

PERFORMANCE GUARANTEES AND SCHEDULE OF GUARANTEES

SCHEDULE OF GUARANTEES:

All performance tests shall be carried out in accordance with the relevant latest international codes/standards.

CATEGORY – I GUARANTEES:

Sl. No	Description	Data
1.	Guaranteed auxiliary power consumption (equipment's to be considered for power consumption is as per 18.1 of this technical specification) at rated capacity in KW. Bidder shall furnish Break-up among list of equipment's considers which is subjected to approval.	Bidder to Provide (Vendor To fill table furnished in Pg 2 of this annexure).

CATEGORY – II GUARANTEES:

Sl. No	Description	Data
1.	Rated capacity of Wet Ball Mill (WBM) TPH at rated Limestone output fineness. <i>Contractor shall demonstrate the above capacity with the originally installed grinding elements in nearly worn-out condition as mutually agreed for the purpose of ascertaining wear life of any of the wear parts</i>	30.2 TPH @ ≥90% through 325mesh with 30 wt. % slurry.
2.	Life of WBM wear parts <i>Contractor shall demonstrate the life of wet ball Mill wear parts in line with requirements stipulated in chapter -9(Design and construction of mill and accessories) of the Technical Specification. The establishment of the above guarantee shall be based on the operating records available at the Power station and will be computed for each pulverizer based on actual total hours of operation.</i>	≥ 8,000 hours
3.	Guaranteed ball consumption <i>Contractor shall guarantee ball consumption per ton of limestone throughput in line with requirements stipulated in chapter - 9(Design and construction of mill and accessories) the Technical Specification. Contractor shall furnish the minimum ball diameter below which the balls shall be replaced.</i>	Bidder to Provide (≤700 grams/Ton of ground limestone)
4.	Noise level at a distance of 1.0 meter from the equipment at site and 1.5 m above operating floor. Noise measurement shall be carried out as using applicable and international standards.	≤ 90 dB A(for ball mill) ≤85 dB A(for other equipment's)

OTHER GUARANTEES:

Sl. No.	Description	Data
1.	Maximum vibration (peak to peak amplitude at site) microns	Bidder to Provide
2.	Scheduled Maintenance (Minor Overhauls): Recommended intervals between maintenance outages	≥ 25,000 hours
3.	Scheduled Maintenance (Major Overhauls): Recommended intervals between maintenance outages	≥ 75,000 hours
4.	Equipment Availability (%) Continuous for 180 days	Bidder to Provide

Power consumption details
(VENDOR TO FILL)

HT MOTORS

Description	Guaranteed Shaft Power	Motor power considering motor efficiency as 95%.	Motor Rating & RPM
Mill Motor*			

*T- S curve to be attached along with offer.

LT MOTORS

Description	Guaranteed Motor power	Motor Rating & RPM

Total power consumptions to be guaranteed by vendor = Shaft power of HT motors + Sum of all motor powers for LT motors.

CLAUSE NO.	FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES			
4.00.00 4.01.00	NOTES APPLICABLE FOR EACH PROJECT: i) Each of the liquidated damages specified above shall be independent and these liquidated damages shall be levied concurrently as applicable. ii) All these liquidated damages for short fall in performance shall be deducted from the contract price as detailed in accompanying General Conditions of Contract (GCC)/ Special Conditions of Contract (SCC) iii) Contractor's aggregate liability to pay Liquidated Damages (LD) for failure to attain the functional guarantee shall not exceed twenty five percent (25%) of the Contract Price. iv) The LD values are applicable on per unit basis for unit capacity of 500 MW. For 200 MW / 210 MW units common absorber has been specified for two / three units based on scope of supply and LD values are applicable for combination of units as indicated in the clause 3.00.00	4.00.00 GUARANTEES PARAMETERS 4.01.00 Guarantees Under Category-I The Performance Guarantees which attract Liquidated Damages (LD) are as follows: The following shall be guaranteed by the Bidder under guarantee point condition of Sub- Section-V, Part-A of section- VI: (i) SO₂ removal Efficiency The Contractor shall guarantee that SO₂ removal efficiency shall not be less than the value specified under guarantee point conditions (as specified in Clause 1.00.00/2.00.00/3.00.00 Sub-section-V, Part-A of Section-VI applicable for respective project). (To be conducted as per the stipulation of Cl. no. 6.00.00 of this sub-section.) (ii) Limestone Consumption The Contractor shall guarantee that limestone consumption of FGD system in kg/hr shall not be more than the value specified under guarantee point conditions (as specified in Clause 1.00.00/2.00.00/3.00.00 Sub-section-V, Part-A of Section-VI applicable for respective project). (iii) Auxiliary Power Consumption The Contractor shall guarantee that total auxiliary power consumption for the unit in normal operation shall not be more than the value specified under guarantee point conditions (as specified in Clause 1.00.00/2.00.00/3.00.00		
LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.: CS-0011-109(4)-9	SUB-SECTION-VI FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	PAGE 16 OF 25	

CLAUSE NO.	FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES			
4.02.00	Sub-section-V, Part-A of Section-VI applicable for complete scope of work for the respective project), inline with the requirements stipulated in clause 5.00.00 of this Sub-Section.			
	Guarantees Under Category-II			
	The parameters/capabilities shall be demonstrated for various systems/equipments shall include but not limited to the following:-			
	(i) Wet ball Mill capacity at rated fineness			
	The contractor shall demonstrate the guaranteed capacity of each limestone pulverizer under the following conditions:			
	i)	Limestone Output fineness :	90% or higher (as per the requirement of the absorber) through 325 mesh (for spray tower process) (OR) 90% or higher (as per the requirement of the absorber) through 200 mesh (for bubbling process)	
	ii)	Limestone Quality :	All available quality from the specified range.	
	(ii) Wet ball Mill wear parts guarantee			
	Contractor shall demonstrate the life of wet ball Mill wear parts in line with requirements stipulated in Part B of the Technical Specification. The establishment of the above guarantee shall be based on the operating records available at the Power station and will be computed for each pulverizer based on actual total hours of operation.			
	(iii) Wet ball Mill ball consumption			
	Contractor shall guarantee ball consumption per ton of limestone throughput in line with requirements stipulated in Part B of the Technical Specification. Contractor shall furnish the minimum ball diameter below which the balls shall be replaced.			
	(iv) Vacuum Belt Filter Capacity			
	Contractor shall demonstrate the Designed Capacity of the Vacuum Belt Filters to dewater the quantity of gypsum with the specified purity and moisture content as specified in Part B of the Technical Specification.			
LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.: CS-0011-109(4)-9		SUB-SECTION-VI FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES
PAGE 17 OF 25				

CLAUSE NO.	FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES	एनटीपीसी NTPC																																				
	(v) Gypsum Purity The contractor shall demonstrate that the purity of the gypsum produced shall not be less than 90%, chloride content shall not be more than 100ppm and the moisture content shall not be more than 10% for guarantee point condition. (vi) The contractor guarantees that the maximum purge rate to waste water treatment system shall not be more than 10 m3/hr for 500 MW unit and for combine 200 and 210 MW units shall not be more than as specified in the Table -1, averaged over a 24 hour period. Table-1 <table><tr><th>S.No</th><th>Project</th><th>Capacity (MW)</th><th>Concept</th><th>Waste water (m3/hr)</th></tr><tr><td rowspan="2">1.</td><td rowspan="2">FGUTPP St-I, II & III (2 X 210 + 2 X 210 + 1 X 210)</td><td rowspan="2">1050</td><td>Stage-I two units flue gas combined</td><td>8</td></tr><tr><td>Stage-II & III three units flue gas combined</td><td>12</td></tr><tr><td>2.</td><td>Farakka St-I (3 X 200)</td><td>600</td><td>Stage-I three units Flue gas combined</td><td>12</td></tr><tr><td>3.</td><td>Kahalgaon St-I (2 X 210)</td><td>420</td><td>Stage-I two units Flue gas combined</td><td>8</td></tr><tr><td>4.</td><td>Kahalgaon St-I (2 X 210)</td><td>420</td><td>Stage-I two units Flue gas combined</td><td>8</td></tr><tr><td rowspan="2">5.</td><td rowspan="2">Singrauli St-I (5 X 200)</td><td rowspan="2">1000</td><td>Stage-I two units Flue gas combined</td><td>8</td></tr><tr><td>Stage-I three units flue gas combined</td><td>12</td></tr></table> (vii) Performance characteristics of fans (capacity, head developed, etc.). (viii) Margins on fans in case Booster Fan is provided by the Contractor. Booster Fans - As specified in Part B of Technical Specifications (ix) Passenger cum Goods Elevator for FGD absorber & Limestone Grinding Building: Over load tests, travel and hoist speed checks. (x) Noise All the plant, equipment and systems covered under this specification shall perform continuously without exceeding the noise level over the entire range	S.No	Project	Capacity (MW)	Concept	Waste water (m3/hr)	1.	FGUTPP St-I, II & III (2 X 210 + 2 X 210 + 1 X 210)	1050	Stage-I two units flue gas combined	8	Stage-II & III three units flue gas combined	12	2.	Farakka St-I (3 X 200)	600	Stage-I three units Flue gas combined	12	3.	Kahalgaon St-I (2 X 210)	420	Stage-I two units Flue gas combined	8	4.	Kahalgaon St-I (2 X 210)	420	Stage-I two units Flue gas combined	8	5.	Singrauli St-I (5 X 200)	1000	Stage-I two units Flue gas combined	8	Stage-I three units flue gas combined	12			
S.No	Project	Capacity (MW)	Concept	Waste water (m3/hr)																																		
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LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.: CS-0011-109(4)-9	SUB-SECTION-VI FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	PAGE 18 OF 25																																		

CLAUSE NO.	FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES			
	of output and operating frequency specified in Part-C of Section-VI of the technical specifications. Noise level measurement shall be carried out using applicable and internationally acceptable standards. The measurement shall be carried out with a calibrated integrating sound level meter meeting the requirement of IEC 651 or BS 5969 or is 9779. Sound pressure shall be measured all around the equipment at a distance of 1.0 m horizontally from the nearest surface of any equipment/ machine and at a height of 1.5 m above the floor level in elevation. A minimum of 6 points around each equipment shall be covered for measurement. additional measurement points shall be considered based on the applicable standards and the size of the equipment. the measurement shall be done with slow response on the a - weighting scale. the average of a-weighted sound pressure level measurements expressed in decibels to a reference of 0.0002 micro bar shall not exceed the guaranteed value. corrections for background noise shall be considered in line with the applicable standards. all the necessary data for determining these corrections, in line with the applicable standards, shall be collected during the tests. (xi) Mist Outlet Droplet Content The mist eliminator outlet droplet content shall be guaranteed to be ≤ 20 mg/Nm³ at absorber outlet measured over a period of 24 hrs continuous operation. 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. (xii) Availability of FGD Plant The Contractor shall guarantee the maximum availability of FGD Plant for the range of coal and limestone specified inline with the requirements stipulated in clause 7.00.00 of this Sub-Section (xiii) Air Conditioning System A. Following shall be demonstrated at Shop 1) Capacity and static pressure of AHU fans at its rated duty point. B. Following shall be demonstrated at Site 1) Capacity (TR) of air cooled condensing units (D-X type) for A/C system of FGD control room building.			
LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.: CS-0011-109(4)-9	SUB-SECTION-VI FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	PAGE 19 OF 25	

CLAUSE NO.	FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES			
	2) Guaranteed room conditions during summer for all the Air conditioned areas. 3) Vibration and noise level of condensing units & centrifugal fans of AHUs. (xiv) Ventilation System A. Following shall be demonstrated at Shop 1) Capacity and discharge pressure of pumps of UAF units at its rated duty point of Ventilation system. 2) Capacity and static pressure of UAF fans at its rated duty point of Ventilation system. B. Following shall be demonstrated at Site 1) Vibration & Noise level of centrifugal fans & pumps of UAF units. (xv) Compressed Air System a) Following shall be demonstrated at shop: i) Capacity and discharge pressure of each air compressor. b) Following shall be demonstrated at site: ii) Dew point of air at the outlet of air drying plants of air compressor. iv) Pressure drop across air drying plant . v) Vibration and noise level of air compressors, blowers of air drying plant (if applicable) (xvi) Equipment Cooling Water System i) For pumps under ECW system -Vibration, noise and parallel operation without hunting & abnormal noise with flow sharing within 10% of each other at the rated duty point shall be demonstrated at site. ii) Heat transfer coefficient determining the performance under design heat load of plate type heat exchangers and Inlet & Outlet temperatures of the Plate type heat exchangers on the primary and secondary side to be demonstrated at site. Pressure drop across the Plate type heat exchanger on the primary & secondary water circuit to be demonstrated at site. (xvii) Limestone Handling System and Gypsum Handling System a) Limestone Handling Plant (i) The Bidder shall demonstrate the unloading at truck tippler, crushing and conveying to storage shed/silo and then reclaim from storage shed/silos and conveying to mill bunker at the guaranteed capacity including all intermediate equipment & conveyors.			
LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.: CS-0011-109(4)-9	SUB-SECTION-VI FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	PAGE 20 OF 25	

CLAUSE NO.	FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES			
5.00.00	(ii) Bidder shall also demonstrate the guaranteed tripping rate of truck tipplers. b) Gypsum Handling Plant The Bidder shall demonstrate the guaranteed conveying from belt filter to storage shed/silo including all intermediate equipment & conveyors. AUXILIARY POWER CONSUMPTION (PA) FOR EACH PROJECT The unit auxiliary power consumption shall be calculated using the following relationship. $P_{an} = P_{un} + T_{Lu}$ P_{an} = Guaranteed Auxiliary Power Consumption for unit # n (Where "n" is the unit number e.g. 1, 2,) P_{un} = Power consumed by the auxiliaries of the unit under test T_{Lu} = Proportional Losses of transformers for one Unit/Block T_L = Losses of all the transformers supplied by bidder based on works test Reports T_{Lu} shall be calculated as below: $T_{Lu} = (T_L / \text{Total MW capacity under the present contract}) \times (\text{capacity in MW for FGD (unit/block) under test})$ While guaranteeing the auxiliary power consumption of each project the bidder shall necessarily include all continuously operating auxiliaries under this package. The auxiliaries to be considered shall include but not be limited to the following: - Absorber Recirculation Pump(s)/Gas Cooling Pumps - Absorber Oxidation Air Blower(s) - Absorber Oxidation Tank Agitators - Gypsum Bleed Pumps - Limestone Gravimetric feeder, Wet ball mill and their integral Auxiliaries divided by the number of units in the project - Limestone Slurry Pump(s) - Vacuum Belt Filter, Vacuum Pump and its integral auxiliaries divided by the number of units in the project - Power consumption of all working Booster water pumps (if provided) to ACW pumps after PHE divided by the number of units in the project			
LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.: CS-0011-109(4)-9	SUB-SECTION-VI FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	PAGE 21 OF 25	

CLAUSE NO.	FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES			
	ix. Power consumption of Clarified water pumps (if provided) and Clarified booster water pumps (if provided) divided by the number of units in the project x. Power consumption of Process water pump(s) divided by the number of units in the project xi. Mist Eliminator Wash Water pump(s) xii. Power consumption of Belt Filter Wash Water Pump divided by the number of units in the project xiii. Power consumption of total number of DM Cooling (working) Water pump to supply cooling water on the primary (DM) side of the plate type heat exchangers in the closed loop Equipment cooling water system divided by the number of units (working) in the project xiv. Power consumption of total number of Auxiliary Cooling (working) water pump/Permeate water pump to supply cooling water on the secondary side of the plate type heat exchangers in the closed loop Equipment cooling (unit auxiliary) water system divided by the number of units (working) in the project xv. Booster Fans xvi. Power consumption of Limestone Slurry Tank Agitator(s) divided by the number of units in the project xvii. Power consumption of Filtrate Pump(s) divided by the number of units in the project xviii. Power consumption of Cloth Wash Water Pump divided by the number of units in the project xix. Power consumption of Hydro-cyclone and Waste Water Pump divided by the number of units in the project xx. Power consumption of all other continuous running Agitators divided by the number of units in the project xxi. Air Conditioning System (*) Total Power consumption at motor input terminals of working units (i.e. excluding stand-by) at its rated duty point of compressor and condenser fans of air cooled condensing unit, Air handling unit (AHU) fans for the Air conditioning system of FGD Control Room Building divided by total nos. of units in respective project xxii Total power consumption at motor input terminal at rated duty of fan of UAF divided by total nos. of units in respective project. (*)			
LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.: CS-0011-109(4)-9	SUB-SECTION-VI FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	PAGE 22 OF 25	

CLAUSE NO.	FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES			
	((*) Above guaranteed power consumption values shall be at 20 deg C for centrifugal fans of AHUs and at 30 deg C for centrifugal fans of UAF units and at an elevation of RL (referring to GLP of respective projects) for both AHUs and UAF centrifugal fans.) xxiii) Total power consumption at motor input terminal at rated duty of Air compressor, Air drying plant (Heater and blower, as applicable) divided by total nos. of units in respective project. xxiv) Power consumption of clarified Water Pumps at rated capacity and head divided by the no of units of the project for Singrauli STPP-I & II (5X200MW) & (2X500MW). xxv) Power consumption of clarified Water Pumps at rated capacity and head divided by the no of units of the project for Farakka STPP-I (3X200MW). xxvi) Power consumption of clarified Water Pumps at rated capacity and head divided by the no of units of the project for Farakka STPP-II (2X500MW). xxvi) Power consumption of clarified Water Pumps at rated capacity and head divided by the no of units of the project for Rihand STPP-I (2X500MW). xxvii) Air Conditioning System (*) Total Power consumption at motor input terminals of working units (i.e. excluding stand-by) at its rated duty point of compressor and condenser fans of air cooled condensing unit, Air handling unit (AHU) fans for the Air conditioning system of FGD Control Room Building divided by total nos. of units in respective project.. xxviii) Total power consumption at motor input terminal at rated duty of fan of UAF divided by total nos. of units in respective project. (*) ((*) Above guaranteed power consumption values shall be at 20 deg C for centrifugal fans of AHUs and at 30 deg C for centrifugal fans of UAF units and at an elevation of RL (referring to GLP of respective projects) for both AHUs and UAF centrifugal fans.) xxix) Total power consumption at motor input terminal at rated duty of Air compressor, Air drying plant (Heater and blower, as applicable) divided by total nos. of units in respective project NOTE: 1. The equipment's listed above for calculating auxiliary power consumption are indicative. Any other equipment required for continuous operation of the system shall also be considered for calculation of auxiliary power consumption. Power consumption of all equipments provided on unitized basis shall be included in the unit auxiliary power consumption. For common station auxiliaries, the power consumption shall be assigned to			
LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.: CS-0011-109(4)-9	SUB-SECTION-VI FUNCTIONAL GUARANTEES & LIQUIDATED DAMAGES	PAGE 23 OF 25	