

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>	87.9 TPH @ ≥90% through 325mesh.
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.


SUB-SECTION-IV


FUNCTIONAL GUARANTEES


<p>CLAUSE NO.</p>	<p align="center">FUNCTIONAL GUARANTEES, LIQUIDATED DAMAGES</p>  <p align="center">FUNCTIONAL GUARANTEES, LIQUIDATED DAMAGES FOR SHORTFALL IN PERFORMANCE AND GUARANTEE TESTS</p> <p>The term "Performance Guarantees" wherever appears in this Sub-Section shall have the same meaning and shall be synonymous to "Functional Guarantees". Similarly the term "Performance Tests" wherever appears in this Sub-Section shall have the same meaning and shall be synonymous to "Guarantee Test(s)".</p> <p>The term "BMCR" (Boiler Maximum Continuous Rating) appearing in the Technical Specification shall mean the maximum continuous steam output of Steam Generator (as defined Cl. No. 1.02.00 Sub-section A-02, Part-B) at super heater outlet at rated parameters.</p> <p>The term "TMCR" (Turbine maximum continuous rating) appearing in the technical specification shall mean 800 MW electrical power output at generator terminals (power at generator terminals as per clause indicated in this sub-section) under rated steam parameters, 0% cycle make-up and 160 mmHg (abs) condenser pressure unless used in conjunction with a different cycle make-up and/or a different condenser pressure and /or a different throttle steam pressure.</p> <p>1.00.00 PERFORMANCE GUARANTEES</p> <p>1.00.01 General Requirements</p> <p>a) The Contractor shall guarantee that the equipment offered shall meet the ratings and performance requirements stipulated for various equipment covered in these specifications.</p> <p>b) The guaranteed performance parameters furnished by the bidder in his offer, shall be without any tolerance values whatsoever and all margins required for instrument inaccuracies and other uncertainties shall be deemed to have been included in the guaranteed figures.</p> <p>c) The Contractor shall conduct performance test and demonstrate all the guarantees covered herein, during performance guarantee/acceptance test. The various tests which are to be carried out during performance guarantee/acceptance test are listed in this Sub-section. The guarantee tests shall be conducted by the Contractor at site in presence of Employer on each unit individually.</p> <p>d) All costs associated with the tests including cost associated with the supply, calibration, installation and removal of the test instrumentation, shall be included in the bid price.</p> <p>e) It is the responsibility of the contractor to perform the Performance</p>		
<p align="center">EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-1 (3X800 MW)</p>	<p align="center">TECHNICAL SPECIFICATIONS SECTION – VI, PART-A BID Doc. No.- CS-9585-001-2</p>	<p align="center">SUB-SECTION-IV FUNCTIONAL GUARANTEES</p>	<p align="center">PAGE 1 OF 98</p>


CLAUSE NO.	FUNCTIONAL GUARANTEES, LIQUIDATED DAMAGES			
	<p>Guarantee/Acceptance test as specified in this subsection. The performance tests will be performed using only the normal number of Employer supplied operating staff. Contractor, vendor or other subcontractor personnel shall only be used for instructional purposes or data collection. At all times during the Performance Tests the emissions and effluents from the Plant shall not exceed the Guaranteed Emission and Effluent Limits.</p> <p>f) The Contractor shall make the plant ready for the performance guarantee tests.</p> <p>g) All instruments required for performance testing shall be of the type and accuracy required by the code and prior to the test, the contractor shall get these instruments calibrated in an independent test Institute approved by the Employer. All test instrumentation required for performance tests shall be supplied by the contractor and shall be retained by him upon satisfactory completion of all such tests at site. All calibration procedures and standards shall be subjected to the approval of the Employer. The protecting tubes, pressure connections and other test connections required for conducting guarantee test shall conform to the relevant codes.</p> <p>h) Tools and tackles, thermowells (both screwed and welded) instruments/devices including flow devices, matching flanges, impulse piping & valves etc. and any special equipment, required for the successful completion of the tests, shall be provided by the contractor free of cost.</p> <p>i) The Performance / Acceptance test shall be carried out as per the agreed procedure. The PG test procedure including demonstration tests shall be submitted within 90 days of the date of Notification of Award and finalization of the PG test procedure shall be done within 180 days from the date of Notification of Award. After the conductance of Performance test, the contractor shall submit the test evaluation report of Performance test results to Employer promptly but not later than one months from the date of conductance of Performance test. However, preliminary test reports shall be submitted to the Employer after completing each test run.</p> <p>The P&G test procedures shall be submitted for equipments/ system & subsystem under Contractor's scope for all Guarantees under category I, II & III as mentioned below, as per latest International codes / standard including correction curves, meeting the specification requirements along with sample calculations & detailed activity plan of preparation (including test instrumentation), conductance and evaluation of Guarantees.</p> <p>j) The contractor shall submit for Employer's approval the detailed Performance Test procedure containing the following:</p>			
<p>EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-1 (3X800 MW)</p>	<p>TECHNICAL SPECIFICATIONS SECTION – VI, PART-A BID Doc. No.- CS-9585-001-2</p>	<p>SUB-SECTION-IV FUNCTIONAL GUARANTEES</p>	<p>PAGE 2 OF 98</p>	

CLAUSE NO.	FUNCTIONAL GUARANTEES, LIQUIDATED DAMAGES			
	<p>a) Object of the test.</p> <p>b) Various guaranteed parameters & tests as per contract.</p> <p>c) Method of conductance of test and test code.</p> <p>d) Duration of test, frequency of readings & number of test runs.</p> <p>e) Method of calculation.</p> <p>f) Correction curves.</p> <p>g) Instrument list consisting of range, accuracy, least count, and location of instruments.</p> <p>h) Scheme showing measurement points.</p> <p>i) Sample calculation.</p> <p>j) Acceptance criteria.</p> <p>k) Any other information required for conducting the test.</p> <p>k) <u>In case during performance guarantee tests it is found that the equipment/system has failed to meet the guarantees, the Contractor shall carry out all necessary modifications and/or replacements to make the equipment/system comply with the guaranteed requirements at no extra cost to the Employer and re-conduct the performance guarantee test(s) with Employer's consent. However if the specified performance guarantee(s) are still not met but are achieved within the Acceptable Shortfall Limit specified at clause 1.01.02 of this subsection, Employer will accept the equipment/system/plant after levying liquidated damages as per clause 1.01.02 of this sub-section. If, however, the demonstrated guarantee(s) continue to be more than the stipulated Acceptable Shortfall Limit, even after the above modifications/replacements within ninety (90) days or a reasonable period allowed by the Employer, after the tests have been completed, the Employer will have the right to either of the following:</u></p> <p><u>i) For Category-I Guarantees</u></p> <p><u>Reject the equipment/system/plant and recover from the Contractor the payments already made</u></p> <p style="text-align: center;"><u>OR</u></p>			
<p style="text-align: center;">EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-1 (3X800 MW)</p>	<p style="text-align: center;">TECHNICAL SPECIFICATIONS SECTION – VI, PART-A BID Doc. No.- CS-9585-001-2</p>	<p style="text-align: center;">SUB-SECTION-IV FUNCTIONAL GUARANTEES</p>	<p style="text-align: center;">PAGE 3 OF 98</p>	

CLAUSE NO.	FUNCTIONAL GUARANTEES, LIQUIDATED DAMAGES			
	<p>Accept the equipment/system/plant after levying Liquidated Damages as specified hereunder. The liquidated damages, for shortfall in performance indicated in clause 1.01.02 for this sub-section are on per unit basis and shall be levied separately for each unit, except for the rate indicated for auxiliary power consumption for station auxiliaries which is on station basis. The liquidated damages shall be prorated for the fractional parts of the deficiencies. The performance guarantees coming under this category shall be called 'Category - I' Guarantees.</p> <p>ii) For Category-II Guarantees</p> <p>Reject the equipment/plant/system and recover from the Contractor the payments already made. The performance guarantees under this category shall be called 'Category - II ' Guarantees. Conformance to the performance requirements under Category-II is mandatory.</p> <p>iii) For Category-III Guarantees</p> <p>Reject the equipment / system/plant & recover from the Contractor the payments already made.</p> <p style="text-align: center;">OR</p> <p>Accept the equipment/system after assessing the deficiency in respect of the various ratings, performance parameters and capabilities and recover from the contract price an amount equivalent to the damages as determined by the EMPLOYER. Such damages shall, however be limited to the cost of replacement of the equipment(s) / system(s) replacement of which shall remove the deficiency so as to achieve the guarantee performance. These parameters/capacities shall be termed as category - III, guarantees.</p>			
1.01.00	GUARANTEES UNDER CATEGORY - I			
1.01.01	<p>The performance guarantees which attract liquidated damages (LD) are as follows:</p> <p>i) Unit Heat Rate</p> <p>a) Unit Heat rate in kcal/kWhr under rated steam conditions at 160 mm Hg (abs) condenser pressure with zero (0%) make up at 800 MW unit load (i.e. 100% of rated load).</p> <p>(b) Unit Heat rate in kcal/kWhr under turbine throttle main steam pressure of 210 Kg/cm² (abs) and turbine throttle main steam temperature / reheat steam temp. at turbine inlet of 600 deg C / 600 deg C at 160 mm Hg (abs) condenser pressure with zero make up at 600 MW unit load (i.e. 75% of rated load).</p>			
EPC PACKAGE FOR PATRATU SUPER THERMAL POWER STATION EXPANSION PHASE-1 (3X800 MW)	TECHNICAL SPECIFICATIONS SECTION – VI, PART-A BID Doc. No.- CS-9585-001-2	SUB-SECTION-IV FUNCTIONAL GUARANTEES	PAGE 4 OF 98	

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	<p>Unit Heat rate shall be computed as per clause 1.01.03.</p> <p>ii) TG Output</p> <p>Continuous TG output of 840 MW unit load (i.e. 105% of rated load) under rated steam conditions at 160 mm Hg (abs) condenser pressure with 0% make-up.</p> <p>iii) Condenser Pressure in mm Hg (abs) measured at 300mm downstream of low pressure turbine last stage bottom blade tip at 840 MW output under rated steam conditions, 3% make up and ambient temperature of 38°C.</p> <p>Note: The condenser pressure measurement while conducting the guarantee tests from (i) to (iii) above shall be measured at 300 mm downstream of low pressure turbine last stage bottom blade tip.</p> <p>iv) Steam Generating Capacity</p> <p>Steam generating capacity in T/hr of steam at rated steam parameters at superheater outlet & rated steam temperature at reheater outlet (with any combination of mills working as per Employer's discretion) with the coal being fired from within the range specified in the table at Annexure-IV-2, Sub section I-B (Project information), Part A, Section VI.</p> <p>v) Coal Pulveriser Wear Parts Warranty</p> <p>Life of coal pulveriser wear parts, in hours of operation, for the entire range of coal characteristics specified. (To be demonstrated as per clause 1.01.04 of this sub-section).</p> <p>vi) SCR/ Hybrid (SCR+SNCR) Efficiency for Control of NOx emission</p> <p>Contractor shall guarantee and demonstrate that at the end of 16000 hrs of operation and with the originally installed catalyst (i.e. without the use of future layer of catalyst) the SCR/ Hybrid (SCR+SNCR) efficiency for control of NOx emission (from thermal as well as fuel) shall not be less than 80% at 6% oxygen (O2) content in flue gas on dry gas basis and ammonia slip not exceeding 3ppm at 100% TMCR load condition, when firing any coal from the range of coal(s) specified.</p> <p>The SCR/ Hybrid (SCR+SNCR) efficiency test for control of NOx emission shall be conducted at the end of 16000 hrs of operation or as and when SCR/ Hybrid (SCR+SNCR) efficiency for control of NOx emission based on online measurements available in the control room reaches to the level of 70%, whichever is earlier. The catalyst will be deemed to have exhausted its life as and when SCR/ Hybrid (SCR+SNCR) efficiency for control of NOx emission reaches to the level of 70%.</p>			
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	<p>vii) Catalyst Life</p> <p>Contractor shall guarantee and demonstrate minimum SCR catalyst life of 16000hrs. The catalyst shall be deemed to have exhausted its life as and when SCR/ Hybrid (SCR+SNCR) efficiency for control of NOx emission reaches to a level of 70%, with ammonia slip not exceeding 3ppm at 6% oxygen (O₂) content in flue gas on dry gas basis.</p> <p>viii) Ammonia Consumption Rate (applicable in case of SCR system alone)</p> <p>Guaranteed Ammonia consumption rate (in Kg/hr/unit, 99.5 wt %) at 100% TMCR for firing coal from the range of coal(s) specified shall be demonstrated. The ammonia consumption rate shall be measured during the test for SCR efficiency for control of NOx emission.</p> <p>ix) Urea consumption rate (Applicable in case of Hybrid (SCR+SNCR) system)</p> <p>Guaranteed solid Urea consumption rate (in Kg/hr/unit) at 100% TMCR for firing coal from the range of coal(s) specified shall be demonstrated. The urea consumption rate shall be measured during the test for Hybrid system (SCR+SNCR) efficiency for control of NOx emission.</p> <p>x) DM water consumption rate (Applicable in case of Hybrid (SCR+SNCR) system)</p> <p>Guaranteed DM water consumption rate (in ton/hr/unit) for making solution of urea and for dilution of urea at 100% TMCR for firing coal from the range of coal(s) specified shall be demonstrated. The DM water consumption rate shall be measured during the test for Hybrid system (SCR+SNCR) efficiency for control of NOx emission.</p> <p>xi) Particulate Emission/ ESP Efficiency</p> <p>Contractor's design shall ensure that the particulate emission from ESP(s) shall not be more than 17 mg/ Nm³ under guarantee point (refer clause no. 1.05.19 related to ESP sizing criteria Sub Section A 02, Part B(Mechanical), Section VI) condition at 100 %TMCR i.e. at 800 MW unit load with design coal firing. The corresponding ESP efficiency shall be worked out as per the procedure outlined in clause 1.01.06 of this Sub-section.</p> <p>xii) FGD SO₂ Removal Efficiency</p> <p>Contractor's design shall ensure that the SO₂ removal efficiency from FGD shall not be more than 80 mg/nm³ (6% O₂ dry basis) under guarantee point condition (refer clause no. 1.05.20.01 related to FGD sizing criteria, Sub-Section A 02, Part B (Mechanical), Section VI). The corresponding SO₂ removal efficiency from FGD shall be worked out.</p>			
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1.01.02	<p>xiii) Limestone Consumption Rate</p> <p>Limestone consumption of FGD system in kg/hr under guarantee point conditions (refer clause no. 1.05.20.01 related to FGD sizing criteria, Sub-Section A-02, Part-B (Mechanical), Section-VI).</p> <p>xiv) Unit Auxiliary Power Consumption</p> <p>Unit auxiliary power consumption comprising of all Unit Auxiliaries shall be guaranteed in line with the requirements stipulated in clause 1.01.08.01 of this sub section. Power consumption of all unit auxiliaries (except Air Cooled Condenser Fans) shall be taken for continuous unit operation at 800 MW (i.e. 100% rated load) under rated steam conditions and at condenser pressure of 160 mm Hg (abs) with 0% make up. Power consumption of Air Cooled Condenser Fans shall be taken at 840 MW (i.e. 105% rated load) under rated steam conditions, guaranteed condenser pressure and ambient temperature of 38 deg.C.</p> <p>xv) Auxiliary Power Consumption for Station Auxiliaries</p> <p>Station auxiliary power consumption comprising of all station Auxiliaries required for continuous station operation at 3 x 800 MW (i.e. 100% rated load of all the units) under rated steam conditions and at condenser pressure of 160 mm Hg (abs) with 0% make-up shall be guaranteed in line with the requirements stipulated in clause 1.01.08.02 of this sub section.</p> <p>Notes:</p> <p>(a) The 16000 hrs, as mentioned above for SCR/ Hybrid system efficiency and catalyst life, shall be based on actual running hours of operation of SCR system counted from the date of successful completion of 'Initial Operation' of unit or start of operation of SCR system on sustainable basis, whichever is later.</p> <p>(b) Power consumption of each of the pump/fan/compressors/ Conveyors etc. wherever mentioned shall be measured with its own drive at the switchgear end.</p> <p>AMOUNT OF LIQUIDATED DAMAGES APPLICABLE FOR CATEGORY-I GUARANTEES</p> <p>If the performance guarantee(s) specified at clause 1.01.01 are not met by the Contractor even after the modifications and/or replacements mentioned at clause 1.00.01 of this Sub-section but are achieved within the stipulated Acceptable Shortfall Limit as indicated in this clause, Employer will accept the equipment/system/plant after levying liquidated damages as indicated here under, however, if the demonstrated guarantee(s) continue to be more than the stipulated Acceptable Shortfall Limit, the Employer may at his discretion reject the</p>			
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equipment/system and recover the payment already made or accept the equipment/system only after levying liquidated damages against the Contractor, at the rates listed herein, and such liquidated damages shall be deducted from the Contract Price:


S. No	Guarantee	Rate of Liquidated Damages (LD)	Acceptable Shortfall with LD
i)	For Increase in the Guaranteed Unit Heat rate		
a)	At 100% TMCR (800 MW) Unit Load	US \$ 322,952 (US Dollar Three hundred twenty two thousand nine hundred fifty two only) per 1 Kcal/Kwhr increase in heat rate	(+) 2.5% of the guaranteed Unit heat rate
b)	At 75% TMCR (600 MW) Unit Load	US \$ 242,214 (US Dollar two hundred forty two thousand two hundred fourteen only) per 1 Kcal/Kwhr increase in heat rate	(+) 2.5% of the guaranteed Unit heat rate
ii)	For deficiency in Turbine Generator Output	US \$ 1097 (US Dollar one thousand ninety seven only) per 1 KW shortfall in TG output	(-) 2.0% of the guaranteed turbine generator output.
iii)	For deficiency in condenser pressure	US \$ 657,355 (US Dollar Six hundred fifty seven thousand three hundred fifty five only) per 1 mm Hg increase in condenser pressure	(+) 2.5% of the guaranteed condenser pressure
iv)	Steam Generator Capacity For shortfall in the guaranteed steam generating capacity in T/h at rated steam parameters at superheater outlet &	US \$ 137,021 (US Dollar One hundred thirty seven thousand twenty one only) for every 1 T/hr short fall in steam output from the guaranteed value.	(-) 1.0% of the guaranteed steam generator capacity





S. No	Guarantee	Rate of Liquidated Damages (LD)	Acceptable Shortfall with LD
	rated steam temperature at reheater outlet (with any combination of mills working as per Employer's choice) with the coal being fired from within the range specified		
v)	Coal Pulveriser Wear Parts Warranty Life of Coal Pulveriser wear parts in hours of operation	To be calculated as per clause 1.01.04 of this subsection.	(-) 500 hours
vi)	SCR/ Hybrid (SCR+SNCR) Efficiency for Control of NOx Emission For shortfall in SCR efficiency for control of NOx emission in percentage point under condition stipulated in clause 1.01.01 (vi) of this Sub Section of Technical Specification	US \$ 136,643 (US Dollar One hundred thirty six thousand six hundred forty three only) for every 1% point shortfall in SCR/ Hybrid (SCR+SNCR) efficiency from the guaranteed value	(-) 10% points from the guaranteed value
vii)	Shortfall in Catalyst Life For shortfall in catalyst life in hrs under condition stipulated in clause 1.01.01 (vii) of this Sub Section of Technical Specification	US \$ 40,976 (US Dollar Forty thousand nine hundred seventy six only) for every 100 hours shortfall in catalyst life from the guaranteed value	(-) 15% from the guaranteed value
viii)	Ammonia Consumption Rate For increase in ammonia consumption rate (in Kg/hr/unit, 99.5wt %) under condition stipulated in	US \$ 74,521 (US Dollar Seventy four thousand five hundred twenty one only) for every 1 Kg/hr increase in ammonia consumption	(+) 10% of the guaranteed ammonia consumption


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S.No	Guarantee	Rate of Liquidated Damages (LD)	Acceptable Shortfall with LD	
	clause 1.01.01 (viii) of this Sub Section of Technical Specification	rate from the guaranteed value		
ix)	Urea Consumption Rate For increase in urea consumption rate (in Kg/hr/unit) under condition stipulated in clause 1.01.01 (ix) of this Sub Section of Technical Specification	US \$40,914 (US Dollar Forty thousand nine hundred fourteen only) for every 1 Kg/hr increase in urea consumption rate from the guaranteed value.	(+) 10% of the guaranteed urea consumption	
x)	DM water Consumption Rate For increase in DM water consumption rate (in ton/hr/unit) under condition stipulated in clause 1.01.01 (x) of this Sub Section of Technical Specification	US \$8,989 (US Dollar Eight thousand nine hundred eighty nine only) for every 1 ton/hr increase in DM water consumption rate from the guaranteed value	(+) 10% of the guaranteed DM water consumption	
xi)	ESP Efficiency For shortfall in guaranteed ESP efficiency in percentage points under conditions specified at clause 1.01.01 (xi) of this sub section	US \$ 1,354,181 (US Dollar One million three hundred fifty four thousand one hundred eighty one Only) for every 0.01% point shortfall in ESP Efficiency from the guaranteed value.	(-) 0.05% point from the guaranteed ESP efficiency	
xii)	FGD SO₂ Removal Efficiency For shortfall in guaranteed SO₂ removal efficiency in percentage points under condition stipulated in clause 1.01.01 (xii) of this Sub Section of Technical Specification	US \$ 50,854 (US Dollar Fifty thousand eight hundred fifty four only) for every 0.1% point shortfall in guaranteed SO₂ removal efficiency	(-) 0.25% points from the guaranteed SO₂ removal efficiency	
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	S. No	Guarantee	Rate of Liquidated Damages (LD)	Acceptable Shortfall with LD
	xiii)	<p>Limestone Consumption Rate</p> <p>For increase in limestone consumption of FGD system in kg/hr/unit under condition stipulated in clause 1.01.01 (xiii) of this Sub Section of Technical Specification</p>	<p>US \$ 263,017</p> <p>(US Dollar Two hundred sixty three thousand seventeen only) for every 100 Kg/hr increase in limestone consumption rate from the guaranteed value</p>	<p>(+) 10% of the guaranteed limestone consumption</p>
	xiv)	<p>Auxiliary power consumption for unit auxiliaries</p> <p>For increase in the auxiliary power consumption in KW guaranteed as per the requirements of clause 1.01.01 and 1.01.08.01 of this sub section</p>	<p>US \$ 3025</p> <p>(US Dollar Three thousand twenty five only) per 1 KW increase in Auxiliary Power Consumption</p>	<p>(+) 1.0% of the guaranteed Auxiliary Power Consumption.</p>
	xv)	<p>Auxiliary power consumption for station auxiliaries</p> <p>For increase in the auxiliary power consumption in KW guaranteed as per the requirements of clause 1.01.01 and 1.01.08.02 of this sub section</p>	<p>US \$ 3025</p> <p>(US Dollar Three thousand twenty five only) per 1 KW increase in Auxiliary Power Consumption</p>	<p>(+) 1.0% of the guaranteed Auxiliary Power Consumption.</p>
<p>NOTE:</p> <p>i) Each of the liquidated damages specified above shall be independent and these liquidated damages shall be levied concurrently as applicable.</p> <p>ii) If the contract currency is other than US dollars, then the liquidated damages shall be in equivalent amount in contract currency based on Bill selling exchange rate of State Bank of India prevailing on the date of award of contract.</p> <p>iii) All these liquidated damages for short fall in performance shall be deducted from the contract price as detailed in accompanying General Conditions of</p>				
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1.01.06.05	Further, during the performance test of the Electrostatic Precipitator, if the contractor establishes that the average of three tested outlet dust burden (Do) values (uncorrected) are either equal to or less than 14 mg/Nm³ at ESP outlet before FGD system inlet, then the contractor shall also be deemed to have successfully met the guaranteed ESP efficiency.			
1.01.07	METHOD OF COMPUTING TEST EFFICIENCY OF FGD The performance tests shall be carried out in accordance with ASME PTC 40 (1991) code. The details of the test shall, however be mutually agreed upon between the employer and the contractor.			
1.01.08	AUXILIARY POWER CONSUMPTION The respective auxiliary power consumption for unit and the station are to be calculated in isolation to calculate the respective guaranteed power consumption as is illustrated hereunder:			
1.01.08.01	Unit Auxiliary Power Consumption The unit auxiliary power consumption shall be calculated using the following relationship. $P_{au} = P_u + TL \text{ (Unit)}$ $P_{au} = \text{Guaranteed Unit Auxiliary Power Consumption.}$ $P_u = \text{Power consumed by the auxiliaries of the unit under test.}$ $TL = \text{Losses of the Generator Transformer and Unit Transformers supplied by bidder based on works test reports and the criteria specified under the Clause 1.01.08.02 (j) under the subheading Transformers.}$ The power consumption (P_u) of entire unit auxiliaries fed from unit transformers shall be measured at the incomers of respective unit boards. Suitable correction for auxiliaries not in service at the time of this measured power consumption like MDBFP etc, shall be done on as per the technical specification. If GCB scheme is adopted, suitable corrections for station auxiliaries shall be done. While guaranteeing the auxiliary power consumption the bidder shall necessarily include all continuously operating unit auxiliaries. The auxiliaries to be considered shall include but not be limited to the following: <ul style="list-style-type: none"> (a) Turbine Unit Oil purifier. (b) Turbine Unit control oil purifier. 			
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	<p>(c) Electric oil heater for turbine lube oil tank (rated power shall be considered).</p> <p>(d) Feed and discharge pumps of turbine oil purification system.</p> <p>(e) Main turbine Condenser air evacuation pumps.</p> <p>(f) Air Cooled Condenser fans.</p> <p>(g) Condensate extraction pumps.</p> <p>(h) Drip pump (if envisaged).</p> <p>(i) Hydrazine dosing pumps (if required).</p> <p>(j) Ammonia dosing pumps (if required).</p> <p>(k) Oil purifiers of 2x50% TDBFPs and their feed and discharge pumps.</p> <p>(l) Lube oil pumps of 2x50% TDBFPs and the electrical oil heater for lube oil.</p> <p>(m) Auxiliary oil pump for MDBFP.</p> <p>(n) Oil pumps for HP-LP bypass system.</p> <p>(o) Motor Driven Boiler Feed Pump</p> <p>(For this purpose only 15% of the power consumed by the MDBFP and MDBP at design point as determined during shop test shall be considered).</p> <p>(p) DM Cooling (normally working) Water pumps to supply cooling water on the primary (DM) side of the plate type heat exchangers in the closed loop Equipment cooling (Unit auxiliaries) water system.</p> <p>(q) Auxiliary Cooling (normally working) water pumps to supply cooling water on the secondary side of the plate type heat exchangers in the closed loop Equipment cooling (unit auxiliary) water system.</p> <p>r) Mills.</p> <p>s) PA Fans.</p> <p>t) FD Fans.</p> <p>u) ID Fans.</p> <p>v) Air Heaters.</p>			
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	<p>w) Coal Feeders.</p> <p>x) Steam Generator Start up drain recirculation Pumps (If required).</p> <p>y) Seal Air Fans.</p> <p>z) Lube oil pumps for fans/ Air heaters & mill system etc.</p> <p>aa) Scanner air fans.</p> <p>ab)</p> <ul style="list-style-type: none"> • SCR System: <ul style="list-style-type: none"> i. Selective Catalytic Reduction (SCR) System is in service and SCR bypass gate in closed condition. SCR with cyclone separator including all heaters, dilution air fan etc. ii. Ammonia unloading handling and storage system, power consumption for continuous operating auxiliaries for unit operation at 100% TMCR. • HYBRID (SCR+SNCR) SYSTEM: <ul style="list-style-type: none"> i. Selective Catalytic Reduction (SCR) and Selective Non Catalytic Reduction (SNCR) System are in service and SCR bypass gate in closed condition. SCR with cyclone separator including all heaters, dilution air fan etc. ii. Urea unloading, handling and storage system and urea to ammonia convertor power consumption for continuous operating auxiliaries for unit operation at 100% TMCR. <p>ac) Electrostatic Precipitator with all TR sets , all hopper heaters including wrap around heaters of adapters, if applicable & all insulator heaters/pent house fans (if applicable) of all ESP passes working and rapping system in normal operation. During the test all hopper heaters including wrap around heaters of adapters, if applicable & all insulator heaters/pent house fans (if applicable) of all ESP passes will be kept in continuously ON condition at 100% duty condition and set point temperature shall be kept 5 degree Celsius above the flue gas temperature. (Refer Note 3 below)</p> <p>ad) Gas Recirculation Fan (if applicable)</p> <p>ae) FGD System</p>			
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1.02.00	<u>GUARANTEES UNDER CATEGORY - II</u> NOT USED			
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CLAUSE NO.	FUNCTIONAL GUARANTEES, LIQUIDATED DAMAGES			
<p>1.03.00</p> <p>1.03.01</p>	<p><u>GUARANTEES UNDER CATEGORY – III</u></p>			
	<p>The parameters/capabilities to be demonstrated for various systems/ equipments shall include but not be limited to the following:</p> <p>Noise</p> <p>All the plant, equipment and systems covered under this specification shall perform continuously without exceeding the noise level over the entire range of output and operating frequency specified in General Technical Requirement, Part-C Section-VI of the technical specifications.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>1.03.02 Steam Turbine and Auxiliaries</p> <p>Turbine hall and other EOT Crane :</p> <p>Over load test, travel & hoist speed checks etc., shall be demonstrated as per IS: 3177 (latest edition).</p> <p>1.03.03 Steam Generator and Auxiliaries</p> <p>Category III Guarantees of this sub-section for various systems/ equipment for steam generator and auxiliaries shall be based on and demonstrated corresponding to ambient air condition of 27 deg. C temperature & 60% RH.</p> <p>(i) Coal Pulverizer capacity at rated fineness</p> <p>Performance testing shall be conducted on coal pulverizers toward</p>			
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1.03.05	<p>for the entire range of coal(s) specified for an operation period of 16,000 hours.</p> <p>Further, ammonia slip shall be demonstrated during the SCR/hybrid (SCR+SNCR) Efficiency test for Control of NOx emission at beginning as well as end of the catalyst life.</p> <p>(iv) SO₂ to SO₃ Conversion Rate</p> <p>Contractor shall guarantee and demonstrate that maximum SO₂ to SO₃ conversion rate shall not exceed 1% for the entire range of coal(s) specified for an operation period of 16,000 hours. SO₂ to SO₃ conversion rate shall be demonstrated during the SCR Efficiency test for Control of NOx emission at beginning as well as end of the catalyst life. Further, SO₂ to SO₃ conversion rate shall also be determined based on the catalyst sample taken for laboratory test within the guarantee period.</p> <p>(v) Pressure drop across SCR and Cyclone separator</p> <p>Contractor shall guarantee and demonstrate the individual pressure drop across the cyclone separator and SCR Reactor at 100% TMCR load condition shall not exceed the guaranteed value for the entire range of coal(s) specified.</p> <p>(vi) Particulate Emission / Cyclone Separator Efficiency</p> <p>Contractor shall guarantee and demonstrate the minimum Cyclone separator efficiency of 60% at 100% TMCR load for the entire range of coal(s) specified.</p> <p>Flue Gas Desulphurisation System</p> <p>(i) Wet ball Mill capacity at rated fineness</p> <p>The contractor shall demonstrate the guaranteed capacity of each limestone pulverizer under the following conditions:</p> <p>i) Limestone fineness : 90% or higher (as per the requirement of the absorber) through 325 mesh.</p> <p>ii) Limestone Quality : All available quality from the specified range.</p> <p>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.</p> <p>(ii) Wet ball Mill wear parts guarantee</p> <p>Contractor shall demonstrate the life of wet ball Mill wear parts in line with requirements stipulated in Part B of the Technical Specification. The</p>			
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1.03.06	<p>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.</p> <p>(iii) Wet ball Mill ball consumption</p> <p>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.</p> <p>(iv) Pressure Drop across FGD</p> <p>The contractor shall demonstrate that the total pressure drop in the gas path across the FGD System shall not exceed the guaranteed values for the range of coal and loads specified in the Technical Specification</p> <p>(v) Vacuum Belt Filter Capacity</p> <p>Contractor shall demonstrate the 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.</p> <p>(vi) Gypsum Purity</p> <p>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 the range of specified coal(s) and limestone.</p> <p>(vii) Waste Water</p> <p>The Contractor guarantees that the maximum purge flow rate to waste water treatment system from FGD system for 3x800 MW units shall be less than 30m³/s averaged over a 24 hour period.</p> <p>(viii) Mist Outlet Droplet Content</p> <p>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.</p> <p>Air Conditioning & Ventilation System</p> <p>(i) Air Conditioning System:</p> <p>A. Following shall be demonstrated at Shop</p> <p>1) Capacity and discharge pressure of chilled water pumps, condenser water pumps at its rated duty point.</p>		
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