CORRIGENDUM - II

SR.NO	DESCRIPTION
1.0	VOLUME II (MASTER SPECIFICATIONS)
2.0	VOLUME III-A (TECHNICAL SPECIFICATIONS FOR STEAM GENERATOR AND AUXILIARIES)
3.0	VOLUME III-B (TECHNICAL SPECIFICATIONS FOR STEAM TURBINE GENERATOR AND AUXILIARIES)
4.0	VOLUME III-C (TECHNICAL SPECIFICATIONS FOR COAL HANDLING SYSTEMS)
5.0	VOLUME III-D (TECHNICAL SPECIFICATIONS FOR ASH HANDLING SYSTEMS)
6.0	VOLUME III-E1 (TECHNICAL SPECIFICATIONS FOR WATER TREATMENT SYSTEMS)
7.0	VOLUME III-E2 (TECHNICAL SPECIFICATIONS FOR MAIN AND AUXILIARY COOLING WATER SYSTEMS)
8.0	VOLUME III-F (TECHNICAL SPECIFICATIONS FOR PIPING, VALVES AND SPECIALTIES)
9.0	VOLUME III-G (TECHNICAL SPECIFICATIONS FOR COMPRESSED AIR, AIR CONDITIONING AND VENTILATION SYSTEMS)

SR.NO	DESCRIPTION
10.0	VOLUME III-H (TECHNICAL SPECIFICATIONS FOR FIRE PROTECTION AND DETECTION SYSTEMS)
11.0	VOLUME III-I (TECHNICAL SPECIFICATIONS FOR MATERIAL HANDLING AND MISCELLENEOUS EQUIPMENTS)
12.0	VOLUME IV-A (TECHNICAL SPECIFICATIONS FOR ELECTRICAL EQUIPMENTS AND ACCESSORIES)
13.0	VOLUME IV-B (TECHNICAL SPECIFICATIONS FOR ELECTRICAL EQUIPMENTS AND ACCESSORIES)
14.0	VOLUME -V (TECHNICAL SPECIFICATIONS FOR CONTROL AND INSTRUMENTATION)
15.0	VOLUME VI-A (TECHNICAL SPECIFICATIONS FOR CIVIL, STRUCTURAL AND ARCHITECTURAL WORKS)
16.0	VOLUME VII-A1 BID PURPOSE DRAWINGS (MECHANICAL)
17.0	VOLUME VII-A2 BID PURPOSE DRAWINGS (MECHANICAL)
18.0	VOLUME VII-B BID PURPOSE DRAWINGS (ELECTRICAL)
19.0	CORRIGENDUM TO ADDENDUM-I

SR.NO	DESCRIPTION
	ANNEXURES
ANNEXURE-I	TOOLS & TACKLES
ANNEXURE-II	WORKSHOP EQUIPMENT
ANNEXURE-III	TUBE SETTLER SPECIFICATION
ANNEXURE-IV	SPECIFICATION FOR INDUSTRIAL TYPE ETHERNET SWITCH
ANNEXURE-V	SPECIFICATION FOR FRP JUNCTION BOX
ANNEXURE-VI	SPECIFICATION FOR SINGLLE INPUT TEMPRATURE TRANSMITTER JUNCTION BOX
ANNEXURE-VII	SPECIFICATION FOR DUEL TEMPRATURE TRANSMITTER JUNCTION BOX
ANNEXURE-VIII	ANALYSIS OF COAL

VOLUME-II

MASTER SPECIFICATION

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	3 / 21 of 555/7.17		7.17 MAIN POWER SOURCE FROM GRID 7.17.1 Rated Voltage : 400kV 7.17.2 Voltage variation : ± 10 % 7.17.3 Frequency Variation : ± 5 % 7.17.4 Rated Short Circuit Level : 50 kA, Three Phase Symmetrical	7.17 As per CEA guidelines,& technical specn. For 500 MW and higher rating TG sets, 7.17.1 Rated voltage 400 kV 7.17.2 voltage variation:+/-5 % 7.17.3 frequency Variation: +3 to - 5% 7.17.4 Rated s.c. level: 50 kA,3ph
2.0	3/29 of 555/1.1.1		Furnace/ evaporator shall be with vertical wall……..tubes design.	Furnace/ evaporator shall be with vertical / spiral wall..... tubes design.
3.0	3/40 of 555/1.7.15		LT XLPE cables, 415 V PMCC for hoists, crane, pumps, & auxiliary loads like lighting panels, Electrical heat tracing panels, Control Panel etc.	LT XLPE cables, 415 V PMCC for hoists, crane, pumps, & auxiliary loads like lighting panels, Control Panel etc.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
4.0	3/47 of 555/1.15.20 (n)		All auxiliary building & associated electrical building/rooms such as CW & ACW pump house, Condensate transfer pump-house, ESP control building, VFD equipment building, Service building etc.	All auxiliary building & associated electrical building/rooms such as CW & ACW pump house, Condensate transfer pump-house, ESP control building, Service building etc.
5.0	3/48 of 555/1.15.20 (ff)		All the plants, areas, buildings etc. shown on plot plan & other drawings.	Deleted
6.0	3/49 of 555/1.15.21		However load flow & transient stability study which may be done on approved software.	(a) All studies shall be done by manual as well as E-tap software. (b) Load flow & transient stability studies will be done on E-tap only.
7.0	3 / 49 of 505/ 1.15.21 (a)		All the electrical system studies such as short circuit levels, voltage drops, grounding, relay setting, relay co-oridation etc & all sizing	(a) All studies shall be done by manual as well as E-tap software. (b) Load flow &

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			calculations such as transformers, busducts, switchgears, motors, cables, lighting, DC UPS system etc. manual calculations & E-Tap software	transient stability studies will be done on E-tap only
8.0	3/52 of 555/1.17.2		Foundation for ……..., PA Fans, Coal Mills, Turbo-Generator and Coal Crusher shall be mounted on springs and dampers.	Foundation for ……..., PA Fans, Coal Mills and Coal Crusher shall be mounted on springs and dampers.
9.0	3/53 of 555/1.17.8.1		C.W. & A.C.W. Pump House with electrical annex including water conveying concrete duct from Cooling Tower fore bay etc.	C.W. & A.C.W. Pump House with electrical annex including water conveying covered R.C.C. channel from Cooling Tower basin to CW Pump House etc.
10.0	Section 3 / Page 59 / Cl.No.4.11.4		Inter connection of power plant earthing grids with switchyard package, earthing grids at minimum four points, also interconnection	Inter connection of power plant earthing grids with switchyard package, earthing grids at minimum four points, also

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			with existing earth grid 2 X 500MW units at minimum 4 points are in EPC contractor scope.	interconnection with existing earth grid 2 X 500MW units at minimum 4 points are in EPC contractor scope. Earthing grid Interconnections to be spaced equally from transformer yard to chimney. Refer dwg.PE-189-GA-101.
10.0	3 / 60 /4.11.6		Switchyard interface	Refer Annexure D, Revision-1, of corrigendum II, vol.IV-A.
11.0	3/60 of 555/5.1		Land, free of charge as available for the construction of: (a) Residential accommodation to be built by the Contractor at his own expense for his employees near site.	(a) Deleted
12.0	3/60 of		Construction power at	Deleted

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	555/5.2		11 kV AC ±10%…… …… …..of this specification.	
13.0	4/66 of 555/2.2		Notwithstanding the Owner's wish to receive the benefits of new, advanced and improved technologies, ..., at least for continuous two (2) years in two different power stations.	Notwithstanding the Owner's wish to receive the benefits of new, advanced and improved technologies, ..., at least one (1) plant for a period not less than one (1) year as on the date of bid opening.
14.0	4/76 of 555/12		The unit would be operated on base load with cyclic load variation. The load variation is expected to be as per schedule depending on power demand. The units shall also be suitable for two shift operation, if required.	The unit would be operated on base load. The load variation is expected to be as per schedule depending on power demand.
15.0	4/76 of 555/12		PLANT LIFE AND MODE OF OPERATION (a) Cold start-up (>50hrs. shutdown): 20 per year (b) Warm start-up	(a) Cold start : > 72 hrs : 150 (b) Warm start : 10 -

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			(between 10 to 50 hrs. of shutdown): 140 per year (c) Hot start-up (Less than 10 hrs. shutdown): 180 per year	72 hrs :1000 (c) Hot start : < 10 hrs : 4000
16.0	4/87 of 555/19		The Contractor shall extend all possible assistance and co-operation to the Owner regarding the transfer of technology and developing expertise in the area of engineering operation and maintenance of the Plant.	The Contractor shall extend all possible assistance and co-operation to the Owner.
17.0	4/91 of 555/Annexure-A(new)		…….	(a) European Standards(EN) (b) American Water Works Association(AWWA) (c) VDI/VDE
18.0	4/99 of 555/12.0		VERTICAL (head-room clearance)	VERTICAL (head-room clearance)

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			2.0 m	Minimum 2.5 m
19.0	4/103 of 555/5.1.1		False ceiling and false flooring shall be provided.	Deleted
20.0	4/104 of 555/5.1.7		The Control Room lighting shall be designed to provide a glare free uniform illumination. The level of illumination shall be minimum 400 LUX.	The Control Room lighting shall be designed to provide a glare free uniform illumination. The level of illumination shall be minimum 300 LUX.
21.0	4/121 of 555/1.13		Supply and application of the final paints and first fill lubricants on all the equipment to be erected under this specification. Supply of LDO, chemicals, lubricating oils upto COD.	Deleted
22.0	5/121 of 555/1.13		Supply and application…… ……oils upto COD	Deleted
23.0	7/153 of 555/2.5		No material shall be despatched …… ……	Deleted

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			Material Despatch Clearance Certificate (MDCC).	
24.0	7/156 of 555/4.2		The Contractor shall give the Engineer/Inspector fifteen (15) days …… …….forward to the Inspector duly certified Six (6) copies of test reports.	Deleted
25.0	7/156 of 555/4.3		The Engineer or Inspector shall …… …… to comply with the contract.	Deleted
26.0	7/156 of 555/4.4		When the factory tests have been …… ……. comply with the contract.	Deleted
27.0	8/172 of 555/1.4.17		Unit Start Up Start-up time (upto full load) and loading capabilities for Turbine Generator together for cold start condition	Start-up time (upto full load) and loading capabilities for Turbine Generator together for cold start condition (greater than 72 hrs

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			(greater than 36 hrs shutdown), warm start conditions (between 8 and 36 hrs shutdown) and hot start conditions (less than 8 hours shutdown) as indicated by the contractor in the offer and accepted by the Owner shall be demonstrated ensuring that the various turbine operational parameters like vibration, absolute and differential expansion, eccentricity and steam-metal temperature mismatch etc are within design limits.	shutdown), warm start conditions (between 10 and 72 hrs shutdown) and hot start conditions (less than 10 hours shutdown) as indicated by the contractor in the offer and accepted by the Owner shall be demonstrated ensuring that the various turbine operational parameters like vibration, absolute and differential expansion, eccentricity and steam-metal temperature mismatch etc are within design limits.
28.0	8/168 of 555/1.2.5		The total auxiliary power consumption for all specified plant auxiliaries (as listed in Volume- I, Section -3) required for continuous unit operation at 100% of rated load under rated steam conditions and at design condenser pressure with 1% make-up.	The total auxiliary power consumption for all specified plant auxiliaries (as listed in Volume- I, Section -3) required for continuous unit operation at 100% of rated load under rated steam conditions and at design condenser pressure with Zero make-up.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
29.0	8/1.4.16 (a)		Turbine-Generator set capability Continuous TG output corresponding to VWO condition under rated steam conditions with 1% make up.	Turbine-Generator set capability Continuous TG output corresponding to VWO condition under rated steam conditions with 0% make up.
30.0	8/1.4.16 (b)		Turbine-Generator set capability Maximum continuous output at generator terminals corresponding to all HP Heaters out of operation under rated steam conditions with 1% makeup.	Turbine-Generator set capability Maximum continuous output at generator terminals corresponding to all HP Heaters out of operation under rated steam conditions with 0% makeup.
31.0	8/179 of 555/1.4.35(b		Pressure drop across the polisher service vessel, as specified, in clean and dirty condition of resin at rated design flow.	Deleted
32.0	8/179 of 555/1.4.36		This test shall be conducted to guarantee that SH/RH temperatures are maintained within +/- 5˚C of rated temperature condition from 40% to 100% TMCR including	This test shall be conducted to guarantee that SH/RH temperatures are maintained within +/- 5˚C of rated temperature condition from 50% to 100%

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			conditions: HP Heaters out of operations, HP-LP Bypass operation.	BMCR including conditions: HP Heaters out of operations, HP-LP Bypass operation.
33.0	8/180 of 555/1.5.1(a)		The steam generator efficiency (by loss method) shall be determined as per the requirements of BS EN 12952 – 15, 2003 (by loss method).	The performance tests shall be conducted in accordance with the latest version of ANSI PTC 4.0.
34.0	8/183 of 555/1.5.4(new)		.....	**To be added** (i) PF fineness variation (ii) HGI correction
35.0	8/186 of 555/1.5.7(b)		Combined pressure drop in condenser tube, water box and inlet and outlet piping shall be measured in between intake and discharge point of the C.W. system with cleanliness factor of 0.9 and COLTCS in service.	Deleted
36.0	9/194 of 555/2.1.6		Warranty period of all kind of spares shall be six thousand (6000) hours of operation,	Deleted

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			except normal wear or eighteen months from the date of receipt at site, whichever is later.	
37.0	9/319 of 555/1.7 to 1.11		100% of each type, size and class	10% of each type, size and class
38.0	9/349 of 555/1.0	EOT Crane	1.0 EOT CRANE…… …… …1.15) Coils for all conductors	Repeated items shall be deleted.
39.0	10/455 of 555/1.21 of Annexure C		Volatile matter of worst coal - 21.56%	Volatile matter of worst coal - 21.30%
40.0	11/520 of 555/57 (e) new	List of vendors for MEAA meter (Energy meters)	----------	**To be added** (e) SATEC
41.0	/8 of 247/9 of Corrigendum-I		Supply of LDO, Chemicals, lubricating oil/**lubricants, consumables etc**. up to COD. All the clauses related	Deleted.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			to the above in entire specification stands modified to this extent.	

VOLUME-III A

STEAM GENERATOR AND AUXILIARIES

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	1/27 of 223/3.1		The boiler and auxiliaries shall be suitable for generation of 100% BMCR capacity with rated pressure and temperature for a fuel mix of 70: 30 ratio between DOMESTIC (Indian) coal and IMPORTED coal.	The boiler and auxiliaries shall be suitable for generation of 100% BMCR capacity with rated pressure and temperature for a fuel mix of 70: 30 ratio between DOMESTIC (Indian) coal and IMPORTED coal on WEIGHT basis
2.0	1/14 of 223/2.2.8		Economiser system with connecting pipes, headers etc. with non-return valves and motor operated valves with integral bypass.	Economiser system with connecting pipes, headers etc. with non-return valves.
3.0	1/17 of 223/2.3.2.2		Feed check valve and isolating valve with motor drive; the feed check valve location to be ahead of isolating valve in the direction of flow.	Feed check valve at the inlet of economizer.
4.0	1/28 of 223/3.2		The Steam Generator shall be capable of starting and picking up load without HP-LP bypass system with	Deleted

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			whole range of specified coal.	
5.0	1/28 of 223/3.4	Oil support	The design of steam generator……above(30%) rated output……range of coal.	The design of steam generator……above(40%) rated output……range of coal.
6.0	1/28 of 223/3.6		The Steam Generator shall be designed for ……. HP heaters out of service from 60% BMCR to 100% BMCR.	The Steam Generator shall be designed for ……..with the HP heaters out of service from 50% BMCR to 100% BMCR.
7.0	1/46 of 223/5.6.6		Superheater outlet temperature shall be ……..60% load to full load by means of remote manual and automatic control devices. The steam Generator shall have minimum superheat attemperation flow during TMCR operation.	Superheater outlet temperature shall be maintained at rated value within specified tolerance by two stage attemperation, from 50% load to full load by means of remote manual and automatic control devices. The steam Generator shall have minimum superheat attemperation flow
8.0	1/49 of 223/ 5.8.1		The outlet temperature of SH and RH shall be	The outlet temperature of SH and RH shall be

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			guaranteed to be maintained within ± 5°C of the rated temperature condition from 60% to 100% BMCR including conditions of the HP heaters out of operation and HP - LP bypass operation.	guaranteed to be maintained within ± 5°C of the rated temperature condition from 50% to 100% BMCR including conditions of the HP heaters out of operation and HP - LP bypass operation.
9.0	1/58 of 223/5.12.16		Piezometer rings to measure fan inlet air for PA and FD fan shall be supplied.	Deleted
10.0	1/68 of 223/5.17.6 (n)		(a) MS IS:3589	(a) IS:1239 up to 150 NB (b) IS:3589 for 200 NB & above
11.0	1/74 of 223/5.25.2.4		A non-return valve and a motor operated stop valve shall be provided on feed line close to Economiser.	A non-return valve shall be provided on feed line close to Economiser.
12.0	1/84 of 223/1.12of Data Sheet-A		Superheater & Reheater Outlet Steam temperature control range shall be Within ± 5 °C	Superheater & Reheater Outlet Steam temperature control range shall be Within ± 5 °C

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			for all loads from 60 % to100 % range BMCR	for all loads from 50 % to 100 % range BMCR
13.0	1/85 of 223/3.0 of Data Sheet-A		Boiler operation shall be capable of cold start-up without bypass. The plant shall be designed for modified ……..…… ……shall be brought down to 60% BMCR.	The plant shall be designed for modified …….. …… shall be brought down to 60% BMCR.
14.0	1/86 of 223/7.3 of Data Sheet-A		Unburnt Combustibles at Economiser outlet as % of Fly Ash to be considered for determining boiler efficiency = 1.5%	Unburnt Combustibles at Economiser outlet as % of Fly Ash to be considered for determining boiler efficiency = 1%
15.0	1/89 of 223/10.7 of Data Sheet-A	Tube and header materials	Design Metal Temperature: Upto & including 400°C : Carbon steel to ASME SA-106 Gr.B/C or SA 210 Gr.C or equivalent Upto & including 550° C :Alloy steel to ASME SA-335:P-11/ P-12/P-22/;ASME SA213:T-	Design Metal Temperature: Upto & including 500° C :Alloy steel to ASME SA-335:P-11/ P-12;ASME SA213:T-11/T-12or equivalent Upto & including 550° C: Alloy steel ASME SA-335/P22; SA213 T-22 or equivalent.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			11/T-22/or equivalent Upto & including 600° C: Alloy steel ASME SA-335/P-91/ 92; SA213 T-91/92 or equivalent Above 600° C: Austenitic stainless steel, Super 304H, TP347H or equivalent	Upto & including 600° C: Alloy steel ASME SA-335P-91/ 92; SA213 T-91/92 or equivalent Austenitic stainless steel
16.0	2/115 of 223/4.1		Double isolation with intermediate venting may be used, if required as an alternative.	Deleted
17.0	3/133 of 223/1.1		The fuel oil system for the plant is meant for supply of fuel oil (HFO) to the boiler up to the load of 30% rated output for support to stabilize coal firing.	The HFO system shall be sized for load carrying up to 30 % BMCR.
18.0	3/133 of 223/1.5.1		The HFO shall be supplied through pressurising pump & heater-sets for stabilisation of	The HFO shall be supplied through pressurising pump & heater-sets for load carrying upto 30 % and

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			pulverised coal combustion upto 40% rated output and also for load carrying upto approximately 30% BMCR without coal firing.	supporting pulverised coal combustion upto 40% BMCR rated output.
19.0	3/137 of 223/3.1.8 (new)		…..	<u>To be added</u>: HFO cooler for long recirculation line from Boiler to HFO day tank
20.0	3/138 of 223/3.2.2.1		One (1) LDO Day oil tank with necessary accessories.	One (1) LDO Day oil tank of capacity 500 m^3 with necessary accessories.
21.0	3/141 of 223/4.2.1		Design flow capacity, each: shall be minimum 200 Cu.m/hr	Design flow capacity, each: shall be minimum 125 Cu.m/hr
22.0	3/146 of 223/6.1.10 (c)		The strainer shall have screen of stainless steel (AISI-304) construction …… … be of 80 mesh.	The strainer shall have screen of stainless steel (AISI-316) construction …… … be of 80 mesh.
23.0	3/164 of 223/18 of Data sheet-A	LDO transfer pumps	Body steam jacketed - Yes	Body steam jacketed - Not Applicable

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
24.0	3/172 of 223/3.1 of Data sheet-A	HFO heater	MOC of tubes SA 285 GR.C or superior as per manufacturer standard.	MOC of tubes SA 179 or superior as per manufacturer standard.

VOLUME-III B

TURBINE GENERATOR AND AUXILIARIES

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	1/ 15 of 308/ 2.1.17 & 2.1.18	Characteristics of recirculation valve	ON/OFF low load recirculation feed control valve	Modulating recirculation feed control valve
2.0	1/ 19 of 308/ 2.2.9	Condensate storage tank	A reserve feed water tank-cum-condensate surge tank of adequate capacity	Condensate storage tank of adequate capacity
3.0	1/ 22 of 308/ 3.4	Condenser Pressure	77 mm Hg absolute.	76 mm Hg absolute.
4.0	1/23 of 308/ 3.10	Noise Level	The radiated sound level ……..from the outline of the Turbine Generator at the shaft centerline elevation at any load considering ……machine and auxiliaries.	The radiated sound level ……..from the outline of the Turbine Generator at any load considering ……machine and auxiliaries.
5.0	1/ 26 of 308/ 5.4	Maximum sustained steam pressure	The Turbine shall be capable …… …….. design Turbine inlet steam pressure.	The Turbine shall be capable of permitting a maximum sustained steam pressure as per prevailing IEC-45.
6.0	1/ 26 of 308/	Turbine	The turbine shall be	The turbine shall be

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	5.5	operation capability	capable of accepting variation in steam temperature and pressure as per IEC-45 in case continuous over pressure is likely.	capable of accepting variation in steam temperature and pressure as per IEC-45.
7.0	1/26 of 308/ 5.6	Turbine mode of operation	Turbine shall be suitable for two cycle shift operation	Turbine shall be suitable for base load operation
8.0	1/ 49 of 308/ 9.8	Noise level for HP/LP bypass Valves	Valves shall be so selected that the noise level is below 85 dB (A) at a distance of 1.0 M.	Valves shall be so selected that the noise level is below 95 dB (A) at a distance of 1.0 M.
9.0	1 / 54 of 308/ 11.8		ASYMMETRICAL SHORT CIRCUIT WITHSTAND The Generator shall also be capable of withstanding, without injury, any other short circuit at its terminals provided the integrated product of (I2)2 x t shall be upto ten (10).	ASYMMETRICAL SHORT CIRCUIT WITHSTAND The Generator shall also be capable of withstanding, without injury, any other short circuit at its terminals provided the integrated product of (I2)2 x t shall be calculated as per IEC 600034 and value shall be equal to or more than 5.7.
10.0	1 / 54 of 308/ 11.8.1		Unbalanced Load The Generator shall be	Unbalanced Load The Generator shall be

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			capable of continuous safe operation with a negative sequence current upto 8% of the rated current, provided none of the phase current exceeds the rated current.	capable of continuous safe operation with a negative sequence current up to 6.6% of the rated current, provided none of the phase current exceeds the rated current. As per IEC 60034
11.0	1 / 55 of 308/ 12.2		The stator core shall be fabricated one of best quality CRGO so that losses are minimum.	The stator core shall be fabricated one of best quality CRGO/ non-grain oriented cold rolled Silicon steel with low loss & high permeability.
12.0	1 / 59 of 308/ 12.10		Provision shall be made for easy change of slip ring connection for uniform wear of slip ring	Delete Refer Cl.12.15.3.2, Sec.1, vol.III- B.
13.0	1 / 62 of 308/ 12.13		Two (2) full capacity (2 x 100%) refrigeration type H2 drier with in-situ reactivation facility shall be provided.	H2 drier of the following types are acceptable (a) Two (2) full capacity (2 x 100%) refrigeration type H2 drier with dew point monitoring

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				facility. (b) Micro processor controlled Two (2) full capacity (2 x 100%) dual tower regeneration-Type H2 Gas Dryer, having activated alumina as desiccant with following features : pre filter, after filter, automatic reactivation of desiccant, dew point monitoring, closed loop reactivation system. Bidder can quote either (a) or (b) type dryer.
14.0	1 / 62 of 308/ 12.13		The valves in gas system shall be of special design to minimise gas leakage. Safety relief valves shall be furnished both on low and high pressure sides of the gas system.	**<u>To be added</u>** Bidder to ensure vent out discharge casing hydrogen to atmosphere in case of emergency to a location above the building top and this process shall

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			A manually operated vent valve shall be provided for discharging casing hydrogen to atmosphere in case of emergency to a location outside the building top.	be automatic and also manual provision kept.
15.0	1 / 67 of 308/ 12.15.3.2		a) (ii)Thyristor convertor with 100% redundancy along with gate firing circuits.	a) (ii)Thyristor convertor with N+2 redundancy along with gate firing circuits. N stands for number of power convertors for rated full load capacity.
			a) (iv)Field flashing system along with transformer and rectifier.	a) (iv) AC Field flashing system along with transformer and rectifier and DC field flashing system with suitable protection system.
			Newly added..	a)(vii)Provisions shall

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				be made for easy change of DC polarity of field winding for uniform wear of slip ring in excitation cubicle.
			Newly added..	a)(viii)MEAA meter shall be provided on HV side of excitation transformer for measurement of energy consumption of excitation system.
			(c) (ii)Protection---- Thyristor 100% redundancy shall be provided	(c) (ii)Protection---- Thyristor N+2 redundancy shall be provided
			(e)(i) Field Breaker..... Discharge contacts shall be rated to discharge the field energy	(e)(i)De excitation of generator field winding shall be done through thyristor switch

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			corresponding to the highest field current which may come during its entire operating range.	connecting non linear resistor to the generator field winding. Rating of thyristor will be subject to approval of owner.
16.0	1 / 71 of 308/ 12.15.4 (c)		Load Angle Limiter	Bidder should give detail write up of the system to ensure that load angle limiter function is covered in generator power diagram i.e, part of excitation system.
17.0	1/ 76 of 308/ Data sheet – 1.6 (c)		Two shift operation and cyclic load variation.	Deleted
18.0	1/ 76 of 308/ Data sheet – 1.7.1	Main Steam Pressure	Pressure: ~ 247 kg/cm2 (a)	Pressure: 247 kg/cm2 (a)
19.0	1/ 76 of 308/ Data sheet – 1.7.2	Turbine steam parameter at HP turbine inlet	Temperature: 565 deg C (minimum)	Temperature: 565 deg C
20.0	1/ 77 of 308/ Data sheet –	Turbine steam	Temperature: 593 deg C (minimum)	Temperature: 593 deg C

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	1.8.2	parameter at IP turbine inlet		
21.0	1/ 77 of 308/ Data sheet – 1.11.1	Condenser Pressure	Normal: 77 mm of Hg (a)	Normal: 76 mm of Hg (a)
22.0	2/ 102 of 308/ Data sheet – 4.3 (Feed Water Heater)	Design temperature (shell and tube side)	As per HEI Standards rounded-off to next higher 10°C	As per HEI Standards rounded-off to next higher 10°F
23.0	2/102 of 308/ Data Sheet –4.4 (Feed Water Heater)	Maximum tube side velocity	Maximum tube side velocity: Not to exceed 2.5 m/sec.	Maximum tube side velocity: As per HEI standard
24.0	3/113 of 308/ 1.1.4		The pumps shall be designed for efficient and reliable operation and shall be of proven design with at least five years of satisfactory operating experience.	Deleted
25.0	3/ 121 of 308/ 3.1.23, & 149 of 308/ Data Sheet – 1.6	% of make-up	3% make-up	1% make-up

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	(Boiler feed Pump)			
26.0	3/ 125 of 308/ 3.3.7		Rating of the motor shall be selected with at least 5% margin for HT motor & 10% for LT motor over the maximum power required within the range of operation.	Bidder should follow as per Volume-IVA/ Section-10 Cl no 4.1.6 - "Motor Name plate rating shall have at least 10% Margin over the input power requirement of the HT Driven equipment and 15% for LT Driven equipment at rated Duty Point"
27.0	3/143 of 308/ 5.19.5 (c)	Exhaust Duct material	Exhaust Duct: Round exhaust ducts shall be fabricated in accordance with ASTM A-155 Grade KC-60, Class-2 or approved equal.	Exhaust Duct: Round exhaust ducts shall be fabricated in accordance with ASTM A 672 or approved equal.
28.0	3/151 of 308/ Data Sheet –1.19 (Boiler feed Pump)	Maximum Vibration level	Maximum Vibration level at all operating conditions: VDI 2056 Group G Degree Good	Maximum Vibration level at all operating conditions: ISO 10816.
29.0	4/163 of 308/ 2.1	Design of condenser	HEI standards or equivalent shall be followed for thermal design and IS-2825 for	HEI standards or equivalent shall be followed design of condenser.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			strength design of condenser.	
30.0	4/165 of 308/ 4.1	Condenser performance requirement	The Condenser shall be designed such that …… …… …… …… …….. differential across the Condenser shall remain within 9.5 °C (during maximum thermal load).	The Condenser shall be designed such that steam received from the Turbine exhaust during Turbine VWO operation with 1% make-up, all heaters in service, and Auxiliary Turbine Drive of Boiler Feed Pump engaged, can be condensed along with other heat rejections like all heater drains & vents diverted to the Condenser etc. maintaining the Condenser pressure of 76 mm of Hg (A) or lower with 5% of tube plugged and having a tube cleanliness factor of 90%.
31.0	4/169 of 308/ 5.1.3	Condenser tube plates material	The Condenser tube plates shall be of carbon steel conforming to ASTM A285 Gr. C.	The Condenser tube plates shall be of carbon steel conforming to SA 516 Gr. 70
32.0	4/169 of 308/ 5.1.3	Condenser tube material	The tubes shall be SS304, seamless, solid drawn type,	The tubes shall be SS316, welded, manufactured and

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			manufactured and tested in accordance with the approved standard.	tested in accordance with the approved standard.
33.0	4/177 of 308/ Data Sheet –22.5 (Condenser)	Condenser tube material in condensing section	SS-304	SS-316
34.0	4/177 of 308/ Data Sheet –22.6 (Condenser)	Condenser tube material in air cooling section	SS-304	SS-316
35.0	5/191 of 308/ Data Sheet – 1.2	Capacity of clean and dirty oil tanks	120% of the total oil quantity in the oil system inclusive of main oil tank.	150% of the total oil quantity in the oil system inclusive of main oil tank.
36.0	6/207 of 308/ 3.13		Vendor should offer proven technology, which has a successful operation track record for minimum 2 years in supercritical power plant.	Deleted

VOLUME-III C

COAL HANDLING SYSTEM

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	/12 of 245/2.1.22	Belt Weighter	Inline conveyor scale/belt weigher shall be provided on each of conveyors 2A & 2B, 4A & 4B and boom conveyors.	Inline conveyor scale/belt weigher shall be provided on each of conveyors 2A & 2B, 4A & 4B, Conv. 8 and boom conveyors.
2.0	/13 of 245/2.1.25		The entire coal handling plant shall be designed so that both the streams and equipment can be run at rated capacity simultaneously and safely without any problem.	The entire coal handling plant shall be designed so that both the streams and equipment can be run at designed capacity simultaneously and safely without any problem.
3.0	/14 of 245/3.1.6		Steel Grating (heavy duty) of 250 mm square openings over wagon tippler hoppers……. shall be 16 mm.	Steel Grating (heavy duty) of 300 mm square openings over wagon tippler Hoppers……..shall be 16 mm.
4.0	/19 of 245/3.9.4	Crusher House Elevator	One elevator in crusher house	One elevator of rack and pinion type in crusher house
5.0	/23of 245/5.1.2		The rated capacity…....min.25% more than the rated capacity.	The design capacity of coal handling system shall be 1500 TPH. For design of structural selection of belt etc. the design capacity shall be

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				minimum 10 % more than design capacity.
6.0	/48 of 245/5.5.11 (New)	Apron feeder	…….	Apron feeder shall be designed to operate when wagon tippler hopper is full of coal.
7.0	/48 of 245/5.5.12 (New)	Apron feeder	……..	Apron feeder shall be designed as per latest RDSO specifications.
8.0	/51 of 245/5.7.17 (New)	Side Arm Charger	……..	Side arm charger shall be designed as per latest RDSO specifications.
9.0	/98 of 245/5.3(b)		(a) Bunker Level Indicators (Ultrasonic type)	(a) Bunker Level Indicators (3D Acoustic type)
10.0	/115 of 245/10	Belt width	(a) Before crusher - 1400 mm (b) After crusher - 1200mm (c) Reversible Belt Feeder -2000mm (d) Belt Feeder - 2000mm	(a) Before crusher - 1400 mm (b) After crusher - 1200mm (c) Reversible Belt Feeder -1600mm (d) Belt Feeder - 1600mm

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
11.0	/115 of 245/16 (New)	Conveyors	-------	**To be added:** (a) Capacities (Conveyors:1A/B, 2A/B,3A/B,4A/B ,5A/B,6A/B,7) (i) Rated - 1200 TPH (ii) Design-1500 TPH (b) Conveyor8: (i) Rated - 450 TPH (ii) Design - 500 TPH
12.0	/145 of 245/1.5	Belt Feeders /Reversible Belt Feeders	Capacity – 1500 TPH (Rated)	Capacity – 1200 TPH (Rated) 1500 TPH (Design)
13.0	/123 of 245/8.0	Gear Box	(a) Helical – In general Bevel (b) Helical– Wherever required and in Bunker House (c) Worm – for Belt Feeder, if	(a) Helical – In general Bevel (b) Helical– Wherever required and in Bunker House (c) Helical – for Belt Feeder, if

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			required	required
14.0	/151 of 245/1.7	Motorised Travelling Tripper	Capacity – 1200 TPH	Capacity – 1200 TPH (Rated) 1500 TPH (Design)
15.0	/166 of 245/	Electrical Hoist	Electrical or manual to be decided based on capacity (All hoists above 3T shall be electrically operated).	Hoists above 1 Tonne shall be electric
16.0	/173 of 245/13.0	Woobler Feeder	…….	**To be added:** Capacity – 1200 TPH (Rated) 1500 TPH (Design)
17.0	/177 of 245/4.8	Crusher		**To be added:** Capacity – 1200 TPH (Rated) 1500 TPH (Design)
18.0	/179 of 245/1.3	Stacker cum Reclaimer	Stacking Capacity : 1500 TPH(Rated)	Stacking Capacity : 1200 TPH (Rated) 1500 TPH (Design)
19.0	/179 of 245/1.4	Stacker cum Reclaimer	Reclaiming Capacity : 1500 TPH(Rated)	Reclaiming Capacity : 1200 TPH (Rated) 1500 TPH (Design)
20.0	/193 of 245/3.0	Apron Feeder and Dribble Feeder	Capacity – 1500 TPH(Rated)	Capacity : 1200 TPH (Rated) 1500 TPH (Design)

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
21.0	/223 of 245/5.0 (new)	GHP capacity	…….	**<u>To be added</u>** Capacity = 150 Tonnes
22.0	/225 of 245/5.0 (new)	Vibro feeder capacity	……..	**<u>To be added</u>** Capacity = 450 TPH
23.0	/217 of 245/	Ventilation	Supplying fresh air to Under ground portion of WT-1 & WT-2, tunnel PART of Conv. 1A/B IN TP-1 to TP-2	Supplying fresh air to Under ground portion of WT-1 & WT-2, tunnel PART of Conv. 1A/B IN TP-1 to pent house.
24.0	/57of 247/11 of corrigendum - I	Pay loaders	Necessary Pay loader (Minimum 4) of adequate capacity along with Two (2) sets of mandatory spares	Necessary Pay loader (Minimum 8) of adequate capacity along with Two (2) sets of mandatory spares
25.0	/63 of 247/36 of Corrigendum-I	Idlers	Type of Bearing: Split case	Type of Bearing: Antifriction Ball/Roller
26.0	/63 of 247/44 of Corrigendum-I		Lump size =300mm	Lump size =300mm for RBF-1 & RBF-2. Lump size=(-)20mm for RBF-3,RBF-4& Belt feeder.

VOLUME-III D

ASH HANDLING SYSTEM

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	/13 of 175 /3.3.3(c) & 3.3.5(g)		Radar type Ash level transmitter and Radio frequency type level switch	3D Acoustic type level transmitter and Radio frequency type level Switch
2.0	/16 of 175/3.4.3		Any type of slurry (BA & CA) shall have the flexibility of being led to any one of two compartments of the slurry sump. There shall be two (2) sets of slurry pumps (Each set shall constitute approximately five /six slurry pumps connected in series). However, final number of pumps in series in each slurry pumping set shall be decided during detail engineering. The system shall preferably be selected avoiding a booster pumping station. Out of two, one (1) series shall be working and one (1) series shall be standby. Each pump shall be of identical duty conditions. At least the pumps in 1st stage shall have scoop controlled	Any type of slurry (BA & CA) shall have the flexibility of being led to any one of two compartments of the slurry sump. There shall be two (2) sets of slurry pumps (Each set shall constitute approximately five /six slurry pumps connected in series). However, final number of pumps in series in each slurry pumping set shall be decided during detail engineering. The system shall preferably be selected avoiding a booster pumping station. Out of two, one (1) series shall be working and one (1) series shall be standby. Each pump shall be of identical duty conditions. At least the pumps in 1st stage shall have scoop controlled

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			fluid couplings to vary the duty point within (-) 45% to (+) 10% of design duty point. Space shall be kept in ash slurry pump house for future one stage. There shall be two (2) slurry pipes running cross-country from slurry pump discharge to ash dump area out of which one (1) shall be working and one (1) shall remain as standby. The cross-country slurry concentration by weight for bottom ash and coarse ash shall be 20 - 25%. The grade level elevation at ash disposal area is about 60 M above the plant grade level. Final dyke height shall be considered at EL281 M for estimating slurry pumping head. All pipe/fittings & supports shall be suitable to take that load at hydro-test condition.	fluid couplings to vary the duty point within (-) 45% to (+) 10% of design duty point. Space shall be kept in ash slurry pump house for future one stage. There shall be two (2) slurry pipes running cross-country from slurry pump discharge to ash dump area out of which one (1) shall be working and one (1) shall remain as standby. The cross-country slurry concentration by weight for bottom ash and coarse ash shall be 20 - 25%. The final height to be considered for bottom ash and fly ash slurry pumps design shall be RL (+) 281m. The plant grade level 208.5(FGL) and dyke height 281 shall be referred to for B.A & HCSD pump design. The B.A pump house shall be designed considering a space provision for future addition of one more pump in each pump

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				series.
3.0	/26 of 175/4.3.1 (f)		Total Five (5) [Three working and two stand by] oil free non lubricated water cooled type screw compressor for pneumatic ash conveying. Two compressors shall be dedicated for transfer of ESP ash to HCSD silo and one for transport of ash from HCSD silo to remote silo. Each ash conveying screw compressor (dry type) shall be complete with intercoolers, after coolers, intake air filter cum silencer, discharge valve with non return valve, relief valve and all necessary instrumentation for supplying conveying air to the system. Each compressor shall be provided with adequately sized air receiver (minimum 20 m3) at its discharge to accommodate variable	Total Six (6) [Four working and two stand by] oil free non lubricated water cooled type screw compressor for pneumatic ash conveying. Three compressors 3 (2W+1S) shall be dedicated for transfer of ESP ash to HCSD silo and Three compressors 3 (2W+1S) for transport of ash from HCSD silo to remote silo. Each ash conveying screw compressor (dry type) shall be complete with intercoolers, after coolers, intake air filter cum silencer, discharge valve with non return valve, relief valve and all necessary instrumentation for supplying conveying air to the system. Total Five (5) air receivers shall be provided to accommodate variable pressure and flow requirement for

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			pressure and flow requirement for transporting ash. Besides, one number air receiver shall be provided near ESP hopper and one air receiver is envisaged near HCSD silo area. Each Air Receiver shall be complete with all fittings, vent connection, auto trap drain stations, relief valves, instrumentation, valve fittings, supports etc. Alternatively centrifugal type oil free non lubricated water cooled compressor shall also be considered.	transporting ash. Two Air receivers common for 3 compressors (ESP to HCSD) of capacity 10m³, Two Air receivers common for three compressors (HCSD to Remote) of capacity 10m³ and one receiver of capacity 20m³ near ESP. Each Air Receiver shall be complete with all fittings, vent connection, auto trap drain stations, relief valves, instrumentation, valve fittings, supports etc. Alternatively centrifugal type oil free non lubricated water cooled compressor shall also be considered.
4.0	/31 of 175 /4.6	Raw ash water pipelines	Two (2) Pipelines shall be laid from Raw ash water pump discharge for the same.	One (1) Pipelines shall be laid from Raw ash water pump discharge for the same.
5.0	/32 of 175 /4.12		FA silo floor washing pumps with drives, valves, pipelines, fittings, accessories etc. These shall be located near HCSD silo and remote silo.	Two (2) Nos.(1W+1S)FA silo floor washing pumps with drives, valves, pipelines, fittings, accessories etc. shall be located at each silo.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				(HCSD silo and remote silo)
6.0	/36 of 175/4.21.16		HCSD pump inlet/outlet piping along with all valves/fitting/expansion joints/loops, clamps, thrust block, pressure monitor devices and other accessories including dense slurry piping & fittings as required, shall be provided up to the disposal area covering a distance of about 12 km, considering the pipe routing around the periphery of the HCSD disposal area. The grade level of disposal area is about approximately 60 m higher than the main plant grade level. This aspect shall be taken into consideration for selecting the pump head and final dyke height shall be considered at EL 281 M.	HCSD pump inlet/outlet piping along with all valves/fitting/expansion joints/loops, clamps, thrust block, pressure monitor devices and other accessories including dense slurry piping & fittings as required, shall be provided up to the disposal area covering a distance of about 12 km, considering the pipe routing around the periphery of the HCSD disposal area.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
7.0	/47 of 175/5.6.1		Bottom Ash : 270 TPH @20-25% by weight for 12 km route length with 60 M static lift.	Bottom Ash : 270 TPH @20-25% by weight for 12 km route length
8.0	/47 of 175/5.6.2		Fly Ash : 300 TPH (Dry ash basis) @65-70 % by weight for 12 km route length with 60 M	Fly Ash : 300 TPH (Dry ash basis) @65-70 % by weight for 12 km route length.
9.0	/56 of 175/6.7.3		Necessary heating arrangement with a suitable bypass shall be …… Least 150°C.	Necessary heating arrangement with a suitable bypass shall be …… Least 200°C.
10.0	/71 of 227/1.0 of corrigendum -1	Ash Handling System	Fly ash is considered to be collected in Electrostatic Precipitator (ESP). There shall be requisite number of hoppers in ESP. Ash from all these hoppers shall be transported pneumatically under pressure. The total fly ash shall be conveyed in Six (6) streams (minimum) operating simultaneously and in parallel, to two (2) HCSD Silos (dedicated for HCSD). From HCSD silos, ash shall be	Fly ash is considered to be collected in Electrostatic Precipitator (ESP). There shall be requisite number of hoppers in ESP. Ash from all these hoppers shall be transported pneumatically under pressure. The total fly ash shall be conveyed in Six (6) streams (minimum) operating simultaneously and in parallel, to two (2) HCSD Silos (dedicated for HCSD). From HCSD silos, ash shall be

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			transported pneumatically under pressure to one (1) remote Dry Fly ash Silo (dedicated for dry/conditioned disposal of ash through closed/open trucks/rail wagons). Ash in pressure conveying shall be conveyed through Six (6) Pressure conveying streams with the aid of Two (2) (1W+1S) screw type/Centrifugal type conveying compressors. Bidder shall also consider the possibility of conveying fly ash from ESP Hoppers directly to Remote silo. The system shall be suitable for delivering ash either to in-plant silos for HCSD feeding or to remote silo for truck/rail wagon disposal and both shall be covered under the performance guarantee fulfilment requirement. For conveying ash from	transported pneumatically under pressure to one (1) remote Dry Fly ash Silo (dedicated for dry/conditioned disposal of ash through closed/open trucks/rail wagons). Ash in pressure conveying shall be conveyed through Six (6) Pressure conveying streams with the aid of Three (2W+1S) screw type/Centrifugal type conveying compressors. The system shall be suitable for delivering ash either to in-plant silos for HCSD feeding or to remote silo for truck/rail wagon disposal and both shall be covered under the performance guarantee fulfilment requirement. For conveying ash from HCSD silos to remote silo, Three (2W+1S) Compressors shall be provided.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			HCSD silos to remote silo, Two(2)(1W+1S) compressor shall be provided.	
11.0	/72of 247 /3.0 of Corrigendum-1	Compressors	(a) Total Four (4) [Two working and two stand by] oil free non lubricated water cooled type screw type/centrifugal type compressors for pneumatic ash conveying. (b) One compressor shall be dedicated for transfer of ESP ash to HCSD silo and one for transport of ash from HCSD silo to remote silo	(a) Total Six(6) (Four working and two stand by) oil free non lubricated water cooled type screw type/centrifugal type compressors for pneumatic ash conveying. (b) Three compressors (3 x 50%) (2W+1S) shall be dedicated for transfer of ESP ash to HCSD silo and Three compressors (3 x 50%) (2W+1S) shall be dedicated for transfer of ash from HCSD silo to remote silo
12.0	/74 of 247 /10.0 of Corrigendum-1		Number – Four (4) (2W+2S). One (1) is working for ESP to HSSD silo, One (1) is	Total Six (6) [Four working and two stand by] oil free non lubricated water cooled type

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			Working for HCSD silo to remote silo. One (1) each standby for ESP to HSSD silo and HCSD silo to remote silo. Capacity and pressure shall be as per requirement	screw type/centrifugal type compressors for pneumatic ash conveying.
13.0	/74 of 247 /13.0 of Corrigendum-1		Four (4) (2W+2S) One working for ESP to HCSD silo, One working for HCSD silo to remote silo	Total Six(6) [Four working and two stand by] oil free non lubricated water cooled type screw type/centrifugal type compressors for Pneumatic ash conveying. (3X50%(2W+1S) for conveying ash from ESP hoppers to HCSD silo & 3X50% (2W+1S) for conveying ash from HCSD silo to Remote silo)

VOLUME- III E1

WATER TREATMENT SYSTEMS

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	1/ 15 of 313 / 2.5 & Process Flow diagram (PE-189-PF-227).		Three numbers (3 x 50%) horizontal type Clear water transfer pumps – These pumps shall supply clear water to the Ash water sump, CHP Dust Suppression, Horticulture/Gardening.	Till ETP is commissioned Service water shall be drawn from Service water storage tank and after Commissioning of ETP service water shall be drawn from clear water storage tank.
2.0	2 /27 of 313 / 1.1	Gravity Filters for DM & for Non-DM	The clarified water from Clariflocculators shall flow through channels and shall then be passed through independent Gravity Filters for DM & for Non-DM, each having designed flow rate (indicative) of 50 m^3/hr & 2000 m^3/hr respectively.	The clarified water from Clariflocculators shall flow through channels and shall then be passed through independent Gravity Filters for DM & for Non-DM, each having designed flow rate (indicative) of 100 m^3/hr i.e. 2 x 100% for DM & cap. of 100 m^3/hr each & 2000 m^3/hr i.e. 9 Nos (8 W + 1 S) & cap. Of 250 m^3/hr for Non-DM respectively.
3.0	Dwg. No. PE-189-PI-249, Rev P0	Raw water header pipe	A common Raw water header pipe is indicated.	Two (2) Raw water header pipes of suitable length complete with all accessories.
4.0	2 / 30 of 313 / 2.1.24	Gravity Filter air blowers	Four (4) Gravity Filter air blowers complete with drive motors,	Four (4) Gravity Filter air blowers ((1 W +1 SB) for DM & (1 W +1

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			suction filter, suction and discharge silencers, relief valve etc.	SB) for Non DM) complete with drive motors, suction filter, suction and discharge silencers, relief valve etc.
5.0	2 / 32 of 313 / 3.1.9	Gravity filter	Two (2) Gravity filters shall be installed for DM & Non-DM respectively.	2 x 100% & cap. of 100 m^3/hr each For DM chain & 9 Nos (8 W + 1 S) & cap. Of 250 m^3/hr each for Non DM complete with drive motors, suction filter, suction and discharge silencers, relief valve etc.
6.0	2 / 32 of 313 / 3.1.9	Gravity filter	Characteristics of Media: 19.7.4 Effective size, mm: Around 0.45 19.7.5 Uniformity Coefficient: 1.6 - 1.65 19.7.6 Silica % (minimum): 90	Characteristics of Media: 19.7.4 Effective size, mm: 0.45 to 0.7 mm. 19.7.5 Uniformity Coefficient: 1.3 - 1.7 19.7.6 Silica % : >99.8
7.0	2 /33 of 313 / 3.1.9	Gravity filter	The depth of gravel in filter bed shall not be less than 50 cm	The depth of gravel in filter bed shall not be less than 450 mm
8.0	2 / 33 of 313 / 3.1.9	Gravity Filter	The velocity of water during backwashing	The velocity of water during backwashing

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
		Blower	shall not be less than 30 m/hr, when air scouring is employed.	shall not be less than 35 m/hr, when air scouring is employed.
9.0	2 / 46 of 313 / 5.2.4	Clarifloccu lator	Minimum Residence time in Draft Tube : 1 min	Deleted
10.0	2 / 54, 56, 57, 59, 60, 61, 62 of 313 / 12.1, 13.1, 14.1, 15.1, 16.1, 17.1, 18.1	Pre Treatment Chemical Injection pump	Two (2) (One working common for DM & for Non-DM and one as standby)	Two (2) (1 W+1S) for DM & 2 nos (1 W+1S) for Non DM
11.0	3 /160 of 313 / 29.2.4	Neutralizat ion Pit	Effective capacity of each Compartment, in m^3: Suitable to hold waste effluent generated from regeneration of two (2) complete DM chains + 20% overall margin.	Effective capacity of each compartment, in m^3: Suitable to hold waste effluent generated from regeneration of one (1) complete chain plus 20% margin.
12.0	3 / 101 of 313 / 3.3.14	Cation & Anion Exchanger	Bed depth of inert resin : 150mm	Bed depth of inert resin : 100mm
13.0	3 / 109 of 313 / 6.2.3	Degasser Water Storage Tank	Effective capacity, in m^3 : Suitable to hold down stream water requirement for one (1) DM Chain for 1 hr + water requirement for	Effective capacity, in m^3: Suitable to hold down stream water requirement for one (1) DM Chain for 1 hr + water requirement for

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			regeneration or 250 m^3 whichever shall be higher.	regeneration or 120 m^3 whichever shall be higher.
14.0	4 / 171 of 313 / 1.2.9	Side Stream Filtration System	The redundancy in the Side Stream Filtration System shall be at least 15 %with a minimum of two (2) modules as standby..	The redundancy in the Side Stream Filtration System shall be at least 15 %with a minimum of two (1) module as standby.
15.0	4 / 2.1.1 / 216 of 313	Automatic Valveless Gravity Filters	Automatic Valveless Gravity Filters Number: Eight (8) (Seven working + One standby)	Automatic Valveless Gravity Filters Number: Eight (8) (Seven working + One standby) each of cap 250 m^3/hr.
16.0	4 /231 of 313 / 4.5 (d)	Oil Water Separator	The Treatment System shall be designed based on the parameters as follows: (a) Suspended solids in treated water : 50 mg/l.	The Treatment System shall be designed based on the parameters as follows: (a) Suspended solids in treated water: 20 mg/l.
17.0	5/312 of 313/5.4.3 (a)	Oil Water Separator	(a) The unit shall have rated output capacity not less than 100m^3/hr (net).	(a) The unit shall have rated output capacity not less than 50m^3/hr (net).
18.0	5/ 232 of 313 / 4.6 & 5/ 312 of 313 /	Coal pile run-off water	Coal pile run-off water quantity :- 400 m3/hr	Capacity shall be adequate based on 100 m^3/hr inlet flow (rain

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	5.4.3 (b)-(i) 5 /Datasheet A / 266 of 313/4.2.2 (C)	quantity	Effective capacity: - Capacity shall be adequate based on 100 m3/hr inlet flow (rain intensity 1hr peak rainfall shall be considered.)	intensity 1hr peak rainfall shall be considered.)

VOLUME- III E2

MAIN AND AUXILIARY COOLING WATER SYSTEMS

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	1/20 of 113/ 3.3.2	Capacity of Boiler fill pump	One (1) BF pump in operation shall be capable of filling up the boiler and deaerator in one (1) hour (maximum).	One (1) BF pump in operation shall be capable of filling up the boiler OR deaerator in maximum TWO (2) hours (higher of the two)
2.0	3A/56 of 113/ 5.11.2 (c)	ACW pump power rating	Pump shaft input power ……..pump (s) operating in parallel.	Deleted

VOLUME-III F

PIPING, SPECIALTIES & THERMAL INSULATION

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	1/33 of 158/ 7.4.8		Owner shall provide only the main steel work or embedded plates in the concrete.	Deleted
2.0	1/40 of 158/ 7.5.1.22		Each valve hand wheel shall be fitted with a **circular nameplate** of …… ……of the valve.	Each valve shall be fitted with **rectangular nameplate** of …… ……of the valve.
3.0	3/98 of 158/ 3.2.1		The expansion joints will be used …… …… **suction** to absorb relative movement between C.W. Pipes and respective equipment.	The expansion joints will be used …… …… **discharge** to absorb relative movement between C.W. Pipes and respective equipment.

VOLUME-III G

COMPRESSED AIR, AIR-CONDITIONING

& VENTILATION SYSTEMS

CONSULTANT : PROCON ENGINEERS

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	2/66 of 171 /3.6 & 3.7		3.6) CW-ACW Pump House and its associated electrical room 3.7) Fuel Oil Heating & Pressurising pump house and its associated electrical room.	3.6) CW-ACW Pump House control room 3.7) Fuel Oil Heating & Pressurising pump house control room.
2.0	3/122 of 171 /3.35 & 3.36(new)		…….	3.6) CW-ACW Pump House and its associated electrical room 3.7) Fuel Oil Heating & Pressurising pump house and its associated electrical room.
3.0	3/118 of 171 /3.8		Battery Charger Room	deleted
4.0	3/67 of 171 /3.18(new)		……	Battery Charger Room
5.0	3/118 of 171 /3.8	Permanent store, inflammable store	Wall mounted exhaust fans with fire dampers. Fans shall be of spark proof construction & with flameproof motor.	For inflammable store, wall mounted exhaust fans with fire dampers shall be provided. Fans shall be of spark proof construction and with flameproof motors. For

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				other permanent store, wall mounted exhaust air fans (not spark proof construction) without fire damper shall be provided. Motors also shall not be flameproof construction.
6.0	3/126 of 171 /5.3.1		There shall be at least Three (3) Air Washer for STG building to make the duct layout simpler and shorter and to reduce the size of ducts.	There shall be at least Four (4) Air Washer for STG building to make the duct layout simpler and shorter and to reduce the size of ducts.
7.0	3/126 of 171 /5.2.12		All dry type transformers shall be provided with independent exhaust fans.	All dry type transformers shall be provided with natural air circulation "AN"

VOLUME-III H

FIRE PROTECTION AND DETECTION SYSTEM

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	/18 of 123/3.12.5		NFPA/BS guideline/codes shall be followed for fire alarm system.	NFPA/BS guideline/codes and IS codes shall be followed for fire alarm system.
2.0	/16 of 123/3.8		Rate of rise cum fixed temperature heat detectors shall be used for Boiler Burner fronts & turbine oil tanks. Heat detectors shall be analogue addressable type	Rate of rise cum fixed temperature heat detectors shall be used for Boiler Burner fronts & QBD turbine oil tanks. Heat detectors shall be analogue addressable type
3.0	/32 of 123/5.2.7		Design & construction of foundation of fire water steel storage tanks mentioned above.	deleted
4.0	/58 of 123/7.6.18 & /112 of 123/6.3		The Dual wavelength Infrared Flame Detector shall be provided in Boiler Burner front and Turbine Oil tanks to provide an alarm in case of fire.	QBD and ROR detectors shall be provided in Boiler Burner front and QBD Turbine Oil tanks to provide an alarm in case of fire.
5.0	/95 of 247/3 of corrigendum -I		To be added: 5.1.32 Transformers of 220 KVA and above shall be Provided with Nitrogen Injection based Fire Protection System in	Nitrogen Injection based Fire Protection system shall be provided to Generator transformer,Station tranformer and Unit

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			addition to HVW Spray system.	Aux.Transformer (in addition to HVW Spray system.)

VOLUME-III I

MATERIAL HANDLING AND MISCELLENEOUS EQUIPMENTS

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	1/B/58 of 328/3.1.1(b)		One (1) goods cum passenger elevator complete with all accessories to be located in the B-C Bay.	One (1) goods cum passenger elevator of conventional type complete with all accessories to be located in the B-C Bay.
2.0	1/A/20 of 328/4.4.1		The lifting hooks in vertical position shall reach at least 2.5 m in case of all cranes.	The lifting hooks in vertical position should reach at least upto 5m from the end stopper in case of turbine hall cranes and upto 2.5m in case of all other cranes.
3.0	1/A/20 of 328/4.4.2		Either the main or the auxiliary hook in vertical position should reach at least up to 1.0 m for all cranes.	Either the main or the auxiliary hook in vertical position should reach at least upto 1.5m from the runaway rails in case of turbine hall cranes and upto 1.0mt for all other cranes.
4.0	1/B/69 of 328/6.10		Emergency exit	deleted
5.0	1/B/77 of 328/3.0 Datasheet A (Elevator for steam generator, Power house building,		Rated speed=0.5m/sec	Rated speed=1m/sec

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	Service building)			
6.0	1/B/78 of 328/19.0(Datasheet)	Power Supply	Power supply for Lighting and fan inside the car shall be 240volts, 1 phase, 50 c /s, 3 wire system.	Power supply for Lighting and fan inside the car shall be 240volts, 1 phase, 50 c /s, 2 wire system with proper earthling.
7.0	Annexure-I of Vol:III-I, Sec-3/D, pg 211/328,	DM water storage tank, Condensate storage tank	(a) DM water storage tank in the vicinity of DM plant Nominal capacity : 850 m^3. & (b) Condensate storage tank near Compressor house Nominal capacity : 1000 m^3	(a) DMWT : 1000 m^3 CST : 850 m^3

VOLUME - IVA

ELECTRICAL

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	Section 1 / Page 15 / Cl.No.1.6(t) (Of Volume–IV A)		Variable Frequency drives	If radial fan is provided then VFD shall be applicable.
2.0	Section 1 / Page 18 / Cl.No.1.8.1(b) & 8.0 (Of Volume–IV A)		Electrical system studies by manual calculations & ETAP except load flow & transient stability study which may be done on approved software.	1) All studies shall be done by manual as well as on E-tap software. 2) Load flow & transient stability studies shall be done on E-tap only
3.0	Section 1 / Page 19 / Cl.No.2.1.1		EHV connection for Generator transformers and station transformers at Bus Post Insulator (BPI) shall be done by switchyard contractor. Balance connection from Bus Post Insulator (BPI) to LA and then LA to bushing of Generator Transformers and Station Transformer's bushing shall be arranged by power plant EPC contractor. The connector for drop conductor to BPI	EHV connection for Generator transformers and station transformers at Bus Post Insulator (BPI) shall be done by switchyard contractor. Balance connection from Bus Post Insulator (BPI) to LA and then LA to bushing of Generator Transformers and Station Transformer's bushing shall be arranged by power plant EPC contractor. The connector for drop

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			shall also be arranged by power plant EPC contractor. Supply of conductor and stringing of over head conductors from Power House wall to nearest intermediate gantry of 400 kV and intermediate gantry to 400 kV switchyard gantry will be done by switchyard contractor. All 330 kV Lightning Arrestors and 400kV Bus Post Insulators including connector, intermediate gantries will be supplied & Installed including Civil foundation under this power plant EPC package. Provision of hooking arrangement at A-axis wall shall be in power plant EPC package. Installation of 330 kV LA, 400kV BPI, 400kV intermediate gantry including civil foundation, grounding etc will be under the scope of power plant EPC Bidder.	conductor to BPI shall also be arranged by power plant EPC contractor. Supply of conductor and stringing of over head conductors from Power House wall to nearest intermediate gantry of 400 kV and intermediate gantry to 400 kV switchyard gantry will be done by switchyard contractor. All 330 kV Lightning Arrestors and 400kV Bus Post Insulators including connector, intermediate gantries will be supplied & Installed including Civil foundation under this power plant EPC package. Provision of hooking arrangement at A-axis wall shall be in power plant EPC package. Installation of 330 kV LA, 400kV BPI, 400kV intermediate gantry including civil foundation, grounding etc will be under the scope of power plant EPC Bidder.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				The scope of electrical works shall cover the complete area in the plot plan as well as all the areas wherever equipment has to be supplied and erected by EPC contractor.
4.0	Section 1 / Page 20/ Cl.No.2.1.2(b) (Of Volume–IV A)		All cable trenches and tray work within power plant area & upto the 400kV Switchyard fancing/ Switchyard control room as per switchyard requirement	Refer Corrigendum-II, for Sr.3 of Table-1, Annexure-D, for cabling scope.
5.0	Section 1 / Page 21 / Cl.No.2.1.2 (f (v)) (Of Volume–IV A)		Power Plant grounding grid is to be interconnected with existing 500 MW unit grounding grid at 4 locations. This is in scope of power plant EPC vendor.	Power Plant grounding grid is to be interconnected with existing 500 MW unit grounding grid at 4 locations. This is in scope of power plant EPC vendor. & Earthing grid Interconnections to be spaced equally from transformer yard to chimney. Refer dwg.PE-189-GA-101.
6.0	Section 1 / Page 20/ Cl.No.2.1.2(e		Complete cabling work…… Power Plant EPC vendor shall also	Refer Corrigendum to Sr. No. 3 of Table - 1 Annexure -D enclosed.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	) and Ann.-D sr. no. 3.0 (Of Volume–IV A)		provide **required no. of cable trays for laying** HT Cable, LT Power and Control and all other cables for interfacing with 400kV Switchyard	
7.0	Section 1 / Page 21/ Cl.No. 3.1.1 (Of Volume–IV A)		The bidder shall submit the copies of the English versionof all standards during detailed Engineering.	The bidder shall submit the CDs of all standards during detailed Engineering
8.0	Section 1 / Page 27/ Cl.No. 5.9.7 (Of Volume–IV A)		Twelve (12) Nos. dry type LT Transformers, connected to ESP Six (6) Nos of LT PMCC by non-segregated phase bus duct, are envisaged. LT transformers shall be fed from 11KV unit switchgear feeder, Six (6) Nos.from each unit switchgear, through cables. AC & ventilations for ESP control building and VFD building shall be provided from this ESP switchboard. ID fan MCC shall be feed from ESP LTPMCC.	Adequate rating/quantity of 11/0.433kV ESP LT Transformers shall be provided & the same shall be connected to ESP LT PMCCs for feeding ESP loads after owner's approval. This ESP LT Transformers shall be fed from each 11kV Unit Switchgear panel directly. (Separate 11KV ESP switchgear is deleted and this shown in Key SLD Revision P3).

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
9.0	Section 1 / Page 29/ Cl.No. 5.11 (Of Volume–IV A)		VFD panels for ID Fans	If radial fan is provided then VFD shall be applicable.
10.0	Section 1 / Page 30/ Cl.No. 6.1.12 (Of Volume–IV A)		Number of rails and rail gauge will be well coordinated with number of wheels and orientation of all large transformers including those in switchyard right from unloading bay of Power House.	Number of rails and rail gauge will be well coordinated with number of wheels and orientation of all large transformers including those in switchyard right from unloading bay of Power House. Bidder to ensure the continuity of rail track from switchyard side & matching of rail gauge.
11.0	Section 1 / Page 32/ Cl.No. 6.3.3 (Of Volume–IV A)		Separate rooms shall be provided for batteries with lay down space for one identical battery set. Battery charger and D.C. distribution board will be located in different room.	No spare space is required. Single tier battery system to be provided.
12.0	Section 1 / Page 34/ Cl.No. 6.4.9 (Of Volume–IV		During design stage adequate space shall be provided for expansion of board on either side to accommodate addition	Space provision for one vertical section for only HT panel shall be considered.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	A)		of panel to take care of unforeseen factors.	
13.0	Section 1 / Page 35/ Cl.No. 6.5.1 (Of Volume–IV A)		Space for accommodating additional trays, which may come in future shall be provided in present cable route. Some trays may be required for future use by others, which will be finalized during detail engineering stage. The successful bidder of the EPC package shall provided such trays without any extra cost to purchaser.	Space for accommodating 10 % additional power & control trays, which may come in future shall be provided in present cable route. The successful bidder of the EPC package shall provide such space without any extra cost to purchaser.
14.0	Section 1 / Page 38/ Cl.No. 10.1 (Of Volume–IV A)		In line with the present-day practice unitized control of the electrical system /equipment has been envisaged for the plant.	In line with the present-day practice unitized control of the electrical system /equipment has been envisaged for the **MAIN** plant.
15.0	Section 1 / Page 43/ Cl.No. 12.0-last para (Of Volume–IV A)		This will be achieved by providing lightning masts on stacks, cooling towers, power house building, towers in switchyard, flood light towers etc. and	This will be achieved by providing lightning masts on stacks, cooling towers, power house building, flood light towers etc. and connecting these with

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			connecting these with ground grid.	ground grid.
16.0	Section 1 / Page 61/ ANNEXURE -C (Of Volume–IV A)		cost figure for loss capitalization	Annexure C to be part of Vol-1 (commercial). Loss capitalisation applicable for GT, UT's and ST's only.
17.0	Section 1 / Page 64/ ANNEXURE -D TABLE 1, SL.NO.3.0 (CABLING SCOPE OF WORK) (Of Volume–IV A)		SCOPE DIVISION AMONG EPC VENDORS Between power plant EPC vendor's equipment and (a) Switchyard vendor's equipment (b) Switchyard control room --- HV/MV/LV power cables, control cables, Instrumentation cables, FS cables, FO Cables, special cables etc for Power supply, Metering, Protection & SAS etc & Raceway	Corrigendum II, vol.IV-A, Table - 1 Annexure - D , enclosed.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			systems	
18.0	Section 2 / Page 90 / Cl.No. 3.2 (Of Volume–IV A)		GT shall be suitable to meet the Generator power rating of 660MW at 0.85 power factor lag without deducting the unit auxiliary power, excitation power or any other power. GT shall be sized with 10% design margin.	GT shall be suitable to meet the Generator power rating of 660MW at 0.85 power factor lag without deducting the unit auxiliary power, excitation power or any other power. GT shall be sized with min. 5% design margin.
19.0	Section 2 / Page 104/ DATA SHEET-A Cl.No. 5.31 (Of Volume–IV A)		Tap-changing gear complete with tap position indicator, operation counter etc. For OLTC gear (where specified), oil surge relay (OSL) with shut-off valve, Local control cabinet and tap changer control in ECP (RTCC) and also DDCMIS/DCS.	Remote Oil temperature indicator & winding temperature indicator shall be provided on ECP panel. Items not listed above & necessary for satisfactory operation of transformer shall be provided. However, GT has OCTC.
20.0	Section 2 / Page 109/ Cl.No. 4.8.1 & DATA SHEET-A Cl.No. 1.10.2 (Of		Each cooling unit shall be provided with two (2) nos. 50% capacity oil pumps and number of cooling fans.	Cooling system shall comprise of 2 units of 60% each. Each cooling unit shall be complete with radiator banks, pumps, fans and other accessories.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	Volume–IV A)			Each cooling unit shall be provided with two (2) nos. 100% capacity oil pumps (1 running and 1 standby) and adequate number of cooling fans with one standby fan.
21.0	Section 2 / Page 105/ Cl.No. 6.1.16 & DATA SHEET-A Cl.No. 1.10.2 (Of Volume–IV A)		Magnetic circuit test 10kV for 1min isolation test on transformer core to tank core to end frame and end frame to tank.	The Core Isolation Test shall be carried out at High Voltage for a period of 1 minute as per IEC - 60076.
22.0	Section 2 / Page 106/ Cl.No. 6.3 & DATA SHEET-A Cl.No. 1.12 (a) (Of Volume–IV A)		Full wave lightning impulse test on HV terminal at 1426 kVp Full wave lightning Impulse test on LV terminal at 126 kVp. Switching impulse test on HV terminal at 1180 kVp	Full wave lightning impulse test on HV terminal at 1425 kVp Full wave lightning Impulse test on LV terminal at 125 kVp. Switching impulse test on HV terminal at 1175 kVp. Same values shall be considered in Cl. 1.12 of Datasheet – A
23.0	Section 2 / Page 110/ 1.14 & DATA		Short-circuit impedance at 75ºC at principal tap Z=13.5% without positive tolerance.	z = 13.5% +/- tolerance value as per IS-2026, is acceptable.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	SHEET-A (Of Volume–IV A)			
24.0	Section 3 / Page 138/ Cl.No. 5.0 (Of Volume–IV A)		Tests	Delete 5.1 (e) Water tightness test from Routine test and Add as 5.2 (f) Water tightness test in Type test
25.0	Section 3 / Page 127/ Cl.No. 4.1.1 & 4.14.1 (Of Volume–IV A)		The busduct shall be isolated phase, continuous (bonded enclosure) natural air-cooled type with positive pressure (+100 mm water column) to prevent entry of dust and moisture.	The busduct shall be isolated phase, continuous (bonded enclosure) natural air-cooled type with positive pressure (+20 to 40 mm water column) to prevent entry of dust and moisture.
26.0	Section 3 / Page 142/ DATA SHEET-A Cl.No. 2.5 (a) (Of Volume–IV A)		Bus conductor (i) Silver joint C 105 (ii) Plain or tinned joint C 90 (iii) Bus conductor C 85 (50 C ambient+35 C)	Temperature rise limits shall be as per IS 8084.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
27.0	Section 3 / Page 142/ DATA SHEET-A Cl.No. 2.6 (Of Volume–IV A)		(a) Bus Conductor Aluminium alloy Grade 19501 (60%IACS) (b) Bus enclosure Aluminium alloy Grade 63401 (56.5%IACS)	(a) Material and Grade Conductor · Main Run & Delta Run : Al. Alloy, Gr. 19501 · Tap-off Run : Al. Alloy, Gr. 63401 (b) Enclosure · Main Run & Delta Run : Al. Alloy, Gr. 19501 · Tap-off Run : Al. Alloy, Gr. 19501
28.0	Section 5 / Page 215 / Data Sheet A Cl.No. 6.0 (Of Volume–IV A)		Rated voltage ratio (line to line) kV 400/11.5	Rated voltage ratio (line to line) kV 400/11.5/11.5
29.0	Section 6 / Page 230/ Cl.No 1.5 (Of Volume–IV A)		IPBD minimum current carrying capacity shall be 26 kA.	Section - 6 - Clause 1.5 to be deleted. Add a new clause at - Section - 3 - Generator Busduct (IPBD) - Cl. No. 3.8 (e) - IPBD minimum current

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				carrying capacity shall be 26 kA.
30.0	Section7 / Page 249/ Cl.No 1.1 (Of Volume–IV A)		MINIMUM TEN (10) SETS OF 11KV SWITCHGEARS AS DETAILED	Adequate number and sufficiently rated 11KV switchgear and 3.3KV switchgear panels shall be provided by bidders as per Key SLD:Electrical System after owner's approval during detailed engineering
31.0	Section 7 / Page 259/ Cl.No 4.5.2(d) (Of Volume–IV A)		CT accuracy class 0.2S for measurement ,Energy audit & accounting (MEAA) as per CEA regulationsand ISF </=2 for performance/precision metering.	Corrigendum II, vol.IV-A, section 7, cl. No. 4.8.3
32.0	Section 7 / Page 263/ Cl.No 4.8.3 (Of Volume–IV A)		Metering for energy auditing and accounting meters accuracy class	A) 0.2S class MEAA Meters & 0.2S class CTs shall be provided for following feeders – (i) On Generator terminals before UT tap-off

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				(ii) On HV side of UTs (iii) On HV side of STs On all 11KV Incomer, TIE, Outgoing feeders, Motor feeders and Transformer feeders on Station Boards and Unit Boards. B) 0.5S class MEAA Meters & 0.5S class CTs shall be provided for following feeders – 1) On Incomer, TIE, Outgoing feeders, Motor feeders and Transformer feeders of all 11KV &

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				3.3KV Switchboards except Station & Unit Boards. 2) For feeders of 11 KV station and unit boards where CT primary current is 200A and below.
33.0	Section 7 / Page 267 / Cl.No 4.9 (Of Volume–IV A)		Transducers - --------- ---All above transducers shall be hooked upto DDCMIS.	Transducers - ------- -----All above transducers shall be hooked upto DDCMIS. For motor feeders, only Y-phase will be provided with the transducer.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
34.0	Section 7 / Page 278 / Cl.No 5.3 (Of Volume–IV A)		HT Switchgear :- Type Test certificate on any equipment , if---------- ---------- shall be furnished..Otherwise equipment will be type tested free of charge to prove the design.	(a) HT Switchgear :- Type Test certificate for HT Switchgear , shall be accepted if the test is carried out on identical switchgear within last 5 years for the following tests - Short Circuit Test (all five test duties) (b) STC - 44KA, 3 Sec. for 11KV and 40KA, 3 Sec. for 3.3 KV Switching over voltage test on lowest rating of 11 KV and 3.3 KV motor feeder Pressure relief device operation test Otherwise equipment will be type tested free of charge, to prove the design. Type tests mentioned other than above shall

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				be carried out as per specification.
35.0	Section 7 / Page 278/ Cl.No 5.3.9 (Of Volume–IV A)		HT Switchgear: - Tests on CTs & PTs - For each switchboard one CT of each rating shall be subjected to following routine tests in the presence of Owner's representative…….	100% CTs / PTs shall be tested by manufacturer and testing of 20% CTs/PTs shall be witnessed by MahaGenco / Vendor at manufacturer's work. However, Type test reports as per specification shall be submitted for Owner's Approval.
36.0	Section 8/ Page 311/ Cl.No 5.9.4 (Of Volume–IV A)		Metering for energy auditing and accounting meters accuracy class	Corrigendum II, vol.IV-A, Cl.No.4.8.3.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
37.0	Section-10 /page 366/Cl.4.1.6 (Of Volume–IV A)		Rating of the motor shall be selected with at least 5% margin for HT motor,& 10 % margin for LT motor over the maximum power required within the range of operation.	Rating of the motor shall be selected with at least 10% margin for HT motor,& 15 % margin for LT motor over the input power requirement at duty point.
38.0	Section-7 /page 250/Cl.1.11 (Of Volume–IV A)		Each bus section of the 11KV / 3.3KV HT Switchgear, one motor and one transformer type spare feeders of highest rating shall be provided.	One No. of largest motor feeder and one No. of transformer feeder of highest rating shall be provided as a spare feeder on each 11KV / 3.3KV Switchboard.
39.0	Section-7 /page 254/Cl.4.1.3 (Of Volume–IV A)		The Switchgear enclosure shall conform to the degree Of protection IP-4X. The minimum thickness of CRCA sheet steel used shall be 2mm.	The Switchgear enclosure shall conform to the degree Of protection IP-4X. The minimum thickness of CRCA sheet steel / Alu-zinc sheet used shall be 2mm.

VOLUME - IVB

ELECTRICAL

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	Section 1 / Page 20/ Cl.No.3.8 (Of Volume–IV B) (Newly Added)		Data Sheet-A Type & size of cable to be Terminated----2-1Cx70sq. mm XLPE Cable	2Run -1Cx95sq.mm or greater XLPE Cable.
2.0	Section 4 / Page 87/ Cl.No.5.2.6 (Of Volume–IV B) (Newly Added)		Test for specific optical density of smoke The cables shall meet the requirements of IS/IEC.	Deleted.
3.0	Vol.IV-B, Section 5, p.114 / Cl.2.3		Operation, control and monitoring of the following Switchgears and associated transformers are not to be included in the Back-up control panel located in control room. (a) 11 kV & 3.3 kV CHP Switchgear. (b) 11 kV & 3.3 kV Raw Water Switchgear.	Operation, control and monitoring of the following Switchgears and associated transformers are not to be included in the Back-up control panel located in control room. (a) 11 kV & 3.3 kV CHP Switchgear. (b) 11 kV & 3.3 kV Raw Water Switchgear.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			(c) 11kV & 3.3 kV AHP Switchgear. (d) EHV sub-station (Generator bay breakers and station transformer bay breakers), AHP, CHP, Plant water system.	(c) 11kV & 3.3 kV AHP Switchgear. (d) EHV substation (Station Transformer bay breakers) AHP, CHP, Plant water system.
4.0	Vol.IV-B, Section 5, p.114 / Cl.2.3.1 (New clause no.given.)		The metering available on the back-up control panels shall include but not be limited to the following: (i) GT HV Current and voltage, ST HV Current and voltage, Generator Watt, VAR, Frequency, Negative Sequence current, R-Y-B phase current, Power Factor and Digital Tri- Vector meter, MEAA meters. (ii) Winding / Oil temperature for Generator	2.3.1 The metering available on the back-up control panels shall include but not be limited to the following: (i) (GT HV Current and voltage, ST HV Current and voltage, Generator Watt, VAR, Frequency, Negative Sequence current, R-Y-B phase current, Power Factor and Digital Tri- Vector meter, MEAA meters. (ii) Winding / Oil temperature for Generator

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			Transformers, Unit transformers, Station transformers and 11kV/3.3kV Unit……etc.	Transformers, Unit transformers, Station transformers and 11kV/3.3kV Unit….. etc.
5.0	Section 7 /Page 201 / Cl.No.5.2.3 (b) (Of Volume–IV B) (Newly Added)		The DC Emergency Lighting Distribution Boards will be fed from two power sources, namely (a) Main Lighting Distribution Board (MLDB). (b) 220V DC distribution boards (DCDB). (c) These lights will be ON all the time - normally from station A.C. (d) Supply, but on its failure from station D.C. supply through automatic switching.	The DC Emergency Lighting Distribution Boards will be fed from DC lighting Panel which will be charged through 220V DC distribution boards (DCDB). These lights will be ON when there is No AC Supply.
6.0	Section 7 /Page 205 / Cl.No.5.4.4.1		Type of Lamp T5 2 x 28W FTL	Type of Lamp 3 x 36 W CFL

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	(e) (Of Volume–IV B) (Newly Added)			
7.0	Section 7 /Page 206 / Cl.No.5.4.4.2 (d) (Of Volume–IV B) (Newly Added)		Type of Lamp 2 x 36 W / 40 W FTL	Type of Lamp x 36 W CFL
8.0	Section 7 /Page 207 / Cl.No.5.4.4.6 (a) (Of Volume–IV B) (Newly Added)		Type of Lamp LED type latest energy saving	Type of Lamp HPSV 150 W Or 250 W
9.0	Section 7 /Page 208 / Cl.No.5.4.4.7 (a) (Of Volume–IV B) (Newly Added)		Type of Lamp T5 type 2 x 28W FTL	Type of Lamp 3x36W CFL

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
10.0	Section 7 /Page 208 / Cl.No.5.4.4.7 (c) (Of Volume–IV B) (Newly Added)		Type of Lamp 2x36W CFL	Type of Lamp 3x36W CFL
11.0	Section 7 /Page 209 / Cl.No.5.4.4.9 (a) (Of Volume–IV B) (Newly Added)		Type of Lamp 1 x 100 W GLS Lamp	Type of Lamp 1 x 18 W CFL Screw type.
12.0	Section 7 /Page 209 / Cl.No.5.4.4.9 (b) (Of Volume–IV B) (Newly Added)		Type of Lamp 1 x 100 W GLS Lamp	Type of Lamp 1 x 18 W CFL Screw type.
13.0	Section 7 /Page 209 / Cl.No.5.4.5(a) (Of Volume–IV B) (Newly Added)		Type of Lamp T5 type 2x28W FTL	Type of Lamp 3x36W CFL.

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Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
14.0	Section 7 /Page 209 / Cl.No.5.4.6(a) (Of Volume–IV B) (Newly Added)		Type of Lamp T5 type 2x28W FTL	Type of Lamp 3x36W CFL.
15.0	Section 7 /Page 209 / Cl.No.5.4.7(b) (Of Volume–IV B) (Newly Added)		Type of Lamp T5 type 2x28W FTL	Type of Lamp 3x36W CFL.
16.0	Section 7 /Page 210 / Cl.No.5.4.8(e) (Of Volume–IV B) (Newly Added)		Type of Lamp T5 type 2x28W FTL	Type of Lamp 3x36W CFL.
17.0	Section 7 /Page 213 / Cl.No.6.4 (Of Volume–IV B) (Newly Added)		BALLAST/ELECTRONIC BALLAST	ELECTRONIC BALLAST

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
18.0	Section 7 /Page 215 / Cl.No.6.6.1 (Of Volume–IV B) (Newly Added)		Each Distribution Board shall consist of one dry type transformer housed in the cubicle voltmeter with selector switch, C.T. Operated ammeter and incoming triple pole MCCB. Outgoing feeder from the Lighting Distribution Board shall have MCCB. Proper discrimination between outgoing MCCB of Lighting Distribution Board and downstream MCCB of Lighting Panel should be ensured.	Each Distribution Board shall consist of one dry type transformer housed in the cubicle voltmeter with selector switch, C.T. Operated ammeter and incoming triple pole SFU. Outgoing feeder from the Lighting Distribution Board shall have SFU. Proper discrimination between outgoing SFU of Lighting Distribution Board and downstream SFU of Lighting Panel should be ensured.
19.0	Section 7 /Page 215 / Cl.No.6.6.2 (Of Volume–IV B) (Newly Added)		Each panel shall have an incoming triple pole MCCB with neutral link and a number of outgoing miniature circuit breakers (MCB) as per annexure.	Each panel shall have an incoming triple pole SFU with neutral link and a number of outgoing miniature circuit breakers (SFU) as per annexure.
20.0	Section 7 /Page 215 / Cl.No.6.6.3 (Of Volume–IV B) (Newly Added)		Board/Panel access door shall be interlocked with incoming MCCB such that the door can be opened only when the MCCB is in OFF position. Means shall be provided to defeat this	Board/Panel access door shall be interlocked with incoming SFU such that the door can be opened only when the SFU is in OFF position. Means shall be provided to

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			interlock.	defeat this interlock.
21.0	Section 7 /Page 215 / Cl.No.6.6.4 (Of Volume–IV B) (Newly Added)		All MCCB shall be single throw, air break, and heavy duty type having quick-make quick-break contacts. Fuses shall be HRC link type. Contactors shall be air break electromagnetic type. Push buttons shall be push to actuate type.	All SFU shall be single throw, air break, and heavy duty type having quick-make quick-break contacts. Fuses shall be HRC link type. Contactors shall be air break electromagnetic type. Push buttons shall be push to actuate type.
22.0	Section 7 /Page 215 / Cl.No.6.6.5 (Of Volume–IV B) (Newly Added)		MCB shall be suitable for manual closing and opening and also automatic trip on overload and short circuit.	SFU shall be suitable for manual closing and opening and also automatic trip on short circuit.
23.0	Section 7 /Page 222 / Cl.No.6.15.6 (a) (Of Volume–IV B) (Newly Added)		Minimum eight nos. High intensity LED type red/white flashing type aviation obstruction light as per ICAO and Director General of civil aviation requirements and with corrosion resistant aluminium casting finished in stove enameled control gear suitable for 200/240V, 50 Hz supply, complete as per specification shall be	Deleted

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			provided. The life of AOLs shall be more than 10 years and with all the necessary fixing accessories as directed by Engineer-in-charge. The AOL system shall be provided with Photoelectric light detectors to monitor north sky for controlling the aviation warning lights. The lights should be switched on when the ambient light goes below 35 candelas and switched off when the intensity is more than 58 candelas. The lights should not be switched off due to momentary increases in light intensities due to lighting flashes or any other short bursts of light. The detectors should be complete with all the accessories, hardware etc. necessary for installation. The facility for Auto/ Manual operation shall be provided.	

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
24.0	Section 7 /Page 224 / Cl.No.6.15.7 (Of Volume–IV B) (Newly Added)		Aviation of NDCT "In accordance with ICAO regulations, aviation warning lights are to be installed along the perimeter of the NDCT opening. Operating and reserve aviation warning lights are to be positioned next to each other. They are to be connected to completely separate power circuits and to be monitored by relays. Suitable photo- electric sensors, alarm and annunciation systems, etc. shall also be provided along with the required auxiliaries for completing the system in all respects. Two inputs will be provided by the bidder along with cable etc- one the main supply and the other as stand by Automatic change over with suitable delay timers with Auto / manual operation shall be provided by the contractor.	Aviation Lights of NDCT "In accordance with ICAO regulations, aviation warning lights are to be installed along the perimeter of the NDCT opening. Operating and reserve aviation warning lights are to be positioned next to each other. They are to be connected to completely separate power circuits and to be monitored by relays. Suitable photo- electric sensors, alarm and annunciation systems, etc. shall also be provided along with the required auxiliaries for completing the system in all respects.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
25.0	Section 7 /Page 237 (DATA SHEET-A) / Cl.No.2.1 (Of Volume–IV B) (Newly Added)		Type - Cast Resin Dry Type	Dry Type.
26.0	Section 7 /Page 238 / Cl.No.2.2 Datasheet A (Of Volume–IV B) (Newly Added)		LIGHTING TRANSFORMER kVA rating : 100 kVA	LIGHTING TRANSFORMER KVA rating: As required
27.0	Section 7 /Page 238 / Cl.No.2.3 Datasheet A (Of Volume–IV B) (Newly Added)		Voltage Rating---415V/415V	Voltage Rating---415V/433V
28.0	Section 7 /Page 239 / Note: 5 Datasheet A (Of Volume–IV B) (Newly		Typical Transformer rating of 100 kVA is indicated in Datasheet-A Sr. No. 2.1. However rating of transformer required shall be worked out by the	Rating of transformer required shall be worked out by the bidder. Calculation for the same shall be submitted with Bid.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	Added)		bidder. Calculation for the same shall be submitted with Bid.	
29.0	Vol.IV-B, Section 7 (Newly Added)		Annexure – C	Deleted.
30.0	Section 10 / Cl.No.4.1.1 and 4.1.5(a) (Of Volume–IV B)		4.1.1 Earth resistance…… 4.1.5(a). …..The length of ground conductor……. Less than one(1)ohm	4.1.1 : No change 4.1.5(a) : Deleted.
31.0	Section 10 / Page 310/ Cl.No.5.2.1 (Of Volume–IV B) (Newly Added)		Cable trays shall be pre-fabricated ladder type, perforated type cable trays sheet steel with hot dip galvanizing furnished in standard length of 2.5 metres.	Cable trays shall be pre-fabricated ladder type, perforated type manufactured from sheet steel with hot dip galvanizing furnished in standard length of 2.5 metres. Cable tray horizontal support shall be welded to the vertical support.. Vertical support for cable tray shall be fabricated out of ISMC-100/ 150 and horizontal supports with ISA- 50X50X6mm thickness/ ISA-65X65X6mm thickness as per requirement.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				Cable tray supports shall be coated with two coats of primer followed by two coats of epoxy paints.
32.0	Section 13 / Page 424/ Cl.No.1.3.1 (a) (Of Volume–IV B) (Newly Added)		(a) One (1) 415 V ± 10%, 3 phase, 4 wire, 50 Hz ± 5% (fault level 50 KA) supply to Main Distribution Board for Normal AC Lighting. Aviation Lighting and elevator.	(a) One (1) 415 V ± 10%, 3 phase, 4 wire, 50 Hz ± 5% supply to Main Distribution Board for Normal AC Lighting.
33.0	Section 13 / Page 424/ Cl.No.1.3.1 (b) (Of Volume–IV B) (Newly Added)		(a) One (1) 415 V ± 10%, 3 phase, 3 wire, 50 Hz ± 5% (fault level 50 KA) supply from emergency source Board of T.G. Building to Lighting board for Emergency lights and Aviation Warning Lights and elevator.	(a) One (1) 415 V ± 10%, 3 phase, 4 wire, 50 Hz ± 5% supply from ACELDB for Aviation Warning Lights .
34.0	Section 13 /		From normal to	The emergency power

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	Page 424/ Cl.No.1.3.2 (Of Volume–IV B) (Newly Added)		emergency Automatic changeover with suitable delay timers with Auto / Manual operation shall be provided by the bidder. The emergency power supply to chimney & chimney emergency power distribution shall be by fire survival (FS) cables.	supply to chimney & chimney emergency power distribution shall be by XLPE FRLS cables.
35.0	Section 13 / Page 424/ Cl.No.2.0 (Of Volume–IV B) (Newly Added)		Distribution Boards.	For main power distribution board construction details, refer Cl.6.5 (Lighting Panel/ Distribution Boards) of section 7, vol. IV-B.
36.0	Section 13 / Page 429/ Cl.No.4.4 (Of Volume–IV B) (Newly Added)		Industrial fluorescent luminaries with 2X40W fluorescent lamps with reflector shall be provided for Elevator machine room. The lux level shall be 100 lux. Four (4) numbers of bulk head luminaries with 100 W GLS lamp and wire guard shall be provided in the elevator pit.	Industrial fluorescent luminaries with 2X40W fluorescent lamps with reflector shall be provided for Elevator machine room. The lux level shall be 100 lux. Four (4) numbers of bulk head luminaries with 2 x 18 W CFS lamp and wire guard shall be provided in the elevator pit.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
37.0	Section 13 / Page 430/ Cl.No.5.1 (Of Volume–IV B) (Newly Added)		Power cables shall have stranded aluminium conductor, 1100 V grade XLPE insulated, extruded PVC inner sheath galvanized steel wire armoured, overall extruded PVC sheath.	For Specification of cables refer sec – 4, Volume- IV B.
38.0	Section 13 / Page 431/ Cl.No.6.1 (Of Volume–IV B) (Newly Added)		The Contractor shall provide a complete grounding system as needed for the RCC chimney. A ground mat, preferably circular type, of diameter at least five (5) meter more than the chimney foundation diameter shall be laid.	The Contractor shall provide a complete grounding system as needed for the RCC chimney. A ground ring preferably circular type, of diameter at least five (5) meter more than the chimney foundation diameter shall be laid.
39.0	Section 13 / Page 432/ Cl.No.6.3 (Of Volume–IV B) (Newly Added)		The main ground mat shall be of bare MS round bar of atleast 40 mm dia buried in earth at a min. depth of 1000 mm below finished grade level. Earth electrode of size 40 mm dia x 3 M length driven into the ground and connected to the ground grid conductor	The main ground ring shall be of bare MS round bar of atleast 40 mm dia buried in earth at a min. depth of 1000 mm below finished grade level. Earth electrode of size 40 mm dia x 3 M length driven into the ground and connected to the ground grid conductor

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			shall be provided, as required, to bring down the ground resistance.	shall be provided, as required, to bring down the ground resistance.
40.0	Section 13 / Page 432/ Cl.No.6.5 (Of Volume–IV B) (Newly Added)		The chimney ground mat shall be connected to the power plant (BTG) station ground mat by 40 mm dia MS round bar at eight (8) points and at six (6) points with ground grid of other area.	The chimney ground ring shall be connected to the power plant station ground mat by 40 mm dia MS round bar at each intersection points.
41.0	Section 13 / Page 433/ Cl.No.7.1 (Of Volume–IV B)		The chimney shall be provided with the flue path. The required number of 204 mm dia., 20004mm long, lead coated copper air termination rod with standard GI dome and spikes on one end and 150mm x 6mm thk. MS plate welded to the other end shall be provided. The complete unit shall be lead covered after fabrication. The lightning conductors shall be securely anchored with at least two (2) suitably spaced	The chimney shall be provided with the flue path. The required number of 20mm dia., 2000mm long, lead coated copper air termination rod with standard GI dome and spikes on one end and 150mm x 6mm thk. MS plate welded to the other end shall be provided. The complete unit shall be lead covered after fabrication. The lightning conductors shall be securely anchored wit h atleast two (2) suitably spaced

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			adequate size GI lead covered clamps near the top of the stack. Air termination rods shall be mechanically and electrically connected by the use of pressure type fittings to the cap ring and to a continuous circumferential band. The system shall be able to withstand the wind pressure. The top air termination rod shall not exceed the aviation clearance height.	adequate size GI lead covered clamps near the top of the stack. Air termination rods shall be mechanically and electrically connected by the use of pressure type fittings to the cap ring and to a continuous circumferential band. The system shall be able to withstand the wind pressure. The top air termination rod shall not exceed the aviation clearance height.
42.0	Section 13 / Page 434/ Cl.No.7.3 (Of Volume–IV B) (Newly Added)		These conductors shall be embedded in the outer surface of the concrete shell and shall come out of the shell below grade level. Conductors embedded in concrete shall have a minimum cover of 50 mm. Railings and steel in the platforms are to be grounded with 50mm x 6mm thick GS flat conductors which are in turn tied to the down conductors.	These conductors shall be embedded in the outer surface of the concrete shell and shall come out of the shell below grade level. Conductors embedded in concrete shall have a minimum cover of 50 mm. Railings and steel in the platforms are to be grounded with 50mm x 6mm thick GS flat conductors which are in turn tied to the

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			Railings and steel in platforms, ladder, exposed steel works shall also be bonded to down conductors with 50mm x 6mm GS flat. Chimney ladder shall be electrically connected to the down conductors at top and bottom of the ladder. For this, the two (2) lower pairs of insert supporting the ladder shall be adequately connected to the earthing system and the top laid inserts shall be connected to the circumferential band connecting the down conductors. Each down conductor shall be connected to earthing electrode through test point. Conductor from the earthing electrode to a height of about 300 mm above ground level shall be 40 mm MS round bar and thereafter 75mm x 10mm GS flat run. Each of the above earthing electrode shall be connected to the earthing	down conductors. Railings and steel in platforms, ladder, exposed steel works shall also be bonded to down conductors with 50mm x 6mm GS flat. Chimney ladder shall be electrically connected to the down conductors at top and bottom of the ladder. For this, the two (2) lower pairs of insert supporting the ladder shall be adequately connected to the earthing system and the top laid inserts shall be connected to the circumferential band connecting the down conductors. Each down conductor shall be connected to earthing electrode through test point. Conductor from the earthing electrode to a height of about 300 mm above ground level shall be 40 mm MS round bar and thereafter 75mm x 10mm GS flat run. Each of the above

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			mat at two points.	earthing electrode shall be connected to the earthing ring at two points.
43.0	Section 13 / Page 437/ Cl.No.8.2.1 (Of Volume–IV B) (Newly Added)		Type Tests Certificate on any equipment/materials, if so desired by the owner, shall be furnished. Otherwise the equipment shall have to be type tested free of charge to prove the design.	All Tests on all equipment/ material/ cables shall be carried out as elaborated in relevant sections.
44.0	Section 14 / Page 444/ Cl.No.1.3.1 (a) (Of Volume–IV B) (Newly Added)		(a) One (1) 415 V ± 10%, 3 phase, 4 wire, 50 Hz ± 5% (fault level 50 KA) supply to Main Distribution Board for Normal AC Lighting, Aviation Lighting and elevator.	(a) One (1) 415 V ± 10%, 3 phase, 4 wire, 50 Hz ± 5% supply to Main Distribution Board for Normal AC Lighting.
45.0	Section 14 / Page 444/ Cl.No.1.3.1 (b) (Of Volume–IV B) (Newly Added)		(a) One (1) 415 V ± 10%, 3 phase, 3 wire, 50 Hz ± 5% (fault level 50 KA) supply from emergency source Board of T.G. Building to	(a) One (1) 415 V ± 10%, 3 phase, 4 wire, 50 Hz ± 5% supply from ACELDB for Aviation Warning Lights.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			Lighting board for Emergency lights and Aviation Warning Lights and elevator.	
46.0	Section 14 / Page 444/ Cl.No.1.3.2 (Of Volume–IV B) (Newly Added)		From normal to emergency Automatic changeover with suitable delay timers with Auto / Manual operation shall be provided by the bidder. The emergency power supply to NDCT & NDCT emergency power distribution shall be by fire survival (FS) cables.	The emergency power supply to NDCT & NDCT emergency power distribution shall be by XLPE FRLS cables.
47.0	Section 14 / Page 444/ Cl.No.2.3.1 (Of Volume–IV B) (Newly Added)		Main Distribution Board	Main Power Distribution Board and lighting distribution boards construction details, refer Cl.6.5 (Lighting Panel/ Distribution Boards) of section 7, vol. IV-B.
48.0	Section 14 / Page 447/ Cl.No.3.2.1		The aviation warning lights are required to be provided at various	The aviation warning lights are required to be provided at various

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
	(Of Volume–IV B) (Newly Added)		levels. The number of obstruction lights to be installed at specified level shall be such that the obstruction is indicated from every angle in the azimuth. Fixtures on each level shall be arranged at the same elevation and with equal radial spacing around the NDCT. The aviation warning lights shall be supplied complete with all accessories and control unit.	levels. The number of obstruction lights to be installed at specified level shall be such that the obstruction is indicated from every angle in the azumith. Fixtures on each level shall be arranged at the same elevation and with equal radial spacing around the NDCT. The aviation warning lights shall be supplied complete with all accessories and control unit.
49.0	Section 14 / Page 449/ Cl.No.4.4 (Of Volume–IV B)		NDCT ELEVATOR MACHINE ROOM	Deleted
50.0	Section 14 / Page 450/ Cl.No.5.1 (Of Volume–IV B) (Newly Added)		Power cables shall have stranded aluminium conductor, 1100 V grade XLPE insulated, extruded PVC inner sheath galvanized steel wire armoured, overall extruded PVC sheath. Control cables shall	For power and control cable specification, refer Section 4, Volume-IV B.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			have stranded annealed tinned copper conductor, 1100V grade PVC insulation, extruded PVC inner sheath, galvanized steel wire armoured, overall extruded PVC sheath. Minimum size of control cable shall be 2.5 sq. mm copper. The minimum sizes of LT cable to be chosen are as below:	
51.0	Section 14 / Page 451/ Cl.No.6.1 (Of Volume–IV B) (Newly Added)		The Contractor shall provide a complete grounding system as needed for the RCC NDCT. A ground mat, preferably circular type, of diameter at least five (5) meter more than the NDCT foundation diameter shall be laid.	The Contractor shall provide a complete grounding system as needed for the RCC NDCT. A ground ring, preferably circular type, of diameter at least five (5) meter more than the NDCT foundation diameter shall be laid.
52.0	Section 14 / Page 452/ Cl.No.6.5 (Of Volume–IV B) (Newly Added)		The NDCT ground mat shall be connected to the power plant (BTG) ground mat by 40 mm dia MS round bar at eight (8) points and at six (6) points with ground grid of other	The NDCT ground ring shall be connected to the power plant ground mat by 40 mm dia MS round bar at four (4) points.

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			area.	
53.0	Section 14 / Page 457/ Cl.No.8.2.1 (Of Volume–IV B) (Newly Added)		Type Tests Certificate on any equipment/materials, if so desired by the owner, shall be furnished. Otherwise the equipment shall have to be type tested free of charge to prove the design.	All Tests on all equipment/ material/ cables shall be carried out as elaborated in relevant sections.
54.0	Section 14 / Page 453/ Cl.No.7.1 (Of Volume–IV B)		The required number of 204 mm dia., 20004mm long, lead……	The required number of 40mm dia., 2000mm long, MSHDG round bar …….
55.0	Section 5 /Page No. 116/ Cl. No. 2.4(l) (Of Volume-IV B)		Auto change-over status (successful, fail, incomplete) of 11KV, 3.3KV & 415V Unit & Station Boards.	Auto change-over status (successful, fail, incomplete) of 11KV, 3.3KV Unit & Station Boards.
56.0	Section 10 /Page No.305 / Cl. No.4.1.4 (Of Volume-IV B) (Newly added)		Ground Grid Conductor	c) i) Electronic earth pits to grounding bus / grounding cubicle and / or distribution board shall be connected with single core copper cable of following size:-

Sr. No.	Sec. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				70sqmm for length < 120 meters 95sqmm for length < 180 meters 120sqmm for length < 250 meters ii) The cable used for electronic earthing shall be soft-drawn stranded copper with minimum size of 6sqmm. For panel earthing.
57.0	Section 13 /Page No.432 / Cl. No.6.4 (Of Volume-IV B)		Galvanized mild steel (450gm / sqmtr. Zinc coating min.	Galvanized mild steel (610gm / sqmtr. Zinc coating min.
58.0	Section 14 /Page No.452 / Cl. No.6.4 (Of Volume-IV B)		Galvanized mild steel (450gm / sqmtr. Zinc coating min.	Galvanized mild steel (610gm / sqmtr. Zinc coating min.

VOLUME - V

CONTROL & INSTRUMENTATION

CONSULTANT : PROCON ENGINEERS

Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
1.0	V/17 of 718 / 2.8		All modulating devices shall be in stay put condition during any of the above failures.	All modulating devices shall be **in fail safe condition** during any of the above failures.
2.0	V/26 of 718/ 4.30		STEAM GENERATOR (SG) INTEGRAL CONTROL AND MONITORING Steam Generator (SG) Integral Control shall be synthesized from the same family of hardware as the DCS and shall integrate seamlessly. Major Boiler controls like Burner Management System (BMS) including Master fuel Trip (MFT) shall be tri-fold or triple-modular redundant and shall be housed in a distinctly separate cabinet set. Secondary Air Damper (SADC), Soot Blower Control and other controls shall be also synthesized from the same family of hardware as the DCS.	STEAM GENERATOR (SG) INTEGRAL CONTROL AND MONITORING Steam Generator (SG) Integral Control shall be synthesized from the same family of hardware as the DCS **or proprietary DCS of the bidder** and shall integrate seamlessly. Major Boiler controls like Burner Management System (BMS) including Master fuel Trip (MFT) shall be tri-fold or triple-modular redundant and shall be housed in a distinctly separate cabinet set. Secondary Air Damper (SADC), and other controls shall be also synthesized from the same family of hardware as the DCS.

Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
				Soot blower control can be implemented in DCS or standalone PLC. In case of standalone PLC, interfacing with DCS shall be envisaged.
3.0	V/31 of 718/ 4.34		Above I/Os used in OLCS or CLCS loops shall be redundant.	**Input/Output cards used for** above I/Os used in OLCS or CLCS loops shall be redundant
4.0	V/35 of 718/ 4.40		Conductor cross section for single pair or triad signal cables shall not have individual conductor cross section below 1.5 mm2 and multi-pair or multi-triad cables shall not have individual conductor cross section below 0.5 mm2. For solenoid valves, depending on pick-up VA, individual conductor cross section shall not be below 2.5 mm2. For interposing relay drive, connection individual conductor cross section shall not be below 1.5 mm2.	Conductor cross section for single pair or triad signal cables as well as multi-pair or multi-triad cables shall not have individual conductor cross section below **0.5 mm2.** **For solenoid valves, the cable size shall be decided considering safety & VA requirements.** For interposing relay drive, connection individual conductor cross section shall not be below 1.5 mm2.

Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
5.0	V/36 of 718/ 4.40/(f)		Scope of supply of cable (f) Interfacing cable (coaxial, fibre optic etc) between owner supplied PLC systems to DCS	**Deleted**
6.0	V/74 of 718 / 1.3.18		OTDR & Splicing kit for optical fiber cable testing & maintenance	OTDR & Splicing kit for optical fiber cable testing & maintenance **(Two no. each).**
7.0	V/95 of 718 /2.14.1		Radar type coal level measuring system at coal bunkers shall be provided for display of bunker level at the central control room. Isolated 4-20 mA DC signal shall be provided for monitoring coal level in DCS	**3D Acoustic type level transmitter** at coal bunkers shall be provided for display of bunker level at the central control room. Isolated 4-20 mA DC signal shall be provided for monitoring coal level in DCS
8.0	V/111 of 718/ 10.4			Note: If on line measuring sensors are not available for Lead (Pb), Benzo (a) Pyrene, Arsenic (As) & Nickel (Ni)., then it can be measured by digesting filter paper of HVS and analysis by AAS/ GC. Off-line Measuring Instruments alongwith all accessories are in Bidders Scope.

Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
9.0	V/111 of 718/ 10.5		AAQMS for each plant location shall be a fixed type, self contained 'Station'. Total three (3) nos such Stations shall be provided at the. minimum. One (1) no 'Station' shall be located at the UP wind direction path. Balance two (2) number 'Stations" shall be located at different plant locations considering the factors like Downwind direction, sensitive receptor, population etc. The exact location of the monitoring station(s) shall be decided in consultation with Owner and regulatory agencies considering all units at Bhusawal projects during project implementation phase. However, during the contract implementation stage, if additional number of such monitoring locations and hence AAQMS Stations are required as per regulatory agencies requirement then the	AAQMS for each plant location shall be a fixed type, self contained 'Station'. Total three (3) nos such Stations shall be provided at the. minimum. **One (1) no 'Station' shall be located at the WT plant of existing 2x500MW unit, Second no. 'Station' shall be located at new project (1x660 MW) CE office(project) expansion unit BTPS and third no 'Station' shall be located at old rest house near Tapi river bank.** If additional number of such monitoring locations and hence AAQMS Stations are required as per regulatory agencies requirement, then the same shall be provided by the Vendor at no extra cost implication to Owner.

Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			same shall be provided by the Vendor at no extra cost implication to Owner.	
10.0	V/113 of 718/ 10.9		Technical Specification of AAQMS Equipment & Metrological sensors	Technical Specification of AAQMS Equipment
11.0	V/134 of 718/ 2.1		Turbine protection shall be based on triple modular redundant configuration in hardware & software meeting NFPA requirement. Configuration shall be realized with three independent trip channels	Turbine protection shall be based on triple modular redundant configuration in hardware & software meeting **all applicable safety standard/requirement including those stipulated in latest edition of IEC61508 & IEC61511 or VDEO116, section 8.7, VDE0160 etc.** Configuration shall be realized with three independent trip channels
12.0	V/138 of 718/ 3.6.1		Emergency Over-speed Protection A quick acting emergency over-speed protection system (including emergency governor) shall be provided to	Emergency Over-speed Protection A quick acting emergency over-speed protection system (including emergency governor) shall be provided to

Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			close instantly the emergency stop valves, control valves, reheat interceptor stop valves and also the non-return valves in the extraction lines at about 111% of the rated speed in case the speed governor fails to limit over-speed.	close instantly the emergency stop valves, control valves, reheat interceptor stop valves and also the non-return valves in the extraction lines at about **110%** of the rated speed in case the speed governor fails to limit over-speed.
13.0	V/149 of 718/ 3.13/(b)		The speed-sensing element shall respond sensitively to speed variations so as to maintain dead band within 0.06% of nominal speed. Speed shall be adjustable within 0 to 106% and Frequency compensation adjustment shall be within 2 to 8%.	The speed-sensing element shall respond sensitively to speed variations so as to maintain dead band within **0.02%** of nominal speed. Speed shall be adjustable within 0 to 106% and Frequency compensation adjustment shall be within 2 to 8%.
14.0	V/188 of 718/3.9.5		For measuring bunker level, ultrasonic type level sensors with indicators shall be provided and indication shall be made available on main CHP PLC & plant DCS	**3D Acoustic type level transmitter** shall be provided for coal bunker and Fly Ash Silo level measurement and indication shall be made available on main CHP PLC & plant DCS.

Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
15.0	V/307 of 718/4.3.4		Junction boxes of metallic construction	Junction boxes of **FRP type.**
16.0	V/310 of 718/5.1.14		Additional operator's stations of unit ESP controls shall be installed in the central control room in addition to local control room.	Additional operator's stations **(one no. per unit)** of unit ESP controls shall be installed in the central control room in addition to local control room.
17.0	V/364 of 718/ /5.13.17		The load shall be reduced by the automatic run-back system which reduces or holds the unit load according to the capacity of main auxiliary systems. The failure of any of the following plant systems or plant variable are to be included in the run-back system : (a) I. D. Fans. (b) F.D. Fans. (c) P.A. Fans. (d) Air preheaters. (e) Boiler circulation water pumps. (f) Boiler Feed Water Pumps. ((g) H.P. Feed Heaters.	The load shall be reduced by the automatic run-back system which reduces or holds the unit load according to the capacity of main auxiliary systems. The failure of any of the following plant systems or plant variable are to be included in the run-back system : (a) I. D. Fans. (b) F.D. Fans. (c) P.A. Fans. (d) Air preheaters. **(e) Deleted.** (f) Boiler Feed Water Pumps. ((g) **Deleted.** (h) **Deleted.**

Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			(h) L.P. Feed Heaters. (i) Condensate extraction pumps. (j) Coal Mills. (k) CW Pumps. (l) Load Shedding.	(i) Condensate extraction pumps. (j) Coal Mills. (k) CW Pumps. (l) Load Shedding.
18.0	V/431 of 718 /11.1.1		Electrical Junction Box (a) Material : 3 mm sheet steel	**FRP type** Junction Box (a) Material : 3 mm
19.0	V/377 of 718 /6.3		Following components shall be redundant as well: communication processors, memory modules, rack power supply units, bulk IO power supply units, IO communication modules, data highway and high speed (100Mbps) data network connecting the operator stations	Following components shall be redundant as well: communication processors, memory modules, rack power supply units, bulk IO power supply units, IO communication modules, data highway and high speed (100Mbps) data network connecting the operator stations. **Minimum I/O LAN speed should be 10 MBPS.**
20.0	V/473 of 718 /2.1.1/(a)		One (1) no. 250 lines Microprocessor based Digital Electronic Private Automatic Branch Exchange (EPABX) for the entire Unit such as	One (1) no. 250 lines Microprocessor based Digital Electronic Private Automatic Branch Exchange (EPABX) for the entire

Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			Main Plant, Coal Handling Plant, Ash Handling Plant, Plant Water System, CW & ACW System, switchyard and the fuel oil transfer system Marshalling panel, capable for expansion up to 400 lines with 16 P&T lines, 8 digital lines, 8 tie lines, with necessary Operator Console associated printer, Main Distribution Frame (MDF) for the exchange etc. EPABX system shall be DIGITAL ISDN IP enable system. The system should be true ISDN digital switch with all types of connectivity like E1, E&M, BRI, PRI, V- SAT, Internet etc. The Exchange will be located at ground floor of service building and also interface with Plant PA System.	Unit such as Main Plant, Coal Handling Plant, Ash Handling Plant, Plant Water System, CW & ACW System, switchyard and the fuel oil transfer system Marshalling panel, capable for expansion up to 400 lines with 16 P&T lines, 8 digital lines, 8 tie lines, with necessary Operator Console associated printer, Main Distribution Frame (MDF) for the exchange etc. EPABX system shall be DIGITAL ISDN IP enable system. The system should be true ISDN digital switch with all types of connectivity like E1, E&M, BRI, PRI, V- SAT, Internet etc. The Exchange will be located at ground floor of service building.
21.0	V/476 of 718/ /4.11		The EPABX System shall have the interfacing capability with Plant Intercommunication	The EPABX System shall have the interfacing capability with **future** Plant

Sr. No.	Vol. No./ Page No./ Cl. No.	Equipment	Existing Particulars	To be read as
			System.	Intercommunication System.
22.0	V/477 of 718/ /5.7		The contractor shall provide facility for connection to PLCC (power line carrier communication) system	**The contractor shall provide interfacing software & hardware for connection to PLCC (power line carrier communication) system at switchyard end. PLCC is in switchyard vendors scope.**
23.0	V/481 of 718/ /6.4		JUNCTION BOXES	Junction boxes of **FRP type.**
24.0	V/485 of 718/7.4.1		JUNCTION BOXES	Junction boxes of **FRP type.**
25.0	V/485 of 718/7.4.3		JUNCTION BOXES	Junction boxes of **FRP type.**
26.0	V/619 of 718/ /9.2/2.3		Maintenance Engineers in CMMS system functioning & maintenance	**Deleted.**
27.0	V/668 of 718/2.6.1/j /iv		Ageing compensation factor: 1.25.	Ageing compensation factor : **1**

VOLUME-VI A

(CIVIL)

CONSULTANT : PROCON ENGINEERS

Sr. No.	Vol. No. / Section /Cl. No. /Page No.	Title	Existing Particulars	To be Read as
1.0	Section 6 / Page138/Cl.No. 1.1.1 (Of Corrigendum–I)		1.1.1 LENGTH OF BRIDGE : (a) Railway Bridge Portion : Two span of 20 to 25 M Total length of Bridge in Railway portion is approximately 50 M. (b) Non-Railway Bridge Portion : 10 spans of 25.00M each i.e. @ 250.00 meters. Total length of viaduct in Non-Railway portion is 250.00 M.	1.1.1LENGTH OF BRIDGE : (a) Total length of Bridge in Railway portion is approximately 150 M (b) Non-Railway Bridge Portion : 10 spans of 20.00M each i.e. @ 200.00 meters. Total length of viaduct in Non-Railway portion is 200.00 M. (approx.)
2.0	Section 6 / Page139/Cl.No. 1.1.2.1 (Of Corrigendum–I)		–	Note: - The length of ROB is indicative and for bid purpose only. However, actual length of ROB shall be decided as per actual site condition and railway requirements.

3.0	Section I/Page 45/ Cl. No. 3.3 (P) (Of Volume –VI A)		Ash slurry disposal pipe lines shall be routed above overhead trestles within Plant area. Pipe lines shall be routed supporting on pedestals upto ash disposal area. A 5.0 m wide WBM service road along with drains wherever required shall also be provided for maintenance purpose of these Ash slurry disposal pipe lines. The required cross drainage works for crossing these pipe lines & service roads are also to be provided.	Ash slurry disposal pipe lines shall be routed above overhead trestles within Plant area. Pipe lines shall be routed supporting on pedestals up to ash disposal area beyond plant boundary.

4.0	Section I/Page 55 & 56 / Cl. No. 4.4 (Of Volume –VI A) Ash Slurry Disposal Pipe line, Third Para		Pipe lines shall be routed supporting on pedestals up to ash disposal area. A 5.0 m wide WBM service road along with drains wherever required shall also be provided for maintenance purpose of these Ash slurry disposal pipe lines. The required cross drainage works for crossing these pipe lines & service roads , permanent approaches to farmer over pipe lines on existing and new proposed lines wherever required as per requirement of Owner are also to be provided.	Pipe lines shall be routed supporting on pedestals up to ash disposal area beyond plant boundary.
5.0	Section 1/ Page 98 / Cl. No. 4.7.12 (a) (Of Volume –VI A)		Cooling tower acceptance test code as per DIN 1947 - VDI	Cooling tower acceptance test code as per CTI code ATC 105 – 2000

6.0	Section 1, / Page 98 / Cl. No. 4.7.12 (b) to (e) (Of Volume –VI A)		b) BS:4485: specification for water cooling towers. c) BS:1042:methods for measurement of fluid flow. d) BS:3435: Measurement of electrical power and energy in acceptance testing. e) ASME-19.5: Supplements on Instruments and Apparatus.	Deleted

7.0	Section 1 /Page 137 / Cl. No. 4.7.22 (a) (Of Volume –VI A)		Test shall be conducted by accredited representatives of …… owners representative.	The test shall be conducted by CTI approved agency in presence of owner and the contractor and it is included in the scope of the work of the contractor. The contractor shall be given permission to inspect the tower in advance. Contractors representatives shall witness all phases of the test and record the data jointly with owners representatives.
8.0	Section I/Page 137/ Cl. No. 4.7.22 (f) (Of Volume –VI A)		The performance test shall be generally as per CTI code ATC-105/BS;4485 part II,using characteristic curve method	The performance test shall be generally as per CTI code ATC-105,using characteristic curve method
9.0	VI A / Section 1 / 4.9.1 (e) / page 141 of 639	Raw Water Treatment Plant	–	Gravity Filter House-housing the DM & Non-DM filters to have an RCC roof. The building shall be complete with brick work, plastering,

				doors, windows, ventilators, rolling shutters, flooring, plaster, painting, hand railing, roofing, water proofing etc. RCC staircases to be provided for access to various floor levels in the Filter House. Adequate clearances to be provided between various floor levels to facilitate proper operation & maintenance of various valves & equipments in the building. The architectural details shall be in accordance with the concept described in Section-IV of Volume VI A.

VOLUME-VII A1

BID PURPOSE DRAWINGS

(MECHANICAL)

Sr. No.	Page No./Sr. No.	Dwg. No.	Revision	TITLE
1.0	/7 of 9/1	PE-189-GA-101	P4	PLOT PLAN
2.0	/7 of 9/9	PE-189-GA-117	P2	GENERAL ARRANGEMENT : COAL HANDLING PLANT
3.0	/7 of 9/10	PE-189-GA-118	P2	GENERAL ARRANGENT:COAL HANDLING PLANTWT-1,2 & TP-1,2 (SECTION A-A)
4.0	/8 of 9/11	PE-189-GA-119	P2	GENERAL ARRANGENT:COAL HANDLING PLANT TP-2 & CRUSHER HOUSE (SECTION B-B)
5.0	/8 of 9/20	PE-189-GA-130	P1	GENERAL ARRANGENT: DEMINERALISATION PLANT

VOLUME-VII A2

BID PURPOSE DRAWINGS

(MECHANICAL)

CONSULTANT : PROCON ENGINEERS

Sr. No.	Page No./Sr. No.	Dwg. No.	Revision	TITLE
1.0	VII A2/7 of 11/4.0	PE-189-PI-203	P1	PROCESS FLOW DIAGRAM :POWER CYCLE SYSTEM (FEEDWATER)
2.0	Corrigendum -I /233 of 247/	PE-189-PF-235	P3	PROCESS FLOW DIAGRAM : BOTTOM ASH AND COARSE ASH HANDLING SYSTEM
3.0	Corrigendu m-I /233 of 247/	PE-189-PF-236	P3	PROCESS FLOW DIAGRAM : FLY ASH HANDLING SYSTEM
4.0	Corrigendu m-I /233 of 247/	PE-189-PF-237	P4	P & I DIAGRAM: BOTTOM ASH HANDLING SYSTEM
5.0	Corrigendu m-I /233 of 247/	PE-189-PI-238	P3	P & I DIAGRAM : COARSE ASH HANDLING SYSTEM
6.0	Corrigendu m-I /233 of 247/	PE-189-PI-239	P3	P & I DIAGRAM : FLY ASH HANDLING SYSTEM
7.0	Corrigendu m-I /233 of 247/	PE-189-PI-240	P3	P & I DIAGRAM : HCSD SILO & REMOTE SILO
8.0	Corrigendu m-I /233 of 247/	PE-189-PI-242	P3	P & I DIAGRAM : COMMON ASH SLURRY DISPOSAL SYSTEM

VOLUME-VII B

BID PURPOSE DRAWINGS

(ELECTRICAL)

Sr. No.	Page No./Sr. No.	Dwg No	Revision	TITLE
1.0	Key SLD Drawing	PE-189-EL-501	P3	All 11/.433 KV ESP feeders shall be fed from 11KV unit switchgear directly. Refer revision (P3) To Key SLD.
2.0	Connection Details of Neutral Grounding Resistor	PE-189-EL-506	P1	
3.0	--	PE-189-EL-517	P2	Illumination, Grounding & Lighting Protection Zones In POWER PLANT EPC Contractor's total SCOPE
4.0	SLD for chimney electrical system	PE-189-EL-518	P0	Deleted
5.0	Sheet No 37, 38, 39 of 47 (Newly Added)	PE-189-EL-SKT-5003	P1	Drawings given in cabling notes and details are only for bidder's reference / Guidance.
6.0	Cabling Notes & Details of (drg.5003), Sheet No 21 of 47 (Newly Added)	PE-189-EL-SKT-5003	P1	For Width-A of 100 mm, Depth shall be 50 mm. For other widths there is no change in depth required.

7.0	Connection Details of NGR	PE-189-EL-506	P1	Cable connection from Neutral of Transformers (UT, ST, UAT, SAT) changed from 2-1C x 70sqmm. Al XLPE to 2-1C x 95sqmm. Al XLPE.

NOTE:

Following updated drawings to be referred with Corrigendum-II (EPC prints):-

1) 5003 P2 (SH 21 OF 47)on cable tray

2) Amendment-DGDC-319-5-12(1) (2),annex.D,Table-1

3) 501 P3 (KEY SLD FOR ELECTRICAL SYSTEM)

4) 517 P2 (ILL,GROU & LP ZONES)

5) 506 , Connection Details of NGR.

VOLUME-VII D

BID PURPOSE DRAWINGS

(CIVIL)

Sr. No.	Page No./Sr. No.	Dwg. No.	Revision	TITLE
1.0	VII D/7 of 7/2.0	PE-189-CV-SK-4005	P4	ROAD LAYOUT

CORRIGENDUM TO ADDENDUM-I

Sr. No.	Section/Page No./ Cl. No.	Existing Particulars	To be read as
1.0	Addendum-I	TECHNICAL SPECIFICATION FOR ADDITIONAL SOURCING OF RAW WATER	Deleted (Not in the scope)

ANNEXURES

ANNEXURE –I

TOOLS & TACKLES

Sr.No	Description	Unit	Quantity	Remarks
1.0	**BOILER**			
	(a) Motorized spanner for high tension bolt	No.	4	
	(b) Manual spanner for high tension bolt	No.	4	
	(c) Dismantle tools for air pre heater	Set	2	
	(d) Compaction device for safety valve adjustment, calibration and hydraulic test	Set	2	
	(e) Tools for safety valve grinding and repair	Set	2	
2.0	**SOOTBLOWER**			
	(a) Specific tools for soot blower	Set	2	
3.0	**MILL**			
	(a) Bolt impact wrench	Set	2	
	(b) Hydraulic bolt tension device	Set	4	
	(c) manual high pressure pump	Set	4	
4.0	**COAL FEEDER**			
	(a) Horizontal calibration pole	No.	4	
	(b) Position detector	No.	4	
	(c) Detector cable	No.	4	
	(d) Glistening paper	No.	5	
	(e) Calibration weight	No.	2	
	(f) Roller dismantle seat	No.	2	
	(g) Roller hoist pole	No.	2	
	(h) Roller extension pole	No.	2	
5.0	**ID FAN**			

Sr.No	Description	Unit	Quantity	Remarks
	(a) Adjustable torque wrench	Set	2	
	(b) Dismantle device	Set	2	
	(c) Screw dismantle and hoist device	Set	2	
6.0	**FD FAN**			
	(a) Wheel hub lug ring	Set	2	
	(b) Blade fasten bolt	No.	6	
	(c) Blade angle adjustment tray	Set	2	
	(d) Wheel hub and main bearing dismantle tools	Set	2	
	(e) Torque wrench	Set	2	
	(f) Blade angle adjustment tray	Set	2	
	(g) Wheel hub and main bearing dismantle tools	Set	2	
	(h) Torque wrench	Set	2	
	(i) Grease gun	No.	2	
7.0	**FAN HOISTING EQUIPMENT**			
	(a) Torque wrench	Set	2	
	(b) Grease gun	Set	2	
	(c) Inner hexagon spanner	Set	2	
8.0	**PULVERIZER HOISTING EQUIPMENT**			
	(a) Torque wrench	Set	4	
	(b) Grease gun	Set	4	
9.0	**ELEVATOR**			
	(a) Multi-purpose meter	No.	2	
	(b) Spanner	Set	2	
	(c) Screw driver	Set	1	

Sr.No	Description	Unit	Quantity	Remarks
	(d) Standard Tool kit for R&P gate elevator	Set	1	
10.0	**STEAM TURBINE**			
	(a) Rotor hoisting tool	Set	1	
	(b) Cylinder hoisting tool	Set	2	
	(c) Shaft carrying tool for bushing turn	Set	2	
	(d) Temporary blinder for main stop valve and combined reheat valve on steam blowing	Set	2	
	(e) Specific spanner for steam governor parts	Set	2	
	(f) Specific spanner for hot tension bolt on steam cylinder	Set	2	
	(g) High temperature grease fill-in device	Set	2	
	(h) DEH specific tool	Set	2	
	(i) Bridge gage for measure bushing abrasion	Set	2	
	(j) Heater for hot tension bolt on steam cylinder	Set	2	
	(k) Specific screw tap for screw hole on steam cylinder	Set	2	
	(l) Specific tool for coupler alignment	Set	2	
	(m) Jacking device for casing	Set	1	
11.0	**STEAM TURBINE GENERATOR**			
	(a) Generator rotor extraction tool	Set	1	
	(b) Guiding blade seat dismantle and installation tool	Set	1	
	(c) Bearing dismantle and installation tool	Set	1	

Sr.No	Description	Unit	Quantity	Remarks
	(d) Sealing bushing dismantle and installation tool	Set	1	
	(e) Cooler dismantle and installation tool	Set	1	
	(f) Porcelain bushing terminal dismantle and installation tool	Set	1	
	(g) Retaining ring dismantle and installation tool	Set	1	
	(h) Glue injection gun	Set	1	
	(i) Side cover bolt heater	Set	1	
	(j) Tilted instrument for gas sealing test	Set	1	
	(k) Rotor vent hole detection device	Set	1	
	(l) Insulation detector for water inner cooled stator	Set	1	
	(m) Corrugated sheet measuring tool	Set	1	
12.0	**CONDENSER**			
	(a) Tube expander	Set	5	
	(b) Expansion pole	No.	10	
	(c) Expansion end	No.	30	
	(d) Scraper	Set	2	
	(e) Hole enlarger	Set	2	
	(f) Tube stopper	No.	150	
13.0	**TURBINE (FEED WATER PUMP)**			
	(a) Special spanner	Set	1	
	(b) Bridge gage	Set	1	
	(c) Bushing dismantle tool	Set	1	
	(d) Steam cylinder guiding tool	Set	1	

Sr.No	Description	Unit	Quantity	Remarks
	(e) Rotor hoisting tool	Set	1	
	(f) Cylinder hoisting tool	Set	1	
14.0	**CONDENSATE PUMP**			
	(a) Draw wrench	No.	1	
15.0	**HP HEATER**			
	(a) Specific dismantle tool for manhole	Set	2	
16.0	**TURBINE BYPASS**			
	(a) Dismantle tool	Set	2	
	(b) Steam blowing protection device	Set	2	
17.0	**PLATEN EXCHANGER**			
	(a) Spanner for plate replacement	No.	2	
18.0	**COMPUTERIZED SUPERVISION SYSTEM**			
	(a) Protection calibration device	Set	1	
	(b) Laptop for commissioning	Set	1	
	(c) Specific tool box	Set	1	
19.0	**3.3 KV SWITCHGEAR PANELS**			
	(a) Relay Test Kid	No.	1	
	(b) Earthing Truck for cable feeder	No.	1	
20.0	**UPS**			
	(a) Screw driver	Set	1	
	(b) Open spanner	Set	1	
21.0	**STATION TRANSFORMER**			
	(a) Torque spanner	Set	1	
	(b) Oil filter device	Set	1	
	(c) Position hammer drill	Set	1	

Sr.No	Description	Unit	Quantity	Remarks
	(d) Dissolved Gas Analyser	Set	1	
22.0	**UNIT AUXILIARY TRANSFORMER**			
	(a) Torque spanner	Set	1	
	(b) Position hammer drill	Set	1	
	(c) Dissolved Gas Analyser	Set	1	
23.0	**DRY TYPE TRANSFORMER**			
	(a) Torque spanner	Set	1	
	(b) Position hammer drill	Set	1	
	(c) Megger set, 500 V	Set	1	
24.0	**ENCLOSED BUSBAR**			
	(a) Torque spanner	No.	1	
25.0	**11 KV SWITCHGEAR PANELS**			
	(a) Trolley extension rail	No.	4	
	(b) Trolley crank	No.	30	
	(c) Earthing Truck for cable feeder	No.	1	
	(d) Laptop for relay setting of numerical relays	Set	1	
26.0	**GAS FIREPROOF SYSTEM**			
	(a) Nitrogen fill-in tool	Set	1	
	(b) Specific joint	Set	1	
	(c) Tee joint	Set	1	
	(d) High pressure hose	Set	1	
	(e) Pressure meter	Set	1	
	(f) Washer	Set	1	
	(g) Specific inner cross pressure wrench	Set	1	
	(h) Socket spanner	Set	1	

Sr.No	Description	Unit	Quantity	Remarks
	(i) Torque spanner	Set	1	
27.0	**BUCKET WHEEL STACKER- RECLAIMER**			
	(a) Torque spanner	No.	1	
	(b) Pressurized shaft type gun	No.	2	
	(c) Light spanner	Set	1	
	(d) Adjustable spanner	Set	1	
	(e) Wire-cutter (insulation handle)	No.	1	
	(f) Screw driver	No.	2	
	(g) Screw driver	No.	2	
	(h) Cross screw driver	No.	2	
	(i) Needle nose pliers	No.	1	
	(j) Angle pliers	No.	1	
	(k) Inner hexagon spanner	Set	1	
	(l) Electric iron	No.	1	
	(m) Digital multi-meter	No.	1	
28.0	**COAL CRUSHER**			
	(a) Adjustable spanner	No.	2	
29.0	**BELT CONVEYER**			
	(a) Torque spanner	No.	2	
30.0	**WAGON TIPPLER**			
	(a) Manually operated hydraulic jack (50 T x10 0 mm stroke)	No.	1	
	(b) Portable hand operated hacksaw with 5 spare blades	Set	1	
	(c) Hydraulic bearing puller	Set	2	

Sr.No	Description	Unit	Quantity	Remarks
	(d) Oil pump for hydraulic jack	No.	1	
31.0	**CRANES & HOISTS**			
	(a) Torque wrenches suitable for fasteners M16 and above with socket.	Set	2	
	(b) Hand grease gun – 1 kg capacity	No.	1	
32.0	**HCSD PUMPS**			
	(a) Manually operated hydraulic jack (50 T x10 0 mm stroke)	No.	1	
	(b) Portable hand operated hacksaw with 5 spare blades	Set	1	
	(c) Hydraulic bearing puller	Set	2	
	(d) Hand grease gun – 1 kg capacity	No.	1	
	(e) Feeler gauge 10 mm thk- 6″ and 12″	Set	2	
	(f) Screw operated coupling and bearing puller	No.	2	
	(g) Vibration analyzer	No.	2	
33.0	**CIRCULATING CHAIN WEIGHT CALIBRATION DEVICE**			
	(a) Length sensor	No.	2	
34.0	**ELECTRIC HEATING BELT VULCANIZATION MACHINE**			
	(a) Tool box	No.	1	
	(b) Angle grinder	No.	1	
	(c) Movable cable tray	Set	1	
	(d) Wrench	No.	1	
	(e) Slip-joint pliers	No.	1	
	(f) Large pliers	No.	1	
	(g) Screw driver	No.	1	

Sr.No	Description	Unit	Quantity	Remarks
	(h) Manual hoist	Set	1	
	(i) Electric iron	No.	1	
	(j) Shears	No.	1	
	(k) Tape	No.	1	
	(l) Hammer	No.	1	
	(m) Wire-cutter	No.	1	
	(n) Blower	No.	1	
	(o) Art knife	No.	2	
	(p) Blade	No.	2	
	(q) Paint brush	No.	2	
35.0	**SLAG DRAGGER**			
	(a) Spanner	No.	1	
	(b) Handle crank	No.	1	
	(c) Torque spanner	No.	1	
36.0	**CW PUMP**			
	(a) Special spanner	No.	2	
	(b) Cover removable bolt	Set	2	
	(c) Inclined block	Set	2	
	(d) Shaft hoist clamp	Set	2	
	(e) Oil filling device	No.	2	
	(f) Rotor hoist tools	No.	2	
	(g) Thrust installation and dismantle tool	No.	2	
	(h) Turning gear tool	No.	2	
37.0	**AIR COMPRESSOR**			
	(a) Special spanner	No.	5	

Sr.No	Description	Unit	Quantity	Remarks
	(b) Tower connector	No.	5	
	(c) Nylon tube	No.	5	
	(d) Clamp	No.	5	
38.0	**NETWORK COMPUTERIZED SUPERVISION SYSTEM**			
	(a) Laptop with all software required	Set	1	
	(b) Flashboard	Set	1	
39.0	**415 V BREAKER**			
	(a) Trolley crank	No.	20	
	(b) Earthing switch crank	No.	20	
40.0	**MINIMUM TOOLS & TACKLES FOR CONTROL & INSTRUMENTATION**			
	(a) Ring spanners set	Set	3	
	(b) Combination spanner set	Set	3	
	(c) Adjustable spanner set	Set	3	
	(d) Pliers set consisting of nose pliers, combination pliers	Set	1	
	(e) Cable termination kit (including crimping & wrapping tools for various types of termination blocks)	Set	1	
	(f) Pipe wrench set, slide wrench set, torque wrench set of various sizes and also adjustable type	Set	1	
	(g) Cable stripper	Set	1	
	(h) Allen key set (General and special purpose)	Set	2	
	(i) Insulated screw gripping screw driver set	Set	2	
	(j) Adjustable position hacksaw	Set	1	

Sr.No	Description	Unit	Quantity	Remarks
	(k) Cable splicer and cutter set	Set	1	
	(l) Precision tweezers	Set	1	
	(m) Copper tube cutter & bender	Set	1	
	(n) Fold up hex key set	Set	1	
	(o) Rubber mallet	Set	1	
	(p) Needle file set	Set	1	
	(q) Marking punches	Set	1	
	(r) IC inserter & extractors	Set	1	
	(s) Portable testing & commissioning tools for DCS	Set	1	
	(t) Portable testing & commissioning tools for PLC	Set	1	For each type PLC

SEAL OF COMPANY

Signature : .....

Name : .....

Designation : .....

ANNEXURE –II

WORKSHOP EQUIPMENT

1.0 GENERAL

1.1 The scope of work of the Bidder covers engineering, manufacture and supply, testing at manufacture's works, painting, delivery for site, storage, erection as per approved layout drawings including erection, testing and commissioning of Machine Tools/ equipments etc. as specified in the Technical Specification. All the plant and equipment shall meet the specified performance to the satisfaction of the Owner.

1.2 Exhaust ventilation shall be provided by the bidder as per the system requirement.

1.3 10T Double Girder EOT crane shall be provided for the workshop building as specified elsewhere. .

2.0 TECHNICAL SPECIFICATION

2.1 GENERAL

2.1.1 This document covers different types of Mechanical Equipment as per equipment wise technical data / features / Specifications given against the following under Clauses.

2.1.2 The design and construction of the machine tools and accessories shall incorporate the latest features to ensure high precision, productivity and flexibility. Material shall be new and the workmanship shall be of very high standard with regard to accuracy, rigidity, power, safety, material, electrical, control, ergonomics, aesthetics etc.

2.1.3 The structure of the machine tools and accessories shall be such as to maintain its rigidity and accuracy for adequately long period even under severe duty conditions. The design / fabrication/machining/assembly shall eliminate or resist distortion under entire range of operating loads as well as to exclude possibilities of vibrations especially at high load and speed conditions. All fabricated items shall be stress relieved after welding.

2.1.4 The constructional features of equipment shall facilitate easy chip / swarf removal, unimpeded coolant flow, and easy hand loading. All control shall

be easily accessible and moving or otherwise hazardous parts suitably guarded. Sub-components / parts of equipment shall be designed to reduce inventory holding.

2.1.5 All important bed ways and slide ways shall be hardened and precision ground and finished accurately parallel and straight. Suitable provision shall be made for lubrication of all sliding surfaces.

2.1.6 All important shafts, spindles and splined shafts shall be made of alloy steel, hardened and ground and mounted on antifriction bearings, wherever necessary. Suitable anti-friction or other bearings shall be provided to take up thrust and axial loads. All high speed rotating parts shall be properly balanced.

2.1.7 All driving and other gears shall be of alloy steel with teeth surfaces hardened and in-volute ground, Gearboxes shall be totally enclosed with provisions for forced lubrication arrangements (worm drives shall run in oil baths). All gearboxes shall be provided with conveniently located inspection/sight windows

2.1.8 All equipment shall have self contained lubricating system complete with necessary pumps, filters and piping suitably arranged. The types and quantity of lubricants required initially as well as for regular operation shall be indicated. Grease guns shall be provided wherever necessary. Suitable protection against excessive build-up or pressure drop in the line shall be provided.

2.1.9 Hydraulic system for equipment shall be self contained with necessary pumps, filter, electrics, valves, controls etc. Suitable protection against excessive build-up and damage shall be provided

2.1.10 Wherever required the machines shall have self coolant system with necessary pumps, strainers and piping etc. The types of coolant recommended and quantity required for operation shall be indicated. The coolant pump shall be so designed that the electric motor does not get over-loaded or overheated when all the coolant outlets are closed with the pumps in operation.

2.1.11 All levers, controls, push buttons etc, shall be conveniently grouped and located within easy reach of operator.

2.1.12 A complete set of service tools, levers, cranks etc. shall be supplied with the equipment without any extra cost for easy operation and maintenance. Minimum three copies of instruction manuals, showing operation maintenance procedures, major drive and greasing diagrams, electric circuits, lubrication and hydraulic circuits etc. shall be supplied with each equipment.

2.1.13 All equipment shall be so packed as to avoid any damage to finished surfaces. Finished surface shall be coated with corrosion preventive compound and covered by oil paper. Wherever available, ISI specification should be followed for packing

2.1.14 The components of all equipment shall be designed, assembled and tested in accordance with Bureau of Indian Standards, wherever available. In case where suitable Indian Standards are not available / not specifically indicated, the equipment shall conform to other applicable international standards such as BS, ASME, ISO and DIN.

2.2 STANDARD AND OPTIONAL ACCESSORIES:

2.2.1 A list of standard accessories offered along with the equipment shall be submitted along with the tender.

2.2.2 In respect of optional accessories, item-wise technical details and prices shall be submitted to enable Owner/Consultant to choose from.

2.2.3 If any of the optional accessories is factory assembled and cannot be retrofitted, the same shall be highlighted.

2.2.4 Foundation bolts shall be in the scope of bidder.

2.2.5 First fill of oil and lubricants and other items such as shots in shot blasting machines, etc will be in the scope of bidder

2.3 TECHNICAL DATA OF SPECIFIC MACHINE/EQUIPMENT

2.3.1 General Purpose Lathe :- One. (1) no.

Centre (general purpose) lathe manufactured in accordance with the latest design and technology for production purpose in Power Plant for turning, facing and threading operation etc. The machine shall be robust, new, unused and commercially proven, conforming to the latest Indian/International standards and shall be equipped with all standard/essential accessories (viz. drive, electrical control, hydraulics, centralized lubrication etc.) as per the following specification.

(a) Technical Specification:-

Sr. no.	Description	Particulars
(i)	Centre distance	3000 mm
(ii)	Swing over bed	640 mm
(iii)	Swing over cross slide	420 mm
(iv)	Range of spindle speed (RPM) 16, from 30 rpm to1630 rpm	
	Feed range	
	a. Longitudinal (60 Nos.)	0.04 – 2.24 mm/rev
	b. Cross (60 Nos.)	0.02 – 1.12 mm/rev
(v)	Thread cutting range	
	a. Metric	48 (0.5 – 28 mm)
	b. Inch	60 (56 – 1 tpi)
	c. Module	40 (0.25 – 14 mm)
(vi)	Carriage	
	a. Cross slide travel	300 mm
	b. Top slide travel	150 mm

Sr. no.	Description	Particulars
(vii)	Main Motor rating	Bidder to indicate
	Tail stock (sleeve dia x travel)	dia. 90 mm x 200 mm

(b) Accessories:

(i) Self centering 3 jaw Chuck

(ii) Driving plate for carriers

(iii) Universal face plate

(iv) Collet chuck & collets

(v) Reduction sleeve

(vi) Dead centre

(vii) Steady rest

(viii) Taper turning arrangement

(ix) Rear tool post

(x) Quick change tool post

(xi) Coolant equipment

(xii) Splash guard and chip tray

(xiii) Chuck guard

(xiv) Machine Lamp

(xv) Set of tool kit consisting of turning tools,Parting tools, threading tools with insert

(xvi) Service tools

(xvii) First Fill oil/grease & lubricants

(xviii) Foundation bolts & leveling wedges, anchor bolts etc.

(xix) Operator, maintenance and spare parts manual (2 sets)

2.3.2 Heavy duty Lathe – One (1) no.

Centre lathe manufactured in accordance with the latest design and technology for production purpose in Power Plant for turning, facing and threading conforming to the latest Indian/International standards . The machine shall be robust, new, unused and equipped with all standard/essential accessories (viz. drive, electrical control, hydraulics, centralized lubrication etc.) as per the following specification.

(a) Technical Specification:-

Sr. no.	Description	Particulars
(i)	Centre distance	5000 mm
(ii)	Swing over bed	900 mm
(iii)	Swing over cross slide	550 mm
(iv)	Range of spindle speed (rpm)	21, from 4.5 to 450
(v)	Feed range	
	a. Longitudinal (60 Nos.)	0.1 – 6.4mm/rev
	b. Cross (60 Nos.)	0.05 – 3.2 mm/rev
(vi)	Thread cutting range	
	a. Metric	51 (1 – 112 mm)
	b. Inch	56 (28 – 1/4 tpi)

Sr. no.	Description	Particulars
	c. Module	39 (0.5 – 36 mm)
(vii)	Carriage	
	a. Rapid traverse	3 m/min
	b. Top slide travel	225 mm
(viii)	Main Motor rating	Bidder to indicate
(ix)	Tail stock (Taper x travel)	MT6 x 280 mm

(b) Accessories:

(i) Self centering 3 jaw Chuck

(ii) Driving plate for carriers

(iii) Universal face plate

(iv) Collet chuck & collets

(v) Reduction sleeve

(vi) Dead centre

(vii) Steady rest

(viii) Taper turning arrangement

(ix) Rear tool post

(x) Quick change tool post

(xi) Coolant equipment

(xii) Splash guard and chip tray

(xiii) Chuck guard

(xiv) Machine Lamp

(xv) Set of tool kit consisting of turning tools, Parting tools, threading tools with insert

(xvi) Service tools

(xvii) First Fill oil/grease & lubricants

(xviii) Foundation bolts & leveling wedges, anchor bolts etc.

(xix) Operator, maintenance and spare parts manual (2 sets)

2.3.3 Radial drilling machine - One. (1) no.

Radial drilling machine suitable for drilling, tapping operation in the Power Plant, shall be new, robust, unused, commercially proven and conforming to the relevant Indian/International standard shall be complete with all electrical equipment and standard / essential accessories and shall be generally as per the following specification

(a) Technical Specification

Sr. no.	**Description**	**Particulars**
(i)	Drilling capacity in steel	50 mm
(ii)	Tapping in steel – metric	M 56 × 2.5
(iii)	Number of spindle speeds	12 (40-1800rpm)
(iv)	Feeds Range	(6) from 0.125 to 1.25 m/mm
(v)	Drilling Radius, max./min	1500 mm/525mm
(vi)	Quill Transverse	325 mm
(vii)	Base plate to spindle	
	a. Max.	1400 mm

Sr. no.	Description	Particulars
	b. Min.	350 mm
(viii)	Arm traverse	740 mm
(ix)	Power, Main Motor	Bidder to indicate
(x)	Power Arm Motor	Bidder to indicate

(b) Accessories:

(i) Complete electrical equipment

(ii) Box table 600 × 500 mm × 500 mm

(iii) Coolant equipment with pump & motor

(iv) Machine lamp

(v) Reduction sleeves

(vi) A set of service tools

(vii) Instruction/maintenances/spare parts/manual

2.3.4 Bench Drilling Machine – Two (2) nos.

Bench drilling machine for drilling, tapping operation in Power plant work shop. The machine shall be new, unused, commercially proven conforming to the relevant Indian/International standard and shall be complete with electrical equipment and all standard/essential accessories and shall generally be as per the following specification.

(a) Technical Specification:-

Sr. no.	Description	Particulars
(i)	Drilling capacity in steel	20 mm

Sr. no.	Description	Particulars
(ii)	Tapping capacity	M 12
(iii)	Spindle traverse	125 mm
(iv)	Distance Column to spindle centre	200 mm
(v)	Max. distance between spindle to base	600 mm
(vi)	Spindle speed range	100 – 2700 rpm
(vii)	Drill head motor power	0.75 KW

(b) Accessories: -

(i) Complete electrical equipment

(ii) Lubrication equipment

(iii) Machine Lamp

(iv) Machine vice

(v) First fill of oil, grease and lubrication

(vi) Foundation bolts, leveling wedges, anchor bolts

(vii) 2 sets of operation, maintenance & spares parts manual

2.3.5 Portable Drilling Machine – Two (2) nos.

Sr. no.	Description	Particulars
(a)	Drill electric	2 Nos
(b)	Cap in steel	10 mm
(c)	Power	500 W

Sr. no.	Description	Particulars
(d)	Drill electric	2 nos
(e)	Cap in steel	16 mm
(f)	Power	Bidder to indicate

2.3.6 Shaping Machine – One (1) no.

Shaping machine, for machining flat surfaces, to be used in workshop of power plant, shall be new, unused, commercially proven, conforming to the relevant Indian/ International standards, shall be of sturdy construction for vibration free working. The machine shall have centralised lubrication, automatic tool lifting device, automatic down feed and shall have variable automatic feeding arrangement and shall be complete with all electrics, drives etc. and as per the following specification.

(a) Technical Specifications:

Sr. no.	Description	Particulars
(i)	Max. length of stroke	760 mm
(ii)	Table travel horizontal	670 mm
(iii)	Table travel vertical	430 mm
(iv)	Table working surface	760X360 mm
(v)	Vertical travel of tool head	150 mm
(vi)	Tool Head Swivel	± 60 degree
(vii)	Range of Ram speeds	12 to 72
(viii)	Main Motor Power	Bidder to indicate

(b) Accessories:-

(i) Complete electrical equipment

(ii) Machine Table

(iii) Automatic lubrication

(iv) Automatic down feed and Tool lifting

(v) Key way cutting attachment

(vi) Machine vice

(vii) Machine Lamp

(viii) First fill of oil, grease and lubrication.

(ix) Foundation bolts, leveling wedges, anchor bolts

(x) 2 sets of operation, maintenance & spares parts manual

2.3.7 Universal Milling Machine – One (1)no.

Universal Milling machine for general purpose milling operation in Maintenance Workshop.

The machine shall be new, unused commercially proven featuring state-of-the art technology, reliable and sturdy conforming to latest Indian / international standard and equipped with all standard / essential accessories (viz. drive, electrics, hydraulic / pneumatic, coolant / lubrication system etc.) as per the following specification.

(a) Technical Specification:-

Sr. no.	Description	Particulars
(i)	Table clamping area	1350 x 300mm
(ii)	Safe load on table	250 Kg
(iii)	Traverse (Power operated)	
	a. Longitudinal	800mm
	b. Cross	270mm

Sr. no.	Description	Particulars
	c. Vertical	400mm
(iv)	Swivel of table	+ / - 45
(v)	Distance from milling spindle to table top surface	70 / 470mm
(vi)	Spindle speeds (in steps	50-1800 rpm
(vii)	Feed range	
	a. Longitudinal & cross	16 – 800 mm /min
	b. Vertical	4 – 200 mm / min
(viii)	Rapid traverse	
	a. Longitudinal & cross	3200 mm / min
	b. Vertical	800 mm / min
(ix)	Power	
	a. Main motor	Bidder to indicate
	b. Feed motor	Bidder to indicate
	c. Power Supply	415V, 3 Phase, 50 Hz

(b) Accessories:

(i) Vertical Milling head

(ii) Parking bracket for Milling head

(iii) Digital readout for traverses …

(iv) Complete electrical equipment…

(v) Machine vice with swivel base …

(vi) Coolant equipment

(vii) Stub arbors

(viii) Draw bolt with nut……

(ix) Support bracket & over-arm brace…

(x) Milling arbors

(xi) Machine lamp

(xii) Set of 5 nos. tool holder / arbors / sleeves cutting tools in different configuration for general purpose application and performing cutting test during commissioning of machine…

(xiii) Set of Service tools (wrenches etc.)…

(xiv) First fill of oil / grease / lubricants

(xv) Foundation bolts / leveler / anchor bolt etc

(xvi) Operation, maintenance manual …

(xvii) Any other essential accessories required to run the quoted configuration of machine (please mention and quote).

2.3.8 Vertical Hydraulic Press – One (1) no.

A vertical hydraulic press (variable day light) for Maintenance workshop suitable for the purpose of pressing bearings, dismantling of gears, bushes in pulleys, etc. as well as suitable for pressing, bending, and straightening activities shall be complete with hydraulic/ pneumatic equipment, coolant / lubrication system, electrical equipment, and other standard accessories etc. The machine shall be new, unused, commercially proven featuring state-of-the art technology, reliable and sturdy conforming to latest Indian / international standard, as per following specification.

(a) Technical Specification:

Sr. no.	Description	Particulars
(i)	Capacity	100 T
(ii)	Ram stroke adjustable	250 mm
(iii)	Day light adjustable in steps of 200 mm	200 mm to 1000 mm
(iv)	Table size	800x 500 mm
(v)	Gap between column	1200x 300 mm
(vi)	Ram speed (approx)	
	a. Pressing	3 mm/min
	b. Rapid	40 mm/min
	c. Return (no load)	50 mm/ min
(vii)	Motor power	Bidder to indicate
(viii)	Accessories	As required
(ix)	A set of tools	One
(x)	Instruction / maintenances / spare parts manual	2 sets

2.3.9 Double Ended Pedestal Grinder – Two (2)nos.

Double ended pedestal grinder for grinding application in Maintenance workshop. The machine shall be new, unused, commercially proven, conforming to the relevant Indian/International standards and shall be equipped with all standard/ essential accessories (viz. electrics, lubrication, Grinding wheel etc.) as per the following specification.

(a) Technical Specifications:

Sr. no.	Description	Particulars
(i)	Size of grinding wheel	300×40×50.8 mm
(ii)	Wheel centre distance	610 mm
(iii)	Base to centre line of spindle	950 mm
(iv)	Motor rating	Bidder to indicate
(v)	Motor speed	1500 (rpm)

(b) Accessories:-

(i) Complete electrical equipment

(ii) Set of grinding wheel

(iii) First fill of oil, grease and lubrication

(iv) Foundation bolts, leveling wedges, anchor bolts

(v) 2 sets of operation maintenance & spares parts manual

2.3.10 Hydraulic Power hacksaw - Two (2) nos.

Hydraulic Power hacksaw for cutting round, flat and square surface in Maintenance workshop, shall be new, unused, commercially proven, conforming to the relevant Indian/International standards and shall be equipped with complete electrical, hydraulic equipment and all standard/ essential accessories and shall generally be as per the following specification.

(a) Technical Specification: -

Sr. no.	Description	Particulars
(i)	Number of strokes per minute	40/51/64/80/102/128
(ii)	Cutting speed m / min	11/14/18/22/28/36
(iii)	Cutting range at 90^0	
	a. Round	300 mm
	b. Flat	300 × 160 mm
	c. Square	250 × 250 mm
(iv)	Cutting range at 45^0	
	a. Round	180 mm
	b. Flat	180 × 170 mm
	c. Square	170 × 170 mm
(v)	Power	Bidder to indicate

(b) Accessories:

(i) Complete electrical equipment

(ii) Complete hydraulic equipment

(iii) Lubrication equipment

(iv) A Machine Lamp

(v) A set of blades

(vi) First fill of oil, grease and lubrication.

(vii) Foundation bolts, leveling wedges, anchor bolts

(viii) Adjustable Material Stop

(ix) 2 sets of operation, maintenance & spares parts manual

MISCELLANEOUS ITEMS TO BE PROCURED FOR THE WORKSHOP

Sr. No.	Equipment	Units	Qty
1.0	**MISCELLANEOUS ITEMS**		
1.1	Standard Fitter's Tool Kit	Sets	4
1.2	Welding Transformer (600 A)	Nos.	4
1.3	Welding Rectifier (600 A)	Nos.	4
1.4	Oxy - Acetylene cutting & Welding Set	Nos.	2
1.5	Electrode Drying Oven	Nos.	2
1.6	Fitter's Bench with Vice	Nos.	4
1.7	Measuring Instruments	Set	1
1.8	Pneumatic / Electric Power Tools	Sets	2
1.9	Hydraulic Puller with Hydraulic Unit	Each	2
1.10	Spray Painting Gun	Nos.	2
1.11	Hand Operated Hydraulic Pallet Truck	Nos.	2
1.12	Flexible Shaft Grinder	Nos.	3
1.13	Welding Generator	No.	1
1.14	Welding table	Nos.	2
1.15	Portable electrode driers	Nos.	2
1.16	Welder Accessories set	Nos.	2
1.17	Hot air blower	Nos.	2
1.18	Induction Heater	No.	2
1.19	Lockers	No.	2
1.20	Gas cutting, welding & brazing set	Sets	2
1.21	Portable type compressor of Pressure 3.5-4 Kg/cm2 (Reciprocating type)	Nos.	2

Sr. No.	Equipment	Units	Qty
1.22	Motor test bed (Size-5mX3mX0.3m (thick))	Set	1
1.23	Burnout Oven (Size-3mX3mX3m)	Set	1
1.24	Transformer oil filtration machine (2000 gallons / hr)	No.	1
1.25	Hydraulic crimping tools up to 1000 sq.mm	Nos.	2
1.26	Manual crimping tools 10 sq mm -185 sq mm	Nos.	2
1.27	Manually operated platform trolley, size 2x2m	Nos.	2
1.28	Vacuum cleaner	Nos.	2
1.29	Safety device, Goggles, Helmets, Safety belts, Earth discharge rod (upto 400kv) 10 Nos each	Set	1
1.30	Soldering Iron with coil and flux	Nos.	5
1.31	Wooden work benches size 2m x 2m	Nos.	4
1.32	Set of measuring tools	Nos.	2
1.33	Electrician measuring tool kit	Sets	3
1.34	Set of general tools	Sets	3
1.35	Electric hand blower	Sets	2
1.36	steel lockers with 12 pigioeon holes in each	Nos.	4
1.37	Steel almairah of standard size	Nos.	4
1.38	Cage encloser type hand lamps with 40W GLS and 15m cable	Nos.	5

2.4 TECHNICAL DATA OF SPECIFIC MACHINE/EQUIPMENT

2.4.1 Standard Fitter's Tool Kit - Four (4) sets

Standard fitter's tool kit with portable tool box 450 mm (long) × 200 mm (high) × 150 mm (wide) (approx) of welded construction having suitable compartments, handles, two grip clips, sturdy padlock etc. consisting of the following tools useful for the repair and assembly.

(a) One hacksaw frame conforming to IS: 5169, 300 mm nominal size with a set of blades conforming to IS : 2594.

(b) One set of engineer's file 250 mm long comprising flat and half round file with bastard cut & smooth conforming to IS : 1931

(c) Ball pean hammer conforming to IS: 841 with handle of 250 gm and 500 gm, 1000 gm each.

(d) Centre punch, tip dia 8 mm conforming to IS: 7177.

(e) One set of Engineer's screw drivers of following size.

(i) 100 × 4 mm

(ii) 125 × 6 mm

(iii) 150 × 8 mm

(iv) 200 × 10 mm

(f) One set of electrician's screw driverscomprising of the following sizes :

(i) 125 × 4 mm

(ii) 100 × 5 mm

(iii) 150 × 5 mm

(iv) 200 × 5 mm

(g) One set of pliers comprising of the following.

(i) Combination side cutting pliers (IS : 3650) : 160 mm

(ii) Round Nose pliers (IS : 3568) : Short Nose, 150mm

Long Nose, 160mm

(iii) Flat Nose Pliers (IS : 8672) : 160mm

(iv) Monkey Pliers : 250mm

(h) Set of cold chisel conforming to IS: 402 suitable for cutting ferrous materials.

(i) Round Nose chisel (Length) : 100 mm &150 mm

(ii) Octagonal chisel (Lengt) : 100 mm & 150 mm

(i) One set of open jaw double ended spanner conforming to IS: 2028 comprising of following size:

(i) 6 × 7 mm

(ii) 8 × 9 mm

(iii) 10 × 11 mm

(iv) 12 × 13 mm

(v) 14× 15 mm

(vi) 16 × 17 mm

(vii) 18 × 19 mm

(viii) 20 × 22 mm

(ix) 21 × 23 mm

(x) 24 × 26 mm

(xi) 25 × 28 mm

(xii) 27 × 32 mm

(xiii) 30 x 32 mm

(j) One set of double ended cranked ring spanner conforming to IS: 2029 comprising of following sizes :

(i) 6 × 7 mm

(ii) 8 × 9 mm

(iii) 10 × 11 mm

(iv) 12 × 13 mm

(v) 14× 15 mm

(vi) 16 × 17 mm

(vii) 18 × 19 mm

(viii) 20 × 22 mm

(ix) 21 × 23 mm

(x) 24 × 26 mm

(xi) 25 × 28 mm

(xii) 27 x 32 mm

(xiii) 30 x 32 mm

(k) Bi – hexagonal square drive socket wrench of following size conforming to IS: 7381 along with the accessories.

(i) Size: 8 mm to 30 mm at every 1 mm

(ii) Accessories

a. Reversible ratchet

b. Sliding bar

c. Universal Joint

d. Extension 75 mm long

e. Extension 125 mm long

f. Extension 250 mm long

(l) Single ended, open jaw, adjustable alloy steel wrench (IS :6149) with Max jaw opening : 43 mm

(m) Pipe wrenches (IS: 4003)Max. capacity: :130 mm

(n) Pincer (IS: 4095), Nominal size : 180 mm

(o) C- clamp of medium duty (IS: 9181) size: 100 mm

(p) One set of Allen keys: 2 mm to 10 mm

(q) Wire brush

(r) Steel scale :150 mm

(s) Measuring tape 5 m length

(t) Flat cold chisels (IS: 402)suitable for cutting Ferrous materials.

Sr. No.	Nominal size, mm	Length, mm
(i)	14	100
(ii)	25	150

(u) Cross cut cold chisels (IS: 402)suitable for cutting ferrous materials.

Sr. No.	Nominal size, mm	Length, mm
(i)	6	100
(ii)	12	100

(v) Combination open and box end wrenches (IS: 6389) size 14 mm, 17 mm, 19 mm (each).

(w) Set of drifts (IS 6835 –: 100 mm long)

(x) Engineers scrappers conforming to IS: 6861 with wooden handles of following type :

(i) Flat scrapper (set consisting of 200 mm, 300mm long)

(ii) Triangular scrapper (set consisting of 200 mm and 300 mm long).

(y) Oil can 500 ml (minimum

2.4.2 Welding Transformer (600A) - Four (4) nos.

Heavy duty, fan cooled, wheel mounted welding transformer for MMA welding shall be complete with standard accessories, electrical equipment and shall generally be as be per following technical specification:

(a) Technical Parameters

Sr. No.	**Description**		**Particulars**
(i)	Input Supply	:	415 V, 3ph, 50Hz
(ii)	Welding Current Range Amps	:	90-630
(iii)	Open circuit voltage (Max)	:	By Bidder
(iv)	Welding current (at 60% duty cycle)	:	500 A
(v)	Welding Current Regulator	:	Stepless

Sr. No.	Description		Particulars
(vi)	Protection Form	:	IP-23
(vii)	Type of insulation	:	By Bidder
(viii)	Type of cooling	:	AF (Forced Air)
(ix)	Type of enclosure	:	Drip Proof

(b) Accessories :

Sr. No.	Description		Particulars
(i)	Electrode holder	:	1
(ii)	Hand screen with colored	:	1
(iii)	Glass and two numbers of clear Glasses.		
	a. Head screen	:	1
	b. Chipping hammer	:	1
(iv)	Hand gloves (chrome leather)	:	1 Pair
(v)	Wire brush	:	1
(vi)	Apron (chrome leather)	:	1
(vii)	Welding cable (10m) with lug	:	1 length
(viii)	Earthing cable (10m) with lug	:	1 length
(ix)	Earth clamp	:	1 Set
(x)	A set of service tools	:	1 Set
(xi)	Operation /Maintenance	:	2 sets
(xii)	Spare parts manual	:	2 sets

(c) Spares

A set of spares required for 2 years normal operation.

2.4.3 Welding Rectifier (600A) Four (4) nos.

All purpose wheel mounted thyristorised MMA welding rectifier having built in hot start facility for arc striking and remote control to adjust welding current during welding. It shall be complete with standard accessories, electrical equipments, torch cable etc. and shall generally be as per following technical specification:

(a) Technical Parameters:

Sr. No.	**Description**		**Particulars**
(i)	Supply voltage	:	415 V ± 10%, 3ph, 50Hz
(ii)	Open circuit voltage	:	By Bidder
(iii)	Welding current range	:	10 – 600 Amps
(iv)	Type of welding current regulation	:	stepless
(v)	Type of insulation	:	By Bidder
(vi)	Type of cooling	:	Forced air
(vii)	Type of enclosure	:	By Bidder

(b) Accessories :

Sr. No.	**Description**		**Particulars**
(i)	Insulated electrode holder	:	1
(ii)	Hand screen	:	1
(iii)	Head screen	:	1
(iv)	Chipping hammer	:	1
(v)	Hand gloves (chrome leather)	:	1 Pair

Sr. No.	Description		Particulars
(vi)	Wire brush	:	1
(vii)	Apron (chrome leather)	:	1
(viii)	Welding cable (10m)with lug	:	1 length
(ix)	Earthing cable (10m)with lug	:	1 length
(x)	Earth clamp	:	1 set
(xi)	A set of service tools	:	1 set
(xii)	Power cable	:	100 m
(xiii)	Operation /Maintenance/ spare parts manual	:	2 set

(c) Spares

A set of spares required for 2 years normal operation

2.4.4 Oxy-acetylene Cutting & Welding set - Two (2) nos.

Oxy-acetylene gas cutting and welding set complete with blow pipes suitable for welding and cutting of ferrous and non-ferrous materials and shall be supplied with oxygen and acetylene regulators, flash back arrestor, nozzle, tips etc. generally as per the following specification:

(a) Accessories:

Sr. No.	Description		Particulars
(i)	Cutting capacity	:	300mm thick MS
(ii)	Type of Cutter	:	Nozzle Mixing (NM)
(iii)	Fuel Gas	:	Acetylene or LPG

Sr. No.	Description		Particulars
(iv)	Length	:	450mm
(v)	Angle Head	:	90 Degree
(vi)	Body Head	:	Stainless Steel/ Forged Brass
(vii)	Welding / brazing blow pipe	:	2
(viii)	Two-stage oxygen regulator	:	1
(ix)	Two- stage acetylene regulator	:	1
(x)	Gas cutting nozzles	:	1 Set
(xi)	Gas Welding / Brazing nozzles	:	1 Set
(xii)	Hose pipe for oxygen (Black),	:	10 m long, 1 length
(xiii)	Hose pipe for acetylene (Red),	:	10 m long, 1 length
(xiv)	Hose clips	:	1 set
(xv)	Hose protector (for oxygen)	:	1
(xvi)	Hose connections and nuts	:	1 set
(xvii)	Spanners & spindle keys	:	1 set
(xviii)	Goggles with round dark glasses	:	1
(xix)	Chrome Leather gloves	:	1 pair
(xx)	Wire brush (standard & narrow)	:	1 no each (1 + 1)
(xxi)	Chipping hammer	:	1
(xxii)	Spark lighter	:	1
(xxiii)	Cylinder trolley	:	1
(xxiv)	Welder's apron	:	1

2.4.5 Electrode Drying Oven - Two (2)nos.

A portable electrode drying oven, having facilities for automatic temperature control shall be complete with electrical equipment, control and standard accessories and shall generally be as per following technical specification

(a) Technical specification

Sr. No.	Description		Particulars
(i)	Input supply	:	230 V, single phase, 50 Hz
(ii)	Rating	:	0.5 KW
(iii)	Temperature range	:	50 – 250^0 C (Controllable)
(iv)	Capacity	:	4 Kg
(v)	Inner Size	:	80(D)x80(W)x450 (H) m

(b) Accessories

(i) Complete electrical equipment

(ii) Complete controls

(iii) A set of services tools

(iv) 2 sets of operation / maintenance / spare parts manual

(c) Spares : A set of spares for 2 years of normal operation.

2.4.6 Fitters Bench With Vice - Four (4) nos.

Fabricated M.S. Fitter's Bench having wooden surface top, with four (4) numbers of cast steel vices out of which three vices of 150 mm jaw width and one vice of 200 mm jaw width for keeping tools and tackles of various sizes and two numbers of drawers. The vice shall have jaws of hardened

steel, shall conform to IS 286 and shall be generally as per following specification.

(i)	Size of table	:	1800 × 1200 × 900 (H)
(ii)	Width of jaws of vice	:	150 mm
(iii)	Opening of jaws of the vice	:	200 mm
(iv)	Depth of jaws of vice	:	90 mm

2.4.7 Measuring Instruments (Mitutoyo / TESA / Mahr equivalent)- One (1) set

Sr. No	Name	Order Ref.	Range	Least Count	Accuracy	Qty. (Nos)
(a)	Coolant Proof Digital Caliper					
		500-603	0-200mm	0.01mm	±0.02mm	1
		500-604	0-300mm	0.01mm	±0.03mm	1
(b)	Dial Caliper	505-684	0-200mm	0.02mm	±0.03mm	2
		50-673	0-300mm	0.02mm	±0.04mm	2
(c)	Vernier Caliper	160-180	0-300mm	0.02mm	±0.04mm	1
		160-131	0-600mm	0.05mm	±0.1mm	1
		160-132	0-1000mm	0.05mm	±0.15mm	1
(d)	Dial Depth Gauge	527-303-500	0-300mm	0.05mm	±0.08mm	1
(e)	Vernier Height Gauge (With Scriber)					
		514-104	0-450mm	0.02mm	±0.05mm	1
(f)	Outside Digimatic Micrometer	293-151-30	0-25mm	0.001mm	±0.001mm	1
		293-152-30	25-50mm	0.001mm	±0.001mm	1
		293-153-30	50-75mm	0.001mm	±0.001mm	1

Sr. No	Name	Order Ref.	Range	Least Count	Accuracy	Qty. (Nos)
		293-154-30	75-100 mm	0.002mm	±0.001mm	1
(g)	Outside Micrometer with interchangeable anvils and zero setting standards to cover full range of measurement	104-140A	100-200 mm	0.01mm		1
		104-141A	200-300 mm	0.01mm		1
		104-142A	300-400 mm	0.01mm		1
		104-143A	400-500 mm	0.01mm		1
(h)	2 point Tubular Inside icrometer with micrometer head. Three point internal micrometer	133-143 to 133-160	50-500mm	0.01mm		1set
		468-963	25-50 mm	0.01mm		1
(i)	Precision Squares	916-104	200×130mm		4µm (outside squareness)	1
		916-218	400×250mm		13µm (outside squareness)	1
(j)	Spring Divider	950-212	150mm			1
		950-213	200mm			1
(k)	Outside	950-222	150mm			1

Sr. No	Name	Order Ref.	Range	Least Count	Accuracy	Qty. (Nos)
	Spring Caliper	950-222	200mm			1
(l)	Inside Spring Caliper	950-232	150mm			1
		950-233	200mm			1
(m)	Universal Bevel Protractors	187-907	150mm	5min		1
		187-908	300mm	5min		1
(n)	Precision Level	960-706		Sensitivity 0.02mm/ m	±0.3 (graduatio n)	1
(o)	Steel Rule	182-131	300mm	Graduatio n 1mm, 0.5mm		2
		182-151	450mm			2
		182-171	600mm			2
(p)	Semi Flexible Steel Rule	182-309	1000mm	Graduatio n 1mm, 0.5mm		2
(q)	Thickness Gauge	184-313	0.05-1mm		28 leaves	1
(r)	Radius Gauge	186-902	0.5-13mm		26 pair	1
(s)	Screw Pitch Gauge (Metric)	188-122	0.4-7mm		21 leaves	1
(t)	V-Block Sets (Magnetic Type)	181-947	50mm			2

Sr. No	Name	Order Ref.	Range	Least Count	Accuracy	Qty. (Nos)
(u)	Pocket Magnifier	183-203	50X			2
(v)	Dial Indicator with dial test stand and universal holder	2960F	1mm 50-0-50		±14mm	2
		513-503E	0.2mm 0-100-0	Graduation 0.01mm	3µm	2

2.4.8 Pneumatic / Electric Power Tools

(a) Impact Wrench (Pneumatic) – (Chicago Pneumatic or equivalent)

Sr. No.	Square drive, size	Standard range of sockets , Handle , pneumatic connector and all essential accessories	Qty.
(i)	3/8″	Inch & mm one each	2 sets
(ii)	½″	Inch & mm one each	2 sets
(iii)	¾″	Inch & mm one each	2 sets
(iv)	1″	Inch & mm one each	2 sets

(b) Die Grinder (Pneumatic) – (CP 3050N or equivalent) - Two(2) nos.

(i) Wheel capacity 50 x 20 mm

(ii) Free speed 18,000 rpm

(c) Pencil grinder (Pneumatic) – (CP 9107 or equivalent) - Two (2) nos

(i) Collect capacity 6 mm

(ii) Free speed 35,000 rpm

(d) Drill (Electric) - (AEG B 500 or equivalent) - Two (2) nos

(i) Dia in steel 16 mm

(ii) Power 500 W

(e) Drill (Electric) - (AEG BE 630R or equivalent) -Two (2) nos

(i) Dia in steel 16 mm

(ii) Power 630 W

(f) Angle Grinder (Electric) – (AEG WSE 9-125 MX) - Two (2) nos.

(i) Disc dia – 125 mm

(ii) Power – 850 W

(g) Angle Grinder (Electric) – (WSL 180) - Two (2) nos

(i) Disc dia – 180 mm

(ii) Power – 2000 W

(h) Angle Grinder (Electric) – (WSL 230) - Two (2) nos

(i) Disc dia – 230 mm

(ii) Power – 2000 W

(i) Angle Sander (Electric)– AEG SE 12 – 180 or equivalent) - Two (2) nos.

(i) Disc dia – 180 mm

(ii) Power – 1200 W

(j) Polisher (Electric) – (AEG PE150 or equivalent) - Two (2) nos

(i) Disc dia – 150 mm

(ii) Power – 1200 W

(k) Jig Saw (Electric) – (AEG 1200 BX or equivalent)- Two (2) nos

(i) Cutting depth steel – 10 mm

(ii) Power – 600 Wl.

(l) Circular Saw (Electric) – (AEG KS66S) - Two (2) nos

(i) Cutting depth – 0 – 66 mm

(ii) Saw blade dia – 190 mm

(iii) Power – 1500 W

2.4.9 Hydraulic Puller with Hydraulic Unit - Two (2) nos

(a) 5 Tons Spread 275 mm

(b) 6 Tons , Spread 200 mm

2.4.10 Spray Painting Gun - Two (2) nos

(a) Air operated multi purpose jet spray gun for primer and final painting, with rubber hose of 5 mm length.

(b) Capacity of gun : ½ liters

2.4.11 Hand Operated Hydraulic Pallet Truck - Two (2) nos

A pallet truck is sturdily built, highly maneuverable and guarantees the easiest and fastest handling of any load. The equipment shall be operable from all angles. The machine shall have high capacity/ weight ratio.

Ergonomically designed steering handle shall be provided to reduce puling power and minimize operator fatigue.
The unit offered shall be new, unused and best of its kind. The unit shall also conform to the latest edition of the applicable Indian Standards IS 5007-1988 and Regulation. Wherever the unit offered is not in accordance with the relevant Indian Standards and Regulations, the copies of the Standards to which the equipment conforms shall be submitted along with the proposal. Unit shall have a printed sketch showing the load capacity at different load centres for safe operation.

(a) Hydraulic System:

Hydraulic system shall be of leak proof hydraulic system containing concealed valves, combined cylinder and reservoir, precision machined components, improved hydraulic packing and an overload safety device. Double sealed high-pressure polyurethane packing shall be provided to ensure long life and prevent leakage.

(b) Main Body:

A rugged main body designed for heavy duty and long life, made of fabricated steel plates and electrically jig welded for accurate positioning and alignment in to a solid one-piece construction, fitted with square lifting leaver arms, ensuring a adaptable lifting action.

(c) Controls:

Pump actuated by steering handle, gives greatest leverage for fast, effortless lifting. Foot controlled valve for positive variable speed lowering of loads. 90deg. turning in each direction with steering handle. Pallet truck shall be supplied with finger protection clamp and release.

(d) Wheels:

Cast iron, fitted with double sealed ball bearings, specially engineered for served severer conditions of dust and dirt. Rubber/polymer/nylon type load wheels can also be used. The

wheels are trunnion mounted to ensure perfect stability and articulation. Foot operated parking brakes shall be provided.
All the moving points fitted with grease nipples for lubrications.
All surfaces prepared with rust resisting treatment and spray-painted.

(e) Specification

Sr. No	Descriptions	Particulars
(i)	Capacity (kg)	2500
(ii)	Lowered height (mm)	195
(iii)	Lift (mm)	90
(iv)	Standard fork length (mm)	1150
(v)	Overall width (mm)	530
(vi)	Overall length (mm)	1550
(vii)	Distance between forks (mm)	230
(viii)	Fork width (mm)	To be indicated by bidder
(ix)	Overall Height (mm)	To be indicated by bidder
(x)	Turning radius (mm)	To be indicated by bidder
(xi)	Load centre	To be indicated by bidder
(xii)	Under clearance	To be indicated by bidder
(xiii)	Dia. of wheels	To be indicated by bidder
(xiv)	Weight (approx.)	To be indicated by bidder

2.4.12 Flexible Shaft Grinder- Three (3) nos

Flexible Shaft Grinder for grinding, buffing, fettling etc. stand mounted, Wheel dia. 100mm, collet 3-6-8 mm, speed- 3200/5600 rpm, power 0.37 KW, Length 1.5mm with all essential accessories :

(a) A set of griding wheels

(b) A set of mounted points

2.4.13 Welding Generator - One (1) no.

The machine shall comprise of a motor and a generator, both mounted on a common base plate and coupled to each other through flexible coupling. The machine will be useful for generating DC arc current for welding.

(a) Technical Specification.

(i)	Rating	:	40 Kva
(ii)	Frequency	:	160 HZ
(iii)	OCV	:	80 V DC
(iv)	Welding current range	:	10- 400 A
(v)	Current Regulation	:	Stepless
(vi)	Type of Insulation	:	H

(b) Accessories:

Sr. No.	**Detail**	:	**Quantity**
(i)	Electrode Holder	:	1
(ii)	Hand Screen	:	1
(iii)	Head Screen	:	1
(iv)	Chipping Hammer	:	1
(v)	Hand Glove (leather)	:	1 pair
(vi)	Wire Brush	:	1
(vii)	Apron	:	1

Sr. No.	Detail	:	Quantity
(viii)	Welding cable (10 m) with lug	:	1 length
(ix)	Earthing cable (10 m) with lug	:	1 length
(x)	Earth clamp	:	1 set
(xi)	A set of service tools	:	1 set
(xii)	Operation/ Maintenance/ spare parts manual 6 sets	:	6 set

2.4.14 Welding Table - Two (2) nos

Fabricated Mild Steel welding table complete with box for electrodes and fixtures for earhing terminals.

(a)	Size of table	:	1500 x 100 x 850 (h) mm
(b)	Top Plate thickness	:	16 mm

2.4.15 Portable welding rod dryer - Two (2) nos.

(a)	Cap.	:	5 & 3 kg
(b)	Rod length	:	450 mm
(c)	Temperature	:	150° c
(d)	Voltage: AC 220V AC.DC	:	60-110V

2.4.16 Welder accessories set - Two (2) nos.

(a)	Armour Hand shield (coloured glass)	:	5
(b)	Armour Hand shield (white/ clear glass)	:	10
(c)	Armour head shield	:	3
(d)	Welder's glove	:	3

2.4.17 Hot air blower - Two (2) nos

Hot air blower, compact light weight for plant maintenance, removal of paint, varnish etc. temp. 300°/600°C, Rated input 2000 W, 415V/3ph/50Hz with all essential accessories.

2.4.18 Induction heater for bearing mounting - Two (2) nos

Induction heater suitable for mounting of bearings couplings, shrink ring etc. in the production and maintenance workshop of steel plant.

The machine shall be new commercially proven featuring state-of-the art technology, reliable and sturdy conforming to latest Indian/ international standard and equipped with all standard / essential accessories (viz. electrics, instrumentation & control, yokes, magnetic probe, supports, glove etc.) as per the following specification.

(a) Specification

(i)	Max. bearing diameter		210 mm
(ii)	Max. bearing width		120 mm
(iii)	Max. bearing weight (approx.)		10 kg
(iv)	Temp. control		150^0C
(v)	Timer		0 – 30 min

(vi)	Heating capacity		3.5 KVA

(b) Magnetic probe

(i) Digital display

(ii) Auto demagnetizing

(iii) Thermal safety guard

(iv) Sound signal

(v) Error report

(vi) Temp & time preset

(c) Accessories:

(i) Heat resistant glove

(ii) Yokes of different sizes

(iii) Magnetic Probe

(iv) Set of Servicing tools (wrenches etc.)

(v) First fill of oil / grease / lubricants

(vi) Set of operation , maintenance & spare parts manual

(vii) Foundation bolts / leveler / anchor bolt etc

2.4.19 Lockers, Almirah - Two (2) nos

(a) Almirah with locker, size approx. 2000x900x450mm

2.4.20 Gas cutting, welding & Brazing set - . -Two (2) nos

2.4.21 Portable type Compressor (Reciprocating) - Two (2) nos 1W + 1S)

The compressor top block and Motor will be mounted on the air receiver. The supply will be complete with dry type suction filter, diaphragm pressure switch with automatic venting for no load re-starting of the compressor, safety valve, pressure gauge, non return valve, air cooled after cooler air cooled inter cooler and air delivery valve.

(a) Specification

(i)	Free Air Delivery	:	120 m3/hr
(ii)	Working Pressure	:	7 kg/cm2
(iii)	Drive	:	V belt drive
(iv)	No of Stage	:	Two
(v)	No of Cylinder	:	Three
(vi)	Receiver capacity	:	500L
(vii)	Mounting	:	Receiver Mounted, 500Litre
(viii)	Cylinder Size	:	To be indicated by the bidder
(ix)	Stroke length	:	To be indicated by the bidder
(x)	Compressor Speed	:	To be indicated by the bidder
(xi)	Type of Valve	:	Disc Valve
(xii)	Motor	:	To be indicated by the bidder
(xiii)	Starter	:	To be indicated by the bidder
(xiv)	Overall dimension (L X W X H)	:	To be indicated by the bidder

2.4.22 2 Motor Test bed (Size-5Mx4Mx0.3M {thick}) - One (1) set

Combined Test bed for HT & LT motors comprising of the following.

(a) 5Mx4Mx0.3M (thick) Test bed fabricated out of MS channel / Angle with 1 coat of red oxide primer and 2 coats of synthetic enamel finish.

(b) Control Panel.

(c) Motor checker for measuring inductance, winding resistance.

(d) Shock Pulse Meter

(e) Hand Held Vibration meter

(f) Surge Comparison Tester.

Any other testing equipment as required to complete the system in all respect shall be provided

2.4.23 Burn Out Oven (Size-4Mx4Mx4M)- One (1) set

Oven System shall be designed to remove varnish, epoxy, paint, grease, oil, rubber or other combustible materials from metals. Parts shall be loaded on a wheel-in cart and heated to (340° - 427° C), in an oxygen deficient atmosphere, where the combustible hydrocarbons decompose.

(a) Specification:

(i) Dimension (HXWXD):4MX4Mx4M

(ii) Temperature:0-450°C

(iii) Fully automated PID control of temperature shall be provided. Along with all standard accessories such as controller, loading trolley, blower fans etc to complete the system in all respect.

(iv) The integral high fire after burner chamber shall be designed to provide excess air for complete combustion of the smoke. Discharges to atmosphere shall be harmless by-products of combustion, conforming to air emission standards.

2.4.24 Transformer Oil filtration machine (2000 gallons / Hr) - One 1) No

Transformer Oil filtration machine, movable type, 2000 Gallons per hour capacity along with all standard accessories and fittings such as filters, oil heaters, vacuum dehydration / degassing chamber, condenser and condensate, pumps, a water separator, piping, control panel with meters and annunciations etc. to complete the system in all respect.

2.4.25	Hydraulic Crimping tools up to 1000 sq. mm	-	Two (2) nos
2.4.26	Manual Crimping tools 10 sq.mm to 185 sq. Mm	-	Two (2) nos
2.4.27	Manually operated platform trolley , size 2x2m.	-	Two (2) nos
2.4.28	Vacuum cleaner	-	Two (2) nos
2.4.29	Safety device, goggles, helmets, safety belts, earth discharge (up to 400 kV) -10 Nos. Each		Qty 1 set rod
2.4.30	Soldering iron with coil and flux	-	Five (5) nos.
2.4.31	Wooden Work benches size 2Mx2M	-	Four (4) nos.
2.4.32	Set of measuring tools	-	Two (2) nos
2.4.33	Electrician measuring tool kit	-	Two (2) nos
2.4.34	Set of general tools	-	Three (3) nos
2.4.35	Electric hand blower	-	Two (2) nos
2.4.36	Steel Lockers with 12 pigeon holes in each.	-	Four (4) nos
2.4.37	Steel Almirah of standard size	-	Four (4) nos

2.4.38 Cage enclosure type Hand Lamps with 40W GLS and 15 mtrs cable – Five (5) sets

Note:

The above parameters are indicative and approximate sizes for tender purpose only. However, bidder shall indicate the actual dimensions/ parameters of the machine suitable for the above load.

ANNEXURE –III

TUBE SETTLER ARRANGEMENT

System and Process Description for Bottom Ash over Flow Water, Pond Recovered Water, CT Blow Down Water Clarification system for Bhusawal TPS Extension 1 x 660 MW

1.0 Bottom ash overflow water contain a lot of suspended solids which include un burnt coal particle, ash particle etc. To remove the suspended particles and to meet the MINAS standard, tube settler system is adopted. The treated water can be used in ash handling system.

2.0 Suspended solids in treated water shall be restricted to 50 mg/ liter as per specification.

3.0 Overflow water from bottom ash hopper shall be collected under gravity in BA overflow sump. From this sump, water shall be pumped to clarification unit. There shall be two no. pumps, out of which one shall be working and another shall remain as stand by. Similarly the recovered water, CT blow down water shall be added to Clarification unit.

4.0 Clarification plant shall comprise of following units

(a)	Flash mixer	-----	1 no
(b)	Flocculator	-----	1 no
(c)	Tube Settler	-----	2 nos.
(d)	Sludge Sump	-----	1 no
(e)	Alum Preparation Tank	-----	2 nos.
(f)	Treated Water Sump		1 no

Water from over flow water sump pond, recovered water, CT blow down shall be fed to the clarification unit during normal operation. There shall be provision of by passing clarification unit during emergency. During by passing, Water shall go directly to ash slurry sump.

5.0 Water shall enter in Flash mixer where coagulant alum solution shall be dosed. In the flash mixer vertically mounted agitator shall be provided for proper mixing of alum solution.

6.0 Outlet water from Flash mixer shall flow to Flocculator, slow speed agitator shall be provided for proper Floc formation. Water shall overflow to inlet channel of tube settlers.

7.0 There shall be two tube settlers, each shall be designed for flow rate (50%), so that, total water (100%) can be treated in this plant. At the inlet of each tube settler, isolation gate shall be provided so that any tube settler can be isolated for maintenance when other units are in operation.

8.0 Tube settler shall be of square configuration and RCC construction. In tube settler, PVC tube media shall be provided to increase surface area for clarification. Water shall flow from bottom through tube media. Due to availability of higher surface area at inclined plane Flocculated mass shall settle faster. Settled mass shall be collected at bottom hoppers in the form of sludge. The sludge from bottom hopper shall be taken under gravity to sludge sump. Overflow from tube settler shall flow under gravity to adjacent treated water sump. From this sump, water shall be recycled to ash water sump by two no. centrifugal pump (i.e. One working and One stand by). Capacity of each pump shall be so selected that (100%) water from tube settler shall be fed to the ash water sump.

9.0 From sludge sump, sludge shall be pumped to ash slurry sump. There shall be 2 nos. pump (one working + one stand by).

10.0 Tube Setters, Flash Mixers, Flocculator, Treated Water Sump & Chemical House shall be located as per site condition.

11.0 The service water required for Tube Settler area Alum Solution Preparation shall be taken as per site condition.

ANNEXURE -IV

SPECIFICATION FOR INDUSTRIAL ETHERNET SWITCH

Sr. No.	Specification	Description
1.0	Description	Modular, Managed, Industrial Ethernet switch for 19" cabinet, store-and-forward-switching, Fanless design, Software Layer 2 Professional
2.0	Port type and quantity	Gigabit-ETHERNET ports in total: 2; 2 x combo ports (10/100/1000BASE TX RJ 45 plus related FE/GE-SFP slot) Fast-ETHERNET ports in total: up to 24 24 x FE modular, granularity 2
3.0	More Interfaces	
3.1	V.24 interface	RJ11 socket
3.2	USB interface	To connect auto-configuration adapter ACA21-USB
4.0	**GIGABIT ETHERNET NETWORK SIZE - LENGTH OF CABLE**	
4.1	Twisted Pair	0 - 100m
4.2	Multimode Fiber (MM) 50/125 µm	0 – 550m, 7.5 dB link budget (with M-SFP-SX/LC)
4.3	Multimode Fiber (MM) 62.5/125 µm	0 – 275m, 7.5 dB link budget (with M-SFP-SX/LC)
4.4	Singlemode Fiber (SM) 9/125 µm	0 – 20 km, 11dB link budget (with M-SFP-LX/LC)
4.5	Singlemode Fiber (LH) 9/125 µm	16 – 80 km, 6 – 22 dB link budget (with M-SFP-LH/LC) 44 –120 km, 13 – 32 dB link budget (with M-SFP-LH+/LC)
5.0	**FAST ETHERNET NETWORK SIZE - LENGTH OF CABLE**	
5.1	Twisted Pair	0 –100m
5.2	Multimode Fiber (MM) 50/125 µm	0 – 5000m, 8 dB link budget

Sr. No.	Specification	Description
5.3	Multimode Fiber (MM) 62.5/125 µm	0 – 4000m, 11dB link budget
5.4	Singlemode Fiber (SM) 9/125 µm	0 – 32.5km, 16 dB link budget
5.5	Singlemode Fiber (LH) 9/125 µm	24 – 87 km, 7– 29 dB link budget
6.0	**NETWORK SIZE – CASCADIBILITY**	
6.1	Line/star topology	any
6.2	Ring structure (HIPER-Ring)	100 switches
6.3	Fault recovery time	Typical. 10 ms (Fiber)
7.0	**POWER REQUIREMENTS**	
7.1	Operating Voltage	24/36/48 V DC (9,6 – 60 V), or 120/250 V DC (77– 320 V) and 110/230 VAC (90 – 265 V)
7.2	Current Consumption at 24 V DC	1400 mA max, if all ports are equipped with Fiber
7.3	Current Consumption at 48 V DC	700mA max, if all ports are equipped with Fiber
7.4	Current consumption 230 VAC	150mA (35W) max, if all ports are equipped with Fiber
7.5	Power output in Btu (IT) h	120 max
8.0	**SOFTWARE**	
8.1	Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
8.2	Diagnostics	LEDs, log-file, syslog, signal relay, RMON, port mirroring, topology discovery 802.1AB, cable tester (TX)
8.3	Configuration	Command line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, Auto

Sr. No.	Specification	Description
		configuration adapter (ACA21-USB, ACA11 read support)
8.4	Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)
8.5	Redundancy Function	HIPER-Ring (ring structure), RSTP 802.1w, redundant network/ring coupling, link aggregation, redundant power supplies
8.6	Failover	USB memory slot for Auto Configuration Adapter
8.7	Port Mirroring	Yes
8.8	Quality of Service	4 Classes
8.9	Software Version	Software Layer 2 Professional
8.10	Flow Control	Flow control 802.3x
8.11	Filter	port priority (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), unknown multicast detection, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D
8.12	Realtime	SNTP server, PTP/IEEE1588
9.0	**AMBIENT CONDITIONS**	
9.1	Operating Temperature	– 40° up to + 85° C
9.2	Storage/Transport Temp.	– 40° up to + 85° C
9.3	Protective paint on PCB	optional conformal coating
9.4	Relative humidity (non-condensing)	10 % up to 95%

Sr. No.	Specification	Description
10.0	**MECHANICAL CONSTRUCTION**	
10.1	Dimensions (WxHxD)	445 mm x 44 mm x 308mm
10.2	Mounting	19" cabinet
10.3	Weight	appr. 5 kg
10.4	Protection class	IP 30
11.0	**MECHANICAL STABILITY**	
11.1	IEC 60068-2-27 shock	15 g, 11ms duration, 18 shocks
11.2	IEC 60068-2-6 vibration	1mm, (2– 13,2 Hz), 90 min.; 0.7g, (13.2 –100 Hz), 90 min.; 3.5 mm, (3 – 9 Hz), 10 cycles, 1 octave/min.; 1g, (9 –150Hz), 10 cycles, 1 octave/min.
12.0	**EMC INTERFERENCE IMMUNITY**	
11.3	EN 61000-4-2 electrostatic discharge (ESD)	8 kV contact discharge, 15 kV air discharge
11.4	EN 61000-4-3 electromagnetic field	35Vpp/m (80 – 2700 MHz); 1 kHz, 80 % AM
11.5	EN 61000-4-4 fast transients (burst)	4 kV power line, 4 kV signal- and data line
11.6	EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1kV (line/line)
11.7	EN 61000-4-12 damped oscillatory wave	IEEE 1613: power line: 5 kV (line/earth)
11.8	EN 61000-4-16 mains frequency voltage	2,5 kV line/earth, 1kV line/line (1MHz)
13.0	**EMC EMITTED IMMUNITY**	
13.1	FCC CFR47 Part 15	FCC CFR47 part 15 class A
13.2	EN 55022	EN 55022 class A

Sr. No.	Specification	Description
14.0	**APPROVALS**	
13.3	Safety of industrial control equipment	cUL 508
13.4	Substation	IEEE 61850-3 with Kema certificate, IEEE1613

ANNEXURE-V

SPECIFICATION FOR FRP JUNCTION BOX

Sr. No.	Specification	Description
1.0	**FEATURES**	
1.1	Type	FRP Junction box
1.2	Mounting	4 corner embedded nut for mounting (as per drg.)
1.3	Gable entry	From bottom
1.4	Cable gland holes	Holes will be provided at the bottom of JB for fixing cable glands.
1.5	No. Of terminals	12,24,36,48,64,72,96,128,256,512,1024 (inclusive of spare 20%)
1.6	Terminal	Numeral ferrules
1.7	Door	Door hinged type, additional screws will be provided if required to achieve IP65 protection. Lock with handle & universal key.
1.8	Terminal type	Cage clamp(280-101) 'DIN' rail mounted
1.9	Earthing stud	M6x30mm long (brass)
1.10	Mounting stud	M8x20mm (MS) Nickel platted.
1.11	Degree of protection	As per clause C7.6 of is 13947.
2.0	**MATERIAL**	
2.1	Case/door	4mm+1mm THK. FRP. Sheet.
2.2	Coating	Pigmented colour as per project requirement from inside out of the J.B
2.3	Gasket	Neoprene type gasket with corner joints.
2.4	Metal tag	Aluminium plate 1 mm THK. (Anodised) letter size 6mm height. Black background & white letter (engraved)
2.5	Nut & bolts	Removable bolts (MS), will be provided.

Sr. No.	Specification	Description
3.0	**TESTS**	
3.1	Routine & acceptance test	Visual, G.A., layout Dimensions, coating thickness (on metallic piece) component rating IR & HV. Test.
3.2	Type test	Degree of protection test is-13947 (part no-1)-1993 certificate to be submitted.

ANNEXURE-VI

SPECIFICATION FOR SINGLE INPUT TEMPRATURE TRANSMITTER JUNCTION BOX

Sr. No.	Specification	Description
1.0	**FEATURES**	
1.1	Type	FRP Junction box suitable for mounting on wall, column and structures
1.2	Mounting	6 corner embedded nut for mounting (as per drg.)
1.3	Gable entry	From bottom
1.4	Gland plate	FRP, 4 mm THK. Undrilled gland plate removable from outside.
1.5	Terminal	Numeral ferrules
1.6	Door	Door screwed type minimum at 4 corners, additional, if required to achieve IP 55/65 protection. Lock with universal key and handle.
1.7	Terminal type	Cage clamp(280-101) 'DIN' rail mounted
1.8	Earthing stud	M6x30mm long (brass)
1.9	Mounting stud	M16x20mm (ms platted)
1.10	Degree of protection	As per clause C7.6 of IS 13947.
1.11	Top surface	Flat (without slope)
2.0	**MATERIAL**	
2.1	Case/door	4mm+1mm THK. FRP. Sheet.
2.2	Coating	RAL 9002 from inside out.
2.3	Gasket	Neoprene type gasket with corner joints.
2.4	Metal tag	Aluminium plate 1 mm THK. (Anodised) letter size 6mm height. Black background & white letter (engraved)
2.5	Nut & bolts	Removable bolts (SS), will be provided.
3.0	**TESTS**	

Sr. No.	Specification	Description
3.1	Routine & acceptance test	Visual, G.A., layout Dimensions, coating thickness (on metallic piece) component rating IR & HV. Test.
3.2	Type test	Degree of protection test IS-13947 (PART NO-1)-1993 certificate to be submitted.

ANNEVURE-VII

SPECIFICATION FOR DUEL TEMPRATURE TRANSMITTER JUNCTION BOX

Sr. No.	Specification	Description
1.0	**FEATURES**	
1.1	Type	FRP Junction box suitable for mounting on wall, column and structures
1.2	Mounting	6 corner embedded nut for mounting (as per drg.)
1.3	Gable entry	From bottom
1.4	Gland plate	FRP, 5 mm THK. Undrilled gland plate removable from outside.
1.5	Terminal	Numeral ferrules
1.6	Door	Door hinged type, if required additional screws will be provided on door to achieve IP protection. Lock with universal key and handle.
1.7	Terminal type	Cage clamp(280-101) 'DIN' rail mounted
1.8	Earthing stud	M6x30mm long (brass)
1.9	Mounting stud	M16x20mm (ms platted)
1.10	Degree of protection	As per clause C7.6 of is 13947.
1.11	Top surface	Flat (without slope)
2.0	**MATERIAL**	
2.1	Case/door	4mm+1mm THK. FRP. Sheet.
2.2	Coating	Pigmented colour from inside out.
2.3	Gasket	Neoprene type gasket with corner joints.
2.4	Metal tag	Aluminium plate 1 mm THK. (Anodised) letter size 6mm height. Black background & white letter (engraved)
2.5	Nut & bolts	Removable bolts (SS), will be provided.

Sr. No.	Specification	Description
3.0	**TESTS**	
3.1	Routine & acceptance test	Visual, G.A., layout Dimensions, coating thickness (on metallic piece) component rating IR & HV. Test.
3.2	Type test	Degree of protection test is-13947 (PART NO.-1)-1993 certificate to be submitted.

ANNEXURE – VIII

ANALYSIS OF COAL

SR. NO.	DESCRIPTION	UNIT	INDIGENOUS COAL			IMPORTED COAL		
			DESIGN COAL (Washed)	WORST COAL	RANGE	FOR PERFORMANCE DEMONSTRATION (Refer Note 4)		RANGE
1.	**PROXIMATE ANALYSIS**					As Received Basis	Air Dried Basis	
	Fixed Carbon	%	28.83	25.50	24-30	39.93	44.8	30 – 55 (ADB)
	Volatile matter	%	26.61	21.30	20-30	30.04	33.7	25 – 40(ADB)
	Moisture	%	10.80	12.00	6-15	18	8	25 Max(ARB)
	Ash	%	33.76	41.20	30- 43	12.03	13.5	8 - 14 (ADB)
	Total	%	100.00	100.00	100	100	100	
	HHV	Kcal/kg	3731 (ARB)	3500	3300- 4000	5617	6302	5000 - 6000(ARB)
	ULTIMATE ANALYSIS							
	Carbon	%	40.34	35.87	30- 45	56.8	63.73	57 - 73
	Hydrogen	%	2.61	2.66	2.5 – 4.0	3.88	4.35	3.5 - 4.8

SR. NO.	DESCRIPTION	UNIT	INDIGENOUS COAL			IMPORTED COAL		
			DESIGN COAL (Washed)	WORST COAL	RANGE	FOR PERFORMANCE DEMONSTRATION (Refer Note 4)		RANGE
	Sulphur	%	0.70	0.60	0.5 – 0.7	0.7	0.79	0.8 (Max)
	Nitrogen	%	0.97	0.72	0.4- 1.5	1.29	1.45	1-2
	Moisture	%	10.80	12.00	6- 15	18	8	25 (Max)
	Ash	%	33.76	41.20	30- 43	12.03	13.5	15 (Max)
	Oxygen	%	10.82 (diff)	6.95 (diff)	Upto 12	7.3	8.18	Balance
	Hard Groove index		55	50	45- 60	50		45 - 60
	ASH CHARACTERISTICS							
	Initial Deformation temp (IDT)	^{0}C	1160	1100	1050 - 1250	1150		1050 - 1300
	Hemispherical Temp (HT)	^{0}C	1200-1300	1150-1300	1150 - 1350	1250		1150 - 1350

SR. NO.	DESCRIPTION	UNIT	INDIGENOUS COAL			IMPORTED COAL	
			DESIGN COAL (Washed)	WORST COAL	RANGE	FOR PERFORMANCE DEMONSTRATION (Refer Note 4)	RANGE
	Fusion Temp. (FT)	^0C	1400	1400	1350- 1450	1350	1300 - 1400
	ASH CONSTITUENTS						
	$Si0_2$	%	61	58	57.2-63.8	55	40 - 65
	Al_20_3	%	29.2	31	26.7 -31.8	20	11 - 30
	Fe_20_3	%	5	7	2.0 -7.2	10	6 - 20
	CaO	%	1.5	1.5	1.1-1.6	5	1 - 20
	MgO	%	0.4	0.8	0.4-1.0	2	0.5 - 5
	Na_2O	%	0.12	0.12	0.12	1	0.1 – 2.5
	K_2O	%	0.4	0.4	0.4	1	0.5 - 2
	TiO_2	%	1.5	1.0	1.0-1.5	5	0.5 - 10

SR. NO.	DESCRIPTION	UNIT	INDIGENOUS COAL			IMPORTED COAL	
			DESIGN COAL (Washed)	WORST COAL	RANGE	FOR PERFORMANCE DEMONSTRATION (Refer Note 4)	RANGE
	P_2O_5	%	0.8	0.2	0.2-0.8	1	0.2 – 2.5
	SO_3		Trace	Trace	Trace	Trace	Trace

Notes:

1. The boiler and auxiliaries shall be designed for 100 % WORST Indigenous Coal as specified above. The performance guarantee shall be carried out by using DESIGN Indigenous Washed Coal as specified above.

2. However, boiler and auxiliaries shall also be suitable to operate continuously at Design / Rated parameters for 100 % BMCR condition for fuel of 30: 70 ratio by weight of IMPORTED: Indigenous Coal as specified.

3. The boiler furnace and heat transfer design shall take into account the specified range of ASH CHARACTERISTICS amongst other data furnished herewith.

4. The analysis to be considered for BLENDING 30 % by weight with DESIGN Coal for Demonstration of Trouble free operation at 100% BMCR, under category-III Guarantee Testing.