DIN, EN, BS or Equivalent	IS, BS, VDE, IEC, EN, ANSI, IEEE, NEMA
5	Civil	IS, AISI, ASTM, ASME, DIN, EN, BS or Equivalent	IS, AFNOR, ASCE, ASNT, BS, DIN, EN, ANSI, ACI, AISC, AWS, SSPC, Manufacturer's Standard
6	Structural Steel	SA/IS2062	BS/EN 1993 (Eurocode-3) or Equivalent international codes.
7	Performance Test		ASME PTC 40, JIS, EPA, Manufacturer's standard.

The design and materials shall conform to the requirements of applicable codes and regulations of the latest edition. The design, manufacture, installation and testing of the Blower shall follow the latest applicable Indian/International (AISI / ASME/EN/Japanese) Standards.



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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 Mist Eliminators along with accessories which is to be furnished in the Flue Gas Desulphurization plant of DADRI 2x490MW project. The following points may be noted.

- a. There are 2 units of each 490 MW and each unit is envisaged with one FGD system. Each FGD Absorber system will be provided with one Three Stage Mist Eliminator.
- 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. 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 Document (**Annexure-IV**)".
- d. Any deviation, not listed under the above section, even if reflected in any other portion of the proposal, shall not be considered applicable.
- e. No deviation or exception shall be permitted without the written approval of the purchaser.
- f. 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.
- g. 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.
- h. 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:

"Bidder should have previous experience of design, manufacture, supply, erection and commissioning / supervised erection & commissioning of the Mist Eliminators for Wet Limestone based FGD system for at least one (1) no. 490 MW or higher capacity pulverized coal fired power plant such that respective equipment(s) should have been in successful operation for a period not less than One (1) year prior to Part-I (Techno-commercial) bid opening date"

The Bidder shall offer only proven design which meets the Provenness criteria indicated above. Necessary document evidences as per Annexure-I for qualification shall be submitted along with



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the bid. If bidder doesn't meet the specified provenness criteria, they are denied to participate in this tender.

5.0 TECHNICAL INFORMATION

Sl. No.	Description	Requirement	
1.	Type	Three stage chevron type	
2.	Quantity		
i.	Quantity of Mist Eliminators for Unit-1	1 set (Complete Mist Eliminators & Washing systems).	
ii.	Quantity of Mist Eliminators for Unit-2	1 set (Complete Mist Eliminators & Washing systems).	
3.	Parameters		
i.	Gas flow	Vertical	
ii.	Casing Dimension	Length : 9900 mm	Width : 20400 mm
iii.	Design Pressure of Mist Eliminator Panel	660 mmH ₂ O (G)	
iv.	Max Allowable Pressure drop across Mist Eliminator element	20 mmH ₂ O (G) at Design point	
v.	Design Temperature	70 Deg C	
4.	Gas condition at ME Inlet	Guarantee Point	Design Point
i.	Gas Flow Rate (Nm ³ /s-wet)	600.6	661.0
ii.	Gas Flow Rate (m ³ /s-wet)	726.4	809.2
iii.	Gas Temperature (Deg C)	57.2	61.3
iv.	Density (kg/m ³)	1.04	1.01
v.	Operating Pressure at Mist Eliminator inlet (mm H ₂ O (G))	58	74
vi.	Gas Flow Distribution	+ or - 20%	
5.	Gas Composition at ME Inlet		
i.	SO ₂ (Vol%-wet)	0.0033	0.0032
ii.	H ₂ O (Vol%-wet)	17.07	20.63
iii.	O ₂ (Vol%-wet)	5.94	5.67
iv.	CO ₂ (Vol%-wet)	9.93	9.51
v.	N ₂ (Vol%-wet)	67.06	64.18
vi.	HCl (ppm-wet)	<6	<6
6.	HF (ppm-wet)	<1	<1
i.	Dust (mg/Nm ³ -dry)	<50	<200
7.	Entrained Mist Condition:		
i.	Mist Concentration at Inlet –at Guarantee & Design Point	200 g/Nm ³ -dry	
ii.	Mist Concentration at Outlet –at Guarantee & Design Point	≤20 mg/Nm ³ -dry @ 6% O ₂ dry	
8.	Mist Composition		



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Sl. No.	Description	Requirement
i.	Solid	30 wt. %
ii.	Cl ⁻	18300 ppm
iii.	Mg ²⁺	7800 ppm
iv.	Ca ²⁺	1000 ppm
v.	Na ⁺	2000 ppm
vi.	SO ₄ ²⁻	10300 ppm

5.1 WASHING ARRANGEMENT

I.	Washing water condition	
a.	Flow rate - Average	25.8 m ³ /hr *1)
b.	Flow rate – Instantaneous Allowable Max	152 m ³ /hr *1)
c.	Feed Pressure (at inlet of Washing Nozzle)	0.2 MPa (Max)

II.	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	Refer Clause 5.2					
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)	*	*	*	*	*	**
	*Washing method shall be confirmed by the vendor. ** Only for Maintenance *1) shall be finalized by vendor						



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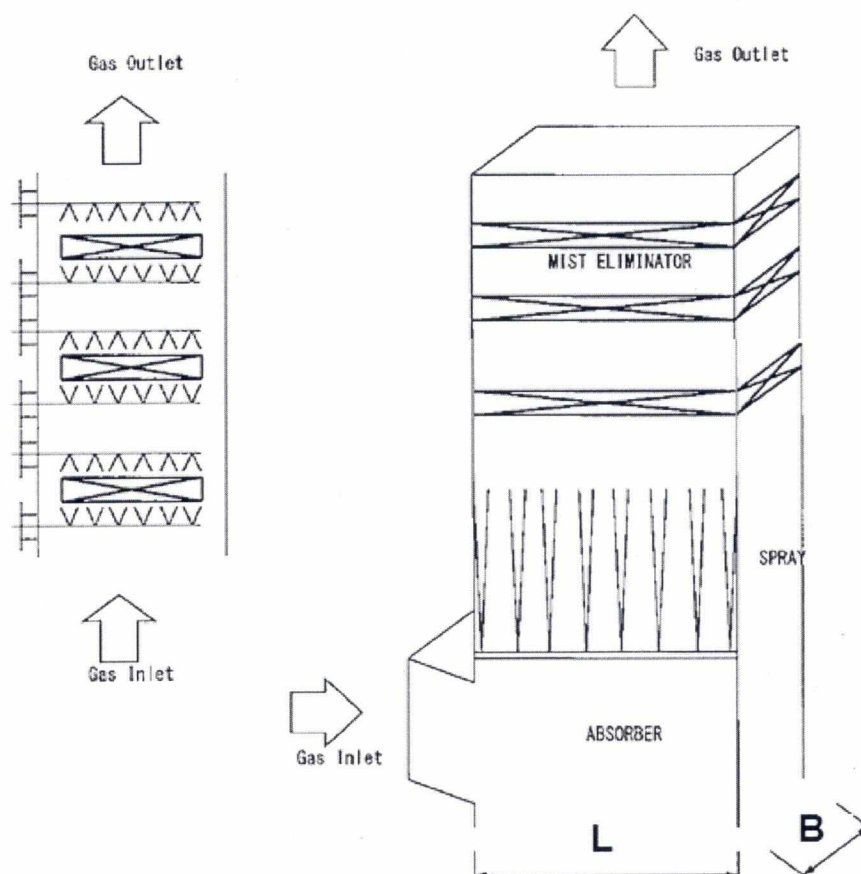
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5.2 WATER ANALYSIS

Process water (CW blow down water) is envisaged for Mist Eliminator washing. Process water analysis is provided below.

S.No	Constituents	Unit	Water quality
1.	Total Dissolved Solids	ppm	~2110
2.	Calcium as CaCO ₃	ppm	721
3.	Magnesium as CaCO ₃	ppm	286
4.	Sodium as CaCO ₃	ppm	358
5.	Potassium as CaCO ₃	ppm	
6.	Iron as Fe	ppm	1.7
7.	Fluoride as F	ppm	0.11
8.	Bicarbonate as CaCO ₃	ppm	688
9.	Chlorides as CaCO ₃	ppm	168
10.	Sulphate as CaCO ₃	ppm	512
11.	Nitrate as NO ₃	ppm	0.55
12.	Silica	ppm	121
13.	pH		7.0 – 8.2
14.	Turbidity	NTU	55

5.3 MIST ELIMINATOR ARRANGEMENT AND MIST PARTICLE SIZE DISTRIBUTION:



L-Length-9900 mm, B-Breadth-20400 mm

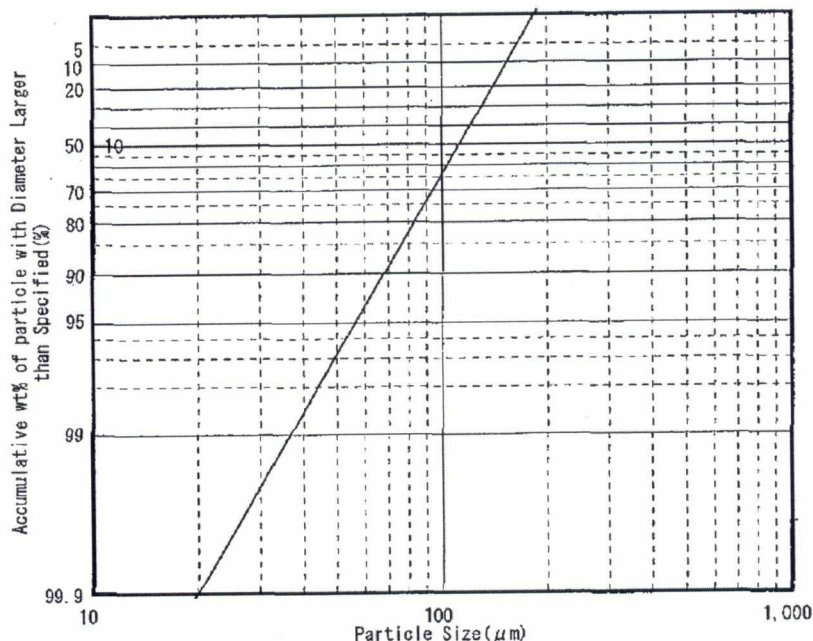
Bidder to decide the spray washing arrangement



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Fig.2 Mist Particle Size Distribution(EXPECTED VALUE)



6.0 SCOPE OF SUPPLY

Scope for the bidders shall include Design, Supply, and Supervision of Erection & Commissioning.

Design: Includes basic engineering, detail engineering, preparation and submission of engineering drawings/calculations/datasheets/quality assurance documents/field quality plans, storage instructions commissioning procedures, operation & maintenance manuals, performance guarantee test procedures and assisting BHEL in obtaining time bound approval from NTPC.

Supply: Includes manufacturing/fabrication, shop floor testing, stage inspections, final inspections, painting & packing.

Supervision of Erection, Testing & commissioning: Includes supervision of erection, Measurement of Outlet Mist concentration at site, training of customer's O&M Personnel and handing over to customer.

Supplier's scope shall cover complete Mist Eliminator unit including sub-systems, start-up spares and special tools (typically) as given below. The scope of supply for Mist Eliminators shall include but not limited to the following:

Sl. No	Scope
1.	Mist Eliminator complete with
	i. Mist Eliminator Panels
	ii. Flushing system complete with all piping, washing nozzle, instrumentation and controls.



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Sl. No	Scope
	iii. Painting and Rust Prevention during shipment and construction
	iv. Supervision of Erection & commissioning at site
	v. Residual droplet content measurement at site using impact method.
	vi. Export packing and Inland Transportation
	vii. Special tools & tackles as applicable
	viii. Erection and start-up spares as applicable
	ix. Installation, operation and maintenance manuals
	x. Any other items required for completeness of the equipment except the items covered in the exclusions.
	xi. Bidder to quote for the Recommended Spare Parts (for 24 months operation) with break up price.

6.1	CONSTRUCTION FEATURES
a.	To separate the entrained droplets, mist eliminators shall be installed above the absorber spraying zone. Mist Eliminators shall be designed, installed, tested and operated so that high availability and high droplet removal efficiency is guaranteed.
b.	The residual droplet content shall be measured according to an impact method.
c.	Three stage chevron type Mist Eliminators (ME) made of Polysulfone or Stainless Steel shall be provided at the exit of Absorber.
d.	Provision shall be made for continuous washing of both ends of the first & second stage and the front section of the third stage of Mist Eliminators. Wash water arrangement shall also be provided at the back end of the second stage of Mist Eliminators.
e.	If the Mist Eliminator washing system is designed for cyclic washing of different sections, all the valves required for cyclic shall be motorized or pneumatically operated. The automatic valve for the spray system shall be easily accessible on a platform close to the Mist Eliminator. Entrained Slurry shall be collected by Mist Eliminators downstream of the slurry spray system to avoid carryover of slurry to the Stack.
f.	The ME system shall be equipped with washing and drain provisions, where drains are directed into the absorber. Washing provisions shall include external and internal piping systems with replaceable nozzles, complete with all piping, instrumentation and controls.
g.	The mist eliminator wash piping/header shall be constructed of rubber lined carbon steel or glass fiber reinforced plastics. Polypropylene or PVC is also acceptable for mist eliminator wash headers provided Contractor or its Collaborator has proven experience for the same.



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h.	Ease of replace-ability and placement of the mist eliminator on maintenance platforms is an important requirement. The ME shall be designed to allow for efficient cleaning in process. Test ports shall be provided downstream of the mist eliminator to enable performance testing.
i.	The mist eliminator system shall be capable of withstanding high velocity spray water jets typically employed during manual cleanings. The ME shall be constructed in individual cells. The design shall safely avoid ME vibration and/or humming. The individual cells shall be sized so that no more than two maintenance personnel are needed to handle them manually when they are fully scaled or plugged, and the cells shall be capable of passing through the access doors for the mist elimination section.
j.	Easy access for placement and replacement of the mist eliminator shall be incorporated in the design of the mist eliminator arrangement and the absorber vessel.
k.	Walkways shall be arranged and also measures shall be taken as appropriate to permit the internal components to be disassembled and reassembled during repairs without the necessity for time-consuming preparatory work. The headroom shall have a height of more than 2200 mm.
l.	The mist eliminator support beams shall be designed to act as maintenance walkways approximately 300 mm wide and shall allow for a minimum 500 Kg/m ² load. The support beam/walkways shall provide personnel access to all mist eliminator modules, wash headers and wash nozzles.
m.	Adequate number of viewing ports with flushing devices connected to automatically operating washing system shall be delivered at following locations: (i) Upstream of 1st stage (ii) Between 1st and 2nd stage (iii) Downstream of 2nd stage. (iv) Downstream of 3rd stage The regular flushing shall be done in a defined time sequence.
n.	Internal supports for mist eliminator sections, etc. shall be designed to withstand the flooded weight of the supported section.
o.	The Mist eliminators and its supporting structure shall be designed to carry sufficient load during maintenance.
p.	The formation of agglomeration, deposition & caking shall be avoided. For mist eliminators the bidder shall submit a cleaning procedure including the required safety measures as part of the inspection concept.
q.	The ME System shall consist of at least three stages and shall be designed to allow efficient cleaning in process. A spray system shall be installed to remove any deposits from the ME.
r.	The demister packages shall be capable of withstanding high velocity spray water jets typically employed during manual cleanings.
s.	The ME shall be designed to allow for efficient cleaning in process. All edges shall be smoothly prepared.



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t.	The regular flushing shall be done in a defined time sequence.
6.2	DESIGN FEATURES
a.	The following items shall be Bidder's scope of design • Performance Calculation • Basic Design • Detail Fabrication Drawings • Support Beam Drawing and Loading data for Absorber Design • Strength Calculation • Documents for Fabrication, Inspection, Installation, Shipment and Erection & Maintenance works at site.
b.	Detailed washing procedure for the mist eliminator shall be submitted such as • Minimum washing water pressure (MPa) • Minimum Flow rate (m³/hr) • Washing time schedule and sequence • Nozzle type • No of spray nozzles • Size of header pipes • Valve list
c.	Alloy 59/C276 or Carbon steel with rubber lining shall be used for hardware.
d.	Mist Eliminator Panel's support shall be designed in consideration of dirty condition of the Mist Eliminator. Design Load of the Mist Eliminator shall be as follows, Mist Eliminator's weight including eliminated liquid weight plus max. allowable pressure drop of the mist eliminator.
e.	The minimum thickness of the Mist Eliminator shall be as per proven practice and bidder to specify the same in the offer.
f.	The spacers to link each panel for restricting the gap between the panels shall be supplied.
g.	Size and location of Manholes which are required for installation and replacement of each segment of the Mist Eliminator shall be provided by the bidder.
h.	Fasteners, spacers and supports shall be provided by bidder to securely hold Mist Eliminator and prevent shifting during operation.
i.	Washing Pipe outside Absorber shall be UV Resistant.



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7.0 GENERAL REQUIREMENTS:

S.No	Description
1.	Metric unit shall be used in the drawings and in the any displays on the equipments. Special attention should be taken that the unit of pressure shall be in dual scales of kPa and kg/cm ² G. For instance the pressure gauges should have dual units indication.
2.	Descriptions in the drawings, in the documents, and in the displays shall be in English
3.	The equipment shall be designed to withstand the corrosive and moist environment in which these are proposed to operate.
4.	Noise level produced by any equipment individually or collectively shall not exceed 85 dB measured at a distance of 1.0 meters horizontally from the source in any direction and 1.5m above operating floor.
5.	Suitable drain connections shall be provided.
6.	The equipment shall be suitable for stable continuous operation.
7.	Limit of connection: The buyer (BHEL) has an intention to minimize interface for utilities as much as possible. The bidder shall consider this requirement in the planning stage of layout for the equipment. The bidder shall provide the header piping for utilities and branch piping to each nozzle. Terminal points for all utilities shall be located at Absorber wall edge at Mist Eliminator elevation. The bidder shall specify all terminal points with tie-in number in the P&ID and submit it in the proposal to confirm the scope of supply.
8.	Service life: Entire equipment except wearing parts shall be designed and fabricated for a minimum service life of 30 years of operation or 200,000 full load operating hours whichever is longer.
9.	Corrosion allowance: Corrosion allowance for entire equipment shall be in accordance with latest applicable international standard.
10.	Unless otherwise specified , flanges shall be in accordance with ANSI B16.5 Class 150
11.	Name plate: Nameplate shall be provided indicating the item number and service name. Name plates shall be of 304 Stainless steel plate and placed at a readily visible location. Nameplate of main equipment shall have enough information, which will be confirmed during engineering phase.
12.	Unless otherwise specified, all equipment items where the weight exceeds 15 kg shall be provided with suitable lifting lugs, ears or ring bolts or tapped holes for lifting rings. Minimum shock factor for lifting lugs shall be minimum 2.0. The position of lifting lugs and reference dimension shall be shown on GA and/or outline drawings. NDT shall be conducted for lifting lugs. When any spreader bars are required for lifting and laydown, the bidder shall provide spreader bar with equipment.
13.	Equipment shall be fabricated as much as practical to minimize erection at the site.



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S.No	Description
14.	Two pieces of stainless steel earth lugs shall be provided with equipment diagonally. The position of earth lugs shall be shown on each GA and/or outline drawing.
15.	Washing headers support and its clamping arrangement along with fasteners shall be provided by the bidder.
16.	If the Mist eliminator is in the resonance condition or any vibration problems occur, the bidder shall solve the problems in a timely manner.
17.	Bidder shall provide the mating flanges with the necessary gaskets.
18.	All the surfaces of the carbon steel (if any) should be rust prevented before shipment for the period of at least 12 months for storage and construction.
19.	The list of all Bought out items with makes and country of origin to be mentioned along with offer to be submitted.
20.	Quality Plan to be submitted along with the offer.
21.	During entire period of the project, the bidders shall strictly follow and adhere to the guidelines for effective Health & Safety Management. Supply of safety gears/PPE for bidder's/bidder's sub vendor personnel deputed at site for Supervision of E&C, PG tests etc. shall be in bidder's scope. Also refer to Annexure-IX- Health & Safety Management Manual for complying with requirements whichever is applicable.
22.	Cost towards the participation in discussions/meetings, providing technical assistance during technical discussions/meetings with customer for approval of drawing/documents etc. TA/DA, boarding and lodging to attend these meetings shall be borne by the bidder and shall be inclusive in supply portion.
23.	Material of construction for all equipment/components shall be subject to BHEL/NTPC/NTPC's consultant approval during detail engineering. Accordingly bidder shall consider MOC for all equipment/component as per best engineering practice, global standard and global references.
24.	Bidder to provide sub vendor list and Bidder shall strictly adhere to BHEL/NTPC approved vendor list.
25.	The modalities of inspection (Stage, Final, In-process) shall be finalized during detail engineering after submission of quality assurance plan (QAP). It shall be reviewed by the NTPC/NTPC's consultant and BHEL. Bidder shall follow the procedures of inspection as per the approved QAP. Bidder has to submit the following documents along with inspection call and if any other documents required as per approved QAP. - Raw material inspection certificate - Internal test reports - Statutory certificates as required.



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S.No	Description
	- All inspection & testing shall be carried out based on the following documents: a. Relevant Standards b. Specifications c. Approved drawings d. Data Sheets e. Calibration certificate for all the measuring instruments f. Bidder should also coordinate in getting the MDCC's (Material Dispatch clearance certificate) and all types of IC's (Inspection Certificates) from the customer/customer's consultant along with BHEL.
26.	Any shim plates for erection of equipment / item at site shall be in the scope of bidder.
27.	During detail engineering, bidder to strictly adhere to BHEL/NTPC/NTPC's consultant drawing formats, document numbering, quality plan & FQP formats
28.	The identification and numbering of equipment, systems, items, etc. of supply, as well as of all documents and drawings shall be in accordance with the VGB guideline RDS-PP (Reference Designation System for Power Plants - KKS system).
29.	Complete detail engineering drawings, calculations, selection of components etc. shall be reviewed & subject to approval of BHEL/NTPC/NTPC's consultant during detail engineering
30.	Bidder shall furnish necessary inputs & drawings of all equipment in editable Auto CAD/ MS-Word /Excel format.
31.	During detail engineering, successful bidder shall ensure flow of drawings/documents as per schedule. Any comments from BHEL/NTPC/NTPC's consultant should be addressed timely by the bidder.
32.	Bidder to note that list above is not exhaustive and any work /items required for completing the smooth operation and ensuring satisfactory running of the machines till final hand over to the end user shall also be in the scope of the bidder.
33.	Bidder shall submit the signed and stamped copy of all the pages which constitutes this technical enquiry specification signed by authorized signatory and clearly mentioning each clause under following two categories to avoid any ambiguity in scope understanding & the scope division along with technical offer. a. "Accepted without deviation and considered in scope of work" b. "Not considered in scope of work"
8.0	PACKING AND FORWARDING
1.	Proper packing to be ensured.



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S.No	Description
	Indigenous Supply: Blower & sub system assembly shall be wrapped in polythene bags & packed in a strong rigid wooden crate. Rain water should not enter into the Blower internals during storage in the outer yard of power plant. Imported Supply: All imported supply should be packed as per Sea worthy packing standards Annexure - VIII. All imported items should have Sea worthy packing. Liberal packing materials and struts shall be provided to arrest rolling and to protect from transit damages.
2.	Cardboard containers shall be enclosed in a solid wooden container
3.	Equipment and process materials shall be packed and semi-knocked down, to the extent possible, to facilitate handling and storage and to protect bearings and other machine surfaces from oxidation. Each container, box, crate or bundle shall be reinforced with steel strapping in such a manner that breaking of one strap will not cause complete failure of packaging. The packing shall be of best standard to withstand rough handling and to provide suitable protection from tropical weather while in transit and while awaiting erection at the site.
4.	Equipment and materials in wooden cases or crates shall be properly cushioned to withstand the abuse of handling, transportation and storage. Packing shall include preservatives suitable to tropical conditions. All machine surfaces and bearings shall be coated with oxidation preventive compounds. All parts subject to damage when in contact with water shall be coated with suitable grease and wrapped in heavy asphalt or tar impregnated paper.
5.	Crates and packing material used for shipping will become the property of owner.(NTPC)
6.	Packing (tare) shall be part of the equipment cost and shall not be subject to return. The packing should ensure integrity and cohesiveness of each delivery batch of equipment during transportation. In case of equipment assemblies and unit's delivery in the packing of glass, plastics or paper the specification of packing with the material and weight characteristics are to be indicated.
7.	Each package should have the following inscriptions and signs stenciled with an indelible ink legibly and clearly: - Destination - Package Number - Gross and Net Weight - Dimensions - Lifting places



TECHNICAL SPECIFICATION OF MIST ELIMINATOR - DADRI (2X490MW)

DADRI:FGD:ME:R00

S.No	Description
	f. Handling marks and the following delivery marking
8.	Each package or shipping units shall be clearly marked or stenciled on at least two sides as follows. BHEL SITE OFFICE, 2 X 490 MW, FGD PACKAGE (STAGE 2) NCTPS – NTPC DADRI GAUTAM BUDH NAGAR, UP – 201008 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.
9.	Each part of the equipment which is to be shipped as a separate piece or smaller parts packed within the same case shall be legibly marked to show the unit of which it is part, and match marked to show its relative position in the unit, to facilitate assembly in the field. Unit marks and match marks shall be made with steel stamps and with paint.
10.	Each case shall contain a packing list showing the detailed contents of the package. When any technical documents are supplied together with the shipment of materials no single package shall contain more than one set of such documents. Shipping papers shall clearly indicate in which packages the technical documents are contained.
11.	The case number shall be written in the form of a fraction, the numerator of which is the serial number of the case and the denominator the total number of case in which a complete unit of equipment is packed.
12.	Wherever necessary besides usual inscriptions the cases shall bear special indication such as "Top", "Do not turn over", "Care", "Keep Dry" etc. as well as indication of the center of gravity (with red vertical lines) and places for attaching slings (with chain marks)
13.	Marking for Safe handling: To ensure safe handling, packing case shall be marked to show the following: a. Upright position b. Sling position and center of Gravity position c. Storage category d. Fragile components (to be marked properly with a clear warning for safe handling
14.	Each crate or package is to contain a packing list in a waterproof envelope. All items are to be clearly marked for easy identification against the packing List. All cases, packages etc. are to be clearly marked on the outside to indicate the total weight where the weight is bearing and the correct position of the slings are to bear an identification mark relating them to the appropriate shipping