Annexure

YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		7	WALDEMAR PRUSS ARMATURENFABRIK GMBH, GERMANY	Not Approved
		8	KSB MIL CONTROLS LTD., KERALA	Not Approved
		9	PARCOL S.P.A, ITALY	Not Approved
8	**CONICAL STRAINERS**	1	ACME FLUID SYSTEMS, GUJARAT	Approved
		2	JAYPEE INDUSTRIES PVT. LTD., NEW DELHI	Approved
		3	MULTITEX FILTRATION ENGINEERS LIMITED, NEW DELHI	Approved
		4	NISSAN SCIENTIFIC PROCESS EQUIPMENT PVT.LTD., MAHARASHTRA	Approved
		5	OTOKLIN GLOBAL BUSINESS LIMITED, MUMBAI	Approved
		6	FILTERATION ENGINEERS (I) PVT. LTD., MUMBAI	Approved
		7	BHATIA ENGINEERING CO., NEW DELHI	Approved
		8	BOMBAY CHEMICAL EQUIPMENTS, MUMBAI	Not Approved
		9	FILTER CONCEPT PRIVATE LIMITED, GUJARAT	Not Approved
		10	GUJARAT OTOFILT, GUJARAT	Not Approved
		11	SUNGOV ENGINEERING PVT. LTD., CHENNAI	Not Approved
		12	GRAND PRIX ENGINEERING PVT. LTD., FARIDABAD, HARYANA	Not Approved
		13	RAK DIN ENGINEERS, HARYANA	Not Approved
9	**DEBRIS FILTER**	1	GEA BGR ENERGY SYSTEM INDIA LTD., CHENNAI	Approved
		2	TAPROGGE GMBH, GERMANY	Approved
		3	MULTITEX FILTRATION ENGINEERS LIMITED, NEW DELHI	Approved
		4	BEIJING CEP GREEN WAVE SCI-TECH CO. LTD., CHINA	Not Approved
		5	QINGDAO HUATAI ELECTRIC EQUIPMENT CO. LTD, CHINA	Not Approved
II	**PACKAGE CATEGORY = MECH. PIPING & LAYOUT**			
1	**THERMAL INSULATION(R-**	1	EFFICIENT ENTERPRISES HYDERABAD	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
	MATTRESSES/P-SECN)	2	GOENKA ROCKWOOL (INDIA) PVT.LTD., CHHATISGARH	Approved
		3	JAMSHEDPUR MINERAL WOOL MFG CO, JHARKHAND	Approved
		4	LLOYD INSULATIONS (INDIA) LTD., NEW DELHI	Approved
		5	LLOYD ROCKFIBRES LTD., NEW DELHI	Approved
		6	LAPINUS ROCKWOOL P LTD, NEW DELHI	Approved
		7	POLYBOND INSULATION PRIVATE LIMITED, CHATTISGARH	Approved
		8	PUNJSTAR INSULATIONFIBRE, NEW DELHI	Approved
		9	ROCKWOOL INDUSTRIES, NEW DELHI	Approved
		10	ROCKWOOL INDIA PVT. LTD., HYDERABAD	Approved
		11	ROXUL-ROCWOOL INSULATION, GUJARAT	Approved
		12	SHREERAM EQUITECH PRIVATE LIMITED, CHATTISGARH	Approved
		13	THERMOCARE ROCKWOOL INDIA PRIVATE LTD., CHATTISGARH	Approved
		14	DHANBAD ROCKWOOL INSULATION (P) LTD., JHARKHAND	Approved
		15	HI-TEC ROCKFIBRE PVT. LTD., CHATTISGARH	Approved
		16	MINSULATE MANUFACTURING COMPANY, JHARKHAND	Approved
2	**BALL VALVES**	1	A.V. VALVES LTD, AGRA (UP)	Approved
		2	AKAY INDUSTRIES PVT.LTD., KARNATAKA	Approved
		3	CHEMTECH INDUSTRIAL VALVES, MAHARASTRA	Approved
		4	DEMBLA VALVES, MAHARASTRA	Approved
		5	HITECH VALVES, CHENNAI	Approved
		6	HAWA VALVES, MUMBAI	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		7	INTERVALVE (INDIA) LTD., PUNE	Approved
		8	JOSHI JAMPALA ENGG PVT LTD, MAHARASTRA	Approved
		9	LEADER VALVES LTD., PUNJAB	Approved
		10	MICROFINISH VALVES PVT LTD., KARNATAKA	Approved
		11	MICON VALVES INDIA, MUMBAI	Approved
		12	SURYA VALVES AND INSTRUMENTS MFG CO., TAMILNADU	Approved
		13	VALTECH INDUSTRIES, MUMBAI	Approved
		14	WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD.- NEW DELHI	Approved
		15	HAWA ENGINEERS LTD., GUJARAT	Approved
		16	ATAM VALVES PVT. LTD., PUNJAB	Approved
		17	BELGAUM AQUA VALVES PVT. LTD., KARNATAKA	Not Approved
		18	CANLE VALVES PRIVATE LIMITED, TAMIL NADU	Not Approved
		19	CRESCENT VALVES MFG CO. PVT. LTD, MUMBAI	Not Approved
		20	DELVAL FLOW CONTROLS PVT. LTD., NOIDA (UP)	Not Approved
		21	MEVADA ENGINEERING WORKS PVT LTD., MUMBAI	Not Approved
		22	UNIFLOW, CHENNAI	Not Approved
3	**BUTTERFLY VALVES (STEAM SERVICE)**	1	FOURESS ENGG. INDIA LTD., MUMBAI	Approved
		2	INSTRUMENTATION LTD., KERALA	Approved
		3	NENGFA WEIYE TIELING VALVE JOINT-STOCK CO. LTD., CHINA	Not Approved
4	**AIR RELEASE VALVES**	1	A.V. VALVES LTD, AGRA (UP)	Approved
		2	G.M. DALUI AND SONS PVT.LTD., WEST BENGAL	Approved
		3	LEADER VALVES LTD., PUNJAB	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		4	UPADHAYA VALVES MANUFACTURERS PRIVATE LIMITED, KOLKATA	Approved
		5	VENUS PUMPS AND ENGG. WORKS, KOLKATA	Approved
		6	R AND D MULTIPLES (METAL CAST) PVT LTD, MUMBAI	Approved
		7	K P MONDAL & SONS, KOLKATA	Not Approved
5	**AIR TRAPS**	1	ARMSTRONG INTRNL PVT LTD, CHENNAI	Approved
		2	ASIAN INDUSTRIAL VALVES & INSTRUMENTS, TAMILNADU	Approved
		3	FORBES MARSHALL PVT.LTD., PUNE	Approved
		4	PENNANT ENGINEERING PVT. LTD., PUNE	Approved
		5	ESCO STEAMCON PVT. LTD., GUJARAT	Not Approved
		6	UNI KLINGER LIMITED, MUMBAI	Not Approved
6	**STEAM TRAPS**	1	ARMSTRONG INTRNL PVT LTD, CHENNAI	Approved
		2	ASIAN INDUSTRIAL VALVES & INSTRUMENTS, TAMILNADU	Approved
		3	FORBES MARSHALL PVT.LTD., PUNE	Approved
		4	LEADER VALVES LTD., PUNJAB	Approved
		5	PENNANT ENGINEERING PVT. LTD., PUNE	Approved
		6	ESCO STEAMCON PVT. LTD., GUJARAT	Not Approved
7	**METAL EXPANSION BELLOWS**	1	FLEXICAN BELLOWS AND HOSES PVT. LTD., GUJARAT	Approved
		2	FLEXATHERM EXPANLLOW PVT. LTD., GUJARAT	Approved
		3	LONESTAR INDUSTRIES, CHENNAI	Approved
		4	MB METALLIC BELLOWS PVT. LTD., CHENNAI	Approved
		5	METALLIC BELOWS INDIA PVT. LTD., CHENNAI	Approved
		6	TEDDINGTON ENGINEERED SOLUTIONS LTD. UK	Approved
		7	B D ENGINEERS, GUJARAT	Not Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
8	**THERMAL INSULATION-ANCILLARY MATERIAL**	1	ALLIED INSULATIONS (INDIA), GHAZIABAD (UP)	Approved
		2	ENERGY SAVING AND ALLIED PRODUCTS, HARYANA	Approved
		3	HKI ENTERPRISES MUMBAI	Approved
		4	INDUSTRIAL ASSOCIATES, KOLKATA.	Approved
		5	LLOYD INSULATIONS (INDIA) LIMITED, NEW DELHI	Approved
		6	SUDHIR TRADING COMPANY, NEW DELHI	Approved
		7	SURESH INDUSTRIAL CORPORATION, CHANDIGARH	Approved
		8	SURESH FASTENERS, CHANDIGARH	Approved
		9	SHREE ENGINEERS, INDORE (MP)	Not Approved
9	**ALUMINIUM SHEETS/COILS**	1	BHARAT ALUMINIUM COMPANY LTD, CHHATTISGARH	Approved
		2	HINDALCO INDUSTRIES LTD, MUMBAI	Approved
		3	JINDAL ALUMINIUM LTD, KARNATAKA	Approved
		4	NATIONAL ALUMINIUM COMPANY LTD., ODISHA	Approved
		5	CHONGQING LANREN ALUMINIUM CO. LTD., CHINA	Not Approved
10	**STEEL GATE/GLOBE/NR VALVES (WATER SYSTEM)**	1	A.V. VALVES LTD, AGRA (UP)	Approved
		2	ATAM VALVES PVT. LTD., PUNJAB	Approved
		3	FLUIDLINE VALVES COMPANY PVT.LTD., GHAZIABAD (UP)	Approved
		4	INTERVALVE (INDIA) LTD., PUNE	Approved
		5	LEADER VALVES LTD., PUNJAB	Approved
		6	NITON VALVE INDUSTRIES PVT LTD, MUMBAI	Approved
		7	STEEL STRONG VALVES (I) PVT.LTD., MUMBAI	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

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Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		8	WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD., NEW DELHI	Approved
		9	FOURESS ENGG. INDIA LTD., MUMBAI	Approved
		10	HAWA ENGINEERS LTD., GUJARAT	Approved
		11	MICON VALVES (INDIA) PVT. LTD., MAHARASTRA	Approved
		12	VALTECH INDUSTRIES, MUMBAI	Approved
		13	HAWA VALVES (INDIA) PVT. LTD., MUMBAI	Approved
		14	CANLE VALVES PRIVATE LIMITED, TAMIL NADU	Not Approved
		15	OSWAL INDUSTRIES LTD, MUMBAI	Not Approved
		16	NSSL PRIVATE LIMITED, NAGPUR, MAHARASHTRA	Not Approved
		17	V.K. VALVES PVT. LTD., PUNJAB	Not Approved
III	**PACKAGE CATEGORY = MECHANICAL AUXILIARY**			
1	**FIRE TENDER**	1	AGNI INDUSTRIAL FIRE SERVICES FARIDABAD	Approved
		2	RELIANCE FIRE & SAFETY HYDERABAD	Approved
		3	SEAARA UNIVERSAL PVT LTD,HYDERABAD	Approved
		4	VIJAY FIRE VEHICLES AND PUMPS LTD, MUMBAI	Approved
		5	BRIJBASI HI-TECH UDYOG LTD, UP	Approved
		6	AMBALA COACH BUILDERS, HARYANA	Approved
		7	AAREL INDUSTRIES, MADHYA PRADESH	Approved
		8	UNITED MANUFACTURING CO., NEW DELHI	Not Approved
2	**COMPRESSED AIR SYSTEM**	1	ATLAS COPCO (INDIA) LTD., GURGAON	Approved
		2	AERZEN MACHINES PVT LTD,	Approved
		3	CHICAGO PNEUMATIC SALES,NEW DELHI	Approved
		4	ELGI EQUIPMENTS LTD, NEW DELHI	Approved
		5	INGERSOLL- RAND (INDIA) LTD., HARYANA	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		6	KIRLOSKAR PNEUMATIC CO. LTD., NEW DELHI	Approved
3	**AIR CONDITIONING SYSTEM**	1	ADVANCE VENTILATION PVT.LTD., NEW DELHI	Approved
		2	BLUE STAR LTD., MUMBAI	Approved
		3	CARRIER AIRCON PVT LTD,HARYANA	Approved
		4	DRAFT-AIR (INDIA) PVT. LTD., NEW DELHI	Approved
		5	GODREJ & BOYCE MFG CO LTD, NEW DELHI	Approved
		6	MW HIGH TECH PROJECTS (I) PVT. LTD., HARYANA	Approved
		7	STERLING AND WILSON LIMITED, KOLKATA	Approved
		8	VOLTAS LTD., MUMBAI	Approved
		9	GEMINI SHREEWAS (ENGINEERS) PVT. LTD., CHENNAI	Not Approved
		10	INDUSTRIAL PROJECT & PRODUCTS CO., GURGAON	Not Approved
		11	ROOTS COOLING SYSTEMS PVT. LTD., NOIDA (UP)	Not Approved
4	**VENTILATION SYSTEM**	1	AIR LINK ENGINEERS PVT. LTD., NEW DELHI	Approved
		2	ADVANCE VENTILATION PVT.LTD., NEW DELHI	Approved
		3	APC SYSTEMS & PRODUCTS PVT LTD, KOLKATA	Approved
		4	BLUE STAR LTD., MUMBAI	Approved
		5	C.DOCTOR AND CO. PVT.LTD, KOLKATA	Approved
		6	DRAFT-AIR (INDIA) PVT. LTD., NEW DELHI	Approved
		7	DUSTVEN PVT LTD, , KARNATAKA	Approved
		8	MESINA , MUMBAI	Approved
		9	ROOTS COOLING SYSTEMS PVT.LTD., NOIDA (UP)	Approved
		10	S.K.SYSTEMS PRIVATE LTD., HARYANA	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		11	STERLING AND WILSON LIMITED, KOLKATA	Approved
		12	VOLTAS LTD., MUMBAI	Approved
		13	TAP ENGINEERING, CHENNAI	Approved
		14	INDUSTRIAL PROJECT & PRODUCTS CO., GURGAON	Not Approved
		15	PACK PLAST INDUSTRIES, RAJASTHAN	Not Approved
5	**FUEL OIL HANDLING & STORAGE SYSTEM**	1	TECHNO ELECTRIC AND ENGG. CO. LTD., KOLKATA	Approved
		2	TECHNOFAB ENGG. LTD., NEW DELHI	Approved
		3	THERMOSYSTEMS PVT. LTD., HYDERABAD	Approved
		4	UNITECH MACHINES LTD., GURGAON (UP)	Approved
		5	GENERAL MECHANICAL WORKS PVT. LTD., GUJARAT	Approved
		6	RAUNAQ INTERNATIONAL LIMITED, HARYANA	Approved
		7	UNITED SYSTEMS & PROJECTS (INDIA) PVT. LTD., TELANGANA	Approved
		8	NEW FIRE ENGINEERS PVT LTD, MUMBAI	Not Approved
		9	SHALKOOT MECHANIQUE PVT. LTD., NOIDA (UP)	Not Approved
		10	XICON INTERNATIONAL LIMITED, MUMBAI	Not Approved
6	**CHEMICAL DOSING SYSTEM**	1	ENPRO INDUSTRIES PVT.LTD., PUNE	Approved
		2	MR SYSTEMS, WESTBENGAL	Approved
		3	POWER PIPING COMPANY, TAMIL NADU	Approved
		4	PSI ENGINEERING SYSTEMS (P) LTD., CHENNAI	Approved
		5	POSITIVE METERING PUMPS (I) PVT. LTD., MAHARASHTRA	Approved
		6	TECHNO CONSULTANTS, MUMBAI	Approved
		7	TECHNOSTRENGTH PVT. LTD., HYDERABAD	Approved

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Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		8	V.K PUMP INDUSTRIES PVT LTD, PUNE	Approved
		9	N.M. ENTERPRISES, NEW DELHI	Not Approved
		10	ROCKWIN FLOWMETER INDIA PVT. LTD., GHAZIABAD (UP)	Not Approved
		11	SWELORE ENGG. PVT. LTD, GUJARAT	Not Approved
7	**D/G EOT CRANE ABOVE 100T**	1	ANUPAM INDUSTRIES LTD., GHAZIABAD (UP)	Approved
		2	FURNACE & FONDRY EQUIPMENT CO., MUMBAI	Approved
		3	HEAVY ENGG. CORPORATION LTD., JHARKHAND	Approved
		4	MUKAND LIMITED, MAHARASHTRA	Approved
		5	TRANSPADE ENGG PVT LTD, KARNATAKA	Approved
		6	WMI KONECRANES INDIA LTD., NEW DELHI	Approved
		7	KONECRANES PVT. LTD., MUMBAI	Approved
		8	HENAN WEIHUA HEAVY MACHINERY CO. LTD., CHINA	Not Approved
		9	ALPHA SERVICES, RAJASTHAN	Not Approved
		10	ELECTROMECH MATERIAL HANDLING SYSTEMS (INDIA) PVT. LTD., PUNE	Not Approved
		11	REVA INDUSTRIES LTD., HARYANA	Not Approved
		12	TEREX INDIA PVT. LTD., PUNE	Not Approved
		13	UNIQUE INDUSTRIAL HANDLERS PVT. LTD., MUMBAI	Not Approved
8	**D/G EOT CRANE UPTO 100T**	1	ANUPAM INDUSTRIES LTD., GHAZIABAD (UP)	Approved
		2	CRANEX LIMITED, NEW DELHI	Approved
		3	CENTURY CRANE ENGINEERS PVT. LTD., HARYANA	Approved
		4	FURNACE & FOUNDRY EQUIPMENTS CO., MUMBAI	Approved
		5	GRIP ENGINEERS PVT. LTD., HARYANA	Approved

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Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		6	HEAVY ENGG. CORPORATION LTD., JHARKHAND	Approved
		7	REVA INDUSTRIES LTD., HARYANA	Approved
		8	MUKAND LIMITED, MAHARASHTRA	Approved
		9	KONECRANES PVT. LTD., MUMBAI	Approved
		10	ALPHA SERVICES, RAJASTHAN	Not Approved
		11	BRADY & MORRIS ENGINEERING CO. LTD., GUJARAT	Not Approved
		12	ELECTROMECH MATERIAL HANDLING SYSTEMS (INDIA) PVT. LTD, PUNE	Not Approved
		13	GMW PRIVATE LIMITED, GUJARAT	Not Approved
		14	HENAN WEIHUA HEAVY MACHINERY CO. LTD., CHINA	Not Approved
		15	MEEKA MACHINERY PVT. LTD., GUJARAT	Not Approved
		16	MANGLA HOISTS PVT LTD, NEW DELHI	Not Approved
		17	ROCKWELL HOISTO CRANES PVT. LTD., HARYANA	Not Approved
		18	S CRANE ENGINEERING WORKS, MUMBAI	Not Approved
		19	SAFEX ENERGY PVT. LTD., GUJARAT	Not Approved
		20	TEREX INDIA PVT. LTD., PUNE	Not Approved
		21	TUOBRO FURGUSON (INDIA) PVT LTD., KOLKATA	Not Approved
		22	TECHNO INDUSTRIES, AHMEDABAD	Not Approved
		23	UNIQUE INDUSTRIAL HANDLERS PVT LTD., MUMBAI	Not Approved
		24	UNICON TECHNOLOGY INTERNATIONAL PVT. LTD, UP	Not Approved
9	**SINGLE GIRDER EOT/HOT MISC. CRANES**	1	ALE MACHINARIES, USA	Approved
		2	ARMSEL MHE PVT. LTD, KARNATAKA	Approved
		3	BRADY & MORRIS ENGG CO LTD, GUJARAT	Approved

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Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		4	CONSOLIDATED HOISTS PVT LTD, PUNE	Approved
		5	CENTURY CRANE ENGINEERS PVT. LTD., HARYANA	Approved
		6	HERCULES HOISTS LTD., MAHARASTRA	Approved
		7	INTRICATE ENGG PVT LTD, KOLKATA	Approved
		8	PIONEER CRANES & ELEVATORS, PUNJAB	Approved
		9	REVA INDUSTRIES LTD., HARYANA	Approved
		10	SHIVA FERROUS PVT LTD, WEST BENGAL	Approved
		11	TRANSPADE ENGG PVT LTD, KARNATAKA	Approved
		12	TRACTEL TIRFOR INDIA PVT. LTD., HARYANA	Approved
		13	TUOBRO FURGUSON (INDIA) PVT LTD., KOLKATA	Approved
		14	UNITTEK ENGINEERS PVT LTD, KARNATAKA	Approved
		15	ALPHA SERVICES, RAJASTHAN	Not Approved
		16	MANGLA HOISTS PVT LTD, NEW DELHI	Not Approved
		17	UNIVERSAL HOIST-O-FABRIK, MAHARASHTRA	Not Approved
10	**ELECTRIC HOIST**	1	ALPHA SERVICES, RAJASTHAN	Approved
		2	BRADY & MORRIS ENGG CO LTD, GUJARAT	Approved
		3	CONSOLIDATED HOISTS PVT LTD, PUNE	Approved
		4	CENTURY CRANE ENGINEERS PVT. LTD., HARYANA	Approved
		5	EDDY CRANES PVT. LTD., MUMBAI	Approved
		6	GRIP ENGINEERS PVT. LTD., HARYANA	Approved
		7	HERCULES HOISTS LTD,MAHARASTRA	Approved
		8	LIFTING EQUIPMENTS AND ACCESSORIES, NEW DELHI	Approved
		9	MELTECH CRANES, THANE	Approved

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Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		10	ROCKWELL HOIST CRANES PVT LTD, NEW DELHI	Approved
		11	REVA INDUSTRIES LTD., HARYANA	Approved
		12	TRANSPADE ENGG PVT LTD, KARNATAKA	Approved
		13	TRACTEL TIRFOR INDIA PVT. LTD., HARYANA	Approved
		14	UNIVERSAL HOIST-O-FABRIK, MAHARASHTRA	Approved
		15	MANGLA HOISTS PVT LTD, NEW DELHI	Not Approved
		16	TECHNO INDUSTRIES, AHMEDABAD	Not Approved
11	**CHAIN PULLEY BLOCK**	1	ARMSEL MHE PVT. LTD, KARNATAKA	Approved
		2	BRADY & MORRIS ENGG CO LTD, GUJARAT	Approved
		3	CENTURY CRANE ENGINEERS PVT LTD, HARYANA	Approved
		4	CONSOLIDATED HOISTS PVT LTD, PUNE	Approved
		5	HERCULES HOISTS LTD., MAHARASTRA	Approved
		6	LIFTING EQUIPMENTS AND ACCESSORIES, NEW DELHI	Approved
		7	SOUTHERN PLANTAID, TELANGANA	Approved
		8	TRACTEL TIRFOR INDIA PVT. LTD., HARYANA	Approved
		9	TRANSPADE ENGG PVT LTD,KARNATAKA	Approved
		10	TUOBRO FURGUSON (INDIA) PVT LTD., KOLKATA	Approved
		11	UNIVERSAL HOIST-O-FABRIK, MAHARASHTRA	Approved
		12	BAKELITE ELECTRICAL MFG. CO. PVT. LTD., MUMBAI	Not Approved
		13	TECHNO INDUSTRIES, AHMEDABAD	Not Approved
12	**MISC. TANKS (SITE FABRICATED)**	1	SAKTHI HI-TECH CONSTRUCTIONS PVT. LTD., CHENNAI	Approved
		2	TECHNO ELECTRIC AND ENGG. CO. LTD., KOLKATA	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		3	THERMOSYSTEMS PVT. LTD., HYDERABAD	Approved
		4	UNITECH MACHINES LTD., GURGAON (UP)	Approved
		5	GMW PRIVATE LIMITED, GUJARAT	Approved
		6	UNITED SYSTEMS & PROJECTS (INDIA) PVT. LTD., TELANGANA	Approved
		7	MAHATHI INFRA SERVICES PVT. LTD., HYDERABAD	Not Approved
		8	SAMAY PROJECT SERVICES PVT. LTD., CHENNAI	Not Approved
		9	SHALKOOT MECHANIQUE PVT. LTD., NOIDA (UP)	Not Approved
		10	XICON INTERNATIONAL LIMITED, MUMBAI	Not Approved
13	**ELEVATORS**	1	JOHNSON & JOHNSON, NEW DELHI	Approved
		2	KONE ELEVATOR INDIA LTD., CHENNAI	Approved
		3	MITSUBUSHI, NEW DELHI	Approved
		4	SCHINDLER INDIA PVT LTD, NEW DELHI	Approved
		5	TECHNO INDUSTRIES, AHMEDABAD	Approved
		6	THYSSENKRUP ELEVATORS, NEW DELHI	Approved
		7	COOPER ELEVATORS INDIA PVT. LTD. CHENNAI	Not Approved
14	**MILL REJECTS SYSTEM (PNEUMATIC TYPE)**	1	H. V. EQUIPMENTS PVT. LTD., NOIDA (UP)	Approved
		2	MELCO INDIA FARIDABAD	Approved
		3	MECAWBER BEEKAY PVT LTD., NEW DELHI	Not Approved
		4	XIAMEN LONGKING BULK MATERIALS SCIENCE & ENGINEERING CO LTD., CHINA	Not Approved
15	**LUBE OIL TRANSFER PUMPS**	1	MATZ PUMPS PVT. LTD., GUJARAT	Approved
		2	TUSHACO PUMPS PVT.LTD. NEW DELHI	Approved
		3	UT PUMPS & SYSTEMS LTD,HARYANA	Approved
		4	ALLWEILER INDIA PRIVATE LIMITED, DAMAN &	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
			DIU	
		5	DELTA PD PUMPS PVT. LTD., MUMBAI	Approved
		6	DEL PD PUMPS & GEARS PVT LTD, GUJARAT	Not Approved
16	**WEIGH BRIDGE**	1	ACME AUTOMATION, CHATTISHARGH	Approved
		2	AVERY LTD, BALLABGARH, HARYANA	Approved
		3	ABB LTD,HARYANA	Approved
		4	ESSAE DIGITRONICS PVT LTD, HARYANA	Approved
		5	IPA PRIVATE LTD., KARNATAKA	Approved
		6	MET WEIGH INDIA HYDERABAD	Approved
		7	SCHENCK & JENSON & NICOLSON	Approved
		8	SCHENCEK PROCESS INDIA LTD,HARYANA	Approved
		9	STATWEIGH INDIA (P) LTD., KARNATAKA	Approved
		10	TECHNO SCALE INDUSTRIES, GUJARAT	Approved
17	**H2 GEN. PLANT**	1	TELEDYNE ENERGY SYSTEMS INC,USA	Approved
		2	TIANJIN MAINLAND HYDROGEN EQUIPMENT CO. LTD., CHINA	Not Approved
		3	EASTERN ELECTROLYSER LIMITED, NEW DELHI	Approved
		4	HYDROGENICS EUROPE N.V., BELGIUM	Approved
		5	NUBERG ENGINEERING LTD., NOIDA (UP)	Not Approved
		6	SUKAN ENGINEERING PVT. LTD., MUMBAI	Not Approved
		7	SPIRARE ENERGY PVT. LTD., NOIDA (UP)	Not Approved
18	**CONDENSATE POLISHING UNIT**	1	BGR ENERGY SYSTEMS LIMITED., ANDHRA PRADESH	Approved
		2	DRIPLEX WATER ENGINEERING INTERNATIONAL PRIVALTE LIMITED, NEW DELHI	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		3	ION EXCHANGE (INDIA) LTD,HARYANA	Approved
		4	SIEMENS LIMITED,HARYANA	Approved
		5	THERMAX LTD., PUNE	Approved
		6	VA TECH WABAG LTD, NEW DELHI	Approved
19	**OXYGEN DOSING SYSTEM**	1	ENPRO INDUSTRIES PVT.LTD., PUNE	Approved
		2	MR SYSTEMS, KOLKATA	Approved
		3	MPT GMBH, GERMANY	Approved
		4	POWER PIPING COMPANY, TAMIL NADU	Approved
		5	PSI ENGINEERING SYSTEMS (P) LTD., CHENNAI	Approved
		6	ROCKWIN FLOWMETER INDIA PVT. LTD.UP	Approved
		7	TECHNO CONSULTANTS, MUMBAI	Approved
		8	V.K PUMP INDUSTRIES PVT LTD., PUNE	Approved
		9	POSITIVE METERING PUMPS (I) PVT. LTD., MAHARASHTRA	Not Approved
20	**WORKSHOP EQUIPMENT**	1	AVERY WEIGHTRINOX, HARYANA	Approved
		2	BATLIBOI LTD., NEW DELHI	Approved
		3	HMT MACHINE TOOLS LTD (100% SUBSIDAIRY OF M/S HMT LTD.), NEW DELHI	Approved
		4	HYDERABAD TULAMAN LTD., HYDERABAD	Approved
		5	ABRO TECHNOLOGIES PVT. LTD, NEW DELHI	Not Approved
		6	JAGDEEP FOUNDRY (REGD.), PUNJAB	Not Approved
		7	KHALSA ENGINEERING WORKS, NEW DELHI	Not Approved
		8	SAGAR HEAVY ENGINEERINGS PVT. LTD., PUNJAB	Not Approved
IV	**PACKAGE CATEGORY = ELECTRICAL**			
1	**NEUTRAL GROUNDING**	1	BHARTIA CULTER HAMMER FARIDABAD	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
	RESISTOR	2	RSI SWITCHGEAR PVT. LTD., RAJASTHAN	Approved
		3	S.R.NARKHEDE ENGG.PVT.LTD., PUNE	Approved
		4	LACHHMAN ELECTRONICS, NEW DELHI	Approved
		5	AMPCONTROL EQUIPMENTS PVT. LTD., MAHARASHTRA	Approved
		6	RESITECH ELECTRICALS PVT. LTD., KOLKATA	Approved
		7	NATIONAL RESISTORS, MAHARASHTRA	Not Approved
2	**DC LEAD ACID BATTERIES**	1	EXIDE INDUSTRIES LTD, NEW DELHI	Approved
		2	HOPPECKE BATTERIEN GMBH & CO.KG, GERMANY	Approved
3	**DC BATTERY CHARGER**	1	AMARA RAJA POWER SYSTEMS LIMITED,	Approved
		2	CHHABI ELECTRICALS PVT.LTD., MAHARASHTRA	Not Approved
		3	EMERSON NETWORK POWER PVT LTD PUNE	Approved
		4	HBL POWER SYSTEMS LTD., TELANGANA	Approved
		5	STATCON POWER CONTROLS LTD.	Approved
		6	CHLORIDE POWER SYSTEMS & SOLUTIONS LIMITED, KOLKATA	Approved
		7	DUBAS ENGG PVT LTD., KARNATAKA	Not Approved
		8	MASS-TECH CONTROLS PVT.LTD., MUMBAI	Not Approved
		9	STATCON ENERGIAA PRIVATE LIMITED, NOIDA (UP)	Not Approved
		10	VERTIV ENERGY PRIVATE LIMITED, MAHARASHTRA	Not Approved
4	**HT XLPE CABLES**	1	APAR INDUSTRIES LIMITED, GUJARAT	Approved
		2	CABLE CORPORATION OF INDIA LTD., MUMBAI	Approved
		3	GEMSCAB INDUSTRIES LTD., NEW DELHI	Approved
		4	HAVELLS INDIA LIMITED, NOIDA (UP)	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		5	KEI INDUSTRIES LTD., NEW DELHI	Approved
		6	KEC INTERNATIONAL LIMITED, MUMBAI	Approved
		7	PARAMOUNT COMMUNICATIONS LTD., NEW DELHI	Approved
		8	POLYCAB WIRES PVT. LTD., MUMBAI	Approved
		9	TORRENT CABLES LTD.GUJARAT	Approved
		10	TIRUPATI PLASTOMATICS PVT LTD., RAJASTHAN	Approved
		11	UNIVERSAL CABLES LTD., MADHYA PRADESH	Approved
		12	TORRENT POWER LTD., GUJARAT	Approved
		13	CMI LTD., NEW DELHI	Not Approved
		14	CRYSTAL CABLE INDUSTRIES LTD., KOLKATA	Not Approved
		15	DYNAMIC CABLES LIMITED, RAJASTHAN	Not Approved
		16	FINOLEX CABLES LIMITED, PUNE	Not Approved
		17	GUPTA POWER INFRASTRUCTURE LIMITED, GHAZIABAD (UP)	Not Approved
		18	RAVIN CABLES LIMITED, MUMBAI	Not Approved
		19	SRIRAM CABLES PVT. LTD., NEW DELHI	Not Approved
		20	STERLITE POWER TRANSMISSION LTD., NEW DELHI	Not Approved
5	**LT XLPE POWER CABLES**	1	CORDS CABLE INDUSTRIES LTD., NEW DELHI	Approved
		2	DIAMOND POWER INFRASTRUCTURE LTD. NEW DELHI	Approved
		3	DELTON CABLES LTD. HARYANA	Approved
		4	GEMSCAB INDUSTRIES LTD., NEW DELHI	Approved
		5	HAVELLS INDIA LTD., NOIDA (UP)	Approved
		6	KEI INDUSTRIES LTD., NEW DELHI	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		7	PARAMOUNT COMMUNICATIONS LTD., NEW DELHI	Approved
		8	POLYCAB WIRES PVT. LTD., MUMBAI	Approved
		9	TORRENT CABLES LTD., GUJARAT	Approved
		10	THERMO CABLES LTD., HYDERABAD	Approved
		11	CRYSTAL CABLE INDUSTRIES LTD., KOLKATA	Approved
		12	SUYOG ELECTRICALS LTD., GUJARAT	Approved
		13	CMI LTD., NEW DELHI	Not Approved
		14	APAR INDUSTRIES LTD., MUMBAI	Not Approved
		15	KEC INTERNATIONAL LIMITED, MUMBAI	Not Approved
		16	TIRUPATI PLASTOMATICS PVT. LTD., RAJASTHAN	Not Approved
		17	DYNAMIC CABLES LIMITED, RAJASTHAN	Not Approved
		18	GUPTA POWER INFRASTRUCTURE LIMITED, GHAZIABAD (UP)	Not Approved
		19	GOVIND CABLE INDUSTRIES, GHAZIABAD (UP)	Not Approved
		20	RAVIN CABLES LIMITED, MUMBAI	Not Approved
		21	SRIRAM CABLES PVT. LTD., NEW DELHI	Not Approved
		22	SPECIAL CABLES PVT. LTD., NEW DELHI	Not Approved
6	**CABLE TRAYS & ACC.**	1	INDIANA GRATINGS PVT. LTD., MUMBAI	Approved
		2	INDUSTRIAL PERFORATION (I) PVT.LTD., KOLKATA	Approved
		3	PREMIER POWER PRODUCTS (CAL) PVT. LTD., KOLKATA	Approved
		4	RUKMANI ELECTRICAL & COMPONENTS PVT LTD., KOLKATA	Approved
		5	RABI ENGINEERING WORKS PVT. LTD., KOLKATA	Approved
		6	UNITECH FABRICATORS AND ENGINEERS PVT	Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
			LTD., KOLKATA	
		7	INDIA ELECTRICALS SYNDICATE, KOLKATA	Approved
		8	PATNY SYSTEMS PVT. LTD., TELANGANA	Approved
		9	RATAN PROJECTS & ENGINEERING CO. PVT. LTD., KOLKATA	Approved
		10	VINFAB ENGINEERS INDIA PVT. LTD., MUMBAI	Approved
		11	ADVANCE POWER PRODUCTS, KOLKATA	Not Approved
		12	EROS METAL WORKS (P) LTD., MAHARASHTRA	Not Approved
		13	INDMARK FORMTECH PVT. LTD., MAHARASHTRA	Not Approved
		14	MAHESHWARI ELECTRICAL MFRS. PVT. LTD., UP	Not Approved
		15	NAMDHARI INDUSTRIAL TRADERS PVT. LTD, PUNJAB	Not Approved
		16	PARMAR METALS PVT.LTD., RAJKOT	Not Approved
		17	PENTAX FERRO INCORPORATE, MUMBAI	Not Approved
		18	SARAL INDUSTRIES, UP	Not Approved
		19	VATCO ELEC-POWER PVT. LTD., MUMBAI	Not Approved
7	**CABLE TRAY SUPPORT SYSTEM (WELDED TYPE)**	1	ASSOCIATED POWER STRUCTURES PVT. LTD.,	Approved
		2	PATNY SYSTEMS (P) LTD., TELANGANA	Approved
		3	INDUSTRIAL PERFORATION (I) PVT.LTD., KOLKATA	Approved
		4	RATAN PROJECTS & ENGINEERING CO. PVT.LTD., KOLKATA	Approved
		5	TJSV STEEL FABRICATION & GALVANIZING (INDIA) LIMITED, TAMIL NADU	Approved
		6	VINFAB ENGINEERS INDIA PVT. LTD., MUMBAI	Approved
		7	EROS INFRASTRUCTURES PVT. LTD., MAHARASHTRA	Not Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		8	INDMARK FORMTECH PVT. LTD., MAHARASHTRA	Not Approved
		9	JAGANNATHAN ENGINEERING WORKS, TAMIL NADU	Not Approved
		10	NAMDHARI INDUSTRIAL TRADERS PVT. LTD., PUNJAB	Not Approved
		11	PENTAX FERRO INCORPORATE, MUMBAI	Not Approved
		12	PREMIER POWER PRODUCTS (CAL) PVT. LTD., KOLKATA	Not Approved
		13	PARMAR METALS PVT.LTD., RAJKOT	Not Approved
		14	RABI ENGINEERING WORKS PVT. LTD., KOLKATA	Not Approved
		15	RUKMANI ELECTRICAL & COMPONENTS PVT LTD., KOLKATA	Not Approved
		16	SARAL INDUSTRIES, UP	Not Approved
		17	UNITECH FABRICATORS AND ENGINEERS PVT LTD., KOLKATA	Not Approved
8	**ABOVE GROUND EARTHING MATERIAL**	1	ASSOCIATED POWER STRUCTURES PVT. LTD.GUJARAT	Approved
		2	INDUSTRIAL PERFORATION (I) PVT.LTD., KOLKATA	Approved
		3	PREMIER POWER PRODUCTS (CAL) PVT. LTD., KOLKATA	Approved
		4	PATNY SYSTEMS (P) LTD, TELANGANA	Approved
		5	RUKMANI ELECTRICAL & COMPONENTS PVT LTD., KOLKATA	Approved
		6	UNITECH FABRICATORS AND ENGINEERS PVT LTD., KOLKATA	Approved
		7	INDIA ELECTRICALS SYNDICATE, KOLKATA	Approved
		8	RATAN PROJECTS & ENGINEERING CO. PVT.LTD., KOLKATA	Approved
		9	INDMARK FORMTECH PVT. LTD., MAHARASHTRA	Not Approved
		10	JAGANNATHAN ENGINEERING WORKS, TAMIL NADU	Not Approved
		11	PASSIVE INFRA PROJECTS PVT. LTD., NEW DELHI	Not Approved
		12	EROS INFRASTRUCTURES PVT. LTD., MAHARASHTRA	Not Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		13	RAJASTHAN METAL SMELTING CO. RAJASTHAN	Not Approved
		14	RABI ENGINEERING WORKS PVT. LTD., KOLKATA	Not Approved
		15	SARAL INDUSTRIES, UP	Not Approved
9	**TREFOIL CLAMPS**	1	AJMERA INDUSTRIAL & ENGINEERING WORKS, MUMBAI	Approved
		2	ELECTROMAC INDUSTRIES, MUMBAI	Approved
		3	MOULDED FIBREGLASS PRODUCTS, KOLKATA	Approved
		4	SUMIP COMPOSITES PVT.LTD., GUJARAT	Approved
		5	AERON COMPOSITE PVT. LTD., GUJARAT	Not Approved
10	**CABLE TERMINATION & JOINTING KITS**	1	ABB LIMITED FARIDABAD	Approved
		2	3M ELECTRO AND COMMUNICATION INDIA P.LTD., NEW DELHI	Approved
		3	RAYCHEM RPG PRIVATE LIMITED, NEW DELHI	Approved
		4	YAMUNA CABLE ACCESSORIES PVT. LTD., HARYANA	Approved
		5	HARI CONSOLIDATED PVT. LTD., NEW DELHI	Approved
		6	CLASSIC ENTERPRISES, MUMBAI	Not Approved
11	**LIGHTING FIXTURES,LAMPS & MISC. ITEMS**	1	AVAIDS TECHNOVATORS PVT. LTD., NEW DELHI	Approved
		2	BAJAJ ELECTRICALS LTD., MUMBAI	Approved
		3	CGL, NEW DELHI	Approved
		4	HAVELLS, NEW DELHI	Approved
		5	MIKA ENGINEERS THANE, MAHARASHTRA	Approved
		6	PHILIPS ELECTRONICS INDIA LTD	Approved
		7	HPL ELECTRIC & POWER LTD, NEW DELHI	Not Approved
		8	HALONIX TECHNOLOGIES (P) LTD., NOIDA (UP)	Not Approved
12	**RIGID STEEL CONDUITS**	REPUTED BIS MAKES SHALL BE ENSURED		

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
13	**PVC WIRES**	REPUTED BIS MAKES SHALL BE ENSURED		
14	**DISTRIBUTION BOARDS**	1	AMARA RAJA POWER SYSTEMS LIMITED, NEW DELHI	Approved
		2	CHHABI ELECTRICALS PVT.LTD., MAHARASHTRA	Approved
		3	C&S ELECTRIC LIMITED, NEW DELHI	Approved
		4	EMERSON NETWORK POWER, THANE	Approved
		5	HITACHI-HIREL POWER ELECTRONICS, GANDHINAGAR	Approved
		6	HBL POWER SYSTEMS LTD., TELANGANA	Approved
		7	JASPER ENGINEERS PVT. LTD., NOIDA, UP	Approved
		8	JACKSON ENGINEERS LIMITED, NOIDA, UP	Approved
		9	LARSON & TOUBRO LTD., MUMBAI	Approved
		10	NITYA ELECTROCONTROLS PVT. LTD., UP	Approved
		11	RSI SWITCHGEAR PVT. LTD.,RAJASTHAN	Approved
		12	SIEMENS LIMITED,HARYANA	Approved
		13	AVAIDS TECHNOVATORS PVT. LTD., NEW DELHI	Not Approved
		14	BCH ELECTRIC LTD., FARIDABAD	Not Approved
		15	RYB SWITCHGEARS PVT. LTD., NEW DELHI	Not Approved
15	**OIL FILLED SERVICE TRANSFORMERS**	1	ABB,HARYANA	Approved
		2	CGL, NEW DELHI	Approved
		3	DANISH PRIVATE LIMITED, RAJASTHAN	Approved
		4	EMCO LIMITED, NEW DELHI	Approved
		5	ESENNAR TRANSFORMERS (P) LTD., TELANGANA	Approved
		6	KECL,HARYANA	Approved
		7	KRYFS POWER COMPONENTS LTD. , MUMBAI	Not Approved

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YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

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Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		8	SOUTHERN POWER EQUIPMENT COMPANY PVT. LTD.	Approved
		9	TOSHIBA, NEW DELHI	Approved
		10	VOLTAMP TRANSFORMERS LTD., GUJARAT	Approved
		11	KANOHAR ELECTRICALS LTD., UP	Not Approved
		12	TESLA TRANSFORMERS LTD., MADHYA PRADESH	Not Approved
16	**FIRE SEALING SYSTEM**	1	HILTI INDIA PRIVATE LIMITED, NEW DELHI	Approved
		2	LLOYD INSULATIONS (INDIA) LIMITED, NEW DELHI	Approved
		3	VIJAY SYSTEMS ENGINEERS PVT LTD., GUJARAT	Approved
		4	ASHARAM ENGINEERING AND FIRESTOP SYSTEM PRIVATE LIMITED, CHHATTISGARH	Not Approved
		5	MULTI KILFIRE PVT LTD., GUJARAT	Not Approved
		6	MURUGAPPA MORGAN THERMAL CERAMICS LTD., TAMIL NADU	Not Approved
		7	SIGNUM FIRE PROTECTION (INDIA) PVT LTD., MAHARASHTRA	Not Approved
		8	UNIFRAX INDIA PRIVATE LIMITED, GUJARAT	Not Approved
17	**GCB**	1	ABB SWITZERLAND LTD.,	Approved
		2	GRID SOLUTIONS SAS, FRANCE (Old Name:ALSTOM GRID SAS)	Approved
18	**LT HR PVC CONTROL CABLE**	1	CORDS CABLE INDUSTRIES LTD., NEW DELHI	Approved
		2	DELTON CABLES LTD., HARYANA	Approved
		3	DIAMOND POWER INFRASTRUCTURE LTD.	Approved
		4	GEMSCAB INDUSTRIES LTD., NEW DELHI	Approved
		5	HAVELLS INDIA LIMITED, NOIDA (UP)	Approved
		6	KEI INDUSTRIES LTD., NEW DELHI	Approved
		7	POLYCAB WIRES PVT. LTD., MUMBAI	Approved
		8	TORRENT CABLES LTD., GUJARAT	Approved

PV Seenaiah 23/10/18

Chief Engineer/TPC

Annexure

YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/PS-PEM

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. PEM Vendors Approval/D.No.51/18,Dt:23.10.2018

Sl. No	Package Name	Sl. No	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
		9	THERMO CABLES LTD., HYDERABAD	Approved
		10	UNIVERSAL CABLES LTD., MADHYA PRADESH	Approved
		11	SUYOG ELECTRICALS LTD., GUJARAT	Approved
		12	TORRENT POWER LTD., GUJARAT	Approved
		13	KEC INTERNATIONAL LIMITED, MUMBAI	Approved
		14	PARAMOUNT COMMUNICATIONS LTD., NEW DELHI	Approved
		15	ADVANCE CABLE TECHNOLOGIES (P) LTD., KARNATAKA	Approved
		16	CMI LTD., NEW DELHI	Not Approved
		17	ELKAY TELELINKS, NEW DELHI	Not Approved
		18	TEMPSENS INSTRUMENT (I) PVT LTD., RAJASTHAN	Not Approved
		19	TIRUPATI PLASTOMATICS PVT. LTD., RAJASTHAN	Not Approved
		20	SPECIAL CABLES PVT. LTD., NEW DELHI	Not Approved
		21	APAR INDUSTRIES LTD., MUMBAI	Approved
		22	CABLE CORPORATION OF INDIA LTD., MUMBAI	Approved
		23	GOYOLENE FIBRES (INDIA) PVT.LTD., MUMBAI	Not Approved
		24	RAVIN CABLES LIMITED, MUMBAI	Not Approved
		25	RADIANT CORPORATION PRIVATE LIMITED, TELANGANA	Not Approved
		26	SRIRAM CABLES PVT. LTD., NEW DELHI	Not Approved
		27	SERVEL INDIA PVT. LTD., NEW DELHI	Not Approved
19	**EPR INSULATED FIRE SURVIVAL CABLE**	1	APAR INDUSTRIES LIMITED, GUJARAT	Approved
		2	KEI INDUSTRIES, NEW DELHI	Approved
		3	SUYOG ELECTRICALS LTD., GUJARAT	Approved
		4	CMI LTD., NEW DELHI	Not Approved

P V Sooraj 23/10/18

Chief Engineer/TPC

TELANGANA POWER GENERATION CORPORATION LIMITED
(A Govt. Of Telangana Undertaking)
Vidyut Soudha, Hyderabad - 500082.
Phone: 040 – 23499261 Fax: 040 – 23499263.

From:	To:
The Chief Engineer, Thermal Projects Construction, TSGENCO, 3rd Floor, A-Block, Vidyut Soudha, Khiarathabad Hyderabad-500 082. cetpctgenco@gmail.com	M/s BHEL, Industrial Systems Group, P.B.No. 1249, Prof. C N R Rao Circle, IISc Post, Malleswaram, Bengaluru-560012 (P): 080-22184294 Email: amit_kumar@bhel.in

Kind Attention: Sri Amit Kumar, Sr. Manager (PMC)

Lr.No.ED/TPC/SE-3/EME-11/YTPS(5X800MW)/F.AHPVENDORS/D.No.53/18,Dt:24.10.18

Sir,

Sub: TSGENCO –YTPS (5X800MW) – AHP Sub-Vendor Approval-Reg.

Ref: 1) BHEL Letter Ref No: IS-1-15-2001/AHP Sub-Vendor Approval/08, Dt: 24.10.2018.
2) Lr.No.CE/TPC/SE-3/EME-11/YTPS(5X800MW)/F.VENDORS/D.No.49/18,Dt:11.09.18.

******

This is with reference to the letter (1) cited, wherein M/s BHEL requested to approve additional vendors for Ash Slurry Disposal Pipes package.

In this regard, it is to inform that Seven (7) Nos. of Vendors were already approved vide letter (2) cited for MSERW Pipes. Hence, approval of additional vendors cannot be considered now and M/s BHEL/ISG is requested to proceed with ordering of the Ash Slurry Disposal Pipes with the already approved Vendors.

Yours faithfully

P V Seshu 24/10/18

CHIEF ENGINEER/TPC

Copy communicated to:

1. DE/T to the Director(Projects)/TSGENCO, Vidyut Soudha, Hyderabad
2. Sri Y.A.Srinivas Rao, BHEL/PMG Camp Office, Vidyut Soudha, Hyderabad.
3. TCE, Site office, Room No.323, Vidyut Soudha, Hyderabad

	TELANGANA POWER GENERATION CORPORATION LIMITED (A Govt. Of Telangana Undertaking) Vidyut Soudha, Hyderabad - 500082. Phone: 040 – 23499261 Fax: 040 – 23499263.
From: The Chief Engineer, Thermal Projects Construction, TSGENCO, 3rd Floor, A-Block, Vidyut Soudha, Khiarathabad Hyderabad-500 082.	To: M/s Bharat Heavy Electricals Limited, Industrial Systems Group, P.B.No.1249, Prof.C N R Rao Circle, IISc Post, Malleswaram, Bangalore-560012

Attention:Sri Amit Kumar, Sr.Manager/Project Management & Commercial

Lr.No.CE/TPC/SE-3/EME-11/YTPS(5X800MW)/F.Vendors/D.No.54/18,Dt:29.10.2018

Sir,

Sub: TSGENCO –YTPS (5X800MW)– Additional Vendor for Ash Handling Package being supplied M/s BHEL/ISG, Bangalore – Approval - Reg.

Ref: 1. Lr.No.CE/TPC/SE-3/EME-11/YTPS(5X800MW)/F.Vendors/D.No.49/18,Dt:11.09.2018
2. M/s BHEL letter ref: IS-1-15-2001/AHP Sub-Vendor Approval/06, Dt.23.10.2018.

******

Please refer to the letter cited (2) above, wherein M/s BHEL/ISG, Bangalore has requested for approval of M/s Macawber Beekay Pvt. Ltd, Noida as additional vendor for Ash Handling Package for Yadadri Thermal Power Station (5X800MW). The same was reviewed and TSGENCO hereby accords approval for M/s Macawber Beekay Pvt. Ltd, Noida as additional vendor for Ash Handling Package for Yadadri Thermal Power Station (5X800MW).

Sl.No.	Item Description	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
1	**ASH HANDLING PACKAGE**	MACAWBER BEEKAY PVT.LTD, NOIDA	Approved

Please note that this approval of vendors for Supply of items for Ash Handling Package does not absolve M/s BHEL of its responsibility of supplying and conforming to the relevant specifications and standards as per the terms and conditions of the contract.

Yours faithfully

29/10/18

CHIEF ENGINEER/TPC

Copy communicated to:

1. The Chief Engineer/Construction/YTPS Site/Dameracherla/Nalgonda.
2. FA&CCA (Res.)&CFO/TSGENCO/Vidyut Soudha/Hyderabad.
3. SE/Tech to The Chairman & Managing Director/TSGENCO/Vidyut Soudha/Hyderabad.
4. Superintending Engineer/Civil/YTPS Site/Dameracherla/Nalgonda(Dist.).
5. Dy CCA, YTPS-II/Co-ordination/Dameracherla/Nalgonda(Dist.).
6. DE/Tech to Director (Projects)/TSGENCO/Vidyut Soudha/Hyderabad.
7. SAO/Pay&Accounts/TSGENCO/Vidyut Soudha/Hyderabad.
8. M/s Tata Consulting Engineers Limited,73/1,Sheriff Centre, St. Marks road, Bangalore-560 001.
9. TCE, Site office, Room No.323, Vidyut Soudha, Hyderabad
10. Sri Y.A.Srinivas Rao, BHEL/PMG Camp Office, Vidyut Soudha, Hyderabad.

O/C

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
Bharat Heavy Electricals Limited
(A Government of India Undertaking)
इण्डस्ट्रियल सिस्टम्स ग्रुप
INDUSTRIAL SYSTEMS GROUP

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पी. बी. नं 1249, प्रो सी एन आर राव सर्कल
आईआईएससी पोस्ट मल्लेश्वरम
बेंगलूरु - 560 012
P.B. No.1249, Prof. C N R Rao Circle
IISc Post Malleswaram
Bengaluru-560 012

BHEL Ref No: IS-1-15-2001/Additional Vendors-machines_01 Date: 31.10.2018

To,
The Chief Engineer,
Thermal Projects Construction,
TSGENCO, 3rd Floor, A-Block,
Vidyut Soudha, Khairatabad, Hyderabad-500082.

Dear Sir,

Sub: 5x800MW Yadadri, Approval of Additional Vendor for machines-reg
Ref: BHEL Letter No: IS-1-15-2001/Additional Vendors-machines dtd: 25.10.2018

In continuation to the BHEL letter Dtd: 25.10.2018 for vendor approval for YADADRI 5X800MW machines supply, we have received credentials of an additional vendor as below.

The following additional vendor given their offer for supplying machines for the said package. We were waiting for the attested credential documents from embassy of India in Russia which we have received on 29.10.2018. We have evaluated the credentials and sending these documents for your kind review and approval as per Annexure-A01 with this letter.

- M/s. Furnace Fabrica India Ltd, Kolkota (in collaboration with M/s JSC Heavy Engineering Ormeto-Yumz , Russia for Wagon Tippler/ Side arm charger & Stacker reclaimer Machines)

M/s. Furnace Fabrica India Ltd, Kolkota:
M/s. Furnace Fabrica India Ltd, Kolkota is a new vendor submitted offer for all the equipment of Machine package as listed in Annexure-A01, in collaboration with M/s JSC Heavy Engineering Ormeto-Yumz , Russia for Wagon Tippler/ Side arm charger & Stacker reclaimer Machines. Respective credentials are attached for your kind reference. The other machines like crusher, screens and paddle feeder, the proposed vendor M/s. Furnace Fabrica India Ltd, Kolkota will procure from TSGENCO approved sources.

Based on the above, kindly accord your approval for the above vendor, to enable us to finalize the offers at the earliest and proceed with ordering.

Thanking you and assuring our best services all the time.

Yours faithfully,
For BHARAT HEAVY ELECTRICALS LTD.

R. Tirupati Rao

(R Tirupati Rao)
Addl. General Manager /Head Engg (Mech.)

Telangana State Power Generation Ltd

ANNEXURE-A01

List of Proposed Vendors for approval of TSGENCO for 5X800MW YADADRI TPS				
Coal Handling Plant (CHP) MACHINES- PROPOSED VENDOR LIST -002				
BHEL Unit: BHEL-ISG				Date: 31.10.18
Sl.No.	Item Description	Proposed Vendors for Yadadri 5X800MW	The following Approved vendors status as per TSGENCO letter for KTPS (1X800MW) Ref: 1) Lr. No.CEE/111/KTPS-VII(1X800MW)/Vendors/D.No.86/15, Dt. 25.05.2015 2) Lr. No.CEE/111/KTPS-VII(1X800MW)/Vendors/D.No.15/15, Dt. 09.04.2015	Remarks
1	STACKER & RECLAIMER	Larsen & Toubro, CHENNAI	Approved	All details given with the Letter Ref. IS-1-15-2001/Additional Vendors-machines Dtd. 25.10.2018
		ELECON EPC PROJECTS LIMITED (Formerly Elecon Engineering Co., Ltd), VALLABH VIDYANAGAR-		
		ThyssenKrupp Limited, PIMPRI PUNE		
		Mcnally Bharat Engineering Ltd, KOLKATA		
		Tenova India Pvt. Ltd. Chennai	Additional Vendor	
		Hunan Changzhong Machinery Co. Ltd., China	Additional Vendor	
		M/s JSC Heavy Engineering Ormeto-Yumz , Russia	**Additional Vendor**	**Seeking for approval.** Credentials given in Annexure
2	WAGON TIPPLER & SIDE ARM CHARGER	Larsen & Toubro, CHENNAI	Approved	All details given with the Letter Ref. IS-1-15-2001/Additional Vendors-machines Dtd. 25.10.2018
		ELECON EPC PROJECTS LIMITED (Formerly Elecon Engineering Co., Ltd), VALLABH VIDYANAGAR-		
		ThyssenKrupp Limited, PIMPRI PUNE		
		Mcnally Bharat Engineering Ltd, KOLKATA		
		Tennova India Pvt. Ltd. Chennai	Additional Vendor	
		Wuhan Power Equipment factory, China (Collaborator of M/s. Hunan Changzhong Machinery Co. ltd, China)	Additional Vendor	
		M/s JSC Heavy Engineering Ormeto-Yumz , Russia	**Additional Vendor**	**Seeking for approval.** Credentials given in Annexure
3	SCREEN	Larsen & Toubro, CHENNAI	Approved	All details given with the Letter Ref. IS-1-15-2001/Additional Vendors-machines Dtd. 25.10.2018
		ELECON EPC PROJECTS LIMITED (Formerly Elecon Engineering Co., Ltd), VALLABH VIDYANAGAR-		
		Mcnally Bharat Engineering Ltd, KOLKATA		
		ThyssenKrupp Limited, PIMPRI PUNE	Additional Vendor	
		M/s Shandong Shankung Machinery Co. Ltd. China (Collaborator of M/s. Hunan Changzhong Machinery Col ltd, China)	Additional Vendor	
4	CRUSHERS	Larsen & Toubro, CHENNAI	Approved	All details given with the Letter Ref. IS 1-15-2001/Additional Vendors-machines Dtd. 25.10.2018
		ELECON EPC PROJECTS LIMITED (Formerly Elecon Engineering Co., Ltd), VALLABH VIDYANAGAR-		
		ThyssenKrupp Limited, PIMPRI PUNE		
		Mcnally Bharat Engineering Ltd, KOLKATA		
		M/s Shandong Shankung Machinery Co. Ltd. China (Collaborator of M/s. Hunan Changzhong Machinery Co. ltd, China)	Additional Vendor	
5	PADDLE FEEDER	Larsen & Toubro, CHENNAI	Approved	All details given with the Letter Ref. IS-1-15-2001/Additional Vendors-machines Dtd. 25.10.2018
		ELECON EPC PROJECTS LIMITED (Formerly Elecon Engineering Co., Ltd), VALLABH VIDYANAGAR-		
		ThyssenKrupp Limited, PIMPRI PUNE		
		Mcnally Bharat Engineering Ltd, KOLKATA	Additional Vendor	
		M/s Shandong Shankung Machinery Co. Ltd. China (Collaborator of M/s. Hunan Changzhong Machinery Co. ltd, China)	Additional Vendor	

O/C

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
Bharat Heavy Electricals Limited
(A Government of India Undertaking)
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आईआईएससी पोस्ट मल्लेश्वरम
बेंगलूरू - 560 012
P.B. No.1249, Prof. C N R Rao Circle
IISc Post Malleswaram
Bengaluru-560 012

BHEL Ref No: IS-1-15-2001/Additional Vendors-machines Date: 25.10.2018

To,
The Chief Engineer,
Thermal Projects Construction,
TSGENCO, 3rd Floor, A-Block,
Vidyut Soudha, Khairatabad, Hyderabad-500082.

30/10/2018

Dear Sir,

Sub: 5x800MW Yadadri, Approval of Additional Vendors for machines-reg.

We have floated enquiry on open tender basis for Machines package (i.e Wagon Tippler, Side Arm Charger, Apron feeder, Stacker/ Reclaimer, Paddle feeder, Crusher & Screen) for Yadadri 5X800MW TPS project. Offers of following vendors have been technically reviewed by us and found in order and these vendors are meeting the BHEL's technical PQ criteria stipulated for this package.

1. M/s L&T, Kolkata
2. M/s Elecon, Anand
3. M/s McNally Bharat Engineering Ltd, Kolkata
4. M/s Thyssen Krup Limited, Pimpri Pune
5. M/s Tenova India Pvt. Ltd., Chennai
6. M/s Hunan Changzhong Machinery Co. Ltd., China (in collaboration with M/s Wuhan Power Equipment factory, China & M/s Shandong Shankung Machinery Co. Ltd., China)

Vendors under Sl. 1 & 2, i.e, M/s L&T and M/s Elecon have been approved for all the machines of this package for KTPS project as per attached list (Annexure-A).

Vendors under Sl no 3 to 6, approval is required as mentioned below. (Details enclosed in attached Annexure-A)

3) M/s Mc Nally Bharat Engineering Ltd, Kolkata:
   As per the KTPS approved vendor list this vendor is approved for the above machines except Paddle Feeder. Credentials of Paddle Feeder are attached for your review and approval.
4) M/s Thyssen Krup Limited, Pimpri Pune:
   As per the KTPS approved vendor list, this vendor is approved for the above machines except Screen. Credentials of Screen are attached for your review and approval.
5) M/s Tenova India Pvt. Ltd. Chennai:
   M/s Tenova India Pvt Ltd is a new vendor proposed for approval of Wagon Tippler, Stacker Reclaimer. Credentials of the same are attached for your review and approval. Other machines like Crusher, Screen and Paddle feeders will be sourced by them from approved vendors of TSGENCO. Currently M/s Tenova is executing and supplying Portal Reclaimer for Maitree Bangladesh Project (2X660MW) for BHEL-ISG.

6) M/s Hunan Changzhong Machinery Co. Ltd., China:
M/s Hunan Changzhong Machinery Co. Ltd., China is a new vendor submitted offer for all the equipments of Machine package as listed in Annexure-A, in collaboration with M/s Wuhan Power Equipment factory, China for supplying Wagon Tippler, Side arm charger and M/s Shandong Shankung Machinery Co. Ltd. China for supplying Crushers, Screens & Paddle Feeders. Respective credentials are attached for your kind review and approval. Currently M/s
Hunan is executing Stacker reclaimer package for NTPC, North Karanpura ((3X660MW) and BIFPCL Maitree, Bangladesh (2x660MW) projects for BHEL ISG.

Based on the above, kindly accord your approval for the above vendors, to enable us to finalize the offers at the earliest and proceed with ordering.

Thanking you and assuring our best services all the time.

Yours faithfully,
For BHARAT HEAVY ELECTRICALS LTD.

R. Tirupati Rao

(R Tirupati Rao)
Addl. General Manager /Head Engg (Mech.)

TELANGANA STATE POWER GENERATION CORPORATION LIMITED
(A Govt. Of Telangana Undertaking)
Vidyut Soudha, Hyderabad - 500082.
Phone: 040 – 23499261 Fax: 040 – 23499263.

From:	To:
Chief Engineer, Thermal Projects Construction, TSGENCO, 3rd Floor, A-Block, Vidyut Soudha, Khiarathabad Hyderabad-500 082.	M/s Bharat Heavy Electricals Limited, Industrial Systems Group, P.B.No.1249, Prof.C N R Rao Circle, IISc Post, Malleswaram, Bangalore-560090

Attention:Sri Amit Kumar, Sr.Manager/Project Management & Commercial

Lr.No.CE/TPC/SE-3/EME-11/YTPS(5X800MW)/F.AHP Vendors/D.No.63/18,Dt:14.11.2018

Sir,

Sub: TSGENCO –YTPS (5X800MW) – AHP Sub-vendor Approval -Reg

Ref:1. Lr.No.CE/TPC/ SE-3/EME-11/YTPS (5x800MW)/F.AHP Vendors/D.No.49/18, Dt:11-09-2018
2. M/s BHEL letter ref: IS-1-15-2001/AHP Sub-Vendor Approval/08, Dt.24-10-2018
3. Lr.No.CE/TPC/ SE-3/EME-11/YTPS (5x800MW)/F.AHP Vendors/D.No.53/18, Dt:24-10-2018
4. M/s BHEL letter ref: IS-1-15-2001/AHP Sub-Vendor Approval/09, Dt.25-10-2018

******

This has the reference to the letter (4) cited, wherein M/s BHEL/ISG, Bangalore requested for approval of additional sub-vendors for Ash Slurry Disposal MSERW Pipes.

In this connection it is to inform that the letters issued from this office vide ref (1) and (3) holds good and M/s BHEL/ISG is requested to proceed with ordering of the Ash Slurry Disposal MSERW Pipes with the already approved vendors.

Yours faithfully

14/11/18

CHIEF ENGINEER/TPC

Copy communicated to:

1. DE/Tech to Director (Projects)/TSGENCO/Vidyut Soudha/Hyderabad.
2. TCE, Site office, Room No.323, Vidyut Soudha, Hyderabad
3. Sri Y.A.Srinivas Rao, BHEL/PMG Camp Office, Vidyut Soudha, Hyderabad.

	TELANGANA STATE POWER GENERATION CORPORATION LIMITED (A Govt. Of Telangana Undertaking) Vidyut Soudha, Hyderabad - 500082. Phone: 040 – 23499261 Fax: 040 – 23499263

From:	To:
The Chief Engineer, Thermal Projects Construction, TSGENCO, 3rd Floor, A-Block, Vidyut Soudha, Khiarathabad Hyderabad-500 082. cetpctgenco@gmail.com	M/s Bharat Heavy Electricals Limited, Component Fabrication Plant, Rudrapur (U S Nagar)-263153, Uttarakhand. T : 05944 - 257250 Email: rupesh@bhel.in

Kind Attention:Sri Rupesh Kumar, Dy Mgr.

Lr.No.CE/TPC/SE-3/EME-11/YTPS/F. Rud Vendors Approval/D.No. 70 /18,Dt:18.12.2018

Sir,

Sub: TSGENCO – Yadadri TPS (5X800MW) – Approval of Vendors furnished by M/s BHEL/ Rudrapur unit - Reg.

Ref: BHEL/RUD/ENGG./YADADRI/16-095-A-2/903/005,Dt:13/07/2018.

******

Please refer to the letter cited above, wherein M/s BHEL/ Rudrapur has requested for approval of vendors for Yadadri TPS (5X800MW). The same was reviewed and TSGENCO hereby accords approval for the vendors. The list of approved vendors is enclosed as Annexure.

Please note that this approval of vendors for Supply of following list of items does not absolve M/s BHEL of its responsibility of supplying and conforming to the relevant specifications and standards as per the terms and conditions of the contract.

Encl: List of TSGENCO Approved Vendors of M/s BHEL/Rudrapur Unit.

Yours faithfully,

Chief Engineer/TPC

Copy communicated to:

1. The Chief Engineer/Construction/YTPS Site/Dameracherla/Nalgonda.
2. FA&CCA (Res.)&CFO/TSGENCO/Vidyut Soudha/Hyderabad.
3. SE/Tech to The Chairman & Managing Director/TSGENCO/Vidyut Soudha/Hyderabad.
4. Superintending Engineer/Civil/YTPS Site/Dameracherla/Nalgonda(Dist.).
5. Dy CCA, YTPS-II/Co-ordination/Dameracherla/Nalgonda(Dist.).
6. DE/Tech to Director (Projects)/TSGENCO/Vidyut Soudha/Hyderabad.
7. SAO/Pay & Accounts/TSGENCO/Vidyut Soudha/Hyderabad.
8. M/s Tata Consulting Engineers Limited,73/1,Sheriff Centre, St. Marks road, Bangalore-560 001.
9. TCE, Site office, Room No.323, Vidyut Soudha, Hyderabad
10. Sri Y.A.Srinivas Rao, BHEL/PMG Camp Office, Vidyut Soudha, Hyderabad.

Annexure

YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/RUDRAPUR

Sl. No.	Package name	Sl. No.	Vendor proposed for approval	TSGENCO Remarks for YTPS (5x800MW)
1	Rubber Bellow	1	M/s Cori Engineers Pvt. Ltd., Chennai	Approved
		2	M/s Resistoflex Pvt. Ltd., Noida	Approved
		3	M/s The Rubber Products Ltd., Mumbai	Approved
		4	M/s Unirub Techno India Pvt. Ltd., Ludhiana	Approved
		5	M/s United Rubber Industries, Mumbai	Approved
		6	M/s Indian Rubber Products, Haridwar	Not Approved
		7	M/s Kanwal Industries Corporation, Noida	
2	Neutral Grounding Resistor	1	M/s Amp. Control Equipments Pvt. Ltd., Pune	Approved
		2	M/s Bhartia Cutler Hammer, Faridabad	Approved
		3	M/s Essen Electricals, Bangalore	Approved
		4	M/s Lachhman Electronics, New Delhi	Approved
		5	M/s RSI Switchgear, Bhiwadi	Approved
		6	M/s SR Narkhede Engg. Pvt. Ltd., Pune	Approved
		7	M/s Resitech Electricals Pvt. itd, Kolkata	Not Approved
		8	M/s Stesalit Telema, Solan, Himachal Pradesh	Approved
3	Neutral Grounding Transformer	1	M/s Pragati Electricals Pvt. Ltd., Thane	Approved
		2	M/s Prayog Electricals Pvt. Ltd., Pune	Approved
4	Lightning Arrester	1	M/s Elpro International Ltd., Pune	Approved
		2	M/s Oblum Electronics, Hyderabad	Approved
5	Surge Capacitor	1	M/s ABB India Pvt Ltd., Dehradun	Approved
		2	M/s Madhav Capacitor Pvt. Ltd., Pune	Approved
		3	M/s Magnawine Magnetics, Sangli	Approved
6	Current Transformer / Voltage Transformer	1	M/s Electrical Control & Systems, Vadodara	Approved
		2	M/s Kalpa Electricals, Bangalore	Approved
		3	M/s Mehru Electrical, Bhiwadi	Approved
		4	M/s Pragati Electricals Pvt. Ltd., Navi Mumbai	Approved
		5	M/s Prayog Electricals Pvt. Ltd., Pune	Approved
		6	M/s Paras Power Engg Pvt. Ltd., Bangalore	Approved
		7	M/s Silkaans Electrical Mfg. Co. Pvt. Ltd., Navi Mumbai	Approved
		8	M/s Vidyut Udyog, Nashik	Approved
7	Epoxy Insulator	1	M/s Krishna Polymers, Ghaziabad	Not Approved
		2	M/s A-Bond Strands Pvt. Ltd., Chennai	Approved
		3	M/s Baroda Bushing & Insulator, Vadodara	Approved
		4	M/s Baroda Mould & Dies, Vadodara	Approved
		5	M/s India Insulator, Miraj, Sangli	Not Approved
		6	M/s Ganpati Fibertech India (P) Ltd., Noida	Approved

CHIEF ENGINEER/TPC

Annexure

YADADRI TPS(5X800MW) Approved Vendors List-M/s BHEL/RUDRAPUR

8	Epoxy Seal Off Bushing	1	M/s A-Bond Strands Pvt. Ltd., Chennai	Approved
		2	M/s Baroda Bushing & insulator, Vadodara	Approved
		3	M/s Baroda Mould & Dies, Vadodara	Approved
		4	M/s Ganpati Fibertech India (P) Ltd., Noida	Approved
		5	M/s Krishna Polymers, Ghaziabad	Not Approved
9	Hot Air Blowing Equipment (HAB) / Air Pressurization Equipment (APE)	1	M/s Elmech Pneumatic Industries, New Delhi	Approved
		2	M/s Mellcon Engineers Pvt. Ltd., New Delhi	Approved
10	SPPT, LAPT & NG Cubicle Assembly	1	M/s BHEL	Approved
		2	M/s Mika Engineers, Mumbai	Approved
		3	M/s Pyrotech Electronics Pvt. Ltd., Udaipur	Approved
		4	M/s RSI Switchgear Pvt. Ltd., Bhiwadi	Approved
		5	M/s Power Gear Ltd., Bangalore	Approved
		6	M/s Karolia Lighting, Rudrapur	Not Approved
		7	M/s Stesalit Telema, Solan, Himachal Pradesh	
11	Copper Strip Flexible/Copper Braided Flexible	1	M/s B.B. Electro Technique, Mumbai/Thane	Approved
		2	M/s Cuprum Indusries, Bhopal	Approved
		3	M/s Forward Engg. Industries, Bhopal	Approved
		4	M/s Rashm Enterprise, Bhopal	Approved
		5	M/s Shree Cable & Conductors Pvt. Ltd., Bhopal	Approved
		6	M/s Dalmia Construction, Mumbai	Approved
		7	M/s SRG Metal Craft, New Delhi	Approved
		8	M/s Karolia Lighting, Rudrapur	Not Approved
12	Support Structure	1	M/s Anil Steels Pvt. Ltd., Sonipat	Approved
		2	M/s Passive Infra projects Ltd., Rohtak	Approved
		3	M/s R S Infraproject, New Delhi	Approved
		4	M/s Saral Industries, Raibareilly	Approved
		5	M/s Nexo Structure, Ludhiana	Approved
		6	M/s Richardson & Crudas, Nagpur	Approved
		7	M/s Jamna Metal Company, New Delhi	Approved
		8	M/s Pioneer Fabricators, Meerut	Not Approved
		9	M/s Srishti Metals Pvt. Ltd., Sonipat	
		10	M/s Anjana Steel Industries Pvt Ltd., Kolkata	
		11	M/s Saxena Marine Tech Pvt Ltd., Ghaziabad	
		12	M/s Bhilai Engineering Corporation Ltd., Bhilai	
		13	M/s Nampa Steel & Power India Pvt Ltd, Kokata	

14/11/11

CHIEF ENGINEER/TPC

TELANGANA STATE POWER GENERATION CORPORATION LIMITED
(A Govt. of Telangana Undertaking)
Vidyut Soudha, Hyderabad - 500082. www.tsgenco.telangana.gov.in
Phone: 040 – 23499261 Fax: 040 – 23499263.

From:	To:
The Chief Engineer, Thermal Projects Construction, TSGENCO, Vidyut Soudha, Khairatabad, Hyderabad-500 082. Email ID: cetpctgenco@gmail.com	M/s. Bharat Heavy Electrical Limited, Industrial Systems Group, Prof. C.N.R. Rao Circle, Iisc Post Malleswaram, Bengaluru – 560012. Email: rtr@bhel.in

Lr.No.CE/TPC/SE-3/EME-7/YTPS(5X800MW)/F.NO.Vendor/D.No.76 /19, Dt:04.10.2019.

Sir,

Sub: TSGENCO – Yadadri TPS (5X800MW) – Approval of Sub-Vendors for LHP (Limestone Handling Plant) & GHP (Gypsum Handling Plant) of FGD package - Issued - Reg.

Ref: 1. M/s. BHEL/ISG Ref No: IS-1-15-2001/Yadadri-FGD Pkg., Dt: 27.08.2019.
2. M/s. BHEL/ISG email dt: 11.09.2019.
3. M/s. TCE Ltr. No. TCE.11005A/PJ/K/042, Dt: 13.09.2019.

*****

Please refer to the letter 1st cited above, wherein M/s BHEL/ISG/Bengaluru furnished the credentials of following sub-vendors for Limestone Handling Plant (LHP) and Gypsum Handling Plant (GHP) of FGD Package pertaining to YTPS (5X800 MW).

In this regard, the credentials of following sub-vendors are reviewed and recommendations of TSGENCO are tabulated as below for Limestone Handling Plant and Gypsum Handling Plant pertaining to YTPS (5X800 MW).

Sl. No.	Package/Plant	Name of Vendor	TSGENCO Remarks/ Recommendations
1	Limestone Handling Plant and Gypsum Handling Plant.	M/s. Bengal Tools Limited, Kolkata.	Approved
		M/s. Macawber Beekay Private Limited, Noida.	Approved
		M/s. OSM Projects Private Limited, Faridabad.	Not Approved.
		M/s. Hamtek Technologies India Private Limited, Hyderabad.	Not Approved.

Please note that the approval of above vendors for Limestone Handling Plant and Gypsum Handling Plant pertaining to YTPS(5X800 MW) does not absolve M/s BHEL of its responsibility of supplying and conforming to the relevant specifications and standards as per the terms and conditions of the contract.

Yours faithfully,

P. V. Sesu 4/10/19

CHIEF ENGINEER/TPC

Copy to:
1. The Chief Engineer/Construction/YTPS Site/Dameracherla/Nalgonda.
2. FA&CCA (Res.)&CFO/TSGENCO/Vidyut Soudha/Hyderabad.

3. SE/Tech to the Chairman & Managing Director/TSGENCO/Vidyut Soudha/Hyderabad.
4. Superintending Engineer/Civil/YTPS Site/Dameracherla/Nalgonda(Dist.).
5. Dy CCA, YTPS-II/Co-ordination/Dameracherla/Nalgonda(Dist.).
6. DE/Tech to the Director (Projects)/TSGENCO/Vidyut Soudha/Hyderabad.
7. SAO/Pay&Accounts/TSGENCO/Vidyut Soudha/Hyderabad.
8. M/s Tata Consulting Engineers Limited,73/1,Sheriff Centre, St. Marks road, Bangalore-560 001.
9. M/s.TCE, Site office, Room No.323, Vidyut Soudha, Hyderabad
10. Sri Y.A.Srinivas Rao, BHEL/PMG Camp Office, Vidyut Soudha, Hyderabad.

TELANGANA STATE POWER GENERATION CORPORATION LIMITED
(A Govt. Of Telangana Undertaking)

Vidyut Soudha, Hyderabad - 500082. www.tsgenco.telangana.gov.in

From:	To:
The Chief Engineer, Thermal Projects Construction, TSGENCO, Vidyut Soudha, Khairatabad, Hyderabad-500 082. E-Mail:cetpctgenco@gmail.com	M/s BHEL/Trichy, High Pressure Boiler Plant, Tiruchirappalli – 620 014. E-Mail:rtoppo@bhel.in

Kind Attention: Sri Rahul Toppo, Dy Manager/Commercial(FB), BHEL/Trichy

Lr.No.CE/TPC/421/YTPS (5X800 MW)/C&I-Vendors/D.No. 78 /2020, Dt:09.07.2020

Sir,

Sub: TSGENCO - YTPS-(5X800MW) – C&I Vendor/Additional Vendor Approval for supply of equipment as proposed by M/s BHEL/ TRICHY - Approval accorded - Reg.

Ref: 1) M/s.BHEL Ref:TP/11497/Vendor List/06, dt.21.12.2019.

2) M/s.TCE Ref:. No:TCE.11005A/PJ/K/069 dt:02.07.2020.

* * *

With reference to the M/s BHEL/Trichy request letter (1) and M/s TCE Comments cited in ref(2) above, regarding Controls & Instrumentation Vendor/Additional Vendor Approval for supply of equipment as proposed by M/s BHEL/ TRICHY, after careful examination TSGENCO remarks on additional vendor for supply of equipment as proposed by M/s BHEL/ TRICHY for YTPS (5X800 MW) project is as follows.

SNo	Item description	BHEL Proposed Addl. Vendor	TSGENCO Remarks
1.	Mass Flow Meter	ABB LIMITED, CHENNAI.	Approved
2.	ORIFICE PLATE ASSEMBLY	IA FLOW ELEMENTS PVT.LTD., CHENNAI	Approved
3.	FLOW NOZZLE	IA FLOW ELEMENTS PVT.LTD., CHENNAI	Approved
4.	FRP JUNCTION BOX	TECHNO GRIP,NAVSARI	Approved
5.	ERV CONTROLLER	VENKAT ELECTRONICS, TRICHY	Approved

SNo	Item description	BHEL Proposed Addl. Vendor	TSGENCO Remarks
6.	GAUGES: PRESSURE GAUGE	GOA INSTRUMENT INDUSTRIES, GOA	Approved
		GAUGES BOURDON(I) PVT LTD, PANVEL	Approved
		TEMPSENS INSTRUMENTS (I) PVT.LTD.,UDAIPUR	Approved
		NEW SCIENTIFIC REPAIRS AND TRADING COMPANY, KOLKATA	Approved
7.	GAUGES: TEMPERATURE GAUGE	PRESSURE AND TEMPERATURE CONTROL, KOLKATA	Approved
		TEMPSENS INSTRUMENTS (I) PVT.LTD.,UDAIPUR	Approved
		NEW SCIENTIFIC REPAIRS AND TRADING COMPANY, KOLKATA	Approved
8.	FLAME SCANHEAD ELECTRONICS CARD	VERATRONIKS,/HYDERABAD	Approved
9.	SONICTUBE ASY&SENSOR ASSY	JAGANNATHAN ENGINEERING WORKS ,TIRUCHIRAPALLI	Approved
		ESSEN INSTRUMENTATION & Electricals, TRICHY	Approved
10	HIGH PR. STARTUP SCV CONTROL VALVE	M/ s EMERSON PROCESS MANAGEMENT PVT LTD	Approved
11	ACTUATOR: PNEUMATIC REGULATOR	INSTRUMENTATION LTD., /KERALA	Approved
		KELTRON CONTROLS,/AROOR	Approved
12	ACTUATOR: PNEUMATIC(O/C)	SMC CORPORATION (INDIA) PVT. LTD.,/NOIDA.	Approved
		RMEBS CONTROLS PVT LTD,/THANE	Approved
13	STEEL SHEET JUNCTION BOXES	HULASI METALS PVT LTD, JAIPUR	Approved
		TECHNO GRIP, NAVSARI	Not Approved
		SAJAS ELECTRICALS, TRICHY	Approved
		SCG Ex d TECH PVT. LTD., CHENNAI	Not Approved
		VENKAT ELECTRONICS, TRICHY	Approved
		SHIBSHA INSTRUMENTS(INDIA) P.LTD., CHENNAI	Not Approved
		NITYA ELECTROCONTROLS PVT LTD, NOIDA	Approved

SNo	Item description	BHEL Proposed Addl. Vendor	TSGENCO Remarks
14	COMPENSATING / EXTENSION CABLE	CMI LIMITED, FARIDABAD	Not Approved
		KEI INDUSTRIES LIMITED, NEW DELHI	Not Approved
		UDEY PYROCABLES PVT LTD, MUMBAI	Approved
		ASSOCIATED CABLES PVT LTD, MUMBAI	Approved
15	SOLENOID VALVE	M/s IMI NORGREN HERION PVT. LTD, Noida,U.P	Approved

Please note that this C&I Vendor/Additional Vendor Approval for supply of equipment as proposed by M/s BHEL/ TRICHY does not absolve M/s BHEL of its responsibility of supplying and conforming to the relevant specifications and standards as per the terms and conditions of the contract.

Yours faithfully

CHIEF ENGINEER/TPC

Copy communicated to:

1. The Chief Engineer/Construction/YTPS Site/Dameracherla/Nalgonda.
2. SE/Tech to The Chairman & Managing Director/TSGENCO/Vidyut Soudha/HYD.
3. Superintending Engineer/Civil/YTPS Site/Dameracherla/Nalgonda(Dist.).
4. Dy CCA, YTPS-II/Co-ordination/Dameracherla/Nalgonda(Dist.).
5. DE/Tech to Director (Projects)/TSGENCO/Vidyut Soudha/Hyderabad.
6. SAO/Pay & Accounts/TSGENCO/Vidyut Soudha/Hyderabad.
7. M/s Tata Consulting Engineers Limited,73/1,Sheriff Centre, St. Marks road, Bangalore-560 001.
8. TCE, Site office, Room No.323, Vidyut Soudha, Hyderabad
9. Sri Y.A.Srinivas Rao, BHEL/PMG, Vidyut Soudha, Hyderabad.

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
Bharat Heavy Electricals Limited
(A Government of India Undertaking)
इण्डस्ट्रियल सिस्टम्स ग्रुप
INDUSTRIAL SYSTEMS GROUP

फोन/Phone : +91 80 2218 4294
फैक्स/Fax : +91 80 2356 2713
ई-मेल/E-mail : amit_kumar@bhel.in
पी.बी.नं 1249, प्रो.सी एन आर राव सर्कल
आईआईएससी पोस्ट मल्लेश्वरम
बेंगलुरु - 560 012
P.B. No.1249, Prof. C N R Rao Circle
IISc Post Malleswaram
Bengaluru -560 012

BHEL Ref No: IS-1-15-2001/AHP Sub-Vendor Approval/09 Dtd:25.10.2018

The Chief Engineer/TPC,
TSGENCO,
Vidyut Soudha, Khairatabad,
Hyderabad-500082
Telangana State.

Dear Sir,

Sub: 5 x 800 MW Yadadri TPS AHP Sub-Vendor Approval Reg.
TSGENCO Lr. No. CE/TPC/SE- 3/ EME- LI /YTPS(5X800MW)/F.VEN DORS/D.No.49/18, 11.09.18.
BHEL letter Ref No: IS-1-15-2001/AHP Sub-Vendor Approval/08 dated 24.10.18
TSGENCO Lr No. ED /TPC /SE-3 /EME-11/YTPS(5X800MW)/F.AHPVENDORS/D.No.53/18,24.10.18

We would like to inform you that BHEL ISG have floated open tender enquiry through E-Procurement for Ash Slurry Disposal MSERW Pipe (400 NB). Enquiry was addressed to all 7 approved vendors also specifically to quote against our tender enquiry. Response status against this enquiry is indicated below.

Sl. No	Approved vendors	Response against BHEL enquiry	Remarks
1	Steel Authority of India Limited (Sail)	Quoted	Technically qualified
2	Welspun Corp Limited	Quoted	Technically qualified
3	Asian mills private Limited	Not Quoted	
4	Rathnamani Metals & tubes	Not Quoted	
5	Surya Roshni Limited	Quoted	Technically qualified
6	JCO Gas pipe limited	Not Quoted	Not manufacturing 400 NB MSERW pipe
7	Jotindra steel & tubes limited	Not Quoted	Not manufacturing 400 NB MSERW pipe
	Vendor quoted but not qualified		
1	Dhanwant Metal Corporation	Quoted	Technically not qualified
	Request for additional vendors approval		
1	Maharashtra Seamless Limited	Quoted	Technically qualified
2	Jindal India Limited	Quoted	Technically qualified

Kindly note that out of 7 approved parties, 2 parties are not manufacturing the 400 NB MSERW pipe. Against balance 5 approved parties, 3 parties have quoted and found technically qualified.

M/s Jindal India Limited and M/s Maharashtra Seamless Limited have also quoted for the tender who are reputed supplier of MSERW pipes. They are meeting the qualification requirements and qualified for the tender also.

In view of above, we request you once again to review the credentials of 2 additional sub- vendors (M/s Jindal & M/s Maharashtra Seamless) and kindly accord approval at the earliest in order to enable us to proceed with ordering of the Ash Slurry Disposal Pipes.

Thanking you and assuring you of our best services always,

Yours faithfully,

Amit Kumar
Sr. Manager (PMC)

Enclosure: -
1. Maharashtra Seamless Ltd Credential
2. Jindal India Ltd Credential

Copy to: -
1. Shri Y.A. Srinivasa Rao GM (PMG) /BHEL

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
Bharat Heavy Electricals Limited
(A Government of India Undertaking)
इण्डस्ट्रियल सिस्टम्स ग्रुप
INDUSTRIAL SYSTEMS GROUP

फोन/Phone : +91 80 2218 4294
फैक्स/Fax : +91 80 2356 2713
ई-मेल/E-mail : amit_kumar@bhel.in
पी.बी.नं 1249, प्रो.सी एन आर राव सर्कल
आईआईएससी पोस्ट मल्लेश्वरम
बेंगलुरु - 560 012
P.B. No.1249, Prof. C N R Rao Circle
IISc Post Malleswaram
Bengaluru -560 012

BHEL Ref No: IS-1-15-2001/AHP Sub-Vendor Approval/09 Dtd:25.10.2018

The Chief Engineer/TPC,
TSGENCO,
Vidyut Soudha, Khairatabad,
Hyderabad-500082
Telangana State.

Dear Sir,

Sub: 5 x 800 MW Yadadri TPS AHP Sub-Vendor Approval Reg.
TSGENCO Lr. No. CE/TPC/SE- 3/ EME- LI /YTPS(5X800MW)/F.VEN DORS/D.No.49/18, 11.09.18.
BHEL letter Ref No: IS-1-15-2001/AHP Sub-Vendor Approval/08 dated 24.10.18
TSGENCO Lr No. ED /TPC /SE-3 /EME-11/YTPS(5X800MW)/F.AHPVENDORS/D.No.53/18,24.10.18

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Thanking you and assuring you of our best services always,

Yours faithfully,

Amit Kumar
Sr. Manager (PMC)

Enclosure: -
1. Maharashtra Seamless Ltd Credential
2. Jindal India Ltd Credential

Copy to: -
1. Shri Y.A. Srinivasa Rao GM (PMG) /BHEL

TELANGANA STATE POWER GENERATION CORPORATION LIMITED
VIDYUT SOUDHA::HYDERABAD - 500082.
CIN:U40102TG2014SGC094070 Phone:040-23499261,Fax:040-23499263.
Web site:www.tsgenco.co.in email id: cetpctgenco@gmail.com

From:
Chief Engineer,
Thermal Projects Construction,
TSGENCO, 3rd Floor, A-Block,
Vidyut Soudha, Khiaratabad
Hyderabad-500 082.

To:
M/s Bharat Heavy Electricals Limited,
Power Sector-PEM,PPEI Building,
Plot No.25,Sector-16A,
Noida-201301(U.P).Tel: 0120-4368714
Email: shahwazahmed@bhel.in

Attention: Sri Shahwaz Ahmed, Dy.Engr/PG II

Lr.No.CE/TPC/SE-3/EME-14/YTPS/F.PEM Vendor Approval/D.No.01 /21,Dt:04.01.2021

Sir,

Sub: TSGENCO – YTPS(5X800MW) – Approval of sub vendors of M/s THERMOSYSTEMS PVT. LTD.,HYDERABAD for Miscellaneous Tanks Package(Site fabricated) furnished by M/s BHEL/ PEM unit – Regarding.

Ref: 1) Lr.No. CE/TPC/SE-3/EME-11/YTPS/F.PEM Vendors Approval/D.No.51/18,Dt:23.10.2018.
2) M/s BHEL/PEM LOI to M/s THERMOSYSTEMS PVT.LTD.,HYD.(LOI No.PW/PE/PG/YAD/P-69/20, dated:11.08.2020.
3) M/s BHEL/PEM Lr. Ref: PEM/PG-II/417/0467M dated 16.12.2020.
4) kick off meeting held on 26.02.2018 & 27.02.2018 at TSGENCO Headquarters, Hyderabad
5) Lr.No.CE/TPC/SE-3/EME- 9/ YPTS (5X800MW)/ F.No.vendors/D.No.109/18,Dt:9.11.2018.
6) Lr.No.CE/C/T/SE/TCD-I/EE/TCD-I/F.YTPS Bidders/D.No.194/2019,Dt:13.11.2019.
7) Lr.No.CE/C/T/SE/TCD-I/EE/TCD-I/F.YTPS Bidders/D.No.365/2019-20,Dt:27.03.2020.

******

Please refer to the letter 3rd cited above, wherein M/s BHEL/PEM has requested for approval of sub vendors of M/s THERMOSYSTEMS PVT. LTD.,HYDERABAD for Miscellaneous Tanks Package(Site fabricated) pertaining to Yadadri TPS(5X800MW)

In this regard, it is to inform that the sub vendors of M/s THERMOSYSTEMS PVT. LTD.,HYDERABAD for Miscellaneous Tanks Package(Site fabricated) furnished by M/s BHEL/PEM are reviewed by TSGENCO and the remarks are furnished in the Column.4

List of Sub vendors for supplying of Miscellaneous Tanks Package(Site fabricated) of M/s THERMOSYSTEMS PVT. LTD., HYDERABAD

Sl. No. (1)	Item Description (2)	Name of Sub vendor/Place (3)	TSGENCO Remarks (4)
1.	GI PIPES ERW	JINDAL,GHAZIABAD/NAGOTHANE/BELLARY/BALANAGAR	Approved
2.	SS PIPES	RATNAMANI,GUJARAT	Approved
3.	STRUCTURAL STEEL	1. SAIL	Approved
		2. RINL	Approved
		3. JINDAL, Raigarh, CHHATTISGARH	Approved
4.	MS PLATES	1. SAIL	Approved
		2. ESSAR STEEL	Approved
		3. TISCO	Approved
		4. JINDAL, Raigarh, CHHATTISGARH	Approved

ROS-6278

5.	PAINT	1. ASIAN PAINT	Approved
		2. BERGER	Approved
		3. KANSAI NEROLAC	Approved

Please note that this approval of vendors for supplying of Miscellaneous Tanks Package(Site fabricated), does not absolve M/s BHEL of its responsibility of supplying and conforming to the relevant specifications and standards as per the terms and conditions of the contract.

Yours faithfully

P.V. Sairaj 4/1/21

CHIEF ENGINEER/TPC

Copy communicated to:

1. The Chief Engineer/Construction/YTPS Site/Dameracherla/Nalgonda.
2. Superintending Engineer/E&M/Stage-I/YTPS Site/Dameracherla/Nalgonda(Dist.).
3. FA&CCA (Res.)&CFO/TSGENCO/Vidyut Soudha/Hyderabad.
4. SE/Tech to The Chairman & Managing Director/TSGENCO/Vidyut Soudha/Hyderabad.
5. Dy CCA, YTPS-II/Co-ordination/Dameracherla/Nalgonda(Dist.).
6. DE/Tech to Director (Projects)/TSGENCO/Vidyut Soudha/Hyderabad.
7. SAO/Pay & Accounts/TSGENCO/Vidyut Soudha/Hyderabad.
8. M/s Tata Consulting Engineers Limited,73/1,Sheriff Centre, St. Marks road, Bangalore-560 001.
9. TCE, Site office, Room No.323, Vidyut Soudha, Hyderabad
10. The GM,BHEL/PMG Camp Office/Vidyut Soudha/Hyderabad.

TELANGANA STATE POWER GENERATION CORPORATION LIMITED
(A Govt. Of Telangana Undertaking)

Vidyut Soudha, Hyderabad - 500082. www.tsgenco.telangana.gov.in

From:	To:
The Chief Engineer, Thermal Projects Construction, TSGENCO, Vidyut Soudha, Khairatabad, Hyderabad-500 082. E-Mail:cetpctgenco@gmail.com	M/s BHEL/BAP, Indira gandhi Industrial complex, Ranipet,vellore dist, Tamilnadu 632406

Kind Attention: Sri P.Somashekhar,Dy.Manager(commercial)/BAP/Ranipet

Lr.No.CE/TPC/SE-II/411/YTPS(5X800MW)/PTP-Sub Vendors/D.No.48 /2021,Dt:02.06.2021

Sir,

Sub: TSGENCO – YTPS (5X800MW) – BHEL/BAP- Pre-treatment plant package - Approval of Sub vendors for supplying of Electrical, Mechanical and C&I items furnished by M/s BHEL/BAP/Ranipet - Reg.

Ref: 1) M/s BHEL/BAP/Ranipet letter Ref: BAP:COMML:R4L9:PTP\Sub-Vendors list, Dt: 06.05.2021 and e-mail Dt: 27.05.2021
2) M/s TCE ref. No: TCE.11005A/PJ/K/0139,dated 29.05.2021

* * *

With reference to the M/s BHEL/BAP, Ranipet request letter (1) and M/s TCE Comments cited in ref(2) above, after careful examination, TSGENCO accords approval for the following Sub vendors of M/s BHEL/Ranipet for supplying of Pre-treatment plant for Electrical, Mechanical and C&I items.

Sl.No.	Item Description	Name of the Vendor	TSGENCO Remarks
MECHANICAL ITEMS			
1.	REACTOR CLARIFIERS (HRSCC) and THICKENER	INDO FAB, MAHARASHTRA	APPROVED
2.	SCREW PUMPS	UT PUMPS, HARYANA	APPROVED
3.	DOSING PUMPS	PSI ENGINEERING, CHENNAI	APPROVED
4.	CENTRIFUGE	HILLER DECANTER, KOLKATTA	APPROVED
5.	HORIZONTAL /VERTICAL CENTRIFUGAL PUMPS	SAM TURBO, COIMBATORE	APPROVED

CHIEF ENGINEER
Thermal Projects Construction
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

Sl.No.	Item Description	Name of the Vendor	TSGENCO Remarks
6.	AGITATORS (Vertical)	SJ INDUSTRIES, CHENNAI	APPROVED
7.	AGITATORS (Horizontal)	CLEAR WATER, NEW DELHI	APPROVED
8.	TWIN LOBE BLOWERS	USHA COMPRESSORS, AHMEDABAD	APPROVED
9.	GATE	H SARKAR, KOLKATA	APPROVED
10.	BALL VALVE (MANUAL & MOTORISED)	CAIR EUROMATIC AUTOMATION PVT. LTD., AHMEDABAD	APPROVED
11.	BUTTERFLY VALVE	STAFFORD CONTROLS LIMITED, CHENNAI	APPROVED
12.	GATE VALVE	SAP INDUSTRIES LTD, AHMEDABAD	APPROVED
		TECHNO VALVE, NASHIK	APPROVED
13.	NON RETURN VALVE	SAP INDUSTRIES LTD, AHMEDABAD	APPROVED
		TECHNO VALVE, NASHIK	APPROVED
14.	SOLENOID VALVE	ASTEN, AHMEDABAD	NOT APPROVED
15.	ELECTRICALLY OPERATED MONORAIL HOIST	ALPHA SERVICES, RAJASTHAN	APPROVED
		BRADY & MORRIS ENGG CO LTD., GUJARAT	APPROVED
		CONSOLIDATED HOISTS PVI LTD, PUNE	APPROVED
		CENTURY CRANE ENGINEERS PVT.LTD., HARYANA	APPROVED
		EDDY CMNES PVT. LTD., MUMBAI	APPROVED
		GRIP ENGINEERS PVT. LTD, HARYANA	APPROVED
		HERCULES HOISTS LTD, MAHARASTRA	APPROVED
		LIFTING EQUIPMENTS AND ACCESSORIES, NEW DELHI	APPROVED

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Khairatabad, Hyderabad

Sl.No.	Item Description	Name of the Vendor	TSGENCO Remarks
		MELTECH CRANES, THANE	APPROVED
16.	MANUALLY OPERATED MONORAIL HOIST	ARMSEL MHE PVT. LTD, KARNATAKA	APPROVED
		BRADY & MORRIS ENGG CO LTD, GUJARAT	APPROVED
		CENTURY CRANE ENGINEERS PVT LTD, HARYANA	APPROVED
		CONSOLIDATED HOISTS PW LTD, PUNE	APPROVED
		HERCULES HOISTS LTD, MAHARASTRA	APPROVED
		LIFTING EQUIPMENTS AND ACCESSORIES, NEW DELHI	APPROVED
		SOUTHERN PLANTAID, TELANGANA	APPROVED
		TRACTEL TIRFOR INDIA PVT.LTD., HARYANA	APPROVED
		TRANSPADE ENGG PVT LTD, KARNATAKA	APPROVED
		TUOBRO FURGUSON (INDIA) PVT LTD, KOLKATA	APPROVED
		UNIVERSAL HOIST-O-FABRIK, MAHARASHTRA	APPROVED
17.	TRACTOR	EICHER, INDIA	APPROVED
		MAHINDRA & MAHINDRA, INDIA	APPROVED
		SONALIKA, INDIA	APPROVED
		ESCORT, INDIA	APPROVED
		SWARAJ, INDIA	APPROVED
		JOHN DEERE, INDIA	APPROVED
ELECTRICAL AND INSTRUMENTATION			
1.	PLC	ENERGY VENTURES (SYSTEM INTEGRATOR FOR ROCKWELL AUTOMATION), NEW DELHI	APPROVED

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Sl.No.	Item Description	Name of the Vendor	TSGENCO Remarks
		PRIME CONTROLS,PUNE (SYSTEM INTEGRATOR FOR GE FANUC),PUNE	APPROVED
		DELSYS AUTOMATION,CHENNAI, (SYSTEM INTEGRATOR FOR GE FANUC &ROCKWELL AUTOMATION) BANGALORE	APPROVED
		COTMAC ELECTRONIC PVT LTD(SYSTEM INTEGRATOR FOR SIEMENS), PUNE/DELHI	APPROVED
		LADDER AUTOMATION SOLUTIONS PVT LTD(SYSTEM INTEGRATOR FOR HONEYWELL), HARYANA	APPROVED
		SUN INDUSTRIAL AUTOMATION & SOLUTION(SYSTEM INTEGRATOR FOR SCHNEIDER),CHENNAI	APPROVED
2.	UPS SYSTEM WITH ACDB	DUBAS, BANGALORE	NOT APPROVED
		FUJI ELECTRIC CONSUL NEOWATT PVT LTD,INDIA	APPROVED
		DELTA INDIA ELECTRONICS PVT LTD,CHENNAI	APPROVED
		HITACHI HIREL POWER ELECTRONICS, GANDHINAGAR	APPROVED
		M/s VERTIV ENERGY, (formerly M/s EMERSON NETWORK POWER), AMBERNIATH	APPROVED
3.	LEVEL GAUGE	PUNE TECHTROL PVT LTD, PUNE	APPROVED
4.	JUNCTION BOX	SHRENIK & COMPANY, GUJARAT	APPROVED
5.	TURBIDITY ANALYSER	HACH, CHENNAI	APPROVED
6.	LEVEL TRANSMITTER (ULTRA SONIC TYPE)	SIEMENS, INDIA	APPROVED
		EIP, MUMBAI	APPROVED
7.	FLOW SWITCH	GIC, MUMBAI	APPROVED
		SCENTIFIC DEVICIES, MUMBAI	NOT APPROVED

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Sl.No.	Item Description	Name of the Vendor	TSGENCO Remarks
		SWITZER, CHENNAI	APPROVED
8.	FIBER OPTIC CABLE	AKSH FIBRE, BHIWADI	APPROVED
		HFCL, GOA	APPROVED
		FINOLEX, PUNE	APPROVED
		D-LINK, INDIA	APPROVED
		BIRLA ERICSSON, REWA ,MADHYA PRADESH	APPROVED
		STERLITE, MUMBAI	APPROVED
		TERRACOM, INDIA	APPROVED
9.	CABLE TRAY	GEE DEE PACKAGES PVT LTD,MYSORE	APPROVED
		PRAMMEN INDUSTRIES, PUDUKKOTTAI	APPROVED
		PATNY SYSTEMS PVT. LTD,SECUNDERABAD	APPROVED
		M.J.ENGINEERING WORKS PVT. LTD, NEW DELHI	APPROVED
		JAMNA METAL COMPANY, NEW DELHI	APPROVED
		INNOSPACER ENGINEERING TECHNOLOGIES, BANGALORE	APPROVED
		INDIA ELECTRICALS SYNDICATE,KOLKATA	APPROVED
		APT ENGINEERING WORKS,NEW DELHI	APPROVED
		RUKMANI ELECTRICAL & COMPONENTS PVT,KOLKATA	APPROVED
		VATCO KHAIRHNE, NAVI MUMBAI	APPROVED
		KANADE ANAND UDYOG PVT. LTD, ANDHERI	APPROVED
		CHEMIN CONTROLS AND INSTRUMENTATION, PONDICHERY	APPROVED

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Sl.No.	Item Description	Name of the Vendor	TSGENCO Remarks
		RATAN PROJECTS ENGINNERING COMPANY PVT LTD,KOLKATA	APPROVED
		SILVERLINE POWER INFRASTRUCTURE,VADODARA	APPROVED
		INDUSTRIAL PERFORATIONS,KOLKATA	APPROVED
		INDIANA GRATINGS PVT LTD,PUNE	APPROVED
		STEELITE ENGINEERING, MUMBAI	APPROVED
		AMTECH ENGINEERING, PUNE	APPROVED
		INAR PROFILES, VIZAG	APPROVED
10.	PRESSURE GAUGE	H,GURU INSTRUMENTS (SOUTH INDIA)PVT., BANGALORE	APPROVED
		GENERAL INSTRUMENTS CONSORTIUM,MUMBAI	APPROVED
		FORBES MARSHALL(HYD) LTD. HYDERABAD	APPROVED
11.	PRESSURE TRANSMITTER	HONEYWELL AUTOMATION INDIA LTD, INDIA	APPROVED
		ABB,INDIA	APPROVED
		EMERSON PROCESS (formerly FISHER ROSEMOUNT-USA),INDIA	APPROVED
		FUJI,INDIA	APPROVED
		SIEMENS LTD,INDIA	APPROVED
12.	INSTRUMENTS FITTINGS	FLUID CONTROLS PVT. LTD,PUNE	APPROVED
		PRECISION ENGG INDUSTRIES, MUMBAI	APPROVED
		EXCEL HYDRO-PNEUMATICS PVT LTD, MUMBAI	APPROVED
		METPRESS ENGINEERING WORKS, KOLKATA	APPROVED
		HP VALVES & FITTINGS (INDIA) PVT. LTD, CHENNAI	APPROVED

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Sl.No.	Item Description	Name of the Vendor	TSGENCO Remarks
		PMT ENGINEERS, AHMEDABAD	APPROVED
		PANAM ENGINEERS LTD, MUMBAI	APPROVED
13.	FLOW TRANSMITTER (PARSHALL FLUME)	SIEMENS,INDIA	APPROVED
		EIP ,MUMBAI	APPROVED
14.	ROTAMETER	EUREKA INDUSTRIAL EQUIPMENTS PVT LTD, PUNE	APPROVED
		SCIENTIFIC DEVICES (BOMBAY) PVT LTD, MUMBAI	APPROVED
		FLOWTECH INSTRUMENTS SERVICES, GUJARAT	APPROVED
		INSTRUMENTATION ENGINEERS PVT LTD, HYDERABAD	APPROVED

Please note that this Sub Vendor approval of M/s BHEL/BAP,Ranipet for supplying of Pre-treatment plant for Electrical, Mechanical and C&I items does not absolve M/s BHEL of its responsibility of supplying and conforming to the relevant specifications and standards as per the terms and conditions of the contract.

Yours faithfully

CHIEF ENGINEER/TPC

Copy communicated to:

1. The Chief Engineer/Construction/YTPS Site/Dameracherla/Nalgonda.
2. SE/Tech to The Chairman & Managing Director/TSGENCO/Vidyut Soudha/Hyderabad.
3. Superintending Engineer/Civil/YTPS Site/Dameracherla/Nalgonda(Dist.).
4. Dy CCA, YTPS-II/Co-ordination/Dameracherla/Nalgonda(Dist.).
5. DE/Tech to Director (Projects)/TSGENCO/Vidyut Soudha/Hyderabad.
6. SAO/Pay&Accounts/TSGENCO/Vidyut Soudha/Hyderabad.
7. Sri S.Anil kumar/GM, BHEL/PMG, Vidyut Soudha, Hyderabad
8. M/s Tata Consulting Engineers Limited,73/1,Sheriff Centre, St. Marks road, Bangalore-560 001.
9. TCE, Site office, Room No.323, Vidyut Soudha, Hyderabad.

PROJECT : YADADRI THERMAL POWER STATION (5X800MW)

OWNER : TELENGANA STATE POWER GENRATION CORPORATION LIMITED.

OWNER'S CONSULTANT: TATA CONSULTING ENGINEERING LIMITED BANGALORE.

EPC CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED,RANIPETH- CHENNAI.

PACKAGE :7X65 CUM /HR DM WATER TREATMENT PLANT

PACKAGE OWNER: WIPRO ENTERPRISES PVT LTD.

DOC NAME : **DM PLANT - SUB VENDOR LIST**

BHEL DOC NO: 4-WT-500-01709 REV0 REV:- 02 Dated 15-07-2021

WIPRO DOC NO : A4-60003258-SVL-IC-01 REV:-P8 Dated 14-07-2021

SUB-VENDER LIST OF DM PLANT

Sr. No.	ITEM DESCRIPTION	SUB VENDOR NAME	LOCATION	STATUS	REMARK
Mechanical					
1	ATMOSPHERIC TANK (CS/SS)	MAHESH INDUSTRIES	PUNE	Credential Attached	
		VIKRANT INDUSTRIES	PUNE	Credential attached	
2	PRESSURE VESSEL (CS/SS)	MAHESH INDUSTRIES	PUNE	Credential Attached	
3	TANK (FRP)	COROSEAL EQUIPMENTS	MUMBAI	Credentials Attached	
4	METERING PUMPS/PRV	POSITIVE METERING PUMP	NASHIK	Lr.no.CE/TPC/SE-3/EME-11/YTPS/F.PEM Vendors Approval/D.no.51/18. Dt.23.10.2018 III Sl.no.6	
5	AGITATOR/STIRER	CEECONS	CHENNAI	Supplied for KTPS -ETP agitators, Supporting doc attached.-Approved drg. Attached	
6	UF MEMBRANES	TEAM	CHENNAI	Supplied for BTPS UF system. Supporting Doc. Attached.	
7	RESIN	ION EXCHANGE	MUMBAI	Supplied for BTPS. Supporting Doc. Attached.	
8	STRAINER	FLUIDNYE	PUNE	Supplied in KTPS . Supporting Doc. Attached.	
		TELEFLO STRAINERS & PRESSURE VESSELS	CHENNAI	Credential Attached	
9	HORIZONTAL CENTRIFUGAL PUMP	FLOWMORE LIMITED	GURGAON	Lr.no.CE/TPC/SE-3/EME-11/YTPS/F.PEM Vendors Approval/D.no.51/18. Dt.23.10.2018 Sl.no.1	
10	VERTICAL CENTRIFUGAL PUMPS	FLOWMORE LTD.	GURGAON	Lr.no.CE/TPC/SE-3/EME-11/YTPS/F.PEM Vendors Approval/D.no.51/18. Dt.23.10.2018 Sl.no.2	
11	NON METALLIC PUMPS	ENGINEERS COMBINE	THANE	Credentails attached	
12	CENTRIFUGAL BLOWER	DATTA AIR SYSTEMS	MUMBAI	Supplied in BTPS. Supporting Doc. Attached.	
13	TWIN LOBE BLOWER	USHA COMPRESSORS	AHAMEDABAD	Lr.No,CEITPC/SE-II/411IYTPS(SXB00MW)/PTP-Sub Vendors/D.No.48 /2021.Dt:02.06.2021, Sl.no.8	
14	BUTTERFLY VALVES	INTERVALVE POONAWALLA LTD	PUNE,	Lr.No. CE/TPC/SE-3/EME-14/YTPS/F.Vendors Approval/D.No.143/18 dt.23.10.18 Sl.no.9	
		CRANE PROCESS FLOW TECHNOLOGY(I) LTD.,	PUNE	Supplied in BTPS Supporting Doc. Attached.	
		DELVAL FLOW CONTROLS PVT LTD,	CHENNAI	Lr.No. CE/TPC/SE-3/EME-14/YTPS/F.Vendors Approval/D.No.143/18 dt.23.10.18 Sl.no.9	
		NOVEL VALVE	MUMBAI	Credential Attached	
		SAP INDUSTRIES LTD	AHMEDABAD	Credential Attached	
		STAFFORD CONTROLS LIMITED	CHENNAI	Lr.No,CEITPC/SE-II/411IYTPS(SXB00MW)/PTP-Sub Vendors/D.No.48 /2021.Dt:02.06.2021, Sl.no.11	
15	CAST IRON GATE/GLV/NRV/SRV	FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	Lr.no.CE/TPC/SE-3/EME-11/YTPS/F.PEM Vendors Approval/D.no.51/18. Dt.23.10.2018 II Sl.no.10	
		HAWA ENGINEERS / MARCK & CARE	AHEMEDABAD	Lr.no.CE/TPC/SE-3/EME-11/YTPS/F.PEM Vendors Approval/D.no.51/18. Dt.23.10.2018 II Sl.no.10	
		TECHNO VALVE	NASHIK	Lr.No,CEITPC/SE-II/411IYTPS(SXB00MW)/PTP-Sub Vendors/D.No.48 /2021.Dt:02.06.2021, Sl.no.12	
16	CONTROL VALVE (Butterfly Valve with pneumatic actuator)	DELVAL FLOW CONTROLS PVT LTD,	CHENNAI	Lr.No. CE/TPC/SE-3/EME-14/YTPS/F.Vendors Approval/D.No.143/18 dt.23.10.18 Sl.no.9	
		STAFFORD CONTROLS LIMITED	CHENNAI	Lr.No,CEITPC/SE-II/411IYTPS(SXB00MW)/PTP-Sub Vendors/D.No.48 /2021.Dt:02.06.2021, Sl.no.11	
		Neles India Pvt Ltd (Previously know as Mesto)		Credentials Attached	
17	DUAL PLATE CHECK VALVES	ADVANCE	NOIDA	Supplied in BTPS. Supporting Doc. Attached.	
		LEADER	JALANDAR	Lr.No.CE/TPC/SE-3/EME-11/YTPS(5X800MW)/F.Vendors/D.No.49/18,Dt: 11 -09-2018 Sno.16	
		SAP INDUSTRIES LTD	AHEMEDABAD	Lr.No,CEITPC/SE-II/411IYTPS(SXB00MW)/PTP-Sub Vendors/D.No.48 /2021.Dt:02.06.2021, Sl.no.13	
		Hawa Valve	MUMBAI	TSGENCO-Yadadri TPS letter reference Lr. No. CE/TPC/SE-3/EME-11/YTPS/ F. PEM Vendors Approval/ D.NO.51/18, DATED:23.10.2018	
18	BALL VALVE	INTERVALVE POONAWALLA LTD	PUNE,	Lr.no.CE/TPC/SE-3/EME-11/YTPS/F.PEM Vendors Approval/D.no.51/18. Dt.23.10.2018 II Sl.no.2	
		NOVEL VALVE	MUMBAI	Credential Attached	
		SAP INDUSTRIES LTD	AHMEDABAD	Credential Attached	
		Hawa Valve	MUMBAI	TSGENCO-Yadadri TPS letter reference Lr. No. CE/TPC/SE-3/EME-11/YTPS/ F. PEM Vendors Approval/ D.NO.51/18, DATED:23.10.2018	
19	SLUICE GATE	YASHWANT	MIRAJ	Supplied in KTPS, BTPS approved Vendor. Supporting Doc. Attached.	
		PROCON ENGINEERS	MUMBAI	Supplied in KTPS. Supporting Doc. Attached.	

20	DIAPHRAGM VALVE	CRANE PROCESS FLOW TECHNOLOGY	SATARA	Supplied in BTPS. Supporting Doc. Attached.	
		TECHNO VALVE	NASIK	Credential Attached	
21	PAINT	BERGER		Lr.No.CE/TPC/SE-3/EME-14/YTPS/F.PEM Vendor Approval/D.No.01/20Dt.04.01.2021 Sno.5	
		ASIAN PAINTS		Lr.No.CE/TPC/SE-3/EME-14/YTPS/F.PEM Vendor Approval/D.No.01/20Dt.04.01.2021 Sno.5	
		KANSAI NAROLAC		Lr.No.CE/TPC/SE-3/EME-14/YTPS/F.PEM Vendor Approval/D.No.01/20Dt.04.01.2021 Sno.5	
22	SAFETY SHOWER	UNICARE	MUMBAI	Supplied in BTPS. Supporting Doc. Attached.	
23	HANDLING EQUIPMENT	GRIP ENGINEERS		Sl.No:10; Approved sub vendor for YTPS(ISG-AHP) vide Lr.No.CE/TPC/SE-3/EME-11/YTPS(5X800MW)/F.Vendors/D.No.49/18,Dt 11-09-2018.	
		UNIVERSAL HOIST-O-FABRIK		Sl.No:25;Approved Sub Vendor for YTPS(Trichy) vide Ltr.No: Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.143/18,Dt.23.10.18	
C&I					
1	PLC/SCADA	ROCKWELL AUTOMATION INDIA PVT LTD		APPROVED SUB VENDOR for BTPS Vide. Lr.No.CE/411/BTPS(4x270MW)/C&I-Vendors/D.no.249/18, Dt.10.10.2018	
		GE INTELLIGENT PLATFORMS PVT LTD		APPROVED SUB VENDOR for BTPS Vide. Lr.No.CE/411/BTPS(4x270MW)/C&I-Vendors/D.no.249/18, Dt.10.10.2018	
		SIEMENS INDIA LTD		APPROVED SUB VENDOR for BTPS Vide. Lr.No.CE/411/BTPS(4x270MW)/C&I-Vendors/D.no.249/18, Dt.10.10.2018	
		SCHNEIDER ELECTRIC INDIA PVT LTD		APPROVED SUB VENDOR for BTPS Vide. Lr.No.CE/411/BTPS(4x270MW)/C&I-Vendors/D.no.249/18, Dt.10.10.2018	
		HONEYWELL AUTOMATION INDIA LTD		APPROVED SUB VENDOR for BTPS Vide. Lr.No.CE/411/BTPS(4x270MW)/C&I-Vendors/D.no.249/18, Dt.10.10.2018	
		ENERGY VENTURES (SYSTEM INTEGRATOR FOR ROCKWELL)		APPROVED SUB VENDOR for BTPS Vide. Lr.No.CE/411/BTPS(4x270MW)/C&I-Vendors/D.no.249/18, Dt.10.10.2018	
		PRIME CONTROL PUNE (SYSTEM INTIGRATOR FOR GE FANUC)		APPROVED SUB VENDOR for BTPS Vide. Lr.No.CE/411/BTPS(4x270MW)/C&I-Vendors/D.no.249/18, Dt.10.10.2018	
		DEL SYS AUTOMATION CHENNAI (SYSTEM INTEGRATOR FOR GE FANUC)		APPROVED SUB VENDOR for BTPS Vide. Lr.No.CE/411/BTPS(4x270MW)/C&I-Vendors/D.no.249/18, Dt.10.10.2018	
		COTMAC ELECTRONIC PVT LTD(SYSTEM INTEGRATOR FOR SIEMENS)		APPROVED SUB VENDOR for BTPS Vide. Lr.No.CE/411/BTPS(4x270MW)/C&I-Vendors/D.no.249/18, Dt.10.10.2018	
		SUN INDUSTRIAL AUTOMATION & SOLUTION (SYSTEM INTIGRATOR FOR SCHNEIDER)		APPROVED SUB VENDOR for BTPS Vide. Lr.No.CE/411/BTPS(4x270MW)/C&I-Vendors/D.no.249/18, Dt.10.10.2018	
		LADDER AUTOMATION SOLUTIONS PVT LTD(SYSTEM INTEGRATOR FOR HONEYWELL)		APPROVED SUB VENDOR for BTPS Vide. Lr.No.CE/411/BTPS(4x270MW)/C&I-Vendors/D.no.249/18, Dt.10.10.2018	
2	OFC	AKSH FIBRE, BHIWADI	BHIWANDI	Sl. NO:62; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		HFCL-GOA	GOA	Sl. NO:62; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		FINOLEX		Sl. NO:62; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		D-LINK		Sl. NO:62; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		BIRLA ERICSSON,REWA		Sl. NO:62; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		STERLITE		Sl. NO:62; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		TERRACOM		Sl. NO:62; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
3	LAPTOP	HP		Sl. NO:47; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		DELL		Sl. NO:47; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		Lenovo		Sl. NO:47; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
4	WORKSPATIONS,SERVER,PC	HP		Sl. NO:57; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		IBM-LENOVO		Sl. NO:57; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		DELL		Sl. NO:57; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		HP		Sl. NO:59; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	

5	TFT MONITOR	DELL		Sl. NO:59; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		IBM-LENOVO		Sl. NO:59; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		SAMSUNG		Sl. NO:59; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
6	LVS	DELTA ELECTRONICS INDIA PVT. LTD. GURGAON		Sl. NO:53; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		PLAN ER- USA /PYROTECH-UDAIPU R		Sl. NO:53; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		BARCO ELECTRONIC SYSTEMS PVT" LTD" NOIDA		Sl. NO:53; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		CHRISTIE-USA		Sl. NO:53; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
7	PRINTER LASER/INKJET	EPSON(INKJET ONLY)		Sl. NO:58; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		IBM		Sl. NO:58; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		DELL		Sl.No:88; Approved sub vendor for KTPS(EDN) (Dtd 09.04.15) Annexure-II	
		HP		Sl. NO:58; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		CANON		Sl. NO:58; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		XEROX		Sl. NO:58; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		LEXMARK		Sl. NO:58; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
8	ETHERNET SWITCHES	HIRSCHMAN		Sl.No65;Approved sub vendor for BTPS(EDN)(Dt 18.08.15) Annexure-II	
9	COMPUTER FURNITURE	COSMOS MEDIA PRODUCTS PVT LTD ,NOIDA		Sl. NO:56; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		GODREJ AND BOYCE MANUFACTURING CO LTD		Sl. NO:56; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		PYROTECH WORKSPACE SOLUTIONS PVT LTD	UDAIPUR	Sl. NO:56; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		ADARSHA CONTROLS SYSTEMS PW LTD ,BANGALORE	BANGLORE	Sl. NO:56; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		OTS ,BANGALORE	BANGLORE	Sl. NO:56; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
10	MODULAR DESK/SERVER & PC RACK	ADARSHA CONTROLS SYSTEMS PW LTD ,BANGALORE	BANGLORE	Sl. NO:55; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		CHEMIN CONTROLS & INSTRUMENTAION	PANDICHERRY	Sl. NO:55; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I	
		COSMOS MEDIA PRODUCTS PVT LTD	NOIDA	Sl. NO:55; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I	
		PYROTECH WORKSPACE SOLUTIONS PVT LTD	UDAIPUR	Sl. NO:55; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I	
11	LEAD ACID BATTERY(PLANTE TYPE)	EXIDE INDUSTRIES, KOLKATA		Sl.No:02 of IV,Approved sub Vendor for YTPS(PEM) Vide Lr.No.CE/TPC/SE3/EME-11/YTPS/F.PEM Vendor Approval/D.No.51/18,Dt. 23.10.18	
		HOPPECKE, GERMANY		Sl.No:02 of IV,Approved sub Vendor for YTPS(PEM) Vide Lr.No.CE/TPC/SE3/EME-11/YTPS/F.PEM Vendor Approval/D.No.51/18,Dt. 23.10.18	
12	UPS SYSTEM WITH ACDB(3 PH INPUT 1 PH OUTPUT)	DELTA INDIA ELECTRONICS PVT LTD		Sl.No:01;Approved sub Vendor for KTPS Dtd 09.04.15 Annexure-1	
		HITACHI HIREL POWER ELECTRONICS,GANDHINAGAR		Sl. NO:64; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		M/s VERTIV ENERGY, AMBERNIATH (formerly M/s EMERSON NETWORK POWER)		Sl. NO:64; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		M/s KELTRON POWER ELECTRONICS,TRIVENDRUM		Sl. NO:64; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		FUJI ELECTRIC CONSUL NEOWATT PVT LTD		Lr.No.CE/TPC/411IYTPS(5X800MW)/C&I-ISG-MachinePkg Vendors/D.No.171/20-Dt.13.11.2020	Add as per mail dated - 27/07/2021
		HITACHI HIREL POWER ELECTRONICS,GANDHINAGAR		Sl.No:4 Approved sub vendor for KTPS(EDN)Dtd: 9/4/15) Annexure-1	

13	ACDB/DCDB	AMARARAJA POWER SYSTEMS LTD,TIRUPATI		Sl.No:4 Approved sub vendor for KTPS(EDN)Dtd: 9/4/15) Annexure-1	
		HBL POWER SYSTEMS HYDERABAD		Sl.No:4 Approved sub vendor for KTPS(EDN)Dtd: 9/4/15) Annexure-1	
		CHHABBI ELECTRICLAS ,JALGOAN		Sl.No:4 Approved sub vendor for KTPS(EDN)Dtd: 9/4/15) Annexure-1	
14	ANALYSER	ROSEMOUNT ANALYTICAL (EMERSON)		Sl. NO:85(swas); Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
15	TEMPERATURE GAUGES	GENERAL INSTRUMENTS CONSORTIUM /GAUGES (GIC)		Sl. NO:79; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
16	TEMPERATURE TRANSMITTER	EMERSON PROCESS MANAGEMENT		Sl.No:08; Approved sub Vendor for YTPS(Hyb) vide Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.141/18,Dt.23.10.18	
		ABB LTD,HYDERABAD		Sl.No:08; Approved sub Vendor for YTPS(Hyb) vide Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.141/18,Dt.23.10.18	
		YOKOGAWA INDIA LTD,BANGALORE		Sl.No:08; Approved sub Vendor for YTPS(Hyb) vide Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.141/18,Dt.23.10.18	
17	THERMOWELLS	GENERAL INSTRUMENTS CONSORTIUM		Sl. NO:78; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
18	LEVEL GAUGES	PUNE TECHTROL PW LTD,PUNE		Sl. NO:80; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		NISAN SCIENTIFIC PROCESS,MUMBAI		Sl.No:11;Approved sub vendor for KTPS(Hyb) vide Lr.No.CEE/111/KTPS-VII(1X800MW)/Vendors/D.No.139/15,Dt.29.06.2015	
19	LEVEL TARSNMITTER RADAR	EIP ENVIRO LEVEL CONTROLS PVT LTD		Approved in datasheet of BTPS DM Doc:4-WT-500-01020	
20	LEVEL TRANSMITTER(ULTRASONIC TYPE)	EIP ENVIRO LEVEL CONTROLS PVT LTD		Approved in datasheet of BTPS DM Doc:4-WT-500-01020	
21	DIFFERENTIAL PRESSURE GAUGES	GENERAL INSTRUMENTS CONSORTIUM		Sl. NO:74; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
22	PRESSURE GAUGES	GENERAL INSTRUMENTS CONSORTIUM		Sl. NO:74; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
23	PRESSURE AND DIFFERENTIAL PRESSURE TARNSMITTER	HONEYWELL AUTOMATION INDIA LTD		Sl. NO:66; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		ABB		Sl. NO:66; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		YOKOGAWA INDIA LTD		Sl. NO:66; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		FUJI		Sl. NO:66; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		ENDRESS + HAUSER(I) AUTOMATION,INDIA		Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I	
24	ROTAMETER (INLINE & By Pass)	EUREKA INDUSTRIAL EQUIPMENTS PVT LTD		Sl.No:4 Approved sub vendor for KTPS(PEM)Dtd: 1/11/14) Annexure-3	
		INSTRUMENTATION ENGINEERS PVT LTD		Sl.No:4 Approved sub vendor for KTPS(PEM)Dtd: 1/11/14) Annexure-3	
		SCIENTIFIC DEVICES (BOMBAY)PVT LTD		Sl.No:4 Approved sub vendor for KTPS(PEM)Dtd: 1/11/14) Annexure-3 Sl.No2;Approved sub vendor for BTPS(EDN)(Dt 18.08.15) Annexure-II	
25	ELECTRIC ACTAUTOR	ROTORK CONTROLS (I) PVT LTD		Sl.No:33; Approved sub vendor for YTPS(PEM-FOPH) Doc No:PE-V0-417-166-A035	
		AUMA INDIA		Sl.No:33; Approved sub vendor for YTPS(PEM-FOPH) Doc No:PE-V0-417-166-A035	
		LIMITORQUE INDIA LTD		Sl.No:33; Approved sub vendor for YTPS(PEM-FOPH) Doc No:PE-V0-417-166-A035	
		ROCKWELL AUTOMATION INDIA PVT LTD		Sl.No:33; Approved sub vendor for YTPS(PEM-FOPH) Doc No:PE-V0-417-166-A035	
26	AIR FILTER REGULATOR	ABB LTD,HYDERABAD		Sl.No:10; Approved sub Vendor for YTPS(Hyb) vide Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.141/18,Dt.23.10.18	
		VELJAN HYDRAIR PVT LTD,HYDERABAD		Sl.No:10; Approved sub Vendor for YTPS(Hyb) vide Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.141/18,Dt.23.10.18	
		SMC pneumatics		Sl. NO:81; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	

		SHAVO NORGREN INDIA PVT LTD		Sl. NO:81; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		PLACKA INSTRUMENTS INDIA PVT LTD		Sl. NO:81; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		PARKER HANNIFIN INDIA PVT. LTD.		Sl. NO:81; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
27	LIE/LIR	CHEMIN CONTROLS PONDICHERRY		Sl. NO:98; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		INSTRUMENTATION LTD RAJASTHAN		Sl.No:21;Approved Sub Vendor for YTPS(Trichy) vide Ltr.No: Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.143/18,Dt.23.10.18	
		PRAMMEN INDUSTRIES		Sl.No:21;Approved Sub Vendor for YTPS(Trichy) vide Ltr.No: Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.143/18,Dt.23.10.18	
		PROCON INSTRUMENTATION PVT LTD		Sl. NO:98; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		PYROTECH ELECTRONICS PVT LTD		Sl. NO:98; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		SAJAS ELECTRICALS		Sl.No:07;Approved sub vendor for KTPS(Pipping Center-Boiler dtd) 09.04.15	
		CHEMTROLS SAMIL INDIA PVT LTD		Sl.No:07;Approved sub vendor for KTPS(Pipping Center-Boiler dtd) 09.04.15	
		D K INSTRUMENTS PVT LTD		Sl.No:07;Approved sub vendor for KTPS(Pipping Center-Boiler dtd) 09.04.15	
		GENERAL INSTRUMENTS CONSORTIUM		Sl.No:07;Approved sub vendor for KTPS(Pipping Center-Boiler dtd) 09.04.15	
		LEVCON INSTRUMENTS PVT LTD		Sl.No:07;Approved sub vendor for KTPS(Pipping Center-Boiler dtd) 09.04.15	
		V AUTOMATE,INDIA		Sl.No:07;Approved sub vendor for KTPS(Pipping Center-Boiler dtd) 09.04.15	
28	SOLENOID VALVES	ASCO		Sl.No:31;Approved sub Vendor for KTPS Dtd 09.04.15 Annexure-1	
		AVCON		Sl.No:15;Approved Sub vendor for YTPS(Hyb) vide Lr.No. CE/TPC/SE-3/EME-14/YTPS/F.Vendors Approval/D.No.06/19,Dt.08.01.19	
		ROTEX		Sl.No:31;Approved sub Vendor for KTPS Dtd 09.04.15 Annexure-1	
		YOKOGAWA		Sl.No:31;Approved sub Vendor for KTPS Dtd 09.04.15 Annexure-1	
29	FRP JUNCTION BOXES	BALIGA LIGHTING EQUIPMENT PVT LTD		Sl.No:11; Approved sub Vendor for YTPS(Hyb) vide Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.141/18,Dt.23.10.18	
		DEVI POLYMERS PVT LTD,CHENNAI		Sl.No:11; Approved sub Vendor for YTPS(Hyb) vide Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.141/18,Dt.23.10.18	
		HENSEL ELECTRIC INDIA PVT LTD,CHENNAI		Sl.No:11; Approved sub Vendor for YTPS(Hyb) vide Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.141/18,Dt.23.10.18	
		K S INSTRUMENTS PVT LTD		Sl.No:6 Approved sub vendor for KTPS(EDN)Dtd: 9/4/15) Annexure-1 Sl.No27;Approved sub vendor for KTPS(Trichy)(Dt 9/4/15) Sl.no:20 Mass Flow Meter FOPH reference	
		SUCHITRA INDUSTRIES		Sl.No:11; Approved sub Vendor for YTPS(Hyb) vide Lr.No:CE/TPC/SE-3/EME-14/YTPS/F.Vendor Approval/D.No.141/18,Dt.23.10.18	
		SHRENIK & COMPANY ,AHMEDABAD		Sl.No:6 Approved sub vendor for KTPS(EDN)Dtd: 9/4/15) Annexure-1	
30	JUNCTION BOX(METAL)	BALIGA LIGHLING,CHENNAI		Sl.No28;Approved sub vendor for BTPS(EDN)(Dt 18.08.15) Annexure-II	
		HI-POWER CONTROLS		Sl.No:07;Approved sub Vendor for KTPS Dtd 09.04.15-Attached	Reference attached
		PYROTECH, UDAIPUR		Sl. NO:65; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		CHEMIN CONTROLS, PONIDCHERRY		Sl. NO:65; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		ELECTRO MECHANICAL (INDIA),KOLKATA		Sl. NO:65; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		K.S. INSTRUMENTS, BANGALORE.		Sl. NO:65; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	

		KHODAY CONTROL SYSTEMS, BANGALORE		Sl. NO:65; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		SUCHITRA INDUSTRIES		Sl.No:06;Approved sub vendor for KTPS(Chennai) dtd 09.04.15-Attached	Reference attached
31	HART COMMUNICATOR	FUJI,JAPAN		Sl. NO:69; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		GE INDIA INDUSTRIAL PVT LTD		Sl. NO:69; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		FLUKE COORPORATION,USA		Sl. NO:69; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		ABB		Sl. NO:69; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		EMERSON		Sl. NO:69; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		YOKOGAWA		Sl. NO:69; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		MERIAM, USA		Sl. NO:69; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		HON EYWELL		Sl. NO:69; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
		FLUKE CORPORATION / USA		Sl. NO:69; Approved sub vendor for YTPS(EDN) vide Lr.No. CE/TPC/421/YTPS(5X800 MW)/C&I Vendors/D.No248/18,DT 03.11.2018	
32	LT MOTOR	CROMPTON GREAVERS LTD		Sl.No:27; Approved sub vendor for YTPS(PEM-FOPH) Doc No:PE-V0-417-166-A035	
		LAXMI HYDRAULICS PVT LTD		Sl.No:27; Approved sub vendor for YTPS(PEM-FOPH) Doc No:PE-V0-417-166-A035	
		BHARAT BIJLEE LTD		Sl.No:27; Approved sub vendor for YTPS(PEM-FOPH) Doc No:PE-V0-417-166-A035	
		SIEMENS		Sl.No:27; Approved sub vendor for YTPS(PEM-FOPH) Doc No:PE-V0-417-166-A035	
		KIRLOSKER ELECTRIC CO		Sl.No:27; Approved sub vendor for YTPS(PEM-FOPH) Doc No:PE-V0-417-166-A035	
		ABB		Sl.No:27; Approved sub vendor for YTPS(PEM-FOPH) Doc No:PE-V0-417-166-A035	
33	FLOW SWITCH	SWITZER	CHENNAI	Sl.No:07;Lr.No.CE/TPC/SE-II/411/YTPS(5X800MW)/PTP subvendors /D.No.48/2021 Dt.02.06.21	
		GIC	MUMBAI	Sl.No:07;Lr.No.CE/TPC/SE-II/411/YTPS(5X800MW)/PTP subvendors /D.No.48/2021 Dt.02.06.21	
		DK INSTRUMENTS	MUMBAI	Supplied in KTPS. Supporting doc. attached	

P Somasekhar
Dy. Manager
Commercial
BHEL-BAP,Ranipet

QUALITY PLAN

1. Quality plan format is attached herewith.
2. Bidder shall prepare Quality plan for all equipment in the attached format for Approval.
3. Typical QAP of TSGENCO Project is also attached for reference.

Manufacturer's Logo, if available	MANUFACTURER'S NAME & ADDRESS:	MANUFACTURING QUALITY PLAN	PROJECT:
Format No		PRODUCT:	BHEL PO NO & DATE:
		SUB-SYSTEM :	MQP NO: REV NO:
			DATE: DD/MM/YYYY PAGE: 1 OF 2

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
										M	C	N	
1	2	3	4	5	6	7	8	9	D**	** 10			11
1.0	**RAW MATERIALS & BOUGHT OUT ITEMS (BOI):**												
									√				
									√				
									√				
2.0	**INPROCESS CONTROLS:**												
									√				
									√				
									√				
3.0	**FINAL INSPECTION :**												
									√				
									√				
									√				
4.0	**PAINTING, MARKING, PACKING AND PRESERVATION:**												
									√				
									√				

PREPARED BY	**REVIEWED & APPROVED BY**
MANUFACTURER	**MAIN SUPPLIER (BHEL)**
SIGNATURE & SEAL	

LEGEND: * **RECORDS** IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
** **M:** MANUFACTURER, **C:** BHEL / BHEL AIA, **N:** CUSTOMER; **P:** PERFORM, W: WITNESS, **V:** VERIFICATION;
CLASS: A - CRITICAL; B - MAJOR; C – MINOR;
MTC- MILL /MANUFACTURER'S TEST CERTIFICATE; IR- INSPECTION REPORT.

Manufacturer's Logo, if available	MANUFACTURER'S NAME & ADDRESS:	MANUFACTURING QUALITY PLAN	PROJECT:
Format No		PRODUCT:	BHEL PO NO & DATE:
		SUB-SYSTEM :	MQP NO: REV NO:
			DATE: DD/MM/YYYY PAGE: 2 OF 2

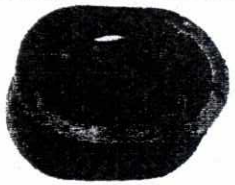
SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
									M	C	N	
1	2	3	4	5	6	7	8	9 D**	** 10			11

NOTES:

1. Latest revision of standards & specifications shall apply.
2. Materials shall be procured in compliance to Functional Technical Specification.
3. Inspection shall be in compliance with approved Quality Control Procedure for the product.
4. Qualified Personnel shall carry out NDT with compliance to approved NDT Procedures and Acceptance Norms, as per ASME Section V.
5. Gauges and measuring Instruments, with valid calibration only shall be used
6. Cleaning and Painting of products shall be carried out as per Approved Painting Schedule as applicable.
7. Finished Products shall be packed to comply with approved Packing Schedule.
8. BHEL Authorized representatives shall have the right to witness the necessary inspection and testing of goods mentioned in the PO. Inspection / Inspection wavier / approval by BHEL does not absolve Supplier's responsibility for conformity of the specification as per the terms of PO.
9. QA Documentation package shall include copy of approved Data Sheets/ Drawings & QP, along with all Material Test Certificate (MTCs), CHPs, Material Dispatch Clearance Certificate for all items.
10. This QP is applicable for mandatory spare also as applicable.

PREPARED BY	REVIEWED & APPROVED BY
MANUFACTURER	MAIN SUPPLIER (BHEL)
SIGNATURE & SEAL	

LEGEND: * **RECORDS** IDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
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CLASS: A - CRITICAL; B - MAJOR; C – MINOR;
MTC- MILL /MANUFACTURER'S TEST CERTIFICATE; IR- INSPECTION REPORT.



QUALITY PLAN FOR EVEREST BLOWERS

(PERFORMANCE / MECHANICAL RUN ROUTINE TEST)

Email : info@everestblowers.com Ph. 011-45457777
Manf. Units (1) B-44 Mayapuri Industrial Area, Phase 1 , New Delhi 110064
(2) 424, MIE, Phase 1, Bahadurgarh-124507

Ref. QAP- CRR

Project:- 1x800 MW, ETP

Client: BHEL

EVEREST AIR BLOWERS

CONTROLLED

QAP-ETEB-BLOWERS-R1
Date off Issue 28.4.2010

No.	PART DETAIL	CHARACTERISTICS	CHECK	QUANTUM	REF. DOC.	ACCP. NORM	FORMAT	AGENCY MU	AGENCY TPI/C	REMARKS
1.00	**RAW MATERIAL**									
1.01	BODY,END PLATES & ROTORS	MECHANICAL HARDNESS	Tensile Test Measurement	1 per Heat/Lot	IS 210:1993 / IS1865:1991	DATA SHEET /Manufacturer SpecificationsFG200	T.C / Compliance Report	R R	R R	*FOR S.G IRON ROTORS TENSILE TEST ONLY
1.02	SHAFT *	CHEMICAL	CHEM. ANALYSIS	1 Per Manf. Lot	BS970(1955) / IS1865:1991	DATA SHEET /Manufacturer SpecificationsEN19	T.C / Compliance Report	R	R	
1.03	GEARS	CHEMICAL	CHEM. ANALYSIS	1 Per Manf. Lot	DIN17147/ DIN 17131 ~ AISI:5120/AISI 5115	DATA SHEET /Manufacturer Specifications20MNCR5	T.C / Compliance Report	R	R	
2.00	**IN PROCESS INSPECTION**									
2.01	BODY, END PLATES, ROTOR	DIMENSIONS	MEASUREMENT	100%	MFG. DRG.	MFG. TOL.	Internal Inspection Report	P	R	
2.02	BODY & PLATES	HYDROSTATIC	AT MIN 1.5Kg/cm2 FOR 10 MINUTES	100%	NO LEAKAGE	NO LEAK	Internal Inspection Report	P	R	
2.03	SHAFTS	HARDNESS	SURFACE HARDNESS	HEAT LOT	MFG. DRG.	MFG. TOL.	Internal Inspection Report	P	R	
2.04	GEARS	HARDNESS	SURFACE HARD.	HEAT LOT	MFG. DRG.	MFG. TOL.	Internal Inspection Report	P	R	
2.05	ROTOR ASSEMBLY	BALANCING	DYNAMIC	100%	ISO 1940-1,1986	Gr 6.3 /MANF. DRG.	Internal Inspection Report	P	R	
3.00	**FINAL INSPECTION**									
3.01	PERFORMANCE TEST	FAD (Capacity), PRESSURE, POWER	PERFORMANCE RUN	100% BY EVEREST 1 PER MODEL BY CLIENT IF REQUIRE	BS 1571 II 1975 ,ISO1217 1996 & STP-01	BS 1571 II 1975 ,ISO1217 1996 & STP-01 PROCEDURE	Internal Inspection Report	P	W	
		NOISE (at open site condition)	NOISE SCALE (A)		Data Sheet	ONLY FOR REFERENCE	Compliance Certificate			
4.00	**DESPATCH**									
4.01	BLOWER ASSEMBLY PAINTING AND DESPATCH	A) Blower DIMENTION B) PAINTING C) Despatch	MEASUREMENT Completeness and defect free	100%	Mfg. Drawing/ Manufacture's Standard Despatch clearance	MFG. TOL. Min. 100 DFT Despatch clearance	Manufacturers Compliance Report	P P P		

* for wc blowers only

NOTE : The ... does not absolve / relieve the supplier from his responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.

MU- Manf.Unit,
C- Client
R - Review
P- Perform

NOTES :-

1) Blower shall be tested by shop floor motors .
2) In case of any Deviation clearance to be taken from Engineering.
3) Noise for refrence only. Actual verification at site on Installation
4) For Unspecified issues/parameters manufacturers standards shall be referred and accepted. Subject to Engg acceptance.

APPROVED

Chief Engineer,
Thermal Projects Construction
TSGENCO, Vidyut Soudha
Khairatabad, Hyderabad

TYPICAL QAPs

TYPICAL QAPs

INSPECTION & TEST PLAN

VENDOR : SWELORE ENGINEERING PVT. LTD.

ADDRESS: 2109, PHASE III, G.I.D.C., VATWA, AHMEDABAD- 382 445

CLIENT: M/S. SOPHISTICATED INDUSTRIAL MATERIALS ANYLYTIC LABS PVT.LTD
P.O. NO.: SIMA/P-929/LOI/SEPL/16-17/3908 Dtd.: 22.12.2016

EQUIPMENT
1) GNQ-17-AP 001/002 Acid Dosing Pumps - 02 Nos.
2) GNQ-18-AP 001/002 Alkali Dosing Pumps - 02 Nos.
3) GNQ-20-AP 001/002 Alum Dosing Pumps - 02 Nos.

ITP No.: P20917
Rev.: 00
Date: 11.01.2017
Page: 1 of 1

S.NO.	STAGES/ACTIVITIES	METHOD OF CHECK	QUANTUM CHECK	REFERENCE DOCUMENTS	ACCEPTANCE F NORMS	ORMAT RECORDS	Inspection By			REMARKS
							Swelore	Client	TPIA	
1	2	3	4	5	6	7	8			9
1	**METERING PUMP**									
1	MATERIAL INSPECTION Liquid end Plate, Connection, Valve seat	TC Review	100%	APPD.Drawings	Confirm to APPD.Drawings / ASTM Specification	Chemical Test Certificate (#)	H	R	R	
2	**PERFORMANCE TEST** a. Linearity (+3%) b. Repetative Accuracy (+ 3%) c. Steady State Accuracy (+ 1%) d. Motor load Test at 100% stroke length e.Relief Valve Test (IN BUILT)	Testing by per	100% swelore & 1 NO. model by CLIENT	APPD.Drawings	APPD.Drawingst/API 675	Test Report	W	W	R	
3	Strip Test(Dismantel & Insp'n- after performance Test)	Wear & Tear	"	APPD.Drawings	No defect	Test Report	H	W	R	
4	Dimensional & Visual Inspection (Major dimensions only)	Measurement	"	APPD.Drawings	APPD.Drawings	Dimensional Report	W	W	R	
5	Hydrotest of Liq. End. Block	Visual	"	APPD.Drawings	No leakage	Test report	H	W	R	
2	**MOTOR FOR PUMPS**									
1	Routine Test	Visual & Measurement	100%	Approved Datasheet	Approved Datasheet	Routine Test Certificate	R	R	R	

NOTE : This approval does not absolve / relieve the supplier from his responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.

Prepared By

Swelore Engineering AHMEDABAD VATVA

Vendor

Approved By

APPROVED Sig.: 18.01.2017

Approved By

Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

Legends :- H - Hold W - Witness A - Approval R - Review

(#) NO MATERIAL TEST CERTIFICATES WILL BE PROVIDED FOR PLASTIC, PVC,CPVC,PTFE,ACRYLIC,P.P,GFT MATERIAL.

TYPICAL QAPs

FLOWMORE PUMPS	MANUFACTURER'S NAME & ADDRESS **FLOWMORE LIMITED (UNIT – I)** 9th Mile Stone, G.T. Road Mohan Nagar, Ghaziabad (U.P.) **FLOWMORE LIMITED (UNIT – II)** 28 A, Site IV, Sahibabad Industrial Area Ghaziabad (U.P.)	**MANUFACTURING QUALITY PLAN** **(Vertical Sump Pump Set)**	QAP NO – 2788 REV – 00 Dt. 21.01.2017 PAGE 1 OF 1	CLIENT: - SOPHISTICATED INDUSTRIAL MATERIAL ANALYTICS LABS PVT.LTD. PROJECT:- WSS – TSGENCO - KOTHAGUDEM ORDER NO:- SIMA/P-929/FM/2016 DATED:- 15.DEC.2016

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUATUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C / N					M	C	N	
1.	2.	3.	4.	5.	6		7.	8.	9.	D	10			11
1.	**RAW MATERIAL**													
1.1	Casing / Volute, Impeller, Shaft & Shaft Sleeve	Chemical & Physical Properties	Major	Chemical Analysis & Mechanical Hardness	Each Heat	Each Heat	Approved C.S. Drawings & Relevant IS	Approved C.S. Drawings & Relevant IS	TR	✓	P	R	R	
2	**IN PROCESS INSPECTION**													
2.1	Casing / Volute, Impeller, Shaft & Shaft Sleeve	Surface Defects	Major	DPT on Machined Surface	100%	100%	ASTME-165	No Liner Indications	TR	✓	P	R	R	
2.2	Impeller	Balancing	Critical	Dynamic Balancing	100%	100%	ISO 1940 Gr. 6.3	ISO 1940 Gr. 6.3	TR	✓	P	R	R	
2.3	Casing	Soundness of Parts	Critical	Hydro Test	100%	100%	Relevant IS	No leakage	TR	✓	P	R	R	Refer Note 1
2.4	Shaft > 50 mm dia.	Ultrasonic Test	Critical	Ultrasonic Test	100%	100%	ASTME 114, ASME Sec V	ASTME 114, ASME Sec V	TR	✓	P	R	R	
3	**FINAL INSPECTION**													
3.1	**PERFORMANCE TEST OF PUMP WITH SHOP MOTOR AT REDUCED SPEED**	Discharge V/S Head Discharge V/S Eff. Discharge V/S Power	Critical	Performance Test	100%	One of each Type	Approved G.A. Drawings & Relevant IS	Approved G.A. Drawings & Relevant IS	IR	✓	P	W	W	
4	**Electric Motor**	Routine Test	Major	Electrical	100%	100%	IS 325	IS 325	TR	✓	P	V	V	Test Certificate will be provided for review
5		Painting & Packing	Major	Visual	100%	-	Manufacturer Standard	Manufacturer Standard	—	–	P	–	–	

LEGEND:
RECORDS, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
M: MANUFACTURER , **C:** CLIENT, **N:** INSPECTION AGENCY
P: PERFORM **W:** WITNESS AND **V:** VERIFICATION
TR: INTERNAL TEST REPORTS, **IR:** INSPECTION REPORTS

MANUFACTURER / SUB-SUPPLIER	MAIN-SUPPLIER	REVIEWED BY	APPROVED BY	APPROVAL SEAL
		APPROVED Sig. 18.01.17		Chief Engineer, Thermal Projects Construction TSGENCO, Vidyut Soudh Khairatabad, Hyderabad

NOTE : This approval does not absolve / relieve the supplier from his responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.

TYPICAL QAPs

FLOWMORE PUMPS	MANUFACTURER'S NAME & ADDRESS **FLOWMORE LIMITED (UNIT – I)** 9th Mile Stone, G.T. Road Mohan Nagar, Ghaziabad (U.P.) **FLOWMORE LIMITED (UNIT – II)** 28 A, Site IV, Sahibabad Industrial Area Ghaziabad (U.P.)	**MANUFACTURING QUALITY PLAN** **(Vertical Sump Pump Set)**	QAP NO – 2788 REV – 00 Dt. 21.01.2017 PAGE **2** OF 2	CLIENT: - SOPHISTICATED INDUSTRIAL MATERIAL ANALYTICS LABS PVT.LTD. PROJECT:- WSS – TSGENCO - KOTHAGUDEM ORDER NO:- SIMA/P-929/FM/2016 DATED:- 15.DEC.2016

NOTE:
1. TEST PRESSURE SHALL BE 1.5 TIMES THE SHUT OFF HEAD OR TWICE THE DUTY POINT HEAD WHICHEVER IS HIGHER

SAP: RANIPET APPROVED Sign: Dt: 13.01 QUALITY ASSURANCE

NOTE : ...oval does not absolve / relieve the supplier from his responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.

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MANUFACTURER / SUB-SUPPLIER	**MAIN-SUPPLIER**		**REVIEWED BY**	**APPROVED BY**	**APPROVAL SEAL**

Chief Engineer,
Thermal Projects Construction
TSGENCO, Vidyut Soudha
Khairatabad, Hyderabad -

TYPICAL QAPs

FLOWMORE PUMPS	MANUFACTURER'S NAME & ADDRESS **FLOWMORE LIMITED (UNIT – I)** 9th Mile Stone, G.T. Road Mohan Nagar, Ghaziabad (U.P.) **FLOWMORE LIMITED (UNIT – II)** 28 A, Site IV, Sahibabad Industrial Area Ghaziabad (U.P.)	**MANUFACTURING QUALITY PLAN** **(Vertical Turbine Pump Set)**	QAP NO –2788 REV – 00 Dt. 19.01.2017 PAGE 1 OF 1	CLIENT: SOPHISTICATED INDUSTRIAL MATERIAL ANALYTICS LABS PVT.LTD. PROJECT: WSS – TSGENCO - KOTHAGUDEM ORDER NO:SIMA/P-929/FM/2016 DATED: 15.DEC.2016

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUATUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C / N					M	C	N	
1.	2.	3.	4.	5.	6		7.	8.	9.	D	10			11
1.	**RAW MATERIAL**													
1.1	Bowl, Impeller, Shaft & Shaft Sleeve	Chemical & Physical Properties	Major	Chemical Analysis & Mechanical Hardness	Each Heat	Each Heat	Approved C.S. Drawings & Relevant IS 1710 / IS 9137	Approved C.S. Drawings & Relevant IS 1710 / IS 9137	TR	✓	P	R	R	
2	**IN PROCESS INSPECTION**													
2.1	Bowl, Impeller, Shaft & Shaft Sleeve	Surface Defects	Major	DPT on Machined Surface	100%	100%	ASTM E-165	No Liner Indications	TR	✓	P	R	R	
2.2	Shaft	Internal Defects	Major	Ultrasonic Test	100%	100%	ASTM A745	ASTM A745	IR	✓	P	R	R	
2.3	Impeller	Balancing	Major	Dynamic Balancing	100%	100%	ISO 1940 Gr. 6.3	ISO 1940 Gr. 6.3	TR	✓	P	R	R	
2.4	Bowls, Col. Assly., S.D. Head	Soundness of Parts	Major	Hydro Test	100%	100%	Relevant IS	No leakage	TR	✓	P	R	R	**Refer Note 1**
3	**FINAL INSPECTION**													
3.1	**PERFORMANCE TEST OF PUMP WITH SHOP MOTOR AT REDUCED SPEED**	Discharge V/S Head Discharge V/S Eff. Discharge V/S Power	Critical	Performance Test	100%	One of each Type	Approved G.A. Drawings & Relevant IS / HIS	Approved G.A. Drawings & Relevant IS / HIS	IR	✓	P	W	W	
4	**Electric Motor**	Routine Test	Major	Electrical	100%	100%	IS 325	IS 325	TR	✓	P	V	V	**Test Certificate will be provided for review**
5		Painting & Packing	Major	Visual	100%	100%	Manufacturer Standard	Manufacturer Standard	—	–	P	–	–	

NOTE:
1. **TEST PRESSURE SHALL BE 1.5 TIMES THE SHUT OFF HEAD OR TWICE THE DUTY POINT HEAD WHICHEVER IS HIGHER**

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NOTE : ... does not absolve ... supplier from his respo... regarding the compliance of P.O. / contract and other Engg / Quality appro... documents.
13.01.17

APPROVED
Sig. 13.01.17
Dt.:

MANUFACTURER / SUB-SUPPLIER	MAIN-SUPPLIER	REVIEWED BY	APPROVED BY	APPROVAL SEAL

Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

TYPICAL QAPs

FLOWMORE	MANUFACTURER'S NAME & ADDRESS **FLOWMORE LIMITED (UNIT – I)** 9th Mile Stone, G.T. Road Mohan Nagar, Ghaziabad (U.P.) **FLOWMORE LIMITED (UNIT – II)** 28 A, Site IV, Sahibabad Industrial Area Ghaziabad (U.P.)	**MANUFACTURING QUALITY PLAN** **(Vertical Turbine Pump Set)**	QAP NO –2788 REV – 00 Dt. 19.01.2017 PAGE 2 OF 2	CLIENT: SOPHISTICATED INDUSTRIAL MATERIAL ANALYTICS LABS PVT.LTD. PROJECT: WSS – TSGENCO - KOTHAGUDEM ORDER NO:SIMA/P-929/FM/2016 DATED: 15.DEC.2016

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13.01.17

MANUFACTURER / SUB-SUPPLIER	MAIN-SUPPLIER	**LEGEND:** RECORDS, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. **M:** MANUFACTURER , **C:** CLIENT, **N: INSPECTION AGENCY** **P:** PERFORM **W:** WITNESS AND **R:** REVIEW **TR:** INTERNAL TEST REPORTS, **IR:** INSPECTION REPORTS	REVIEWED BY	APPROVED BY	APPROVAL SEAL

APPROVED
Sig.
Dt.: 13-01-17

Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

TYPICAL QAPs

FLOWMORE PUMPS	MANUFACTURER'S NAME & ADDRESS **FLOWMORE LIMITED (UNIT – I)** 9th Mile Stone, G.T. Road Mohan Nagar, Ghaziabad (U.P.) **FLOWMORE LIMITED (UNIT – II)** 28 A, Site IV, Sahibabad Industrial Area Ghaziabad (U.P.)	**MANUFACTURING QUALITY PLAN** **(Vertical Turbine Pump Set)**	QAP NO –2788 REV – 00 Dt. 19.01.2017 PAGE 1 OF 1	CLIENT: SOPHISTICATED INDUSTRIAL MATERIAL ANALYTICS LABS PVT.LTD. PROJECT: WSS - TSGENCO - KOTHAGUDEM ORDER NO:SIMA/P-929/FM/2016 DATED: 15.DEC.2016

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUATUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C / N					M	C	N	
1.	2.	3.	4.	5.	6		7.	8.	9.	D	10			11
1.	**RAW MATERIAL**													
1.1	Bowl, Impeller, Shaft & Shaft Sleeve	Chemical & Physical Properties	Major	Chemical Analysis & Mechanical Hardness	Each Heat	Each Heat	Approved C.S. Drawings & Relevant IS 1710 / IS 9137	Approved C.S. Drawings & Relevant IS 1710 / IS 9137	TR	✓	P	R	R	
2	**IN PROCESS INSPECTION**													
2.1	Bowl, Impeller, Shaft & Shaft Sleeve	Surface Defects	Major	DPT on Machined Surface	100%	100%	ASTM E-165	No Liner Indications	TR	✓	P	R	R	
2.2	Shaft	Internal Defects	Major	Ultrasonic Test	100%	100%	ASTM A745	ASTM A745	IR	✓	P	R	R	
2.3	Impeller	Balancing	Major	Dynamic Balancing	100%	100%	ISO 1940 Gr. 6.3	ISO 1940 Gr. 6.3	TR	✓	P	R	R	
2.4	Bowls, Col. Assly., S.D. Head	Soundness of Parts	Major	Hydro Test	100%	100%	Relevant IS	No leakage	TR	✓	P	R	R	**Refer Note 1**
3	**FINAL INSPECTION**													
3.1	**PERFORMANCE TEST OF PUMP WITH SHOP MOTOR AT REDUCED SPEED**	Discharge V/S Head Discharge V/S Eff. Discharge V/S Power	Critical	Performance Test	100%	One of each Type	Approved G.A. Drawings & Relevant IS / HIS	Approved G.A. Drawings & Relevant IS / HIS	IR	✓	P	W	W	
4	**Electric Motor**	Routine Test	Major	Electrical	100%	100%	IS 325	IS 325	TR	✓	P	V	V	**Test Certificate will be provided for review**
5		Painting & Packing	Major	Visual	100%	100%	Manufacturer Standard	Manufacturer Standard	—	–	P	–	–	

NOTE:
1. **TEST PRESSURE SHALL BE 1.5 TIMES THE SHUT OFF HEAD OR TWICE THE DUTY POINT HEAD WHICHEVER IS HIGHER**

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NOTE : ... does not absolve ... supplier from his respon... regarding the compliance of PO / Contract and other Engg / Quality appro... documents.
12.01.17

MANUFACTURER / SUB-SUPPLIER	MAIN-SUPPLIER	REVIEWED BY	APPROVED BY	APPROVAL SEAL
			Chief Engineer, ...rmal Projects Construction TSGENCO, Vidyut Soudha, Khairatabad, Hyderabad - 8...	

RANI ... Approved Sig. 12.01.17 Dt. QUALITY ASSURANCE

TYPICAL QAPs

QUALITY ASSURANCE PLAN

("ROTOMAC" PROGRESSIVE CAVITY PUMPS) Page 1/1

Party's Name	M/s SOPHISTICATED INDUSTRIAL MATERIAL		
Party's Enquiry No. & Dt.	27-07-16		
Your P.O. No. & Dt.	BHEL P.O. No. 7761795 Dt. 11/08/2016		
Pump Model No : BARESHAFT PUMP SAM05201CINI09R1B6R00	Tag No. GNB-01-AP-001/002	Qty. (Nos.) : (1W+1S) = 2 Nos.	
Pump Model No : BARESHAFT PUMP SAM05201CINI09R1B6R00	Tag No. GNB-02-AP-001/002	Qty. (Nos.) : (1W+1S) = 2 Nos.	
Pump Model No : BARESHAFT PUMP SAP07281CINI09R1B6R00	Tag No. GNB-04-AP-001/002	Qty. (Nos.) : (1W+1S) = 2 Nos.	
Pump Model No : BARESHAFT PUMP SAM05201CINI09R1B6R00	Tag No. GNB-03-AP-001/002	Qty. (Nos.) : (1W+1S) = 2 Nos.	
Pump Model No : BARESHAFT PUMP SAP07282CINI09R1B6R00	Tag No. GNB-08-AP-001/002	Qty. (Nos.) : (1W+1S) = 2 Nos.	

Legend:

Type of Check:	"C" Chemical Composition Test; "M" Material Test based on Manufacturers T/C
	"T" Physical Test; "I" Dimensional Confirmity Test; "H" Hydraulic Test
	"P" Performance Test; "V Visual InspectionTest

Class of Test: "A" Critical comp.; "B" Less Critical Comp.; "Z" Nil Critical Comp. — "P" Perform, "W" Witness, "R" Review

RAW MATERIAL (For Own Manufactured Items)

ITEM / Activity	Test Class Characteris	Type of Check	Extent of Check	Material of Constuction	Ref. Std. / Accept. Norm	Record Format/Doc	Insp. RIPL	Insp. SIMA	Insp. 3rd Party
BARE PUMP									
Pump Housing	B	C	100%	CI, 2% NI IS: 210, FG: 260	AS PER datasheet	RIPL Record	P	R	R
Shaft	A	C	100%	AISI-316 HCP STD	AS PER datasheet	Spectro Analysis	P	R	R
Rotor	A	C	100%	AISI-316 HCP UG	AS PER datasheet	Spectro Analysis	P	R	R
Bonded Stator	A	T	100%	Nitrile Rubber	AS PER datasheet	RIPL Mfg. Std	P	R	R
Base Plate	A	I,V	One of each Set		GA Drawing	RIPL Controled Drawing	P	R	R
HYDRAULIC PRESSURE TEST									
Pump Housing	A	H	100%	As Per API 676	1.5 Times the Max. Pressure	RIPL Test Certificate	P	R	R
End Cover	A	H	100%	As Per API 676	1.5 Times the Max. Pressure	RIPL Test Certificate	P	R	R
PERFORMANCE TEST									
Bare Shaft Pump	A	P,V	100% P& 50%R		As Per Specification	RIPL Test Certificate	P	W	W
FINAL DIMENSION CHECK WITH B/P									
Complete Assly.	A	I,V	50%		As per Specn		P	W	R
PAINTING									
	A	V	50%		As Per BHEL painting Specs.	As Per BHEL painting Specs.	P	R	R
PRIME MOVER	B	V	100%		IS: 12615/IEC Norms	Test Certificate	R	R	R

NOTES:

1. Physichal Test 'T' on Stator : Includes check for Shore A hardness and verified against RIPL STD
2. "RIPL" abbreviation for "Rotomac Ind. Pvt. Ltd (Manufacturer)"
2. "RIPL" Standard Paint shade is RAL 6001

Prepared By: Manish Sahu		Checked & Approved By: Abhai Gupta (RIPL)	Rev No. : R0
Date:	02-01-17	Date:	02-01-17

Send 25.1.17

We: This QP to be read alongwith Relevant P.O / Approved Drawing of Packing and preservation to be ensured for all the items, Pasta Steel Fe.

NOTE : This approval does not absolve / relieve the supplier from his responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.

SIGNATURE

BHEL : BAP : RANIPET APPROVED Sig. Dt.: 25/01/17 QUALITY ASSURANCE

Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

493 of 1251

ROS-6278

PROCON ENGINEERS
Mfgs of Pneumatic & Manual Diaphragm Valves.
101, ARK Industrial Estate, Off. Andheri Kurla Rd. Marol, Mumbai-59.

Client: SOPHISTICATED INDUSTRIAL MATERIALS ANALYTIC LABS
P.O. No: SIMA/P-929/PE/2016/4140 DT 21.1.17
Project: BHEL

QAP No: QAP-9280-Rev.0
Date: 02.02.2017

Quality Assurance Plan

(Item: Manual & Pneumatically Operated Diaphragm Valves)

Sr. No.	Component & Operation	Characteristics	Class	Type of Check	Quantum of Check Mfg	Quantum of Check C / TPI	Reference Document	Acceptance Norms	Format of Record	Insp. Agency Mfg.	Insp. Agency C	Insp. Agency TPI	Remarks
1	**RAW MATERIAL INSPECTION**												
1.1	Body, Bonnet & Compressor	Physical	Major	Mechanical Properties	1 Sample / Heat	-	Relevant Material Specs.	Relevant Material Specs.	Foundry TC	P	R	R	
		Chemical	Major	Chemical Analysis	1 Sample / Heat	-	Relevant Material Specs.	Relevant Material Specs.	Foundry TC	P	R	R	Not Applicable for Cast Iron
1.2	Bar Stock for Stem / Spindle	Physical & Chemical	Major	Mechanical & Chem. Analysis	1 Sample / Lot	-	Relevant Material Specs.	Relevant Material Specs.	Lab TC	P	R	R	
		Internal Defects	Major	UT	1 Sample / Lot	-	Approved Mfg Drg / Data Sheet	Approved Mfg Drg / Data Sheet	Lab TC	P	R	R	Applicable for Dia. ≥ 50 mm
2	**IN PROCESS INSPECTION**												
2.1	After Machining for Body, Bonnet, Compressor & Stem	Dimensions	Major	Measurement	100%	-	Approved Mfg Drg / Data Sheet	EN 13397 / Mfg Std	IR	P	R	R	
		Surface Quality	Major	Visual	100%	-	-	No Blow Holes	IR	P	R	R	
		Before Lining Hydro Test	Major	Body Hydro Test	100%	-	EN 12266 (PART-I) / BS 6755 (PART-I)	No Leakage	IR	P	R	R	
2.2	Body Diaphragm	Dimensions	Major	Measurement	Random	-	Mfg Std	Mfg Std	IR	P	R	R	
		Surface Quality	Major	Visual	100%	-	-	Smooth Finish	IR	P	R	R	
		Hardness	Major	Measurement	Random	-	IS 3400 (Part 2 / 23)	Mfg Drg / Mfg Std	IR	P	R	R	
		Tensile & Elongation	Major	Physical	1 Sample / Batch	-	IS 3400 (Part 1)	Mfg Drg / Mfg Std	IR / TC	P	R	R	Not Applicable for PTFE Diaphragm (If Applicable)
		Rubber - Fabric Bond	Major	Physical	1 Sample / Batch	-	IS 3400 (Part 5)	Mfg Drg / Mfg Std	IR / TC	P	R	R	Not Applicable for PTFE Diaphragm (If Applicable)
		Flex Test	Major	Physical	1 Sample / Batch	-	1500 Flexes	No Cracks	IR / TC	P	R	R	
		Bleed Resistance	Major	Chemical	1 Sample / Batch	-	Sample kept in 33% HCL, 48% NaOH & DM Water Separately for 72 Hrs	No Discoloration, Weight Gain Limit: 0% To +2%	IR / TC	P	R	R	Not Applicable for PTFE Diaphragm (If Applicable)
2.3	Body Lining	Dimensions	Major	Measurement	100%	-	Approved Mfg Drg / Data Sheet	EN 13397 / Mfg Std	IR	P	R	R	
		Surface Quality	Major	Visual	100%	-	-	Smooth Finish	IR	P	R	R	
		Hardness & Thickness	Major	Measurement	Random	-	Approved Mfg Drg / Data Sheet	Approved Mfg Drg / Data Sheet	IR	P	R	R	
		Spark Test	Critical	HV Test	100%	-	IS 4682 (PART-I)	IS 4682 (PART-I) / No Spark at 5KV per mm of Thick.	IR	P	R	R	
		Bleed Resistance	Major	Chemical	1 Sample / Batch	-	Sample kept in 33% HCL, 48% NaOH & DM Water Separately for 72 Hrs	No Discoloration, Weight Gain Limit: 0% To +2%	IR / TC	P	R	R	
3	**FINAL INSPECTION**				% per Size per Type								
3.1	Complete Valve (As Applicable)	Pressure Test	Critical	Hydrostatic Test (Body & Seal)	100%	10%	Approved Mfg Drg / Data Sheet	No Leakage	IR	P	W	R	Body Hydro Test applicable only for Unlined Valves
		Functional	Critical	Operations	100%	10%	-	Smooth Operation	IR	P	W	R W	Open / Closing of valve with Job Actuator
		Seat Pneumatic Test	Critical	Pneumatic Test (Seat)	100%	10%	Approved Mfg Drg / Data Sheet	No Leakage	IR	P	W	R	
		Lining Hardness / Thickness / Spark Test	Major	Measurement	100%	10%	Approved Mfg Drg / Data Sheet	Approved Drg / Data Sheet / IS 4682 (PART-I) / No Spark at 5KV per mm of Thick.	IR	P	W	R	
		Dimensions	Major	Measurement	100%	10%	Approved Mfg Drg / Data Sheet	Approved Mfg Drg / Data Sheet	IR	P	W	R W	

NOTES
1. Life Cycle Test (POD) for body diaphragms to be reviewed by BHEL. If Life Cycle Test is not carried out for the diaphragm material under consideration (by ~~NTPC~~ / BHEL), the same shall be offered for ~~NTPC~~ / BHEL witness (50,000 Cycles) on any one size of diaphragm.
2. For Manual Valves: Body Hydro (Shell) Test to be carried out at 1.5 Times the PN rating of the valve; Hydro Seat Test to be carried out at 1.1 Times the PN rating of the valve.
   For Pneumatic / Motorized Valves: Body Hydro (Shell) Test to be carried out at 1.5 Times the Design Pressure of the valve; Hydro Seat Test to be carried out at 1.1 Times the Design Pressure of the valve.
3. Air Seat Test to be carried out at 5 Kg/Cm2 Subject to Engg acceptance

LEGEND					
P - Perform	Mfg - Manufacturer	IR - Inspection Report	PO - Purchase Order
W - Witness	C - Client / Contractor	TC - Test Certificate	Mfg Std - Manufacturer's Standard
R - Review	TPI - Third Party Inspection / Consultant / Owner	Mfg Drg - Manufacturer's Drawing	COC - Certificate of Compliance

- For PROCON ENGINEERS

V. Amarnath

CLIENT / CONSULTANT APPROVALS

NOTE : This ... absolve / relieve the supplier from his responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.
12.01.17
DATE

APPROVED
Dt. 13.01.2017

Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

ISO 9001:2008 CERTIFIED

A. V. VALVES LTD.
16, Industrial Estate, Nunhai, Agra - 282 006 (INDIA)
Phone : +91–562–2281202, 203, 204, 205 Fax : +91-562-2281201
E-mail: avvalves@sancharnet.in & avengg@dataone.in

QUALITY ASSURANCE PLAN
For CHECK VALVES

Client : **M/s. ANDHRA PRADESH POWER GEN. CORPN. LTD., (APGENCO)**
Contractor: **M/s. Sophisticated Industrial Materials Analytic Labs Pvt. Ltd., New Delhi**
Pur. Order : **SIMA / P-929 / AVVL / 2016 / 4052** **PO DATED : 11-JAN.-2017**

Sheet No. Page 1 of 1 | O. A. No. **4056**
QAP. No. **AV / QP – CHVS– 4056 / 16** Rev.- 0 Dated : 18 / 01 / 2017
Project : **VALVES FOR BHEL ETP - 1×800MW, KOTHAGUDEM**

Sr. No.	Description	Characteristics	Class / Category	Type / Method of Check	Quantum Extent of Check	Reference Document No(s)	Acceptance Norms	Format of Record	INSPECTION BY AVVL	CLIENT	TPIA	Remarks
1.0	**RAW MATERIAL**											
1.1	Body, Cover, Disc/ Piston, Body-seat and Hinge-pin	Physical Properties	MA	Physical Analysis	1 / Lot	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Lab Rep.	P	R	R	All T/C's shall be submitted
1.2		Chemical Properties	MA	Chemical Analysis	1 / Lot	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Lab Rep.	P	R	R	
1.3		Surface Defects	MA	Surface Defect	100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Insp. report	P	R	R	
1.5	Body, Bonnet & Spindle	PMI Test	MA	PMI Test (if applicable)	**100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Insp. report	P	W	R	For SS Valves Only.
2.0	**STAGE / IN – PROCESS INSPECTION**											
2.1	Machining of Component	Dimensional Check	MA	Measurement	100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Log Book	P	R	R	
2.2	Assembly	Visual : DPT	MA	Surface Defect	100%	Spec./ Appd Drg / Datasheet	ASTM E – 165	Insp. report	P	R	R	
3.0	**FINAL INSPECTION**											
3.1	Testing of Complete Valve	Dimension, Surface Defect	MA	Measurement, Visual	100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Insp. report	P	R	W	**100%by AVVL & ~~10%~~ by TPIA / As per sampling plan. Client
3.2		Valve Operation	MA	Operation Check	100%	Approved Drawing	Smooth Operation	Insp. report	P	R	W	
3.3		Hydro Test of Body	MA	Hydraulic Test	100%	API 598 / IS : 778	APPROVED DRAWING	Insp. report	P	R	W	
3.4		Hydro Test of Seat	MA	Hydraulic Test	100%	API 598 / IS : 778	APPROVED DRAWING	Insp. report	P	R	W	
4.0	**PAINTING, PROTECTION, MARKING, PACKING & COLOUR CODING :**											
4.1	Complete Valve	Appearance	MA	DFT Check	100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Insp. report	P	R	R	
4.2	Marking & Stamping	Verification	MA	Visual	100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Insp. report	P	R	R	

Legends : 1. MA : Major, **2. I/R :** Inspection Report, **3. T/C :** Test Certificate, **4. P :** Performed, **5. W :** Witness, **6. R :** Review **7. H :** Hold

NOTE : This approval does not relieve / relieve the supplier from responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.
14.01.17

(Prepared by)
ANIL BHARADWAJ (Mgr- QA)
For A. V. VALVES LIMITED

(Reviewed by)
14.01.17

(Approved by)
Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

qap-SIMA Labs-4056

TYPICAL QAPs

ROS-6278

A. V. VALVES LTD.
16, Industrial Estate, Nunhai, Agra - 282 006 (INDIA)
Phone : +91–562–2281202, 203, 204, 205 Fax : +91-562-2281201
E-mail: avvalves@sancharnet.in & avengg@dataone.in
ISO 9001:2008 CERTIFIED

QUALITY ASSURANCE PLAN
For GATE VALVES

Client : **M/s. ANDHRA PRADESH POWER GEN. CORPN. LTD., (APGENCO)** Sheet No. Page 1 of 1 O. A. No. **4056**

Contractor: **M/s. Sophisticated Industrial Materials Analytic Labs Pvt. Ltd., New Delhi** QAP. No. **AV / QP – VLVS– 4056 / 16** Rev.- 0 Dated : 18 / 01 / 2017

Pur. Order : **SIMA / P-929 / AVVL / 2016 / 4052 PO DATED : 11-JAN.-2017** **Project :** **VALVES FOR BHEL ETP - 1×800MW, KOTHAGUDEM**

Sr. No.	Description	Characteristics	Class / Category	Type / Method of Check	Quantum Extent of Check	Reference Document No(s)	Acceptance Norms	Format of Record	INSPECTION BY			Remarks
									AVVL	CLIENT	TPIA	
1.0	**RAW MATERIAL**											
1.1	Body, Bonnet, Wedge, Body-seat & Wedge-seat and Stem / Spindle	Physical Properties	MA	Physical Analysis	1 / Lot	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Lab Rep.	P	R	R	All T/C's shall be submitted
1.2		Chemical Properties	MA	Chemical Analysis	1 / Lot	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Lab Rep.	P	R	R	
1.3		Surface Defects	MA	Surface Defect	100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Insp. report	P	R	R	
1.5	Body, Bonnet & Spindle	PMI Test	MA	PMI Test (if applicable)	**100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Insp. report	P	W	R	For SS Valves Only.
2.0	**STAGE / IN – PROCESS INSPECTION**											
2.1	Machining of Component	Dimensional Check	MA	Measurement	100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Log Book	P	R	R	
2.2	Assembly	Visual : DPT	MA	Surface Defect	100%	Spec./ Appd Drg / Datasheet	ASTM E – 165	Insp. report	P	R	R	
3.0	**FINAL INSPECTION**											
3.1	Testing of Complete Valve	Dimension, Surface Defect	MA	Measurement, Visual	100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Insp. report	P	R	W	**100%by AVVL & ~~10%~~ by TPIA / Client As per Surfacing Plan
3.2		Valve Operation	MA	Operation Check	100%	Approved Drawing	Smooth Operation	Insp. report	P	R	W	
3.3		Hydro Test of Body	MA	Hydraulic Test	100%	IS : 14846 / API 598 / IS 778	APPROVED DRAWING	Insp. report	P	R/W	W	
3.4		Hydro Test of Seat	MA	Hydraulic Test	100%	IS : 14846 / API 598 / IS 778	APPROVED DRAWING	Insp. report	P	R/W	W	
3.7		Air (Pneu.) Test of Seat	MA	Pneumatic Test	100%	IS : 14846 / API 598 / IS 778	APPROVED DRAWING	Insp. report	P	R/W	W	
4.0	**PAINTING, PROTECTION, MARKING, PACKING & COLOUR CODING :**											
4.1	Complete Valve	Appearance	MA	DFT Check	100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Insp. report	P	R	R	
4.2	Marking & Stamping	Verification	MA	Visual	100%	Spec./ Appd Drg / Datasheet	Spec./ Appd Drg / Datasheet	Insp. report	P	R	R	

Legends : 1. MA : Major, **2. I/R :** Inspection Report, **3. T/C :** Test Certificate, **4. P :** Performed, **5. W :** Witness, **6. R :** Review **7. H :** Hold

Note :- This QAP to be read alongwith relevant P.O. approved drawing / Data sheet etc.

NOTE : ... does not absolve / relieve the supplier from his responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.
14.01.17

(Prepared by)
ANIL BHARADWAJ (Mgr- QA)
For A. V. VALVES LIMITED

(Reviewed by)

(Approved by)
Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82

qap-SIMA Labs-4056

TYPICAL QAPs

ROS-6278

TYPICAL QAPs

MANUFACTURER'S NAME AND ADDRESS: KRISHNA ENGINEERING Plot No.4406,GIDC, Ankleshwar – 393002, Gujarat	MANUFACTURING QUALITY PLAN	PROJECT : KOTHAGUDEM TPS - 1 X 800 MW
	ITEM : INCLINED SURFACE SETTLER QP NO.: QAP/ISS/16-17/SIMA REV. NO.: 00 DATE: 16.12.2016 SUB-SYSTEM: PAGE: 01 OF 01	PACKAGE : OILY WATER SEPARATOR CONTRACT NO. : P - 929 MAIN-SUPPLIER: SIMA LABS PVT. LTD.

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
				M	C / B					M	C	B	
1.	2.	3.	4.	5.		6.	7.	8.	D*	** 9.			10.
A	FRP ITEMS (PLATE PACKS)	MATERIAL IDENTIFICATION	CHEMICAL	100%	RANDOM	APPROVED DATASHEET	REVIEW OF RAW MATERIAL TEST CERTIFICATE	MATERIAL TEST CERTIFICATE		P	V	V	REVIEW OF RECORD
		VISUAL AND DIMENTIONAL CHECK	MAJOR DIMENTION	100%	RANDOM	APPROVED DATASHEET / GA DRAWING	MAJOR DIMENTIONAL CHECK (VISUAL / DIMENSIONAL)	APPROVED DATASHEET / GA DRAWING / INTERNAL INSPECTION REPORT		P	V/W	W	FINAL INSPECTION
B	PACKING & MARKING	PACKING & MARKING	VISUAL	100%	RANDOM	APPROVED DATASHEET / GA DRAWING/ PACKING LIST	MANUFACTURERS REQUIREMENT	INTERNAL INSPECTION REPORT		P	V/W	V/W	FINAL INSPECTION

NOTE : ... absolve / relieve the supplier from his responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.

APPROVED

Paresh Mistry
For KRISHNA ENGINEERING
Partner

MANUFACTURER/ SUB-SUPPLIER	MAIN-SUPPLIER
SIGNATURE	

LEGEND: * RECORDS, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
** **M:** MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER,
P: PERFORM **W:** WITNESS AND **V:** VERIFICATION. AS APPROPRIATE,
CHP: BIFPCL SHALL IDENTIFY IN COLUM "B" AS ' W"

FOR BIFPCL USE	DOC. NO.:	REV..... CAT.....	
	REVIEWED BY	APPROVED BY	APPROVAL SEAL

Chief Engineer,
Thermal Projects Construction
TSGENCO, Vidyut Soudha
Khairatabad, Hyderabad -

TYPICAL QAPs

MANUFACTURER'S NAME AND ADDRESS: KRISHNA ENGINEERING Plot No.4406,GIDC, Ankleshwar – 393002, Gujarat	**MANUFACTURING QUALITY PLAN**	PROJECT : KOTHAGUDEM TPS - 1 X 800 MW
	ITEM : OILY WATER SEPARATOR / QP NO.: QAP/TPI/16-17/SIMA / REV. NO.: 00 / DATE: 06.12.2016	PACKAGE : OILY WATER SEPARATOR
	SUB-SYSTEM: / PAGE: 01 OF 01	CONTRACT NO. : P - 929
		MAIN-SUPPLIER: SIMA LABS PVT. LTD.

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK M	QUANTUM OF CHECK C / B	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	AGENCY M	AGENCY C	AGENCY B	REMARKS
1.	2.	3.	4.	5.		6.	7.	8.		** 9.			10.
A	FRP ITEMS (PLATE PACKS AND BAFFLE)	MATERIAL IDENTIFICATION	CHEMICAL	100%	RANDOM	APPROVED DATASHEET	REVIEW OF RAW MATERIAL TEST CERTIFICATE	MATERIAL TEST CERTIFICATE		P	V	V	REVIEW OF RECORD
		VISUAL AND DIMENTIONAL CHECK	MAJOR DIMENTION	100%	RANDOM	APPROVED DATASHEET / GA DRAWING	MAJOR DIMENTIONAL CHECK (VISUAL / DIMENSIONAL)	APPROVED DATASHEET / GA DRAWING / INTERNAL INSPECTION REPORT		P	V/W	V/W	FINAL INSPECTION
B	STEEL ITEMS (OIL SKIMMER PIPE & WEIR PLATE)	MATERIAL IDENTIFICATION	CHEMICAL / PHYSICAL	100%	RANDOM	APPROVED DATASHEET	REVIEW OF RAW MATERIAL TEST CERTIFICATE	MATERIAL TEST CERTIFICATE		P	V	V	REVIEW OF RECORD
		VISUAL AND DIMENTIONAL CHECK	MAJOR DIMENTION	100%	RANDOM	APPROVED DATASHEET / GA DRAWING	MAJOR DIMENTIONAL CHECK (VISUAL / DIMENSIONAL)	APPROVED DATASHEET / GA DRAWING / INTERNAL INSPECTION REPORT		P	V/W	V/W	FINAL INSPECTION
	PACKING & MARKING	PACKING & MARKING	VISUAL	100%	RANDOM	APPROVED DATASHEET / GA DRAWING/ PACKING LIST	MANUFACTURERS REQUIREMENT	INTERNAL INSPECTION REPORT		P	V/W	V/W	FINAL INSPECTION

NOTE : This approval does not absolve / relieve the supplier from his responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.

SIGNATURE & DATE

Paresh Mistry
For KRISHNA ENGINEERING
Partner

MANUFACTURER/ SUB-SUPPLIER	MAIN-SUPPLIER
SIGNATURE	

LEGEND: * RECORDS, INDENTIFIED WITH "TICK" (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER,
P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE,
CHP: BIFPCL SHALL IDENTIFY IN COLUM "B" AS ' W"
B-BHEL or BHEL Authorised Insp. Agc

FOR BIFPCL USE

DOC. NO.: REV..... CAT.....

APPROVED

REVIEWED BY APPROVED BY APPROVAL SEAL

Chief Engineer,
rmal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

1/1

TYPICAL QAPs

SOPHISTICATED INDUSTRIAL MATERIALS ANALYTIC LABS PVT LTD.

QUALITY ASSURANCE PLAN FOR CSEP & MSRL TANKS

QAP NO. : 000-MST-001-14
EDITION : 01
REV. : ~~00~~ 01
DATE : 09/~~02/2017~~ 25.02.2017
PAGE : 01 of 01

S. No.	COMPONENT AND OPERATION STAGES	CHARACTERISTIC	CLASSIFICATION	TYPE OF CHECK	QUANTUM OF CHECK		Reference Doc. & Acceptance Norms	Format Records	Remarks
					M/S	T			
I	Welder Qualification Test	WPS, PQR, QW	Major	Perform/Verification	CH	V	ASME-IX, WPS/PQR	IR	
II	Raw Material Identification for Shell, Bottom, Plates & Pipes, Nozzle	Mechanical & chemical property chk	Major	Verification with respect standard.	CH	V	Approved Drawing	TC	
III	Inspection of dished ends	workmanship &dimensions	Major	Visual and measurment	CH	V	Approved Drawing	IR	
IV	Joint preparation weld set-ups & nozzles fittings.	Alignment & dimension	Major	Visual and measurment	CH	V	Approved Drawing	IR	
V	**Final Inspection**								
	Final Inspaction before R/L / Coating of completed Tank	Dimension	Major	Measurment	W	V	Approved Drawing	IR	
		Visual Check For Defects	Major	Visual	W	V	Free From Surface Defects	IR	
		Hydro test	Major	Water Fill Test	W	W	Tank Full of Water	IR	
		Surface Prepration	Major	Visual / Surface Profile	W	V	Approved Drawing	IR	
	Final Inspaction After Rubber Linning (For Rubber linning Tank)	Hardness Test	Major	measurment	W	V	Approved Drawing	IR	
		Visual Check For Surface Defects	Major	Visual	W	V	Approved Drawing	IR	
		Pill of Test	Major	Adhesion Test	W	V	Approved Drawing	IR	
		Thickness of Rubber lining	Major	Measurement	W	V	Approved Drawing	IR	
		Holiday Test	Major	Spark Test at 5kV/mm	W	W	Approved Drawing	IR	
VII	Stamping/Marking & identification	Name Plates, Tag No. Verification	Major	Visual	W	V	Approved Drawing	IR	
VIII	Final inspection after Coating/ Painting	Surface finish, DFT, Shade	Major	Visual	W	V	Approved Drawing	IR	

NOTE : This approval does not absolve / relieve the supplier from his responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.

SIGNATURE & DATE

Note: This QP to be read alongwith relevant Standard codes/ APPD Doc / Data sheet etc.

ABBREVIATIONS Quantum of check 100%.

CH	: CHECK 100%	V	: VERIFY DOCUMENTS
R	: REVIEW	M	: MANUFACTURER
W	: WITNESS/CHECK (HOLD POINT)	S	: SIMA LAB PVT LTD
IR	: INSPECTION REPORT	T	: THIRD PARTY
TC	: TEST CERTIFICATE	R/L	RUBBER LINNING

(2) Fairness and Presentation to be ensured for all the component.
(3) Comply the requirements as noted.

FOR SIMA LABS PVT. LTD.

Chief Engineer,
Thermal Projects Construction
TSGENCO, Vidyut Soudha.
Khairatabad, Hyderabad -

ROS-6278

TYPICAL QAPs

JINDAL PIPES LIMTED (ERW PIPES)
QUALITY ASSURANCE PLAN FOR CARBON STEEL ERW PIPES

Customer : SIMA LABS PVT.LTD.
Project : BHEL TELANGANA
Specification : IS: 1239 & 3589 Gr. 410

QAP No. : JPL/ERW/IS:1239-3589/001
Rev. No. : 01
Date : 17/02/2017
Page : 1of 3

Sl. No	Inspection / Test Stage	Checks	Type of Inspection	Frequency of Check	Reference Documents	Acceptance Norms	Format of Record	Inspection By P	W	R	Remarks
1.0	**Receiving Inspn & Testing**										
1.1	Inspection of H.R. Coils.	Suppliers approval	Review of records	On receipt of material	Suppliers Heat No. / Coil No. / P.O / Material specification	Approved vendor list / IS 10748 / IS 1239 & 3589	H.R coil Inspn. & Test Report / Suppliers T.C	1	-	-	
		Results of supplier's T.C	-do-	T.C for each coil				1	-	-	Chemical & Mechanical testing for one sample per heat to be witnessed by BHEL or BHEL AIA.
		Marking & Heat No	Visual	Each coil	P.O / Material specification	IS 10748	H.R coil Inspn. & Test Report	1	-	-	
		Width and Thickness	Measurement	Each coil	P.O / Material specification	IS 10748	H.R coil Inspn. & Test Report	1	-	-	
		Surface defects & packaging condn.	Visual	Each coil	P.O / Material specification	IS 10748	H.R coil Inspn. & Test Report	1	2	3	
		Chemical Elements	~~wet analysis~~ XRF Analyzer	One sample Per heat	P.O / Material specification	IS 10748 / IS 1239 & 3589	H.R coil Inspn. & Test Report	1	3	3	
		Mechanical Properties	Mechanical Testing	One Sample Per Heat	P.O / Material specification	IS 10748 / IS 1239 & 3589	H.R coil Inspn. & Test Report	1	2, 3	3	

P – Perform By, R – Review By, W - Witness By, 1- JPL , 2 - Third Party / Customer / SIMALABS PVT LTD
3 - BHEL or BHEL AIA

Acceptance Norms - Appd Drg / Appd Datasheet

JINDAL PIPES LIMITED:

Approved By

Chief Engineer,
Thermal Projects Construction
TSGENCO, Vidyut Soudha
Khairatabad, Hyderabad

Note :- This QAP to be read alongwith relevant P.O / Appd Drg / Data Sheet etc.
Packing and preservation to be ensured.

NOTE : ... does not absolve ... from his responsibility regarding the compliance ... and other Engg / ... documents.
Engg / ... DATE

ROS-6278

TYPICAL QAPs

JINDAL PIPES LIMTED (ERW PIPES)
QUALITY ASSURANCE PLAN FOR CARBON STEEL ERW PIPES

Customer : SIMA LABS PVT.LTD.
Project : BHEL TELANGANA
Specification : IS: 1239 & 3589 Gr. 410

QAP No. : JPL/ERW/IS:1239-3589/001
Rev. No. : 01
Date : 17/02/2017
Page : 2of 3

Sl. No	Inspection / Test Stage	Checks	Type of Inspection	Frequency of Check	Reference Documents	Acceptance Norms	Format of Record	Inspection By P	W	R	Remarks
2.0	**In-Process Inspn**										
2.1	Edge Preparation Trimming/Milling	Width & thickness	Measurement	5 times/coil		Strip width Chart & IS 1239 & 3589	Slitting/Milling Rpt.	1	-	-	
		Surface defects	Visual	Continuous monitoring	P.O / Material specification	IS 1239 & 3589	Slitting/Milling Rpt.	1	-	-	For Pipe. one sample Per heat mech. Property (YS, UTS, % EL) to be witnessed by BHEL or BHEL AIA)
2.2	Pipe manufacture	**Dimensional**									
		Out side diameter	Measurement	As per relevant specification	Material specification	As per IS 1239 & 3589	Mill Inspn. Rpt.	1	-	-	
		Thickness	Measurement	-DO-	Material specification	As Per P.O/ IS 1239 & 3589	Mill Inspn. Rpt.	1	-	-	
		Length	Measurement	-DO-	Material specification	As Per IS 1239 & 3589	Mill Inspn. Rpt.	1	-	-	
		Straightness	Measurement	-DO-	Material specification.	As Per IS 1239 & 3589	Mill Inspn. Rpt.	1	-	-	
		Mech. Property									
		YS, UTS, %El	Mechanical Test	As Per Relevant Specification	Material specification	As Per IS 1239 & 3589	Mech. Testing Rpt.	1	2,	3	
		Flattening	Flattening	As per relevant specification	Material specification	As Per IS 1239 & 3589	Flattening Test Rpt.	1	-	-	
2.3	End Preparation	Bevel Angle & Root Face	Measurement	Hourly	Material specification	As Per IS 1239 & 3589	Bevelling Inspn. Rpt.	1	-	-	

P – Perform By, R – Review By, W - Witness By, 1- JPL , 2 - Third Party / Customer / SIMALAB
3 - BHEL or BHELAIA.

Note : This QAP to be read along with the Relevant PO / approved Drgs / Data Sheet etc.
Acceptance Norms — Appd Drg / Appd Datasheet.

JINDAL PIPES LIMITED:

Approved By

Chief Engineer,
Thermal Projects Construction
TSGENCO, Vidyut Soudh
Khairatabad, Hyderabad

NOTE : This approval does not absolve / relieve the supplier from its responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.

SIGN. & DATE

ROS-6278

TYPICAL QAPs

ROS-6278

JINDAL PIPES LIMTED (ERW PIPES)
QUALITY ASSURANCE PLAN FOR CARBON STEEL ERW PIPES

Customer : SIMA LABS PVT.LTD.
Project : BHEL TELANGANA
Specification : IS: 1239 & 3589 Gr. 410

QAP No. : JPL/ERW/IS:1239-3589/001
Rev. No. : 01
Date : 17/02/2017
Page : 3of 3

Sl. No	Inspection / Test Stage	Checks	Type of Inspection	Frequency of Check	Reference Documents	Acceptance Norms	Format of Record	Inspection By			Remarks
								P	W	R	
2.4	Hydrostatic Test	Leakage	Visual	Each Pipe	Material specification	As Per IS 1239 & 3589	Hydrostatic Test Rpt.	1		2	
3.0	**Final Inspection**	Y.S, U.T.S, % El & Flattenting	Mechanical Test	As Per IS:4711		-do-.	Test Report	1	-	2	
		Visual & Dimn.					Inspn. Rpt				
		Surface condition	Visual	As Per IS: 4711	-do-	-do-		1	2	3	
		O.D	Measurement	-do-	-do-	-do-		1	2	3	
		Wall Thickness	Measurement	-do-	-do-	-do-		1	2	3	
		Length									
		Marking	Visual	-do-	-do-	-do-		1	2	3	
		Straightness	Measurement	-do-	-do-	-do-		1	2	3	
4.0	**Issue of Test Certificate**	Conformance to specification	Review of all Tests	All Test	-do-	-do-	Works Mill T.C	-	-	2 & 3	

P – Perform By, R – Review By, W - Witness By, 1- JPL , 2 - Third Party / Customer / SIMA LABS PVT LTD

3- BHEL or BHEL AIA.

Acceptance Norms - As per Dwg / Appd Datasheet;

JINDAL PIPES LIMITED:

Approved By

NOTE : This approval does not absolve / relieve the supplier from his responsibilities regarding the compliance of PO / Contract and other Engg / Quality approved documents.

DATE

Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

Note - This QAP to be read alongwith relevant P.O / Approved Dwg / Datasheet.

Painting and Preservation to be ensured for all the Components

TYPICAL QAPs

ROS-6278

QUALITY ASSURANCE PROGRAM FOR PLC PANEL

Project Name	PLC BASED CONTROL SYSTEM FOR ETP PLANT	QAP No	16100037-12-SL-014-QAP-01
Client	TELENGANA STATE POWER GENERATION CORPORATION	Revision	R0
EPC Contractor	M/s. BHARAT HEAVY ELECTRICALS LTD	Date	07-03-2017
PT Contractor	M/S SIMA LABS PVT LIMITED	Contract No	-
Vendor	M/s. SUN INDUSTRIAL AUTOMATION & SOLUTIONS		
Item Description	QAP FOR PLC CONTROL PANEL		

P: Performer	R:REVIEW	W:WITNESS	1: SIAS	2: SIMA	3: BHEL	4.TSPGC
SUN Industrial Automation &				M/s. BHARAT HEAVY ELECTRICALS LTD		

Sl.No.	Components/Operation	Characteristics	Remarks	Method of Check	Extent of Check	Reference/ Acceptance Document	Acceptance Norm	Format of Record	1	2	3	4
1.0	IN COMING MATERIALS											
1.1	PLC, HMI, Hardwares / Softwares	Physical Inspection * Indentification Labels * Physical Damages	Rejected Products are identified with rejected Sticker pasted on product	Physical	100%	Purchase Order on vendor & literature enclosed with PLC & Panel BOM	Should be as per approved drawing. No physical damages to the product. All necessary accessories like connectors should be in place.	Vendor TC	P	R	R	R
1.2	PLC Panel	Physical Inspection *Dimensions *Painting *Cut-outs *Lifting Hooks *Locking Arrangements *Components Drawing Pocket Laying Accessories Mounting Accessories Plinth & AV pads Cable Gland Plates Hardware's Hinges Louver's & Filters	Panel accepted with Product identification to the tag on the Panel. In case of any deviations the same is informed to vendor to correct the defect.	Measuring Tape, Visual, Vernier & Depth Gauge	100%	Purchase Order on vendor & literature enclosed with PLC & Panel BOM	Dimensions to be as per drawings Painting should be free from scales, unevenness, and peelings, to be of correct shade. Cutouts should as per the drawings. Lifting hooks should be as per drawings. Locking arrangement should be as per specification. All components should be fitted in this panel as specified. Protection Class Certification	Vendor TC	P	R	R	R
1.3	Cables / Wires	Physical Inspection, Data Transfer to SCADA for Communication cables	-	Visual, Wire Gauge, Screw Gauge	100%	Purchase Order on vendor & literature enclosed with PLC & Panel BOM	Products should be as specified in the approved drawing. Product is accepted based on the test certifications of the Vendor	Vendor TC	P	R	R	R

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गुणवत्ता विभाग / Quality Department
भेल/हैदराबाद / BHEL / BAP / RANIPET - 632 406.

Chief Engineer
Thermal Projects Cor
TSGENCO, Vidyu
Khairatabad, Hyd

QUALITY ASSURANCE PROGRAM FOR PLC PANEL

Project Name	PLC BASED CONTROL SYSTEM FOR ETP PLANT	QAP No	16100037-12-SL-014-QAP-01
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EPC Contractor	M/s. BHARAT HEAVY ELECTRICALS LTD	Date	07-03-2017
PT Contractor	M/S SIMA LABS PVT LIMITED	Contract No	-
Vendor	M/s. SUN INDUSTRIAL AUTOMATION & SOLUTIONS		
Item Description	QAP FOR PLC CONTROL PANEL		

P: Performer	R:REVIEW	W:WITNESS	1: SIAS	2: SIMA	3: BHEL	4.TSPGC
SUN Industrial Automation &				M/s. BHARAT HEAVY ELECTRICALS LTD		

Sl.No.	Components/Operation	Characteristics	Remarks	Method of Check	Extent of Check	Reference/ Acceptance Document	Acceptance Norm	Format of Record	1	2	3	4
1.5	Relay Boards MCB's	Physical Damages Dimensions Accessories	Accepted with Product identification No. Tag on the Product /Carton In case of defect the product is sent back to vendor.	Visual	100%	Purchase Order on vendor & literature enclosed with PLC & Panel BOM	Product should be as per approved drawing. No physical damages to the product Dimensions should be as per specification All necessary mounting accessories supplied	Vendor TC	P	R	R	R
1.6	Power Supplies (24 V DC)	Physical Inspection Physical Damages Dimensions Mounting accessories	Accepted with Product identification No. Tag on the Product In case of defect the product is sent back to vendor	Visual	100%	Purchase Order on vendor & literature enclosed with PLC & Panel BOM	No physical damages to the product Dimensions should be as per specification All necessary mounting accessories supplied	Vendor TC	P	R	R	R
1.7	Laptop & Ethernet switch	Physical Inspection Physical Damages Dimensions.	Accepted with Product identification No. tag on the Product In case of defect the product is sent back to vendor	Visual	100%	Purchase Order on vendor& literature enclosed with PLC& Panel BOM Installation Record of Vendor	No physical damages to the product All necessary accessories supplied	Internal IR	P	R	R	R
1.8	Pushbutton/indication lamps,Selector Switch	Physical Inspection Physical Damages Dimensions.	Accepted with Product identification No. tag on the Product In case of defect the product is sent back to vendor	Visual	100%	Purchase Order on vendor& literature enclosed with PLC& Panel BOM	No physical damages to the product All necessary accessories supplied	Vendor TC	P	R	R	R

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மூத்த அபியந்தா/குழுத் தலைவர் / Sr. Engineer / QA - Systems
குணாம் பிரிவு / Quality Department
பெல்/பஹுபன/பிஏபிபி/ரானிபேட் / BHEL / BAP / RANIPET - 632 406.

Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

TYPICAL QAPs

QUALITY ASSURANCE PROGRAM FOR PLC PANEL

Project Name	PLC BASED CONTROL SYSTEM FOR ETP PLANT	QAP No	16100037-12-SL-014-QAP-01
Client	TELENGANA STATE POWER GENERATION CORPORATION	Revision	R0
EPC Contractor	M/s. BHARAT HEAVY ELECTRICALS LTD	Date	07-03-2017
PT Contractor	M/S SIMA LABS PVT LIMITED	Contract No	-
Vendor	M/s. SUN INDUSTRIAL AUTOMATION & SOLUTIONS		
Item Description	QAP FOR PLC CONTROL PANEL		

P: Performer	R:REVIEW	W:WITNESS	1: SIAS	2: SIMA	3: BHEL	4.TSPGC
SUN Industrial Automation &				M/s. BHARAT HEAVY ELECTRICALS LTD		

Sl.No.	Components/Operation	Characteristics	Remarks	Method of Check	Extent of Check	Reference/ Acceptance Document	Acceptance Norm	Format of Record	1	2	3	4
2.0	IN PROCESS											
2.1	PLC Panel	Mechanical Completion mounting of components/Equipments Mounting of terminal blocks Labelling of the equipments Fixing of Cable Troughs Connecting Ethernet Switch for Data Into PLC	Comments & Observations are recorded in the Process / Inspection Tag Deviation in Ferruling are recorded and rectified Deviation in Crimping's are recorded and rectified Deviation in Termination are recorded and rectified	Visual	100%	Approved Wiring Diagrams Termination Schedules Inter-connection Diagrams	Mounting of components as per approved drawings	Vendor TC	P	R	R	R
		Point To Point Wiring Check Checking Of Wire size used Checking of wire Colours Checking of Ferrules Checking of Crimping's Checking of termination Continuity Check Conductance & Insulation	Comments & Observations are recorded in the Process / Inspection Tag Deviation in Ferruling are recorded and rectified Deviation in Crimping's are recorded and rectified Deviation in Termination are recorded and rectified	Visual	100%	Approved Wiring Diagrams Termination Schedules Inter-connection Diagrams	Wire Colouring to be as per requirement All ferruling are as per requirements No Loose Crimps. Correct size lugs used terminations to equipments & TB's are as per requirement	Vendor TC	P	R	R	R
2.2	Pushbuttons Indicating Lights Fuse & fuse Holders Terminal Block Lugs, Wirings	Physical Ventilation	Accepted if as per approved final BOM and drawings Deviations are recorded and modified	Visual	100%	Bill of Materials Test Certificates of Vendors For Wires	All Materials to be as per approved final BOM and drawings	Vendor TC	P	R	R	R

Chief Engineer,
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ROS-6278

QUALITY ASSURANCE PROGRAM FOR PLC PANEL

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Client	TELENGANA STATE POWER GENERATION CORPORATION	Revision	R0
EPC Contractor	M/s. BHARAT HEAVY ELECTRICALS LTD	Date	07-03-2017
PT Contractor	M/S SIMA LABS PVT LIMITED	Contract No	-
Vendor	M/s. SUN INDUSTRIAL AUTOMATION & SOLUTIONS		
Item Description	QAP FOR PLC CONTROL PANEL		

P: Performer	R:REVIEW	W:WITNESS	1: SIAS	2: SIMA	3: BHEL	4.TSPGC
SUN Industrial Automation &				M/s. BHARAT HEAVY ELECTRICALS LTD		

Sl.No.	Components/Operation	Characteristics	Remarks	Method of Check	Extent of Check	Reference/ Acceptance Document	Acceptance Norm	Format of Record	1	2	3	4
3.0	FACTORY ACCEPTANCE TESTS											
3.1	Assembled System	Mechanical Completion mounting of components/Equipments Mounting of terminal blocks Labelling of the equipments Fixing of Cable Troughs Fixing of bus bars	Comments & Observations are recorded in the Process tag, inspection Report Observations in Layouts are recorded and corresponding drawings revised Overlapping due to use of wrong component equipment entities change of component/ equipment	Visual, Vernier, Measuring tape	100%	Approved G.A Drawings	Mounting of Components as per drawings. Use of Materials as per Bill Of Materials	Internal TR	P	W	W	R
3.2	Checking of hardware used Checking of component used BOM Check	Point To Point Wiring Check Checking of Wire sizes used Checking of Wire colours Checking of ferrules Checking of Crimping Type Checking of Termination Continuity Check Megger Test	Comments and observation are recorded in the process Tag. Inspection Report	Visual, Multimeter	100% Cables (Sample basis for Pre –fabricated Cables)	Approved wiring Diagrams, Interconnection Diagrams.	Wire sizes to be as per requirement Wire colour to be as be as per requirements All Ferruling is as per requirements No loose Crimps. Correct size lugs used. Terminations to equipments & tb's are as per requirements. Continuity between the ends of wires as per requirement Crimping & Termination with Sizing	Internal TR	P	W	W	R

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सीनियर इंजीनियर/क्यूए-सिस्टम्स / Sr. Engineer / QA - Systems
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QUALITY ASSURANCE PROGRAM FOR PLC PANEL

Project Name	PLC BASED CONTROL SYSTEM FOR ETP PLANT	QAP No	16100037-12-SL-014-QAP-01
Client	TELENGANA STATE POWER GENERATION CORPORATION	Revision	R0
EPC Contractor	M/s. BHARAT HEAVY ELECTRICALS LTD	Date	07-03-2017
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SUN Industrial Automation &				M/s. BHARAT HEAVY ELECTRICALS LTD		

Sl.No.	Components/Operation	Characteristics	Remarks	Method of Check	Extent of Check	Reference/ Acceptance Document	Acceptance Norm	Format of Record	1	2	3	4
3.3	Power UP for PLC Panel & Mimic Panel	Power UP Tests & Power Distribution Test.	Materials accepted based on the indications & readings Any deviations are corrected and equipment passed on to next stage Comments and observations are reported in the process Tag Inspection Report	Visual, Multimeter	100%	Schematic Diagrams BOM & Approved Testing Procedure	All equipments should get powered ON as per Specification All indications as per the requirements should get indicated Measurement of corresponding voltages as per the distributor diagram	Internal TR	P	W	W	R

S. Sheela

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वरिष्ठ अभियंता/क्यूए-सिस्टम्स / Sr. Engineer / QA : Systems
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Chief Engineer,
Thermal Projects Construction,
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Khairatabad, Hyderabad - 82.

TYPICAL QAPs

QUALITY ASSURANCE PROGRAM FOR PLC PANEL

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EPC Contractor	M/s. BHARAT HEAVY ELECTRICALS LTD	Date	07-03-2017
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Item Description	QAP FOR PLC CONTROL PANEL		

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SUN Industrial Automation &				M/s. BHARAT HEAVY ELECTRICALS LTD		

Sl.No.	Components/Operation	Characteristics	Remarks	Method of Check	Extent of Check	Reference/ Acceptance Document	Acceptance Norm	Format of Record	1	2	3	4
3.4	Input/Output	Input/Output Tests	Materials are accepted based on the input & output recognition in the software. Any deviations are corrected and materials passed on to next stage of inspection. Observations are reported in the process Tag Inspection Report	Visual indication	100%	Schematic Diagrams Wiring Diagrams, Interconnection Diagrams. Approved Testing Procedure	All Inputs & Outputs Should get energised as per the Simulation	Internal TR	P	W	W	R
3.5	Communication	MMI communication	Subject acceptance based on through communication. Any deviations are corrected Observations are reported in the process Tag Inspection Report	Visual indication	100%	Schematic Diagrams Wiring Diagrams, Interconnection Diagrams. Approved Testing Procedure	All Inputs & Outputs Should get energised as per the Simulation	Internal TR	P	W	W	R
3.6	Redundancy	Redundancy checks	CPU ,Communication redundancy checks	Visual indication	100%	Schematic Diagrams Wiring Diagrams, Interconnection Diagrams. Approved Testing Procedure	Results marked in the FAT procedure document	Internal TR	P	W	W	R

एस.शीला / S. SHEELA
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गुणता विभाग / Quality Department
बीएचईएल/बीएपी/रानीपेट / BHEL / BAP / RANIPET - 632 406.

Chief Engineer,
Thermal Projects Construction,
TSGENCO, Vidyut Soudha,
Khairatabad, Hyderabad - 82.

INDICATIVE MASTER DRAWINGS LIST (ETP PLANT)

PROJECT : YADADRI 5X800MW

PACKAGE : BOP - WATER SYSTEM

CLIENT :

Sr. No.	BHEL_DRG_NO	VENDOR_DRG_NO.	DRAWING TITLE	SCH DATE OF SUB	CAT
1			Process Sizing Calculation for Effluent Treatment Plant		A
2			P & I Diagram of Effluent Treatment Plant		A
3			Layout for Effluent Treatment Plant		A
4			Control Write-up		A
5			Electrical Load List		A
6			GA of Common Collection Pit & Pump House		A
7			GA of STG and GTG area Oily Waste Collection Pit & Pump House		A
8			GA of Lamella Clarifier		A
9			GA of TPI Separator		A
10			GA of Lamella Sludge Collection Pit & Pump House		A
11			GA of NaOH Dosing Tank		A

12			GA of Acid Dosing Tank		A
13			GA of Polymer Dosing Tank		A
14			GA of HRSG Blowdown sump 1 and 2.		A
15			GA of HRSG Floor Wash Collection Pit 1 and 2.		A
16			GA of GUARD POND		A
17			UNDERGROUND PIPE ROUTING FROM VARIOUS SUMPS TO ETP AREA		A
18			G.A, Cross Sectional Drawing, Performance Curve & Technical Data Sheet of HRSG-1 & 2 blow down sump pump & Motor		A
19			G.A, Cross Sectional Drawing, Performance Curve & Technical Data Sheet of Transformer Yard Pit-1 & 2 Dewatering Pump & Motor		A
20			G.A, Cross Sectional Drawing, Performance Curve & Technical Data Sheet of STG & GTG Area Oily Waste Collection Pit-1 & 2 Dewatering Pump & Motor		A
21			G.A, Cross Sectional Drawing, Performance Curve & Technical Data Sheet of HRSG Area Floor Wash Collection Pit-1 & 2 Dewatering Pump& Motor		A
22			G.A, Cross Sectional Drawing, Performance Curve & Technical Data Sheet of Common Collection Pit Dewatering Pump & Motor		A
23			G.A, Cross Sectional Drawing, Performance Curve & Technical Data Sheet of Lamella Sludge Transfer Pump & Motor		A
24			G.A, Cross Sectional Drawing, Performance Curve & Technical Data Sheet of Treated Effluent disposal pump & Motor		A
25			G.A, Cross Sectional Drawing, Performance Curve & Technical Data Sheet of Polymer Dosing pump & Motor		A
26			Technical Datasheet of Non-Return Valve including GA & C/S drg		A

27			Technical Datasheet of Manual Operated Gate Valve including GA & C/S drg.		A
28			Technical Datasheet of Diaphragm Valve(Manual operated) including GA & C/S drg.		A
29			Technical Datasheet of Butterfly Valve(Manual operated) including GA & C/S drg.		A
30			GA of Agitator Assembly (ETP)		A
31			GA of Sluice Gate		A
32			Valve Schedule		I
33			Pipe Schedule		I
34			Painting Schedule		I
35			Operation & Maintenance Manual		I
36			PG Test procedure		I
37			G.A & R.C DETAIL OF HRSG AREA FLOOR WASH COLLECTION PIT 1/2 & PUMPS FOR ETP		A
38			CIVIL DESIGN CALCULATION OF OF HRSG AREA FLOOR WASH COLLECTION PIT 1/2 & PUMPS FOR ETP		A
39			CIVIL G.A & R.CC HRSG BLOW DOWN SUMP PIT 1 / 2 & PUMPS FOR ETP		A
40			DESIGN CALCULATIONS FOR HRSG BLOW DOWN SUMP PIT 1 / 2 & PUMPSFOR ETP		A
41			Civil Design Basis Report		I
42			Civil G.A & RCC Details of Common Collection Pit & Pump House		A
43			Civil Design Calculation of Common Collection Pit & Pump House		I

44			Civil G.A & RCC Details of Lamella Sludge Collection Pit & Pump House		A
45			Civil Design Calculation of Lamella Sludge Collection Pit & Pump House		I
46			CIVIL G.A & R.CC DETAIL STG & CTG AREA OILY WASTE COLLECTION PIT 1 / 2 & PUMPS FOR E T P		A
47			DESIGN CALCULATIONS FOR STG & CTG AREA OILY WASTE COLLECTION PIT 1 / 2 & PUMPS FOR E T P		A
48			CIVIL GA & RCC DRAWING OF GUARD POND (ETP)		A
49			CIVIL DESIGN CALCULATION OF GUARD POND (ETP)		A
50			Cable Tray Layout for Effluent treatment Plant		A
51			Earthing Layout for Effluent treatment Plant		A
52			Control Cable Schedule		A
53			Instrument Cable Schedule & Interconnection Chart		I
54			Instrument Schedule		I
55			Technical Datasheet for Pressure Guage		A
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Performance Guarantee Test Procedure

a. Effluent treatment plant outlet water guarantee shall be as per approved attached Design memorandum document
b. The performance test shall be conducted once in fair season when turbidity is moderate, and once in rainy season, when turbidity is high. In case the turbidity at the time of test during rainy season is found less than the design turbidity, the test shall be conducted with that turbidity only. The duration, type and mode of conducting the above tests shall be mutually decided upon between the Purchaser and the Bidder.
c. The duration of the test shall not be less than 72 hours on continuous basis. These tests will be carried out within a reasonable period from the date of commissioning of the System. Basically the test shall be such as to prove beyond doubt that the guaranteed performance of the System under varying flow conditions (within the specified units) to the satisfaction of the Purchaser. The test procedures shall be as per relevant equivalent standards from recognized origins.
d. The test shall be deemed to be a failure when either of the limits as indicated in Design philosophy is exceeded and retesting will have to be arranged.
e. Each pump shall be guaranteed for capacity, total dynamic head and power consumption
f. Each blower shall be guaranteed for head and power consumption.
g. The System must meet the guarantee with reference to suspended solids / turbidity, chemical consumption & ensure satisfactory performance of the chemical injection and sludge disposal system in each test run.

Water system packages fall under Category - B of this Performance Guarantee document. Bidder to refer below document in specific correlation w.r.t water system package only.

PERFORMANCE GUARANTEES

1.00.00 **PERFORMANCE GUARANTEES, PERFORMANCE/ACCEPTANCE TESTS & LIQUIDATED DAMAGES FOR SHORTFALL IN PERFORMANCE**

1.01.00 The Bidder shall guarantee that the equipment offered shall meet the ratings and performance requirements stipulated for various equipment covered in this specification. The guarantees are categorised as:

a) Those which attract liquidated damages, as listed below (Category-"A"). The Bidder shall furnish signed declarations in the manner prescribed in the bid proposal schedules for these guarantees.

b) Those which do not attract liquidated damages, as listed below (Category-"B"). This guarantee list indicated in this section is not exhaustive and the Owner reserves the right to call upon the Bidder to demonstrate any parameter, operation, etc. of any equipment as specified and as required to meet the duty conditions.

1.02.00 The guaranteed parameters shall be without any tolerance values. The Bidder shall demonstrate all the guarantees covered in various volumes and sections of this specification during Performance/Acceptance test. In case during tests it is found that the equipment/system has failed to meet the guarantees, the Contractor shall carry out all necessary modification to make the equipment/system comply with guaranteed requirements. However, if the Contractor is not able to demonstrate the guarantees, even after the modifications within ninety (90) days of notification by the Owner, the Owner will at his discretion :

i. reject the equipment and recover the payment already made or accept the equipment only after levying liquidated damages as identified in this section for those guarantees which are covered under category "A".

OR

ii. reject the equipment and recover the payment already made or accept the equipment only after assessing and deducting from the contract price an amount equivalent to the deficiency of the equipment/system as assessed by the Owner, for those guarantees which are covered under Category-B.

1.03.00 All guaranteed parameters shall necessarily be quoted by the Bidder based on the established proven results obtained from similar units in successful operation. Evidence for this shall necessarily include the test codes used, acceptance test results, accuracies of various instruments used for the performance test, details of tolerances, if allowed, etc. While quoting the guaranteed parameters, the Bidder shall keep in view the requirements

specified in the specification especially regarding the reliability, operability and maintainability of the equipment proposed. The Owner reserves the right to evaluate the parameters quoted by the Bidder based on his experience and published material available.

1.04.00 The liquidated damages shall be calculated prorata for the fractional parts of the unit unless stated otherwise.

1.05.00 The turbine generator, boiler, auxiliaries, and all other plant equipment and system shall perform continuously without the noise level (individual or collectively) exceeding the values specified in respective equipment specification over the entire range of output and operating frequencies.

1.06.00 **Performance/Acceptance Tests**

1.06.01 The performance/acceptance tests for various equipment and systems shall be carried out as specified under the respective equipment specifications and those specified below shall be specifically applicable. All the guarantees shall be tested together as far as practicable.

1.06.02 In case of systems with stand-by equipment the liquidated damages for non-performance will be levied for normal operating number of equipment only. However, for this purpose all the equipment including standby equipment shall be tested and average values arrived at.

1.06.03 For instrument inaccuracies during PG Test, refer subsequent clauses of this section.

1.06.04 For Total Auxiliary Power Consumption, the transformers listed under the respective clauses, shall be taken together for purposes of guarantee and not individually.

2.00.00 **START-UP, INITIAL OPERATION, RELIABILITY RUN AND PERFORMANCE TESTS**

For the purpose of Taking over of the Plant, the following activities shall have to be completed successfully.

i) Mechanical Completion
ii) Preliminary Operation
iii) Initial Operation
iv) Reliability Operation
v) Trial Operation
vi) Performance Guarantee Tests

2.01.00 **Mechanical Completion**

(a) Mechanical completion is defined as the state of readiness of works and completeness of Field Quality checks under the scope of contract to undergo the pre-commissioning checks, followed immediately thereafter by commissioning including preliminary operation, initial operation, reliability operation, performance tests including unit characteristics tests for functional or operational occupation of the

works.

(b) Mechanical completion shall be deemed to occur when the contract erection/installation/construction and Field Quality check works are completed as per specifications for all equipment / systems including standby. It also include but not limited to the following:

(i) all installation/erection and Field Quality checks duly carried out and individual protocol viz. erection, FQA (Field Quality Assurance) and commissioning protocol to be signed.

(ii) all defects/deficiencies notified by the Purchaser during installation/erection rectified to the satisfaction of Purchaser which, in the opinion of the Purchaser, will not affect the safe operability and maintainability of the works, and

(iii) the contract works, in the opinion of Purchaser, subject to sub-clause (ii) above, being fit, sound, safe and operable for undertaking the pre-commissioning checks, preliminary operation, initial operation, reliability operation and performance tests including unit characteristics tests followed by subsequent commercial operation without interruption for reason of defect/deficiency or unfulfilled obligations of the Contractor in the erection/installation work.

2.02.00 **Specific Requirements of Mechanical Completion**

(a) Mechanical completion in different disciplines shall be determined based on the following characteristics, signifying the readiness of the works/plants and systems for undertaking the pre-commissioning checks and subsequent preliminary operation, initial operation, reliability operation and performance tests including unit characteristics tests as applicable to the contract works:

(i) All plant construction/installation in various disciplines, as detailed under (b) below and as applicable to the contract are completed including aesthetic and workmanship and safety aspects, with all installation/construction checks as per specification, relevant codes, standards and practices ensuring conformity to contract and meeting any applicable statutory requirements.

(ii) All contractual obligations up to the stage of completion of construction / installation are fulfilled to the satisfaction of the Purchaser.

(b) All contract works or otherwise ready to be taken into service, or for functional or operational occupation save pre-commissioning/ commissioning checks, preliminary operation, initial operation, reliability operation, performance tests, unit characteristics tests are to be carried out as per approved commissioning procedure submitted by the contractor including but not limited to the following:

(i) Areas inclusive of all roads, accesses, structures, housings, platforms, walkways, stairs, ladders, safe approach to equipments, safety/ protective guards, covers, hand rails and such items of work are constructed as per specification and approved for use.

(ii) Drains, sewers, waste disposal channels, vents, chutes, ducts and such works are constructed and connected to treatment and other disposal systems.

(iii) Equipment and piping in different systems/disciplines with all appurtenances, auxiliaries and accessories along with supporting structures, hangers, mounts, etc., are erected/ installed, supported, anchored, aligned, grouted and adjusted for operating conditions.

(iv) Electrical power supply, control, communication and lighting equipment along with control panels, control desks, switchgear, local starters and such accessories along with protective systems, interlocks and integral and auxiliary systems are permanently installed, aligned and adjusted, with megger, continuity and specified installation checks duly carried out.

(v) Cables are laid, routed, supported, dressed, clamped, tagged, ferruled and terminated with clamp terminals designated and all continuity and megger checks duly carried out.

(vi) Safety/relief valves are calibrated and set to operating conditions and tried out. All safety systems are installed, calibrated, checked and accepted.

(vii) Plant identification numbers, colour codes, tags, nameplates are duly mounted / painted/affixed.

(viii) All painting, lining and insulation works are completed with specified checks to the satisfaction of the Purchaser.

2.03.00 **Other Prerequisites for Mechanical Completion**

The Contractor shall also meet the following prerequisites for mechanical completion:

(a) Submit a compilation of all reports of shop tests, material tests and various stage inspection establishing total compliance to contract specification in manufacturing items of supply of contract.

(b) Submission of a certificate by the Contractor in a format agreed by the Purchaser that the contract works have been designed, selected, manufactured, furnished and installed under the full responsibility of the Contractor.

(c) All erected plants, structures, equipment and systems are maintained and preserved in sound condition and are fit and sound to undertake

pre-commissioning checks and 'tests before commercial operation' for operational and functional occupation immediately thereafter.

(d) All areas and constructed works are cleared daily upto the satisfaction of the Owner of all construction materials, temporary works, debris, rubbish water and all such impediments to render the contract works safe, sound and operable.

(e) All safety features and safety equipment are functional.

(f) Fire prevention and fire extinguishing system in all fire prone areas are to be made functional.

(g) Any specific statutory approvals pre-requisite to commissioning of the plant are duly obtained.

2.04.00 **Preliminary Operation**

Preliminary operation shall mean all activities undertaken as part of commissioning after mechanical completion upto commencement of initial operation and shall include mechanical and electrical checkouts, calibration of instruments and protection devices, commissioning of sub/supporting systems covered under the contract.

2.05.00 **Initial Operation**

Initial operation shall include all operations undertaken as part of commissioning after completion of preliminary operation upto commencement of reliability operation. It shall be the first integral operation of the complete BOP integrated with Boiler, Turbine Generator package covered under the contract and shall include first light up / initial equipment rolling, equipment stretch-out, dry-out no-load / partial load /full loads runs for mechanical / electrical tryout and gathering of operational data, calibration, setting and commissioning of controls systems; and shutdown inspection and adjustment after running trails of the plant under the contract.

During initial operation each and every activity wise commissioning protocols are to be jointly signed by the Purchaser and Contractor commissioning team.

The auto loop control tuning shall continue upto the commencement of 72 hour full load operation of trial run.

The initial operations shall include operation of unit as a whole under normal operating conditions for twenty four (24) consecutive hours at the 100% TGMCR load or twelve (12) consecutive hours for two (2) consecutive days at the 100% TGMCR load unless otherwise agreed to by the Purchaser or restricted by system load conditions. The completion of initial operation will be certified in writing by the Purchaser.

2.06.00 **Reliability Operation**

(a) After the initial operations, the plant shall be on reliability operation. During the reliability operation, the Contractor will be allowed to make

minor adjustments as may be necessary, provided that such adjustments do not interfere with or prevent the commercial use of the plant or result in significant reduction of output. The duration of the reliability operation of plant shall be spread over a period of thirty (30) days. The maximum number of interruption attributable to Contractor shall be of four (4) numbers each not exceeding four (4) hours duration. In case either the number of interruptions, attributable to the Contractor, exceeds four (4) or the duration of any of the four (4) interruptions exceeds four (4) hours the reliability test shall be repeated.

(b) For the period of reliability operation, the time of actual operation shall be counted. In case the duration of actual continuous operation of any of the above modes is discontinued for reasons, which are not due to Contractor's fault or negligence, that particular test would be deemed to have satisfied the reliability operation test. However, should the test be discontinued due to Contractor fault, the test shall be restarted for that particular case.

(c) Should any failure (other than of an entirely minor nature) due to or arising out of faulty design, materials, or workmanship (but not otherwise) occur in any item of the plant, sufficient to prevent commercial use of the plant, the reliability test period of thirty (30) days shall recommence for that item after the defect has been remedied by the manufacturer/Contractor. The onus of proving that any failure is not due to faulty design, materials and workmanship will lie with the Contractor.

(d) A 'reliability operation' report comprising observations and recordings of various parameters measured in respect of the 'reliability operation' shall be prepared and submitted to the Purchaser. This report, besides recording the details of various observations during 'reliability operation' shall also include the dates of start and finish of the reliability operation and shall be signed by the representatives of both the parties. The report shall have recordings of all details of interruptions that occurred, adjustments made and any repairs carried out during the 'reliability operation'.

Also a punch list is to be prepared during the reliability test and the defects are to be rectified by the contractor before commencement of 72 hour operation at full load during trial operation.

(e) Should any failure or interruption occur in any portion of the tests due to or arising from faulty design, materials, workmanship, omissions, incorrect erection, or inadequate instructions by the Contractor's supervisors, sufficient to prevent safe commercial use of the plant, the reliability operation test at the particular load shall be considered void and the reliability test shall recommence after the Contractor has remedied the cause of the defect.

(f) During the reliability operation all the equipments, Raw/ DM water system and sub-systems, control loops, interlocks and protection including switchyard installations will be in service and change over to standby equipments are to be done on running condition of the unit.

(g) The 'reliability operations' shall be considered successful, provided that each item of plant can meet the above requirements.

(h) Upon the completion of 'reliability operations', as soon as practicable, or at such time as may be otherwise agreed to by the parties concerned, the Contractor shall notify in writing to the Purchaser that the Plant is ready for performance tests.

2.07.00 **TRIAL OPERATION:**

1. On completion of erection of any major items along with its auxiliaries, the same shall be thoroughly inspected by the Contractor together with the TSGENCO's Engineers for correctness and completeness and acceptability for pre-commissioning tests. Though the TSGENCO's Engineers associate themselves with such inspection, the responsibility for declaration for correctness, completeness and acceptability shall rest with the Contractor and the pre-commissioning tests and inspections shall be carried out after such declaration. The pre-commissioning tests to be performed at site as well as necessary documentation and formats for the protocols to be signed during and after the tests shall be prepared by the Contractor taking into account relevant Indian/International/ Manufacturers standard as applicable and finalized by the TSGENCO sufficiently in advance through mutual discussions. On conclusion of satisfactory pre-commissioning tests of each individual equipment, the trial operation of the unit shall start consistent with parameters of the technical specifications.

2. The duration of trial operation shall be for 14 days during which period the unit shall be run from half to full load or any other load cycle mutually agreed to during which period the unit shall run at full load for 72 hours continuously. However, if required, the Purchaser and the Contractor may mutually agree for economical load operation for 48 hours continuously. Any interruption caused by the Contractor up to 24 hours will not effect the period of 14 days indicated above. In case of such interruption occurring for more than 24 hours, the above period shall be extended correspondingly. During the above trial operation the standby auxiliary equipment shall also be run for a minimum period of more than 72 hours during which period the equipment shall run at its rated capacity for a minimum period of 24 hours. Further the above trial operation shall be carried out in full fledged manner with the associated instruments and controls. The unit is deemed to be commissioned on successful completion of the above trial operation.

3. A document shall be prepared on the results of trial operation. This document besides recording of the details of the various observations during the trial run will also include the date of start and finish of the trial operation and will be signed by the representative of both the parties. The document of the trial operation shall have log sheets and all adjustments, repairs, interruptions etc., shall be recorded therein. If any major adjustment is carried out which has been changed from the initial operation value, then the reason for it is to be furnished in the

report in detail.

The Purchaser and the Contractor will observe the plant overall reliability and shall test the equipment runback, rundown, auto start of equipments, CMC function and its reliability, complete automation of the plant system etc.

4. The readiness of the unit for the trial operation shall be intimated by written notice to the TSGENCO after mutual discussions. After receipt of such notice if the trial operation could not be performed or could not be completed due to any reasons not attributable to the Contractor and if the situation continues, the Contractor shall be absolved of the responsibility for the delay and the plant shall be deemed to have been taken over by the TSGENCO at the end of 60 days after the Contractor's notifications of readiness of the same.

5. The trial operation shall be carried out in compliance with relevant manufacturer's standards and/or relevant Indian/International standards and manufacturer's operation directions before starting them.

6. Defects which are minor in nature and do not endanger the safe operation of the plant, shall not be considered as reasons for not taking over the plant by the TSGENCO. These defects shall be listed in the above mentioned documents and shall be rectified by the Contractor in accordance with the agreement made in this respect.

2.08.00 **Performance Tests**

(a) PG test notification to be given by the contractor to the purchaser after COD. The performance tests shall be conducted at site on all major systems by the Contractor. The Contractor's commissioning Engineers shall make the entire plant ready for such tests and assist the Purchaser in operation during the tests. The test shall be commenced after the 'Plant/Equipment' has attained stable operation at the end of 'reliability operation'. The date of commencement of the performance tests shall be as soon as practicable on completion of the 'reliability operation' or as may be mutually agreed upon between the Contractor and Purchaser.

Final trail operation shall be carried out for a period of seventy two (72) hours at 100% TGMCR before 'taking over'.

(b) **Independent Inspector**

The Purchaser reserves his right to appoint an independent inspector at his own cost as his representative to discuss the test programme, to approve the instrumentation, to witness the tests and to analyze the test results.

(c) The tests shall be binding on both the parties of the contract to determine compliance of the 'plant'/'equipment' with the performance

guarantees.

(d) The performance tests shall be carried out to prove the guarantees. The purpose of the performance tests is to check whether the plant meets the guaranteed performances.

(e) The performance test procedure, the instrumentation to be installed, the instrument accuracy classes, including the definition of the calculation method to be used, the areas of responsibility and the items which specifically require preparation and agreement shall be submitted by the Contractor for review and approval during detail engineering phase. The schematics identifying the guarantee test instrumentation shall be submitted along with procedure. It shall be ensured that necessary test points and spool pieces are installed during the detail-engineering phase and also identified in process and instrumentation drawings. Code of the PG test is to be fixed up during detail engineering stage. The Contractor shall furnish detail test programme during detail engineering stage.

(f) The performance test instruments shall be of precision type with instrument accuracy limits as required and defined in the applicable performance test codes such that measurement uncertainty does not exceed the values agreed to by the Contractor in the Schedule of Performance Guarantees.

(g) All test instrumentation for the performance tests as required shall be supplied by the Contractor on loan basis. All costs associated with the supply, calibration, installation and return of the test instrumentation are deemed to have been included in the contract price. The test shall be in accordance with those specified or as per agreed performance test codes. Batch calibration shall not be accepted.

(h) Any special equipment, tools and tackle required for successful completion of the performance tests shall be provided by the Contractor.

(i) It is Contractor's responsibility to co-ordinate for carrying out the performance tests. The duration of the test shall be in accordance with the agreed test codes. All other tests to prove the guarantees as indicated in the Contractor's offer shall also be conducted.

(j) The plant parameters during the performance test shall be adjusted as far as practicable to the guaranteed performance test conditions. The tests shall be conducted to provide guaranteed parameters as defined in the contract.

(k) Category-B tests are to be completed before Category-A PG test. Protocols are to be signed jointly by the Purchaser and Contractor for each Category-B test.

(l) **Reporting of Test Results**

(a) Within two weeks after the conclusion of the performance test,

the Contractor shall submit ten (10) copies of test reports to the Purchaser stating whether the plant passed or failed such test(s), accompanied by sufficient test data and calculations to demonstrate the level of performance attained with respect to each of the tested parameters.

(b) The report(s) shall include as a minimum, the following:-

(i) Scope

(ii) Various guaranteed parameters & tests as per the contract.

(iii) Codes/standards used

(iv) . Description of the test procedures

(v) Full schematic diagrams with indication of test instruments locations and identification tags of same.

(vi) Instrumentation details and calibration.

(vii) Duration of test, frequency of readings and number of test runs

(viii) Test logs and summary of test readings used for performance calculations.

(ix) Full set of correction curves.

(x) Computation of test results.

(xi) Sample calculation

(xii) Performance calculation

(xiii) Computations to prove measurement uncertainty is within acceptable limits.

(xiv) Acceptance criteria

(xv) Any other information required for conducting the test

(xvi) Conclusions of performance tests.

(m) Within fifteen (15) days of receipt of such test report(s), the Purchaser shall submit a notice to the Contractor stating either:-

(i) That Purchaser concurs with the information provided in the test report(s), or

(ii) That Purchaser disputes some or all of the information provided

in the Contractor's test report(s), the areas being disputed, and the levels of performance being disputed.

(n) If Purchaser concurs with the information in the Contractor's test report(s), the Purchaser shall, within fifteen (15) days of receipt of the test report, provide a written notice to the Contractor accepting the results of the tests.

(o) If Purchaser disputes any or all of the results contained in the Contractor's test report(s), the Contractor and Purchaser shall meet within fifteen (15) days of the receipt of the Purchaser notice at a mutually acceptable location to review and discuss the dispute.

All the category-B test results are to be computed and to be submitted along with the PG test report for detail study by the Purchaser.

2.08.00 **Notice of Tests**

The Contractor shall issue 21 days notice to the Purchaser of the date after which he will be ready to commence the tests and the Contractor shall commence the tests promptly thereafter.

2.09.00 **Delayed Tests**

(a) If the tests could be carried out but are being unduly delayed by the Contractor, the Purchaser may by notice inform the Contractor to conduct the tests within 14 days after the receipt of such notice. The Contractor shall conduct the tests on such days within that period as the Contractor may fix and of which he shall issue notice to the Purchaser.

(b) If the Contractor fails to conduct the tests within such notice period, the Purchaser may himself proceed with the tests. All tests so conducted by the Purchaser shall be at the risk and cost of the Contractor and the cost thereof shall be deducted from the contract price or charged to the Contractor. The tests shall then be deemed to have been conducted by the Contractor and the test results shall be binding on the Contractor.

(c) **Facilities for Tests on Completion**

Except where otherwise specified, the Contractor shall provide and bear costs for these items, as may be required to carry out the tests on completion.

(d) **Retesting**

If the plant fails to pass the test (which in the case of performance tests means not achieving the acceptable limits), the Purchaser may require such tests to be repeated on the same terms and conditions save that only reasonable notice of the date and time of such tests shall be required to be given by the Contractor to the Purchaser.

(e) **Disagreement as a Result of Tests**

If the Purchaser and the Contractor disagree on the interpretation of the test results, each shall give a statement of his views to other within 14 days after such disagreement arises. The statement shall be accompanied by all relevant evidence.

ANNEXURE -6

DRAWINGS & DOCUMENT'S ATTACHED

The following drawing/document are enclosed as a part of the specification:

1. Design Memorandum: 4-WT-060-01389 Rev: 04
2. Specification for ESP/ APH wash water pumps
3. P& ID for ETP System: 1-WT-060-01597, Rev: 02
4. P& ID for ESP, APH wash water - 3-WT-060-01459
5. Effluent collection pit, pump & piping details
6. Plot plan with location details of ETP and collection pits

ETP design memorandum is given approval
However, BHEL requested to follow the instrument redundancy and control philosophy as per specification

Also the DM shall be updated (control philosophy etc) after finalization of ETP vendor as per vendor approved P&ID and other documents

TATA CONSULTING ENGINEERS LIMITED
VENDOR DOCUMENT REVIEW STATUS
☑A Drawing/Document approved as submitted. Proceed with fabrication/construction.
☐B Drawing/Document approved subjected to comments noted. Proceed with fabrication/ construction considering our commnets.
☐C Our comments are noted on this marked up print.
☐D Our commnets are noted in memo attached to the forwarding transmittal letter No. .....Dated.....
☐E Correct original of this drawing/document to reflect our comments and resubmit for approval.
☐F Correct original of this drawing/document to reflect our comments and resubmit for records.
☐G Drawings/Documents of this category are for information only and not for approval. Information furnished on the drawing/document is noted.
☑H Drawing/Document reviewed against our previous comments and other revisions highlighted and identified by the vendor.
☐ I Drawing/Document returned without review.
☐J Print not enclosed.
Approval conveyed herein neither relieves the Vendor/Contractor of his contractual obligations and his responsibilities for correctness of dimensions, materials of construction, weights, quantities, design details, assembly fits, performance requirements and conformity of the supplies with the Indian Statutory Laws as may be applicable, nor does it limit the purchaser's rights under the contract.
Reviewed by.....MB.....Date.28-07-2021

		ABH Sd/-	SS Sd/-	MSM Sd/-	Based on comnts dt.23.01.21
		ABH Sd/-	SS Sd/-	MSM Sd/-	Based on comnts dt.20.11.20
02	04.11.20	ABH Sd/-	SS Sd/-	MSM Sd/-	Based on comnts dt.27.09.19 & ETP pits updated
01	18.09.19	ABH Sd/-	SS Sd/-	MSM Sd/-	Based on resoln. Dt.23.07.19
00	08.06.19	ABH Sd/-	SS Sd/-	MSM Sd/-	Fresh Issue
Rev.No	Date	Prepared	Checked	Approved	Remarks

TELANGANA STATE POWER GENERATION CORPORATION LTD
TELANGANA STATE, INDIA
5 X 800 MW YADADRI - NALGONDA THERMAL POWER STATION

OWNER's CONSULTANT

TATA CONSULTING ENGINEERS LIMITED
BANGALORE

BHARAT HEAVY ELECTRICALS LTD
BOILER AUXILIARIES PLANT
RANIPET – 632 406.

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DEPT CODE		NAME	SIGN	DATE
9776	PRPD	ABH	Sd/-	08.06.19
	CHD	SS	Sd/-	08.06.19
	APPD	MSM	Sd/-	08.06.19

TITLE	DOCUMENT NO.	REV.NO
DESIGN MEMORANDUM FOR EFFLUENT TREATMENT PLANT	**4-WT-060-01389**	**04**

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1.0 INTRODUCTION

The scope of this design memorandum covers the basis of design, system philosophy, equipment selection and layout aspects and Control Philosophy of Effluent Treatment Plant for **5x800 MW TSGENCO YADADRI TPS, NALGONDA**

The purpose of the system is to collect the waste from various areas in the Power plant and treat the water, to make it suitable for reuse in Circulating water system within the Power plant.

2.0 SYSTEM DESCRIPTION FOR EFFLUENT TREATMENT PLANT

2.1 Effluent collection & neutralization system

Following effluents will be collected /treated as minimum in the Effluent treatment plant (ETP):

1. Regeneration waste from DM plant.
2. Boiler & TG area wash water
3. Oily Wastes from Fuel oil area.
4. Oily waste from Transformer Yard.
5. Oily waste from Central Lube oil system area (Stage-1 & Stage-2).
6. Oily waste from Switchyard area
7. Oily waste from Auxiliary boiler area
8. Waste from Ammonia Storage area
9. Backwash Waste Water from Side Stream Filtration.
10. Waste from Softening plants of AC systems across Power plant.
11. Condensate Polishing Unit regeneration area regeneration waste.
12. Cooling Tower Blow down (CTBD) – (provision considered)
13. Central Monitoring Basin Waste Treatment & Reuse System.

Brief description is mentioned below:

a) Regeneration waste from DM plant.

DM Plant Regeneration Waste will be generated due to periodic regeneration of resin-beds by acid or alkali. It will contain high amount of dissolved solids and also may be acidic or alkaline based on sequence of the regeneration. The regeneration waste comprising of acid, alkali and backwash water from the DM plant is led to the Neutralization Pit through drain channels. The pH of neutralized waste is maintained in the range of 7.2-8.0 by dosing acid/alkali in Npit in DM plant area.
Once the pH level in the waste is achieved within desirable range the same is pumped to the Central Monitoring Basin by means of Neutralized Waste Disposal Pumps (DM plant scope). As the treatment of regeneration waste of DM Plant is carried out in DM Plant itself, no further treatment scheme for control of pH has been envisaged. All the pumps, Npit, Acid & Alkali dosing system, piping etc. shall be under DM plant scope.

b) Boiler & TG Area Wash Water

Boiler and TG Area Wash Water is generated from floor washings, leakages from bearing cooling systems, leakage from pumps etc. This waste basically contains suspended solids. Underground

Retention Pits shall be provided to collect the waste from Boiler and TG Area. From Retention Pit, the waste shall be transferred by Pumps to Central Monitoring Basin for equalization.

c) Oily Wastes from Fuel oil area/transformer yard area/Central Lube oil system area/switchyard area and Auxiliary boiler area.

The oily waste run off during regular washing/cleaning, leakage and draining from Fuel Oil Unloading Area shall be treated in Oily Waste Treatment System. An underground Retention Pit shall be provided to collect run off water. Oily waste from the all the above Retention Pits shall be directed to Pre-OWS collection pit and transferred to Oil water separator (OWS) (Plate or tube type) for removal of oil and suspended solids. The Pre-OWS collection pit will be located near Oil water separator in ETP area. This system also receives service oily waste effluent from Central Lube Oil system area and oily waste from Transformer Yard area.

Separated oil shall be collected in a Slop Oil Storage Tank. The treated water from OWS may be discharged in another collection pit from where treated water shall be pumped to Central Monitoring Basin.

Sludge produced from CPI will be collected in a pit and then transferred by means of CPI Sludge Transfer Pumps for land filling purpose.

Oily waste from switchyard area shall be collected in local pit and pumped to Pre-OWS collection pit and then to OWS for further treatment.

Oily waste from Auxiliary boiler area will be collected in local pit and pumped to Pre-OWS collection pit.

4 Central Lube Oil system area oily waste is generated from oil leakage from Oil tanks, purification and transfer system or during floor wash. This effluent basically contains suspended solids and some oil and grease. An underground Retention Pit shall be provided to collect oily waste from Central Lube Oil system area. From Retention Pit, the waste shall be transferred by Pumps to Pre-OWS collection pit and then to OWS for further treatment.

The Oily Waste Treatment System viz. Pre-OWS collection pit, Oil Water Separator, Slop Oil Storage Tank etc. shall be located outdoor.

d) Waste from Ammonia storage area

Waste from SCR system is mainly due to possibility of ammonia leakage in Ammonia storage area. Ammonia drains shall be collected in waste ammonia dilution tank, diluted with Service water and collected in waste water retaining basin and pumped to CMB for further treatment. Scope of waste collection and pumping upto CMB is covered in SCR area. Please refer drg. 0-SR-056-00042 for further reference. This waste is generated only in rare cases of leakage of ammonia. 4

e) Cooling tower blowdown waste

Cooling tower blowdown waste is utilized in CHP and Ash water sump. A provision for diverting Cooling tower blowdown waste to CMB is provided. This waste is received at CMB only in rare event of nil consumption in CHP & Ash water sump.

f) Backwash Waste Water from Side Stream Filtration

Backwash waste from Side Stream Filters will be collected in a pit and then transferred to inlet of Central Monitoring Basin by means of Backwash Water Transfer Pumps.
The System viz. Backwash Waste Water Pit, Backwash Waste Water Transfer Pumps etc. shall be located outdoor.

Sizing Calculation of Side Stream Filtration Backwash pit

Velocity criteria of Backwash = 2.5 times of inlet velocity.

Capacity of one AVGF = 200 M^3/Hr.

Backwash cycle happens for 6 mints (typ.) per AVGF.

Accordingly, maximum back wash water generated per AVGF = 200*2.5*6/60 = 50 M3.

Maximum back wash water generated for four AVGF = 50*4 = 200M3.

Capacity of back wash pit selected for Stage-1 = 300 m3 & Stage-2 = 450m3

Total waste expected from SSF in a day = 50*60 working filters = 3000m3; 125m3/hr ⚠4

g) Waste from Softening plants of AC systems across Power plant

Waste from water softening plants for AC system across Power plant are collected in a local pits as identified in the table below and transferred to CMB as part of ETP system. Waste from softening plant from DM plant shall be transferred to N.pit of DM plant..

Following are the details of waste expected from softening plant of AC system.

S.No.	Location of Pit	Capacity of water softening Plant	Water Quantity per day to ETP	Remarks
1.	POWER HOUSE # 1 & 2	10 m3/hr	22 m3	Terminated at nearest TG area wash pit
2.	POWER HOUSE # 3 & 4	10 m3/hr	22 m3	Terminated at nearest TG area wash pit
3.	POWER HOUSE # 5	8 m3/hr	18 m3	Terminated at nearest TG area wash pit
4.	SERVICE BUILDING #1	10 m3/hr	22 m3	Terminated at nearest TG area wash pit
5.	SERVICE BUILDING #2	10 m3/hr	22 m3	Terminated at nearest TG area wash pit
6.	ESP CONTROL BUILDING #1	2 m3/hr	4 m3	Terminated at nearest Boiler wash pit
7.	ESP CONTROL BUILDING #2	2 m3/hr	4 m3	Terminated at nearest TG area wash pit
8.	ESP CONTROL BUILDING #3	2 m3/hr	4 m3	Terminated at nearest TG area wash pit
9.	ESP CONTROL BUILDING #4	2 m3/hr	4 m3	Terminated at nearest TG area wash pit
10.	ESP CONTROL BUILDING #5	2 m3/hr	4 m3	Terminated at nearest TG area wash pit
11.	FGD CONTROL BUILDING #I	2 m3/hr	4 m3	Collection in a Separate pit
12.	FGD CONTROL BUILDING #II	2 m3/hr	4 m3	Collection in a Separate pit
13.	DM PLANT BUILDING	2 m3/hr	4 m3	Terminated at N. Pit
	Total	4	**138 m^3/day (5.75m3/hr)**	TDS: ~20000ppm

h) Condensate Polishing Unit (CPU) regeneration area regeneration waste.

The regeneration waste from Condensate Polishing Plant regeneration area shall be collected in neutralization pit to be constructed under CPU regeneration area. This regeneration waste will contain high amount of dissolved solids and also may be acidic or alkaline based on sequence of the regeneration. The regeneration waste is led to the Neutralization Pit through drain channels. The pH of neutralized waste is maintained in the range of 7.2-8.0 by dosing acid/alkali in N.pit in Condensate Polishing Unit regeneration area.
Once the pH level in the waste is achieved within desirable range the same is pumped to the Central Monitoring Basin by means of Neutralized Waste Disposal Pumps (CPU plant scope). As the treatment of regeneration waste of CPU Plant is carried out in CPU Plant itself, no further treatment scheme for control of pH has been envisaged. All the pumps, N.pit, Acid & Alkali dosing system, piping etc. shall be under CPU plant scope.

i) Central Monitoring Basin (CMB) Waste Treatment & Recycling System

Waste water streams after required treatment as addressed above will be led to a Central Monitoring Basin, which acts as an equalization basin.

From Central Monitoring Basin wastewater will be pumped by means of Two (2) numbers Central Monitoring Basin Effluent Transfer Pump/ clarifier feed pumps to Clarifier – UF – RO system for

Reuse in CW system. RO reject will be terminated in CWBD pipeline of Stage-1 for further usage in AHP/ CHP. 4

A Chemical storage area shall be provided to handling, storage, solution preparation and injection of chemicals for treatment of waste water.

2.2 Effluent treatment for reuse system

The neutralized effluent from CMB is admitted to ETP- Reuse system. The following equipment are envisaged in ETP reuse system

1. High rate solids contact (HRSC) clarifier
2. Ultra filtration systems (submerged)
3. RO system
4. Common Membrane cleaning & protection system
5. Valves & piping
6. Electrical, Controls & Instrumentation

The waste water in the CMB is neutralized and passed through a HRSC Clarifier for settlement of suspended solids. Dosing system is envisaged before Clarifier to ensure proper coagulation followed by flocculation of the raw effluent. Dosing system for removal of hardness and silica if required are also envisaged. The sludge accumulated at the bottom of the Clarifier is led to the sludge sump. Water from sludge is recovered through centrifuge and is sent back to feed of Clarifier/ CMB. Solid waste from centrifuge is collected for further disposal by Customer. Clarified water is then admitted directly to UF feed chamber and to membrane tank.

The clarified water is then drawn through the submerged UF membranes by means of UF permeate pumps. UF system is provided for removal of Fouling elements (Colloids, Organics etc) and Suspended Solids respectively. UF system filtered water is stored in UF permeate cum backwash tank. Backwash pumps are provided for periodic backwash of UF system. The backwash reject UF system is collected in UF backwash waste water pit and pumped to CMB. A Clean in place (CIP) system is envisaged for periodic cleaning of the UF system.

The UF permeate water is pumped to Reverse Osmosis system by RO feed pumps. Cartridge filters in the downstream of the RO feed pumps prevent intrusion of any foreign particles from contacting the RO membranes. Necessary pretreatment dosing system involving HCl (for pH correction), anti-scalant and SBS are envisaged prior to RO system. A CIP system is envisaged for periodic cleaning of the RO membranes. The RO system consists of feed pump, Cartridge Filter, HP pump, RO membrane block.

The RO permeate output is stored in RO permeate storage tank and the RO reject (brine) is connected to CW blowdown (CWBD) pipeline of Stage-1 leading to AHP/ CHP.

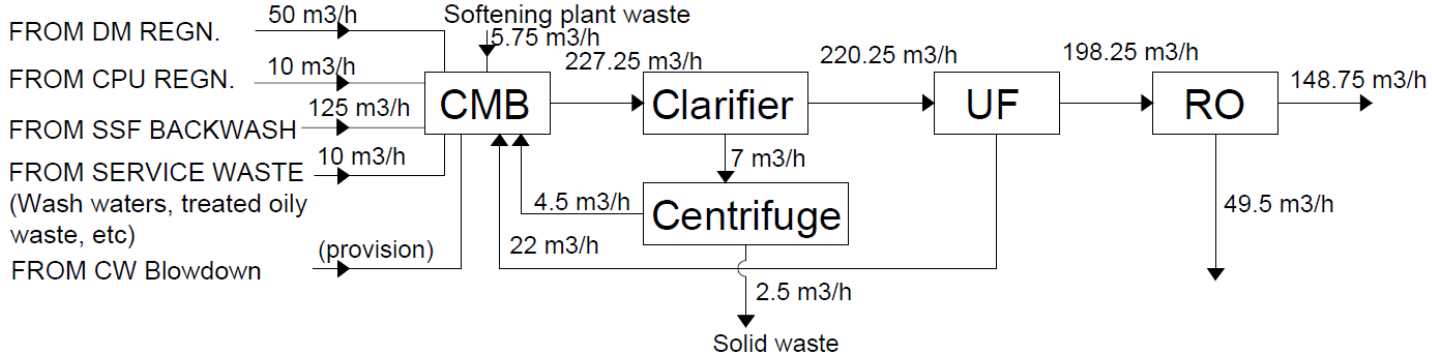
The RO permeate is further pumped to CW fore-bay of Stage-1 for further use. 4

Necessary piping and valves are envisaged for interconnecting / isolating the equipment. Main Control Panel (MCP) along with Instruments & controls are envisaged for safe operation.

Other sub-systems like membrane flushing & cleaning system are also envisaged in the design and their operations are intermittent whenever required. The Proposed ETP is semi-automatic based on reject flow adjustment (Recovery & feed design parameter).

The other drains from the plant equipment etc. are let out in the nearby common trenches leading to UF backwash waste water pit and to CMB for further disposal. A provision to terminate excess water from Clarified water tank to storm water drain is envisaged and will be operated only during monsoon.

2.3 MASS BALANCE FOR EFFLUENT TREATMENT PLANT



Ref. drg: Water balance diagram: PE-DG-417-172-N008 4

2.4 Effluent WATER QUALITY (INPUT WATER TO ETP)

The raw water constituents considered for Design of the plant is as per the latest Water analysis (dt.05.03.19) provided by Customer. The combined effluent water received at Central Monitoring Basin (CMB) of Effluent treatment plant is considered for design of ETP

Table-1

S.No	Parameter	Service water waste (mg/l)	SSF waste (mg/l)	Waste from Softening plant of AC system	N.pit waste (CPU + DM) (mg/l)	Combined water (mg/l)
1)	Flow rate	10 m^3/hr	125 m^3/hr	5.75 m^3/hr	60 m^3/hr	200.75m^3/hr
2)	Calcium as Ca^{2+}	48.82	317.33	48.8	-	201.4
3)	Magnesium as Mg^{2+}	18	117	18	-	74.3
4)	Sodium as Na^{+}	84.7	550.5	7848.4	3000	1468.5
5)	Potassium as K^{+}	0.84	5.5	0.9	-	3.5
6)	Iron as Fe^{2+}	0	0	0	-	0
7)	Manganese as Mn^{2+}	0	0	0	-	0
8)	Strontium as Sr^{2+}	0	0	0	-	0
9)	Barium as Ba^{2+}	0	0	0	-	0
10)	Chloride as Cl^{-}	114	741.3	12086.5	3000	1710.1
11)	Sulphate as SO_4^{2-}	77.6	504.5	77.6	-	320.2
12)	Nitrate as NO_3^{-}	4.3	27.9	4.3	-	17.7

13)	Bicarbonates as HCO^{3-}	164.4	183	164.4	-	126.8
14)	Carbonate as CO_3^{2-}	0	0	0	-	0
15)	Bromide as Br^-	0	0	0	-	0
16)	Fluoride as F^-	0.5	3.25	0.5	-	2.1
17)	Phosphate as PO_4^{3-}	0	0	0	-	0
18)	Silica (as SiO_2)	14	91	14	-	57.8
19)	Total Suspended Solids (TSS)	10	1500	10	-	935
20)	Total dissolved solids (TDS)	527	3427	20264	6000	3983
21)	pH	7 - 8	7 - 8	7 - 8	7 - 8	7 – 8

2.5 FEED FLOW DATA

Feed water flow rate, temperature and quality at the inlet of CMB is as specified below.

Sl. No.	Parameters	Capacities
1	Flow rate at the inlet of CMB	200.75 m^3/hr
2	Total water to be treated after considering UF b/w waste and water recovered in centrifuge	227.25 m^3/hr
3	Temperature (°C)	25 – 30
4	TDS	3983 ppm
5	TSS	935 ppm

2.6 PRODUCT WATER QUALITY

The pre-treatment and various permeate qualities for the above waste water are as specified below.

1. CLARIFIER OUTLET:

Sl. No.	Description	Unit	Value
1	Max. Permeate Flow Rate from Clarifier System(total)	m3/hr	220.25
2	Turbidity	NTU	<10

2. UF PERMEATE:

Sl. No.	Description	Unit	Value

1	Net Permeate Flow Rate from UF System(total)	m3/hr	198.25
2	SDI_{15}		≤3
3	Recovery	%	90%

3. RO PERMEATE:

Sl. No.	Description	Unit	Value
1	Net Permeate Flow Rate from RO System(total)	m3/hr	148.75
2	Total Dissolved Solids	ppm	≤200
3	Recovery	%	75

3.0 PLANT CAPACITY

The capacity of each system of the Water treatment plant is described in this section.

1. Pre-treatment plant
   a. Clarifier: 1x100%
   b. Centrifuge: 1x100%
   Net clarified water Capacity: 220.75 m^3/hr (total)

2. RO plant
   a. UF system (submerged): 3x50%
   b. RO system: 2x50%
   Net Treated water capacity: 148.75 m^3/hr

4.0 CONTROL PHILOSOPHY

The control of the ETP shall be from a hot redundant PLC based control panel.
PLC is a Programmable Automation unit consisting of a Processor. PLC has I/O Modules, redundant Power Supply Modules, redundant communication interface modules, Ethernet networking components etc., One PC with 24" monitor & key board is provided as Operator workstation and One PC is provided for Operator and Engineering workstation. One Large video screen and Mimic back up panel with push buttons, lamps, annunciation windows are also provided. One printer is also provided. RIO panels are provided for remotely located sumps. Please refer Control System for Mechanical Auxiliary Packages (PE-DM-417-145-I900) and ETP PLC configuration 4-WT-060-01143 for details.

Controllers are configured in redundant mode. The automation unit caters to the composite requirements of measurement, signal conditioning, algorithm execution and final element(s) control of each process sub-system.

The UF-RO Plant is designed for remote operation through the PLC system. Taking the equipment into Service and initiation of RO units shall be initiated by the operator from the operator station and balance operation shall be carried out sequentially by the PLC system. Taking the streams out of operation shall be automatic based on throughputs or effluent quality. Detailed programming will be based on UF & RO membrane OEM guidelines.

Effluent treatment plant PLC shall be housed in an AC room.

PLC shall be connected to BOP network for remote operation / maintenance from CCR. BOP network shall be interface with DDCMIS through soft links. There shall be redundant bidirectional OPC interface between the PLC and common DDCMIS network.

2 No: of Remote I/Os considered for remote sumps. Remote I/O Panels shall be provided with push buttons, indicating lamps and annunciation system. RIO panels are provided as follows

1. RIO Panel-1 (Located at ESP Control Room Unit#1) takes signals from the following remote sumps
   a) Transformer Yard Oily Waste collection pit-1 (unit#1)
   b) Transformer Yard Oily Waste collection pit-2 (unit#2)
   c) Transformer Yard Oily Waste collection pit-6 (FGD Transformer)
   d) Switchyard Area OWS collection pit
   e) FGD control room HVAC softener plant pit #1
   f) Central lube oil system pit station #1
   g) Auxiliary boiler area collection pit
   h) Boiler Area wash pit Unit#1
   i) Boiler Area wash pit Unit#2
   j) TG Area wash pit Unit#1
   k) TG Area wash pit Unit#2

2. RIO Panel-2 (Located at ESP Control Room Unit#5) takes signals from the following remote sumps
   a) Transformer Yard Oily Waste collection pit-3 (unit#3)
   b) Transformer Yard Oily Waste collection pit-4 (unit#4)
   c) Transformer Yard Oily Waste collection pit-5 (unit#5)
   d) Fuel oil Area Oily waste retention pit
   e) FGD control room HVAC softener plant pit #2
   f) Central lube oil system pit station #2
   g) Boiler Area wash pit Unit#3
   h) Boiler Area wash pit Unit#4
   i) Boiler Area wash pit Unit#4
   j) TG Area wash pit Unit#3
   k) TG Area wash pit Unit#4
   l) TG Area wash pit Unit#5
   m) SSF backwash pit stage 2

All equipment in ETP area shall be controlled and connected to main PLC located in ETP control room. All sump pumps shall be controlled through PLC only.

One (1) number Local Control Panel (LCP) shall be provided within first floor of Centrifuge Building for control and monitoring of Centrifuge & Accessories:

All the drives control shall be as per approved drive control philosophy (PE-DM-417-145-I002).

Unidirectional LT drives shall be operable from Remote i.e. from ETP Control Room. Drives shall be provided with Local Emergency Stop Push Button (EPB). All dosing tank agitators are operable from PLC. Remote manual operation of all drives shall be done from OWS/OEWS.

Remote control commands i.e. start/stop, shall be generated from PLC and shall be issued to MCC through interposing relays mounted in respective MCC. PLC output command shall be latched in MCC. EPB (stay put type), in MCC supplier's scope, shall be wired directly to MCC to stop the motor irrespective of motor being in remote/local mode. The EPB shall be provided with press to lock and turn to release type, keyless mechanism. Under its locked position, the drive operation shall be inhibited.

Necessary electrical protections for the drives shall be realized at MCC, whereas process interlocks and protections shall be realized in PLC.

Following signal exchange shall take place between MCC & PLC
i. Drive Start & Stop commands.
ii. Drive ON & OFF feedback.
iii. MCC disturbed (Thermal O/L /Control supply fail/ EPB operated/ MCC isolated.

Current transducers, 4-20mA types (in MCC suppliers scope), shall be mounted in the MCC for monitoring the current in PLC for all the drives > 30 KW.

Instrument redundancy shall be. triple redundancy for protection, Dual redundancy for Interlock & permissive and for monitoring single instrument shall be provided.

A collection pit/sump will typically have the following instrumentation
i. 3 Level Transmitters in each sump for trip interlock on 'Level Low Low' of pumps and start permissive on 'Level Not Low'
ii. 1 Level gauge in each sump for local indication.
iii. 1 Pressure gauge at each pump discharge for local indication.
iv. 2 pressure transmitters at common discharge of the sump pumps for monitoring and alarm.
v. 1 Flow transmitter at common discharge of the sump pumps for monitoring

Transformer Yard Oily Waste Collection pit & Pumps

Each pit is provided with two transfer pumps with 1 working 1 standby philosophy for transferring waste from the above sump to Pre OWS collection pit. In auto mode any pump shall be selected in Standby duty, which would start after pre-set running hours of working pump. Each pit is also provided with Level Transmitters. The pumps are interlocked with the level of the pits. On level 'Low

Low' the working pump will trip & on Level 'High' alarm will be generated. The pumps shall also trip on Level 'High High' of Pre OWS collection pit. Pressure transmitters are provided at pump common discharge to monitor and alarm in case of high or low discharge pressure. Standby changeover is also envisaged at Low pressure. Flow transmitter is provided at common discharge to monitor flow.

Switchyard Area Oily Waste Collection pit & Pumps

The pit is provided with two transfer pumps with 1 working 1 standby philosophy for transferring waste from the above sump to Pre OWS collection pit. In auto mode any pump shall be selected in Standby duty, which would start after pre-set running hours of working pump. Each pit is also provided with Level Transmitters. The pumps are interlocked with the level of the pits. On level 'Low Low' the working pump will trip & on Level 'High' alarm will be generated. The pumps shall also trip on Level 'High High' of Pre OWS collection pit. Pressure transmitters are provided at pump common discharge to monitor and alarm in case of high or low discharge pressure. Standby changeover is also envisaged at Low pressure. Flow transmitter is provided at common discharge to monitor flow.

Fuel Oil Area Oily Waste Retention pit & Pumps

Each pit is provided with two transfer pumps with 1 working 1 standby philosophy for transferring waste from the above sump to Pre OWS collection pit. In auto mode any pump shall be selected in Standby duty, which would start after pre-set running hours of working pump. Each pit is also provided with Level Transmitters. The pumps are interlocked with the level of the pits. On level 'Low Low' the working pump will trip & on Level 'High' alarm will be generated. The pumps shall also trip on Level 'High High' of Pre OWS collection pit. Pressure transmitters are provided at pump common discharge to monitor and alarm in case of high or low discharge pressure. Standby changeover is also envisaged at Low pressure. Flow transmitter is provided at common discharge to monitor flow.

Auxillary Boiler Area Oily Waste Retention pit & Pumps

The pit is provided with two transfer pumps with 1 working 1 standby philosophy for transferring waste from the above sump to Pre OWS collection pit. In auto mode any pump shall be selected in Standby duty, which would start after pre-set running hours of working pump. Each pit is also provided with Level Transmitters. The pumps are interlocked with the level of the pits. On level 'Low Low' the working pump will trip & on Level 'High' alarm will be generated. The pumps shall also trip on Level 'High High' of Pre OWS collection pit. Pressure transmitters are provided at pump common discharge to monitor and alarm in case of high or low discharge pressure. Standby changeover is also envisaged at Low pressure. Flow transmitter is provided at common discharge to monitor flow.

Central Lube Oil System Area Oily Waste pit & Pumps

Each pit is provided with two transfer pumps with 1 working 1 standby philosophy for transferring waste from the above sump to Pre OWS collection pit. In auto mode any pump shall be selected in Standby duty, which would start after pre-set running hours of working pump. Each pit is also provided with Level Transmitters. The pumps are interlocked with the level of the pits. On level 'Low Low' the working pump will trip & on Level 'High' alarm will be generated. The pumps shall also trip on Level 'High High' of Pre OWS collection pit. Pressure transmitters are provided at pump common discharge to monitor and alarm in case of high or low discharge pressure. Standby changeover is also envisaged at Low pressure. Flow transmitter is provided at common discharge to monitor flow.

TG Area Wash pit & pumps 4

Each pit is provided with two transfer pumps with 1 working 1 standby philosophy for transferring waste from the above sump to Pre-OWS collection pit. In auto mode any pump shall be selected in Standby duty, which would start after pre-set running hours of working pump. Each pit is also provided with Level Transmitters. The pumps are interlocked with the level of the pits. On level 'Low Low' the working pump will trip & on Level 'High' alarm will be generated. The pumps shall also trip on Level 'High High' of Pre-OWS collection pit. Pressure transmitters are provided at pump common discharge to monitor and alarm in case of high or low discharge pressure. Standby changeover is also envisaged at Low pressure. Flow transmitter is provided at common discharge to monitor flow

Pre OWS Collection pit & Pumps

The pit is provided with two transfer pumps with 1 working 1 standby philosophy for transferring waste from the above sump to OWS. In auto mode any pump shall be selected in Standby duty, which would start after pre-set running hours of working pump. The pit is also provided with two number (2) Level Transmitters. The pumps are interlocked with the level of the pits. On level 'Low Low' the working pump will trip & on Level 'High' alarm will be generated. Pressure transmitters are provided at pump common discharge to monitor and alarm in case of high or low discharge pressure. Standby changeover is also envisaged at Low pressure. Flow transmitter is provided at common discharge to monitor flow.

CPI Sludge Pit & Pumps

The sludge from OWS is collected in the sump. Each pit is provided with two transfer pumps for transferring waste from the above sump to Sludge pit of ETP Clarifier. Level transmitter is provided to trip the pump in case of level 'Low Low'. The pumps shall also trip on Level 'High High' of Sludge pit of ETP Clarifier. Pressure transmitters are provided at pump discharge for standby changeover and monitoring. Flow transmitter is provided for monitoring.

CPI sludge pit blowers are interlocked with level of sludge pit. Blowers trip on level low low of sludge pit. Pressure transmitters are provided for standby changeover and monitoring. Flow transmitter provided for monitoring.

Boiler Area Wash pit & pumps

Each pit is provided with two transfer pumps with 1 working 1 standby philosophy for transferring waste from the above sump to Central Monitoring Basin(CMB). In auto mode any pump shall be selected in Standby duty, which would start after pre-set running hours of working pump. Each pit is also provided with Level Transmitters. The pumps are interlocked with the level of the pits. On level 'Low Low' the working pump will trip & on Level 'High' alarm will be generated. The pumps shall also trip on Level 'High High' of CMB. Pressure transmitters are provided at pump common discharge to monitor and alarm in case of high or low discharge pressure. Standby changeover is also envisaged at Low pressure.Flow transmitter is provided at common discharge to monitor flow.

SSF Backwash pit & pumps

Each pit is provided with two transfer pumps with 1 working 1 standby philosophy for transferring waste from the above sump to Central Monitoring Basin(CMB). In auto mode any pump shall be selected in Standby duty, which would start after pre-set running hours of working pump. Each pit

is also provided with Level Transmitters. The pumps are interlocked with the level of the pits. On level 'Low Low' the working pump will trip & on Level 'High' alarm will be generated. The pumps shall also trip on Level 'High High' of CMB. Pressure transmitters are provided at pump common discharge to monitor and alarm in case of high or low discharge pressure. Standby changeover is also envisaged at Low pressure.Flow transmitter is provided at common discharge to monitor flow.

HVAC softener waste pits & pumps in FGD Control Room area

The pit is provided with two transfer pumps with 1 working 1 standby philosophy for transferring waste from the above sump to Central Monitoring Basin(CMB). In auto mode any pump shall be selected in Standby duty, which would start after pre-set running hours of working pump. Each pit is also provided with Level Transmitters. The pumps are interlocked with the level of the pits. On level 'Low Low' the working pump will trip & on Level 'High' alarm will be generated. The pumps shall also trip on Level 'High High' of CMB. Pressure transmitters are provided at pump common discharge to monitor and alarm in case of high or low discharge pressure. Standby changeover is also envisaged at Low pressure. Flow transmitter is provided at common discharge to monitor flow.

Central Monitoring Basin and Accessories:

The Central Monitoring Basin receives the effluents from different sources as described in above. The overflow from the Central Monitoring Basin is collected in a common collection outlet chamber connected to Central Monitoring Basin Effluent Transfer pumps, to transfer effluent to the Clarifiers for further treatment. These pumps upon selection can be started from PLC and stop automatically through the level transmitter. The pump will trip at preset low low level in Central Monitoring Basin. Flow transmitter is provided to monitor flow.

Clarifier Feed Pumps 

Start Permissive
- Level Not Low in CMB
- Discharge Valve open

Standby Changeover
- Pump outlet pressure Low

Trip interlock
- Level Low Low in CMB
- Discharge Valve closed

The pump operation is operator initiated based on CMB level.

Clarifier System

Ferric Chloride dosing system, Lime Dosing System, polyelectrolyte dosing system are provided for effective Clarification.

Water from Stilling Chamber will flow to Parshall Flume for measurement of flow in open Channel. It will flow further to Feed well/ Distribution Chambers. From Distribution Chambers water will be

directed to High Rate Solid Contact Clarifier (HRSCC). Rake Mechanism Drive Motor and Recirculator Drive Motor for the Clarifier will be operated from PLC.

Treated Water from Clarifier HRSCC shall be transferred to Clarified water tank. Clarified water tank is provided with Level Transmitters. In auto mode the Pumps will be started when the sump level reaches high level and trips automatically when the level reaches low low level. UF system will be put in production mode during the pump operation.

The Clarified water tank is provided with three numbers of Transfer Pumps with 2 working 1 standby philosophy for transferring treated water through to UF membrane.

Clarified water transfer pump

Start Permissive
- Level Not Low in Clarified Water Tank
- Discharge Valve open

Standby Changeover
- Pump outlet pressure Low

Auto On
- As per OEM sequence of operation for UF

Auto Off
- As per OEM sequence of operation for UF

Trip interlock
- Level Low Low in Clarified Water Tank
- Discharge Valve closed

Centrifuge Feed pumps

Start Permissive
- Level Not Low in Sludge Collection Pit
- Discharge vale open

Standby Changeover
- Outlet Pressure Low

Auto On and Off
- As per OEM sequence of operation for centrifuge

Trip interlock
- Level Low Low in Sludge Collection Pit
- Discharge vale close

Sludge Pit Blowers

Start Permissive
- Level Not Low in Sludge Collection Pit
- Discharge valve open

Standby Changeover
- Outlet Pressure Low

Auto On and Off
- As per OEM sequence of operation for centrifuge

Trip interlock
- Level Low Low in Sludge Collection Pit
- Discharge vale close

Slaked Lime Transfer Pumps/Lime Dosing Pumps

Start Permissive
- Suction Valve open
- Discharge Valve open

Standby Changeover
- Outlet pressure Low

Auto On and Off
- -NA-

Trip interlock
- Suction Valve closed
- Discharge valve closed

Polyelectrolyte Dosing/Dewatering Polyelectrolyte

Start Permissive
- Level Not Low in Dosing Tank
- Discharge Valve open
- Suction Valve open

Standby Changeover
- Outlet pressure Low

Auto On and Off
- -NA-

Trip interlock
- Level Low Low in Dosing Tank

- Discharge valve closed
- Suction Valve closed

Ferric Chloride Dosing/Acid Dosing (to CMB)/Alkali Dosing(to CMB) Pumps

Start Permissive
- Level Not Low in Dosing Tank
- Discharge Valve open

Standby Changeover
- Outlet pressure Low

Auto On and Off
- -NA-

Trip interlock
- Level Low Low in Dosing Tank
- Discharge valve closed

UF system

Self-cleaning strainer

Auto Cleaning Strainers (2W + 1S) , Strainer with 1 mm mesh size are provided to protect the UF membranes from coarse solids, Trash and non-biodegradable solids. Diff. Pressure transmitter is provided across the strainers to monitor the diff. Pressure across the Strainer. Cleaning of strainer is based on Timer. At high differential pressure (DP) across the strainers, Cleaning Timer Override & Starts Cleaning.

3 streams of (2 Working + 1 Standby) Submerged UF are provided. The service and backwash of each stream will be fully automated. Pressure and level transmitters are provided in each UF tank to monitor TMP (trans-membrane Pressure) of each system. TMP measurement is dependent on membrane OEM.

Membrane Tank Feed Inlet Control Valve

Auto control valves are provided at the inlet of each membrane tank and also level transmitters are provided for the membrane tanks for level control and isolation purpose of membrane tank. Respective control valves are closed during MAINTENANCE CLEAN and RECOVERY CLEAN during all other modes PLC controls the control valve position based on the operator set point in Membrane tank level, at Low level alarm respective membrane tank will go to standby mode and at high level alarm respective membrane tank inlet control valve will close to avoid tank overflow.
Permeate flow transmitters are provided to monitor flow. The system will maintain the production flow rate up to a maximum Trans membrane Pressure (TMP) or a minimum tank level.

Permeate water is stored in UF Product water Tank, Level Transmitters are provided for Level control & monitor purpose. At the high level alarm All Three train will go to standby mode to avoid tank overflow.
The PLC continuously calculates the TMP value based on the pressure transmitter and level transmitter values. The permeate pump speed is regulated such that the TMP never exceeds the set value.
Several triggers may cause a train to go to STANDBY rather than shutting it down. These triggers include a low membrane tank level and low net permeate demand. If a low membrane tank level occurs, the train will immediately proceed to STANDBY. If the STANDBY triggers no longer exist, the train will proceed into PRODUCTION.
UF permeate/backwash pumps are provided with 1 working and 1 standby configuration for each stream. The pumps starting and stopping and opening and closing of associated valves shall be as per operating sequence requirements of UF membranes. The pump operation is always dependent on the membranes' modes of operation as per the OEM sequence charts. Hence separate permissive and interlocks are not applicable.
In the Production Cycle, the trains alternate between PRODUCTION and either BACKPULSE or RELAX. In RELAX mode, the PLC stops permeating and the membranes sit for an operator entered duration before returning to PRODUCTION mode. During this time, solids that have concentrated around the membrane are distributed away from the membrane surface by the aeration. When Backpulse is selected, the membranes are Backpulsed. VFD runs at pre set back pulse rpm. Treated water is periodically reversed back through the membranes to maintain stable Transmembrane pressures. A Pressure transmitter on the Permeate header is used to calculate the BACKPULSE TMP. This provides membrane protection against over-pressurization. In case of TMP alarm VFD speed is regulated to deactivate the TMP trigger.
Backpulse tank is provided to store permeate water for backwash operation. The inlet flow control valve is interlocked with the level transmitter provided in the tank. On Level high the valve closes and level Low the valve opens.

Membrane Aeration

Two membrane aeration blowers (1W + 1S) are provided for Membrane aeration purpose. The blowers supply low-pressure air into a common air header for all of the trains. This common air header then divides into multiple air headers to the membrane tanks.

Start Permissive
- Discharge valve open

Standby Changeover
- Blower outlet pressure Low

Auto On and Off
- As per OEM sequence of operation

Trip interlock
- Discharge valve closed

The turbidity Analyser is provided at membrane common product water line to monitors permeate water quality during production mode.

Clean In Place (CIP) Controls

Clean in Place Tanks and pumps are provided for maintenance and recovery cleaning of the UF tanks. The membranes require cleaning to maintain peak performance.
Sodium hypochlorite is used to remove organic contaminants from the membranes. The PLC will request a sodium hypochlorite pump for MAINTENANCE CLEANS and RECOVERY CLEANS per operator selection, to run in specific steps during the cleaning procedure.

NaOCL Dosing Pump

Start Permissive
- Level Not-Low of dosing tank
- Discharge Valve open

Standby Changeover
- Outlet pressure low

Auto On and Off
- As per OEM sequence of operation

Trip interlock
- Level Low Low of dosing tank
- Discharge Valve close

Citric acid is periodically used to remove inorganic contaminants from the membranes. The PLC will request a citric acid pump for MAINTENANCE CLEANS and RECOVERY CLEANS per operator selection, to run in specific steps during the cleaning procedure.

Citric Dosing Pump

Start Permissive
- Level Not-Low of dosing tank
- Discharge Valve open

Standby Changeover
- Outlet pressure low

Auto On and Off
- As per OEM sequence of operation

Trip interlock
- Level Low Low of dosing tank
- Discharge Valve close

Hydrochloric Acid is periodically used to remove inorganic contaminants from the membranes such as calcium carbonate, manganese and iron compounds. This cleaning is used only for RECOVERY CLEANS as per the cleaning procedure.

HCL Dosing Pump

Start Permissive
- Level Not-Low of dosing tank
- Discharge Valve open

Standby Changeover
- Outlet pressure low

Auto On and Off
- As per OEM sequence of operation

Trip interlock
- Level Low Low of dosing tank
- Discharge Valve close

MAINTENANCE CLEANS can be scheduled through the PLC or as initiated by operator. RECOVERY CLEANS is operator-initiated and should have the operator present during the majority of the clean.

The CIP drain pump delivers the cleaning solution into the membrane tank during MAINTENANCE CLEAN and RECOVERY

CIP/Drain Pump

Start Permissive
- Level Not-Low in CIP tank during CIP operation & Level Not Low Low in corresponding membrane tank during drain operation.
- Discharge Valve open

Standby Changeover
- Outlet pressure Low

Auto On and Off
- As per OEM sequence of operation

Trip interlock
- Level Low Low in CIP tank during CIP operation & Level Low Low in corresponding membrane tank during drain operation.
- Discharge valve closed

Priming System Control

Each train is provided with an ejector, which uses compressed air to operate and primes the membrane permeate pump during the priming step, and at the beginning of BACKPULSE. When the TMP in PRODUCTION exceeds a threshold value, the ejector on the train also operates at the beginning of PRODUCTION.

UF permeate is collected in UF product water tank. Level transmitters are provided to monitor and interlock with RO feed pumps.

UF Backwash Waste Collection Pit

Provide to collect backwash waste from UF skids.

UF backwash waste disposal pumps

Start Permissive
- Level Not-Low in UF backwash waste collection Pit.
- Discharge Valve open

Standby Changeover
- Outlet pressure low

Auto On and Off
- -NA-

Trip interlock
- Level Low Low in UF backwash waste collection Pit.
- Discharge valve closed

RO system

UF product water is treated in RO system. There are two (2) working streams of RO. Each stream consists of two banks.

The RO system Stage-I consists of the following equipment.
- RO feed pumps(2W+1S)
- Cartridge filters(2W)
- Chemical dosing system
- RO High Pressure Pumps
- RO Membrane banks of Stream 1&2
- Chemical cleaning system(CIP)

RO feed pumps are provided with 2 working 1 standby philosophy for transferring water form UF product water tank to cartridge filters. Pressure transmitters are provided at each pump outlet to monitor pressure of the pumps.The pump will trip on level low of UF product water tank.

HCL dosing system is provided to dose HCL at the upstream of Cartridge filter to maintain the pH value of RO feed water. Antiscalant dosing system is provided to avoid membrane scaling. De-chlorination dosing system is provided to dose the SBS (sodium bisulphite) solution at the downstream of CFs to remove the residual chlorine from RO Feed water.

RO feed pump

Start Permissive
- Level in UF product water tank not Low.
- Discharge valve open.

Standby Changeover
- Pump outlet pressure Low

Auto On and Off
- As per OEM sequence of operation for RO skids.

Trip interlock
- Level in UF product water tank Low Low.
- Discharge valve not open.

RO Cartridge Filter

The UF Permeate water is fed to the RO Cartridge filter to make quality water feed RO System.

The Maintenance of the RO Cartridge filter will be initiated by the monitoring differential pressure across the filter through DP transmitter.

Below instruments are required for monitoring Quality of water to RO Unit at CF Outlet Header Line to HP Pump Suction.

1. Temperature Transmitter- The High Temperature alarm triggered if the Temperature value exceeds the set point
2. pH Transmitter- The high pH alarm triggered if the pH value exceeds the set point. The Low pH alarm triggered if the pH value decreases the set point
3. Conductivity Transmitter- The HH conductivity alarm trigger if the conductivity value exceeds the set point
4. ORP Transmitter- The HH ORP alarm trigger and dump valve will open if the ORP value exceeds the set point.
5. Pressure Transmitter is provided to monitor suction pressure of HP pumps

RO High Pressure Pump:

High pressure pumps three numbers are provided to feed water to the RO membranes for Reverse Osmosis to occur. For each RO-1 stream one dedicated high pressure pump and one common standby high pressure pump is provided.

High Pressure Pump Operation is monitored by Suction & Discharge Pressure Transmitters.

If HP pump suction pressure is below low set point the pump stops and if HP pump discharge is above high set point also the pump stops.

VFDs are provided for RO HP pumps. Speed of pumps are increased over years as RO inlet pressure requirement increases.

Start Permissive
- Any RO feed pump ON
- Suction Valve open
- Discharge valve open.
- Dump Valve close
- Suction Pressure Not Low

Standby Changeover
- -NA-

Auto On and Off
- As per OEM sequence of operation for RO skids.

Trip interlock
- All RO feed pump OFF
- Suction Valve closed
- Discharge valve closed.
- Dump Valve open
- Suction Pressure Low Low
- Discharge pressure High High

RO Vessel (RO Bank-1/2):

RO System is provided with 2 W configuration with 2 Stage (Bank-1/2) Vessel.

Below instrument also required monitoring/Flow of water to RO Vessel.

1. Pressure Indicator- At Bank-1/2 RO Concentrate Line
2. Pressure Transmitter- At Bank-1/2 RO Concentrate Line
3. Flow Transmitter -At RO Concentrate Line
4. Pressure Indicator –At RO Permeate Line
5. Flow Transmitter -At RO Permeate Line
6. Conductivity Transmitter-At RO Permeate Line

RO Stage-I Permeate water flow to Inter Permeate Storage Tank. The flow & cumulative flow are indicated in PLC. The Hi Flow alarm trigger if the flow value exceeds the set point.

RO Concentrate water flow to CW blow down. The flow & cumulative flow are indicated in PLC. The Low Flow alarm trigger if the flow value decrease the set point.

Conductivity at the RO Permeate outlet of RO System is measured through Conductivity Transmitter. The conductivity value is indicated in PLC. The HH conductivity alarm trigger if the conductivity value exceeds the set point.

RO permeate is stored in RO permeate water tank. RO permeate transfer pumps are provided with 2 working 1 standby philosophy for transferring water form RO permeate tank to CW forebay of stage-1 & stage-2.

The auto operation of RO streams shall be as per operational requirements of membranes as defined by OEM.

Clean in Place (CIP) System

RO Chemical Cleaning operation (CIP) is done in manual mode only.

CIP system consists of the following equipment.

- Chemical cleaning tank(CIP)
- CIP Pumps (1W+1S)
- CIP cartridge filter

Chemical Cleaning Tank

The RO permeate/Utility water is filled in tank.

Below instruments are required for monitoring/Level/Temperature Control of CIP Solution at CIP Tank

1. Level transmitter
2. Level Indicator (Glass Tube)-
3. Temperature Indicator

CIP Tank water/Solution feed to RO system for cleaning purpose.

CIP Pumps P-A/B is used to feed water/Solution to RO System. Pump is stopped at LL level.

CIP Pump-A/B

Pump Operation monitored by Discharge Pressure Indicator.

Below instruments are required for monitoring/Flow of water/Solution to RO Vessel.

1. Pressure Indicator –At Pump Discharge
2. Flow Transmitter - At Pump Discharge Header Line

Start Permissive

- CIP tank level Not Low

Standby Changeover

- -NA- as RO CIP is done in manual mode.

Auto On and Off

- -NA- as RO CIP is done in manual mode.

Trip interlock

- CIP tank level Low Low

CIP Cartridge Filter

The Maintenance of the CIP Cartridge filter will be initiated by the monitoring inlet outlet pressure across the filter, which is measured by Inlet/Outlet CF Pressure Indicator.

The differential pressure (DP) across the filters measured by DP Indicator transmitter.

RO Dosing System:

This system provides the chemical Dosing to RO System.

Chemical Preparation operation done by operator in manual.

RO Systems have below Chemical Dosing System.

- Antiscalant Dosing System
- SBS Dosing System
- Acid Dosing System

Antiscalant Dosing System

The Utility water is filled in tank.

Below instruments are required for monitoring/Level Control of Antiscalant Solution at Tank

1. Level transmitter
2. Level Indicator (Glass Tube)

Preparation Tank is supplied with Agitator for mixing homogenous Solution.

Tank Chemical Solution feed to RO system for dosing purpose.

Antiscalant Dosing Pumps P-A/B is used to feed Chemical solution to RO System.

Start Permissive

- Dosing tank level Not Low
- Discharge valve open

Standby Changeover
- Outlet pressure low.

Auto On and Off
- As per OEM sequence of operation for RO skids

Trip interlock
- Dosing tank level Low Low
- Discharge valve closed

SBS Dosing System

The Utility water is filled in tank.

Below instruments are required for monitoring/Level Control of SBS Solution at Tank

1. Level transmitter
2. Level Indicator (Glass Tube)-

Preparation tank is supplied with Agitator for mixing homogenous Solution.

Tank Chemical Solution feed to RO system for dosing purpose.

SBS Dosing Pumps P-A/B is used to feed Chemical solution to RO System.

Start Permissive
- Dosing tank level Not Low
- Discharge valve open

Standby Changeover
- Outlet pressure low.

Auto On and Off
- As per OEM sequence of operation for RO skids

Trip interlock
- Dosing tank level Low Low
- Discharge valve closed

Acid Dosing System

The Utility water is filled in tank by any pump.

Below instruments are required for monitoring/Level Control of Acid Solution at Tank

1. Level transmitter
2. Level Indicator (Glass Tube)-

Tank Chemical Solution feed to RO system for dosing purpose.

Acid Dosing Pumps P-A/B is used to feed Chemical solution to RO System.

Start Permissive
- Dosing tank level Not Low
- Discharge valve open

Standby Changeover
- Outlet pressure low.

Auto On and Off
- As per OEM sequence of operation for RO skids

Trip interlock
- Dosing tank level Low Low
- Discharge valve closed

RO PERMEATE TRANSFER PUMP:

RO permeate is transferred to CW forebay Stage-I. Discharge pressure transmitter is provided to monitor and alarm in case of pressure beyond set points.

Start Permissive
- RO permeate tank level Not Low

Standby Changeover
- Outlet pressure Low

Auto On and Off
- -NA-

Trip interlock
- RO permeate tank level Low Low

LAYOUT:

All the sumps along with the pumps, surface settlers, Oil water separator etc. shall be located outdoor. The dosing system of Effluent treatment plant shall also be housed inside UF-RO building.

5.0 MEMBRANE WARRANTIES

UF membranes shall be guaranteed for 5years (2 years' full replacement + 3 years pro-rated replacement) as per the guidelines of membrane manufacturer.
RO membrane shall be guaranteed for 3years pro-rata with replacement. RO membrane replacement shall be prorated as per the guidelines of membrane manufacturer.

6.0 DESIGN STANDARDS

Sl. No.	DESCRIPTION	STANDARD
1	Design, Fabrication Of Cylindrical Storage Tanks	IS:803
2	Design of pressure vessels	IS 2825/ASME SEC VIII DIV I
3	CS Piping Material	IS:1239 / IS:3589
4	FRP tanks	BS 4994
5	PVC Piping & Fittings	IS 4985 or Equivalent IS 7834 or Equivalent
6	HDPE Pipes	IS 4984
7	SS HP Piping (RO) Material	ASTM A312 TP316
8	Code For CS Flanges & Pipe Fittings	ANSI B.16.5, B 16.9
9	Code For SS Flanges & Pipe Fittings	ASTM A403, ASTM A182 F 316L, ANSI B16.5, B16.9
9	Centrifugal pumps	Speed: 1450/3000 rpm Std: IS5120.

7.0 REFERENCES

1. P& ID for ETP plant (1-WT-060-01597)
2. Equipment layout of ETP (1-WT-060-01598)
3. Drive Control Philosophy (PE-DM-417-145-I002)
4. Control System for Mechanical Auxiliary Packages (PE-DM-417-145-I900)
5. **Enclosures:**

   a) Data Sheet-A for Effluent Treatment plant.
   b) ANNEXURE I Pumps and pipe selection criteria.

DATASHEET –A

1.0	**BACKWASH WASTE WATER FROM SIDE STREAM FILTRATION**	
	Suspended solid at inlet waste water	1500 ppm (maximum)
1.1	**SSF BACKWASH WASTE WATER PIT**	**Stage-1 & Stage-2**
(A)	Number	One (1) per stage
(B)	Description (applicable for each sump)	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Backwash waste from Side stream filtration system
(iii)	Effective capacity, m^3	Suitable to receive the backwash waste from four numbers filters at a time from each stage. However it shall not be less than 300cu.m for Stage-1 & 450cu.m for Stage-2
(iv)	Material of Construction	RCC
1.2	**BACKWASH WASTE WATER TRANSFER PUMP**	**Stage-1 & Stage-2**
(A)	Number	Two (2) [1Working + 1 standby] per Stage
(B)	Description (applicable for each pump)	
(i)	Type	Vertical Centrifugal type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Backwash waste from Side stream filtration system
(iv)	Duty	Intermittent
(v)	Rated capacity, each m^3/hr.	Not less than 150
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	**Material of Construction**	
	• Casing	2.5 % Ni CI as per IS 210 FG 260
	• Impeller	Stainless Steel – Gr. 316
	• Shaft	Stainless Steel – Gr. 410
2.0	**BOILER / TG AREA WASH WATER**	
2.1	**BOILER AREA WASH WATER PIT**	
(A)	Number	One (1) / Unit
(B)	Description	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Boiler Area Wash Water
(iii)	Effective capacity, m^3	Not less than 10
(iv)	Material of Construction	RCC
2.2	**BOILER AREA WASH WATER TRANSFER PUMPS**	
(A)	Number	Two (2) [1Working + 1 standby]/ Unit
(B)	Description (applicable for each pump)	
(i)	Type	Vertical Centrifugal type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Boiler Area Wash Water

(iv)	Duty	Intermittent
(v)	Rated capacity, each m^3/hr ,	Not less than 10
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	Material of Construction	
	• Casing	2.5 % Ni CI to IS 210 FG 260
	• Impeller	Stainless Steel – Gr. 316
	• Shaft	Stainless Steel – Gr. 410
2.3	**TG AREA WASH WATER PIT**	
(A)	Number	One (1) / Unit
(B)	Description	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	TG Area Wash Water
(iii)	Effective capacity, m^3	Not less than 10
(iv)	Material of Construction	RCC
2.4	**TG AREA WASH WATER TRANSFER PUMPS**	
(A)	Number	Two (2) [1Working + 1 standby]/ Unit
(B)	Description (applicable for each pump)	
(i)	Type	Screw type 4
(ii)	Location	Outdoor
(iii)	Fluid to be handled	TG Area Wash Water
(iv)	Duty	Intermittent
(v)	Rated capacity, each m^3/hr ,	Not less than 10
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	**Material of Construction**	
	• Casing	2 % Ni CI to IS 210 FG 260
	• Impeller	SS 316
	• Shaft	Nitrile /EPDM
2.5	**HVAC SOFTENER WASTE PIT(FGD CONTROL BUILDING AREA)**	
(A)	Number	One (1) / stage
(B)	Description	
	Type	Underground, Rectangular with flat bottom.
	Type of fluid to be handled	HVAC Softener waste Water
	Effective capacity, m^3	Not less than 10 4
	Material of Construction	RCC
2.6	**HVAC SOFTENER WASTE WATER TRANSFER PUMPS**	
(A)	Number	Two (2) [1Working + 1 standby]/ stage
(B)	Description (applicable for each pump)	
	Type	Vertical Centrifugal type
	Location	Outdoor
	Fluid to be handled	HVAC Softener waste Water
	Duty	Intermittent
	Rated capacity, each m^3/hr ,	Not less than 10 4

	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
	Pump Speed, RPM	1500 (maximum)
	Material of Construction	
	Casing	Stainless Steel – Gr. 316
	Impeller	Stainless Steel – Gr. 316
	Shaft	Stainless Steel – Gr. 410
3.0	**OIL HANDLING AREA/SERVICE WASTE WATER EFFLUENT**	
	• Range of free oil concentration in retention pit.	0-1000 mg/ l
	• Total suspended solids.	300 mg/ l (max)
	• Sp. gravity of oil	0.9
3.1	**OILY WASTE FROM FUEL OIL STORAGE AREA**	
3.1.1	**RETENTION PIT FOR OILY WASTE FROM FUEL OIL STORAGE AREA** (WATER PIT)	
(A)	Number	One (1)
(B)	Description (applicable for each sump)	
(i)	Type	Please refer to PE-DG-417-166-A001 Rev-01
(ii)	Type of fluid to be handled	Oily waste from Fuel Oil Storage area.
(iii)	Effective capacity,m^3	Existing pit in Fuel Oil area. Please refer to PE-DG-417-166-A001 Rev-01
(iv)	Material of Construction	RCC
3.1.2	**FUEL OIL STORAGE AREA OILY WASTE TRANSFER PUMP**	
(A)	Number	Two (2) [1Working + 1 standby].
(B)	Description (applicable for each pump)	
(i)	Type	Screw type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Oily Waste form Fuel Oil Storage Area.
(iv)	Duty	Intermittent
(v)	Rated capacity each, m^3/hr,	Not less than 20
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	Material of Construction	
	• Casing	2 % Ni CI to IS 210 FG 260
	• Rotor	SS 316
	• Stator	Nitrile /EPDM
	• Shaft	SS 316
3.2	**OILY WASTE FROM CENTRAL LUBE OIL SYSTEM AREA (Stage-1 & Stage-2)**	
3.2.1	**RETENTION PIT FOR OILY WASTE FROM CENTRAL LUBE OIL SYSTEM AREA**	
(A)	Number	One (1) / Stage
(B)	Description (applicable for each sump)	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Service waste from Power House area.
(iii)	Effective capacity, m^3	Not less than 10
(iv)	Material of Construction	RCC

3.2.2	**CENTRAL LUBE OIL SYSTEM AREA OILY WASTE TRANSFER PUMP**	
(A)	Number	Two (2) [1Working + 1 standby]/ Stage
(B)	Description (applicable for each pump)	
(i)	Type	Screw type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Service waste from Power House area.
(iv)	Duty	Intermittent
(v)	Rated capacity each, m^3/hr,	Not less than 10
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	Material of Construction	
	• Casing	2 % Ni CI to IS 210 FG 260
	• Rotor	SS 316
	• Stator	Nitrile /EPDM
	• Shaft	SS 316
3.3	**OILY WASTE FROM TRANSFORMER YARD AREA**	
3.3.1	**RETENTION PIT-1 FOR OILY WASTE FROM TRANSFORMER YARD AREA**	
(A)	Number	One (1)
(B)	Description (applicable for each sump)	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Service waste from Transformer Yard Area.
(iii)	Effective capacity, m^3	Not less than 151
(iv)	Material of Construction	RCC
3.3.2	**TRANSFORMER YARD AREA OILY WASTE TRANSFER PUMP FOR RETENTION PIT-1**	
(A)	Number	Two (2) [1Working + 1 standby]
(B)	Description (applicable for each pump)	
(i)	Type	Screw type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Service Waste from Transformer Yard area.
(iv)	Duty	Intermittent
(v)	Rated capacity each, m^3/hr,	Not less than 20
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	Material of Construction	
	• Casing	2 % Ni CI to IS 210 FG 260
	• Rotor	SS 316
	• Stator	Nitrile /EPDM
	• Shaft	SS 316
3.3.3	**RETENTION PIT-2 FOR OILY WASTE FROM TRANSFORMER YARD AREA**	

(A)	Number	One (1)
(B)	Description (applicable for each sump)	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Service waste from Transformer Yard Area.
(iii)	Effective capacity, m^3	Not less than 154
(iv)	Material of Construction	RCC
3.3.4	**TRANSFORMER YARD AREA OILY WASTE TRANSFER PUMP FOR RETENTION PIT-2**	
(A)	Number	Two (2) [1Working + 1 standby]
(B)	Description (applicable for each pump)	
(i)	Type	Screw type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Service Waste from Transformer Yard area.
(iv)	Duty	Intermittent
(v)	Rated capacity each, m^3/hr,	Not less than 20
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	Material of Construction	
	• Casing	2 % Ni CI to IS 210 FG 260
	• Rotor	SS 316
	• Stator	Nitrile /EPDM
	• Shaft	SS 316
3.3.5	**RETENTION PIT-3 FOR OILY WASTE FROM TRANSFORMER YARD AREA**	
(A)	Number	One (1)
(B)	Description (applicable for each sump)	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Service waste from Transformer Yard Area.
(iii)	Effective capacity, m^3	Not less than 152
(iv)	Material of Construction	RCC
3.3.6	**TRANSFORMER YARD AREA OILY WASTE TRANSFER PUMP FOR RETENTION PIT-3**	
(A)	Number	Two (2) [1Working + 1 standby]
(B)	Description (applicable for each pump)	
(i)	Type	Screw type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Service Waste from Transformer Yard area.
(iv)	Duty	Intermittent
(v)	Rated capacity each, m^3/hr,	Not less than 20
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	Material of Construction	
	• Casing	2 % Ni CI to IS 210 FG 260
	• Rotor	SS 316

	• Stator	Nitrile /EPDM
	• Shaft	SS 316
3.3.7	**RETENTION PIT-4 FOR OILY WASTE FROM TRANSFORMER YARD AREA**	
(A)	Number	One (1)
(B)	Description (applicable for each sump)	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Service waste from Transformer Yard Area.
(iii)	Effective capacity, m^3	Not less than 154
(iv)	Material of Construction	RCC
3.3.8	**TRANSFORMER YARD AREA OILY WASTE TRANSFER PUMP FOR RETENTION PIT-4**	
(A)	Number	Two (2) [1Working + 1 standby]
(B)	Description (applicable for each pump)	
(i)	Type	Screw type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Service Waste from Transformer Yard area.
(iv)	Duty	Intermittent
(v)	Rated capacity each, m^3/hr,	Not less than 20
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	Material of Construction	
	• Casing	2 % Ni CI to IS 210 FG 260
	• Rotor	SS 316
	• Stator	Nitrile /EPDM
	• Shaft	SS 316
3.3.9	**RETENTION PIT-5 FOR OILY WASTE FROM TRANSFORMER YARD AREA**	
(A)	Number	One (1)
(B)	Description (applicable for each sump)	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Service waste from Transformer Yard Area.
(iii)	Effective capacity, m^3	Not less than 169
(iv)	Material of Construction	RCC
3.3.10	**TRANSFORMER YARD AREA OILY WASTE TRANSFER PUMP FOR RETENTION PIT-5**	
(A)	Number	Two (2) [1Working + 1 standby]
(B)	Description (applicable for each pump)	
(i)	Type	Screw type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Service Waste from Transformer Yard area.
(iv)	Duty	Intermittent
(v)	Rated capacity each, m^3/hr,	Not less than 20
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements

(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	Material of Construction	
	• Casing	2 % Ni CI to IS 210 FG 260
	• Rotor	SS 316
	• Stator	Nitrile /EPDM
	• Shaft	SS 316
3.3.11	**RETENTION PIT-6 FOR OILY WASTE FROM TRANSFORMER YARD AREA**	
(A)	Number	One (1)
(B)	Description (applicable for each sump)	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Service waste from Transformer Yard Area.
(iii)	Effective capacity, m^3	Not less than 169
(iv)	Material of Construction	RCC
3.3.12	**TRANSFORMER YARD AREA OILY WASTE TRANSFER PUMP FOR RETENTION PIT-6**	
(A)	Number	Two (2) [1Working + 1 standby]
(B)	Description (applicable for each pump)	
(i)	Type	Screw type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Service Waste from Transformer Yard area.
(iv)	Duty	Intermittent
(v)	Rated capacity each, m^3/hr,	Not less than 20
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	Material of Construction	
	• Casing	2 % Ni CI to IS 210 FG 260
	• Rotor	SS 316
	• Stator	Nitrile /EPDM
	• Shaft	SS 316
3.4	**OILY WASTE FROM SWITCH YARD AREA**	
3.4.1	**RETENTION PIT FOR OILY WASTE FROM SWITCHYARD YARD AREA**	
(A)	Number	One (1)
(B)	Description (applicable for each sump)	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Service waste from Switchyard Area.
(iii)	Effective capacity, m^3	Not less than 160
(iv)	Material of Construction	RCC
3.4.2	**SWITCHYARD AREA OILY WASTE TRANSFER PUMP**	
(A)	Number	Two (2) [1Working + 1 standby]
(B)	Description (applicable for each pump)	
(i)	Type	Screw type
(ii)	Location	Outdoor

(iii)	Fluid to be handled	Service Waste from Switchyard Area
(iv)	Duty	Intermittent
(v)	Rated capacity each, m^3/hr,	Not less than 20
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	Material of Construction	
	Casing	2 % Ni CI to IS 210 FG 260
	Rotor	SS 316
	Stator	Nitrile /EPDM
	Shaft	SS 316
3.5	**OILY WASTE FROM AUXILIARY BOILER AREA**	
3.5.1	**RETENTION PIT FOR OILY WASTE FROM AUXILIARY BOILER AREA**	
(A)	Number	One (1)
(B)	Description (applicable for each sump)	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Service waste from Auxiliary Boiler Area.
(iii)	Effective capacity, m^3	Not less than 10
(iv)	Material of Construction	RCC
3.5.2	**AUXILIARY BOILER AREA OILY WASTE TRANSFER PUMP**	
(A)	Number	Two (2) [1Working + 1 standby]
(B)	Description (applicable for each pump)	
(i)	Type	Screw type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Service waste from Auxiliary Boiler Area.
(iv)	Duty	Intermittent
(v)	Rated capacity each, m^3/hr,	Not less than 10
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	Material of Construction	
	Casing	2 % Ni CI to IS 210 FG 260
	Rotor	SS 316
	Stator	Nitrile /EPDM
	Shaft	SS 316
3.6	**PRE OIL WATER SEPARATOR COLLECTION PIT**	
(A)	Number	One (1)
(B)	Description (applicable for each sump)	
(i)	Type	Underground, Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Oily waste from Fuel Oil Storage Area, Transformer Yard Area, Aux. boiler, Central lube oil systems, switchyard area,
(iii)	Effective capacity, m^3	Not less than 200

(iv)	Material of Construction	RCC
3.7	**PRE OIL WATER SEPARATOR COLLECTION PIT TRANSFER PUMP**	
(A)	Number	Two (2) [1Working + 1 standby]
(B)	Description (applicable for each pump)	
(i)	Type	Screw type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	Oily Waste from Pre Oil Water Separator Collection Pit
(iv)	Duty	Intermittent
(v)	Rated capacity, Cubic Meter per Hour.	Not less than 50
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	**Material of Construction**	
	• Casing	2 % Ni CI to IS 210 FG 260
	• Rotor	SS 316
	• Stator	Nitrile /EPDM
	• Shaft	SS 316
3.8	**OIL WATER SEPARATOR**	
(A)	Number	One (1)
(B)	Type	Plate or Tube with Counter Flow / Cross Flow.
(i)	Duty	Continuous
(ii)	Rated output capacity, Cubic Meter per Hour.	Not less than 50
(iii)	Treated water quality	• Free Oil content not to exceed 10 ppm for free oil concentration 1000 ppm max. in feed waste to the Separator. • Suspended Solids not to exceed 100 ppm for Suspended Solids 300 ppm max. in feed waste to the Separator.
(iv)	Design Criteria	
	• Angle of inclination of Plates or Tubes	60 degree maximum.
	• Rise Rate	Suitable to provide efficient coalescence and removal of oil from wastewater to maintain oil concentration 10 ppm max. in treated effluent.
(v)	Material of Construction	
	• Body	RCC
	• Plates or Tubes	UV inhibited virgin FRP or GRP or PVC.
(vi)	Oil Skimmer System	Shall be provided.
(vii)	Sludge Disposal System	By gravity. All accessories Shall be provided.
(viii)	Oil water separator plate/ tube cleaning pumps	1no. along with 10m hoze & nozzle
3.9	**SLOP OIL STORAGE TANK**	
(i)	Number	Two (2).
(ii)	Type	Vertical Cylindrical.
(iii)	Type of fluid to be handled	Slop Oil.

(iv)	Effective capacity,m^3	Not less than 2
(v)	Material of Construction	Carbon Steel
3.10	**CPI SLUDGE PIT**	
A)	Numbers Shall be provided	One (1)
B)	Description	
(i)	Type	Rectangular with flat bottom.
(ii)	Type of fluid to be handled	Sludge from Oil Water separator
(iii)	Effective capacity of each compartment, m^3,(min.)	Not less than 100 % of sludge generated from Oil Water Separator in 8 hours
(iv)	Material of Construction	RCC.
(v)	Type of protection	
(vi)	Internal	Epoxy painted.
3.11	**CPI SLUDGE PIT BLOWER**	
A)	Number	Two (2) [1Working + 1 standby].
B)	Description for each Blower	
(i)	Location	Outdoor
(ii)	Fluid to be handled	Ambient Air.
(iii)	Service	Sludge mixing
(iv)	Duty	Intermittent
(v)	Type of Blower	Rotary, twin lobe
(vi)	Rated Capacity	Suitable to meet 100% of system requirements
(vii)	Head to be developed at rated capacity	As per system requirements
(viii)	**Material of construction**	
	• Casing	CI to IS 210 FG 260
	• Lobes	CS to BS 970, EN9 Forged
	• Shaft	CS to BS 970, EN9 Forged
(ix)	Accessories Shall be provided	Common base frame, Pulley, V-Belt Guard, Acoustic Hood, Suction Filter, Suction Silencer, Discharge Silencer, Anti Vibration Pad, Safety Relief Valve, Non Return Valve
3.12	**CPI SLUDGE TRANSFER PUMP**	
A)	Number	Two (2) [1Working + 1 standby].
B)	Description (applicable for each pump)	
(i)	Type	Vertical Centrifugal type
(ii)	Location	Outdoor
(iii)	Fluid to be handled	CPI sludge
(iv)	Duty	Intermittent
(v)	Rated capacity, each m^3/hr.	Suitable to transfer 100 % of sludge generated from Oil Water Separator in 8 hours, within 1 hour.
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Pump Speed, RPM	1500 (maximum)
(viii)	**Material of Construction**	
	• Casing	2.5 % Ni CI as per IS 210 FG 260

	• Impeller	Stainless Steel – Gr. 316
	• Shaft	Stainless Steel – Gr. 410
4.0	**CENTRAL MONITORING BASIN**	
(i)	Number	One (1)
(ii)	Number of compartments	Two (2)
(iii)	Type	Underground, Rectangular truncated pyramid type
(iv)	MOC	Earthen
(v)	Minimum Effective capacity (Each Compartment), m3	Not less than 1500
(vi)	Inlet Arrangement	Inlet chamber with gate
(vii)	MOC of Inlet Chamber	Earthen
5.0	**CLARIFIER FEED PUMPS**	
A)	Number	Two (2) [1Working + 1 standby].
B)	Description for each Pump	
(i)	Type of Pump	Vertical Centrifugal type
(ii)	Location	Indoor
(iii)	Fluid to be handled	Water from Central Monitoring Basin
(iv)	Duty	Continuous
(v)	Rated Capacity each, m^3/hr,	Not less than 227.25 + 10% margin
(vi)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vii)	Range of Operation (%)	10 – 100
(viii)	Pump Speed, (RPM)	1500 (maximum)
(ix)	**Material of construction**	
	a) Casing	2.5 % Ni CI as per IS 210 FG 260
	b) Impeller	Stainless Steel – Gr. 316
	c) Shaft	Stainless Steel – Gr. 410
6.0	**ACID DOSING TANK**	
A)	Numbers required	One (1)
B)	Description (applicable for each Tank)	
(i)	Type	Vertical rectangular with flat bottom
(ii)	Location	In the vicinity of Central Monitoring Basin
(iii)	Type of fluid to be handled	Acid Solution
(iv)	Effective capacity, m3	Suitable to meet 100% requirement.
(v)	Material of Construction	FRP
7.0	**ACID DOSING PUMP**	
A)	Number	Two (2) [1Working + 1 standby].
B)	Description for each Pump	
(i)	Type of Pump	Metering pumps, Simplex, mechanically actuated (hydraulically operated)diaphragm type
(ii)	Location	In the vicinity of Central Monitoring Basin Pump House
(iii)	Fluid to be handled	Acid Solution.
(iv)	Rated Capacity each, m3/hr	Suitable to meet 100% requirement.

(v)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vi)	Range of Operation (%)	10 – 100
(vii)	Pump Speed, (RPM)	1500 (maximum)
(viii)	**Material of construction**	
	• All wetted parts	SS-316.
	• Diaphragm	PTFE
8.0	**ALKALI DOSING TANK**	
A)	Numbers required	One (1)
B)	Description (applicable for each Tank)	
(i)	Type	Vertical rectangular with flat bottom
(ii)	Location	In the vicinity of Central Monitoring Basin Pump House
(iii)	Type of fluid to be handled	Alkali Solution
(iv)	Effective capacity, m3	Suitable to meet 100% requiremen
(v)	Material of Construction	FRP
(vi)	Agitator	
	a) Number	One (1)
	b) MOC	SS 316/ CS-FRP lined
9.0	**ALKALI DOSING PUMP**	
A)	Number	Two (2) [1Working + 1 standby].
B)	Description for each Pump	
(i)	Type of Pump	Metering pumps, Simplex , mechanically actuated (hydraulically operated)diaphragm type
(ii)	Location	In the vicinity of Central Monitoring Basin
(iii)	Fluid to be handled	Alkali Solution.
(iv)	Rated Capacity each, m3/hr	Suitable to meet 100% requirement.
(v)	Minimum Head to be developed at rated capacity, MLC	As per System Requirements
(vi)	Range of Operation (%)	10 – 100
(vii)	Pump Speed, (RPM)	1500 (maximum)
(viii)	**Material of construction**	
	• All wetted parts	SS-316.
	• Diaphragm	PTFE
10.0	**SAFETY EQUIPMENT**	Six (6) sets of safety equipment [(Personal Protection Equipment (PPE)] comprising PVC protection suits with hoods, rubber boots, face visors and thick PVC gauntlets shall also be provided. One (1) numbers safety shower units and adequate nos. of eye fountains to protect against any chemical hazard shall also be provided.

Datasheet for ETP – Reuse RO system		
1.0	**HRSC Clarifier**	
A	Quantity	1 No.

B	Description of each clarifier	
i)	Type	Solids contacts type
ii)	Output capacity at rated condition	220.25 m^3/hr
iii)	Design Criteria	
	• Residence time in Draft Tube	Not less than 15 seconds
	• Residence time in Flocculation zone	15 min minimum
	• Residence time in Clarification zone	100 min minimum
	• Surface flow rate in Clarification zone	Not to exceed 2.5 m^3/hr/m^2 , Side water depth = 4.5 meters (minimum)
iv)	Material of Construction	RCC
	• Recirculation Drive	
	• Number	One (1) for each Clarifier
	• Material of construction	SS 316
v)	Rake mechanism	
	• Number	One (1) for each Clarifier
	• Material of construction	Epoxy painted carbon steel complete rubber squeezers
vi)	Sludge disposal arrangement	
	• Continuous	By gravity through telescopic standpipe
	• Intermittent	Main sludge disposal line shall consist of manual adjustable timer operated blow-off valve with manual over riding facilities
vii)	Accessories	Shall be provided as per system requirements in line with attached P&ID.
viii)	Instruments	Shall be provided as per system requirements in line with attached P&ID.
ix)	Painting	Shall be provided
x)	Walkway	Shall be provided with handrails around launder periphery of each clarifier. Width of the walkway shall not be less than 1200 mm.
2.0	**SLUDGE SUMP**	
A)	Numbers	One (1) number
B)	Description	
i)	Type	Rectangular and Underground, Outdoor Location.
ii)	Type of fluid to be handled	Sludge from Clarifier
iii)	Effective capacity	Not less than 30m^3
iv)	Minimum Free Board, in mm.	500
v)	Material of Construction	RCC.
vi)	Type of protection	
	a) Internal	Epoxy painted
	b) External	Not applicable
3.0	**AIR BLOWERS FOR SLUDGE SUMP**	
A)	Quantity	2 Nos. (1W + 1S)
B)	Description for each Blower	
i)	Location	Outdoor.
ii)	Fluid to be handled	Ambient Air.
iii)	Service	To scour the sludge bed
iv)	Duty	Intermittent.
v)	Type of Blower	Rotary Twin Lobe Oil Free.
vi)	Type of Impeller	Involutes.
vii)	Design standard	As per supplier standard practice
viii)	Service temperature, in0C	60 maximum.
ix)	Rated Capacity, (each) in m^3/hr	100% requirement of each Sludge Sump

x)	Permissible tolerance in rated capacity, in %	As per BS-1571-Part II.
xi)	Head to be developed at rated capacity	To ensure the desired performance.
xii)	Material of construction	
	a. Casing	CI
	b. Lobe	CI
	c. Common Base plate	Fabricated Carbon Steel
	d. Coupling Pulley	C.I./Carbon Steel
	e. Coupling Guard	Carbon Steel.
	f. Safety Relief Valve	SS-316
	g. Nuts and bolts	Carbon Steel
xiii)	Type of drive	Electrical Motor
xiv)	Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no be less than the maximum power required by the Blower.
xv)	Rated speed (RPM)	1500 (Sync.) maximum.
xvi)	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase, 50 (+5%), HZ
xvii)	Type of coupling between Blower & Motor	V Belt.
xviii)	Noise level (for complete set of Blower & Motor)	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
xix)	Tests and Inspection	
	a) Material Test required for	Casing and Lobe
	b) Hydro-test	BS-1571-Part II.
	c) Dynamic Balancing Test	Shall be provided
xx)	Performance Test	
	a) Test Code	BS-1571-Part II.
	b) Tests to be done for determination of	Head-Capacity Curve and BHP-Capacity Curve.
	c) Test to be carried out	On prototype model at rated speed.
	d) Test for satisfactory operation of Blower at site	Required.
xxi)	Instruments and alarm	Shall be provided as per P&ID.
xxii)	Trip interlock	Not required.
xxiii)	Accessories	Common base frame, Pulley, V-Belt Guard, Acoustic Hood, Suction Filter, Suction Silencer, Discharge Silencer, Anti Vibration Pad, Safety Relief Valve, Non Return Valve
4.0	**CENTRIFUGE FEED PUMPS**	
A)	Quantity	Two (2) (1Working +1Standby)
B)	Description for each Pump	
i)	Type	Vertical Centrifugal Non Clog type
ii)	Type of Impeller	Open
iii)	Location	Outdoor
iv)	Fluid to be handled	Sludge-water Slurry
v)	Duty	Intermittent
vi)	Design Standard	As per supplier standard practice to meet system requirements
vii)	Design Temperature in degree Celsius	60
viii)	Rated Capacity m^3/hr	Not less than 10 m^3/hr
ix)	Suction Condition	Flooded.
x)	Tentative Head to be developed at rated capacity, MLC	Shall be specified during detailed engineering considering 10% margin to meet the requirements of the system As per supplier standard practice (C should be considered as

		120 to calculate frictional loss in pipe as per Hazen Williams Equation).
xi)	Shut off Head	To be suitable for stable operation at rated duty point.
xii)	Range of operation	20% - 120%
xiii)	Pump speed (RPM)	1500 (maximum)
xiv)	Material of construction	
	• Inner Casing	SS316
	• Shaft	SS410
	• Impeller	SS316
	• Nuts and Bolts	SS-316 (under wetted condition) and MS Cadmium plated (in other places)
xv)	Type of drive	Electrical Motor
xvi)	Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
xvii)	Rated speed (RPM)	1500 (Sync.) maximum.
xviii)	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase, 50 HZ (+5%).
xix)	Type of coupling between Pump & Motor	Flexible Spacer.
xx)	Noise level (for complete set of Pump & Motor)	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
xxi)	Painting for complete set of Pump & Motor	
	Primer	Shall be provided
	Finish paint	Shall be provided
xxii)	Tests and Inspection	
	Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.
	a) Hydro-test	As per Relevant Code
	b) Dynamic Balancing Test	Shall be provided
	c) Performance Test	Shall be provided
xxiii)	Instruments along with alarms, interlocks and accessories	Shall be provided as per system requirements in line with attached P&ID.
xxiv)	Trip interlock	Shall be provided.
5.0	**CENTRIFUGE**	
i)	Capacity	Not less than 10m3/hr
ii)	MOC of Bowl/ Shaft/ Scroll/ Casing	SS316
iii)	Wear lining	Tungsten carbide
6.0	**CLARIFIED WATER TANK**	
	Number	One (1)
	Type	Above ground, rectangular
	MOC	RCC
	Minimum Effective capacity (Each Compartment), m3	Not less than 230 4
7.0	**CLARIFIED WATER TRANSFER PUMPS**	
A	Quantity	3 Nos. (2W+1S)
B	Description of Each pump	
(i)	Location	Indoor.
(ii)	Fluid to be handled	Clarified water
(iii)	Service	To Transfer clarified water to UF system
(iv)	Duty	Continuous and to be suitable for parallel operation.
(v)	Type of Pump	Horizontal Centrifugal Non Clog type
(vi)	Type of Impeller	Closed
(vii)	Design standard	As per IS-5659 & IS-5120.
(viii)	Service temperature, in degree Celsius	60

(ix)	Rated Capacity, in m3/hr	Not less than 111 + 10% margin
(x)	Permissible tolerance in rated capacity, in %	As per IS-5659 & IS-5120.
(xi)	Range of operation	20 % - 120 %.
(xii)	Suction Condition	Flooded.
(xiii)	Head to be developed at rated capacity	To pump water to UF system through basket strainers. (C should be considered as 120 to calculate the frictional loss in pipe as per Hazen Williams Equation).
(xiv)	Shut Off Head	To be suitable for stable operation at rated duty point.
(xv)	Permissible tolerance in efficiency at rated capacity, in %	As per IS-5659 & IS-5120.
(xvi)	Material of construction	
	a) Casing	AISI-316.
	b) Impeller	AISI-316.
	c) Shaft	AISI-316.
	d) Mechanical Seal	AISI-316.
	e) Common Base plate	Fabricated Steel as per IS 2062.
	f) Nuts and bolts	AISI-316.
(xvii)	Type of drive	Electrical Motor
(xviii)	Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
(xix)	Rated speed (RPM)	1500 (Sync.) maximum.
(xx)	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase, 50 HZ (+5%)
(xxi)	Type of coupling between Pump & Motor	Flexible Spacer.
(xxii)	Noise level (for complete set of Pump	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
(xxiii)	Tests and Inspection	
	a) Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.
	b) Hydro-test	As per IS-5120.
	c) Dynamic Balancing Test	Shall be provided
(xxiv)	Performance Test	
	a) Test Code	Hydraulic Institute Standard.
	b) Tests to be done for determination of	Head-Capacity Curve, BHP-Capacity Curve and Efficiency- Capacity Curve and NPSH-Capacity Curve.
	c) Test to be carried out	On prototype model at rated speed.
	d) Test for satisfactory operation of pump at site	Required.
(xxv)	Instruments, alarm and Interlock	Shall be provided as per system requirements in line with attached P&ID.
(xxvi)	Suction Strainer along with flushing connection	Required. Material of construction of each strainer shall be SS316.
(xxvii)	Operation	Start/Stop from remote. Local emergency stop provided
(xxviii)	Trip interlock	Shall be provided.
8.0	**BASKET STRAINER**	
i)	Quantity	3 Nos. (2W+1S)
ii)	Capacity	Min. 111m3/hr each
iii)	MOC	SS316
9.0	**UF system**	
i)	Streams	3 Nos.
ii)	Capacity	198.25m3/hr total, 99.5m^3/hr/ stream

iii)	UF recovery	90% min.
iv)	Design flux	50 lmh (max.)
v)	UF modules MOC	PVDF (Hollow fiber, submerged)
vi)	UF cassette/ membrane housing/ skid frame	FRP/ suitable material
vii)	Guarantee life of membrane	2 years cliff + 3 years prorated
viii)	Membrane flow mode/ configuration	Outside to inside
ix)	Chlorine resistance	2,00,000 ppm hours
10.0	**UF membrane holding tank**	
i)	Tank size	To suit membrane installation as per Membrane manufacturer's recommendation.
ii)	MOC	RCC with suitable internal painting/ protection
11.0	**MEMBRANE AERATION BLOWERS WITH MOTOR**	
i)	No. of blowers	2Nos. (1W+1S)
ii)	Operation	Intermittent
iii)	Type of blower	Positive displacement – rotary twin lobe
iv)	Capacity	As per membrane manufacturer's recommendation
v)	Head	As per membrane manufacturer's recommendation
vi)	MOC	
vii)	Casing & Impeller (lobe)	Cast iron
viii)	Shaft	Carbon steel
12.0	**UF PERMEATE CUM BACKWASH PUMPS WITH MOTOR & ACC.**	
i)	No. of pumps	1W+1S/ train
ii)	Operation	Continuous with VFD
iii)	Type	Vertical/ Horizontal centrifugal
iv)	MOC	
v)	Impeller & Casing	SS316
vi)	Shaft	SS410
vii)	Speed of the pump	Not to exceed 2900rpm
viii)	Design flow	As per membrane manufacturer's recommendation
ix)	Head	As per membrane manufacturer's recommendation
x)	Impeller type	Closed
xi)	Seal	Mechanical seal
13.0	**UF BACKWASH TANK**	
i)	Quantity	1 Nos.
ii)	Type	Vertical Cylindrical with top cover hinged & dished bottom. The tank shall be fitted with vent, drain, overflow, etc.
iii)	Location	Outdoor
iv)	Useful capacity (for each tank)	Backwash requirement of 1 UF system stream plus 20% margin
v)	Pressure Rating	Atmospheric
vi)	Material of construction	FRP with suitable internal protection
vii)	Free board	300mm
viii)	Agitator with motor & reduction gears	As per chemical preparation requirement
ix)	Accessories for each tank	Manhole, handhold, approach ladder & charging platform etc
14.0	**UF CIP TANK**	
i)	Quantity	1 No.

ii)	Type	Vertical Cylindrical with top cover hinged & dished bottom. The tank shall be fitted with vent, drain, overflow, etc.
iii)	Location	Outdoor
iv)	Useful capacity (for each tank)	Cleaning requirement of 1 UF system stream plus 20% margin
v)	Pressure Rating	Atmospheric
vi)	Material of construction	FRP with suitable internal protection
vii)	Free board	300mm
viii)	Agitator with motor & reduction gears	As per chemical preparation requirement
ix)	Accessories for each tank	Manhole, handhold, approach ladder & charging platform etc
15.0	**UF CLEANING PUMPS**	
A)	Quantity	2 Nos. (1W+1S)
B)	Description for each Pump	
(i)	Location	Indoor.
(ii)	Fluid to be handled	UF permeate water
(iii)	Service	Chemical cleaning of UF system
(iv)	Duty	Continuous and to be suitable for parallel operation.
(v)	Type of Pump	Horizontal Centrifugal Non Clog type
(vi)	Type of Impeller	Closed
(vii)	Design standard	As per IS-5659 & IS-5120.
(viii)	Service temperature, in degree Celsius	60
(ix)	Rated Capacity, in m3/hr	As per UF system requirement
(x)	Permissible tolerance in rated capacity, in %	As per IS-5659 & IS-5120.
(xi)	Range of operation	20 % - 120 %.
(xii)	Suction Condition	Flooded.
(xiii)	Head to be developed at rated capacity	To pump meet UF system backwash requirement (C should be considered as 120 to calculate the frictional loss in pipe as per Hazen Williams Equation).
(xiv)	Shut Off Head	To be suitable for stable operation at rated duty point.
(xv)	Permissible tolerance in efficiency at rated capacity, in %	As per IS-5659 & IS-5120.
(xvi)	Material of construction	
	a) Casing	AISI-316.
	b) Impeller	AISI-316.
	c) Shaft	AISI-316.
	d) Mechanical Seal	AISI-316.
	e) Common Base plate	Fabricated Steel as per IS 2062.
	f) Nuts and bolts	AISI-316.
(xvii)	Type of drive	Electrical Motor
(xviii)	Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
(xix)	Rated speed (RPM)	1500 (Sync.) maximum.
(xx)	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase, 50 HZ (+5%)
(xxi)	Type of coupling between Pump & Motor	Flexible Spacer.
(xxii)	Noise level (for complete set of Pump	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
(xxiii)	Tests and Inspection	

	a) Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.
	b) Hydro-test	As per IS-5120.
	c) Dynamic Balancing Test	Shall be provided
(xxiv)	Performance Test	
	a) Test Code	Hydraulic Institute Standard.
	b) Tests to be done for determination of	Head-Capacity Curve, BHP-Capacity Curve and Efficiency- Capacity Curve and NPSH-Capacity Curve.
	c) Test to be carried out	On prototype model at rated speed.
	d) Test for satisfactory operation of pump at site	Required.
(xxv)	Instruments, alarm and Interlock	Shall be provided as per system requirements in line with attached P&ID.
(xxvi)	Suction Strainer along with flushing connection	Required. Material of construction of each strainer shall be SS316.
(xxvii)	Operation	Start/Stop from remote. Local emergency stop provided
(xxviii)	Trip interlock	Shall be provided.
16.0	**UF Dosing systems**	
	Chemical cleaning system description	No. of Dosing systems shall be decided based on UF membrane manufacturer's recommendation. Each dosing system shall consists of the following.
16.1	**DOSING TANK**	
i)	Quantity	1 per dosing system
ii)	Type	Vertical Cylindrical with top cover hinged & dished bottom. The tank shall be fitted with vent, drain, fume absorber, overflow seal pots etc.
iii)	Location	Indoor
iv)	Useful capacity (for each tank)	Cleaning requirement of 1 UF system stream plus 25% margin
v)	Pressure Rating	Atmospheric
vi)	Material of construction	FRP with suitable internal protection
vii)	Free board	300mm
viii)	Dissolving basket	As per chemical preparation requirement
ix)	Agitator with motor & reduction gears	As per chemical preparation requirement
x)	Accessories for each tank	Handhole, approach ladder & charging platform etc
16.2	**DOSING PUMPS**	
i)	Quantity	2 (1W+1S) per dosing system
ii)	Type	Simplex positive displacement hydraulically operated diaphragm type
iii)	Suction strainers	Required
iv)	Pressure dampener	Required
v)	External safety relief valve (in addition to inbuilt safety valve)	PVC
vi)	Maximum pump stroke per minute	100 - 200
vii)	Motor rating	Minimum 15 % margin over BKW at rated duty point
viii)	Material of construction	
ix)	Liquid end (pump, head, valves, valve housing, valve spring, etc)	PP, for all wetted parts
x)	Diaphragm	PTFE
xi)	Packing	PTFE
xii)	Frame	MS fabricated, epoxy painted
17.0	**UF PRODUCT WATER TANK**	

i)	Number	One (1)
ii)	Type	Above ground, rectangular
iii)	MOC	RCC
iv)	Minimum Effective capacity (Each Compartment), m3	Not less than 200
18.0	**RO feed pumps**	
A)	Quantity	3 Nos. (2W+1S)
B)	Description for each Pump	
(i)	Location	Indoor.
(ii)	Fluid to be handled	UF filtered water
(iii)	Service	To transfer UF filtered water to RO system
(iv)	Duty	Continuous and to be suitable for parallel operation.
(v)	Type of Pump	Horizontal Centrifugal Non Clog type
(vi)	Type of Impeller	Closed
(vii)	Design standard	As per IS-5659 & IS-5120.
(viii)	Service temperature, in degree Celsius	60
(ix)	Rated Capacity, in m3/hr	Not less than 99.5m3/hr with 10% margin
(x)	Permissible tolerance in rated capacity, in %	As per IS-5659 & IS-5120.
(xi)	Range of operation	20 % - 120 %.
(xii)	Suction Condition	Flooded.
(xiii)	Head to be developed at rated capacity	3kg/cm2 min.
(xiv)	Shut Off Head	To be suitable for stable operation at rated duty point.
(xv)	Permissible tolerance in efficiency at rated capacity, in %	As per IS-5659 & IS-5120.
(xvi)	Material of construction	
	a) Casing	AISI-316.
	b) Impeller	AISI-316.
	c) Shaft	AISI-316.
	d) Mechanical Seal	AISI-316.
	e) Common Base plate	Fabricated Steel as per IS 2062.
	f) Nuts and bolts	AISI-316.
(xvii)	Type of drive	Electrical Motor
(xviii)	Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
(xix)	Rated speed (RPM)	1500 (Sync.) maximum.
(xx)	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase, 50 HZ (+5%)
(xxi)	Type of coupling between Pump & Motor	Flexible Spacer.
(xxii)	Noise level (for complete set of Pump	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
(xxiii)	Tests and Inspection	
	a) Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.
	b) Hydro-test	As per IS-5120.
	c) Dynamic Balancing Test	Shall be provided
(xxiv)	Performance Test	
	a) Test Code	Hydraulic Institute Standard.
	b) Tests to be done for determination of	Head-Capacity Curve, BHP-Capacity Curve and Efficiency- Capacity Curve and NPSH-Capacity Curve.
	c) Test to be carried out	On prototype model at rated speed.
	d) Test for satisfactory operation of pump at site	Required.

(xxv)	Instruments, alarm and Interlock	Shall be provided as per system requirements in line with attached P&ID.
(xxvi)	Suction Strainer along with flushing connection	Required. Material of construction of each strainer shall be SS316.
(xxvii)	Operation	Start/Stop from remote. Local emergency stop provided
(xxviii)	Trip interlock	Shall be provided.
19.0	**Cartridge filters**	
i)	Quantity	2 Nos. (2W)
ii)	Capacity	99.5m3/hr each
iii)	MOC housing	SS316/ FRP
iv)	MOC elements	PP, 5 micron nominal (efficiency around 70%)
20.0	**RO HP pumps**	
A)	Quantity	3 Nos. (2W+1S)
B)	Description for each Pump	
(i)	Location	Indoor.
(ii)	Fluid to be handled	UF filtered water
(iii)	Service	To transfer UF filtered water to RO membrane
(iv)	Duty	Continuous and to be suitable for parallel operation.
(v)	Type of Pump	Horizontal/ vertical Centrifugal
(vi)	Type of Impeller	Closed
(vii)	Design standard	As per IS-5659 & IS-5120.
(viii)	Service temperature, in degree Celsius	60
(ix)	Rated Capacity, in m3/hr	Not less than 99.5m3/hr + 10% margin
(x)	Permissible tolerance in rated capacity, in %	As per IS-5659 & IS-5120.
(xi)	Range of operation	20 % - 120 %.
(xii)	Suction Condition	Flooded.
(xiii)	Head to be developed at rated capacity	15kg/cm2 min.
(xiv)	Shut Off Head	To be suitable for stable operation at rated duty point.
(xv)	Permissible tolerance in efficiency at rated capacity, in %	As per IS-5659 & IS-5120.
(xvi)	Material of construction	
	a) Casing	AISI-316.
	b) Impeller	AISI-316.
	c) Shaft	AISI-316.
	d) Mechanical Seal	AISI-316.
	e) Common Base plate	Fabricated Steel as per IS 2062.
	f) Nuts and bolts	AISI-316.
(xvii)	Type of drive	Electrical Motor
(xviii)	Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
(xix)	Rated speed (RPM)	2900 (Sync.) maximum.
(xx)	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase, 50 HZ (+5%)
(xxi)	Type of coupling between Pump & Motor	Flexible Spacer.
(xxii)	Noise level (for complete set of Pump	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
(xxiii)	Tests and Inspection	
	a) Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.
	b) Hydro-test	As per IS-5120.
	c) Dynamic Balancing Test	Shall be provided

(xxiv)	Performance Test	
	a) Test Code	Hydraulic Institute Standard.
	b) Tests to be done for determination of	Head-Capacity Curve, BHP-Capacity Curve and Efficiency- Capacity Curve and NPSH-Capacity Curve.
	c) Test to be carried out	On prototype model at rated speed.
	d) Test for satisfactory operation of pump at site	Required.
(xxv)	Instruments, alarm and Interlock	Shall be provided as per system requirements in line with attached P&ID.
(xxvi)	Suction Strainer along with flushing connection	Required. Material of construction of each strainer shall be SS316.
(xxvii)	Operation	Start/Stop from remote. Local emergency stop provided
(xxviii)	Trip interlock	Shall be provided.
(xxix)	Vibration limits	As per ISO10816-7 2009 (E) standard
21.0	**RO system**	
i)	No. of skids required	2 Nos. (2W)
ii)	Qty. of permeate output/ stream	74.5m3/hr
iii)	Skid frame	CS-epoxy painted
iv)	RO membrane elements	
v)	Size of element	8”dia.x 40”length
vi)	Area per element	400 sq.ft max.
vii)	Membrane type	Thin film composite polyamide
viii)	Preferred make	Hydranautics/ Toray/ Suez/ Dow/ equivalent
ix)	Recovery	75%
x)	Quality of permeate	≤200 ppm at end of 3rd year at 35 Deg.C
xi)	Permeate flux (max.)	≤20 lmh
xii)	Feed water temperature range	25 to 35 Deg. C.
xiii)	Flux Decline Coefficient / Year	5%
xiv)	Salt passage increase factor (SPIF)	10% per Year
xv)	Life of RO membranes	3 years (with prorate replacement warranty)
xvi)	RO pressure vessels	
xvii)	MOC	FRP
xviii)	Elements per pressure vessel	6
xix)	Pressure rating	300 psi
xx)	Test pressure	As per design code (ASME Sec-X)
xxi)	Feed and Brine port MOC	SS316L
22.0	**RO PERMEATE TANK**	
i)	Number	One (1)
ii)	Type	Above ground, rectangular
iii)	MOC	RCC
iv)	Minimum Effective capacity (Each Compartment), m3	Not less than 150 4
23.0	**RO PERMEATE PUMPS**	
A)	Quantity	2 Nos. (1W+1S)
B)	Description for each Pump	
(i)	Location	Indoor.
(ii)	Fluid to be handled	RO permeate water
(iii)	Service	To transfer RO permeate water to CW forebays of each Stage
(iv)	Duty	Continuous and to be suitable for parallel operation.
(v)	Type of Pump	Horizontal Centrifugal Non Clog type
(vi)	Type of Impeller	Closed
(vii)	Design standard	As per IS-5659 & IS-5120.
(viii)	Service temperature, in degree Celsius	60

(ix)	Rated Capacity, in m3/hr	Not less than 149m3/hr with 10% margin
(x)	Permissible tolerance in rated capacity, in %	As per IS-5659 & IS-5120.
(xi)	Range of operation	20 % - 120 %.
(xii)	Suction Condition	Flooded.
(xiii)	Head to be developed at rated capacity	4kg/cm2 min.
(xiv)	Shut Off Head	To be suitable for stable operation at rated duty point.
(xv)	Permissible tolerance in efficiency at rated capacity, in %	As per IS-5659 & IS-5120.
(xvi)	Material of construction	
	a) Casing	AISI-316.
	b) Impeller	AISI-316.
	c) Shaft	AISI-316.
	d) Mechanical Seal	AISI-316.
	e) Common Base plate	Fabricated Steel as per IS 2062.
	f) Nuts and bolts	AISI-316.
(xvii)	Type of drive	Electrical Motor
(xviii)	Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
(xix)	Rated speed (RPM)	1500 (Sync.) maximum.
(xx)	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase, 50 HZ (+5%)
(xxi)	Type of coupling between Pump & Motor	Flexible Spacer.
(xxii)	Noise level (for complete set of Pump	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
(xxiii)	Tests and Inspection	
	a) Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.
	b) Hydro-test	As per IS-5120.
	c) Dynamic Balancing Test	Shall be provided
(xxiv)	Performance Test	
	a) Test Code	Hydraulic Institute Standard.
	b) Tests to be done for determination of	Head-Capacity Curve, BHP-Capacity Curve and Efficiency- Capacity Curve and NPSH-Capacity Curve.
	c) Test to be carried out	On prototype model at rated speed.
	d) Test for satisfactory operation of pump at site	Required.
(xxv)	Instruments, alarm and Interlock	Shall be provided as per system requirements in line with attached P&ID.
(xxvi)	Suction Strainer along with flushing connection	Required. Material of construction of each strainer shall be SS316.
(xxvii)	Operation	Start/Stop from remote. Local emergency stop provided
(xxviii)	Trip interlock	Shall be provided.
24.0	**RO CIP TANK**	
i)	Quantity	1 Nos.
ii)	Type	Vertical Cylindrical with top cover hinged & dished bottom. The tank shall be fitted with vent, drain, overflow, etc.
iii)	Location	Outdoor
iv)	Useful capacity (for each tank)	10m3
v)	Pressure Rating	Atmospheric
vi)	Material of construction	FRP with suitable internal protection
vii)	Free board	300mm

viii)	Agitator with motor & reduction gears	As per chemical preparation requirement
ix)	Accessories for each tank	Manhole, handhold, approach ladder & charging platform etc
25.0	**RO CIP PUMPS**	
A)	Quantity	2 Nos. (1W+1S)
B)	Description for each Pump	
(i)	Location	Indoor.
(ii)	Fluid to be handled	RO permeate water
(iii)	Service	Chemical cleaning of RO system
(iv)	Duty	Continuous
(v)	Type of Pump	Horizontal Centrifugal Non Clog type
(vi)	Type of Impeller	Closed
(vii)	Design standard	As per IS-5659 & IS-5120.
(viii)	Service temperature, in degree Celsius	60
(ix)	Rated Capacity, in m3/hr	108m3/hr
(x)	Permissible tolerance in rated capacity, in %	As per IS-5659 & IS-5120.
(xi)	Range of operation	20 % - 120 %.
(xii)	Suction Condition	Flooded.
(xiii)	Head to be developed at rated capacity	5 kg/cm2
(xiv)	Shut Off Head	To be suitable for stable operation at rated duty point.
(xv)	Permissible tolerance in efficiency at rated capacity, in %	As per IS-5659 & IS-5120.
(xvi)	Material of construction	
	a) Casing	AISI-316.
	b) Impeller	AISI-316.
	c) Shaft	AISI-316.
	d) Mechanical Seal	AISI-316.
	e) Common Base plate	Fabricated Steel as per IS 2062.
	f) Nuts and bolts	AISI-316.
(xvii)	Type of drive	Electrical Motor
(xviii)	Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
(xix)	Rated speed (RPM)	1500 (Sync.) maximum.
(xx)	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase, 50 HZ (+5%)
(xxi)	Type of coupling between Pump & Motor	Flexible Spacer.
(xxii)	Noise level (for complete set of Pump	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
(xxiii)	Tests and Inspection	
	a) Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.
	b) Hydro-test	As per IS-5120.
	c) Dynamic Balancing Test	Shall be provided
(xxiv)	Performance Test	
	a) Test Code	Hydraulic Institute Standard.
	b) Tests to be done for determination of	Head-Capacity Curve, BHP-Capacity Curve and Efficiency- Capacity Curve and NPSH-Capacity Curve.
	c) Test to be carried out	On prototype model at rated speed.
	d) Test for satisfactory operation of pump at site	Required.
(xxv)	Instruments, alarm and Interlock	Shall be provided as per system requirements in line with attached P&ID.

(xxvi)	Suction Strainer along with flushing connection	Required. Material of construction of each strainer shall be SS316.
(xxvii)	Operation	Start/Stop from remote. Local emergency stop provided
(xxviii)	Trip interlock	Shall be provided.
26.0	**RO CIP Cartridge filters**	
i)	Quantity	1 Nos. (1W)
ii)	Capacity	108m3/hr each
iii)	MOC housing	SS316/ FRP
iv)	MOC elements	PP, 5micron nominal
27.0	**UF BACKWASH WASTE WATER PIT** 4	
i)	Number	One (1)
ii)	Type	below ground, rectangular
iii)	MOC	RCC
iv)	Minimum Effective capacity m3	Not less than 100m3
28.0	**UF BACKWASH WASTE DISPOSAL PUMPS** 4	
A)	Quantity	2 Nos. (1W+1S)
B)	Description for each Pump	
(i)	Location	Outdoor.
(ii)	Fluid to be handled	UF Backwash waste
(iii)	Service	Backwash waste, plant drains to CMB
(iv)	Duty	Continuous
(v)	Type of Pump	Vertical Centrifugal Non Clog type
(vi)	Type of Impeller	Closed
(vii)	Design standard	As per IS-5659 & IS-5120.
(viii)	Service temperature, in degree Celsius	60
(ix)	Rated Capacity, in m3/hr	100m3/hr
(x)	Permissible tolerance in rated capacity, in %	As per IS-5659 & IS-5120.
(xi)	Range of operation	20 % - 120 %.
(xii)	Suction Condition	Flooded.
(xiii)	Head to be developed at rated capacity	5 kg/cm2
(xiv)	Shut Off Head	To be suitable for stable operation at rated duty point.
(xv)	Permissible tolerance in efficiency at rated capacity, in %	As per IS-5659 & IS-5120.
(xvi)	Material of construction	
	a) Casing	AISI-316.
	b) Impeller	AISI-316.
	c) Shaft	AISI-316.
	d) Mechanical Seal	AISI-316.
	e) Common Base plate	Fabricated Steel as per IS 2062.
	f) Nuts and bolts	AISI-316.
(xvii)	Type of drive	Electrical Motor
(xviii)	Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
(xix)	Rated speed (RPM)	1500 (Sync.) maximum.
(xx)	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase, 50 HZ (+5%)
(xxi)	Type of coupling between Pump & Motor	Flexible Spacer.
(xxii)	Noise level (for complete set of Pump	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
(xxiii)	Tests and Inspection	
	a) Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.

	b) Hydro-test	As per IS-5120.
	c) Dynamic Balancing Test	Shall be provided
(xxiv)	Performance Test	
	a) Test Code	Hydraulic Institute Standard.
	b) Tests to be done for determination of	Head-Capacity Curve, BHP-Capacity Curve and Efficiency- Capacity Curve and NPSH-Capacity Curve.
	c) Test to be carried out	On prototype model at rated speed.
	d) Test for satisfactory operation of pump at site	Required.
(xxv)	Instruments, alarm and Interlock	Shall be provided as per system requirements in line with attached P&ID.
(xxvi)	Suction Strainer along with flushing connection	Required. Material of construction of each strainer shall be SS316.
(xxvii)	Operation	Start/Stop from remote. Local emergency stop provided
(xxviii)	Trip interlock	Shall be provided.
29.0	**RO DOSING SYSTEMS**	
29.1	**ACID DOSING SYSTEM**	
29.1.1	**DOSING TANK**	
i)	Quantity	1 per dosing system
ii)	Type	Vertical Cylindrical with top cover hinged & dished bottom. The tank shall be fitted with vent, drain, fume absorber, overflow seal pots etc.
iii)	Location	Indoor
iv)	Useful capacity (for each tank)	Capacity for 1 day storage of HCl for 10ppm dosing of HCl (30%) for 2 streams of RO system
v)	Pressure Rating	Atmospheric
vi)	Material of construction	FRP with suitable internal protection
vii)	Free board	300mm
viii)	Dissolving basket	As per chemical preparation requirement
ix)	Agitator with motor & reduction gears	As per chemical preparation requirement
x)	Accessories for each tank	Handhole, approach ladder & charging platform etc
29.1.2	**DOSING PUMPS**	
i)	Quantity	3 (2W+1S) (1 dosing pump per stream)
ii)	Type	Simplex positive displacement hydraulically operated diaphragm type
iii)	Suction strainers	Required
iv)	Pressure dampener	Required
v)	External safety relief valve (in addition to inbuilt safety valve)	PVC
vi)	Maximum pump stroke per minute	100 - 200
vii)	Motor rating	Minimum 15 % margin over BKW at rated duty point
viii)	Material of construction	
ix)	Liquid end (pump, head, valves, valve housing, valve spring, etc)	PP, for all wetted parts
x)	Diaphragm	PTFE
xi)	Packing	PTFE
xii)	Frame	MS fabricated, epoxy painted
29.2	**ANTISCALANT DOSING SYSTEM**	
29.2.1	**DOSING TANK**	
i)	Quantity	1 per dosing system

ii)	Type	Vertical Cylindrical with top cover hinged & dished bottom. The tank shall be fitted with vent, drain, fume absorber, overflow seal pots etc.
iii)	Location	Indoor
iv)	Useful capacity (for each tank)	Capacity for 1 day storage of Antiscalant for 3ppm dosing for 2 streams of RO system
v)	Pressure Rating	Atmospheric
vi)	Material of construction	FRP with suitable internal protection
vii)	Free board	300mm
viii)	Dissolving basket	As per chemical preparation requirement
ix)	Agitator with motor & reduction gears	As per chemical preparation requirement
x)	Accessories for each tank	Handhole, approach ladder & charging platform etc
29.2.2	**DOSING PUMPS**	
i)	Quantity	3 (2W+1S) (1 dosing pump per stream)
ii)	Type	Simplex positive displacement hydraulically operated diaphragm type
iii)	Suction strainers	Required
iv)	Pressure dampener	Required
v)	External safety relief valve (in addition to inbuilt safety valve)	PVC
vi)	Maximum pump stroke per minute	100 - 200
vii)	Motor rating	Minimum 15 % margin over BKW at rated duty point
viii)	Material of construction	
ix)	Liquid end (pump, head, valves, valve housing, valve spring, etc)	PP, for all wetted parts
x)	Diaphragm	PTFE
xi)	Packing	PTFE
xii)	Frame	MS fabricated, epoxy painted
29.3	**SBS DOSING SYSTEM**	
29.3.1	**DOSING TANK**	
i)	Quantity	1 per dosing system
ii)	Type	Vertical Cylindrical with top cover hinged & dished bottom. The tank shall be fitted with vent, drain, fume absorber, overflow seal pots etc.
iii)	Location	Indoor
iv)	Useful capacity (for each tank)	Capacity for 1 day storage of Sodium bisulphite (SBS) for 3ppm dosing for 2 streams of RO system
v)	Pressure Rating	Atmospheric
vi)	Material of construction	FRP with suitable internal protection
vii)	Free board	300mm
viii)	Dissolving basket	As per chemical preparation requirement
ix)	Agitator with motor & reduction gears	As per chemical preparation requirement
x)	Accessories for each tank	Handhole, approach ladder & charging platform etc
29.3.2	**DOSING PUMPS**	
i)	Quantity	3 (2W+1S) (1 dosing pump per stream)
ii)	Type	Simplex positive displacement hydraulically operated diaphragm type
iii)	Suction strainers	Required
iv)	Pressure dampener	Required
v)	External safety relief valve (in addition to inbuilt safety valve)	PVC

vi)	Maximum pump stroke per minute	100 - 200
vii)	Motor rating	Minimum 15 % margin over BKW at rated duty point
viii)	Material of construction	
ix)	Liquid end (pump, head, valves, valve housing, valve spring, etc)	PP, for all wetted parts
x)	Diaphragm	PTFE
xi)	Packing	PTFE
xii)	Frame	MS fabricated, epoxy painted

30.0	**LIME SOLUTION SLAKING TANKS**	
A)	Numbers	One (1)
B)	Description for each Tank	
i)	Type	Vertical rectangular with Semicircular bottom.
ii)	Type of fluid to be handled	10 % w/w Lime Solution.
iii)	Effective capacity of each tank, m3/hr	Not less 120% of the quantity required for Clarifiers (design dosage rate not less than 20 mg/l)
iv)	Free Board, mm	300
v)	Design Pressure, Kg/sq. cm (g)	Atmospheric.
vi)	Design Temperature in degree Celsius	60
vii)	Design Code	As per supplier standard practice to meet system requirements
viii)	Code for Test and Inspection	As per supplier standard practice to meet system requirements
ix)	Material of Construction ⚠4	MS-epoxy or equivalent compatible with Lime
x)	Type of Protection	
	a) Internal	Epoxy painted as per painting sub section
	b) External	As per painting specification
	c) Agitator along with drive motor and all other accessories	
	• Number	One (1) per Tank
	• Material of Construction	MS with Epoxy painted/ equivalent compatible with lime
	c) Dissolving Basket	
	• Number	One (1) per Tank
	• Material of Construction	Dissolving Basket shall be of SS-316 construction with 10 mm dia. Holes with 50 mm triangular pitch.
xi)	Accessories	Shall be provided as per system requirements in line with attached P&ID.
xii)	Instruments	Shall be provided as per system requirements in line with attached P&ID.
31.0	**SLAKED LIME TRANSFER PUMPS**	
A)	Numbers	Two (2) (1W+1S)
B)	Description for each Pump	
i)	Location	Indoor
ii)	Fluid to be handled	10 % w/w Lime Solution.
iii)	Duty	Continuous and suitable for parallel operation
iv)	Type of Pump	Screw type
v)	Drive	Electric motor
vi)	Suction condition	Flooded
C)	Design data	
i)	Rated capacity of each pump	Shall be supplied to meet the requirement in order to produce clarified water at the rate of capacity 220.25m3/hr (with due consideration of water loss through clarifiers for disposal of sludge).

ii)	Total developed head at rated capacity, MLC	Shall be specified During detailed engineering to meet the system requirements
iii)	Pumping temperature	10 degree C/ 60 degree C (max)
iv)	Speed	1500 maximum
v)	No of stages	One (1) max.
D)	Constructional feature	
i)	Pump type	Single screw / Twin screw
ii)	Bearing lubrication	Grease / oil
iii)	Seal	Mechanical
iv)	Drive transmission	Direct
v)	Mounting	Common base plate
vi)	Flange drilling	ANSI B 16.5 Class 150
vii)	Nozzle orientation	
	1. Suction	End / Side
	2. Discharge	Top / Side
viii)	Gear box for speed reduction provided	Yes
ix)	Relief valve	Provided
E)	Material of construction	
i)	Casing	2% Ni CI to IS 210 FG 260
ii)	Rotor / gear	SS 316
iii)	Stator	Nitrile / EPDM
iv)	Shaft and shaft sleeve	ASTM A 276 Gr 410 & SS 316
F)	Accessories	
i)	Coupling with coupling guard, base plate, foundation bolts, counter flanges	Provided
ii)	Sealing and flushing connections for mechanical seal testing and inspection	Provided
iii)	Instruments along with alarms, interlocks and accessories	Shall be provided as per P&ID enclosed.
32.0	**LIME SOLUTION PREPARATION CUM DOSING TANKS**	
A)	Numbers	One (1)
B)	Description for each Tank	
i)	Type	Vertical rectangular with flat bottom.
ii)	Type of fluid to be handled	6 % w/w Lime Solution.
iii)	Effective capacity of each tank, m3	Not less 120% of the quantity required for each Clarifier at rated design output capacity (design dosage rate not less than 20 mg/l)
iv)	Material of Construction 4	MS-epoxy or equivalent compatible with Lime
v)	Type of Protection	
	a. Internal	Epoxy painted as per painting sub section.
	b) External	As per painting specification.
	c) Agitator along with drive motor and all other accessories	
	• Number	One (1) per Tank
	• Material of Construction 4	MS-epoxy or equivalent compatible with Lime
	d) Dissolving Basket	
	• Number	One (1) per Tank
	• Material of Construction	Dissolving Basket shall be of SS-316 construction with 10 mm dia. Holes with 50 mm triangular pitch.
vi)	Accessories	Shall be provided as per system requirements in line with attached P&ID.
vii)	Instruments	Shall be provided as per system requirements in line with attached P&ID.
33.0	**LIME DOSING PUMPS**	

A)	Numbers	2 Nos. (1W + 1S)
B)	Description for each Pump	
i)	Location	Indoor
ii)	Fluid to be handled	6 % w/w Lime Solution.
iii)	Duty	Continuous
iv)	Type of Pump	Screw type
v)	Drive	Electric motor
vi)	Suction condition	Flooded
C)	Design data	
i)	Rated capacity of each pump	Each dosing pump is provided to meet the requirement in order to produce clarified water at the rate of 220.25 m^3/hr/ clarifier water (with due consideration of water loss through clarifiers for disposal of sludge).
ii)	Total developed head at rated capacity, MLC	Shall be specified During detailed engineering to meet the system requirements
iii)	Pumping temperature	10 degree C/ 60 degree C (max)
iv)	Speed	1500 maximum
v)	No of stages	One (1) max.
D)	Constructional feature	
i)	Pump type	Single screw / Twin screw
ii)	Bearing lubrication	Grease / oil
iii)	Seal	Mechanical
iv)	Drive transmission	Direct
v)	Mounting	Common base plate
vi)	Flange drilling	ANSI B 16.5 Class 150
vii)	Nozzle orientation	
	1. Suction	End / Side
	2. Discharge	Top / Side
viii)	Gear box for speed reduction provided	Yes
ix)	Relief valve	Provided
E)	Material of construction	
i)	Casing	2% Ni CI to IS 210 FG 260
ii)	Rotor / gear	SS 316
iii)	Stator	Nitrile / EPDM
iv)	Shaft and shaft sleeve	ASTM A 276 Gr 410 & SS 316
F)	Accessories	
i)	Coupling with coupling guard, base plate, foundation bolts, counter flanges	Provided
ii)	Sealing and flushing connections for mechanical seal testing and inspection	Provided
iii)	Instruments along with alarms, interlocks and accessories	Shall be provided as per P&ID enclosed.
34.0	**FeCl3 PREPARATION CUM DOSING TANK** 4	
A)	Quantity	One (1)
B)	Description for each Tank	
i)	Type	Vertical rectangular with flat bottom.
ii)	Type of fluid to be handled	Ferric chloride (FeCl3) solution at concentration suitable for effective dosing
iii)	Effective capacity of each tank, m3	Not less 120% of the quantity required for each Clarifier at rated design output capacity (design dosage rate not less than 10mg/l) for 24 hours of continuous full load operation.
iv)	Material of Construction	MS-epoxy or equivalent compatible with FeCl3
v)	Type of Protection	

	a. Internal	Suitable coating
	b) External	As per painting specification.
	c) Agitator along with drive motor and all other accessories	
	• Number	One (1) per Tank
	• Material of Construction	SS316/ MS-FRP lined
vi)	Dissolving basket	1 no. per tank, MOC:SS316
vii)	Accessories	Shall be provided as per system requirements in line with attached P&ID.
viii)	Instruments	Shall be provided as per system requirements in line with attached P&ID.
35.0	**FeCl3 INJECTION PUMPS** 4	
A)	Numbers	2 Nos. (1W + 1S)
B)	Description (applicable for each Pump)	
i)	Type	Simplex positive displacement hydraulically operated diaphragm type
ii)	Location	Indoor.
iii)	Fluid to be handled	37 % Ferric chloride solution/ concentration suitable for effective dosing
iv)	Service	To dose FeCl3 solution to the Clarifier.
v)	Duty	Continuous and suitable for parallel operation
vi)	Suction Condition	Flooded
vii)	Rated Capacity, m^3/hr	Each dosing pump is provided to meet the requirement in order to produce clarified water at the rate of 220.25 m^3/hr/ clarifier water (with due consideration of water loss through clarifiers for disposal of sludge).
viii)	Tentative head to be developed at rated capacity, MLC	Shall be specified during detailed engineering stage to meet the system requirements
ix)	Design Standard	As per supplier standard practice to meet system requirements
x)	Design Temperature in degree Celsius	60
xi)	Range of Operation (%)	0 – 100
xii)	Rated Speed	1500 maximum
xiii)	Material of construction	
	a) All wetted parts	SS 316/ suitable for handling FeCl3
	b) Diaphragm	PTFE
xiv)	Type of drive	Electrical Motor
xv)	Criteria for selection of drive motor	Minimum 15 % margin over BKW at rated duty point shall be taken and standard motor with next higher KW as available shall be selected. This shall in no way be less than the maximum power required by the Pump.
xvi)	Rated speed (RPM)	1500 (Sync.) maximum.
xvii)	Voltage, Phase & Frequency (± % Variation)	415 V (+10%), 3 Phase, 50 HZ (+5%).
xviii)	Type of coupling between Pump & Motor	Flexible Spacer.
xix)	Noise level (for complete set of Pump & Motor)	Not more than 85 db (At a distance of 1.0 m from the outer surface of Motor).
xx)	Painting for complete set of Pump & Motor	
	a) Primer	Shall be provided
	b) Finish paint	Shall be provided
xxi)	Tests and Inspection	

	• Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.
	• Hydro-test	As per applicable code.
	• Dynamic Balancing Test	Shall be provided
	• Performance Test	Shall be provided
xxii)	Instruments along with alarms, interlocks and accessories	Shall be provided as per the system requirements and P&ID enclosed.
xxiii)	Trip interlock	Shall be provided.
xxiv)	Accessories	
	a) Pulsation Dampener	Shall be provided.
	b) Pressure Relief Valve	Shall be provided.
36.0	**POLYELECTROLYTE PREPARATION CUM DOSING TANK**	
A)	Quantity	One (1)
B)	Description for each Tank	
i)	Type	Vertical rectangular with flat bottom.
ii)	Type of fluid to be handled	Polyelectrolyte solution
iii)	Effective capacity of each tank, m3	Not less 120% of the quantity required for each Clarifier at rated design output capacity (design dosage rate not less than 1mg/l) for 24 hours of continuous full load operation.
iv)	Material of Construction 4	MS-epoxy or equivalent compatible with Polyelectrolyte
v)	Type of Protection	
	a. Internal	Suitable coating
	b) External	As per painting specification
	c) Agitator along with drive motor and all other accessories	
	• Number	One (1) per Tank
	• Material of Construction	SS316
vi)	Dissolving basket	1 no. per tank, MOC:SS316
vii)	Accessories	Shall be provided as per system requirements in line with attached P&ID.
viii)	Instruments	Shall be provided as per system requirements in line with attached P&ID.
37.0	**POLYELECTROLYTE INJECTION PUMPS**	
A)	Numbers	2 Nos. (1W + 1S)
B)	Description for each Pump	
i)	Location	Indoor
ii)	Fluid to be handled 4	0.5 % Polyelectrolyte Solution.
iii)	Duty	Continuous
iv)	Type of Pump 4	Screw type
v)	Drive	Electric motor
vi)	Suction condition	Flooded
C)	Design data	
i)	Rated capacity of each pump	Each dosing pump is provided to meet the requirement in order to produce clarified water at the rate of 220.25 m^3/hr/ clarifier water (with due consideration of water loss through clarifiers for disposal of sludge).
ii)	Total developed head at rated capacity, MLC	Shall be specified During detailed engineering to meet the system requirements
iii)	Pumping temperature	10 degree C/ 60 degree C (max)
iv)	Speed	1500 maximum
v)	No of stages	One (1) max.
D)	Constructional feature	

i)	Pump type	Single screw / Twin screw
ii)	Bearing lubrication	Grease / oil
iii)	Seal	Mechanical
iv)	Drive transmission	Direct
v)	Mounting	Common base plate
vi)	Flange drilling	ANSI B 16.5 Class 150
vii)	Nozzle orientation	
	1. Suction	End / Side
	2. Discharge	Top / Side
viii)	Gear box for speed reduction provided	Yes
ix)	Relief valve	Provided
E)	Material of construction	
i)	Casing	2% Ni CI to IS 210 FG 260
ii)	Rotor / gear	SS 316
iii)	Stator	Nitrile / EPDM
iv)	Shaft and shaft sleeve	ASTM A 276 Gr 410 & SS 316
F)	Accessories	
i)	Coupling with coupling guard, base plate, foundation bolts, counter flanges	Provided
ii)	Sealing and flushing connections for mechanical seal testing and inspection	Provided
iii)	Instruments along with alarms, interlocks and accessories	Shall be provided as per P&ID enclosed.
38.0	**DEWATERING POLYELECTROLYTE PREPARATION CUM DOSING TANK**	
A)	Quantity	One (1)
B)	Description for each Tank	
i)	Type	Vertical rectangular with flat bottom.
ii)	Type of fluid to be handled	Polyelectrolyte solution
iii)	Effective capacity of each tank, m3	Not less 120% of the quantity required for each Clarifier at rated design output capacity (design dosage rate not less than 1mg/l) for 24 hours of continuous full load operation.
iv)	Material of Construction 4	MS-epoxy or equivalent suitable for Polyelectrolyte handling
v)	Type of Protection	
	a. Internal	Suitable coating
	b) External	Not applicable.
	c) Agitator along with drive motor and all other accessories	
	• Number	One (1) per Tank
	• Material of Construction	SS316
vi)	Accessories	Shall be provided as per system requirements in line with attached P&ID.
vii)	Instruments	Shall be provided as per system requirements in line with attached P&ID.
39.0	**DEWATERING POLYELECTROLYTE DOSING PUMP**	**To Centrifuge**
A)	Numbers	2 Nos. (1W + 1S)
B)	Description for each Pump	
i)	Location	Indoor
ii)	Fluid to be handled 4	0.5 % Polyelectrolyte Solution.
iii)	Duty	Continuous
iv)	Type of Pump	Screw type
v)	Drive	Electric motor

vi)	Suction condition	Flooded
C)	Design data	
i)	Rated capacity of each pump	Suitable to meet 100% of system requirements
ii)	Total developed head at rated capacity, MLC	Shall be specified During detailed engineering to meet the system requirements
iii)	Pumping temperature	10 degree C/ 60 degree C (max)
iv)	Speed	1500 maximum
v)	No of stages	One (1) max.
D)	Constructional feature	
i)	Pump type	Single screw / Twin screw
ii)	Bearing lubrication	Grease / oil
iii)	Seal	Mechanical
iv)	Drive transmission	Direct
v)	Mounting	Common base plate
vi)	Flange drilling	ANSI B 16.5 Class 150
vii)	Nozzle orientation	
	1. Suction	End / Side
	2. Discharge	Top / Side
viii)	Gear box for speed reduction provided	Yes
ix)	Relief valve	Provided
E)	Material of construction	
i)	Casing	2% Ni CI to IS 210 FG 260
ii)	Rotor / gear	SS 316
iii)	Stator	Nitrile / EPDM
iv)	Shaft and shaft sleeve	ASTM A 276 Gr 410 & SS 316
F)	Accessories	
i)	Coupling with coupling guard, base plate, foundation bolts, counter flanges	Provided
ii)	Sealing and flushing connections for mechanical seal testing and inspection	Provided
iii)	Instruments along with alarms, interlocks and accessories	Shall be provided as per P&ID enclosed.

DATASHEET OF PIPING, ISOLATION GATES & VALVES FOR EFFLUENT TREATMENT PLANT

1.0	**PIPING**	
SL NO.	**SERVICE**	**MATERIAL**
1.1	Raw water piping, Clarified Water piping, and service water piping.	Carbon Steel IS-1239 Heavy Grade upto 150 mm NB and IS-3589 for sizes above 150 mm with minimum pipe thickness as indicated in the P&ID.
1.2	Crude Oily Wastewater piping	Seamless Carbon Steel
1.3	Sludge handling piping.	• Cast Iron (underground) • Carbon Steel (overground)
1.4	Neutralized Wastewater piping	Carbon Steel (inside rubber lined)
1.5	Potable Water piping.	Carbon Steel IS-1239 Heavy Grade upto 150 mm NB and IS-3589 for sizes above 150 mm with minimum pipe thickness as indicated in the P&ID. The pipes shall be galvanized as per IS-4736.

1.6	Service and Instrument Air Piping less than and equal to 50 mm NB.	Stainless Steel as per ASTM A- 312 Gr. 304. Size- as per schedule 40 ANSI B36.10
1.7	Service and Instrument air piping for sizes equal to greater than 65 mm NB.	Stainless steel as per ASTM A-312 Gr. 304. Size-upto 150 mm NB as per schedule 10S, ANSI B-36.10.
1.8	Piping handling Alum, Lime, poly electrolyte.	CPVC (SCHD. 80)/ Carbon Steel Rubber lined to IS-1239 Heavy Grade upto 150 mm NB and IS-3589 for sizes above 150 mm with minimum pipe thickness of 6 mm. Rubber lining thickness shall be - 4.5 mm in three (3) layers) of shore hardness 60^{o} – 70^{o} A.
1.9	Sampling Pipe	Stainless Steel to ASTM Schedule-10.
2.0	**VALVES**	
2.1	**CAST IRON BODY BUTTERFLY VALVES :** i. Service: For raw water, waste water, clarified water, and filtered water. ii. Basic Design Code: All the Butterfly valves shall be of double flanged type of low leakage rate confirming to AWWA-C-504 class 150 (min.). **iii. Material of construction** • Body: 2% Ni Cast Iron as per IS-210 Gr. FG260 with 2% Ni. • Valve Disc: 2% Ni Cast Iron as per IS-210 Gr. FG260 with 2% Ni. • Shaft: Stainless Steel ASTM-A-296 type 316. • Seat ring: Nitrile rubber, EPDM (Ethylene propylene rubber),Hypalon • Shaft Bearing: Ferrobestos LA-33. • Gland Packing: Impregnated Teflon • Seal: Nitrile Rubber iv. Construction: Cast Body and Disc v. Pressure: To be suitably chosen according to requirement, but not less than class 75A as per AWWA-C-504. vi. All the butterfly valves shall be provided with Hand wheel or lever as per the requirements. vii. End preparation: Flanged, Drilled as per ANSI B16.5. Necessary counter flange nuts, bolts, gaskets are to be provided with each valve. viii. Testing: As per AWWA-C-504. However valve disc strength for both forward reverse flow is to be carried out as per BS5155. ix. All the butterfly valves shall be provided with an indicator to show the position of the disc.	
2.2	**CAST IRON BODY GATE/GLOBE/CHECK VALVE** i. Service: For Service Water, Clarified Water, Potable Water. ii. Basic Design Code • Gate valve - IS 14846 for 50 mm - 1200 mm NB • Gate valve- API 602 for below 50 mm. • Globe valve - MSS - SP – 85 • Check valve - IS-5312/MSS - SP -71 • Ball - BS-5351 iii. Pressure Class - To be suitably chosen considering the pressure requirement. iv. Construction: Cast body and bonnet / cover **v. Material of Construction** • Body & Bonnet/ cover: IS 210 Gr. FG 260 • Trim / Disc.: IS-210 Gr. FG 260 • Seating surface: 13% Cr steel as per IS 1570 • Stem: Stainless steel AISI 410/ 13% chrome steel. • End Preparation: Socket welded for size equal to and below 50mm NB and flanged with counter flanges for 65mm NB and above. vi. Testing • Gate: As per IS - 780 for 50 mm - 300 mm NB	

	• Gate:IS-2906 for sizes equal to and above 350 mm NB • Globe: Hydrostatic Test as per MSS-SP-85 Check: S-5312/MSS-SP-71
2.3	**STAINLESS STEEL BODY/ GATE/GLOBE /CHECK/BALL VALVE** i. Service: Potable Water, Service and Instrument Air. ii. Sizes: • Potable Water - For sizes less than and equal to 50 mm NB. • Service and Instrument Air- For all sizes. Ball valves shall be used in air line. iii. Basic Design Code • Gate valve - ANSI-B-16.34 • Globe valve - ANSI-B-16.34 • Check valve - ANSI-B-16.34 • Ball - BS-5351 iv. Pressure Class - To be suitably chosen considering the pressure requirement as indicated below: Unless otherwise specified, all pipe work shall be suitable for a minimum pressure of 10.0 kg/sq. cm(g) at 80 deg. C or as required by the design of the different piping system, if higher. v. Construction: Forged body up to 50mm NB and Cast body above that **vi. Material of Construction** • Body & Bonnet/ cover: ASTM-A-182 F304 for Ball Valves: • Body & Bonnet/ cover: A351 CF8M for cast body, A 182 F304 for forged body, • Trim / Disc/Ball.: ASTM-A-182 F304 for Gate, Globe, Check valves and Stainless steel ASME-SA 479 Grade 316 for Ball valves. • Seating surface: 13% Cr steel as per IS 1570. For Ball valves PTFE seats and seals. • End Preparation: Socket welded for size equal to and below 50mm NB and flanged with counter flanges for 65mm NB and above. vii. Testing : As per ANSI B-16.34
2.4	**STEEL BODY GATE/ GLOBE/CHECK VALVE/ BALL VALVE** i. Service: Clarified water i. Sizes: For sizes less than and equal to 50 mm NB ii. Basic Design Code • Gate valve - API 600 for 50mm NB. API 602 for size less than 50 mm NB. • Globe valve - BS-1873/ANSI-B-16.34 • Check valve - BS-1868/ANSI B16.34 • Ball - BS-5351 iii. Pressure Class - To be suitably chosen considering the pressure requirement as indicated below: Unless otherwise specified, all pipe work shall be suitable for a minimum pressure of 10.0 kg/sq. cm(g) at 80 deg. C or as required by the design of the different piping system, if higher. iv. Construction: Forged body **v. Material of Construction** • Body & Bonnet/ cover: ASTM-A-216 Gr. WCB for cast body & ASTM-A-105 for forged body. • Trim / Disc.: 13% Cr Steel as per ASTM-A- 182 Gr. F6 heat treated and hardened(min 250 NB) for cast body and ASTM-A-105 Hard faced with Stellite (min 350 HB) for forged body • Seating surface: 13% Cr. Steel as per ASTM-A- 182 Gr. F6 • End Preparation: Socket welded for size equal to and below 50mm NB and flanged with counter flanges for 65mm NB and above. vi. Testing : As per ANSI B-16.34 • Gate: As per API-598 • Globe: BS-1873 • Check: BS-1868

2.5	**DIAPHRAGM VALVE** i. Service: For alum and poly electrolyte chemical. ii. The Diaphragm shall conform to following requirement • Design standard: BS: 5156 or equivalent of required rating/class. (Minimum rating of valves shall be PN 10). • Type: Flanged and lined body ends, sealed bonnet, weir pattern, tight shut off type • **Material of Construction** • Body , Bonnet: Cast iron IS 210 Gr. FG 260 or equivalent or Cast steel ASTM A-216 Gr. WCB • Handwheel : Cast Iron • Compressor : Stainless Steel • Stem and Bush: Stainless Steel.	
2.6	**DIAPHRAGM VALVE** i. Service: Acid and alkali chemical. These valves shall conform to above (sl number 2.5) except that the diaphragm shall be of reinforced Teflon, EPDM/Black Butyl/ approved equivalent for acid services and reinforced neoprene/Hypalon/approved equivalent for alkali services and body and bonnet shall be of SS316.	
2.7	**ISOLATION GATES**	i. Design standard for each gate shall be IS:3042 or Eqv. ii. The gates shall be rectangular or square sluice, rising spindle type conforming to class-1 of IS:3042. iii. Material of Construction of each gate: • Frame and Door: Cast Iron IS:210 Gr. 20 • Spindles, bolts & nuts : M.S. to IS:2062 • Face & seat rings: Gun metal (as per IS:3042). • All the parts of each gates shall be applied with the coats of heavy duty bitumastic paint. • Each of the gates shall be provided with hand wheel, and a position indicator. • Each gate shall be FRP coated on both sides.

DATASHEET FOR PIPING IN ETP REUSE AREA

Sl. No.	Service	Sizes	Pipes	Fittings
1	NaOCl/Citric acid/ Antiscalant/ HCL/ other chemicals	All sizes	CPVC sch.80 of ASTM	CPVC sch.80 of ASTM
2	All Instrument/Plant air	All sizes	Galvanized as per IS 1239, heavy grade	Screwed fittings of galvanized as per IS 1239, heavy grade
3	High pressure discharge piping	All sizes	SS316 Sch 40	SS316 Sch 40
4	RO permeate	Upto DN150 >DN150	UPVC PN10 GRP PN10	UPVC PN10 GRP PN10
5	RO Reject high pressure piping	All sizes	SS316 Sch.40	SS316 Sch 40
6	RO Reject- Low pressure piping	All sizes	UPVC, PN 10	UPVC, PN 10

Sl. No.	Service	Sizes	Pipes	Fittings
7	Cleaning solution line	Upto DN150 >DN150	UPVC PN10 GRP PN10	UPVC PN10 GRP PN10
8	LP Valves	All	CI Body with Nylon coated	
9	Velocity		Pump suction: ≤1.4 m/s Pump discharge (Low pressure piping): ≤2.5 m/s HP Piping (RO Feed / Brine): ≤3.5 m/s	

Annexure-1

PUMPS AND PIPE SELECTION CRITERIA.

Pump and Pipeline carrying water and chemicals etc. shall generally be sized on the following velocities. However wherever minimum pipe sizes are defined in the drawing/datasheets, the selected size shall not be less than the specified size.

	VELOCITY IN m/sec.		
	BELOW 50 MM.	**50-150 MM**	**200 MM AND ABOVE**
Pump Suction for water	------	1.2-1.5	1.2-1.8
Pump discharge for water	1.2-1.8	1.8-2.4	2.1-2.5
Header for water	-------	1.5-2.4	1.8-2.4
Pump Suction for chemical solution	1.0-1.2	1.1-1.3	-------
Pump discharge for chemical solution	1.2-1.4	1.3-1.5	--------
Gravity flows	1.0 (maximum).		

Note 1- All piping system shall be capable of withstanding the maximum pressure in the corresponding line.

Note 2- TDH of all pumps shall be decided by the supplier assuming the following 'C values in Hazen & Williams equation for calculation of friction loss.

a) **Carbon steel pipes – 100**
b) **C. I pipes –100**
c) **Rubber lined steel pipe – 120**
d) **PVC/HDPE pipes – 140**

10% margin shall be taken over the pipe friction losses for calculating the pump head.

Specification for ESP/ APH wash water transfer pumps

1. ESP/ APH wash water will be terminated in ESP wash water pits (3nos.).
2. Each pit shall house 2nos. (1W+1S) ESP/APH wash water transfer pumps of capacity 420m3/hr.
3. ESP wash water shall be pumped and terminated in Ash slurry sumps 3Nos. as indicated in piping routing drawing & PID.
4. Details of pump MOC are provided below.

ANNEXURE-I

DATA SPECIFICATION SHEET

		Group-A	Group-B	Group-C	Group-D
1.	Pumps				
1.1	Rated Capacity (Cu.M/hr.)	<---------- Refer - II ---------->			
1.2	Total Head at rated Capacity (MLC)	<---------- DO ---------->			
1.3	Nos. Required	<---------- DO ---------->			
1.4	Duty	<---------- Intermittent ---------->			
1.5	Pump Design Standard	<---------- IS-5120/ IS:1710--------->			
1.6	Parallel operation required	Yes	No	No	Yes
1.7	Material of Construction				
	a) Base plate/Cover Plate	<---------- M.S. IS-2062 / Equivalent ---------->			
	b) Column Pipe	<---------- M.S. IS-2062 / Equivalent ---------->			
	c) Casing	<--------- 2% NiCI, IS-210, FG-260 (*)---------->			
	d) Impeller	<---------- 2% NiCI, IS-210, FG-260 (**)------->			
	e) Pump/Impeller Shaft	<---------- SS. AISI-316 ---------->			
	f) Shaft Sleeve	<---------- SS. AISI-316 (Hardened) ---------->			
	g) Shaft Coupling	<---------- SS. AISI-410 ---------->			
	h) Shaft Bearing	BUSH GM as per IS-306 Gr.1 / Equivalent			
	i) Gland	<----- C.I., IS-210, FG-260/Equivalent ---------->			
	j) Gland Packing	<------ Braided Graphite-free Teflon --> ***			
	k) Fasteners coming in contact with water	<---------- SS. AISI-304 ---------->			
	l) Fasteners not coming in contact with water	<---------- Carbon Steel ---------->			

Note : * Alloy CI (min 30 mm thick) BHN 350 min
** Ni-hard (min 25 mm thick) BHN 550 min.

		Group-A	Group-B	Group-C	Group-D
	*** S.S. Wire reinforced/impregnated graphite teflon.				
	m) Discharge pipe	MS IS-1239/Equivalent	--	--	MS IS-1239/ Equivalent
	n) Motor stool	<---------- Close Grained C.I.---------->			
1.8	Range of Operation	<---------- Refer -II ---------->			
1.9	Tests and Inspection	<-- As per Cl. No. 6.00.00 and lead specification -->			
1.10	Supply of Accessories & Services (Wherever Applicable) for each group and each rating of Pumps				
	a) Base plate	Yes			
	b) Sole Plate	Yes			
	c) Foundation bolts, nuts, sleeves etc.	Yes			
	d) Companion flanges with nuts, bolts & gaskets	Yes			
	e) Unions for external water for cooling/sealing/ lubrication	Yes, if required			
	f) Cooling/ sealing/lubrication system with all accessories, complete with pipes, valves and with instruments	Yes, if required			
	g) Discharge pressure gauge	Yes			
	h) Suction pressure gauge	Yes, for Group-B only			
	i) Pump-motor coupling and guard	Yes			
	j) Eye bolts, lifting tackle etc	Yes			
	k) Pre-lubrication tank and accessories	Yes, if required			
	l) Suction bell	Yes			

DRAWING NO. 1-WT-060-01597

ALL DIMENSIONS ARE IN MILLIMETRES

INSTRUMENTS

M	MOTOR OPERATED
DV	DRAIN VALVE
SP	SAMPLING POINT (LOCAL)
	DRAIN
AIT Turb	TURBIDITY ANALYZER
LG	LEVEL GAUGE
FIT	FLOW INDICATING TRANSMITTER
LIT	LEVEL TRANSMITTER
PG	PRESSURE GAUGE
FIT	PARSHALL FLUME FLOW TRANSMITTER
PT	PRESSURE TRANSMITTER
	CHEMICAL DIAPHRAGM SEAL
	TO PLC FOR MONITORING
PLC	TO PLC

VALVES

S	SOLENOID VALVE
	SLUICE/GATE VALVE
	NON RETURN VALVE
	DIAPHRAGM VALVE
	BALL VALVE
	GLOBE VALVE
	GAUGE COCK (2/3 WAY)
	3 WAY NEEDLE VALVE
	CHANNEL SHUTTER
	PRESSURE RELIEF VALVE
	BUTTERFLY VALVE (FLANGED)

EQUIPMENT

	SCREW PUMP
P	HYD. DIAPHRAGM METERING PUMP
R	MIXER WITH GEAR (HORIZONTAL)
	Y-STRAINER
PD	PULSATION DAMPENER
	EJECTOR
	SUBMERSIBLE PUMP
	DRIVE MOTOR
	BLOWER

O-LS	OPEN LIMIT SWITCH
C-LS	CLOSE LIMIT SWITCH
OC-LS	OPEN-CLOSE LIMIT SWITCH

KKS CODING SYSTEM

UNIT KEY
FUNCTION KEY
AREA KEY
xx xxx xx
xx xxx
EQUIPMENT / INSTRUMENT NO. KEY
EQUIPMENT / INSTRUMENT KEY

UNIT KEY

90 – COMMON

FUNCTION KEY

GTA – COMMON

EQUIPMENT/ INST. KEY

MECHANICAL :

AP – PUMPS
AN – BLOWERS
AA – VALVES
AT – FILTERING ELEMENT
AM – MIXERS
BB – VESSELS AND STORAGE TANKS

ELECT, C&I :

AE – MOTORS
CF – FLOW MEASUREMENT
CP – PRESSURE MEASUREMENT
CT – TEMPERATURE MEASUREMENT
CQ – ANALYTICAL MEASUREMENT
CL – LEVEL MEASUREMENT
DP – DIFF. PR. MEASUREMENT

EQUIPMENT/INST. NO. KEY

MECHANICAL :

001 TO 050 EQUIPMENTS
051 TO 099 MOTORISED VALVE
101 TO 150 PNEU. ACTUATED VALVES
201 TO 299 SOLENOID OPERATED VALVES
401 TO 499 NON RETURN VALVES
501 TO 599 MANUAL VALVES
701 TO 799 PR. RELIEF VALVES

ELECT, C&I :

001 TO 099 ANALOG INSTRUMENTS – REMOTE
101 TO 199 PROCESS SWITCHES
501 TO 599 PROCESS INDICATORS – LOCAL

REV	DATE	ALTERED:	CHECKED:	ZONE	
02	12.02.21	AJV	SS	4A	Revised for tender
01	12.02.21	AJV	SS	4A	Revised based on resolutions dt.23.01.21

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PROJECT: YADADRI THERMAL POWER STATION (5X800 MW)

OWNER: TELENGANA STATE POWER GENERATION CORPORATION LIMITED

OWNER'S CONSULTANT: TATA CONSULTING ENGINEERS LIMITED BANGALORE

EPC CONTRACTOR: BHARAT HEAVY ELECTRICALS LIMITED, NEW DELHI
UNIT : BOILER AUXILARIES PLANT ; RANIPET
PACKAGE : PT PLANT

TITLE: P&ID DIAGRAM FOR EFFLUENT TREATMENT PLANT.

	NAME	SIGN.	DATE
DRAWN	M.V	Sd/-	27.05.19
CHECKED	S.S	Sd/-	27.05.19
APPROVED	M.S.M	Sd/-	27.05.19

ALL DIMENSIONS ARE IN MILLIMETRES

BHEL DRAWING NO. 1-WT-060-01597 SH. 1 OF 1

REV 02

DEPT CODE: DPG 8778
GRADE OF UNTOL DIM: PR-QA-500
PROJECTION
SCALE: N.T.S

Size A1

DRAWING NO. 1-WT-060-01597

ALL DIMENSIONS ARE IN MILLIMETRES

OILY WASTE FROM TRANSFORMER UNIT-1
PE-DG-417-100-E001

TRANSFORMER YARD OILY WASTE TRANSFER PUMP 1
QTY : 1W + 1S
CAP. -20 M³/ HR.

TRANSFORMER YARD OILY WASTE COLLECTION PIT 1
CAP.-151 M³
M.O.C.-RCC

EX1
PLC RIO-1

OILY WASTE FROM TRANSFORMER UNIT-2
PE-DG-417-100-E001

TRANSFORMER YARD OILY WASTE TRANSFER PUMP 2
QTY : 1W + 1S
CAP. -20 M³/ HR.

TRANSFORMER YARD OILY WASTE COLLECTION PIT 2
CAP.-154 M³
M.O.C.-RCC

EX2
PLC RIO-1

OILY WASTE FROM TRANSFORMER UNIT-3
PE-DG-417-100-E001

TRANSFORMER YARD OILY WASTE TRANSFER PUMP 3
QTY : 1W + 1S
CAP. -20 M³/ HR.

TRANSFORMER YARD OILY WASTE COLLECTION PIT 3
CAP.-152 M³
M.O.C.-RCC

EX3
PLC RIO-2

OILY WASTE FROM TRANSFORMER UNIT-4
PE-DG-417-100-E001

TRANSFORMER YARD OILY WASTE TRANSFER PUMP 4
QTY : 1W + 1S
CAP. -20 M³/ HR.

TRANSFORMER YARD OILY WASTE COLLECTION PIT 4
CAP.-154 M³
M.O.C.-RCC

EX4
PLC RIO-2

OILY WASTE FROM TRANSFORMER UNIT-5
PE-DG-417-100-E001

TRANSFORMER YARD OILY WASTE TRANSFER PUMP 5
QTY : 1W + 1S
CAP. -20 M³/ HR.

TRANSFORMER YARD OILY WASTE COLLECTION PIT 5
CAP.-169 M³
M.O.C.-RCC

EX5
PLC RIO-2

OILY WASTE FROM FGD TRANSFORMER
PE-DG-417-100-E001

TRANSFORMER YARD OILY WASTE TRANSFER PUMP 6
QTY : 1W + 1S
CAP. -20 M³/ HR.

TRANSFORMER YARD OILY WASTE COLLECTION PIT 6
CAP.-169 M³
M.O.C.-RCC

EX6
PLC RIO-2

OIL WASTE FROM FUEL OIL AREA
PE-DG-417-166-A001

FUEL OIL AREA OILY WASTE TRANSFER PUMPS
QTY : 1W + 1S
CAP:-20 M³/ HR.

FUEL OIL AREA WATER PIT
CAP.-40 M³
M.O.C.-RCC

EF1
PLC RIO-2

FROM TG AREA WASH DRAIN SUMP
(Ref. 1-WT-060-01597 Sheet 01 of 06)

PRE_OWS WASTE TRANSFER PUMPS
QTY : 1W + 1S
CAP :55 M³/ HR

PRE-OWS COLLECTION PIT
CAP : 200 M³
M.O.C : RCC

E26
MAIN PLC

OILY WASTE FROM SWITCHYARD AREA
TB-0-387-510-002

SWITCHYARD AREA OWS WASTE TRANSFER PUMPS #1
QTY : 1W + 1S
CAP :20 M³/ HR.

SWITCHYARD AREA OILY WASTE COLLECTION PIT #1
M.O.C.-RCC

EY1
PLC RIO-1

OILY WASTE FROM SWITCHYARD AREA
TB-0-387-510-002

SWITCHYARD AREA OWS WASTE TRANSFER PUMPS #2
QTY : 1W + 1S
CAP :20 M³/ HR.

SWITCHYARD AREA OILY WASTE COLLECTION PIT #2
M.O.C.-RCC

EY2
PLC RIO-1

WASTE FROM HVAC SOFTNER PLANT OF FGD CONTROL ROOM-1
PE-DG-417-100-M001

FGD CONTRL ROOM HVAC SOFTNER PLANT PIT TRF PUMPS #1
QTY : 1W + 1S
CAP :10 M³/ HR.

FGD CONTRL ROOM HVAC SOFTNER PLANT WASTE PIT #1
CAP.-10 M³
M.O.C.-RCC

EH1
PLC RIO-1

WASTE FROM HVAC SOFTNER PLANT OF FGD CONTROL ROOM-2
PE-DG-417-100-M001

FGD CONTRL ROOM HVAC SOFTNER PLANT PIT TRF PUMPS #2
QTY : 1W + 1S
CAP :10 M³/ HR.

FGD CONTRL ROOM HVAC SOFTNER PLANT WASTE PIT #2
CAP.-10 M³
M.O.C.-RCC

EH2
PLC RIO-2

TO CMB
(Ref. 1-WT-060-01597 Sheet 03 of 06)

OILY WASTE FROM AUX. BOILER AREA
PE-DG-417-100-M001

AUXILLARY BOILER AREA WASTE TRANSFER PUMPS
QTY : 1W + 1S
CAP :10 M³/ HR.

EA1
PLC RIO-1

AUXILLARY BOILER AREA OILY WASTE COLLECTION PIT
CAP.-10 M³
M.O.C.-RCC

OILY WASTE FROM CENTRAL LUBE OIL SYSTEM #1
PE-DG-417-167-M221

CENTRAL LUBE OIL SYSTEM OILY WASTE PIT TRF PUMPS STATION #1
QTY : 1W + 1S
CAP :10 M³/ HR.

CENTRAL LUBE OIL SYSTEM OILY WASTE COLLECTION PIT STATION #1
CAP.-10 M³
M.O.C.-RCC

EL1
PLC RIO-1

OILY WASTE FROM CENTRAL LUBE OIL SYSTEM #2
PE-DG-417-167-M221

CENTRAL LUBE OIL SYSTEM OILY WASTE PIT TRF PUMPS STATION #2
QTY : 1W + 1S
CAP :10 M³/ HR.

CENTRAL LUBE OIL SYSTEM PIT STATION #2
CAP.-10 M³
M.O.C.-RCC

EL2
PLC RIO-2

SLOP STORAGE TANK
Capacity : 2m³
MOC : MS

TO CMB
(REF 1-WT-060-01597 Sheet 03 of 06)

1no. Carbuoy with trolley

Platform

OIL WATER SEPARATOR
QTY : 1NO
CAP. -50 M³/ HR.

E27
MAIN PLC

TO ETP CLARIFIER SLUDGE PIT
(REF 1-WT-060-01597 Sheet 04 of 06)

CPI SLUDGE TRF PUMPS
QTY : 1W + 1S
CAP : 4 M³/ HR.

CPI SLUDGE PIT
Capacity : 4m³
MOC : RCC

E28
MAIN PLC
ZONE-02

CPI SLUDGE BLOWER ZONE-03
QTY : 1W + 1S
CAP : M³/ HR.

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PROJECT: YADADRI THERMAL POWER STATION (5X800 MW)

OWNER: TELENGANA STATE POWER GENERATION CORPORATION LIMITED

OWNER'S CONSULTANT: TATA CONSULTING ENGINEERS LIMITED BANGALORE

EPC CONTRACTOR: BHARAT HEAVY ELECTRICALS LIMITED, NEW DELHI
UNIT : BOILER AUXILARIES PLANT ; RANIPET
PACKAGE : PT PLANT

TITLE: P&ID DIAGRAM FOR EFFLUENT TREATMENT PLANT.

	NAME	SIGN.	DATE
DRAWN	M.V	Sd/-	27.05.19
CHECKED	S.S	Sd/-	27.05.19
APPROVED	M.S.M	Sd/-	27.05.19

REV	DATE	ALTERED:	A.J.V
02	22.07.21	CHECKED:	S.S
ZONE	Revised for tender		
REV	DATE	ALTERED:	A.J.V
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ZONE	Revised based on resolutions dt.23.01.21		

ALL DIMENSIONS ARE IN MILLIMETRES

BHEL DRAWING NO. 1-WT-060-01597 REV 02

DEPT. DPG 2008 | DRG. NO. 9776 | GRADE OF UNTOL.DIM PR-QA-500 | PROJECTION | SCALE N.T.S | SH. 2 OF 6

Size A1

ROS-6278

DRAWING NO. 1-WT-060-01597

ALL DIMENSIONS ARE IN MILLIMETRES

WASTE WATER FROM BOILER AREA UNIT-1
PE-DG-417-100-M001
HVAC WASTE WATER FROM ESP CONROL BUILDING 1
PE-DG-417-100-M002

BOILER AREA WASTE WATER TRANSFER PUMPS#UNIT-1

QTY : 1W + 1S
CAP : 10 M³/ HR.

EB1 BOILER AREA WASH PIT #UNIT-1
CAP.-10 M³
M.O.C.-RCC
PLC RIO-1

WASTE WATER FROM TG AREA UNIT-1
PE-DG-417-100-M001
HVAC WASTE WATER FROM POWER HOUSE 1&2 & ESP CONTROL BUILDING 2
PE-DG-417-100-M002

TG AREA WASTE WATER TRANSFER PUMPS#UNIT-1

QTY : 1W + 1S
CAP : 10 M³/ HR.

ET1 TG AREA WASH PIT #UNIT-1
CAP.-10 M³
M.O.C.-RCC
PLC RIO-1

WASTE WATER FROM SSF BACKWASH#UNIT-1
REF:3-WT-070-00875 (Sheet 01)

SSF BACKWASH WASTE WATER TRANSFER PUMPS STAGE-I

QTY : 1W + 1S
CAP :150 M³/ HR.

ES1 SSF BACKWASH PIT 1 STAGE-I
CAP.-300 M³
M.O.C.-RCC
MAIN PLC

WASTE WATER FROM SSF BACKWASH#UNIT-2
REF:3-WT-070-00875 (Sheet 02)

SSF BACKWASH WASTE WATER TRANSFER PUMPS STAGE-II

QTY : 1W + 1S
CAP :150 M³/ HR.

ES2 SSF BACKWASH PIT 2 STAGE-II
CAP.-450 M³
M.O.C.-RCC
PLC RIO-2

WASTE WATER FROM BOILER AREA UNIT-2
PE-DG-417-100-M001

BOILER AREA WASTE WATER TRANSFER PUMPS#UNIT-2

QTY : 1W + 1S
CAP : 10 M³/ HR.

EB2 BOILER AREA WASH PIT #UNIT-2
CAP.-10 M³
M.O.C.-RCC
PLC RIO-1

WASTE WATER FROM TG AREA UNIT-2
PE-DG-417-100-M001
HVAC WASTE WATER FROM SERVICE BUILDING 1 & ESP CONTROL BUILDING 3
PE-DG-417-100-M002

TG AREA WASTE WATER TRANSFER PUMPS#UNIT-2

QTY : 1W + 1S
CAP : 10 M³/ HR.

ET2 TG AREA WASH PIT #UNIT-2
CAP.-10 M³
M.O.C.-RCC
PLC RIO-1

(REF :1-WT-060-01597 Sheet 02 of 06)
TO PRE-OWS PIT

WASTE WATER FROM BOILER AREA UNIT-3
PE-DG-417-100-M001

BOILER AREA WASTE WATER TRANSFER PUMPS#UNIT-3

QTY : 1W + 1S
CAP : 10 M³/ HR.

EB3 BOILER AREA WASH PIT #UNIT-3
CAP.-10 M³
M.O.C.-RCC
PLC RIO-2

WASTE WATER FROM TG AREA UNIT-3
PE-DG-417-100-M001
HVAC WASTE WATER FROM POWER HOUSE 3&4 & ESP CONTROL BUILDING 4
PE-DG-417-100-M002

TG AREA WASTE WATER TRANSFER PUMPS#UNIT-3

QTY : 1W + 1S
CAP : 10 M³/ HR.

ET3 TG AREA WASH PIT #UNIT-3
CAP.-10 M³
M.O.C.-RCC
PLC RIO-2

WASTE WATER FROM BOILER AREA UNIT-4
PE-DG-417-100-M001

BOILER AREA WASTE WATER TRANSFER PUMPS#UNIT-4

QTY : 1W + 1S
CAP : 10 M³/ HR.

EB4 BOILER AREA WASH PIT #UNIT-4
CAP.-10 M³
M.O.C.-RCC
PLC RIO-2

WASTE WATER FROM TG AREA UNIT-4
PE-DG-417-100-M001
HVAC WASTE WATER FROM POWER HOUSE 5 & ESP CONTROL BUILDING 5
PE-DG-417-100-M002

TG AREA WASTE WATER TRANSFER PUMPS#UNIT-4

QTY : 1W + 1S
CAP : 10 M³/ HR.

ET4 TG AREA WASH PIT #UNIT-4
CAP.-10 M³
M.O.C.-RCC
PLC RIO-2

WASTE WATER FROM BOILER AREA UNIT-5
PE-DG-417-100-M001

BOILER AREA WASTE WATER TRANSFER PUMPS#UNIT-5

QTY : 1W + 1S
CAP : 10 M³/ HR.

EB5 BOILER AREA WASH PIT #UNIT-5
CAP.-10 M³
M.O.C.-RCC
PLC RIO-2

WASTE WATER FROM TG AREA UNIT-5
PE-DG-417-100-M001
HVAC WASTE WATER FROM SERVICE BUILDING 2
PE-DG-417-100-M002

TG AREA WASTE WATER TRANSFER PUMPS#UNIT-5

QTY : 1W + 1S
CAP : 10 M³/ HR.

ET5 TG AREA WASH PIT #UNIT-5
CAP.-10 M³
M.O.C.-RCC
PLC RIO-2

ALKALI DOSING
ACID DOSING
(REFER SHEET 06 OF 06)

FROM OIL WATER SEPARATOR (REFER SHEET 03 OF 06)
DM PLANT WASTE (REF :1-WT-500-01295)
CT BLOW DOWN WASTE (REF PE-DG-417-145-M001)
CPU REGN. WASTE (REF PE-DG-417-159A-M001)
ETP UF BACKWASH WASTE (REFER SHEET 05 OF 06)
FGD CONTRL ROOM HVAC SOFTNER PLANT PITS (REF Sheet 02 of 06)

CENTRAL MONITORING BASIN(COMPARTMENT-A)
CAPACITY: 1500M3
MOC: RCC

CENTRAL MONITORING BASIN(COMPARTMENT-B)
CAPACITY: 1500M3
MOC: RCC

CENTRAL MONITORING BASIN (TWO COMPARTMENT) EACH
CAPACITY: 3000M3
QTY: 1 NO.
MAIN PLC

TO HRSCC CLARIFIER

CLARIFIER FEED PUMPS

QTY : 1W + 1S
CAP :228 M³/ HR.

REV	DATE	ALTERED:
02	22.07.21	CHECKED:
ZONE	Revised for tender	
REV	DATE	ALTERED: AJV
01	12.02.21	CHECKED: SS
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PROJECT	YADADRI THERMAL POWER STATION (5X800 MW)
OWNER	TELENGANA STATE POWER GENERATION CORPORATION LIMITED
OWNER'S CONSULTANT	TATA CONSULTING ENGINEERS LIMITED BANGALORE
EPC CONTRACTOR	BHARAT HEAVY ELECTRICALS LIMITED, NEW DELHI
	UNIT : BOILER AUXILARIES PLANT ; RANIPET PACKAGE : PT PLANT

TITLE: P&ID DIAGRAM FOR EFFLUENT TREATMENT PLANT.

	NAME	SIGN.	DATE
DRAWN	M.V	Sd/-	27.05.19
CHECKED	S.S	Sd/-	27.05.19
APPROVED	M.S.M	Sd/-	27.05.19

ALL DIMENSIONS ARE IN MILLIMETRES | BHEL DRAWING NO. 1-WT-060-01597 | REV 02
DEPT CODE: DPG 8778 | GRADE OF UNTOL.DIM PR-QA-500 | PROJECTION | SCALE N.T.S | Sh. 1 Of 6

Size A1

DRAWING NO. 1-WT-060-01597

ALL DIMENSIONS ARE IN MILLIMETRES

From Clarifier feed pumps
Refer Sheet 3

STILLING CHAMBER
QTY:1
MOC:RCC
CAP:4M³

INLET CHAMBER

CLARIFIER HRSCC
QTY:1NO.
CAP:220.5M³/HR.

FLUSHING LINE

TO STORM WATER DRAIN

OVER FLOW LINE

CLARIFIED WATER TANK
Capacity 230m³
MOC: RCC

RECIRCULATION

CLARIFIED WATER TRANSFER PUMPS
QTY : 3nos. (2W+1S)
CAP : 111M3/HR @2.5 BAR(G)

TO UF BASKET STRAINERS
Refer Sheet 5 of 6

FROM CPI SLUDGE PIT
Refer Sheet 2 OF 6

SLUDGE COLLECTION PIT
CAP.- 30M3
M.O.C.- RCC

CENTRIFUGE FEED PUMPS
QTY:2Nos(1W+1S)
CAP:10M³/hr EACH
TYPE: Vertical Centrifugal

DEWATERING POLYELECTROLYTE FROM DOSING PUMP

CENTRIFUGE
1X100%
Capacity :10m³/hr

SLUDGE TROLLEY : 1No.
SLUDGE (DISPOSAL MANUALLY BY CUSTOMER)

TO CENTRAL MONITORING BASIN
Refer Sheet 3 of 6

SLUDGE PIT BLOWERS (1W+1S)
CAP.- 50 M3/HR EACH

Utility/ Service water

REFER DRG. NO.:
PE-DG-417-172-N003

LIME SOLUTION SLAKING TANKS
QTY : 1 NO.

SLAKED LIME TRANSFER PUMPS
QTY : 2 NOS. (1W+1S)
TYPE: HOR.CENTRIFUGAL

LIME SOLUTION PREP.CUM DOSING TANK
QTY : 1 NO.

LIME DOSING PUMPS
QTY : 2 NOS. (1W+1S)
TYPE: HOR.CENTRIFUGAL

POLYELECTROLYTE DOSING TANK
QTY : 1 NO.

POLYELECTROLYTE INJECTION PUMPS
QTY : 2 NOS. (1W+1S)

FeCL₃ DOSING SKID

PREPARATION / DOSING TANK

DOSING PUMPS
QTY : 2 NOS. (1W+1S)

TO STILLING CHAMBER OF ETP CLARIFIER

ACID DOSING SKID

DOSG. TANK

DOSING PUMPS
QTY : 2 NOS. (1W+1S)

TO CMB
Refer sheet 03 of 06

ALKALI DOSING SKID

PREPARATION / DOSING TANK

DOSING PUMPS
QTY : 2 NOS. (1W+1S)

TO CMB
Refer sheet 03 of 06

DEWATERING POLYELECTROLYTE DOSING TANK
QTY : 1 NO.

CPVC SCH.80

DEWATERING POLYELECTROLYTE INJECTION PUMPS
QTY : 2 NOS. (1W+1S)

TO STILLING CHAMBER OF ETP CLARIFIER

REV	DATE	ALTERED:	AJV
02	22.07.21	CHECKED:	SS
ZONE 2A	Revised for tender		
REV	DATE	ALTERED:	AJV
01	12.02.21	CHECKED:	SS
ZONE 1A	Revised based on resolutions dt.23.01.21		

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PROJECT	YADADRI THERMAL POWER STATION (5X800 MW)
OWNER	TELENGANA STATE POWER GENERATION CORPORATION LIMITED
OWNER'S CONSULTANT	TATA CONSULTING ENGINEERS LIMITED BANGALORE
EPC CONTRACTOR	BHARAT HEAVY ELECTRICALS LIMITED, NEW DELHI UNIT : BOILER AUXILARIES PLANT ; RANIPET PACKAGE : PT PLANT

TITLE: P&ID DIAGRAM FOR EFFLUENT TREATMENT PLANT.

	NAME	SIGN.	DATE
DRAWN	M.V	Sd/-	27.05.19
CHECKED	S.S	Sd/-	27.05.19
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ALL DIMENSIONS ARE IN MILLIMETRES | BHEL DRAWING NO. 1-WT-060-01597 | REV 02

DEPT. DPG | CODE 9776 | GRADE OF UNTOL.DIM PR/QA-500 | PROJECTION | SCALE N.T.S | SH. 4 OF 6

Size A1

ROS-6278

DRAWING NO. 1-WT-060-01597

ALL DIMENSIONS ARE IN MILLIMETRES

FROM CLARIFIED WATER TRANSFER PUMP
REFER SHEET 02
FLOW : 227.25 m3/hr

AUTO SELF CLEANING STRAINER
QTY: 2Nos(2W+1S)
CAP: 111m3/hr
MOC: SS316

FEED DISTRIBUTION CHANNEL (RCC)

MEMBRANE TANK-A (RCC)

MEMBRANE TANK-B (RCC)

MEMBRANE TANK-C (RCC)

UF SYSTEM
QTY: 3NOS(2W+1S)
TYPE:SUBMERGED
MOC:PVDF
CAP: 99.5M³/HR (EACH)

PERMEATE/BACKPULSE PUMP
QTY: 6NOs.(5W+1S)
CAP: 99.5m3/hr min Each
MOC:SS316

TO RO FEED PUMPS
REFER DRG. NO :
1-WT-060-01597 Sht. 6 of 6

UF PRODUCT WATER TANK
CAP:200m³
MOC:RCC

SERVICE WATER FROM PLANT SERVICE WATER SOURCE
REFER DRG. NO :
PE-DG-417-172-N003

BACKPULSE TANK
1NO. (FRP)

MEMBRANE AIR BLOWERS
QTY: 2Nos.(1W+1S)

Utility Service water
REFER DRG. NO :
PE-DG-417-172-N003

NaOCl DOSING SKID
TANK 1NO.
DOSING PUMPS 2NOS. (1W+1S)

CITRIC ACID DOSING SKID
TANK 1NO.
DOSING PUMPS 2NOS. (1W+1S)

HCl DOSING SKID
TANK 1NO.
DOSING PUMPS 2NOS. (1W+1S)

NaOCl SOLN FOR MC & RC FROM DOSING PUMP
HCL SOLN FOR MC & RC FROM DOSING PUMP
CITRIC ACID FOR MC & RC FROM DOSING PUMP

CLEAN IN PLACE /DRAIN PUMP
QTY: 2NOs. (1W+1S)

CLEAN-IN-PLACE TANK
1NO. (FRP)

UF BACWASH WASTE COLLECTION PIT
CAP:30Cu.m
MOC:RCC

UF BACWASH WASTE DISPOSAL PUMPS
QTY: 2NOs.(1W+1S)
CAP: m3/hr

TO CMB
Refer sheet 03 of 06

REV	DATE	ALTERED:	A/V
02	22.07.21	CHECKED:	SS
ZONE	Revised for tender		
REV	DATE	ALTERED:	A/V
01	12.02.21	CHECKED:	SS
ZONE	Revised based on resolutions dt.23.01.21		

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PROJECT: YADADRI THERMAL POWER STATION (5X800 MW)

OWNER: TELENGANA STATE POWER GENERATION CORPORATION LIMITED

OWNER'S CONSULTANT: TATA CONSULTING ENGINEERS LIMITED BANGALORE

EPC CONTRACTOR: BHARAT HEAVY ELECTRICALS LIMITED, NEW DELHI
UNIT : BOILER AUXILARIES PLANT ; RANIPET
PACKAGE : PT PLANT

TITLE: P&ID DIAGRAM FOR EFFLUENT TREATMENT PLANT.

	NAME	SIGN.	DATE
DRAWN	M.V	Sd/-	27.05.19
CHECKED	S.S	Sd/-	27.05.19
APPROVED	M.S.M	Sd/-	27.05.19

ALL DIMENSIONS ARE IN MILLIMETRES

BHEL DRAWING NO. 1-WT-060-01597 SH. 1 OF 6

REV 02

DEPT. DPG CODE 8778

GRADE OF UNTOL DIM PR-QA-500

PROJECTION

SCALE N.T.S

Size A1

DRAWING NO. 1-WT-060-01597

ALL DIMENSIONS ARE IN MILLIMETRES

RETURN TO UF PRODUCT WATER TANK
REFER DRG. NO :
1-WT-060-01597 Sht. 5 of 6

CONTD WITH INST.
TAG NOS:
REFER DRG. NO :
1-WT-060-01597 Sht. 5 of 6

300 NB GRP PN10
FROM UF PRODUCT WATER TANK
REFER DRG. NO :
1-WT-060-01597 Sht. 5 of 6

RO FEED PUMPS
QTY: 3NOs.(2W+1S)
CAP: 110m3/hr @ 2 BAR

ACID DOSING FROM DOSING PUMP

ANTISCALANT DOSING FROM DOSING PUMP

DECHLORINATION DOSING FROM DOSING PUMP

STATIC MIXER

TO CLARIFIER WASH TANK

CART. FILTERS
QTY: 2W
CAP: 99.5m3/hr Each
PORE SIZE: 5 MICRON

DUMP TO UF BACKWASH WASTE PIT
REFER DRG. NO :
1-WT-060-01597 Sht. 5 of 6

HP PUMPS
(VERTICAL-CENTRIFUGAL)
QTY: 3NOs.(2W+1S)
CAP:110m3/hr @ 15BAR(g)
MOC: SS316

CLNG. PRODUCT RETURN TO CC TANK
100NB UPVC SCH40

RO, STAGE - 1

RO, STAGE - 2

CLNG. BRINE RTN.TO CC TANK

80NB UPVC SCH40

RO SYSTEM (2 STREAMS)
QTY:2W
CAP: 74.5m3/hr each
75% recovery

RO reject to CW blowdown pipeof stage-1

REFER DRG. NO :
PE-DC-417-165-N001
Sheet 1 of 5

TO CW FOREBAY STAGE-1
REFER DRG. NO :
PE-DC-417-165-N001 Sheet 1 of 5

RO PERMEATE TANK
1NO.(RCC-150m3)

RO PERMEATE TRANSFER PUMPS
QTY.3NOS.(1W+1S)
CAP: 165m3/hr each @2.5 BAR

CHEMICAL CLEANING TANK
QTY: 1 NO.
MOC: FRP
CAP: 10m3

CLEAN IN PLACE PUMPS
QTY: 2NOs.(1W+1S)
CAP: 108m3/hr @ 5.5 BAR

CARTRIDGE FILTER
QTY: 1 NO.
CAP: 108m3/hr
PORE SIZE: 5 MICRON

RO CHEMICAL CLENING SKID

REFER DRG. NO :
PE-DC-417-172-N003

DOSG. TANK
DOSING PUMPS
HCL DOSING SKID

PREP. TANK
DOSG. TANK
ANTISCALANT DOSING SKID

PREP. TANK
TANK
DECHLORINATION DOSING SKID

TO UF backwash waste pit
REFER DRG. NO :
1-WT-060-01597 Sht. 5 of 6

REV	DATE	ALTERED: AJV
02	22.07.21	CHECKED: S.S
ZONE	Revised for tender	
REV	DATE	ALTERED: AJV
01	03.02.21	CHECKED: S.S
ZONE	Revised based on CRS resolution on ETP Design Memo. dt.22.01.21	

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PROJECT: **YADADRI THERMAL POWER STATION (5X800 MW)**

OWNER: **TELENGANA STATE POWER GENERATION CORPORATION LIMITED**

OWNER'S CONSULTANT: **TATA CONSULTING ENGINEERS LIMITED BANGALORE**

EPC CONTRACTOR: **BHARAT HEAVY ELECTRICALS LIMITED,** NEW DELHI
UNIT : BOILER AUXILARIES PLANT : RANIPET
PACKAGE : PT PLANT

TITLE: P&ID DIAGRAM FOR EFFLUENT TREATMENT PLANT.

	NAME	SIGN.	DATE
DRAWN	Pugazh	Sd/-	27.05.19
CHECKED	AJV	Sd/-	27.05.19
APPROVED	S.S	Sd/-	27.05.19

ALL DIMENSIONS ARE IN MILLIMETRES

BHEL DRAWING NO. 1-WT-060-01597 SH: 6 OF 6

REV 02

DEPT CODE: DPG 9776

GRADE OF UNTOL DM PR-QA-500

PROJECTION

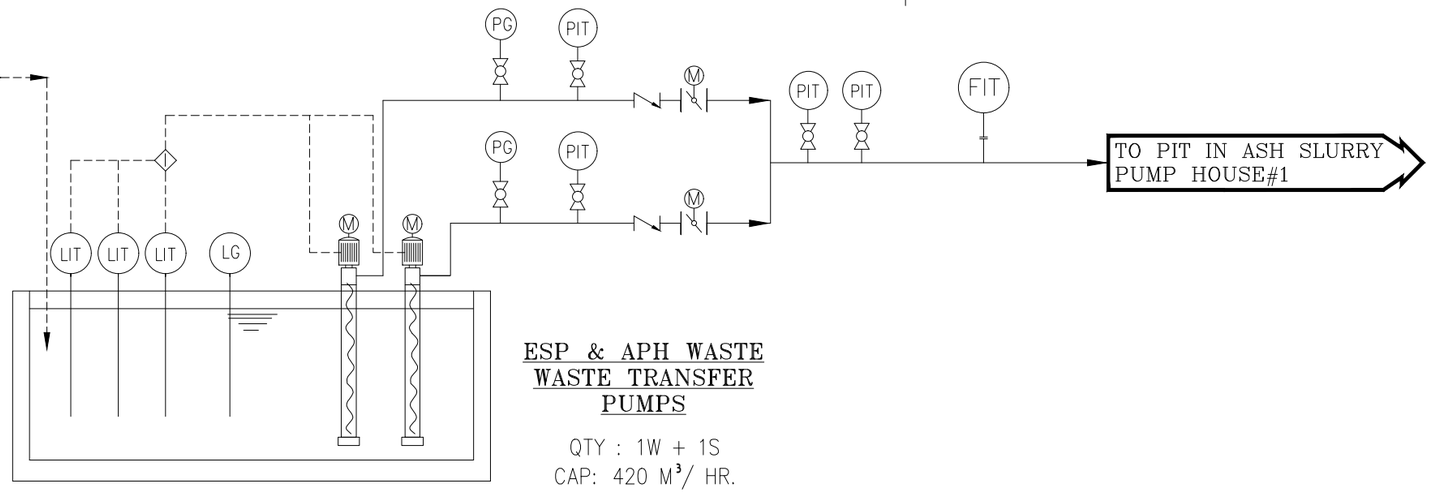
SCALE N.T.S

Size A1

DRAWING NO. 3-WT-060-01459

ALL DIMENSIONS ARE IN MILLIMETRES

ESP & APH WASTE WATER FROM UNITS 1 & 2



ESP & APH WASTE WASTE TRANSFER PUMPS

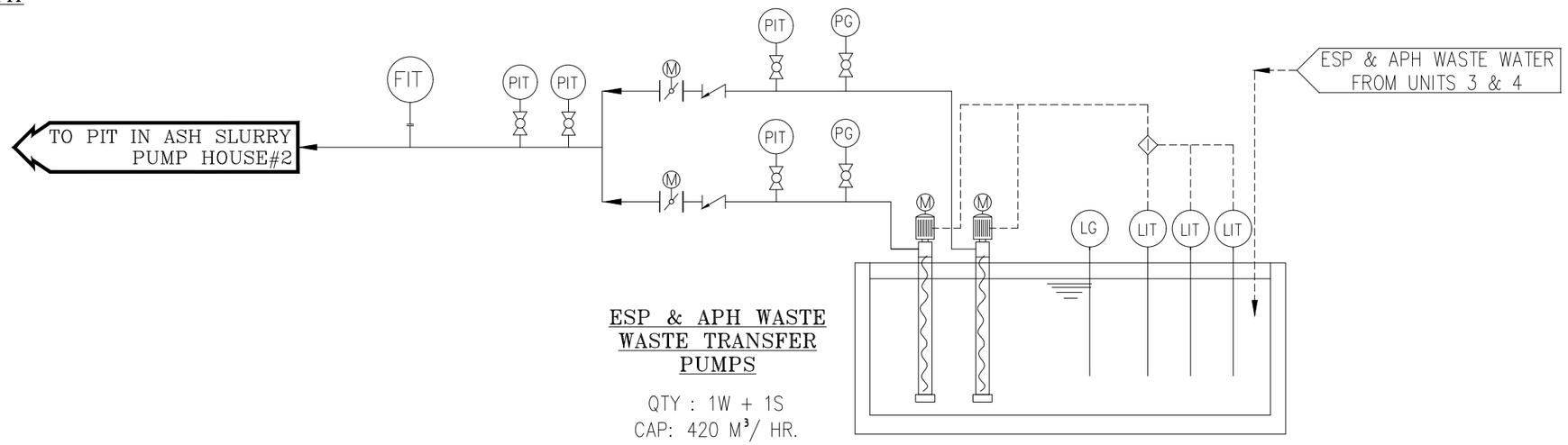
QTY : 1W + 1S
CAP: 420 M^3/ HR.

EE1

ESP, APH WASH PIT

CAP.–100 M^3
M.O.C.–RCC

ESP & APH WASTE WATER FROM UNITS 3 & 4



ESP & APH WASTE WASTE TRANSFER PUMPS

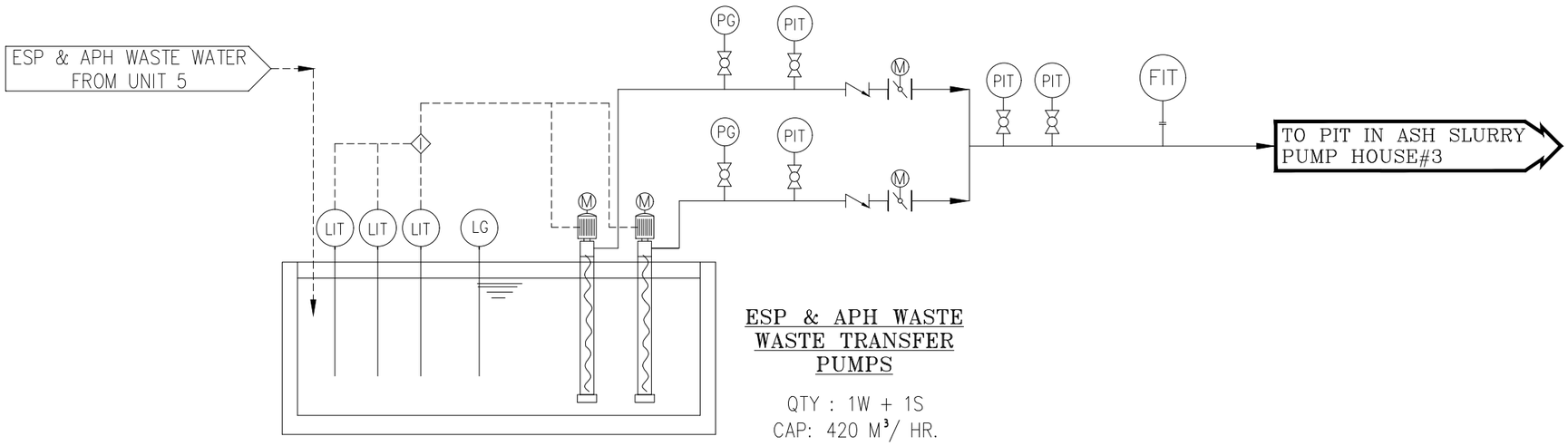
QTY : 1W + 1S
CAP: 420 M^3/ HR.

ESP, APH WASH PIT

CAP.–100 M^3
M.O.C.–RCC

EE2

ESP & APH WASTE WATER FROM UNIT 5



ESP & APH WASTE WASTE TRANSFER PUMPS

QTY : 1W + 1S
CAP: 420 M^3/ HR.

EE3

ESP, APH WASH PIT

CAP.–100 M^3
M.O.C.–RCC

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PROJECT: YADADRI THERMAL POWER STATION (5X800 MW)

OWNER: TELENGANA STATE POWER GENERATION CORPORATION LIMITED

OWNER'S CONSULTANT: TATA CONSULTING ENGINEERS LIMITED BANGALORE

EPC CONTRACTOR: BHARAT HEAVY ELECTRICALS LIMITED, NEW DELHI
UNIT : BOILER AUXILARIES PLANT : RANIPET
PACKAGE : PT PLANT

TITLE: P&ID FOR EFFLUENT TREATMENT PLANT [ESP, APH WASH WATER]

	NAME	SIGN.	DATE
DRAWN	SV	Sd/-	04.08.21
CHECKED	BS	Sd/-	04.08.21
APPROVED	MSN	Sd/-	04.08.21

REV	DATE	ALTERED:
		CHECKED:
ZONE		

ALL DIMENSIONS ARE IN MILLIMETRES

DEPT. NR. CODE: 8076

UNITS ON PR.QA-585

PROJECTION

SCALE N.T.S

BHEL DRAWING NO. 3–WT–060–01459

REV 00

Project: Yadadri 5x800MW

Date: 04.08.21

EFFLUENT COLLECTION PIT, PUMP & PIPING DETAILS

Sl. no	Description	Pit / Sump					Pumps		Piping			Remarks
		ID	Capacity (m^3)	Qty (Nos.)	Size L x W x D (m)	Coordinates (m)	Qty (Nos.)	Capacity (m^3/hr)	Size	Line Tag	Length (m)	
1	SSF Backwash waste water pit - Stage-1	ES-1	300	1	15 x 10 x 2	S: 169.81 W: 238.00	2(1W+1S)	150	200NB	EPW-02	450	
2	SSF Backwash waste water pit - Stage-2	ES-2	450	1	15 x 15 x 2	S: 579.42 E: 858.00	2(1W+1S)	150	200NB	EPW-01	2110	
3	Boiler Area Wash Water pit Pit#1	EB-1	10	1	3 x 2 x 2	S: 167.99 W:112.23	2(1W+1S)	10	100NB	EPW-03	1550	
4	Boiler Area Wash Water pit Pit#2	EB-2	10	1	3 x 2 x 2	S: 169.44 E: 177.95	2(1W+1S)	10				
5	Boiler Area Wash Water pit Pit#3	EB-3	10	1	3 x 2 x 2	S: 168.20 E: 321.04	2(1W+1S)	10				
6	Boiler Area Wash Water pit Pit#4	EB-4	10	1	3 x 2 x 2	S: 168.05 E: 542.15	2(1W+1S)	10				
7	Boiler Area Wash Water pit Pit#5	EB-5	10	1	3 x 2 x 2	S: 167.97 E: 685.19	2(1W+1S)	10				
8	TG area wash water pit Pit#1	ET-1	10	1	3 x 2 x 2	S: 255.37 W: 136.30	2(1W+1S)	10	100NB	EPW-04	1730	
9	TG area wash water pit Pit#2	ET-2	10	1	3 x 2 x 2	S: 231.80 E: 129.25	2(1W+1S)	10				
10	TG area wash water pit Pit#3	ET-3	10	1	3 x 2 x 2	S: 242.75 E: 419.37	2(1W+1S)	10				
11	TG area wash water pit Pit#4	ET-4	10	1	3 x 2 x 2	S: 255.37 E: 561.24	2(1W+1S)	10				
12	TG area wash water pit Pit#5	ET-5	10	1	3 x 2 x 2	S: 264.38 E: 691.13	2(1W+1S)	10				
13	Retention pit for Oily Water from Fuel Oil area	EF-1	40	1	5 x 4 x 2	N: 419.93 E: 485.29	2(1W+1S)	20	100NB	EPO-03	1720	
14	Retention pit for Oily waste from Aux. Boiler area	EA-1	10	1	3 x 2 x 2	N: 10.00 E: 319.50	2(1W+1S)	10				
15	Oily waste from Transformer Yard Area Pit#1	EX-1	151	1	5.5 x 13 x 2.1	S: 385.95 W: 157.80	2(1W+1S)	20	150NB	EPO-01	2090	
16	Oily waste from Transformer Yard Area Pit#2	EX-2	154	1	5.5 x 13 x 2.145	S: 392.05 W: 22.67	2(1W+1S)	20				
17	Oily waste from Transformer Yard Area Pit#3	EX-3	152	1	5.5 x 13 x 2.125	S: 391.35 E: 314.95	2(1W+1S)	20				
18	Oily waste from Transformer Yard Area Pit#4	EX-4	154	1	5.5 x 13 x 2.15	S: 394.80 E: 504.94	2(1W+1S)	20				
19	Oily waste from Transformer Yard Area Pit#5	EX-5	169	1	5.5 x 13 x 2.35	S: 394.8 E: 649.06	2(1W+1S)	20				
20	Oily waste from Transformer Yard Area Pit#6	EX-6	169	1	5.5 x 13 x 2.35	S: 350.85 E: 172.85	2(1W+1S)	20				
21	Retention pit for Oily waste from Switch Yard area#1	EY-1		1	3 x 3 x 1	S: 463.65 E: 199.63	2(1W+1S)	20				
22	Retention pit for Oily waste from Switch Yard area	EY-2		1	3 x 3 x 1	S: 463.62 E: 683.64	2(1W+1S)	20				

Project: Yadadri 5x800MW

Date: 04.08.21

EFFLUENT COLLECTION PIT, PUMP & PIPING DETAILS

Sl. no	Description	Pit / Sump					Pumps		Piping			Remarks
		ID	Capacity (m^3)	Qty (Nos.)	Size L x W x D (m)	Coordinates (m)	Qty (Nos.)	Capacity (m^3/hr)	Size	Line Tag	Length (m)	
23	FGD control room HVAC softener plant pit #1	EH-1	10	1	2 x 1 x 2	N: 30.74 E: 98.53	2(1W+1S)	10	80NB	EPW-05	1430	
24	FGD control room HVAC softener plant pit #2	EH-2	10	1	2 x 1 x 2	N: 14.00 E: 562.00	2(1W+1S)	10				
25	Central Lube oil system pit Station#1 Location 1	EL-1	10	1	3 x 2 x 2	S: 269.27 W: 9.36	2(1W+1S)	10	100NB	EPO-02	1290	
26	Central Lube oil system pit Station#2 Location 2	EL-2	10	1	3 x 2 x 2	S: 269.27 E: 423.62	2(1W+1S)	10				
27	ESP, APH area wash pit #1 (common for units 1 & 2)	EE-1	100	1	7.5 x 7.5 x 2	S: 130.20 E: 152.46	2(1W+1S)	420	250 NB	EPW-06	480	
28	ESP, APH area wash pit #1 (common for units 3 & 4)	EE-2	100	1	7.5 x 7.5 x 2	S: 132.36 E: 591.61	2(1W+1S)	420	250 NB	EPW-07	440	
29	ESP, APH area wash pit #1 (for unit 5)	EE-3	100	1	6 x 6 x 3	S: 129.16 E: 733.90	2(1W+1S)	420	250 NB	EPW-08	340	

Other Terminal Piping

a ETP RO Permeate (from ETP to CW Forebay stage-1) Size: 200NB GRP Length: 500 m

b ETP RO Reject (from ETP to CW Blowdown Line stage-1) Size: 150NB Length: 300 m

NORTH

COMPARTMENT-1

RAW WATER RESERVOIR

TUNGAPAHAD VAGU

EFFLUENT COLLECTION NETWORK

BURIED PIPE CORIDOR 20 M WIDE

BURIED PIPE CORIDOR 20 M WIDE

BURIED PIPE CORIDOR

COMPARTMENT-II
CAP. 40250 CUB.M
(COVERED AT TOP)

COMPARTMENT-I
CAP. 40250 CUB.M
(COVERED AT TOP)

EL:4.0M
RL:85.5M(FGL)

EL:4.0M
RL:85.5M(FGL)

EL:4.0M
RL:85.5M(FGL)

EL:(-)0.25M
RL:81.25M(FFL)

EL:(-)1.5M
RL:80.0M(FGL)

EL:(-)3.5M
RL:78.0M(FGL)

EL:1.5M
RL:83.0M(FGL)

EL:1.5M
RL:83.0M(FGL)

CT#1

CT#2

CT#3

CT#4

CT#5

BOILER#1

BOILER#2

BOILER#3

BOILER#4

BOILER#5

ESP CONTROL ROOM #1

ESP CONTROL ROOM #2

ESP CONTROL ROOM #3

ESP CONTROL ROOM #4

ESP CONTROL ROOM #5

SPACE FOR SERIES REACTOR

SWITCHYARD
STORAGE
75X75 SQM

UNDER UTILISATION

UNCRUSHED LIMESTONE DUMPING AREA WITH STRUCTURAL SHED 80M(L) X 40M (W) X 16.7M (CLEAR HEIGHT)

AHP CLARIFIERS 1&2 DIA: 24m

CON.TRF.

REFERENCE : PE-DG-417-100-M001

ROS-6278

608 of 1251