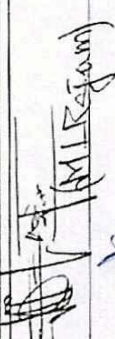
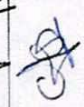


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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL HYDERABAD CONTRACT NO.: XXX		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					REF NO.:				
		SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Degerator					REVISION NO.: 00				
							DATE: 26-04-2019				
SN	ITEM	QP/INS- PN CAT	QP No. XXXX-110	QP SUB- MISSION SCHED ULE	QP APPL SCHED DULE	PROPOSED SUB-SUPPLIER	PLACE	SS APPL STAT US / CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
		III				KONGO COLMET MFG. CO. LTD.	JAPAN	N			VENDOR
		III				OSAKA ASAHII METAL MFG. CO. LTD.,	JAPAN	N			
		III				GLYCO METAL LTD.	UK	N			
		III				COLIERENE	UK	N			
		III				MITCHEL	UK	N			
		III				WALKESHAIH (GLACIER)	UK	N			
		I				MITCHEL	BENGALURU	DR			BHEL PAID VENDOR
		I				FALPBW BEARINGS PVT LTD	RAJKOT	DR			BHEL PAID VENDOR
		I				DAE DONG METAL INDUSTRY	KOREA	DR			BHEL PAID VENDOR
20	HYDRAULIC COUPLING	I				VOITH	GERMANY	A			
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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR: BHEL, HYDERABAD CONTRACT NO.: XXX		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator			REF NO.:	REVISION NO.: 00		DATE: 26-04-2019
SN	ITEM	QP/INS- PN CAT	QP No. XXXX-110	QP SUB- MISSIO N SCHE DULE	QP APPL SCHE DULE	PROPOSED SUB-SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHE DULE	SS APPL SCHE DULE	REMARKS		
		I				VOITH	HYDERABAD	A			FOR 30% MDBEP		
		I				EBARA	JAPAN	DR			BHEL PND VENDOR		
		I				HITACHI	JAPAN	DR			BHEL PND VENDOR		
21	CONNECTING COUPLING BETWEEN MOTOR & HC, BFP, BP, CEP	I				SEISA	JAPAN	N					
		I				DIADO PRECISION INDUSTRIES	JAPAN	N			BHEL/MHI APPROVED SUB- VENDOR		
		II				NIPPON PILLAR	JAPAN	N					
		II				EAGLE INDUSTRY	JAPAN	N					
		II				FLEXBOX	UK	N					
		I				EUROFLEX TRANSMISSION,	HYDERABAD	N			BHEL/MHI APPROVED SUB- VENDOR		
		I				EUROFLEX LTD	UK	N					
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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					REF NO.: REVISION NO.: 00 DATE: 26-04-2019		
SN	ITEM	Q/P INS- PN CAT	Q/P No. XXXX-110	Q/P SUB- MISSIO N SCHED ULE	Q/P APPL SCHE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
		II				BIBBY TRANSMISSION (TURBOFLEX)	UK	N			
		I				JOHN CRANE SEALING SYSTEMS	BANGALORE	DR			BHEL PAID VENDOR
		I				CUBIC TRANSMISSION PVT LTD	HYDERABAD	DR			BHEL PAID VENDOR
		I				RATHI TURBOFLEX PVT LTD	PUNE	DR			BHEL PAID VENDOR
		I				KTR COUPLINGS INDIA PVT LTD	PUNE	DR			BHEL PAID VENDOR
		I				UNIQUE ENGINEERING ENTERPRISES PVT LTD	SECUNDERAB AD	DR			BHEL PAID VENDOR
22	SUCTION STRAINERS FOR CEP, DRIP, BP & BFP	I				GUJRAT OTTOFT	AHMEDABAD	A			
		I				MULTITEX	DELHI/NOIDA	A			
		I				JAYEESH ENGG	MUMBAI	A			CEP: 650NB, BP: 450, BFP:450

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NTPC

PROJECT: 2X660 MW KHURJA STPS
PACKAGE: 2 X 660 MW TG PKG
CONTRACTOR: BHEL HYDERABAD
CONTRACT NO.: XXX

LIST OF ITEMS REQUIRING QUALITY PLAN AND
SUBCONTRACTOR APPROVAL

REF NO.:

REVISION NO.: 00

DATE: 26-04-2019

SUB SYSTEM: BEP, Drive Turbine, Heaters (HP, LP)
Drain Cooler and Deaerator

SN	ITEM	QP/INS-PS-CAT	QP No. XXX-110	QP SUB-MISSIO N SCHD ULE	QP APPL SCHE DULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHD ULE	SC APPL SCHD ULE	REMARKS
		I				FILTRATION ENGG	MUMBAI	A			CEP: 650NB, BP: 450. BEP: 450
		I				GRAND PRIN ENGINEERING PVT. LTD	FARIDABAD	DR			BHEL PAID VENDOR
		I				NISAN SCIENTIFIC PROCESS	NAVI MUMBAI	DR			BHEL PAID VENDOR
		I				PATEL HEAT EXCHANGERS PVT.LTD	BHOPAL	DR			BHEL PAID VENDOR
		I				PROCTDYNE ENGINEERS	CHENNAI	DR			BHEL PAID VENDOR
25	THRUST BEARING (BEP, BP & CEP)	III				DAIDO METAL	JAPAN	N			BHEL/MIH APPROVED SUB- VENDOR
		III				ROLLS ROYCE MARINE JAPAN (MITCHEL BRGS)	UK	N			BHEL/MIH APPROVED SUB- VENDOR
		III				WAKESHAIH (GLACIER)	UK	N			BHEL/MIH APPROVED SUB- VENDOR
		III				KINGSBURY	USA	N			BHEL/MIH APPROVED SUB- VENDOR

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 26-04-2019					
SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Degerator				Q/INS- PN CAT	Q/ N ^o XXXX-110	Q/ SUB- MISSION SCHED ULE	Q/ APPL SCHED DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US / CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
SN	ITEM												
	MECHANICAL SEALS (BFP, BP, CEP & DRIP)	III						MITCHELL BRGS	UK	N			
		I						MITCHELL BRGS	BENGALURU	DR			FOR BFP TD BP AND CEP
		I						MITCHELL BRGS	BENGALURU	A			APPROVED FOR MID BP THRUST BRG
		I						DAE DONG METAL IND.	KOREA	DR			BHEL PAID VENDOR
		I						TURBOLINK CO. LTD	KOREA	DR			BHEL PAID VENDOR
		III						NIPPON PILLAR	JAPAN	N			
		III						FLOW SERVE SANMAR	CHENNAI	N			FOR BP, CEP & DRIP ONLY
		III						EAGLE BURMANN INDIA	MUMBAI	N			FOR BP, CEP & DRIP ONLY
24		III					EAGLE BURUGMAN	JAPAN/ GERMANY	N				

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PROJECT: 2X660 MW KIRURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR: BHEL, HYDERABAD CONTRACT NO.: XXX		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					REF NO.: REVISION NO.: 00 DATE: 26-04-2019				
SN	ITEM	QP/INS- PN CAT	QP No. XXXX-110	QP SUB- MISSO N SCHED ULE	QP APPL SCHED ULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
	DRIP PUMP CASING	II									APPROVED VENDORS FOR 250MW CEP OF BHEL MODEL
	DRIP PUMP IMPELLER	II									
	DRIP PUMP SHAFT	II									
	DRIP PUMP WEAR RING	II									
	DRIP PUMP BEARING	II									
	DRIP PUMP	I				BHEL HYDERABAD		N			AS PER CEP VENDOR LIST

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PROJECT: 2X660 MW KHURJA STPS
PACKAGE: 2 X 660 MW TG PKG
CONTRACTOR : BHEL, HYDERABAD
CONTRACT NO.: XXX

LIST OF ITEMS REQUIRING QUALITY PLAN AND
SUBCONTRACTOR APPROVAL

SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP)
Drain Cooler and Deaerator

REF NO.:
REVISION NO.: 00
DATE: 23-04-2019

SN	ITEM	QIP/ INS- PN CAT *	QP No. XXXX-110	QP SUB- MISSIO N SCHED ULE	QP APPL SCHE DULE	PROPOSED SUB-SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
28	TURBINE OUTER CASING & STOP VALVE BODY CASING	I				VOIST ALPINE	AUSTRIA	A			
		I				SANDE-STAHIL	GERMANY	A			
		I				BHEL- CFFP	HARDWAR	A			
		I				ISGEC HEAVY ENGINEERING LTD	MUJAFARNAG AR	A			
		I				STAR WIRES	BALLABGARH	A			
		I				KOLHAPUR STEELS	KOLHAPUR	DR			
		I				JSC ENERGOMASH	UKRAINE	DR			
		I				PRAKASH SPECTRO	VILAYWADA	DR			
		I				NISSOIWAI	JAPAN	DR			

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					REF NO.: REVISION NO.: 00 DATE: 23-04-2019				
SN	ITEM	QP/ INS- PN CAT	QP No. XXXX-110	QP SUB- MISSION SCHED ULE	QP APPL SCHE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US / CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	REMARKS
29	INTERMEDIATE PIECE VALVE COVER & CHAMBER	I				BOLLINENI CASTING	AP	DR			
		I				SANDE-STAHLE	GERMANY	A			
		I				VOIST ALPINE	AUSTRIA	A			
		I				BHEL - CFFP	HARDWAR	A			
		I				ISGEC HEAVY ENGINEERING LTD	MUZAFFARNA GAR	A			
		I				STARWIRE	BALLABGARH	A			
		I				KOLHAPUR STEELS	KOLHAPUR	A			
		I				PRAKASH SPECTRO	VILAYAWADA	DR			
		I				PEEKAY STEEL CASTINGS LTD	COIMBATORE	DR			

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PROJECT: 2X660 MW KIIURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR: BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					REF NO.: REVISION NO.: 00 DATE: 23-04-2019		REMARKS
SN	ITEM	QPI INS- FN CAT *	QP No. XXXX-110	QP SUB- MISSIO N SCHED ULE	QP APPL SCHE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	
		1				SAURABH METALS PVT LTD	BHOPAL	DR			
		1				THE KCP LTD	CHENNAI	DR			
		1				PTC INDUSTRIES LTD	LUCKNOW	DR			
		1				BOLLINENI CASTING	AP	DR			
		1				VIMAL ALLOYS PVT LTD	MANDI, PUNJAB	DR			
		1				VOIST ALPINE	AUSTRIA	A			
		1				SANDE STAHLGUSS GMBH,	GERMANY	A			
		1				BHEL - CFFP	HARIDWAR	A			
		1				STAR WIRES	BALLABGARH	A			
30	GUIDE BLADE CARRIER	1									

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019				
SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deerator				QP No. XXXX-110	QP SUB- MISSIO N SCHED ULE	QP APPL SCHE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	REMARKS
SN	ITEM	QP/ INS- PN CAT *										
		I					KOLHAPUR STEEL	KOLHAPUR	A			
		I					KCP LTD	CHENNAI	A			
		I					PRAKASH SPECTRO	VIJAYAWAD A	DR			
		I					ISGEC HEAVY ENGINEERING LTD	MUJAFARNAG AR	A			
		I					VOIST ALPINE	AUSTRIA	A			
		I					BHEL - CFFP	HARIDWAR	A			
		I					KOLHAPUR STEEL	KOLHAPUR	DR			
		I					SANDESTAHI	GERMANY	A			
		I					ISGEC HEAVY ENGINEERING LTD	MUJAFARNAG AR	A			
31	STEAM CHAMBER											

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PROJECT: 2X660 MW KIHURJA STPS
PACKAGE: 2 X 660 MW TG PKG
CONTRACTOR : BHEL, HYDERABAD
CONTRACT NO.: XXX

LIST OF ITEMS REQUIRING QUALITY PLAN AND
SUBCONTRACTOR APPROVAL

SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP)
Drain Cooler and Deaerator

REF NO.:
REVISION NO.: 00
DATE: 23-04-2019

SN	ITEM	QP/ INS- PN CAT	QP No. XXXX-110	QP SUB- MISSIO N SCHED ULE	QP APPL SCHE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	REMARKS
		I				JSC ENERGOMASH	UKRAIN	DR			
		I				KOBE STEEL	JAPAN	A			
		I				JSW	JAPAN	A			
		I				CRUIST FORGE	FRANCE	A			
		I				PETRO ROSA	GERMANY	A			
		I				FINE FORGE	HYDERABAD	A			
		I				C BLADE	ITALY	A			
		I				WUXI	CHINA	A			AS PER NTPC APPROVAL CONDITIONS
		I				AZAD ENGG	HYDERABAD	A			FOR MACHINING ONLY
33	PRECISION BLADE FORGINGS	I									

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PROJECT: 2X660 MW KHURJA STPS
PACKAGE: 2 X 660 MW TG PKG
CONTRACTOR : BHEL, HYDERABAD
CONTRACT NO.: XXX

LIST OF ITEMS REQUIRING QUALITY PLAN AND
SUBCONTRACTOR APPROVAL

SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP)
Drain Cooler and Deaerator

REF NO.:
REVISION NO.: 00
DATE: 23-04-2019

SN	ITEM	QTY INS- PN CAT *	QP No. XXXX-110	QP SUB- MISSIO N SCH ULE	QP APPL SCHE DULE	PROPOSED SUB-SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCH ULE	SC APPL SCH ULE	REMARKS
34	BAR STOCK FOR BLADES	I				WALZWERK EINSL	GERMANY	A			
		I				BOEHLER	AUSTRIA	A			
		I				BGH	GERMANY	A			
		I				BREITENFIELD	AUSTRALIA	A			
		I				KALYANI CARPENTER	PUNE	DR			
		I				STARWIRE	BALLABHGA RH	A			
35	DRAWN PROFILE FOR GUIDE BLADES (DRIVE TURBINE)	I				FIAY	ITALY	A			
		I				LEISTRITZ	GERMANY	A			
		I				BOEHLER	AUSTRIA	A			

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					REF NO.: REVISION NO.: 00 DATE: 23-04-2019		
SN	ITEM	QI/INS-PN-CAT	QI No. XXXX-110	QI SUB-MISSIO N SCHED ULE	QI APPL SCHE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	REMARKS
38	CONNECTING COUPLING	I				RENK TACKER GMBH	GERMANY	A			
		I				LUFKIN	USA/France	A			
		I				FLENDER	GERMANY	A			
		I				WALCHANDNAGAR	WALCHANDN AGAR	A			
		I				EUROFLEX LTD	HYDERABAD	A			
		I				JOHN CRANE	UK	A			
		I				AMERDRIVES	USA	A			
		I				RATHI TURBOFLEX	PUNE	A			
39	AUX. CONTROL VALVE BODY & COVER	II				BHEL - CFFP	HARDWAR	A			

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PROJECT: 2X660 MW KHURJA STPS
PACKAGE: 2 X 660 MW TG PKG
CONTRACTOR : BHEL, HYDERABAD
CONTRACT NO.: XXX

LIST OF ITEMS REQUIRING QUALITY PLAN AND
SUBCONTRACTOR APPROVAL

SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP)
Drain Cooler and Deaerator

REF NO.:
REVISION NO.: 00
DATE: 23-04-2019

SN	ITEM	QP/ INS- FN CAT *	QP No. xxxx-110	QP SUB- MISSIO N SCHED ULE	QP APPL SCHIE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	REMARKS
		II				KOLHAPUR STEELS	KOLHAPUR	A			
		II				ISGEC HEAVY ENGINEERING LTD	MUJAFARNA GAR	A			
		II				STAR WIRES	BALLABGARH	A			
		I				PRAKASH SPECTRO	VIJAYAWADA	DR			
		I				BOLLINENI CASTING	AP	DR			
40	LUBE OIL PUMP (CENTRIFUGAL)	II				KSB	PUNE	A			
		II				KIRLOSOKAR EBARA	KIRLOSOKARWA DI	A			
		II				SULZER	MUMBAI	A			
		II				FLOWSERVE SANMAR	CHENNAI	DR			

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					REF NO.: REVISION NO.: 00 DATE: 23-04-2019				
SN	ITEM	QP/ INS- PN CAT *	QP No. XXXX-110	QP SUB- MISSIO N SCHED ULE	QP APPL SCHE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	REMARKS
41	LUBE OIL PUMP (SCREW PUMP)	II				ALLWEILER	GERMANY	A			
		II				ALLWEILER, INDIA (FORMERLY TUSHACO PUMP)	DAMAN	A			
		II				LEISTRITZ	GERMANY	A			
		II				IMOPUMP	USA	DR			
		II				UT PUMPS & SYSTEMS	FARIDABAD	DR			
		II				DELTA P D PUMPS	MUMBAI	DR			
		II				ALEKTON ENGINEERING	CHENNAI	DR			
		II				SETTIMA MECCANICA	ITALY	DR			
		II				NETZSCH TECHNOLOGIES	BANGALORE	DR			

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019					
SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator				QP/INS- PN CAT *	QP No. XXXX-110	QP SUB- MISSION SCHED ULE	QP APPL SCHE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	REMARKS
SN	ITEM												
42	DISCONNECTING COUPLING	II						AMER DRIVES	USA	A			
43	CENTRIFUGE	I						ALFALAVAL	PUNE/ SWEDEN	A			
		I						WEST FALIA INDIA	BANGALORE	A			
44	JOP	II						ALLWEILER. INDIA	DAMAN	A			
		II						DYNAMIC TECHNOLOGIES	BANGALORE	DR			
		II						ALLWEILER	GERMANY	A			
		II						DELTA P D PUMPS	VAPI	DR			
45	FOUNDATION FRAME FOR BFP, BP & DRIVE TURBINE & MOTOR	I						BHEL	HYDERABAD	A			

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PROJECT: 2X660 MW KIRURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019			
SN	ITEM	QP/INS. PN CAT	QP No. XXXX-110	QP SUB- MISSION SCHED ULE	QP APPL SCHE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
46	LUBE OIL SYSTEM	I				BHEL	HYDERABAD	A			
47	OIL COOLERS	I				BHEL	HYDERABAD	A			
48	TUBE SHEET FORGING (HP HEATER)	I				RINGMILL S.P.A.,	ITALY	A			
		I				FORGIATURA MORANDINI SRL	ITALY	A			
		I				FORGE MONCHIERI S.R.L.	ITALY	A			
		I				TAEWOONG COMPANY LIMITED	KOREA	A			
		I				BAY-FORGE LIMITED,	CHENNAI	DR			
		I				BHEL-CFFP	HARIDWAR	A			
49	STEEL FORGING (OTHER THAN HP HEATER, TUBE SHEETS)	II				GOLDEN IRON & STEEL WORKS,	DELHI	A			
		II				THE PUNJAB STEEL WORKS,	DELHI	A			

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR: BHEL, HYDERABAD CONTRACT NO: XXX		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					REF NO.:				
		SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator					REVISION NO.: 00				
							DATE: 23-04-2019				
SN	ITEM	QP/INS- FN CAT	QP No. xxx-110	QP SUB- MISSIO N SCHED ULE	QP APPL SCHED ULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
		II				ACME FORGINGS PVT LTD.,	RAJKOT	A			
		II				CHW FORGE PRIVATE LIMITED	GHAZIABAD	A			
		II				GHAZIABAD ISPAT UDYOG LTD.,	GHAZIABAD	A			
		II				METAL FORGING	DELHI	DR			
		II				SANGHVI FORGING & ENGINEERING	BARODA	DR			
		II				C.D. INDUSTRIES	GHAZIABAD	DR			
		II				KISSAN DIE-TECH	GHAZIABAD	DR			
50	HEMI HEAD	I				VOEST ALPINE GIESSEI LINZ GMBH LTD.,	GERMANY	A			
		I				EDMONTON EXCHANGER & MFG LTD.,	CANADA	A			
		I				DILLING-GTS VENTES,	GERMANY	A			

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019					
SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator				QIP/INS- PN CAT	QIP No. XXXX-110	QIP SUB- MISSIO N SCHED ULE	QIP APPL SCHE DULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	REMARKS
SN	ITEM												
		I						CEREC	FRANCE	A			
		I						CEREC	VADODARA	DR			
		I						KONIG & CO. GMBH	GERMANY	A			
		I						ANTONIUS VESSEL HEADS B.V.	FRANCE	DR			
		I						M/S RICHARDSON & CRUDDAS (1972) LTD.,	MUMBAI	A			
		I						M/S J BOWN & CO.(DUKINFIELD) LIMITED	U.K	A			
		I						STEEL FORCE	BELGIUM	DR			
		I						ICEM ENGINEERING PVT LTD	THANE	DR			
		I						GELUM CHANG HEAD CO	KOREA	DR			
51	DISHED ENDS	I						DYNAMIC DISH INDIA (PVT) LTD.,	HYDERABAD	DR			

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PROJECT: 2X660 MW KHURJA STPS
PACKAGE: 2 X 660 MW TGPKG
CONTRACTOR : BHEL, HYDERABAD
CONTRACT NO.: XXX

LIST OF ITEMS REQUIRING QUALITY PLAN AND
SUBCONTRACTOR APPROVAL

SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP)
Drain Cooler and Deaerator

REF NO.:

REVISION NO.: 00

DATE: 23-04-2019

SN	ITEM	QTY INS- FN CAT	QTY No. XXXX-110	QTY SUB- MISSION SCHED- ULE	QTY APPL SCHED- ULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED- ULE	SC APPL SCHED- ULE	REMARKS
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		I				METAL ENGINEERS,	HYDERABAD	A			
		I				SATYA FABRICATORS PVT LTD.	HYDERABAD	A			
		I				MAHENDRA DISH ENDS	THANE	A			
		I				CEREC	FRANCE	A			
		I				CEREC	VADODARA	A			
		I				THE ANUP ENGINEERING LTD	INDIA	A			
		I				KONIG & CO. GMBH.	GERMANY	A			
		I				ICEMENGINEERING COMPANY LTD.	THANE	A			
52	SMALL FORGING	II				GOLDEN IRON & STEEL WKS.	DELHI	A			
		II				THE PUNJAB STEEL WORKS.	DELHI	A			

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PROJECT: 2X660 MW KHURJA STPS
PACKAGE: 2 X 660 MW TG PKG
CONTRACTOR : BHEL, HYDERABAD
CONTRACT NO.: XXX

LIST OF ITEMS REQUIRING QUALITY PLAN AND
SUBCONTRACTOR APPROVAL

SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP)
Drain Cooler and Deaerator

REF NO.:
REVISION NO.: 00
DATE: 23-04-2019

SN	ITEM	QTY INS- FN CAT	QTY No. XXXX-110	QTY SUB- MISSIO N SCHED ULE	QTY APPL SCHE DULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
		II				ACME FORGINGS PVT LTD.,	RAJKOT	A			
		II				CHW FORGE PRIVATE LIMITED	GHAZIABAD	A			
		II				GHAZIABAD ISPAT UDYOG LTD.	GHAZIABAD	A			
		II				METAL FORGING	DELHI	DR			
		II				SANGHVI FORGING & ENGINEERING	BARODA	DR			
		II				C.D.INDUSTRIES	GHAZIABAD	DR			
		II				KISSAN DIE-TECH	GHAZIABAD	DR			
53	STAINLESS STEEL TUBE (STRAIGHT) WELDED	II				NEOTISS LIMITED (formerly VALLOUREC HEAT EXCHANGER TUBES LTD.)	PATANCHER U. HYDERABAD	A			FOR LP HEATER ONLY (SS WELDED U TUBE)
		II				RATNADEEP METAL & TUBES P LTD	AHMEDABAD	A			FOR LP HEATER ONLY

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW 1G PKG CONTRACTOR: BHEL, HYDERABAD CONTRACT NO.: XXX		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					REF NO.: REVISION NO.: 00 DATE: 23-04-2019				
SN	ITEM	QP/INS- FN CAT	QP No. XXXX-110	QP SUB- MISSIO N SCHED ULE	QP APPL SCHIE DULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
		II				RATNAMANI METALS & TUBES LTD.,	AHMEDABAD / KUTCH	A			
		II				HEAVY METAL & TUBES LIMITED,	AHMEDABAD	A			
		II				REMI	TARAPUR	A			FOR LP HEATER ONLY(SS WELDED U TUBE)
		II				BHANDARI FOILS AND TUBES LTD.,	INDIA	DR			
		II				PLYMOUTH TUBE COMPANY,	USA	A			
53 B	STAINLESS STEEL TUBE (U TUBE) SEAMLESS	I				RATNAMANI METALS & TUBES LTD.,	AHMEDABAD / KUTCH	A			
		I				HEAVY METALS & TUBES LTD	AHMEDABAD	A			
		I				PLYMOUTH TUBE COMPANY	USA	A			
		I				REMI DELTA TAIL TUBULARS LTD	TARAPUR	A			
		I				SHINHAN METAL	SOUTH KOREA	DR			

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PROJECT: 2X660 MW KIIRJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019			
SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator											
SN	ITEM	QTY INS- FN CAT	QTY No. XXXX-110	QTY SUB- MISSION SCHED ULE	QTY APPL SCHED ULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US / CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
54	STAINLESS STEEL TUBE (U TUBE) WELDED (ABOVE 17 BWG)	1				MAXIM TUBES COMPANY PVT LTD	GUJARAT	DR			
		1				RATNAMANI METALS & TUBES LTD.,	AHMEDABAD / KUTCH	A			
		1				SPX HEAT TRANSFER DIVISION	USA	A			TUBES FROM APPD SOURCES
		1				NEOTISS LIMITED (formerly VALLOUREC HEAT EXCHANGER TUBES LTD.,)	PATANCHER U. HYDERABAD	DR			
		1				REMI	TARAPUR	DR			
		1				SHINHAN METAL	SOUTH KOREA	DR			
		1				HEAVY METALS & TUBES LTD	AHMEDABAD	DR			
		1				PLYMOUTH TUBE COMPANY	USA	A			
55	STAINLESS STEEL TUBE (U TUBE) WELDED (UP TO 17 BWG)	1				RATNAMANI METALS & TUBES LTD.,	AHMEDABAD / KUTCH	A			

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PROJECT: 2X660 MW KILURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					REF NO.:		
				SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator					REVISION NO.: 00		
				DATE: 23-04-2019							
SN	ITEM	QP/ INS- FN CAT	QP No. XXX-110	OP SUB- MISSIO N SCHED ULE	OP APPL SCHED ULE	PROPOSED SUB-SUPPLIER	PLACE	SS APPL STAT US / CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
		I				SPX HEAT TRANSFER DIVISION	USA	A			TUBES FROM APPD SOURCES
		I				PLYMOUTH TUBE COMPANY	USA	A			
		I				NEOTISS LIMITED (formerly VALLOUREC HEAT EXCHANGER TUBES LTD.)	PATANCHER U. HYDERABAD	A			
		I				REMI	TARAPUR	DR			
		I				SHINHAN	KOREA	DR			
		I				HEAVY METALS & TUBES LTD	AHMEDABAD	DR			
56	SAFETY RELIEF VALVE (TUBE SIDE AND SHELL SIDE)	I				TYCO	USA	A			
		I				DRESSER	USA	A			
		I				M/FAINGER LESSER	GERMANY	A			

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019			
SN	ITEM	Q/P INS- FN CAT	Q/P No. XXX-110	Q/P SUB- MISSO N SCHED ULE	Q/P APPL SCHE DULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
						BHEL-HPBP, TRICHY	TRICHY	DR			
						PENTAIR VALVES & CONTROLS	VADODARA	DR			
						KSB MIL CONTROL LIMITED	CHENNAI	DR			
						ASIAN INDUSTRIAL VALVES AND INSTRUMENTS	CHENNAI	DR			
57	DRAIN COOLER	I				BHEL	HYDERBAD	A			
58	VALVES GATE, GLOBE, CHECK 1/2 TO 10" (UPTO 2500 CL)	III				TOA VALVES	JAPAN	A			
		III				DEUTSCHE BABCOCK	GERMANY	A			
		III				DRESSER	USA	A			
		II				BHEL - HPBP	TRICHY	A			
		I				FLOSTEER ENGINEERS PVT. LTD.	AHMEDABAD	DR			
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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019					
SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator				QIP/INS- PN CAT	QIP No. XXXX-110	QIP SUB- MISSIO N SCHED ULE	QIP APPL SCHE DULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	REMARKS
SN	ITEM												
		I						JOSHUAMPALA ENGINEERING PRIVATE LI	SATARA	DR			
		I						SKILT FABRICATORS PVT.LTD.	MUMBAI	DR			
		I						VALVE TECH INDUSTRIES	NAVI MUMBAI	DR			
		I						CHEMTECH INDUSTRIAL VALVES	THANE	DR			
59	VALVES (GATE, GLOBE, NRV) 1/2 TO 10" FOR LP APPLICATION	I						L&T	CHENNAI/ COIMBATORE	A			
		II						BHEL-HPBP	TRICHY	A			
								FOURESS	AURANGABA D	A			Up to 2"x800# Upto 10x600#
		I						WEIR BDK	HUBLI	A			Up to 2"x800# Upto 10x600#
		I						FLOSTER ENGINEERS PVT. LTD.,	AHMEDABAD	DR			
		I						JOSHUAMPALA ENGINEERING PRIVATE LI	SATARA	DR			
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PROJECT: 2X660 MW KHRJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR: BHEL, HYDERABAD CONTRACT NO.: XXX		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 09 DATE: 23-04-2019					
SN	ITEM	QP/INS. PN CAT	QP No. XXX-110	QP SUB- MISSION SCHED ULE	OP APPL SCHE DULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
		1				SKILT FABRICATORS PVT.LTD.	MUMBAI	DR			
		1				VALVE TECH INDUSTRIES	NAVI MUMBAI	DR			
		1				CHEMTECH INDUSTRIAL VALVES	THANE	DR			
60	CCS GLOBE VALVES UPTO 300 NB AND 150 CLASS	1				KBL	KONDAPURI	A			
		1				FOURESS ENGG	AURANGABA D	A			
		1				WEIR BDK	HUBLI	A			
		1				KSB	COIMBATORE	A			
		1				LEADER ENGG	JALLANDHAR	A			
		1				SKILT	MUMBAI	DR			
		1				BHEL - HPBP	TRICHY	A			

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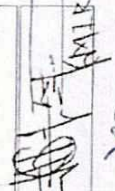
PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019					
SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator				OP SUB- MISSIO N SCHED ULE	OP No. XXXX-110	QIP/ INS- FN CAT	ITEM	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US / CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
SN	ITEM	QIP/ INS- FN CAT	OP No. XXXX-110	OP SUB- MISSIO N SCHED ULE	OP APPL SCHED ULE								
		I						FLOSTEER ENGINEERS PVT. LTD.,	AHMEDABAD	DR			
		I						JOSHAMPALA ENGINEERING PRIVATE LI	SATARA	DR			
		I						VALVE TECH INDUSTRIES	NAVI MUMBAI	DR			
		I						CHEMTECH INDUSTRIAL VALVES	THANE	DR			
61	DEARATOR SPRAY VALVES	III						NEWTERA (COCHRANE ENVIRONMENTAL SYSTEM (CRANE)	USA	A			
		III						STERLING	USA	A			
		III						KCD	USA	DR			
		I						VALUE TREK ENGINEERS	HYDERABAD	DR			
		I						VJAYA TOOLING ENGINEERS	HYDERABAD	DR			

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019					
SN	ITEM	Q/P INS- PN CAT	Q/P No. XXX-110	Q/P SUB- MISSIO N SCHED ULE	Q/P APPL SCHE DULE	PROPOSED SUB-SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
62	DEARATOR TRAY ASSEMBLY	I				PAVAN ENTERPRISES	HYDERABAD	DR			
		III				NEWTERA (COCHRANE ENVIRONMENTAL SYSTEM (CRANE))	USA	A			
		III				STERLING	USA	A			
		III				KCD	USA	DR			
		I				VRK INDUSTRIES	HYDERABAD	A			
		I				PREMIER ENGG	HYDERABAD	DR			
		I				VALUE TREK	HYDERABAD	DR			
		I				PAVAN ENGG	HYDERABAD	DR			
		I				VIJAY TOOLING	HYDERABAD	DR			
63	LT MOTORS UPTO 200 KW (REFER NOTE 5)	I				BIHARAT BIJLEE	MUMBAI	A			UPTO 160 KW
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		PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR: BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator				REF NO.:	
										REVISION NO.: 00	
										DATE: 23-04-2019	
SN	ITEM	QP/INS- FN CAT	QP No. XXXX-110	QP SUB- MISSIO N SCHED ULE	QP APPL SCHED ULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS

NOTES

N- BHEL/MIH approved vendors acceptable to NTPC

A- Proposed vendor is acceptable to NTPC, DR – "Details required" for NTPC review.

QP / INSPECTION CATEGORY:

- CAT - I: For those items the Quality Plans are approved by NTPC and final acceptance will be on physical inspection witness by NTPC.
- CAT - II: For those items the Quality Plans are approved by NTPC. However, no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis of review of documents as per QP.
- CAT - III: For those items main supplier approves Quality Plan. The final acceptance by NTPC shall on the basis of Certificate of Conformance by main supplier.

Motors:

a) Less than 30 KW

Acceptance of Motor less than 30 KW is based on COC of the manufacturer & the contractor confirming as follows:

It is hereby confirmed that the above mentioned motor /motors was/ were manufactured taking care of NTPC specific requirements regarding ambient temp., voltage & frequency variation, hot starts, pull out torque, starting KVA/KW, temp. rise, distance between centre of stud & gland plate and tested in accordance with approved drawing /data sheets.

b) 30 KW and above

Acceptance of Motor rating between 30 KW & 50 KW is based on NTPC review of Routine Test inspection report as per IS 325 by main contractor along with COC of the manufacturer & the contractor confirming as follows:

« It is hereby confirmed that the above mentioned motor /motors was/ were manufactured taking care of NTPC specific requirements regarding ambient temp., voltage & frequency variation, hot starts, pull out torque, starting KVA/KW, temp. rise, distance between centre of stud & gland plate, space heater and tested in accordance with approved drawing /data sheets.

For details Refer Technical specification.

For HT motors refer separate vendor list finalized for BHEL- Bhopal.

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		PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL HYDERABAD CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator				REF NO: REVISION NO.: 00 DATE: 23-04-2019	
SN	ITEM	QP/INS- PN CAT	QP No. XXXX-110	QP SUB- MISSIO N SCHD ULE	QP APPL SCHD ULE	PROPOSED SUBS PLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHD ULE	SC APPL SCHD ULE	REMARKS

Note -1: Manufacturer/Sub vendor shall be considered for acceptance subject to Sub-QR/provenness approval from NTPC Engineering & Owner.

NOTE - 2: If Booster pump shaft and CEP shaft are made from rolled bars then vendors shall be as per BHEL approved vendor list.

NOTE - 3: Valves of size ½ inch and below shall be procured from BHEL approved sources.

NOTE - 4: Items, any not listed in above shall be procured from BHEL approved sources.



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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR: BHEL HYDERABAD CONTRACT NO.: XXX		LIST OF SUB Q/ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					REF NO.: REVISION NO: 00 DATE: 23-04-2019				
SN	ITEM	Q/INS- FN CAT	Q/No. XXXX-110	Q/ SUB- MISSO N SCHED ULE	Q/ APPL SCHED ULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	REMARKS
1	LP HEATER	1				BHEL	HYDERBAD	Note-1			SUB-Q/ITEM
2	HP HEATER	1				BHEL	HYDERBAD	Note-1			SUB-Q/ITEM
		1				SPX	USA	Note-1			SUB-Q/ITEM
		1				BHI	SOUTH KOREA	Note-1			SUB-Q/ITEM
		1				TEI	USA	Note-1			SUB-Q/ITEM
		1				SHANGHAI	CHINA	Note-1			SUB-Q/ITEM
		1				HOLTEC	USA	Note-1			SUB-Q/ITEM
3	DEARATOR	1				BHEL	HYDERABAD	Note-1			SUB-Q/ITEM
	# FABRICATOR BASED ON BHEL HYD DESIGN					BHEL-HPVP	VISHAKAPAT NAM	A			
						VRK	HYDERABAD	DR			

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, HYDERABAD CONTRACT NO.: XXX				LIST OF SUB Q R ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019			
SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator				SUBSYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator			SUBSYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator				
SN	ITEM	QP/INS- FN CAT	QP No. XXXX-110	QP SUB- MISSION SCHEDULE	OP APPL SCHEDULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US / CAT	SS DETAIL SUB- SCHEDULE	SC APPL SCHEDULE	REMARKS
						THANDAV LAKSHMI ENGINEERING WORKS	VISHAKAPAT NAM	DR			
						JAY ENGG	TRICHY	DR			
						SAI SARAG	HYDERABAD	DR			
						PREMIER ENGG	HYDERABAD	DR			
4	BOILER FEED PUMP	I				MHI	JAPAN	Note-1			SUB-QR ITEM
		I				BHEL	HYDERABAD	Note-1			SUB-QR ITEM
5	CONDENSATE EXTRACTION PUMP	I				MHI	JAPAN	Note-1			SUB-QR ITEM
		I				BHEL	HYDERABAD	Note-1			SUB-QR ITEM

QP / INSPECTION CATEGORY:

CAT - I: For those items the Quality Plans are approved by NTPC and final acceptance will be on physical inspection witness by NTPC.

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		PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR: BHEL HYDERABAD CONTRACT NO: XXX		LIST OF SUB QR ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL SUB SYSTEM: BFP, Drive Turbine, Heaters (HP, LP) Drain Cooler and Deaerator				REF NO.:			
								REVISION NO.: 00			
								DATE: 23-04-2019			
SN	ITEM	QIP/INS-PS CAT	QIP No. XXX-110	QIP SUB-MISSIO N SCHEDULE	QIP APPL SCHEDULE	PROPOSED SUB-SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB-SCHEDULE	SC APPL SCHEDULE	REMARKS

CAT - II : For those items the Quality Plans are approved by NTPC. However, no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis of review of documents as per QP.

CAT - III: For those items main supplier approves Quality Plan. The final acceptance by NTPC shall on the basis of Certificate of Conformance by main supplier.

Note -1: Manufacturer/Sub vendor shall be considered for acceptance subject to Sub-QR/provenness approval from NTPC Engineering & Owner.

NOTE - 2: If Booster pump shaft and CEP shaft are made from rolled bars then vendors shall be as per BHEL approved vendor list.

NOTE - 3: Valves of size ½ inch and below shall be procured from BHEL approved sources.

NOTE - 4: Items, any not listed in above shall be procured from BHEL approved sources.



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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR: BHEL, PEM CONTRACT NO.: XXX		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL					SUB SYSTEM: BOP			REF NO.: REVISION NO.: 00 DATE: 23-04-2019	
SN	ITEM	QTY INS- PN CAT	Q.P. No. XXXX-110	Q.P. SUB- MISSIO N SCHED ULE	Q.P. APPL SCHED ULE	PROPOSED SUBSUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS
1	THERMAL INSULATION- ROCKWOOL	I				GOENKA ROCKWOOL (INDIA) PVT. LTD.	RAIPUR	DR			
		I				LLOYD INSULATIONS (INDIA) LTD.	BHILAI, JAMSHEDPUR	A			
		I				HI-TEC ROCKFIBRE PVT. LTD.	RAJNANDGA ON	DR			
		I				MINSULATE MANUFACTURING COMPANY	JAMSHEDPUR	DR			
		I				THERMOCARE ROCKWOOL INDIA PRIVATE LTD.	RAJNANDGA ON	DR			
		I				ROCKWOOL INDIA PVT. LTD.	SILVASSA, MEDAK	DR			
		II				DHANBAD ROCKWOOL INSULATION (p) LTD.	DHANBAD	DR			
		II				POLYBOND INSULATION PRIVATE LTD.	BHILAI	DR			
		II				SHRIRAM EQUITTECH PRIVATE LIMITED	DURG	DR			
2	M.E.BELLOWS	I				B.D.ENGINEERS	AHMEDABAD	DR			

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, PEM CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019			
SUB SYSTEM: BOP											
SN	ITEM	Q/P INS- PN CAT	Q/P No. XXX-110	Q/P SUB- MISSIO N SCHED ULE	Q/P APPL SCHE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHED ULE	REMARKS
		1				FLEXICAN BELLOWS AND HOSES PVT. LTD.	BARODA	A			UPTO 2200 NB
		1				FLEXATHERM EXPANULOW PVT. LTD.	VADODARA	DR			
		1				LONESTAR INDUSTRIES	CHENNAI	A			UPTO 2200 NB
		1				MB METALLIC BELLOWS PVT LTD	CHENNAI	A			UPTO 2000 NB
		1				METALLIC BELLOWS INDIA PVT. LTD.	CHENNAI	DR			
3	SPRING LOADED BY- PASS VALVES	1				WEIR VALVES & CONTROLS UK LTD.	UNITED KINDGOM	DR			
		1				SEMPELL GmbH	GERMANY	DR			
		1				STRACK GmbH	GERMANY	DR			
		1				BHEL-TRICHY VALVES	TRICHY	DR			
4	BUTTERFLY VALVES (STEAM SERVICE)	1				FOURESS ENGINEERING (INDIA) PVT. LTD.	BANGALORE	DR			
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PROJECT: 2X660 MW KIURJA STPS PACKAGE: 2 X 660 MW TG PRG CONTRACTOR: BHEL, PEM CONTRACT NO.: XXX				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019				
SUB SYSTEM: BOP				SUB SYSTEM: BOP		SUB SYSTEM: BOP		SUB SYSTEM: BOP				
SN	ITEM	QIP/INS- PN CAT	QIP No. xxx-110	QIP SUB- MISSIO N SCHED ULE	QIP APPL SCHE DULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHED ULE	SC APPL SCHED ULE	REMARKS	
		I				INSTRUMENTATION LTD.	PALAKKAD	DR				
		I				NENGFA WEIWE TIEJING VALVE JOINT- STOCK Co. LTD.	CHINA	DR				

A- Proposed vendor is acceptable to NTPC, DR -- "Details required" for NTPC review.

QIP/INSPECTION CATEGORY:

CAT - I: For those items the Quality Plans are approved by NTPC and final acceptance will be on physical inspection witness by NTPC.

CAT - II: For those items the Quality Plans are approved by NTPC. However, no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis of review of documents as per QIP.

CAT- III: For those items main supplier approves Quality Plan. The final acceptance by NTPC shall be on the basis of Certificate of Conformance by main supplier.

Note -1: Manufacturer/Sub-Vendor's acceptance shall be subjected to Sub-QR/Proveness approval from NTPC - Engineering & Owner.

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PROJECT: 2X660 MW KHURJA STPS PACKAGE: 2 X 660 MW TG PKG CONTRACTOR : BHEL, PEM CONTRACT NO: XXX				LIST OF SUB-QR ITEMS REQUIRING QUALITY PLAN AND SUBCONTRACTOR APPROVAL				REF NO.: REVISION NO.: 00 DATE: 23-04-2019			
SUB SYSTEM: BOP											
SN	ITEM	QIP/ INS- FN CAT	QIP No. XXXX-110	QIP SUB- MISSIO N SCHED ULE	QIP APPL SCHED ULE	PROPOSED SUB SUPPLIER	PLACE	SS APPL STAT US/ CAT	SS DETAIL SUB- SCHEDU LE	SC APPL SCHEDU LE	REMARKS
1	COLTCS	1				GEA-BGR ENERGY SYSTEM INDIA LTD	NELLORE	NOTE- 1			Subject to Sub-QR clearance.
		1				MULTITEX FILTRATION ENGINEERS LIMITED	GREATER NOIDA	NOTE- 1			Subject to Sub-QR clearance.
		1				TAPROGGE GmbH	GERMANY	NOTE- 1			Subject to Sub-QR clearance.
		1				BEIJING CEP GREEN WAVE SCI-TECH CO. LTD.	BEIJING	NOTE- 1			Subject to Sub-QR clearance.

QIP/INSPECTION CATEGORY:

CAT - I: For those items the Quality Plans are approved by NTPC and final acceptance will be on physical inspection witness by NTPC.

CAT - II: For those items the Quality Plans are approved by NTPC. However, no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis of review of documents as per QIP.

CAT - III: For those items main supplier approves Quality Plan. The final acceptance by NTPC shall on the basis of Certificate of Conformance by main supplier.

Note -1: Manufacturer/Sub vendor shall be considered for acceptance subject to Sub-QR/provenness approval from NTPC Engineering & Owner.



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3	Chain Pulley Block (UP TO 5 TONS IN CAT-III)	I	Tractel Tirfor India Pvt. Ltd	Palwal	A	Approved Upto 15 Tons
		I	Universal Hoisto Fabrik	Thane	A	Approved Upto 20 Tons
		I	Mangla Hoist	Greater Noida	A	Approved Upto 10 Tons
		I	Reva Industries	Faridabad	A	Approved Upto 25 Tons
		I	Eddy Cranes	Pune	A	Approved Upto 14 Tons
		I	Alpha Services	Bhiwadi	A	Approved Upto 15 Tons
		I	Century Crane Engineers	Ballabhgarh	A	Approved Upto 25 Tons
		II	Techno	Ahmedabad	DR	
		II	Brady & Morris	Ahmedabad	DR	
		II	Century Crane Engineers	Ballabhgarh	A	Approved Upto 15 Tons
		II	BAKELITE ELECTRICAL	MUMBAI	DR	
		II	Universal Hoisto Fabrik	Thane	DR	
		II	Tractel Tirfor India Pvt. Ltd	Kalyani	A	Approved Upto 20 Tons
		II	Tuobro Furguson India Pvt. Ltd	Kolkata	DR	

Note 1 : Above the approved capacity, sub-vendor is deemed to be in DR category.

LEGENDS

1. SYSTEM SUPPLIER / SUB-SUPPLIER APPROVAL STATUS CATEGORY (SHALL BE FILLED BY NTPC)

A - For these items proposed vendor is acceptable to owner. To be indicated with letter "A" in the list alongwith the condition of approval, if any.

DR - For these items "Detailed required" for owner review. To be identified with letter "DR" in the list.

NOTED - For these items vendors are approved by Main Supplier and accepted by owner without specific vendor approval from owner. To be identified with "NOTED".

2. QP/INSPN CATEGORY

CAT-I : For these items the Quality Plans are approved by owner and the final acceptance will be on physical inspection witness by owner.

CAT-II : For these items the Quality Plans approved by owner. However no physical inspection shall be done by owner. The final acceptance by owner shall be on the basis review of documents as per approved QP

CAT-III : For these items Main Supplier approves the Quality Plans. The final acceptance by owner shall be on the basis certificate of conformance by the main supplier.



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BHEL.

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PROJECT: THDC KHURJA STPP		NTPC DOC NO:	
PACKAGE: TG & ASSOCIATE PACKAGE		REV. NO.	
MAIN SUPPLIER: BHEL		DATE	
CONTRACT NO.: THDC/RKSH/CC-9515-371		ANNEXURE	
ITEM		PLACE OF MANUFACTURING	
SR. NO.	QAP / INSP. CAT	QAP NO.	APPROVAL STATUS
1	TG HALL EOT Crane & LIFTING BEAM (REFER NOTE 1)	Mukand	Note 1
		WMI Konecranes	
		Anupam Industries	
		Unique Industries Handlers	
		HEC	
		Nasik	
		Ranchi	
5	FIRE DETECTION & PROTECTION SYSTEM L1 VENDOR (REFER NOTE 2)	BHEL	Note 1
Note 1 : Manufacturer/Sub-Vendor's acceptance shall be subjected to Sub-QR/Proveness approval from NTPC - Engineering & Owner. Note 2 : Comprehensive L-2 list of sub-vendors shall be finalized alongwith the finally selected L-1 vendor but prior to order finalization on L-1 vendor by the Bidder.			

LEGENDS

1. SYSTEM SUPPLIER / SUB-SUPPLIER APPROVAL STATUS CATEGORY (SHALL BE FILLED BY NTPC)

A - For these items proposed vendor is acceptable to owner. To be indicated with letter "A" in the list alongwith the condition of approval, if any.

DR - For these items "Detailed required" for owner review. To be identified with letter "DR" in the list.

NOTED - For these items vendors are approved by Main Supplier and accepted by owner without specific vendor approval from owner. To be identified with "NOTED".

2. QP/INSPN CATEGORY:

CAT-I: For these items the Quality Plans are approved by owner and the final acceptance will be on physical inspection witness by owner.

CAT-II: For these items the Quality Plans approved by owner. However no physical inspection shall be done by owner. The final acceptance by owner shall be on the basis review of documents as per approved QP.

CAT-III: For these items Main Supplier approves the Quality Plans. The final acceptance by owner shall be on the basis certificate of conformance by the main supplier.



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2X660 MW KHURJA STPP

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SECTION – IA

REV. NO. 00

DATE:

NOTE:

1. The sub vendor list above is indicative only and is subject to BHEL and Customer approval during detailed engineering stage without any commercial & delivery implication to BHEL.

Generally, the vendors who are already approved on NTPC as on date will be accepted. However, this will also be subject to final approval by NTPC/ Customer. In case the proposed vendor is not approved by NTPC/Customer, in that condition bidder shall submit the following back up documents:

- a) Documentation to show that the equipment /system has been supplied for a plant of similar or higher capacity.
 - b) End user performance certificate that the equipment/system has been operating satisfactorily for minimum two years as on the scheduled date of bid opening.
- Bidder to assess the capability of their proposed sub-vendors in terms of preparation of drawings, calculations, documents, quality assurance, supply of material etc. as per project schedule before placing the order on them.

2. The inspection category will be intimated after award of contract by BHEL/customer. However, the same will be adhered by the bidder without any commercial and delivery implication to BHEL/ customer.

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ANNEXURE-III

FUNCTIONAL GUARANTEES AND LIQUIDATED DAMAGES

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FUNCTIONAL GUARANTEES, LIQUIDATED DAMAGES FOR SHORTFALL IN PERFORMANCE AND GUARANTEE TESTS

(The term "Performance Guarantees" wherever appears in this Sub-Section shall have the same meaning and shall be synonymous to "Functional Guarantees". Similarly, the term "Performance Tests" wherever appears in this Sub-Section shall have the same meaning and shall be synonymous to "Guarantee Test(s)". The term "TMCR" (Turbine maximum continuous rating) appearing in the Technical Specification shall mean 660 MW electrical power output at generator terminals (power at generator terminals as per clause indicated in this sub-section) under rated steam parameters, 0% cycle make-up and 77 mm Hg (abs) condenser pressure unless used in conjunction with a different cycle make-up and/or a different condenser pressure.

1.00.00 PERFORMANCE GUARANTEES

1.00.01 General Requirements

- a) The bidder shall guarantee that the equipment offered shall meet the ratings and performance requirements stipulated for various equipment covered in these specifications.
- b) The guaranteed performance parameters furnished by the Bidder in his offer, shall be without any tolerance values and all margins required for instrument inaccuracies and other uncertainties shall be deemed to have been included in the guaranteed figures
- c) The Contractor shall conduct performance test and demonstrate all the guarantees covered herein during functional guarantee / acceptance test. The various tests which are to be carried out during performance guarantee/acceptance test are listed in this Sub-section. The guarantee tests shall be conducted by the Contractor at site in presence of Employer on each unit individually.
- d) All costs associated with the tests including cost associated with the calibration shall be included in the bid price.
- e) It is the responsibility of the contractor to perform the Performance Guarantee/Acceptance test as specified in this subsection. The performance tests will be performed using only the normal number of Employer supplied operating staff. Contractor, vendor or other subcontractor personnel shall only be used for instructional purposes or data collection. At all times during the Performance Tests the emissions and effluents if any as per scope from the Plant shall not exceed the Guaranteed Emission and Effluent Limits.
- f) The Contractor shall make their system ready for the performance guarantee tests before start of initial operation.
- g) The instruments to be used for process control shall also be used for PG test. Minimum number of instruments to be used for PG test has been identified in respective P&IDs with accuracy class meeting the code requirement. All instruments required for performance testing shall be of the type and accuracy required by the ASME PTC code. Prior to the start of the initial operation, the contractor shall get these instruments calibrated in an independent test Institute approved by the Employer. All test instrumentation, Personal computer(s), necessary server and required interface, software for on line computation of test results & report as required for PG tests shall be supplied by the contractor and shall be retained by the Employer. Separate system shall be supplied for each unit. All calibration procedures and standards shall be subjected to the approval of the Employer. The protecting tubes, pressure connections and other test connections required for conducting guarantee test shall conform to the relevant codes.
- h) Tools and tackles, instruments/devices including flow devices, matching flanges, impulse piping & valves etc. and any special equipment, required for the successful completion of the tests, shall be provided by the contractor free of cost.
- i) The Performance / Acceptance test shall be carried out as per the agreed procedure. The PG test procedure including demonstration tests shall be submitted within 90 days of the date of Notification of Award and finalization of the PG test procedure shall be done within 180 days from the date of Notification of Award. After the conductance of Performance test, the preliminary test results shall be calculated automatically by the server/software provided by

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- the contractor. The correction curves approved by the employer shall be fed/inbuilt in the PG test program/software. Preliminary test reports shall be submitted to the Employer instantly after completing each test run. The contractor shall also submit the detailed test evaluation report of Performance test results to Employer promptly but not later than one months from the date of conductance of Performance test.
- The PG test procedures shall be submitted for equipment/ system & subsystem under Contractor's scope for all Guarantees under category I, II & III as per latest International codes / standard meeting the specification requirements. The procedure shall also include correction curves, detailed activity plan of conductance of test and sample calculations.
- j) The Contractor shall submit for Employer's approval the detailed Performance Test procedure containing the following:
- Object of the test.
 - Various guaranteed parameters & tests as per contract.
 - Method of conductance of test and test code.
 - Duration of test, frequency of readings & number of test runs.
 - Method of calculation.
 - Correction curves and respective equations for graphs to be fed for the online computation
 - Instrument list consisting of range, accuracy, least count, and location of instruments along with reference approved P&IDs.
 - Scheme showing measurement points.
 - Sample calculation.
 - Acceptance criteria.
 - Any other information required for conducting the test.
- k) In case during performance guarantee tests it is found that the equipment/system has failed to meet the guarantees, the Contractor shall carry out all necessary modifications and/or replacements to make the equipment/system comply with the guaranteed requirements at no extra cost to the Employer and re-conduct the performance guarantee test(s) with Employer's consent. However, if the specified performance guarantee(s) are still not met but are achieved within the Acceptable Shortfall Limit specified at clause 1.01.02 of this subsection, Employer will accept the equipment/system/plant after levying liquidated damages as per clause 1.01.02 of this sub-section. If, however, the demonstrated guarantee(s) continue to be more than the stipulated Acceptable Shortfall Limit, even after the above modifications/replacements within ninety (90) days or a reasonable period allowed by the Employer, after the tests have been completed, the Employer will have the right to either of the following:
- (i) For Category-I Guarantees
- Reject the equipment / system / plant and recover from the Contractor the payments already made
- OR
- Accept the equipment /system/ plant after levying Liquidated Damages as specified hereunder. The liquidated damages for shortfall in performance indicated in clause 1.01.02 of this sub-section shall be levied separately for each unit. The liquidated damages shall be prorated for the fractional parts of deficiencies. The performance guarantees coming under this category are called 'Category-I' Guarantees.
- (ii) For Category-II Guarantees
- Reject the equipment / system/ plant and recover from the Contractor the payments already made. The performance guarantees under this category shall be called 'Category-II' Guarantees. Conformance to the performance requirements under Category-II is mandatory.
- (iii) For Category-III Guarantees

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Reject the equipment /system / plant and recover from the Contractor the payments already made.

OR

Accept the equipment/system after assessing the deficiency in respect of the various ratings, performance parameters and capabilities and recover from the contract price an amount equivalent to the damages as determined by the Employer. Such damages shall, however be limited to the cost of replacement of the equipment(s) / system(s), replacement of which shall remove the deficiency so as to achieve the guaranteed performance. These parameters/capacities shall be termed as Category-III Guarantees.

1.01.00 GUARANTEES UNDER CATEGORY I

NIL

1.02.00 GUARANTEES UNDER CATEGORY II

NIL

1.03.00 GUARANTEES UNDER CATEGORY III

CONDENSATE POLISHING PLANT

1.03.01 Following shall be guaranteed by the Bidder in the relevant Guarantee Schedule of the Bid Document and falls under “GUARANTEE UNDER CATEGORY –III”:

1.0 All the design parameters at clause no 4.0 (4.1 to 4.6) of Section IA, i.e. the effluent quality, the design flow, design service length, Chemical consumption for regeneration and Pressure drop across the resin bed in clean and dirty condition at rated design flow shall be guaranteed by the Bidder.

2.0 All the CPU plant equipments covered under this specification shall perform continuously without exceeding the noise level over the entire range of output and operating frequency specified in General Technical Requirement, Section-II of this technical specifications.

Noise level measurement shall be carried out using applicable and internationally acceptable standards. The measurement shall be carried out with a calibrated integrating sound level meter meeting the requirement of IEC 61672-1 and IEC-61672-2 (latest edition).

Sound pressure shall be measured all around the equipment at a distance of 1.0 m horizontally from the nearest surface of any equipment/ machine and at a height of 1.5 m above the floor level in elevation.

A minimum of 6 points around each equipment shall be covered for measurement. Additional measurement points shall be considered based on the applicable standards and the size of the equipment. The measurement shall be done with slow response on the A - weighting scale. The average of A-weighted sound pressure level measurements expressed in decibels to a reference of 0.0002 micro bar shall not exceed the guaranteed value. Corrections for background noise shall be considered in line with the applicable standards. All the necessary data for determining these corrections, in line with the applicable standards, shall be collected during the tests.

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ANNEXURE IV

DRAWING/ DOCUMENTS REQUIREMENT & DISTRIBUTION SCHEDULE

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After award of LOI, the drawing documents listed in MDL are minimum drawing/documents, which shall be submitted by the bidder for BHEL and Customer approval. However, any additional drawing/document if found necessary for completion of the engineering, the same shall be submitted by bidder without any commercial & delivery implication to BHEL.

The bidder has to submit the revised drawing/document along with the compliance sheet indicating enumerate reply to all BHEL and customer comments or observations. Without compliance sheet the submission of the drawings/documents will not be considered and the delay on this account will be solely on bidder's side only. Bidder to comply with the observations of the BHEL and CUSTOMER without price & delivery implication.

Every revised submission incorporating BHEL/Customer comments shall be resubmitted within 7 days by bidder.

Bidder further confirmed that drawings submitted shall be complete in all respects with revised drawing submitted incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays attributable to bidder's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings.

- List and schedule of drawings/documents to be submitted after award of contract shall be as per MDL.
- Bidder to note that drawings/documents submission shall be through web based Document Management System. Bidder would be provided access to the DMS for drawings/documents approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.
 - Internet explorer version – Minimum Internet Explorer 7
 - Internet speed – 2 mbps (Minimum preferred)
 - Pop ups from our external DMS IP (124.124.36.198) should not be blocked
 - Vendor's internal proxy setting should not block DMS application's link
 - (<http://124.124.36.198/wrenchwebaccess/login.aspx>)
 - DMS user manuals to be used by BHEL PEM vendors for uploading, viewing, revising, commenting and tracking documents on PEM's DMS have been uploaded on PEM internet website (www.bhelpem.com) under the Vendor session.
 - For quick access bidder may refer the link <http://bhelpem.com/DMSManuals/DMSManuals.html>
- Bidder shall submit soft copy/hard copy/CD ROMs of all the finally approved drawings and O&M Manuals as required by Customer/Customer consultant/BHEL-site/BHEL-PEM. The exact number of hard copies/CD ROMs of these documents to be submitted shall be notified to the bidder at the time of detailed engineering and bidder shall submit the same without any commercial/delivery implications to BHEL/Customer.
- All the drawing documents along with the O&M manual (of all the revisions) are necessarily to be submitted in soft copies in addition to hard copies.
- Bidder to submit soft copies of all the drawing and document along with quality plans for BHEL review and approval.
- Editable copy of all the drawings and documents shall be provided.
- The date of submission of drawing documents shall be considered as the date of submission of hard and soft copies whichever is later.
- All the drawings shall be prepared on computer auto cad and other documents (like datasheet etc.) on MS office software. Bidder not complying to the requirement shall not be considered. For the execution of the contract regular meeting (generally once in 15 days or as per project requirement) is required.
- Vendor to come for meeting with the concerned dealing persons as per BHEL or customer requirement in a short notice.
- Bidder to submit instrument schedule, cable schedule and valve schedule in MS- Excel format during detailed engineering.

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- Bidder to also furnish the auto cad copy/MS-Excel/MS-word (as applicable) of the following documents after award of contract. However, any other auto cad copy/MS-Excel/MS-word of any other document as per the insistence of BHEL and customer will also be submitted by the bidder without any delivery and commercial implication to BHEL and customer.

- P&IDs.
- Equipment lay out of CPU Plant.
- Equipment Cable tray layout of CPU Plant.
- Civil assignment drawings.
- Piping lay out drawing of CPU Plant.

Other requirements

- Engineering for this project is to be carried out in Integrated Intelligent Engineering environment at BHEL end. The engineering platform on which BHEL is doing the project is based on Smart Plant Suite. This is being done to have automated interface checking and thereby minimising rework at site.
Hence in line with above, bidder shall provide necessary support with respect to detailed piping drawing, isometric drawing, etc. as and when required during detail engineering.
- Successful bidder shall furnish detailed erection manual for each of the equipment as well as complete system supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.
- Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.
- In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion. However, in case changes are necessitated due to any constraints at customer end, delay in review/ approval of such revised drawing beyond one month will be to customer's account.

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MASTER DRAWING LIST (MDL)

S.No.	BHEL Drawing No	NTPC Drawing No	Drawing Title	No. Of Weeks for Document Submission After Placing LOI/LOA
1.	PE-V0-475-155A-A001 *	9915-371-110-PEM-PVM-F-165	P& I DIAGRAM OF CONDENSATE POLISHING UNIT (LEGENDS)	4
2.	PE-V0-475-155A-A001-1 *	9915-371-110-PEM-PVM-F-166	P & I DIAGRAM OF CONDENSATE POLISHING PLANT (CPP)	4
3.	PE-V0-475-155A-A001-2 *	9915-371-110-PEM-PVM-F-167	P & I DIAGRAM OF CONDENSATE POLISHING PLANT (CPP)	4
4.	PE-V0-475-155A-A001-3 *	9915-371-110-PEM-PVM-F-168	P & I DIAGRAM OF REGENERATION SYSTEM OF CPP	4
5.	PE-V0-475-155A-A006 *	9915-371-110-PEM-PVM-G-175	OPERATION & CONTROL PHILOSOPHY FOR CPU	4
6.	PE-V0-475-155A-A004 *	9915-371-110-PEM-PVM-U-171	PROCESS CALCULATION AND EQUIPMENT SIZING FOR CPP	4
7.	PE-V0-475-155A-A004-1 *	9915-371-110-PEM-PVM-U-172	THICKNESS CALCULATION FOR PRESSURE VESSEL FOR CPP	4
8.	PE-V0-475-155A-A004-2 *	9915-371-110-PEM-PVM-U-173	PRESSURE DROP CALCULATION FOR CPP	4
9.	PE-V0-475-155A-A005 *	9915-371-110-PEM-PVM-W-174	SUB-VENDOR LIST AND INSPECTION CRITERIA	4
10.	PE-V0-475-155A-A004-3 *	9915-371-110-PEM-PVM-Y-177	DATASHEET OF RESIN	6
11.	PE-V0-475-155A-A048	9915-371-110-PEM-PVI-G-218	ALARM AND ANNUNCIATION LIST	6
12.	PE-V0-475-155A-A002 *	9915-371-110-PEM-PVM-F-169	EQUIPMENT LAYOUT OF CONDENSATE POLISHING UNIT (SERVICE VESSEL AREA)	6
13.	PE-V0-475-155A-A003 *	9915-371-110-PEM-PVM-F-170	EQUIPMENT LAYOUT OF CONDENSATE POLISHING UNIT (REGENERATION AREA)	6
14.	PE-V0-475-155A-A050	9915-371-110-PEM-PVM-H-220	VALVE SCHEDULE (VALVE LIST) FOR CPP	8
15.	PE-V0-475-155A-A015	9915-371-110-PEM-QVE-Q-184	QP FOR CONTROL CABLE FOR CPU	8
16.	PE-V0-475-155A-A124	9915-371-110-PEM-PVI-G-283	INSTRUMENTS SCHEDULE FOR FOR CPP	8
17.	PE-V0-475-155A-A122	9915-371-110-PEM-PVM-H-281	PAINTING SCHEDULE FOR CPU	8
18.	PE-V0-475-155A-A018		WPS FOR DM WATER STORAGE TANK FOR CPU	8
19.	PE-V0-475-155A-A019		WPS FOR MS PIPE (IS: 1239/3589) AT SITE FOR CPU	8

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20.	PE-V0-475-155A-A044		WPS FOR SS PIPES AT SITE FOR CPU	8
21.	PE-V0-475-155A-A045	9915-371-110-PEM-PVE-Y-215	Data Sheet of Motorized Butterfly Valve	10
22.	PE-V0-475-155A-A021	9915-371-110-PEM-PVI-Y-190	DATASHEET AND GA OF ANALYSER RACK/PANEL	10
23.	PE-V0-475-155A-A022	9915-371-110-PEM-PVI-Y-191	DATA SHEET FOR ELECTRONIC TRANSMITTERS	10
24.	PE-V0-475-155A-A023	9915-371-110-PEM-PVI-Y-192	DATA SHEET FOR LEVEL TRANSMITTER - ULTRASONIC	10
25.	PE-V0-475-155A-A024	9915-371-110-PEM-PVI-Y-193	DATASHEET OF SOLENOID VALVES	10
26.	PE-V0-475-155A-A025	9915-371-110-PEM-PVI-Y-194	DATA SHEET FOR AIR FILTER REGULATOR	10
27.	PE-V0-475-155A-A026	9915-371-110-PEM-PVI-Y-195	DATA SHEET FOR PH ANALYSER	10
28.	PE-V0-475-155A-A027	9915-371-110-PEM-PVI-Y-196	DATA SHEET FOR SODIUM ANALYSER	10
29.	PE-V0-475-155A-A028	9915-371-110-PEM-PVI-Y-197	DATA SHEET FOR CONDUCTIVITY ANALYSER	10
30.	PE-V0-475-155A-A030	9915-371-110-PEM-PVI-Y-199	DATA SHEET FOR PNEUMATIC OPERATED CONTROL VALVES FOR CPP	10
31.	PE-V0-475-155A-A031	9915-371-110-PEM-PVI-Y-200	DATA SHEET OF LIR FOR INSTRUMENTS FOR CPP	10
32.	PE-V0-475-155A-A049	9915-371-110-PEM-PVM-H-219	PIPING SCHEDULE (LINE LIST) FOR CPP	10
33.	PE-V0-475-155A-A014	9915-371-110-PEM-QVM-Q-183	MQP FOR BUTTERFLY VALVE (MANUAL/PNEUMATIC/MOTOR OPERATED)	10
34.	PE-V0-475-155A-A123	9915-371-110-PEM-PVI-G-282	I/O LIST AND DRIVE LIST	10
35.	PE-V0-475-155A-A119	9915-371-110-PEM-PVM-H-279	CIVIL SCOPE OF SERVICE VESSEL AERA	10
36.	PE-V0-475-155A-A127	9915-371-110-PEM-PVM-H-285	CIVIL SCOPE DRG FOR REGN AREA	10
37.	PE-V0-475-155A-A138	9915-371-110-PEM-PVM-Y-296	DATASHEET AND GA OF PRE-FILTERS	10
38.	PE-V0-475-155A-A088	9915-371-110-PEM-QVM-Q-256	MQP FOR HORIZONTAL CENTRIFUGAL PUMPS (M/s SAM TURBO MAKE)	10
39.	PE-V0-475-155A-A089	9915-371-110-PEM-QVM-Q-257	MQP FOR ELECTRIC ACTUATOR (WITH GEAR BOX)	10
40.	PE-V0-475-155A-A092	9915-371-110-PEM-QVM-Q-258	MQP FOR HEMI HEADS (PETAL & CROWN IN MOCKUP CONDITION/HEMIHEADS)	10
41.	PE-V0-475-155A-A093	9915-371-110-PEM-QVM-Q-259	MQP FOR PRESSURE VESSEL (OTHER THAN SERVICE VESSEL)	10

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42.	PE-V0-475-155A-A094	9915-371-110-PEM-QVM-Q-260	MQP FOR ATMOSPHERIC TANKS/OPEN TANKS/IRU/PRIMING CHAMBER	10
43.	PE-V0-475-155A-A095	9915-371-110-PEM-QVM-Q-261	MQP FOR ALKALI/ ACID STORAGE TANKS/HOT WATER TANK	10
44.	PE-V0-475-155A-A096	9915-371-110-PEM-QVM-Q-262	MQP FOR HORIZONTAL CENTRIFUGAL PUMPS	10
45.	PE-V0-475-155A-A098	9915-371-110-PEM-QVM-Q-263	MQP FOR HORIZONTAL CENTRIFUGAL PUMPS (RUBBERLINED)	10
46.	PE-V0-475-155A-A099	9915-371-110-PEM-QVM-Q-264	MQP FOR POLYPROPYLENE ACID/ALKALI UNLOADING PUMP(HORIZONTAL)	10
47.	PE-V0-475-155A-A100	9915-371-110-PEM-QVM-Q-265	MQP FOR METERING PUMPS (DIAPHRAGM TYPE)	10
48.	PE-V0-475-155A-A101	9915-371-110-PEM-QVM-Q-266	MQP FOR AIR BLOWER (LOBE TYPE)	10
49.	PE-V0-475-155A-A102	9915-371-110-PEM-QVM-Q-267	MQP FOR RUBBER LINING	10
50.	PE-V0-475-155A-A103	9915-371-110-PEM-QVM-Q-268	MQP FOR FABRICATION OF HIGH PRESSURE PIPES & FITTINGS	10
51.	PE-V0-475-155A-A105	9915-371-110-PEM-QVM-Q-269	MQP FOR BUTTERFLY VALVES (MANUAL & PNEU/ELEC) 150 LBS	10
52.	PE-V0-475-155A-A106	9915-371-110-PEM-QVM-Q-270	MQP FOR LT POWER CABLES AS PER IS:1554 (PART-1)	10
53.	PE-V0-475-155A-A107	9915-371-110-PEM-QVM-Q-271	MQP FOR DIAPHRAGM VALVE (MANUAL/PNEU.)	10
54.	PE-V0-475-155A-A109	9915-371-110-PEM-QVM-Q-272	MQP FOR DUAL PLATE TYPE VALVES(SS & CI CLASS 150)	10
55.	PE-V0-475-155A-A111	9915-371-110-PEM-QVM-Q-273	MQP FOR BALL VALVE (UPTO PN 10) (CAT III ITEM- QP IS NOT APPLICABLE)	10
56.	PE-V0-475-155A-A112	9915-371-110-PEM-QVM-Q-274	MQP FOR AGITATOR WITH MOTOR	10
57.	PE-V0-475-155A-A113	9915-371-110-PEM-QVM-Q-275	MQP FOR MS PIPES (IS:1239 & 3589)	10
58.	PE-V0-475-155A-A115	9915-371-110-PEM-QVM-Q-276	MQP FOR CS PIPE(ASTM A 106 GR B)	10
59.	PE-V0-475-155A-A116	9915-371-110-PEM-QVM-Q-277	MQP FOR SS PIPES (ERW/SEAMLESS)	10
60.	PE-V0-475-155A-A118	9915-371-110-PEM-QVM-Q-278	MQP FOR PRE-ASSEMBLY OF SKIDS FOR REGENERATION AREA FOR CPU	10
61.	PE-V0-475-155A-A008	9915-371-110-PEM-PVI-G-178	LIST OF 230V AC UPS LOAD (FOR CPP)	12
62.	PE-V0-475-155A-A007-1	9915-371-110-PEM-PVI-Q-177	HOOK UP & INSTALLATION DRAWING FOR INSTRUMENTS FOR CPP	12

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63.	PE-V0-475-155A-A009	9915-371-110-PEM-PVI-S-179	POWER DISTRIBUTION SCHEME-230 VAC. FOR CPP SYSTEM	12
64.	PE-V0-475-155A-A020	9915-371-110-PEM-PVI-B-189	GA OF AC & DC POWER DISTRIBUTION BOARD (FOR CPP)	12
65.	PE-V0-475-155A-A017	9915-371-110-PEM-PVI-P-186	HMI - LOGS, TRENDS AND BAR CHARTS FOR CPP	12
66.	PE-V0-475-155A-A033	9915-371-110-PEM-PVM-B-199	GA DRAWING OF SERVICE VESSEL	12
67.	PE-V0-475-155A-A032	9915-371-110-PEM-PVM-B-201	GA DRAWING OF DM WATER STORAGE TANKS	12
68.	PE-V0-475-155A-A034	9915-371-110-PEM-PVM-B-203	GA DRAWING OF REGENERATION VESSELS	12
69.	PE-V0-475-155A-A035	9915-371-110-PEM-PVM-B-204	GA DRAWING OF ACID STORAGE TANK	12
70.	PE-V0-475-155A-A036	9915-371-110-PEM-PVM-B-205	GA DRAWING OF ALKALI STORAGE TANK	12
71.	PE-V0-475-155A-A037	9915-371-110-PEM-PVM-B-206	GA DRAWING OF ACID MEASURING TANK	12
72.	PE-V0-475-155A-A038	9915-371-110-PEM-PVM-B-208	GA DRAWING OF ALKALI PREPARATION TANK	12
73.	PE-V0-475-155A-A039	9915-371-110-PEM-PVM-B-209	GA DRAWING OF ALKALI DAY TANK	12
74.	PE-V0-475-155A-A040	9915-371-110-PEM-PVM-B-210	GA DRAWING OF AC FILTER FOR ALKALI	12
75.	PE-V0-475-155A-A041	9915-371-110-PEM-PVM-B-211	GA DRAWING OF HOT WATER TANK	12
76.	PE-V0-475-155A-A042	9915-371-110-PEM-PVM-B-212	GA DRAWING OF PRIMING TANK OF NEUTRALISATION PIT	12
77.	PE-V0-475-155A-A043	9915-371-110-PEM-PVM-B-213	GA DRAWING OF LIME TANK OF NEUTRALISATION PIT	12
78.	PE-V0-475-155A-A046	9915-371-110-PEM-PVM-B-216	GA FOR RESIN MAKE-UP HOPPER	12
79.	PE-V0-475-155A-A047	9915-371-110-PEM-PVM-B-217	GA FOR RESIN TRANSFER WASTE WATER COLLECTION SUMP (IF APPLICABLE)	12
80.	PE-V0-475-155A-A051	9915-371-110-PEM-PVM-H-221	INTERCONNECTION SCHEDULE FOR CPP	12
81.	PE-V0-475-155A-A125	9915-371-110-PEM-PVI-G-284	INSTRUMENTATION CABLE LIST & ICS FOR CPP	12
82.	PE-V0-475-155A-A059	9915-371-110-PEM-PVM-Y-229	DATA SHEET OF AC FILTER MEDIA	12
83.	PE-V0-475-155A-A060	9915-371-110-PEM-PVM-Y-230	DATA SHEET ALONG WITH GA OF PLUG VALVE	12
84.	PE-V0-475-155A-A061	9915-371-110-PEM-PVM-Y-231	DATA SHEET ALONG WITH GA OF DUAL PLATE VALVE	12
85.	PE-V0-475-155A-A063	9915-371-110-PEM-PVM-Y-232	DATA SHEET ALONG WITH GA OF BALL VALVE (MANUAL)	12

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86.	PE-V0-475-155A-A064	9915-371-110-PEM-PVM-Y-233	DATA SHEET ALONG WITH GA OF BALL VALVE (AUTO)	12
87.	PE-V0-475-155A-A065	9915-371-110-PEM-PVM-Y-234	DATA SHEET ALONG WITH GA OF HIGH PR BALL VALVE (MANUAL)	12
88.	PE-V0-475-155A-A066	9915-371-110-PEM-PVM-Y-235	DATA SHEET ALONG WITH GA OF HIGH PR BALL VALVE (AUTO)	12
89.	PE-V0-475-155A-A068	9915-371-110-PEM-PVM-Y-236	DATA SHEET ALONG WITH GA, C/S AND CH. CURVE OF REGENERATION PUMPS	12
90.	PE-V0-475-155A-A069	9915-371-110-PEM-PVM-Y-237	DATA SHEET ALONG WITH GA, C/S AND CH. CURVE OF ACID UNLOADING PUMPS	12
91.	PE-V0-475-155A-A070	9915-371-110-PEM-PVM-Y-238	DATA SHEET ALONG WITH GA, C/S AND CH. CURVE OF ALKALI UNLOADING PUMPS	12
92.	PE-V0-475-155A-A071	9915-371-110-PEM-PVM-Y-239	DATA SHEET ALONGWITH GA, C/S AND CH.CURVE OF EFFLUENT DISPOSAL PUMPS	12
93.	PE-V0-475-155A-A072	9915-371-110-PEM-PVM-Y-240	DATA SHEET ALONG WITH GA, C/S AND CH.CURVE OF METERING PUMPS (ALKALI)	12
94.	PE-V0-475-155A-A073	9915-371-110-PEM-PVM-Y-241	DATA SHEET ALONG WITH GA, C/S AND CH. CURVE OF METERING PUMPS (ACID)	12
95.	PE-V0-475-155A-A074	9915-371-110-PEM-PVM-Y-242	DATA SHEET ALONG WITH GA, C/S OF BLOWERS OF SERVICE AREA	12
96.	PE-V0-475-155A-A075	9915-371-110-PEM-PVM-Y-243	DATA SHEET ALONG WITH GA, C/S OF BLOWERS OF REGENERATION AREA	12
97.	PE-V0-475-155A-A076	9915-371-110-PEM-PVM-Y-244	DATA SHEET OF SAFETY SHOWERS	12
98.	PE-V0-475-155A-A077	9915-371-110-PEM-PVM-Y-245	DATA SHEET OF AGITATORS FOR ALKALI PREPARATION AND ALKALI DAY TANK	12
99.	PE-V0-475-155A-A079	9915-371-110-PEM-PVM-Y-247	DATA SHEET ALONG WITH GA OF DIAPHRAGM VALVE (MANUAL)	12
100.	PE-V0-475-155A-A080	9915-371-110-PEM-PVM-Y-248	DATA SHEET ALONG WITH GA OF DIAPHRAGM VALVE (AUTO)	12
101.	PE-V0-475-155A-A081	9915-371-110-PEM-PVM-Y-249	DATA SHEET ALONG WITH GA OF BUTTERFLY VALVE (MANUAL)	12
102.	PE-V0-475-155A-A082	9915-371-110-PEM-PVM-Y-250	DATA SHEET ALONG WITH GA OF BUTTERFLY VALVE (AUTO)	12
103.	PE-V0-475-155A-A083	9915-371-110-PEM-PVM-Y-251	DATA SHEET ALONG WITH GA OF HIGH PR BUTTERFLY VALVE (MANUAL)	12
104.	PE-V0-475-155A-A084	9915-371-110-PEM-PVM-Y-252	DATA SHEET ALONG WITH GA OF HIGH PR BUTTERFLY VALVE (AUTO)	12
105.	PE-V0-475-155A-A085	9915-371-110-PEM-PVM-Y-253	DATA SHEET ALONG WITH GA, C/S AND CH. CURVE OF ALKALI	12

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			TRANSFER PUMPS	
106.	PE-V0-475-155A-A086	9915-371-110-PEM-PVM-Y-254	DATA SHEET ALONG WITH GA, C/S AND CH. CURVE OF DM WATER PUMPS FOR RESIN TRANSFER	12
107.	PE-V0-475-155A-A087	9915-371-110-PEM-PVM-Y-255	DATA SHEET ALONG WITH GA, C/S AND CH. CURVE OF RESIN TRANSFER WASTE WATER RECYCLE PUMPS	12
108.	PE-V0-475-155A-A037-1	9915-371-110-PEM-PVI-F-207	CABLE TRAY/TRENCH & CONDUIT ROUTING DIAGRAM FOR CONDENSATE POLISHING UNIT(SERVICE VESSEL AREA)	14
109.	PE-V0-475-155A-A129	9915-371-110-PEM-PVE-H-287	CABLE SCHEDULE (POWER) FOR CPU	14
110.	PE-V0-475-155A-A078	9915-371-110-PEM-PVM-Y-246	DATA SHEET AND GA FOR JUNCTION BOX / ANALYZER PANEL AND JB LAYOUT	14
111.	PE-V0-475-155A-A121	9915-371-110-PEM-PVM-Y-280	DATA SHEET OF MOTORS FOR CPP	14
112.	PE-V0-475-155A-A011	9915-371-110-PEM-PVI-T-180	CONTROL LOGICS FOR CPP	16
113.	PE-V0-475-155A-A052	9915-371-110-PEM-PVM-P-222	EXTERNAL PIPING LAYOUT FROM CPP SERVICE VESSELS TO REGENERATION AREA	16
114.	PE-V0-475-155A-A053	9915-371-110-PEM-PVM-P-223	EXTERNAL PIPING LAYOUT IN REGENERATION AREA	16
115.	PE-V0-475-155A-A054	9915-371-110-PEM-PVM-P-224	PIPING LAYOUT AROUND SERVICE VESSELS	16
116.	PE-V0-475-155A-A055	9915-371-110-PEM-PVM-P-225	INTERNAL PIPING LAYOUT IN REGENERATION BUILDING	16
117.	PE-V0-475-155A-A056	9915-371-110-PEM-PVM-P-226	YARD PIPING FROM N-PIT TO ASH SLURRY SUMP	16
118.	PE-V0-475-155A-A130	9915-371-110-PEM-PVE-F-288	EARTHING LAYOUT OF CPU SERVICE VESSEL AREA	16
119.	PE-V0-475-155A-A131	9915-371-110-PEM-PVE-F-289	EARTHING LAYOUT OF CPU REGENERATION AREA	16
120.	PE-V0-475-155A-A134	9915-371-110-PEM-PVE-F-292	CABLE TRAY/TRENCH & CONDUIT ROUTING DIAGRAM FOR CONDENSATE POLISHING UNIT(REGENERATION AREA)	16
121.	PE-V0-475-155A-A128	9915-371-110-PEM-PVE-H-286	ELECTRICAL LOAD LIST FOR CPU	16
122.	PE-V0-475-155A-A132	9915-371-110-PEM-PVE-W-290	TYPE TEST REPORT OF CV TEST FOR CONTROL VALVE (FOR CPP)	16
123.	PE-V0-475-155A-A133	9915-371-110-PEM-PVE-W-291	TYPE TEST REPORT FOR FLOW NOZZLES & ORIFICE PLATES (FOR CPP)	16

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124.	PE-V0-475-155A-A012	9915-371-110-PEM-PVI-W-181	TYPE TEST REPORT FOR ELECTRONIC TRANSMITTERS (FOR CPP)	18
125.	PE-V0-475-155A-A013	9915-371-110-PEM-PVI-W-182	TYPE TEST REPORT FOR G & F TYPE INSTRUMENTATION CABLE (FOR CPP)	18
126.	PE-V0-475-155A-A029	9915-371-110-PEM-PVI-W-198	TYPE TEST REPORT OF CABLE (ELECTRICAL)	18
127.	PE-V0-475-155A-A016		TYPE TEST REPORT OF JUNCTION BOX (DEGREE OF PROTECTION) FOR CPP	18
128.	PE-V0-475-155A-A057		PERFORMANCE & GUARANTEE TEST PROCEDURE FOR CONDENSATE POLISHING PLANT	20
129.	PE-V0-475-155A-A058		O&M MANUAL OF CPP	22

Note-The drawing/document marked as (*) shall be considered as basic drawings/documents and payment as per suggested price format shall be made after approval of drawings/ documents marked as (*) in either CAT-I/II/IV .

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**TECHNICAL SPECIFICATION FOR
CONDENSATE POLISHING UNIT****2X660 MW KHURJA STPP**

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S.No	Description of Drgs/Docs	No of Prints	No of ROMs/DVDs/Portable Hard Disk	CD
1	Drawings, Data sheets, Design calculations, Purchase specifications and other documents			
	First submission and submission with major changes			
	▪ Layout (A0&A1 sizes)	4	-	
	▪ Other Drawings/Documents (A0&A1 sizes)	2	-	
	▪ P&ID (All sizes)	4	-	
	a) Final drawings/documents (Directly to site)	6	2	
	b) "As Built" Drawing/Documents (Directly to site)	6	2	
	c) Analysis reports of Equipments / piping /structures components/system employing software packages as detailed in the specifications.	2	2	
2	Erection Manual (Directly to site)	4 sets	2	
3	Operation & Maintenance manual			
	i) First Submission	1 set	--	
	ii) Final Submission (Directly to site)	4 sets	2	
4	Plant Hand Book			
	i) First Submission	1	1	
5	Commissioning and Performance Test Procedure manual			
	i) First Submission	1 set	--	
	ii) Final Submission (Directly to site)	4 sets	2	

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TITLE:

**TECHNICAL SPECIFICATION FOR
CONDENSATE POLISHING UNIT**
2X660 MW KHURJA STPP

BHEL DOCUMENTS NO.: PE-TS-475-155-A001

VOLUME IIB

SECTION – IA

REV. NO. 00

DATE:

S.No	Description of Drgs/Docs	No of Prints	No of ROMs/DVDs/Portable Hard Disk	CD
6	Performance and Functional Guarantee Test Report i) First Submission	2 sets	--	
	ii) Approved Copies (Direct to Site)	4 sets	2	
7	Project Completion Report (Directly to site)	6 sets	2	
8	QA programme including Organisation for implementation and QA system manual(with revisions)	1	--	
9	Vendor details in respect of proposed vendors including contractor's evaluation report.	2	--	
10	Manufacturing QPs, Field QPs, Field welding schedules and their reference document like test procedures, WPS, POR etc i) For review/comment	1	--	
	ii) Approved final copies of Field QPs, Field welding schedules and their reference document like test procedures, WPS, POR etc (Direct to Site)	4	2	
11	Welding Manual, Heat Treatment Manuals, Storage & preservation manuals i) For review/comment	1 set	--	
	ii) Approved copies (Direct to Site)	4 sets	2	
12	QA Documentation Package for items / equipment manufactured and despatched to site	2 sets	2	
13	QA Documentation Package for field activities on equipment/systems at site	2 sets	2	

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Note:

- Quantity of prints may change during detailed engineering stage based on BHEL / Customer requirement. However, the same will be adhered by the bidder without any delivery/commercial implication to BHEL.
- All the drawing documents along with the O&M manual (of all the revisions) are necessarily to be submitted in soft copies in addition to hard copies.
- Bidder to submit soft copies of all the drawing and document along with quality plans for BHEL review and approval.
- The date of submission of drawing documents shall be considered as the date of submission of hard and soft copies whichever is later.
- All the drawings shall be prepared on computer auto cad and other documents (like datasheet etc.) on MS office software. Bidder not complying to the requirement shall not be considered. For the execution of the contract regular meeting (generally once in 15 days or as per project requirement) is required.
- Bidder has to come for meeting with the concerned dealing persons as per BHEL or customer requirement in a short notice.
- Bidder to submit instrument schedule, cable schedule and valve schedule in MS- Excel format during detailed engineering.
- Bidder to also furnish the auto cad copy / MS-word (as applicable)/MS-Excel (as applicable) of the following documents after award of contract. However, any other auto cad copy/MS-Excel/MS-word of any other document as per the insistence of BHEL / customer will also be submitted by the bidder without any delivery/commercial implication to BHEL.
 - P&IDs.
 - Equipment lay out of the service vessel area and regeneration area.
 - Equipment Cable tray layout for service vessel area and regeneration area
 - Equipment earthing layout service vessel area and regeneration area
 - Civil scope drawings.
 - Piping lay out drawing for Service vessel area, regenerative area and yard piping layout.
 - Valve schedule.
 - Instrument schedule.
 - Any Other Dwg/Docs as required.

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ANNEXURE-V

MANDATORY SPARES FOR CONDENSATE POLISHING UNIT

S. N.	DESCRIPTION	UNIT	QTY
1.00.00	MECHANICAL-CPU		
1	SCREENS AND NOZZLES FOR UNDER DRAIN SYSTEM		
A)	ACTIVATED CARBON FILTER	%	15% OF AC FITTER VESSEL
B)	POLISHER SERVICE VESSEL	%	100% OF ONE VESSEL
2	UNDER DRAIN SYSTEM SCREENS, NOZZLES/ HEADERAL LATERAL/ANY OTHER TYPE USED FOR		
A)	CATION REGENERATION UNIT	SET	1 SET
B)	ANION REGENERATION UNIT	SET	1 SET
C)	MIXED RESIN STORAGE UNIT WHICHEVER APPLICABLE	SET	1 SET
3	ALL RESINS (CATION, ANION & INERT RESINS)	M3	ONE FULL CHARGE REQUIRED FOR ONE SERVICE VESSEL
2.00.00	ELECTRICAL		
A)	MOTORS	SET	1NO OF EACH TYPE AND RATING
B)	DM WATER REGENERATION PUMPS MOTOR AND MOTOR BEARING (IF APPLICABLE)	NO.	1NO
C)	ALKALI TRANSFER CUM RECIRCULATION PUMP MOTOR AND MOTOR BEARING (IF APPLICABLE)	NO.	1NO
D)	WASTE RECIRCULATION CUM DISPOSAL PUMPS MOTOR AND MOTOR BEARING (IF APPLICABLE)	NO.	1NO
E)	ACID UNLOADING PUMPS AND MOTOR BEARING	NO.	1NO
3.00.00	CONTROL & INSTRUMENTATION -CPU		
	MEASURING INSTRUMENTS		
1	ELECTRONIC TRANSMITTERS		
I)	TRANSMITTERS OF ALL TYPES AND MODEL. (FOR THE MEASUREMENT OF PRESSURE, DIFFERENTIAL PRESSURE, FLOW, LEVEL, ETC.) INCLUDING LOCAL INDICATION (IF APPLICABLE)	%	10 % OR 1 NO. OF EACH TYPE AND MODEL WHICHEVER IS MORE
2	TEMPERATURE ELEMENTS		
I)	TEMPERATURE TRANSMITTER	%	10 % OR 1 NO. OF EACH TYPE AND MODEL WHICHEVER IS MORE
II)	RTD'S*	NO.	1 NO. OF EACH TYPE
III)	THERMO WELL**	NO.	1 NO. OF EACH TYPE
	* (WITH HEAD ASSEMBLY, TERMINAL BLOCK AND NIPPLE) ** (TO BE DIVIDED INTO VARIOUS INSERTION LENGTHS IN PROPORTION TO MAIN POPULATION)		
3	LOCAL INDICATORS (NON-ELECTRICAL TYPE) -AS APPLICABLE FOR THE PACKAGE AS PER THE FOLLOWING ITEMS		
I)	TEMPERATURE GAUGES	NO.	1 NO. OF EACH RANGE AND TYPE
II)	PRESSURE GAUGES	NO.	1 NO. OF EACH RANGE AND TYPE
III)	DIFFERENTIAL PRESSURE GAUGES	NO.	1 NO. OF EACH RANGE

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			AND TYPE
IV)	LEVEL GAUGES	NO.	1 NO. OF EACH RANGE AND TYPE
V)	FLOW GAUGES EXCLUDING ROTAMETERS	NO.	1 NO. OF EACH RANGE AND TYPE
VI)	ALL TYPES OF ROTAMETERS	NO.	1 NO. OF EACH RANGE AND TYPE
4	PROCESS ACTUATED SWITCH DEVICES -AS APPLICABLE FOR THIS PACKAGE,AS PER THE FOLLOWING ITEMS		
I)	TEMPERATURE SWITCHES	NO.	1 NO. OF EACH RANGE AND TYPE
II)	PRESSURE SWITCHES	NO.	1 NO. OF EACH RANGE AND TYPE
III)	DIFFERENTIAL PRESSURE SWITCHES	NO.	1 NO. OF EACH RANGE AND TYPE
IV)	LEVEL SWITCHES	NO.	1 NO. OF EACH RANGE AND TYPE
V)	FLOW SWITCHES	NO.	1 NO. OF EACH RANGE AND TYPE
5	SOLENOID VALVES	%	10 % OR 1 NO. OF EACH TYPE AND MODEL WHICHEVER IS MORE
6	LIMIT SWITCHES (FOR PNEUMATIC VALVES AND MANUAL VALVES)	NO.	2 NO. OF EACH TYPE
7	ANALYSERS		
I)	PH ANALYZER		
A)	FLOW THROUGH TYPE CELL AND ELECTRODE	NO.	1 NO. OF EACH TYPE
B)	ELECTRONIC TRANSMITTER UNIT WITHOUT SENSOR	NO.	1 NO. OF EACH TYPE
C)	PRE-FABRICATED CABLE WITH CONNECTOR	SET	1 SET
II)	CONDUCTIVITY ANALYZER		
A)	FLOW THROUGH TYPE CELL AND ELECTRODE	NO.	1 NO OF EACH TYPE
B)	ELECTRONIC TRANSMITTER UNIT WITHOUT SENSOR	NO.	1 NO OF EACH TYPE
C)	PRE-FABRICATED CABLE WITH CONNECTOR	SET	1 SET
III)	SODIUM ANALYZER		
A)	MAIN PCB ASSEMBLY	NO.	1 NO OF EACH TYPE
B)	POWER SUPPLY CARDS (IF APPLICABLE)	NO.	1 NO OF EACH TYPE
C)	RUBBER TUBES & CAPILLARY TUBES	SET	1 SET
D)	PRE-FABRICATED CABLE WITH CONNECTOR	SET	1 SET
E)	SOLENOID VALVES	SET	1 SET
F)	ALL CHEMICAL REAGENTS FOR 12 MONTH OPERATION (SUPPLY TO BE STAGGERED AS PER THE SHELF LIFE)	SET	1 SET
IV)	SILICA ANALYSER (IF APPLICABLE)		
A)	MAIN PCB ASSEMBLY	NO.	1 NO OF EACH TYPE
B)	POWER SUPPLY CARDS(IF APPLICABLE)	NO.	1 NO OF EACH TYPE
C)	RUBBER TUBES & CAPILLARY TUBES	SET	1 SET
D)	PRE-FABRICATED CABLE WITH CONNECTOR	SET	1 SET
E)	SOLENOID VALVES	SET	1 SET
F)	ALL CHEMICAL REAGENTS FOR 12 MONTH OPERATION (SUPPLY TO BE STAGGERED AS PER THE SHELF LIFE)	SET	1 SET
V)	DISSOLVED O2 ANALYSERS (IF APPLICABLE) - SIMILAR SPARES AS ABOVE ANALYSERS		
VI)	TURBIDITY ANALYSERS (IF APPLICABLE) - SIMILAR SPARES AS ABOVE ANALYSERS		
4.00.00	PROCESS CONNECTION PIPING (FOR IMPULSE PIPING/TUBING,SAMPLING PIPING/TUBING AND AIR SUPPLY PIPING AS APPLICABLE)		
1	2 WAY, 3WAY, 5WAY VALVE MANIFOLDS	NO.	1 NO.OF EACH

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			TYPE, CLASS, SIZE AND MODEL
2	FILTER REGULATOR (IF APPLICABLE)	NO.	1 NO. OF EACH TYPE, CLASS, SIZE AND MODEL
5.00.00	CONTROL VALVES, ACTUATORS AND ACCESSORIES		
1	PNEUMATIC AND ELECTRO-HYDRAULIC ACTUATOR ASSEMBLY	NO.	10% OR 1 NO. OF EACH TYPE, MODEL AND RATING, WHICHEVER IS MORE.
2	DIAPHRAGMS, O' RINGS, SEALS ETC. OF ALL TYPES MAKE ETC.	NO.	100%
3	PRESSURE GAUGES OF ALL TYPES, MAKE, RATING ETC.	NO.	10% OR 2 NOS. OF EACH TYPE WHICHEVER IS MORE
4	SOLENOID VALVES (IF APPLICABLE)	NO.	10% OR 2 NOS. OF EACH TYPE WHICHEVER IS MORE
5	POSITIONER UNITS /SMART POSITIONERS (COMPLETE UNIT) & ACCESSORIES (LINK ASSEMBLY)	NO.	10% OR 1 NO. OF EACH TYPE WHICHEVER IS MORE
6	PNEUMATIC AIR-FILTER/ REGULATOR OF EACH TYPE, MAKE RATING ETC.	NO.	10% OR 2 NOS., WHICHEVER IS MORE
7	AIR LOCK RELAYS	NO.	10% OR 2 NOS. OF EACH TYPE WHICHEVER IS MORE
5.00.01	PNEUMATICALLY OPERATED ISOLATION / BLOCK VALVES, ACTUATORS & ACCESSORIES (FOR ALL ON/OFF VALVES SUPPLIED UNDER THIS PACKAGE EVEN IF ONE OR MORE OF THESE ITEMS ARE ALSO SPECIFIED ELSEWHERE UNDER MANDATORY SPARES)		
1	PNEUMATIC ACTUATOR ASSEMBLY.	NO.	10% OR 1 NO. OF EACH TYPE, MODEL AND RATING, WHICHEVER IS MORE.
2	DIAPHRAGMS, O' RINGS, SEALS ETC. OF ALL TYPES MAKE ETC.	NO.	100%
3	LIMIT SWITCHES (COMPLETE UNIT)& ACCESSORIES (LINK ASSEMBLY)	NO.	10% OR 2 NOS., WHICHEVER IS MORE
4	PNEUMATIC AIR-FILTER/REGULATOR OF EACH TYPE, MAKE RATING ETC.	NO.	10% OR 2 NOS., WHICHEVER IS MORE

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Notes:

- 1) Mandatory spare requirements of Valves and specialties for power cycle piping systems specified above does not include items/valves/specialties which are already specified/ covered elsewhere in this Technical specification for mandatory spare requirement.
- 2) Wherever complete valve assembly as mandatory spare has been specified above for power cycle piping, it shall include complete gear operator/ box assembly which forms part of original valve assembly / supply.
- 3) Mandatory spares for valve actuators (for Pneumatically & Electrically operated valves) shall be supplied as per actuator quantity/details specified elsewhere in this technical specification for mandatory spare requirement.
- 4) Mandatory spare requirement for complete valve assembly above 50NB in power cycle piping systems shall include Gate valve, Globe valve, check valve, safety valve, relief valve, safety relief valve, Angle valve, butterfly valve etc.
- 5) In case the quantity of mandatory spares so calculated happens to be a fraction, the same shall be rounded off to next higher whole number. For example, 10% of 11 is equal to 1.1, then it should be rounded as 2 instead of 1.
- 6) Identification: Each spare shall be clearly marked and labelled on the outside of the packing with its description. When more than one spare part is packed in single case, a general description of the contents shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.

CLAUSE NO.		MANDATORY SPARES 		
1.00.00	SPARES The Bidder shall include in his scope of supply all the necessary Mandatory spares, start up and commissioning spares and recommended spares and indicate these in the relevant schedules of the Bid Form and Price Schedules. The general requirements pertaining to the supply of these spares is given below:- 1.01.00 MANDATORY SPARES (a) The list of mandatory spares considered essential by the Employer is indicated in this chapter. The bidder shall indicate the prices for each and every item (except for items not applicable to the bidders design) in the 'Schedule of mandatory Spares' whether or not he considers it necessary for the Employer to have such spares. If the bidder fails to comply with the above or fails to quote the price of any spare item, the cost of such spares shall be deemed to be included in the contract price. The bidder shall furnish the population per unit of each item in the Bid Forms and Price Schedules. Whenever the quantity is mentioned in "sets" the bidder has to give the item details and prices of each item. (b) The Employer reserves the right to buy any or all the mandatory spares parts. (c) The prices of mandatory spares indicated by the Bidder in the Bid Proposal sheets shall be used for bid evaluation purposes. (d) All mandatory spares shall be delivered at site at least two months before scheduled date of initial operation of the first unit. However, spares shall not be dispatched before dispatch of corresponding main equipments. (e) Wherever quantity is specified both as a percentage and a value, the Bidder has to supply the higher quantity until and unless specified otherwise. 1.02.00 RECOMMENDED SPARES (a) In addition to the spare parts mentioned above, the contractor shall also provide a list of recommended spares for 3 years of normal operation of the plant and indicate the list and total prices in relevant schedule of the Bid Form and Price Schedules. This list shall take into consideration the mandatory spares specified in this Section-VI, Part-A and should be independent of the list of the mandatory spares. The Employer reserves the right to buy any or all of the recommended spares. The recommended spares shall be delivered at project site at least two months before the			
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CLAUSE NO.	MANDATORY SPARES 
	scheduled date of initial operation of first unit. However, the spares shall not be dispatched before the dispatch of the main equipment. (b) Price of recommended spars will not be used for evaluation of the bids. The price of these spars will remain valid upto 6 months after placement of Notification of Award for the main equipment. However, the Contractor shall be liable to provide necessary justification for the quoted prices for these spares as desired by the Employer.
1.03.00	START-UP & COMMISSIONING SPARES Start-up and commissioning spares are those spares which may be required during the start-up and commissioning of the equipment/system. All spares used till the plant is handed over to the employer shall come under this category. The Contractor shall provide for an adequate stock of such start up and commissioning spares to be brought by him to the site for the plant erection and commissioning. They must be available at site before the equipments are energized. The unused spares, if any, should be removed from there only after the issue of Taking Over certificate. All start up spares which remain unused at the time shall remain the property of the Contractor.
1.04.00	The Bidder shall include in his scope of supply all the necessary Mandatory spares, start up and commissioning spares and recommended spares and indicate these in the relevant schedules of the Bid Form and Price Schedules. The general requirements pertaining to the supply of these spars is given below.
2.00.00	The Contractor shall indicate the service expectancy period for the spares parts (both mandatory and recommended) under normal operating conditions before replacement is necessary.
3.00.00	All spares supplied under this contract shall be strictly inter changeable with the parts for which they are intended for replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site e.g. small items shall be packed in sealed transparent plastic with desecrator packs as necessary.
4.00.00	All the spares (both recommended and mandatory) shall be manufactured alongwith the main equipment components as a continuous operation as per same specification and quality plan.
5.00.00	The contractor will provide Employer with cross-sectional drawings, catalogues, assembly drawings and other relevant documents so as to enable the Employer to identify and finalise order for recommended spares.
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CLAUSE NO.	MANDATORY SPARES		
6.00.00	Each spares part shall be clearly marked or labelled on the outside of the packing with its description. When more than one spares part is packed in a single case, a general description of the content shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purposes of identification.		
7.00.00	All cases, containers or other packages are to be opened for such examination as may be considered necessary by the Employer.		
8.00.00	The contractor will provide the Employer with all the addresses and particulars of his sub suppliers while placing the order on vendors for items/components/equipments covered under the contract and will further ensure with his vendors that the Employer, if so desires, will have the right to place order for spares directly on them on mutually agreed terms based on offers of such vendors.		
9.00.00	The Contractor shall warrant that all spares supplied will be new and in accordance with the contract Documents and will be free from defects in design, material and workmanship.		
10.00.00	In addition to the recommended spares listed by the contractor, if the employer further identifies certain particular items of spares, the contractor shall submit the prices and delivery quotation for such spares within 30 days of receipt of such request with a validity period of 6 months for consideration by the Employer and placement of order for additional spares if the Employer so desires.		
11.00.00	The Contractor shall guarantee the long term availability of spares to the Employer for the full life of the equipment covered under the contract. The Contractor shall guarantee that before going out of production of spares parts of the equipment covered under the Contract, he shall give the Employer atleast 2 years advance notice so that the latter may order his bulk requirement of spares, if he so desires. The same provision will also be applicable to sub-contractors. Further, in case of discontinuance of manufacture of any spares by the Contractor and/or his sub contractors, Contractor will provide the Employers, two years in advance, with full manufacturing drawings, material specifications and technical information including information on alternative equivalent makes required by the Employer for the purpose of manufacture/procurement of such items.		
12.00.00	Material Codification The bidder to provide datasheets/ assembly drawings of the manufacturer/ any other relevant document showing Bill of Material(s), Make, Model Number, Part Number etc. through which mandatory spares to be supplied can be uniquely identified. This would facilitate the Employer to assign a unique code to each of the mandatory spare as brought out in GCC. The bidder shall extend all necessary assistance in this regard.		
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CLAUSE NO.	 MANDATORY SPARES 
13.00	In case spares indicated in the list are not applicable to the particular design offered by the bidder, the bidder should offer spares applicable to offered design with quantities generally in line with the approach followed in the lists of mandatory spares.
14.00	Interchangeability and Packings: All spares supplied under this contract shall be strictly interchangeable with parts for which they are intended for replacements. These spares should include all mounted accessories like components, boards, add or items, fitting, connectors etc. and be complete in all respects so that the replacement of the main items by these spares does not require any additional item. The vendors must conform the pair to pair compatibility of each electrical spares modules with the modules should be supplied in the original package. All electronic modules should be preset and/or preprogrammed for ready use at site. Alternatively, suitable instruction sheet indicating the details of required PCB jumper position, BCD which is setting, EPROM/PROM listing etc should be packed along with each module. Also a caution mark sign should be put on all such module which needs pre setting/pre programming before putting them in to service. The spare shall be treated and properly packed for long term storage
15.0	Identification: Each spare shall be clearly marked and labeled on the outside of the packing with its description. When more than one spare part is packed in single case, a general description of the contents shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purpose of identification.
16.0	Wherever the quantity is given only in percentage, the spare quantity shall be distributed into various ranges/size/rating/type (as the case may be) in the same proportion of the main population. The percentage shall be taken for the full population of the plant, unless otherwise mentioned. For the quantities coming less than 1, shall be treated as 1 only.
17.0	If the same spare(s) is appearing at two different places, spare has to be considered at only one place, in order to avoid any duplicity.
KHURJA SUPER THERMAL POWER PROJECT (2X660 MW) TURBINE GENERATOR AND ASSOCIATED PACKAGES TECHNICAL SPECIFICATION SECTION-VI, PART-A BID DOC NO.: THDC/RKSH/CC-9915-371 MANDATORY SPARES PAGE 4 OF 59	

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Annexure - VI

OPERATION AND MAINTENANCE SERVICES

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1.0 OPERATION AND MAINTENANCE SERVICES

The bidder scope also covers the Operation and Maintenance (O&M) services for Preventive and Breakdown maintenance from the date of successful commissioning till handing over. The date of start of O&M services shall be communicated to successful bidder by BHEL site personnel.

Bidder to note that the spares and consumables (except regeneration chemicals i.e. HCL & NaOH) required for maintenance of the equipment during this O&M period shall be in bidder's scope of supply. Bidder shall use only genuine parts as mentioned in O&M Manual. Any damage or malfunction caused by the use of unauthentic parts or unqualified personnel shall be responsibility of bidder and as a consequence of above bidder is required to replenish the unauthorised part and abridge the qualified person without any commercial implication to BHEL.

O&M Services scope also covers all regular maintenance by trained service engineers and supply of genuine parts and lubricants as per the original equipment manufacturer's recommendations.

For the purpose of Operation of CPU System, One-day shall be considered as 24 hours i.e. 3 shifts of 8 hours each. The CPU (along with related accessories) shall be operated on Round-the-clock basis on all the days of the year including Sundays and Public Holidays meeting outlet guarantee parameter along with service run as defined in Section IA Clause No. 4.

O & M Personnel should be acquainted with local language. Governmental / Statutory approval w.r.t. O&M service as applicable shall be in bidder's scope.

Total duration of the Operation and Maintenance services has been envisaged for twelve (12) months for complete Condensate Polishing Unit identified in price format/specification. The duration of operation & maintenance services can be increased or decreased as per requirement and payment in such case shall be made on pro-rata basis.

The operation and maintenance services can be continuous or intermittent as per site requirement for complete Condensate Polishing Unit identified in price format/specification.

Bidder has to compulsorily maintain log book for the O & M staff engaged for O&M jobs and submit to Engineer in charge for certification for realization of the bills. After certification of the bill by Engineer in charge of BHEL, bidder shall claim the amount after completion of minimum 30 days.

Depending on start of O&M services, there is a possibility that some period of O&M services and Warranty period may overlap. **However, it is clarified that any maintenance required or any spare of CPU System required to be replaced during Warranty period (as**

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part of warranty clause requirement) shall not be made part of O&M Services. Bidder may take care of this fact while working out the prices of O&M services.

Wherever CPU (Condensate Polishing Unit) has been written in O&M Service Specification, the same shall be deemed as complete CPU (Condensate Polishing Unit) with Regeneration Facility.

The vendor shall deploy following minimum manpower for Operation of CPU.

- i. One qualified and experienced CPU operator per shift on "Round the Clock" basis throughout the year for all days of the year including Sundays & Public Holidays. There must be minimum 30 minutes overlapping between two shift operators to get familiarize with the status of CPU.
- ii. Two Helper per shift on " Round the Clock" basis throughout the year for all the days of the year including Sundays and Public Holidays. The helper shall assist the CPU Operator in day to day operation of CPU and accessories and shall assist him for keeping CPU equipment's in neat and tidy condition.
- iii. Wages of all manpower deployed for O&M shall be borne by bidder.

1.1 Responsibility of CPU Operator

- i. CPU operator shall be responsible for proper sequential operation of CPU including operation of standby equipment in a predefined sequence and stopping the same (when necessary) as per the procedural practice. In case of any abnormality (like non availability of power supply at incomer of CPU), he shall immediately report the matter to BHEL site Engineer for further action. Similarly, any malfunctioning in the system shall be immediately resolved by CPU operator with suitable corrective action irrespective of time of occurrence of malfunctioning / abnormality in the system in consultation with BHEL site Engineer. A log book of all such outrages shall be maintained by CPU operator, which shall be shared with BHEL site engineer on periodic basis.
- ii. CPU operator shall take reading of all the parameters of CPU periodically as per requirement which shall be mutually discussed and finalised with BHEL site engineer. However, the frequency of taking the reading may change based upon instruction from BHEL site Engineer. All the readings shall be recorded in a logbook register.

1.2 Responsibility of Helper.

- i. The CPU helper shall assist CPU operator for day to day smooth operation of CPU. He shall be responsible for keeping all the equipment's of CPU in clean and tidy condition. He shall also carry out general cleaning of all CPU equipment's including Electrical & Control Panels (Part of CPU), etc. on regular basis.

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- ii. The helper shall work under the control of CPU operator and shall always ensure that unusable junk materials are not allowed to be kept in CPU area. Under such eventuality, he will report the matter to Plant Operator, who in turn will take suitable action including reporting the matter to BHEL site Engineer.

1.2.1 All the log book registers shall be arranged by vendor. Log book register duly paged and bounded will be maintained in good condition by vendor.

1.2.2 All the necessary tools & tackles and other materials, required for operation of CPU shall be kept by vendor under the control of CPU operator, which shall be handed over to customer in new condition. Required testing instruments should also be always available with Plant Operator.

1.2.3 In case of any operator / helper being on leave, vendor shall immediately take advance action and provide substitution so that minimum manpower as indicated above is not reduced on any day. In case a particular shift duty CPU Operator or helper does not turn up due to any reasons, the earlier duty person shall continue to make sure that CPU never remains unattended.

2.0 Maintenance of CPU

- i. Maintenance work under scope of the vendor shall broadly include but in no way limited to the following:
 - a) Preventive maintenance of the plant.
 - b) Servicing of the CPU and associated equipment's at regular interval
 - c) Attending to complaints.
 - d) Replacement of worn out or defective components
 - e) Replacing of consumables like greases, oil, lubricants, servo fluids/control fluids, gases, reagents for analysers and etc as and when required.

No consumable or any other items of CPU shall be arranged by Customer & BHEL and no extra payment shall be made by customer & BHEL in this regard.

- ii. Vendor shall be responsible at all time, during the entire period of contract for satisfactory performance of CPU (including accessories) with zero down time. During emergency or breakdown, vendor's Engineer along with related technicians shall be available immediately even though it may be beyond normal working hours or on public holidays till the CPU is restored back into normal satisfactory condition. Response time for attending breakdown complaints shall not exceed 2 hours.

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iii. Defective / worn out components shall be replaced only by genuine and original parts. OEM or its authorized dealer's invoice shall be submitted as proof of using genuine parts. All common spares required for CPU shall normally be kept available in the plant by the vendor. However, for critical spares, the same shall be made available in not more than 72 hours from the time of break-down requiring such spare.

iv. Preventive Maintenance, servicing of CPU equipment’s and accessories etc. shall be done by vendor in a planned manner in consultation with concerned BHEL engineer. Preventive maintenance and service should be done as per the recommendations / guidelines of various OEMs

v. Vendor shall arrange and maintain separate logbook register for services / maintenance of CPU. Record of work done for services/maintenance repairs etc. shall be recorded by vendor’s engineer in this register. This register shall always be with updated records & shall be produced to BHEL engineer on weekly basis or as & when required by him.

vi. Vendor shall arrange and maintain sufficient stock of spares and consumable at site. Similarly, all necessary tools & instruments required for the purpose of servicing / maintenance / routine testing etc. shall also be arranged by vendor and should be available at site at all times.

vii. Repairs / servicing works shall normally be done by vendor at site up to maximum possible extent. However, in case any equipment or accessories is essentially required to be taken by vendor out of the plant premises for repairing / servicing, all necessary arrangements including to and fro transportation shall be the responsibility of vendor. Vendor shall also inform concerned BHEL & customer’s engineer for doing procedural formalities (like issue of gate pass etc.), prior to taking out the materials out of Plant premises.

viii. In case bidder fails to supply the spares required for maintenance of the equipment, same shall be provided by BHEL at Bidders risk and cost.

ix. Vendor shall be fully responsible for safety of his personal at all times. Vendor shall also be responsible for taking all safety precautions at all the times, especially during servicing / preventive maintenance and repairs of CPU.

x. Technicians & helpers engaged by the vendor shall wear uniform with nameplate for easy identification, while being within plant premises

xi. Vendor's engineer shall be focal point for BHEL & customer. He shall report to BHEL engineer on daily basis, for taking necessary instructions and to update the status of CPU

xii. If any damage to the equipment and its accessories has happened due to improper maintenance by bidder, same shall be recovered from the bidder.

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xiii. Bidder is to arrange all the safety gears like helmets, air plugs, safety shoes, googles, Personal Protection Equipment (PPE)] comprising PVC protection suits with hoods, rubber boots, face visors and thick PVC gauntlets shall also be provided by bidder etc. during the maintenance for the O&M Staff. The safety items are only over and above the safety items as included in safety items included in Section IA datasheet A.

xiv. Fabrication and erection of platform/extra support for maintenance of any type of CPU equipment, if felt necessary during operation and maintenance of the system, has to be done by the bidder.

Notes:

1. The bidder shall take approval from Engineer-in charge of BHEL by submitting organization Chart of O&M staff for this site clearly indicating man power deployment with their educational background & experience with supporting documents.
2. The bidder shall be solely and wholly responsible for safety and security of workers engaged in the job and the BHEL property. In case of any accident the contractor shall pay proper compensation to the workers as per workmen’s compensation act and repair/replace BHEL property at their own cost & arrangement. The bidder shall also make adequate provision of insurance for their workers at their own cost to cover them against the risk of accident.
3. The bidder and their workers engaged in the job shall follow all safety rules at the time of execution of work. It shall be responsibility of the bidder to supply all safety equipment as necessary to its O&M staff.
4. Beyond general shift if any trouble/breakdown occurs in the plant, Maintenance team must reach the plant without any delay along with Engineer/Site In-charge.
5. No Person from the list of manpower shall leave the plant site without prior permission from the Engineer in charge of BHEL.
6. However, in operation part, if any person is absent, substitute must be given immediately otherwise proportionate deduction will be made.
7. The replacement / substitute personnel for maintenance, manpower shall have the same educational qualification and experience.
8. If any additional manpower is required during O&M whatsoever under the scope of contract the same shall be made available by bidder in time within the cost. To cater the need of time bound maintenance jobs, the bidder shall depute additional manpower without any cost implication to BHEL
9. During execution of work if any personnel is found not suitable for the job or his presence inside premises is felt undesirable, the personnel has to be replaced within 15 days by bidder.
10. BHEL will not be responsible for payment towards idle labour charges
11. Power Cost during O&M period shall not be the part of bidder's scope.

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Statutory Compliance by the bidder:

All Statutory compliances related to Labour, Health & Safety, Quality & Environment protection and insurance shall be as GCC Rev-07.

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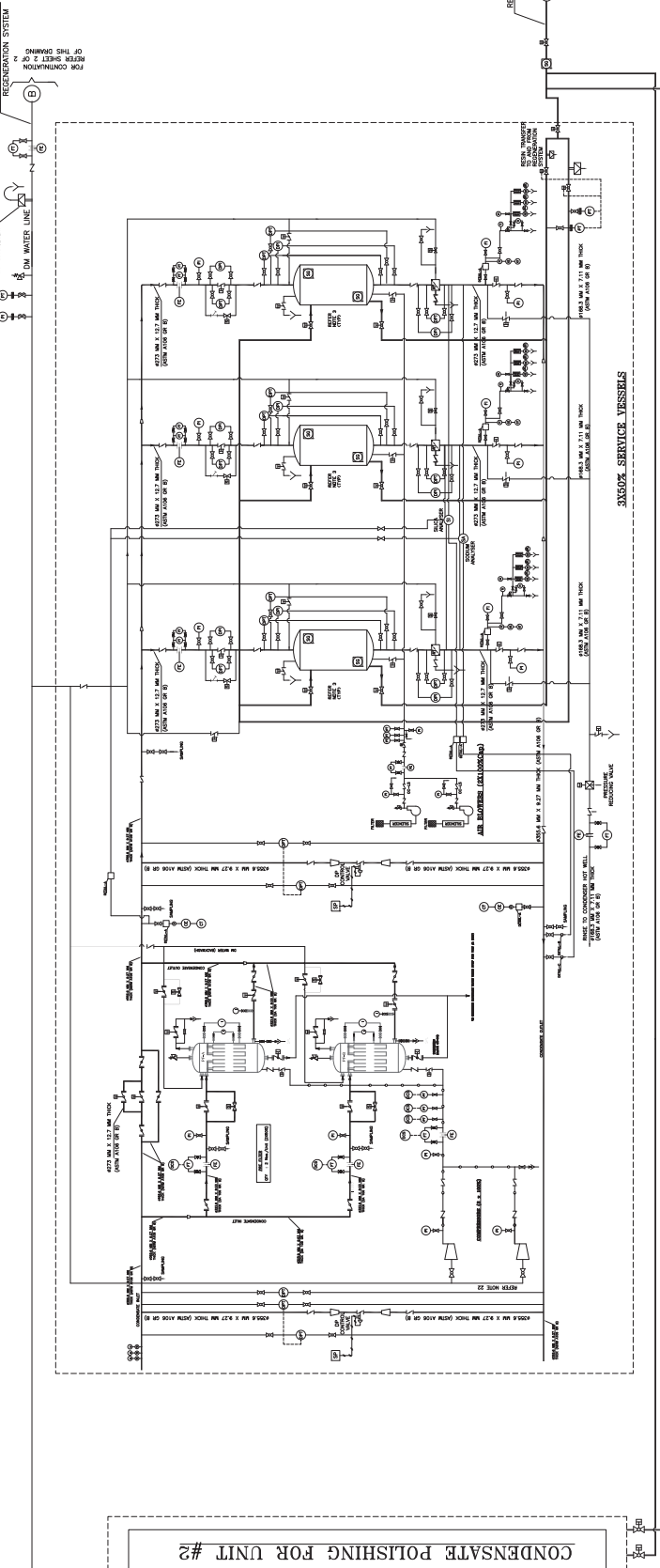
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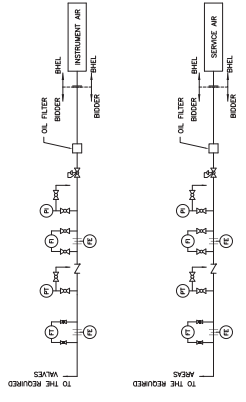
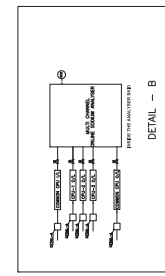
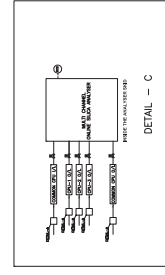
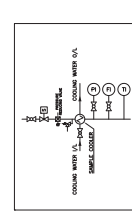
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DRAWINGS



CONDENSATE POLISHING FOR UNIT #1 (TYPICAL)



LEGEND

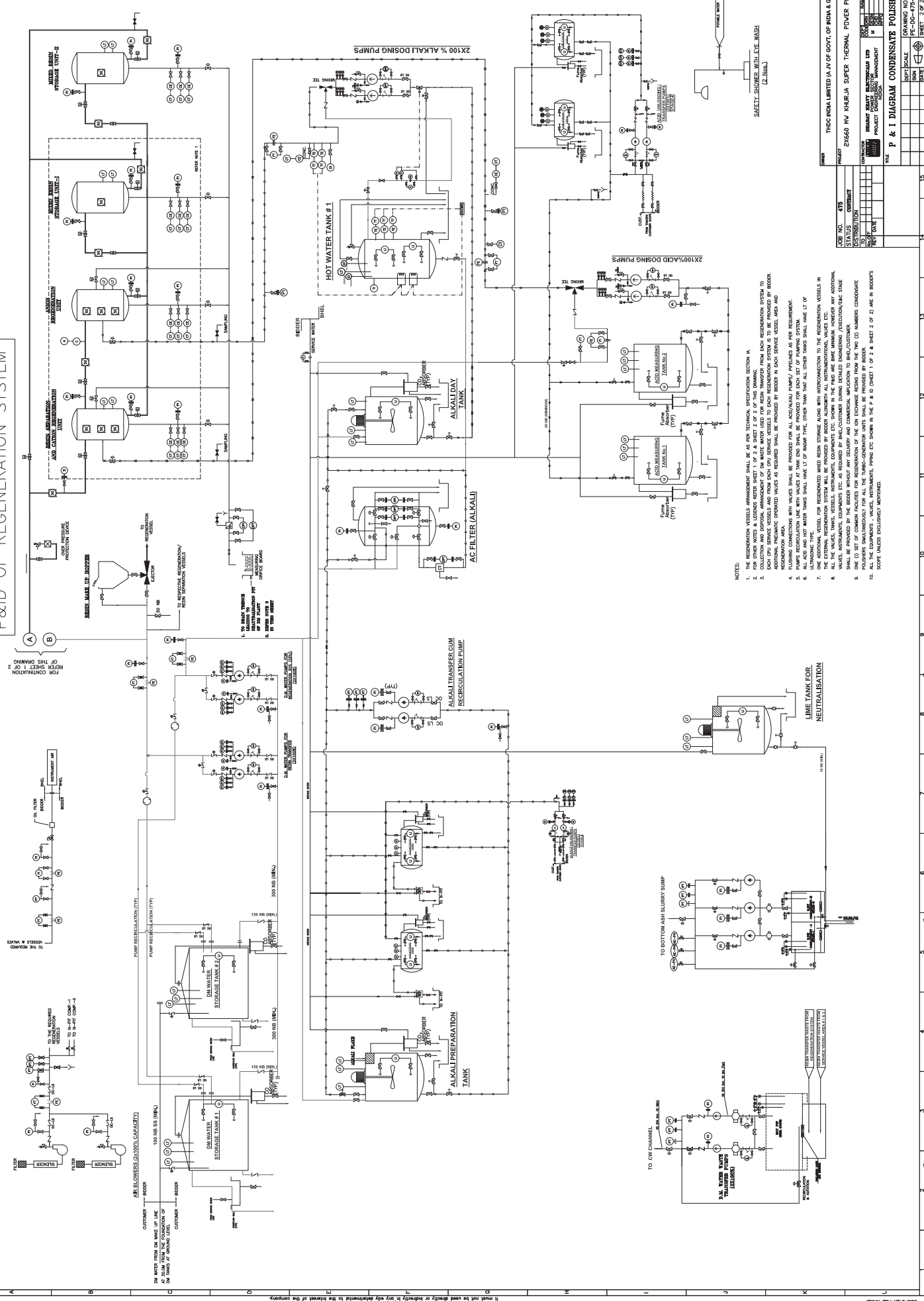
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	BLOWER		CONTROL SYSTEM		FLOW ELEMENT
	PRIMING CHAMBER		LEVEL INDICATOR		CONDUCTIVITY TRANSMITTER (SP)
	PUMP		LEVEL TRANSMITTER		DENSITY INDICATOR
	BALL VALVE		PRESSURE SWITCH		PRESSURE INDICATOR (LOCAL)
	PLUG VALVE		PRESSURE TRANSMITTER		SAMPLE COOLER
	GLOBE VALVE		PRESSURE SWITCH (Pressure Breakdown)		ONLINE SODIUM ANALYSER
	DRAIN VALVE		PRESSURE REDUCING VALVE		ONLINE SILICA ANALYSER
	DRAIN VALVE		PRESSURE RELIEF VALVE		SMART POSITIONER
	DRAIN VALVE		NON RETURN VALVE		OPEN CLOSE LIMIT SWITCH
	DRAIN VALVE		ACID SOLUTION LINE		TEMPERATURE TRANSMITTER
	DRAIN VALVE		ALKALI SOLUTION LINE		TEMPERATURE INDICATOR (LOCAL)
	DRAIN VALVE		RESIN TRAP		TEMPERATURE TRANSMITTER
	DRAIN VALVE		RESIN TRANSFER LINE		TEMPERATURE INDICATOR (LOCAL)
	DRAIN VALVE		SIGHT GLASS		TEMPERATURE TRANSMITTER
	DRAIN VALVE		DOUBLE ACTING PNEUMATIC OPERATOR		TEMPERATURE INDICATOR (LOCAL)
	DRAIN VALVE		PNEUMATICALLY OPERATED VALVE		FLOW INDICATOR
	DRAIN VALVE		Y-TYPE STRAINER		FLOW TRANSMITTER
	DRAIN VALVE		ORIFICE PLATE		FLOW TRANSMITTER

PROJECT	THDC INDIA LIMITED (A JV OF GOVT. OF INDIA & GOVT. OF HP)
STATUS	CONTRACT
DISTRIBUTION	26660 MW KHEJA SUPER THERMAL POWER PROJECT
REVISION	
DATE	
BY	
CHECKED	
APPROVED	
PROJECT MANAGER	
DESIGNER	
DRAWN	
SCALE	
SHEET NO.	
SHEET TOTAL	

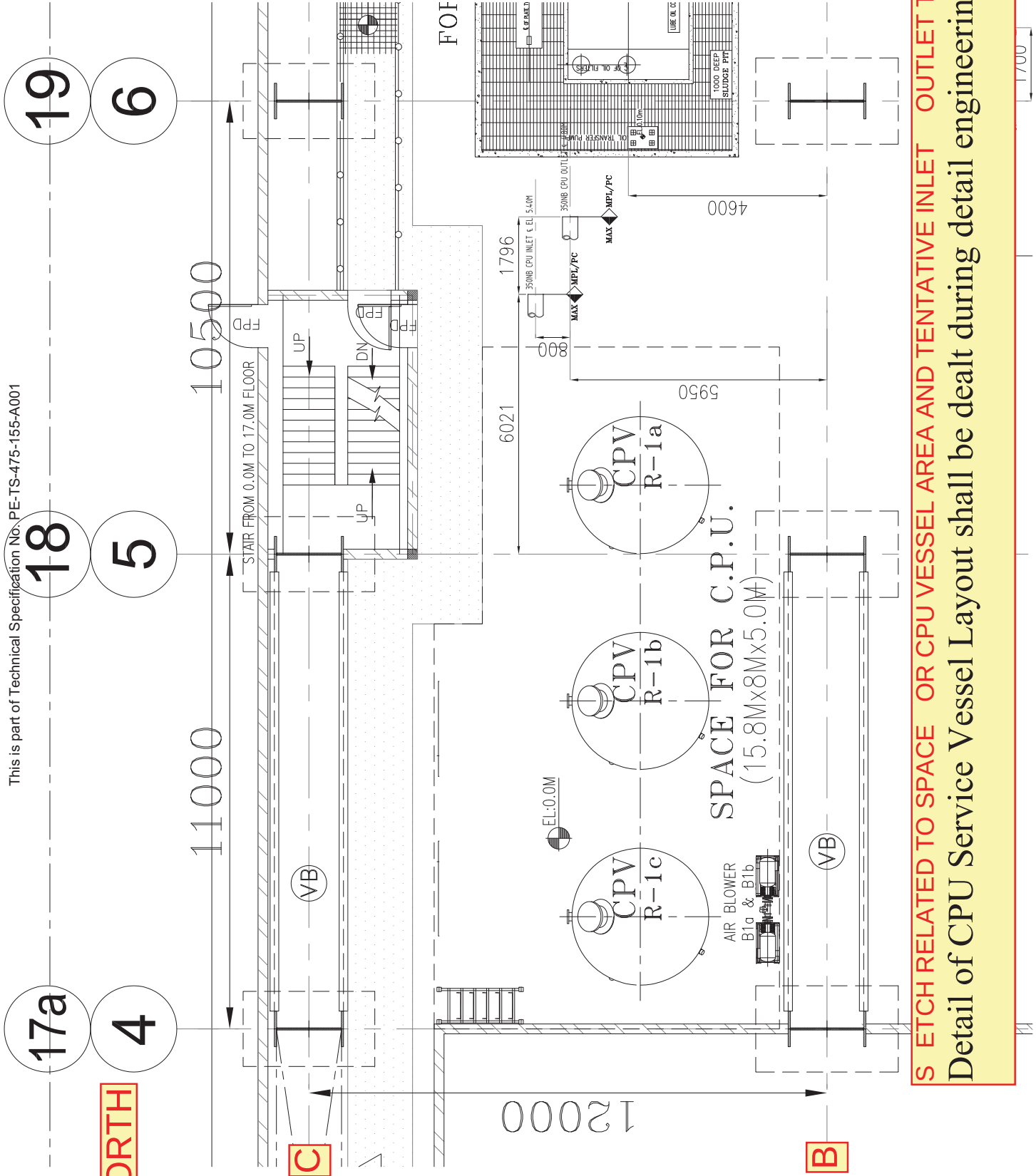
THE P & I DIAGRAM CONDENSATE POLISHING PLANT
PC-004-750-155A-A001
REV. 1 OF 2
REV. 00

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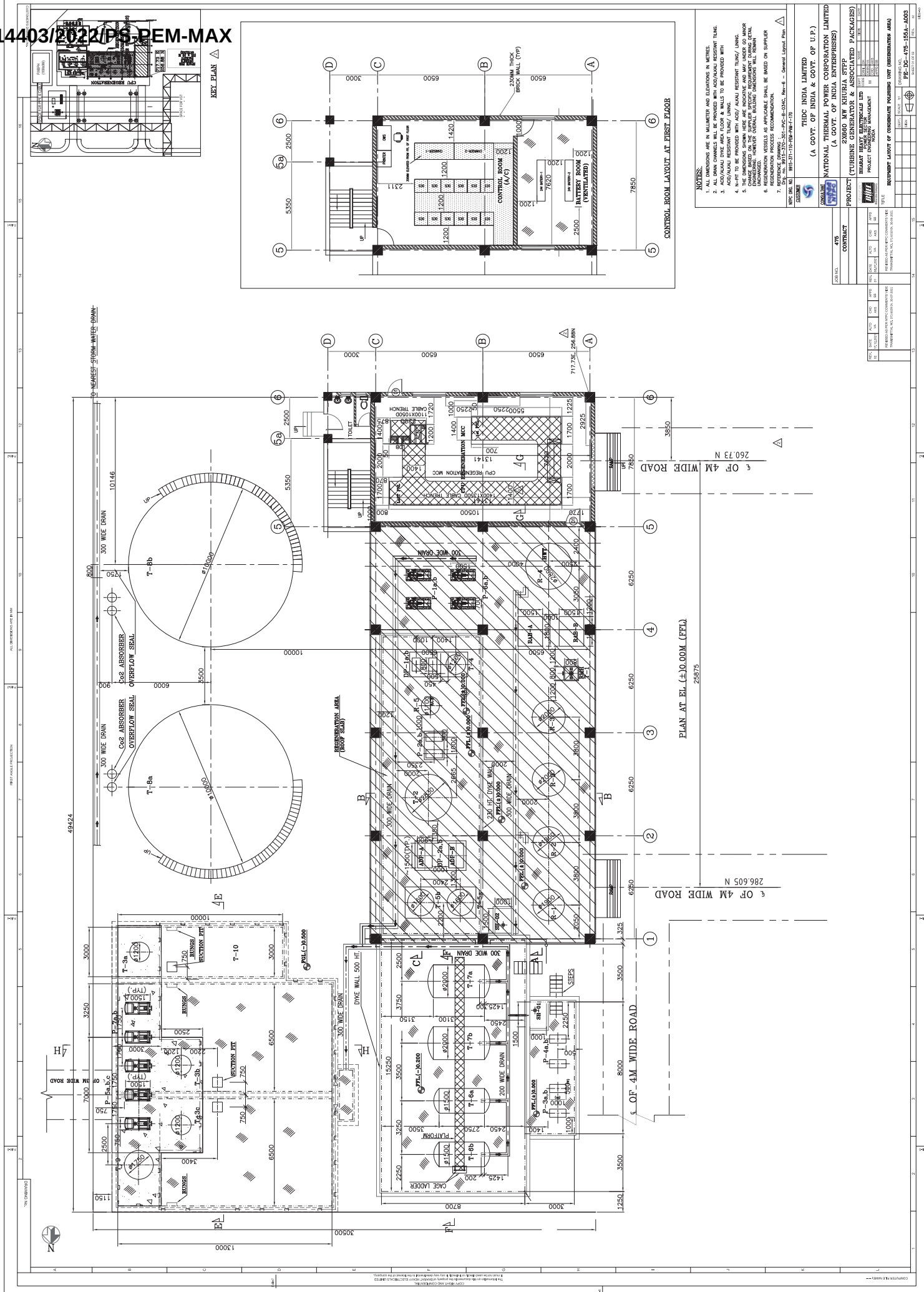
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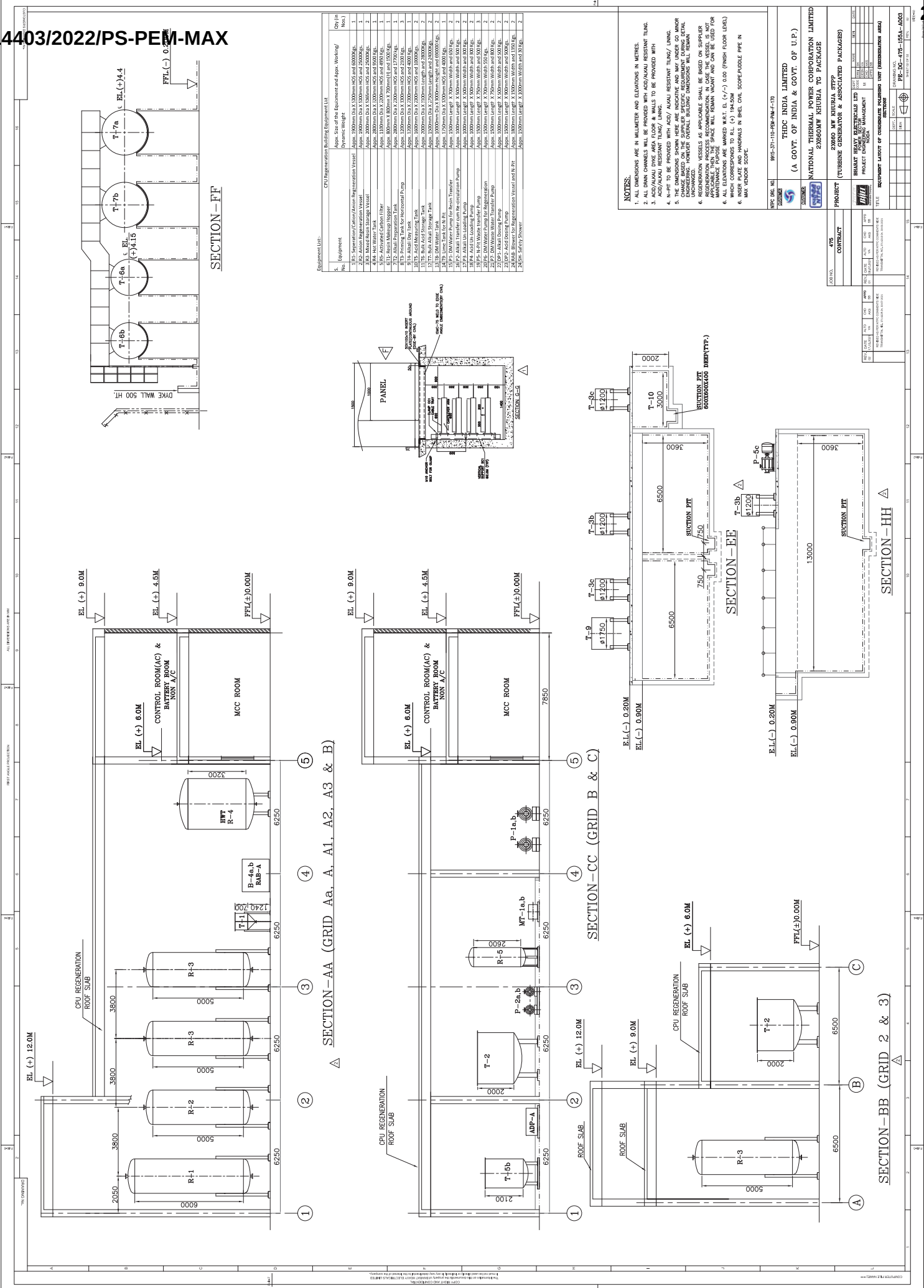
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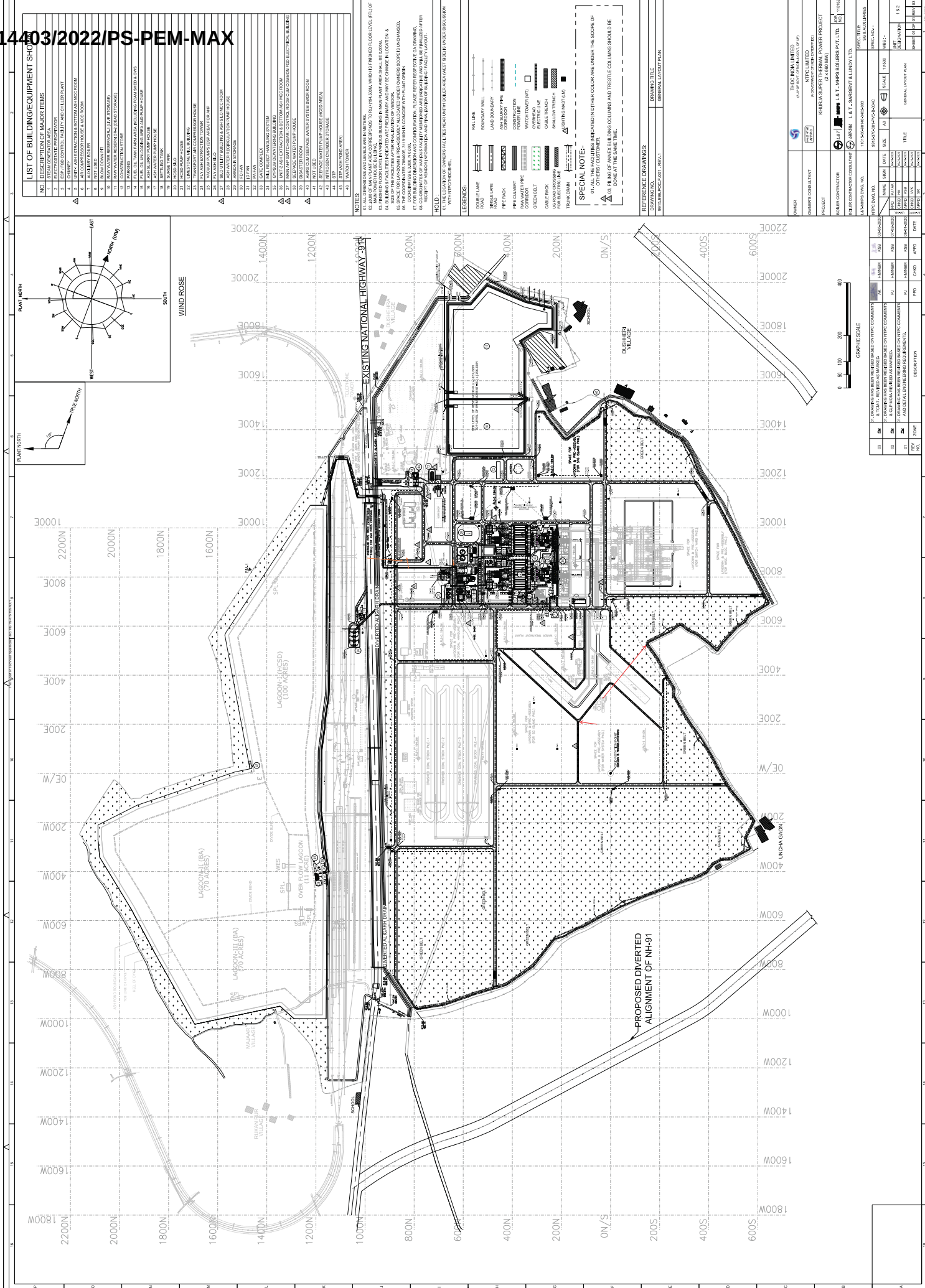
This is part of Technical Specification No. PE-TS-475-155-A001



SKETCH RELATED TO SPACE OR CPU VESSEL AREA AND TENTATIVE INLET OUTLET TP
Detail of CPU Service Vessel Layout shall be dealt during detail engineering.







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DATA SHEET-A

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1.0	DESCRIPTION OF TURBO GENERATOR UNIT (TG) FOR WHICH CONDENSATE POLISHING IS TO BE PROVIDED :	
(i)	No. of units	Two (2)
(ii)	Capacity of unit	660 MW
(iii)	Total flow in all the service vessels (per unit)	1346 Tones per hour
2.0	CONDENSATE POLISHER SERVICE VESSELS PER UNIT :	
(i)	Number of condensate polisher service vessel	Three numbers (3X50%)
(ii)	Type of condensate polisher service vessel	Cylindrical / Spherical
(iii)	Capacity of each condensate polisher service vessel	50% of condensate flow
(iv)	Flow through each condensate polisher service vessel	673 Tones per hour
(v)	Operating pressure of each condensate polisher service vessel	30.0 kg./sq.cm (g)
(vi)	Design pressure of each condensate polisher service vessel	47.25 kg./sq.cm (g)
(vii)	Operating temperature of service vessel and their internals/ appurtenances including resin	46.9 degree Celsius.
(viii)	Design temperature of service vessel and their internals/ appurtenances including resin	60 degree Celsius.
(ix)	Pressure drop	3.5 kg/sq cm (max, including CPU service vessels, pre filters, valves and fittings & resin traps connected with the unit) for clogged condition. 2.1 kg/sq cm (max, including CPU service vessels, pre filters, valves and fittings & resin traps connected with the unit) for clean condition.
(x)	Design code of each condensate polisher service vessel	ASME sec VIII div 1 ed. 2010 or acceptable equivalent international standard.
(xi)	Material of construction of each condensate polisher service vessel	- Carbon steel plates to SA - 515/ 516 Gr. 70 with rubber lining inside. The lining shall be of rubber having a hardness of 65 plus/minus 5 shore-A meeting the requirements of IS: 4682, Part-I (4.5 mm thick Rubber lining in three layers). - Inlet water distributor: - Hub and internals diffuser splash plate or header and perforated laterals. Material of construction shall be SS-316 - Under drains: - Same as above with screened laterals with internal perforated pipes and rubber lined flat bottom.
(xii)	Resin traps at the outlet of each condensate polisher service vessel	Rubber lined steel construction and internals (cord & screen) shall be of JOHNSON SCREENS IRELAND or equivalent (SS-316) construction
2.1	AIR-BLOWERS FOR RESIN MIXING (SERVICE VESSELS AREA) PER 660 MW TG UNIT	
(i)	Number of air blowers per 660 MW TG Unit	Two (2x100%)
(ii)	Type of each air blowers	Centrifugal/Twin lobe type, oil free, positive displacement

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(iii)	Duty	Intermittent
(iv)	Capacity & Head	As required
(v)	Pressure gauge	One per blower
(vi)	Location of each air blowers	Indoor
(vii)	Material of Construction	Casing, cover and stator – Cast Iron GR FG 260 to IS 210 Lobe/ Impeller – Cast Iron GR FG 260 to IS 210 Shaft – Carbon steel BS:970 En-8/ANSI-I045
(viii)	Accessories	Each blower shall be complete with motor, V-belt drive with belt guard, inlet filter/silencer, flexible couplings and discharge snubber, all mounted on a single base. Relief valve(s) shall also be provided by the bidder.
2.2	PRE FILTER	
(i)	Number	Two (2X50%) for each 660 MW TG unit Total (4X50%) for station
(ii)	Type	Back washable (Vertical)
(iii)	Design code of each pre filter	ASME sec VIII div 1 (latest)
(iv)	Flow through each pre filter	673 Tones per hour
(v)	Operating pressure of each Pre Filter	30.0 kg./sq.cm (a)
(vi)	Design pressure of each Pre Filter	47.25 kg./sq.cm (g)
(vii)	Operating temperature of Pre Filter and their internals/ appurtenances	46.9 degree Celsius.
(viii)	Design temperature of Pre Filter and their internals/ appurtenances	60 degree Celsius.
(ix)	Pre –Filter Housing	2 nos. for each TG-unit
(x)	Pre- Filter media (Cartridge)	20 micron/ Proven Design Mesh Size (PP material/ Proven Design).
(xi)	Automatic Bypass provision & valve arrangement	Inlet, outlet and common bypass pneumatic valves with necessary interlocks with CPU
(xii)	Absolute recovery	99.98%
(xiii)	Material of construction (shell & dished ends) of each pre filter	Carbon steel plates to SA - 515 / 516 Gr. 70 with rubber lining inside. The lining shall be of rubber having a hardness of 65 plus/minus 5 shore-A meeting the requirements of IS: 4682, Part-I.
2.3	COMPRESSOR FOR BACKWASHING (PRE-FILTER) PER 660 MW TG UNIT	
(i)	Number of compressor per 660 MW TG Unit	Two (2x100%)
(ii)	Type	Oil Free Screw compressors (Air cooled/ water cooled)
(iii)	Duty	Intermittent

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(iv)	Capacity & Head	As required
(v)	Design Temp/ RH	45deg Celsius/ 75 RH
(vi)	Design & Testing Code	ISO 1217
(vii)	Pressure gauge	One per compressor
(viii)	Location of each compressor	Indoor
(ix)	Material of Construction	As per manufacturers standard suitable for CPU application
2.4	BACKWASH WATER COLLECTION TANK (BHEL SCOPE)	
(i)	Number	One (1) for each 660 MW TG unit
(ii)	Type	RCC Pit With Solvent Free Epoxy Coating.
(iii)	Capacity	Holding capacity shall be 1.5 times the capacity of condensate water required for backwashing of pre filter
2.5	PRE FILTER BACKWASH WASTE WATER TRANSFER PUMPS	
(i)	Number	Two (1 working+1 standby) for each 660 MW TG unit
(ii)	Type	Vertical Centrifugal
(iii)	Pump Speed	Maximum 1500 rpm
(iv)	Capacity & head	Designed for evacuating water from the backwash waste water tank before next filling and head as required.
(v)	Material of construction	
•	casing, impeller	SS316L
•	Shaft	SS 316L
•	shaft sleeve material	SS 410
(vi)	Recirculation line with pneumatic actuated regulating type diaphragm valve	Required
3.0	EXTERNAL REGENERATION FACILITIES (One (1) set of external regeneration system common for all the condensate polishing plants shall be provided by the bidder.)	

3.1	CHEMICAL HANDLING, PREPARATION & DOSING SYSTEM			
a)	Chemical Tanks	Alkali Preparation Tank	Alkali Day Tank	Acid Measuring Tank
(i)	Number required	One (1) Number	One (1) Number	Two (2) Number
(ii)	Type	-- Vertical Cylindrical with dish end at bottom and cover at top; Atmospheric --		
(iii)	Useful capacity (Each)	Minimum 10 Cu.m	Each tank shall be adequate to hold chemical for 125% of one regeneration	

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(iv)	Material	----- M.S. with 4.5 mm thick rubber lining inside-----	
(v)	Accessories Required	Vent, Overflow, drain connection, manhole (only for alkali preparation tank), motor driven stirrer (only for alkali preparation tank & alkali day tanks), dissolving basket in SS 316 construction (only for alkali preparation & alkali day tanks), fume absorber/ CO ₂ absorber, operating platform, ladders, lifting lugs (4 nos minimum) etc. as required by manufacturer's standard	
(vi)	Stirrer per tank	Slow speed stirrer driven by motor drive and reduction gear. Speed of stirrer = 200 RPM Max. Material of Construction of each stirrer and agitator = Stainless Steel – 316.	Not Applicable.
(vii)	Dissolving basket	One number per tank. Material of Construction of each dissolving basket – SS316.	Not Applicable.
b)	Dosing Pumps	Acid	Alkali
(i)	Number	Two (1Working +1Standby) (2X100%)	Two (1Working +1Standby) (2X100%)
(ii)	Type	----- Simplex positive displacement type; hydraulically operated diaphragm type -----	
(iii)	Whether suction strainer required	----- Yes -----	
(iv)	Material of Construction of strainer	Haste alloy –B	SS316
(v)	Accessories		
1)	Pressure Dampener	-----Two (2)-----	
2)	External safety relief valve (in addition to inbuilt safety valve)	Two (Hastelloy-B)	Two (SS:316)
3)	Maximum pump stroke speed per minute	-----100 per minute-----	
(vi)	Material of construction		
1)	Liquid End (Pump Head, Valves, Valve housing, valve spring etc.).	PVC	AISI:316
2)	Diaphragm	PT.F.E.	P.T.F.E.
3)	Packing	P.T.F.E.	P.T.F.E.
4)	Shaft	----- Hardened steel EN 8 (BS:970)-----	
5)	Worm & Worm Wheel (If Applicable)	-----Manganese Bronze-----	