

ITEM	SPECIFICATION REQUIREMENT
C. Other Maintenance Requirement	
1. Generator stator handling In case the Generator stator cannot be handled by the turbine house crane, all provisions for its overhauling, including the arrangement to slide the stator on the turbine house floor, the foundation work for stator jacking /lowering assembly, dismantling of building end walls/structures etc. shall be kept.	Yes
2. Maintenance of the internals/impellers of all important equipment, like boiler feed pumps, feed water heaters, Surface Condenser, fans of the boiler draft plant, Intake and circulating water pumps, cooling water pumps, coal mills, compressors, blowers, heat exchangers, fuel oil pumps, filters etc.	Shall be possible without disconnecting or dismantling any piping/ducting.
3. Overhauling and handling of the casings for the above items	Shall be possible without disturbing/dismantling any piping/ducting not directly connected to them.
4. Crane Approach Wherever required the unobstructed approach of the crane hook/other hoisting equipment hook to various plant & equipment shall be possible.	Yes
D. Central Control Room	
All electronic equipment other than those directly associated with control, operation or presentation of displays shall be mounted external to the control room in air conditioned control equipment room.	Yes
The bidder shall describe in his bid the proposed layout philosophy of the Central Control Room and Control Equipment Room and the arrangement of equipment best suited for the system offered by him and as per good ergonomically consideration.	
However, as a guide line, following features are given :	
a) False ceiling and false flooring shall be provided.	
b) Uniform height, colouring schemes for cabinets etc. shall be available.	

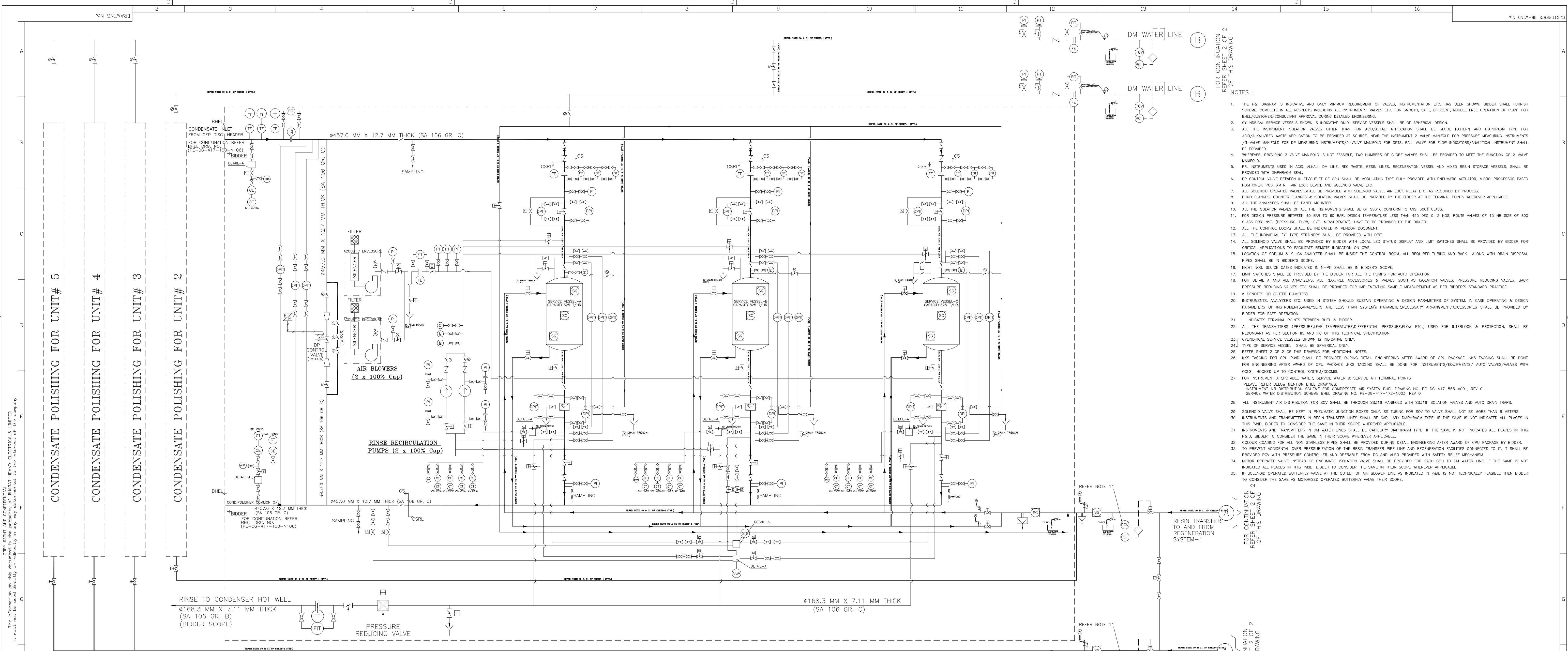
ITEM	SPECIFICATION REQUIREMENT
c) The total area of floor space covered by Control Consoles/Panels in the Control Room shall not exceed 15% of floor area.	
d) No opening shall be provided from Boiler side.	
e) Two double leaf doors, suitably located for entering the Control room shall be provided with opening towards the turbine floor.	
f) Cable entry for the panels/consoles shall be from bottom and suitable openings shall be provided.	
g) The Control Room lighting shall be designed to provide a glare free uniform illumination. The level of illumination shall be minimum 400 LUX.	
h) Necessary Air Conditioning shall be provided for Central Control room, Control Equipment Room and SWAS room etc.	
i) Basic amenities like toilet, Tiffin rooms, wash basins, rest rooms etc. shall be provided near the Control Room.	
E. Toilet and drinking water facility	Required in all buildings and on all floors wherever operating personnel are to be deployed.

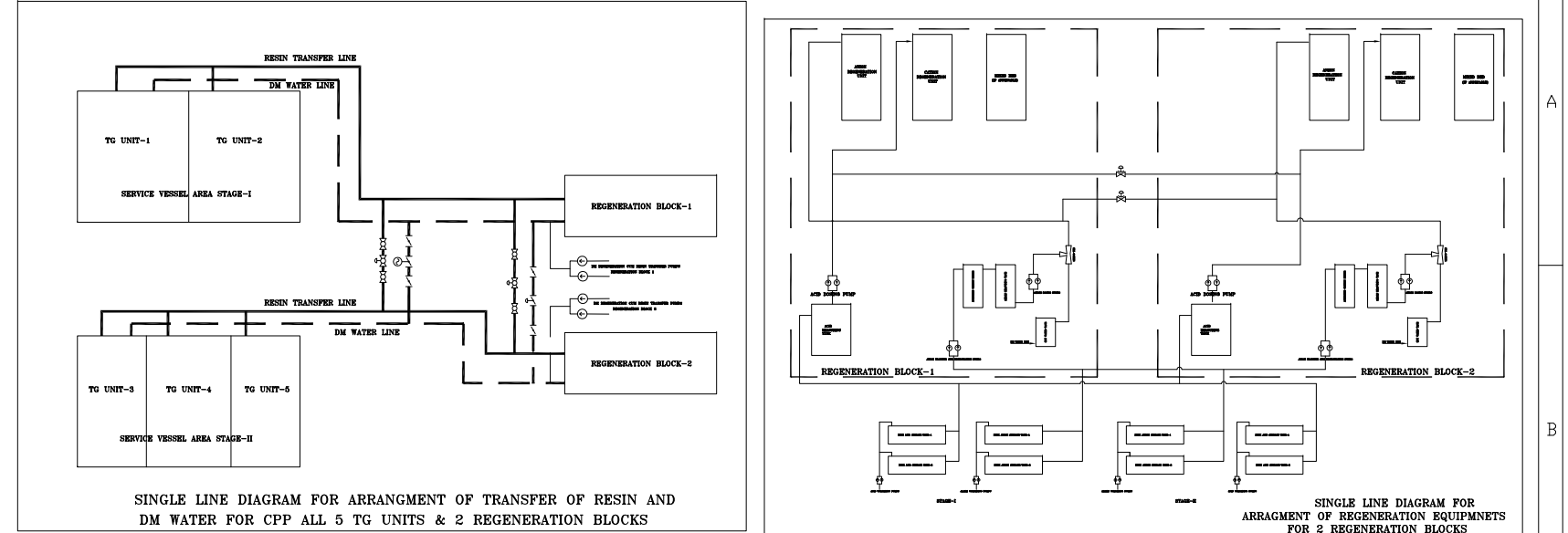
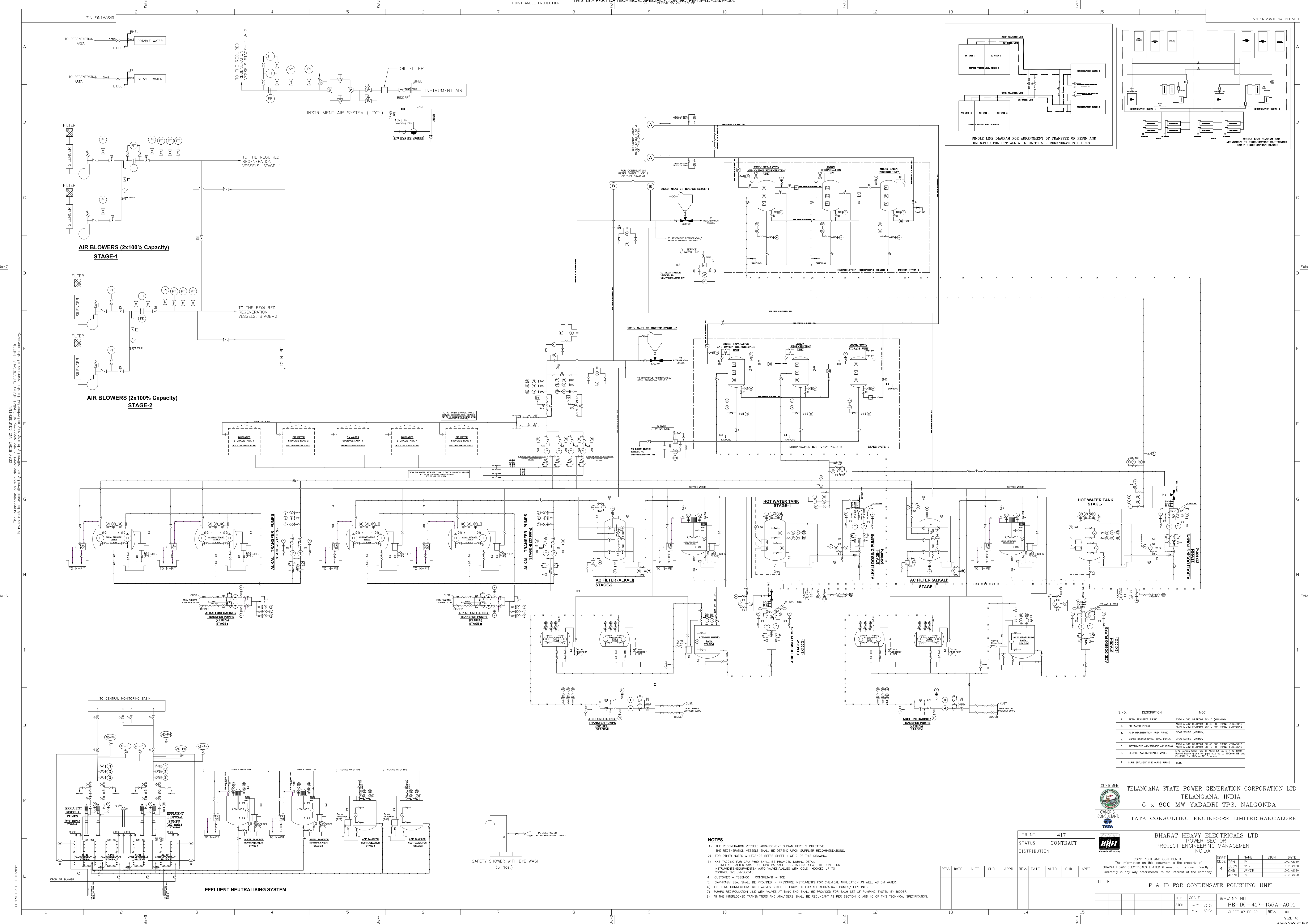


TITLE : 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
	SECTION : I	
	SUB-SECTION:	
	REV. NO. 00	DATE :

TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT

P & ID





- NOTES:**
- 1) THE REGENERATION VESSELS ARRANGEMENT SHOWN HERE IS INDICATIVE. THE REGENERATION VESSELS SHALL BE DEPEND UPON SUPPLIER RECOMMENDATIONS.
 - 2) FOR OTHER NOTES & LEGENDS REFER SHEET 1 OF 2 OF THIS DRAWING.
 - 3) KKK TAGGING FOR CPU PAID SHALL BE PROVIDED DURING DESIGN ENGINEERING AFTER AWARD OF CPU PACKAGE. KKK TAGGING SHALL BE DONE FOR INSTRUMENTS/EQUIPMENTS/ AUTO VALVES/VALVES WITH OOLS. HOOKED UP TO CONTROL SYSTEM/DOOMS.
 - 4) CUSTOMER - TSCEND CONSULTANT - TCE
 - 5) DASHBROOM SEAL SHALL BE PROVIDED IN PRESSURE INSTRUMENTS FOR CHEMICAL APPLICATION AS WELL AS DM WATER.
 - 6) FLUSHING CONNECTIONS WITH VALVES SHALL BE PROVIDED FOR ALL ACID/ALKALI PUMPS/ PIPELINES.
 - 7) PUMPS RECIRCULATION LINE WITH VALVES AT TANK END SHALL BE PROVIDED FOR EACH SET OF PUMPING SYSTEM BY BODDER.
 - 8) ALL THE INTERLOCKED TRANSMITTERS AND ANALYSERS SHALL BE REDUNDANT AS PER SECTION 8.1 OF THIS TECHNICAL SPECIFICATION.

S.NO.	DESCRIPTION	MOD.
1.	RESIN TRANSFER PIPING	AS PER 3112 (GATEWAY) SCHEMATIC DRAWINGS
2.	DM WATER PIPING	AS PER 3112 (GATEWAY) SCHEMATIC FOR PIPING CONFORMANCE
3.	ACID REGENERATION AREA PIPING	AS PER 3112 (GATEWAY) SCHEMATIC FOR PIPING CONFORMANCE
4.	ALKALI REGENERATION AREA PIPING	AS PER 3112 (GATEWAY) SCHEMATIC FOR PIPING CONFORMANCE
5.	INSTRUMENT AIR/SERVICE AIR PIPING	AS PER 3112 (GATEWAY) SCHEMATIC FOR PIPING CONFORMANCE
6.	SERVICE WATER/POTABLE WATER	AS PER 3112 (GATEWAY) SCHEMATIC FOR PIPING CONFORMANCE
7.	WASTE EFFLUENT DISCHARGE PIPING	AS PER 3112 (GATEWAY) SCHEMATIC FOR PIPING CONFORMANCE

TSCEND
TATA CONSULTING ENGINEERS LIMITED

CUSTOMER:
TELANGANA STATE POWER GENERATION CORPORATION LTD
TELANGANA, INDIA
5 x 800 MW YADADRI TPS, NALGONDA

OWNER'S CONSULTANT:
TATA CONSULTING ENGINEERS LIMITED, BANGALORE

JOB NO.: 417
STATUS: CONTRACT
DISTRIBUTION:

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
Noida

DEPT.: SRN
CODE: BK
DESIGN: MKG
CHKD: JPS/SB
APPD: PK

DATE: 10-01-2020
DATE: 10-01-2020
DATE: 10-01-2020

TITLE:
P & ID FOR CONDENSATE POLISHING UNIT

DEPT.: SRN
SCALE: 1:1
DRAWING NO.: PE-DG-417-155A-A001
SHEET: 02 OF 02
REV.: 00

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

DATASHEET – A

1.0	DESCRIPTION OF TURBO GENERATOR UNIT (TG) FOR WHICH CONDENSATE POLISHING IS TO BE PROVIDED :	
(i)	No. of TG units	Five (5) nos.
(ii)	Capacity of each unit	800 MW
(iii)	Total flow in all working service vessels of each units	1650.0 Tons/hr (VWO, 1% Make Up condition)
2.0	CONDENSATE POLISHER SERVICE VESSELS PER UNIT :	
(i)	No. of condensate polisher service vessel per TG unit	Three (3X50%) nos. per TG unit
(ii)	Total Number required for all 5 TG units	15 nos.
(iii)	Capacity of each condensate polisher service vessel	50% of total condensate flow per unit
(iv)	Flow through each condensate polisher service vessel per unit	825 Tones per hour
(v)	Operating pressure of each condensate polisher service vessel	31.27 kg/cm ² (g)
(vi)	CEP shut off pressure	38.8 kg/cm ² (g)
(vii)	Design pressure of each condensate polisher service vessel	47 kg/cm ² (g)
(viii)	Design code of each condensate polisher service vessel	ASME Sec VIII div 1 Latest edition / IS 2825 as applicable
(ix)	Process design Temperature	51.8 °C
(x)	Design temperature of service vessel, its internals and accessories	60 °C
(xi)	Type of vessels	Spherical
(xii)	Percentage deration to be considered on design exchange capacity for design of the system	Minimum 10 %
(xiii)	Material of construction	
	Shell	Carbon steel plates to SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
	Head	Carbon steel plates to SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
(xiv)	Inside protection	Inside lined with Natural Rubber [4.5 mm thick in (3) layers] with shore hardness 65 ± 5 in Scale-A.
(xv)	Output between two successive regeneration (each Service vessel)	198000 Tons (Under Normal run condition) 39600 Tons (Under startup condition) 39600 Tons (Under condenser tube leakage condition)
(xvi)	Cycle time	240 hours (Under Normal run condition) 48 hours (Under startup condition) 48 hours (Under condenser tube leakage condition)
(xvii)	Average velocity of condensate through service vessels/Surface flow rate	≤ 120 m/ hour
(xviii)	Resin bed depth (Minimum)	1100 mm
(xix)	Resin traps at the outlet of each condensate polisher service vessel & rinse outlet	SS-316 with SS 316 Internals
2.1	RINSE RECIRCULATION PUMPS PER UNIT:	
(i)	Number	Two (2x100%) nos. per TG unit
(ii)	Total Number required for all 5	10 nos.

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

	TG units	
(iii)	Type	Horizontal, centrifugal
(iv)	Service/Duty	Intermittent
(v)	Capacity & head	As per System requirement
(vi)	Suction condition	Flooded
(vii)	Material of construction	
	Casing, impeller	SS 316
	Shaft	SS 410
	shaft sleeve material	SS 410
(viii)	Packing seal	Mechanical type
(ix)	Pump Speed	Maximum 1500 rpm
(x)	Accessories required for each pump	Common base plate, coupling guards, drain plug, vent valve, isolation valves, Y-type strainers etc.
(xi)	Drive motor	415V, 3Φ, 50 HZ TEFC, Energy Efficiency Class IE-3 as per IS : 12615
(xii)	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.
(xiii)	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).
(xiv)	Dynamic Balancing Test	To be provided
2.2	AIR-BLOWERS FOR RESIN MIXING (SERVICE VESSELS AREA) PER UNIT	
(i)	Number per unit	Two (2x100%) nos. per TG unit
(ii)	Total Number required for all 5 TG units	10 nos.
(iii)	Type	Rotary, Twin Lobe, oil free, positive displacement
(iv)	Duty	Intermittent
(v)	Capacity and head	As per System requirement
(vi)	Noise level	85 dB (A) Max. at one meter
(vii)	Pressure gauge	One per blower
(viii)	Location	Indoor
(ix)	Material of construction	Casing – Cast Iron GR FG 260 to IS 210 Lobe – Cast Iron GR FG 260 to IS 210 Shaft – Carbon Steel to EN 8
(x)	Accessories	With acoustic enclosure for each blower
(xi)	Drive motor	415V, 3Φ, 50 HZ TEFC, Energy Efficiency Class IE-3 as per IS : 12615
(xii)	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.
(xiii)	Dynamic Balancing Test	To be provided
3.0	EXTERNAL REGENERATION FACILITIES (Consists of 2 sets of external regeneration)	
3.1	REGENERATION VESSELS	
a.	RESIN SEPARATION AND CATION RESIN REGENERATION VESSEL (FOR BOTH REGENERATION SYSTEM 1ST & 2ND)	
(i)	Total Number required	Two (2) nos. vessel
(ii)	Design Temperature	60°C

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(iii)	Minimum Design Pressure	Design pressure shall be the maximum expected pressure to which the vessel may be subjected plus 5% extra margin, Maximum expected pressure for vessels placed in the discharge line of pumps shall be based on the shut-off head of the pumps plus static head at pump suction or 10 kg/cm ² (g) whichever is maximum.
(iv)	Type	Vertical Cylindrical
(v)	Material of construction	
	Shell	Carbon steel plates to SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
	Head	Carbon steel plates to SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
(vi)	Inside protection	Inside lined with Natural Rubber [4.5 mm thick in (3) layers] with shore hardness 65 ± 5 in Scale-A.
(vii)	Design code	ASME Sec VIII div 1 (Latest edition) / IS 2825 as applicable
(viii)	Free board	Not less than 100%
b.	ANION RESIN REGENERATION VESSEL (FOR BOTH REGENERATION SYSTEM 1ST & 2ND)	
(i)	Total Number required	Two (2) nos. vessel
(ii)	Design Temperature	60°C
(iii)	Minimum Design Pressure	Design pressure shall be the maximum expected pressure to which the vessel may be subjected plus 5% extra margin, Maximum expected pressure for vessels placed in the discharge line of pumps shall be based on the shut-off head of the pumps plus static head at pump suction or 10 kg/cm ² (g) whichever is maximum.
(iv)	Type	Vertical Cylindrical
(v)	Material of construction	
	Shell	Carbon steel plates to SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
	Dished ends	Carbon steel plates to SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
(vi)	Inside protection	Inside lined with Natural Rubber [4.5 mm thick in (3) layers] with shore hardness 65 ± 5 in Scale-A.
(vii)	Design code	ASME Sec VIII div 1 (Latest edition) / IS 2825 as applicable
(viii)	Free board	Not less than 100%
c.	MIXED RESIN STORAGE VESSEL (FOR BOTH REGENERATION SYSTEM 1ST & 2ND)	
(i)	Total Number required	Two (2) nos. vessel
(ii)	Design Temperature	60°C
(iii)	Minimum Design Pressure	Design pressure shall be the maximum expected pressure to which the vessel may be subjected plus 5% extra margin, Maximum expected pressure for vessels placed in the discharge line of pumps shall be based on the shut-off head of the pumps plus static head at pump suction or 10 kg/cm ² (g) whichever is maximum.
(iv)	Type	Vertical Cylindrical
(v)	Material of construction	
	Shell	Carbon steel plates to SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
	Dished ends	Carbon steel plates to SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
(vi)	Inside protection	Inside lined with Natural Rubber [4.5 mm thick in (3) layers] with shore hardness 65 ± 5 in Scale-A.
(vii)	Design code	ASME Sec VIII div 1 (Latest edition) / IS 2825 as applicable
(viii)	Free board	Not less than 100%
d.	Resin traps at the common outlet header of regeneration vessels	2 nos. (Body :CSRL with SS 316 Internals)
e.	Accessories	Operating platforms, ladders, supports, lifting lugs (4 nos. minimum), handhold (1 no. of 150mm dia) & manhole (Minimum-2 nos.) etc. for each vessel shall be provided.

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

	The vessels indicated against sr. no. a, b and c above is for reference only. Please note that number and type of regeneration vessels shall be as per supplier recommendation only.		
3.2	BULK ACID STORAGE TANKS (FOR BOTH REGENEARTION SYSTEM 1ST & 2ND)		
(i)	CHEMICAL TANKS	Acid Storage Tank for 1 st set of Regeneration system	Acid Storage Tank for 2 nd set of Regeneration system
(ii)	Number required	Two (2) Nos.	Two (2) Nos.
(iii)	Design code	-----As per BSEN : 12285 or equivalent -----	
(iv)	Dimensions (diameter, length & thickness)	-----As per BSEN : 12285 or equivalent -----	
(v)	Location	-----Outdoor-----	
(vi)	Useful capacity	Capacity of both tanks together shall adequate to hold the quantity of commercial Acid (30-33% HCl) required for thirty (30) days of operation of 2 TG Units complete cation resin regeneration requirement plus acid required to neutralize excess alkali present in regeneration waste of 1 st set of regeneration system.	Capacity of both tanks together shall adequate to hold the quantity of commercial Acid (30-33% HCl) required for thirty (30) days of operation of 3 TG Units complete cation resin regeneration requirement plus acid required to neutralize excess alkali present in regeneration waste of 2 nd set of regeneration system.
(vii)	Type and Pressure class	Horizontal cylindrical with dished ends, atmospheric, above ground	
(viii)	Material of construction	Shell - SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70. Dished Ends- SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.	
(ix)	Protection – Inside	Inside lined with Natural Rubber [4.5 mm thick in (3) layers]. with shore hardness 65 ± 5 in Scale-A.	
(x)	Protection – Outside/Painting	As per BHEL/ TSGENCO approved painting schedule	
(xi)	Concentration	30 -33 % HCl	30 -33 % HCl
(xii)	Accessories for each tank	Vent, overflow, Drain, fume absorber cum seal pot, sample connection , Manhole (2 nos. Minimum), operating platform, ladders, lifting lugs (4 nos. Minimum) etc.	
(xiii)	Pipe & flanges M.O.C.	CPVC Sch.80 minimum	
(xiv)	Valve M.O.C.	CPVC PN 10 minimum	
(xv)	Manhole, staircase	To be Provided	To be Provided
3.3	BULK ALKALI STORAGE TANKS (FOR BOTH REGENEARTION SYSTEM 1ST & 2ND)		
(i)	CHEMICAL TANKS	Alkali Storage Tank for 1 st set of Regeneration system	Alkali Storage Tank for 2 nd set of Regeneration system
(ii)	Number required	Two (2) nos.	Two (2) nos.
(iii)	Design code	-----As per BSEN : 12285 or equivalent -----	
(iv)	Dimensions (diameter, length & thickness)	-----As per BSEN : 12285 or equivalent -----	
(v)	Location	-----Outdoor-----	

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(vi)	Useful capacity	Capacity of both tanks together shall adequate to hold the quantity of commercial Alkali required for thirty (30) days of operation of 2 TG Units complete anion resin regeneration requirement plus alkali required to neutralize excess acid present in regeneration waste of 1st set of regeneration system.	Capacity of both tanks together shall adequate to hold the quantity of commercial Alkali required for thirty (30) days of operation of 3 TG Units complete anion resin regeneration requirement plus alkali required to neutralize excess acid present in regeneration waste of 2nd set of regeneration system.
(vii)	Type and Pressure class	Horizontal cylindrical with dished ends, atmospheric, above ground	
(viii)	Material of construction	Shell - SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70. Dished Ends- SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.	
(ix)	Protection – Inside	Inside lined with Natural Rubber [4.5 mm thick in (3) layers]. with shore hardness 65 ± 5 in Scale-A.	
(x)	Protection – Outside/Painting	As per BHEL/ TSGENCO approved painting schedule	
(xi)	Concentration	48 % NaOH	48 % NaOH
(xii)	Accessories	Vent, overflow, Drain, CO2 absorber ,seal pot, sample connection ,spare connection ,Manhole (2 nos. Minimum), operating platform, ladders, lifting lugs (4 nos. Minimum) etc.	
(xiii)	Pipe & flanges M.O.C.	CPVC Sch.80 minimum	
(xiv)	Valve M.O.C.	CPVC PN 10 minimum	
(xv)	Manhole, staircase	Provided	Provided
3.4	ACID UNLOADING / TRANSFER PUMPS(FOR BOTH REGENEARTION SYSTEM 1ST & 2ND)		
(i)	PUMPS	Acid Unloading/Transfer Pumps for 1 st set of Regeneration system	Acid Unloading/Transfer Pumps for 2 nd set of Regeneration system
(ii)	Number required	Two (2x100%) nos. (1W+1S)	Two (2x100%) nos. (1W+1S)
(iii)	Type	-----Horizontal Centrifugal-----	
(iv)	Location	-----Outdoor-----	
(v)	Service	-----Intermittent-----	
(vi)	Pressure gauge	----- One per pump with Teflon diaphragm seal-----	
(vii)	Capacity and head	-----10 m3 / hr and 10 MLC (minimum)-----	
(viii)	Liquid to be handled	30 -33 % HCL	30 -33 % HCL
(ix)	Material of construction		
	Casing	Polypropylene	Polypropylene
	Impeller	Polypropylene	Polypropylene
	Shaft	BS-970 Hardened Steel EN8	BS-970 Hardened Steel EN8
	Types of shaft sealing	Mechanical seal	Mechanical seal
(x)	Pump speed	1500 rpm	1500 rpm
(xi)	Drive motor	415V, 3Φ, 50 HZ TEFC, Energy Efficiency Class IE-3 as per IS : 12615	
(xii)	Accessories required	Coupling guard, drain plug, vent valve ,suction hoses, isolation valves, Y- type strainers etc. for each pump.	
(xiii)	Type of coupling between motor and pump	Flexible coupling	
(xiv)	Reinforced rubber house with coupling and isolation valve	Two (2) Nos. of size 80NB, minimum 20 meter length with isolation valve, Reinforced Chemical Resistant Rubber	Two (2) Nos. of size 80NB, minimum 20 meter length with isolation valve, Reinforced Chemical Resistant Rubber

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(xv)	MOC for piping, valves & fittings in acid handling	For valve -CPVC PN10 minimum, For piping, flanges & fittings –CPVC Sch. 80 minimum	
(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)	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).	
(xviii)	Dynamic Balancing Test	To be provided	
3.5	ALKALI UNLOADING / TRANSFER PUMPS(FOR BOTH REGENEARTION SYSTEM 1ST & 2ND)		
(i)	PUMPS	Alkali unloading/Transfer pumps for 1st set of Regeneration system	Alkali unloading/Transfer pumps for 2nd set of Regeneration system
(ii)	Number required	Two (2x100%) nos. (1W+1S)	Two (2x100%) nos. (1W+1S)
(iii)	Type	-----Horizontal Centrifugal-----	
(iv)	Location	-----Outdoor-----	
(v)	Service	-----Intermittent-----	
(vi)	Pressure gauge	----- One per pump with Teflon diaphragm seal-----	
(vii)	Capacity and head	-----10 m3 / hr and 10 MLC (minimum)-----	
(viii)	Liquid to be handled	48% NaOH	48% NaOH
(ix)	Material of construction		
	Casing	SS-316	SS-316
	Impeller	SS-316	SS-316
	Shaft	SS-410	SS-410
	Types of shaft sealing	Mechanical seal	Mechanical seal
(x)	Pump speed	1500 rpm	1500 rpm
(xi)	Drive motor	415V, 3Φ, 50 HZ TEFC, Energy Efficiency Class IE-3 as per IS : 12615	
(xii)	Accessories required	Coupling guard, drain plug, vent valve ,suction hoses, isolation valves, Y- type strainers etc. for each pump.	
(xiii)	Type of coupling between motor and pump	Flexible coupling	
(xiv)	Reinforced rubber house with coupling and isolation valve	Two (2) Nos. of size 80NB, minimum 20 meter length with isolation valve, Reinforced Chemical Resistant Rubber	Two (2) Nos. of size 80NB, minimum 20 meter length with isolation valve, Reinforced Chemical Resistant Rubber
(xv)	MOC for piping, valves & fittings in alkali handling	For valve -CPVC PN10 minimum, For piping, flanges & fittings –CPVC Sch. 80 minimum	
(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)	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).	
(xviii)	Dynamic Balancing Test	To be provided	
3.6	CHEMICAL HANDLING, PREPARATION & DOSING SYSTEM		
a)	ALKALI TRANSFER CUM RECIRCULATION PUMPS WITH MOTOR(FOR BOTH REGENEARTION SYSTEM 1ST & 2ND)		
(i)	Total Nos. required	Four (4x100%) (2 W+ 2 SB)	
(ii)	Type	Horizontal, centrifugal	
(iii)	Service	Intermittent	
(iv)	Location	Outdoor	

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(v)	Pressure gauge	One per pump with Teflon diaphragm seal	
(vi)	Maximum Pump Speed	1500 rpm	
(vii)	Type of Coupling between pump & motor drive	As per manufacturer's standard practice	
(viii)	Type of Sealing	Mechanical Seal	
(ix)	Type of Suction Strainer	Y- Type	
(x)	Concentration of working media.	44 - 48% Sodium Hydroxide (NaOH)	
(xi)	Capacity & head of each pump	10 m ³ /hr & 10 MLC (minimum)	
(xii)	Suction condition	Flooded	
(xiii)	Materials of construction		
a.	Casing, impeller	Stainless Steel – 316	
b.	Shaft	Stainless Steel -410	
(xiv)	Drive motor	415V, 3Φ, 50 HZ TEFC, Energy Efficiency Class IE-3 as per IS : 12615	
(xv)	Accessories required	Coupling guard, drain plug, vent valve , isolation valves, Y- type strainers etc. for each pump.	
(xvi)	Type of coupling between motor and pump	Flexible coupling	
(xvii)	MOC for piping, valves & fittings in alkali handling	For valve -CPVC PN10 minimum, For piping, flanges & fittings –CPVC Sch. 80 minimum	
(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)	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)	Dynamic Balancing Test	To be provided	
b)	CHEMICAL TANKS (FOR BOTH REGENERATION SYSTEM 1ST & 2ND)	ALKALI MEASURING CUM PREPEARTION TANK	ACID MEASURING TANK
(i)	Total Number required	Two (2) nos.	Two (2) nos.
(ii)	Type	Vertical cylindrical atmospheric with dished bottom and cover at top	
(iii)	Liquid to be handled	48% NaOH	30-33% HCL
(iv)	Location	----- To be designed for indoor duty -----	
(v)	Useful capacity (each tank)	Adequate to hold quantity of alkali required (48% NaOH) for single regeneration of a condensate polisher mixed bed with 20% overall margin.	Adequate to hold quantity of acid required (30-33% HCL) for single regeneration of a condensate polisher mixed bed with 20% overall margin.
(vi)	Material (Shell, Dished end & top cover)	Shell - SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70. Dished Ends- SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70. Top cover - SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.	
(vii)	Internal protection	Inside lined with Natural Rubber [4.5 mm thick in (3) layers]. with shore hardness 65 ± 5 in Scale-A.	
(viii)	External painting	As per BHEL/ TSGENCO approved painting schedule	
(ix)	Level indicator	Provided	Provided
(x)	Level transmitter per tank	As per CPU P&ID	As per CPU P&ID
(xi)	Stirrer per tank	Slow speed stirrer driven by motor drive and reduction gear. Speed of stirrer = 200 RPM Max.	Not Applicable

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(xii)	MOC of Agitator	SS – 316	Not Applicable
(xiii)	Drive motor of stirrer	Energy Efficiency Class IE-3 as per IS : 12615	Not Applicable
(xiv)	Dissolving Basket	Provide (50-60 mesh B.S.)	Not Applicable
(xv)	MOC of Basket	SS – 316	Not Applicable
(xvi)	Accessories	Fume absorbers, carbon dioxide absorber, vent, overflow, drain connection, overflow seal pot, sample connection, level gauge, level transmitter, operating platform, ladders, lifting lugs (4 Nos. minimum), manhole, hand hole etc.	
c)	DOSING PUMPS (FOR BOTH REGENERATION SYSTEM 1ST & 2ND)	ACID DOSING PUMPS	ALKALI DOSING PUMPS
(i)	Total number required	Four (4x100%) nos. (2W+ 2SB)	Four (4x100%) nos. (2W+ 2SB)
(ii)	Type	Positive displacement and hydraulic operated diaphragm type with stroke adjustment	
(iii)	Duty	Continuous and suitable for parallel operation	
(iv)	Design Temperature(in°C)	60	
(v)	Fluid to be handled	Commercial (30-33%) Hydrochloric Acid	Commercial (40-48%) Sodium Hydroxide
(vi)	Suction Condition	Flooded	
(vii)	Location	Indoor	
(viii)	Whether suction strainer required	----- Yes -----	
(ix)	Range of operation (%)	0-100%	
(x)	Material of construction		
	Liquid End (Pump Head, Valves, Valve housing, valve spring etc.)	Polypropylene	SS-316
	Diaphragm	-----PTFE-----	
	Packing	-----PTFE-----	
	Shaft	----- Hardened steel EN 8 (BS : 970)-----	
	Worm & worm wheel (if applicable)	-----Manganese Bronze -----	
	Connecting rod	-----Manganese Bronze -----	
	Cross head guide	-----Bronze -----	
(xi)	Capacity & head for each pump	Capable of meeting regeneration one cation /Anion unit (with 20% margin); head as per system requirement.	
(xii)	Accessories		
	Pressure/Pulsation Dampener	One per pump	One per pump
	External safety relief valve (in addition to inbuilt safety valve)	Four (One per pump) MOC -Polypropylene	Four (One per pump) MOC- SS-316
	MOC of safety relief valve	Poly propylene	SS-316
(xiii)	Pressure gauge	----- One per pump with Teflon diaphragm seal -----	
(xiv)	Pump Speed, (RPM)	1500 rpm	
(xv)	Maximum pump stroke speed per minute	----- 100 -----	
(xvi)	Accessories required for each pump	Coupling guard, drain plug, vent valve, isolation valves, Y-type strainers, pressure gauges, pulsation dampener etc.	
(xvii)	Drive motor of pump	The drive motor of each pump will be Energy Efficiency Class IE-3 as per IS : 12615	

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(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)	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)	Material Test required for	Casing, Impeller, Shaft and Shaft Sleeve.	
(xxii)	Hydro-test	As per IS-1520 and IS-5120.	
(xxiii)	Dynamic Balancing Test	To be provided	
(xxiv)	Instruments along with alarms, interlocks and accessories	To be provided as per the requirements of the Tender Specification and CPU tender P&ID Drawings.	
(xxv)	Start and stop facility provided both at local and remote	To be provided in conjunction with Auto Start Facility.	
(xxvi)	Trip interlock	To be provided.	
d)	Density Meter	Acid	Alkali
(i)	Total Number	One (1) at each mixing tee outlet (Total 2 nos.)	One (1) at each mixing tee outlet (Total 2 nos.)
(ii)	Type	Density indicator (Hydrometer type)	Density indicator (Hydrometer type)
(iii)	Indication	Local	Local
(iv)	Location	Diluted Acid line	Diluted Alkali line
e)	Flow Indicator		
(i)	Number	One in each DM water line(Total 2 nos.)	One in each DM water line(Total 2 nos.)
(ii)	Type	Rotameter	Rotameter
f)	Flow Transmitter	One in each water line (Total 4 nos.) /As per CPU tender P&ID	
g)	Concentration Analyzer	One (1) at each mixing tee outlet (Total 4 nos.)/ As per CPU tender P&ID	
3.7	ACTIVATED CARBON FILTER FOR ALKALI(FOR BOTH REGENEARTION SYSTEM 1ST & 2ND)		
(i)	Total Numbers required	Two (2) nos.	
(ii)	Type	Vertical cylindrical with dished ends	
(iii)	Design Pressure	Design pressure shall be the maximum expected pressure to which the vessel may be subjected plus 5% extra margin. Maximum expected pressure for vessels placed in the discharge line of pumps shall be based on the shut-off head of the pumps plus static head at pump suction or 10 kg/cm2(g) whichever is maximum	
(iv)	Time Period for each Service Cycle between two consecutive regenerations, in hrs.	24	
(v)	Design Temperature(in °C)	60	
(vi)	Capacity	10 m3/hr (minimum) or Not less than the design capacity of alkali transfer cum recirculation pump	
(vii)	Surface flow rate/Velocity through each ACF	Not more than 15 m3/m2 /hr	
(viii)	Bed depth	1200mm activated carbon + 300 mm Gravel support (Min)	
(ix)	Percentage Free board	75% minimum	
(x)	Pressure gauge	As per CPU tender P&ID.	

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(xi)	Number and Location	Two Nos. for each filter
(xii)	Seal	Teflon diaphragm
(xiii)	Material of construction	
	Shell	Carbon steel plates to IS 2062 / SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
	Dish ends /Head	Carbon steel plates to IS 2002 Gr. 2A / SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
(xiv)	Inside protection	Inside lined with Natural Rubber [4.5 mm thick in (3) layers] with shore hardness 65 ± 5 in Scale-A.
(xv)	Design code	ASME sec VIII div 1 Latest edition / IS 2825 as applicable
(xvi)	Influent Distributor Material	SS 316
(xvii)	Backwash	DM water
(xviii)	Backwash Velocity	As per system requirement
(xix)	Manhole for each ACF	Two (2) nos. minimum each of Davit type and 500 mm dia.
(xx)	Sight Windows for each ACF	One (1) no. in backwash space
(xxi)	Hand hole for each ACF	One (1) no. of 150 mm dia for removal of activated carbon.
(xxii)	Accessories for each ACF	Manhole, vent drain, sample connection, operating platforms, ladders, supports, lifting lugs (4 nos. min) etc.
3.8	ALKALI DILLUENT WATER HEATING TANK (HOT WATER TANK) (FOR BOTH REGENEARTION SYSTEM 1ST & 2ND)	
(i)	Total Numbers required	Two (2) nos.
(ii)	Type/Capacity of each HWT	Vertical Cylindrical with dished end with Electric heater / 120% of water required for single regeneration of a condensate polisher mixed bed.
(iii)	Design Temperature (in °C)	60
(iv)	Electric heater Qty. for each HWT	2 nos. Electric heater (2X60%)
(v)	Temperature of alkali to be heated for each HWT	To obtain temp. from 15°C of 50°C at alkali mixing feed out let within 5 hours.
(vi)	Design Pressure	Design pressure shall be the maximum expected pressure to which the vessel may be subjected plus 5% extra margin. Maximum expected pressure for vessels placed in the discharge line of pumps shall be based on the shut-off head of the pumps plus static head at pump suction or 10 kg/cm ² (g) whichever is maximum
(vii)	Material of construction	
	Shell	Carbon steel plates to SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
	dished end	Carbon steel plates to SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.
(viii)	Design code	ASME sec VIII div 1 latest edition / IS 2825 as applicable
(ix)	Temperature gauge, Temp. transmitters	To be provided by the bidder (as per P&ID)
(x)	Burn out protection for each HWT	To be provided by the bidder
(xi)	Inside protection	Inside lined with Natural Rubber [8.0 mm thick in (6) layers] with shore hardness 65 ± 5 in Scale-A suitable for temperature 70°C.
(xii)	Accessories for each HWT	Manhole , vent, drain, sample connection, level transmitter, level

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

		gauges -2 nos. (minimum), operating platform, ladders, lifting lugs (4 Nos. minimum) etc.
3.9	CPU REGENERATION CUM RESIN TRANSFER PUMPS FOR BOTH REGENEARTION SYSTEM 1ST & 2ND)	
(i)	Total Numbers required	Four (4x100%) nos. (2W+2SB)
(ii)	Type	Horizontal, centrifugal
(iii)	Operation	Intermittent
(iv)	Liquid to be handled	DM Water
(v)	Capacity & head	To be selected by the Bidder as necessary to meet the system requirements
(vi)	Suction condition	Flooded
(vii)	Material of construction	
	• Casing & impeller	SS 316/ ASTM A 351 CF 8M
	• Shaft	SS 410
	• Wearing rings	As per manufacturer's Standard
	• Shaft sleeve material	SS 410
(viii)	Packing seal	Mechanical type
(ix)	Mechanical Seal	To be Provided by bidder
(x)	Pump Speed	Maximum 1500 rpm
(xi)	Pressure gauge	One for each pump with Teflon diaphragm seal
(xii)	Recirculation line with motor actuated valve	Provided
(xiii)	Accessories required for each pump	Common base plate, Coupling guard, drain plug, vent valve, isolation valves, Y-type strainers, pressure gauges, pulsation dampener etc.
(xiv)	Drive motor	The drive motor of each Pump will be Energy Efficiency Class IE-3 as per IS : 12615
(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)	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).
(xvii)	Dynamic Balancing Test	To be provided
3.10	AIR-BLOWERS FOR RESIN MIXING (REGENERATION AREA) (FOR BOTH REGENEARTION SYSTEM 1ST & 2ND)	
(i)	Total Numbers required	Four (4x100%) Nos. (2W+2SB) with acoustic enclosure
(ii)	Type	Rotary ,Twin lobe type, oil free, positive displacement
(iii)	Location	Indoor
(iv)	Duty	Intermittent
(v)	Capacity and head	As per system requirement
(vi)	Noise Level	85 dB (A) Max. at one meter
(vii)	Pressure gauge	One per blower
(viii)	Material of construction	Casing – Cast Iron GR FG 260 to IS 210 Lobe – Cast Iron GR FG 260 to IS 210 Shaft – Carbon Steel to EN 8
(ix)	Drive motor	The drive motor of each air blower will be Energy Efficiency Class IE-3 as per IS : 12615
(x)	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.

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(xi)	Dynamic Balancing Test	To be provided
4.0	NEUTRALISING SYSTEM	
4.1	Neutralization Pit for 1st set of Regeneration system	
(i)	Number	One (1) no. Pit with two (2) compartments
(ii)	Type	Necessary air grid arrangement of polypropylene construction shall be provided by bidder in each compartment for effective neutralization of the waste effluent for air agitation
(iii)	Material of Construction	RCC inside lined with PVC sheet (3 mm thick).
(iv)	No. of compartments	Two compartments
(v)	Capacity of each compartment	Adequate to hold the quantity of waste effluent generated due to single regeneration of Condensate Polisher Mixed Bed plus 20% overall margin.
(vi)	Gates	Four Nos. (in bidder's scope) for each neutralization pit. MOC of the gates will be Carbon Steel rubber lined.
4.2	Neutralization Pit for 2nd set of Regeneration system	
(i)	Number	One (1) no. Pit with two (2) compartments
(ii)	Type	Necessary air grid arrangement of polypropylene construction shall be provided by bidder in each compartment for effective neutralization of the waste effluent for air agitation
(iii)	Material of Construction	RCC inside lined with PVC sheet (3 mm thick).
(iv)	No. of compartments	Two compartments
(v)	Capacity of each compartment	Adequate to hold the quantity of waste effluent generated due to single regeneration of Condensate Polisher Mixed Bed plus 20% overall margin.
(vi)	Gates	Four Nos. (in bidder's scope) for each neutralization pit. MOC of the gates will be Carbon Steel rubber lined.
4.3	Neutralization Pit Disposal Pumps for 1st set of Regeneration system	
(i)	Number	Two (2X100%) nos. (1 working + 1 Standby)
(ii)	Type	Vertical Centrifugal
(iii)	Capacity & head	Capacity= 100 M3/Hr min. (To be increased by the Bidder if necessary to transfer the waste of single regeneration of the resins of a Condensate Polisher Mixed Bed within four (4) hours) Head- As per system requirement (Margins shall be considered as defined elsewhere in this Technical specification under section C1)
(iv)	Duty	Intermittent
(v)	Pump Speed	1500 rpm
(vi)	Drive motor	Induction motor 415V, 3 phase 50Hz, TEFC ; Energy Efficiency Class IE-3 as per IS : 12615
(vii)	Material of Construction	
	Casing	SS-316 / Stainless Steel CF 8M
	Impeller	SS-316 / Stainless Steel CF 8M
	Shaft	SS-410
(viii)	Drive motor	The drive motor of each air blower will be Energy Efficiency Class IE-3 as per IS : 12615
(ix)	Accessories required for each pump	Base plate, Coupling guard, drain plug, vent valve, isolation valves, Y-type strainers, pressure gauges, Pressure transmitter ,pulsation dampener etc.
(x)	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.

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(xi)	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).	
(xii)	Dynamic Balancing Test	To be provided	
4.4	Neutralization Pit Disposal Pumps for 2nd set of Regeneration system		
(i)	Number	Two (2X100%) nos. (1 working + 1 Standby)	
(ii)	Type	Vertical Centrifugal	
(iii)	Capacity & head	Capacity= 100 M3/Hr min. (To be increased by the Bidder if necessary to transfer the waste of single regeneration of the resins of a Condensate Polisher Mixed Bed within four (4) hours) Head- As per system requirement (Margins shall be considered as defined elsewhere in this Technical specification under section C1)	
(iv)	Duty	Intermittent	
(v)	Pump Speed	1500 rpm	
(vi)	Drive motor	Induction motor 415V, 3 phase 50Hz, TEFC ; Energy Efficiency Class IE-3 as per IS : 12615	
(vii)	Material of Construction		
	Casing	SS-316 / Stainless Steel CF 8M	
	Impeller	SS-316 / Stainless Steel CF 8M	
	Shaft	SS-410	
(viii)	Drive motor	The drive motor of each air blower will be Energy Efficiency Class IE-3 as per IS : 12615	
(ix)	Accessories required for each pump	Base plate, Coupling guard, drain plug, vent valve, isolation valves, Y-type strainers, pressure gauges, Pressure transmitter ,pulsation dampener etc.	
(x)	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.	
(xi)	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).	
(xii)	Dynamic Balancing Test	To be provided	
4.5	Chemical Tanks for N-pit	Acid Measuring Tank –N. pit for 1st set of Regeneration system	Acid Measuring Tank –N. pit for 2nd set of Regeneration system
(i)	Number required	One (1) No.	One (1) No.
(ii)	Type	Vertical cylindrical atmospheric with dished bottom and cover at top	
(iii)	Location	----- To be designed for outdoor duty -----	
(iv)	Liquid to be handled	30-33% HCL	30-33% HCL
(v)	Useful capacity for each tank	Suitable to meet the requirement for neutralisation of excess alkali present in the regeneration waste effluent from CPU + 20% margin	
(vi)	Material (Shell, Dished end & top cover)	Shell - SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70. Dished Ends- SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70. Top cover - SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.	
(vii)	Internal protection	Inside lined with Natural Rubber [4.5 mm thick in (3) layers]. with shore hardness 65 ± 5 in Scale-A.	
(viii)	External painting	As per BHEL/ TSGENCO approved painting schedule.	
(ix)	Level indicator for each tank	Provided	Provided
(x)	Level transmitter per tank	As per CPU tender P&ID	As per CPU tender P&ID
(xi)	Vent, Overflow, drain connection	Provided	Provided

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(xii)	Accessories	Fume absorbers cum over flow seal pot , vent, overflow, drain connection, sample connection, level gauge, level transmitter, operating platform, ladders, lifting lugs (4 Nos. minimum), manhole, hand hole etc.	
4.6	Chemical Tanks for N-pit	Alkali Measuring Tank–N. pit for 1st set of Regeneration system	Alkali Measuring Tank–N. pit for 2nd set of Regeneration system
(i)	Number required	One (1) No.	One (1) No.
(ii)	Type	Vertical cylindrical atmospheric with dished bottom and cover at top	
(iii)	Location	----- To be designed for outdoor duty -----	
(iv)	Liquid to be handled	48% NaOH	48% NaOH
(v)	Useful capacity for each tank	Suitable to meet the requirement for neutralisation of excess acid/alkali present in the regeneration waste effluent from CPU + 20% margin	
(vi)	Material (Shell, Dished end & top cover)	Shell - SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70. Dished Ends- SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70. Top cover - SA 515 Gr. 60 or 70 / SA 516 Gr. 60 or 70.	
	Internal protection	Inside lined with Natural Rubber [4.5 mm thick in (3) layers]. with shore hardness 65 ± 5 in Scale-A.	
	External painting	As per BHEL/ TSGENCO approved painting schedule.	
(vii)	Level indicator for each tank	Provided	Provided
(viii)	Level transmitter per tank	As per CPU tender P&ID	As per CPU tender P&ID
(ix)	Vent, Overflow, drain connection	Provided	Provided
(x)	Stirrer per tank	Slow speed stirrer driven by motor drive and reduction gear. Speed of stirrer = 200 RPM Max.	Slow speed stirrer driven by motor drive and reduction gear. Speed of stirrer = 200 RPM Max.
(xi)	MOC of Agitator	SS – 316	SS – 316
(xii)	Drive motor of stirrer	Energy Efficiency Class IE-3 as per IS : 12615	Energy Efficiency Class IE-3 as per IS : 12615
(xiii)	Dissolving Basket	Provide (50-60 mesh B.S.)	Provide (50-60 mesh B.S.)
(xiv)	MOC of Basket	SS – 316	SS – 316
(xv)	Accessories	carbon dioxide absorber, hand hole, vent, drain, sample connection, level gauge, level transmitter, operating platform, ladders, lifting lugs (4 Nos. minimum) ,manhole etc.	
5.0	PIPING & VALVES		
(i)	Resin Transfer piping	ASTM A 312 Gr. TP 304 Schedule 10S; Minimum pipe Size: NB80 Velocity : 2-3 m/s	
(ii)	DM water line	ASTM A 312 Gr. TP 304 Schedule 40S for Piping less than and equal to 50 mm NB & ASTM A 312 Gr. TP 304 Schedule 10S for piping equal to greater than 65 mm NB	
(iii)	Piping-Service Vessel Inlet	Piping-ASTM A 106 Gr C Ball Valves – SS-(CF8M) BFV – ASTM A 216 Gr. WCB- Body SS-(CF8M) - disc.	
(iv)	Piping-Service vessel Outlet	Piping – ASTMA 106 Gr. C BFV – SS-(CF8M) - Body & disc both. Ball Valves – SS-(CF8M)	

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(v)	Service vessel bypass piping (Butterfly Valves)	Piping – ASTM 106 Gr. C BFV – ASTM A 216 Gr. WCB – body CF8M -Disc
(vi)	Service vessel rinse piping & rinse recirculation pumps suction and discharge piping	CS to ASTM A 106 Gr. B
(vii)	Effluent Transfer Piping	Piping, & Fittings shall be CSRL only & valves shall be minimum PN 10 rating.
(viii)	Acid & Alkali Regeneration piping all concentration (Diaphragm Valves)	All piping, Valves & Fittings in regeneration area shall be CPVC Sch. 80 (minimum) only & valves shall be PN 10 rating (minimum).
(ix)	Acid / Alkali Transfer piping all concentration (Diaphragm Valves)	All piping, Valves & Fittings in regeneration area shall be CPVC Sch. 80 (minimum) only & valves shall be PN 10 rating (minimum).
(x)	Instrument Air/ service air piping	ASTM A 312 Gr. TP 304 Schedule 40S for Piping less than and equal to 50 mm NB & ASTM A 312 Gr. TP 304 Schedule 10S for piping equal to greater than 65 mm NB
(xi)	Piping for air blower	Hot dip MS galvanized (heavy grade).
(xii)	Sampling Pipe	Stainless Steel to ASTM Schedule-10.
(xiii)	Service water	ERW Carbon Steel Pipe to ASTM 53 Gr. B / IS-1239, Part-I heavy grade for pipe size up to 150mm NB and IS-3589 for 200mm NB & above
6.0	VALVES	
(i)	BUTTERFLY VALVES	Butterfly valves shall be of low leakage rate confirming to AWWA-C-504 or EN593/ BS:5155 PN 10 (min.) All the butterfly valves shall be provided with Hand wheel or lever as per the requirements. For larger sizes i.e. 150 NB and above valve provided with motorized or pneumatic actuator shall be provided with a hand wheel for manual operation. All the valves shall be equipped with adjustable mechanical stop-limiting devices to prevent over travel of the valve disc in the open and closed positions. The valve operators (Hand wheel or Gear reduction unit or Motor actuator etc.) shall be designed as per relevant International Standard. All the butterfly valves shall be provided with an indicator to show the position of the disc. Flanges shall conform to ANSI B 16.5 CL300 (min.) used for Service vessel area. Butterfly valves shall be lugged wafer type of construction. However specifically mentioned bypass control valves type will be as defined elsewhere in this technical specification.
(ii)	BALL VALVE	These valves shall be used for resin transfer line. These valves shall be flanged type and of SS 316 construction.

	TITLE: 5X800 MW YADADRI THERMAL POWER STATION	SPECIFICATION NO. PE-TS-417-155A-A001	
		SECTION : I	
	TECHNICAL SPECIFICATION FOR CONDENSATE POLISHING UNIT	SUB-SECTION: 1A	
		REV. NO. 00	DATE :

(iii)	DIAPHRAGM VALVE	The Diaphragm shall conform to following requirement for DM water application: i) Design standard: BS: 5156 or equivalent of required rating / class. (Minimum rating of valves shall be PN 10). ii) Type: Flanged and lined body ends, sealed bonnet, weir pattern, tight shut off type iii) Material of Construction a) Body, Bonnet: Cast iron IS 210 Gr. FG 260 or equivalent or Cast steel ASTM A-216 Gr. WCB b) Body lining: Soft natural rubber(Neoprene), ebonite, Polypropylene c) Hand wheel: Cast Iron d) Compressor: Stainless Steel (SS-316) e) Stem and Bush: Stainless Steel For Acid and Alkali services the valve shall be CPVC PN10 (minimum) only.
(iv)	Other Type of valves (Globe, NRV, pressure relief valve, pressure reducing valve etc.)	The same shall be as defined in Section –II A of this specification under chapter Low pressure piping (for #150 class/PN10 valves) and high pressure piping (for #300 class valves).
7.0	SAFETY EQUIPMENTS	Four (4) sets of safety equipment comprising PVC protection suits with hoods, rubber boots, face visors and thick PVC gauntlets shall also be provided. Three number personnel water drench shower/safety shower and eye bath each in regeneration area & acid/alkali storage area shall be provided by the bidder.
8.0	Painting	Painting of all equipments of CPU service vessel area and CPU regeneration area equipments shall be as per TSGENCO approved painting schedule.
9.0	Inspection & Testing	Inspection and testing of all equipments of CPU service vessel area and CPU regeneration area equipments shall be as per TSGENCO approved QAP.



TITLE:
**5X800 MW YADADRI THERMAL POWER
STATION**

SPECIFICATION NO. PE-TS-417-155A-
A001

SECTION : I

**TECHNICAL SPECIFICATION FOR
CONDENSATE POLISHING UNIT**

SUB-SECTION: 1A

REV. NO. 00

DATE :

10.0 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.

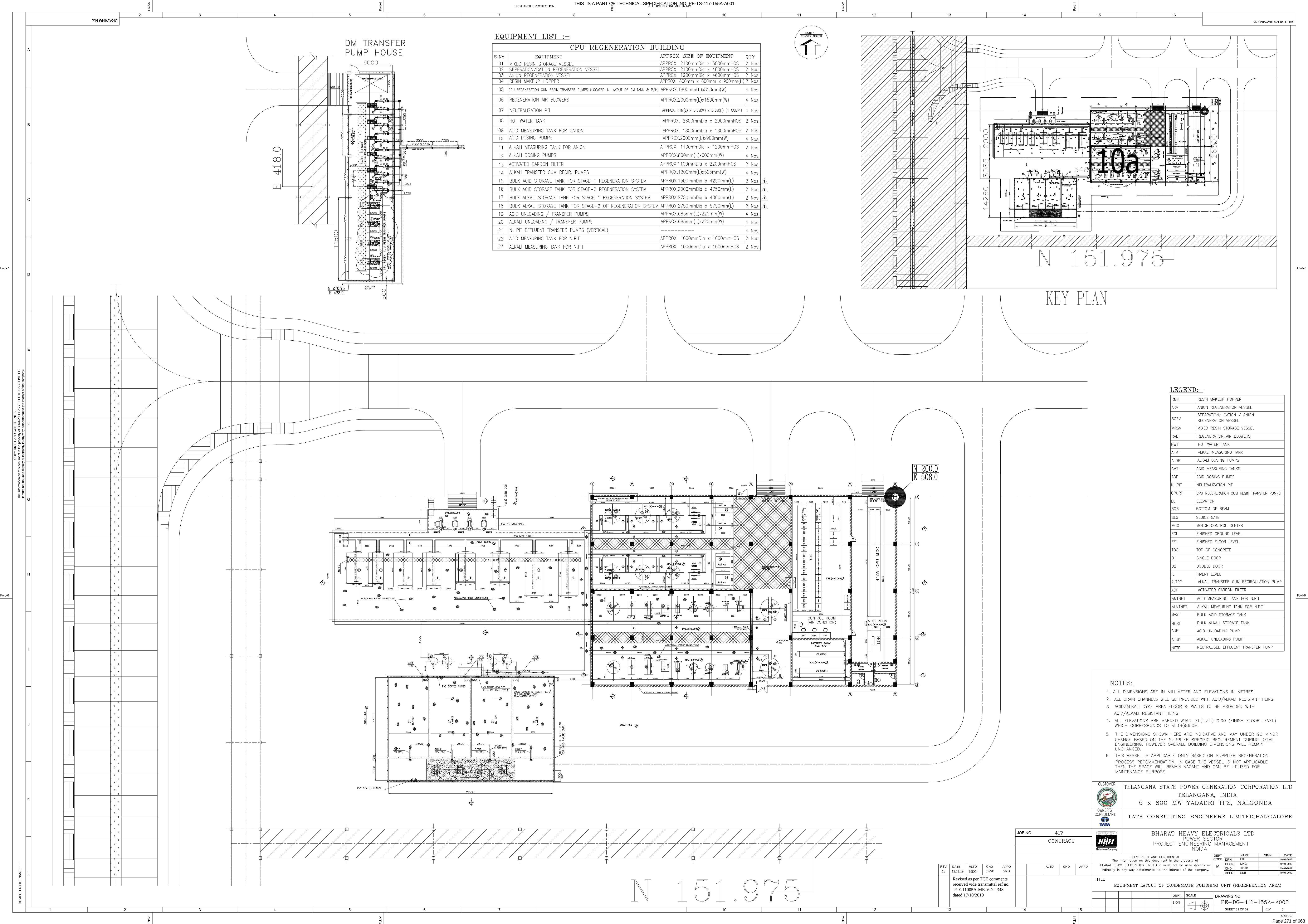
	VELOCITY IN m/sec.		
	BELOW 50 MM.	50-150 MM	200 MM AND ABOVE
Pump Suction for water	-----	1.2-1.5	1.2-1.8
Pump discharge for water	1.2-1.8	1.8-2.4	2.1-2.5
Header for water	-----	1.5-2.4	2.1-2.4
Air velocity	20-30	25-40	25-40
Resin Transfer line	2-3		
Pump Suction for chemical solution	1.0-1.2	1.1-1.3	-----
Pump discharge for chemical solution	1.2-1.4	1.3-1.5	-----
Gravity flows	1.0 (maximum).		

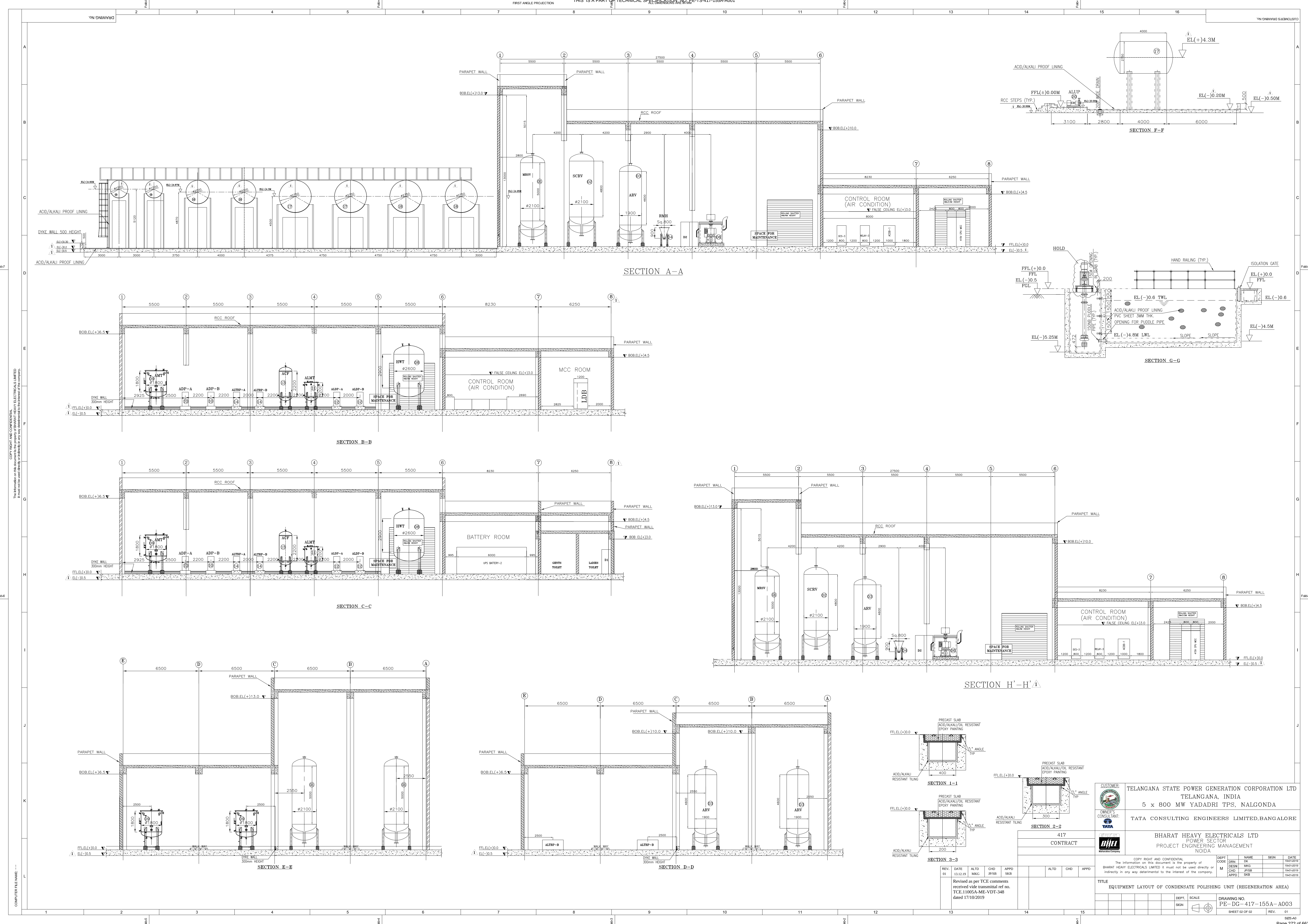
Note 1- All piping system shall be capable of withstanding the maximum pressure in the corresponding line.

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) Stainless Steel pipes-100
- d) Rubber lined steel pipe – 120
- e) PVC/HDPE pipes – 140

10% margin shall be taken over the pipe friction losses for calculating the pump head.
Static head to be considered as specified elsewhere in this technical specification.
Major pressure drop of pipes shall be calculated by William & hazen equation.





DATE