



## COMPARATIVE FEATURES OF 500 MW UNITS

	U5	U6
<b>1</b>	<b>Turbo-generator</b>	
<b>Make</b>	KWU / BHEL	SIEMENS / BHEL
<b>MCR</b>	500 MW	500 MW
<b>Rating</b>	588 MVA	588 MVA
<b>Cooling</b>	H2 & primary water	H2 & primary water
<b>Gen self excitation</b>	319V, 4030 A	340V, 4040 A
<b>Generator voltage</b>	21 KV	21 KV
<b>2</b>	<b>Turbine</b>	
<b>HP Turbine</b>	Barrel type outer casing, 20 stages	Barrel type outer casing, 18 stages
<b>IP Turbine</b>	Double flow split casing, 14 stages	Double flow split casing, 11 stages
<b>LP Turbine</b>	Double flow split casing, 6 stages	Double flow split casing, 6 stages
<b>3</b>	<b>MS stop / Control valves</b>	
<b>Type &amp; nos</b>	Valve assembly & turbine casing interconnected by piping, 4 nos	Valve assembly integral with turbine casing, 4 nos
<b>4</b>	<b>RH stop / Control valves</b>	
	4 nos	2 nos
<b>5</b>	<b>TG foundation</b>	
	Rigid RCC	Spring mounted
<b>6</b>	<b>Generator transformer</b>	
<b>Make</b>	Telk	Telk
<b>Rating</b>	3 X 1phase, 200 MVA each, 21 / 220 KV, Gen current = 16000amp	3 X 1phase, 200 MVA each, 21 / 220 KV, Gen current = 16000amp
<b>7</b>	<b>Steam generator</b>	
<b>Make</b>	BHEL / CE	BHEL
<b>Furnace heat release</b>	80,000 Kcal/M3/hr	100,000 Kcal/M3/hr
<b>Rated MS flow (VWO)</b>	1672.2 T/H	1614 T/H
<b>MS pr/temp</b>	178 bar / 541 deg	178 bar / 541 deg
<b>RH pr / temp</b>	40 bar / 541 deg	41 bar / 568 deg
<b>Fuels</b>	oil / gas / coal ( Any combination)	oil / gas ( Any combination)
<b>No. of burners</b>	16 each for oil / gas ( 4 elevations) 32 for coal (8 elevations)	20 each for oil / gas ( 5 elevations)
<b>Water wall tubes</b>	Plain tube (carbon steel) Side-1038, each 50.8 mmOD Roof-139, each 57.0 mmOD	Rifled Tubes (seamless carbon steel)
<b>SGWCPS</b>	4 (485 KW each), wet motor type	3 (380 KW each), Wet motor type
<b>Flue gas condotioing</b>	ESP & FGD	Clean fuel
<b>MS piping</b>	Low alloy ferric steel P22	X-20 MoCrV 120
<b>Furnace</b>	17.653 X 15.289 X 72 M height	17.653 X 15.289 X 68 M height
<b>Soot Blowers</b>	30 LRSB 9M each, 4 dual purpose, furnace wall blowers, 100	26 LRSBs, 4 dual purpose
<b>FD fans</b>	2 nos axial single stage variable pitch 6.6KV/990rpm/2700KW	2 nos axial single stage variable pitch 6.6KV/990rpm/2750KW
<b>PA fans</b>	2 nos axial 2 stage variable pitch, 6.6KV/1480rpm/2750KW	No PA
<b>ID fans</b>	4 nos radial 740 rpm, 6.6KV / 740 rpm / 2050 KW	4 radial LCI drive
<b>GR fans</b>	2 nos radial,6.6KV/ 740rpm/1050KW	2 nos radial,6.6KV 740rpm/1050KW
<b>Coal mills</b>	8 bowl mills, 6.6KV/600rpm/500KW	No coal provision
<b>APH</b>	2 Ijusstrom regenerative 3-tier trisector, 415V / 25HP	2 Ijusstrom regenerative 3-tier bisector, 415V / 25HP
<b>8</b>	<b>HP-LP Bypass</b>	
	60% HP bypass	60% HP bypass
	100% LP Bypass	100% LP Bypass

9	<b>Condenser</b>	
<b>Make</b>	BHEL	L & T
<b>Rated Vacuum</b>	0.1187 Bar	0.1187 Bar
<b>Heat Load</b>	644.76 x 10 <sup>6</sup> Kcal/Kwh	586.25 x 10 <sup>6</sup> Kcal/Kwh
<b>CW flow</b>	60,000 M <sup>3</sup> /Hr	60,000 M <sup>3</sup> /Hr
<b>No. of Tubes</b>	24,690	24,690
<b>Cooling Surface</b>	26,272 M <sup>2</sup>	26,272 M <sup>2</sup>
<b>Back Pr</b>	0.12 Bar	0.12 Bar
<b>Support Plates</b>	88	

10	<b>Chimney</b>	
<b>Material</b>	RCC	RCC
<b>Height</b>	152 M	275 M
<b>Base Dia</b>	14.27 M	19.82 M
<b>Top Dia</b>	7.32 M	7.60 M
	Inside Refractory Lining	Inside Refractory Lining

11	<b>Cooling Water System</b>	
<b>CW Pumps</b>	425 rpm, 1 stage	425 rpm, 1 stage
<b>Make</b>	Kubota	Kubota
<b>Type</b>	Pull out type bowl impeller	Fixed bowl Semi Pull out
<b>Capacity</b>	16,000 M <sup>3</sup> /Hr each pump	16,000 M <sup>3</sup> /Hr each pump
<b>Material of Bowl Housing Etc</b>	Ni-Resist	SS-316
<b>Cleaning of Condenser tubes</b>	Back-wash 4 way valve	Debris filter & ball cleaning system
<b>Methods of chlorine dosing</b>	Liquified chlorine gas injection	Electrochlorination i.e. dosing of hypochloride solution

12	<b>Boiler Feed Pumps</b>	
<b>Make</b>	KSB	Worthington
<b>Motor of MBFP</b>	Siemens, Constant speed	Anasaid, Variable speed with hydraulic coupling
<b>Turbine of STBFP</b>	BHEL	BHEL

13	<b>CEP</b>	
<b>Pump</b>	Weir	Worthington
<b>Motor</b>		

14	<b>Feed water heaters</b>	
<b>Make</b>	Yuba	BHEL
<b>Number</b>	5 nos + 1 dearator (2) HPH vertical + 3 LPH Horizontal)	6 nos + 1 dearator (3) HPH + 3 LPH All horizontal)
<b>Material</b>	HP monel & LP Admiralty	SS 304 for both

15	<b>Deaerator</b>	
<b>Make</b>	IAEC	L & T
<b>Type</b>	Mixing type of heat exchanger consisting of no. of trays	Mixing type of heat exchanger consisting of spray nozzles

16	<b>DM plant</b>	
<b>Make</b>	Ion exchanger ltd, 3 streams, 45 M <sup>3</sup> /Hr each	Gaco system ltd, 2 streams, 45 M <sup>3</sup> /Hr each.

17	<b>Condensate Polishing unit</b>	
<b>Make</b>		Ion exchange Ltd, 2 stream 50% each I.e. 733 M <sup>3</sup> /Hr each.

18	<b>Instrumentation &amp; control</b>	
<b>Supplier</b>	Siemens, Germany.	Honeywell, USA.
<b>System</b>	Teleperm / Iskamatic b modular hardwired system with Simatic S-5 PLCs.	Honeywell USA TDC 3000 distributed digital system.
<b>Sequence of events recording</b>	Part of DAS.	Stand alone Redundant system.
<b>Annunciation system</b>	Hardwired.	Micro processor based ,Alarms are printed & historised.
<b>Analog control system</b>	Hardwired, Implimentation of control loops.	software, Implimentation of control loops.
<b>Binary control system</b>	Hardwired, Implimentation of control loops.	software, Implimentation of control loops.
<b>Logs,reports, Journals etc.</b>	Part og DAS	Partly on TDC 3000 In addition , process information computer system (PICS) is provided for performance calculation , start up , shut down guidance etc.
<b>Measurement</b>	3000 parameters, 120 field instrument enclosures, Analog 30 closed loops, Binary controls 50 ON-OFF controls, Audio Visual alarms 716 displays.	
<b>Ease of on line</b>	Modification fairly flexible.	Highly flexible.

19	<b>Turbine cycle heat rate</b>	
	2100.8 Kcal/Kwhr	2057.5 Kcal/Kwhr
<b>Improvement in turbine cycle heat rate in U6= 43.3 Kcal/Kwhr, % improvement = 2.06 %</b>		

<b>20</b>	<b>Break up of Improvement in turbine cycle heat rate</b>	
	<b>RH temp 568°C instead of 540°C</b>	11.5 Kcal/Kwhr
	<b>New HP turbine module</b>	14 Kcal/Kwhr
	<b>New IP turbine module</b>	2 Kcal/Kwhr
	<b>New blade profile</b>	3 Kcal/Kwhr
	<b>10% RH pressure drop</b>	7.2 Kcal/Kwhr
	<b>7 feed water heaters instaead of 6</b>	5.6 Kcal/Kwhr
	<b>Total</b>	43.3 Kcal/Kwhr
<b>21</b>	<b>Station transformer</b>	
	<b>Rating</b>	4 X 1phase, 40/3 MVA 220 / 6.9 / 6.9 KV
	<b>Cooling</b>	ON
	<b>Taps</b>	OLTC 10% in steps of 1.25%
<b>22</b>	<b>Bus duct</b>	
		21KV isolated phase aluminium generator bus ducts, 7.2 KV segregated phase coppor bus ducts.
<b>23</b>	<b>Coppor conducted cables</b>	
		Fire resistant , Instrumentation cables 350 KM , PVC aux cables 270 Km, XLPE 6.6 KV cables 30Km, PVC control cables 430Km, Heat resistant cable 90 Km
<b>24</b>	<b>ESP</b>	
	<b>Type</b>	5 streams each with 4 fields rigid frame
	<b>Tonnage</b>	4200 T
	<b>Electrode material</b>	Corton steel
	<b>Flue gas flow</b>	943 M3/Sec
	<b>Collection efficiency</b>	99.5 % plus
<b>25</b>	<b>Ash handling System</b>	
	<b>Bottom Ash</b>	20%
	<b>Collection capacity</b>	205 T/Hr
	<b>Operation</b>	Intermittent, Jet pump sluice ash to disposal area.
	<b>Fly Ash</b>	80%
	<b>Collection capacity</b>	160 T/Hr
	<b>Operation</b>	Continuous