भारत हेवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
BHARAT HEAVY ELECTRICALS LIMITED
(A Govt. of India Undertaking)

TCN – 08

Ref: PSER:SCT:KLN-M1864:TCN-08 Date: 16-01-2018

Sub	Tender Change Notice (TCN) - 08.	
Job	Design, Engineering, Manufacturing, Supply, Erection, Commissioning etc. of Water Treatment Plant Packages for 2x660 MW Maitree STPP, Rampal, Bangladesh.	
Ref	1.0	Tender no PSER:SCT:KLN-M1864:17.
	2.0	BHEL's NIT, vide reference no PSER:SCT:KLN-M1864:6286 Date: 21-11-2017.
	3.0	BHEL's TCN-01, vide reference no PSER:SCT:KLN-M1864:TCN-01 Date: 08-12-2017.
	4.0	BHEL's TCN-02, vide reference no PSER:SCT:KLN-M1864:TCN-02 Date: 12-12-2017.
	5.0	BHEL's TCN-03, vide reference no PSER:SCT:KLN-M1864:TCN-03 Date: 18-12-2017.
	6.0	BHEL's TCN-04, vide reference no PSER:SCT:KLN-M1864:TCN-04 Date: 23-12-2017.
	7.0	BHEL's TCN-05, vide reference no PSER:SCT:KLN-M1864:TCN-05 Date: 26-12-2017.
	8.0	BHEL's TCN-06, vide reference no PSER:SCT:KLN-M1864:TCN-06 Date: 02-01-2018.
	9.0	BHEL's TCN-07, vide reference no PSER:SCT:KLN-M1864:TCN-07 Date: 12-01-2018
	10.0	Other References, if any.

With reference to above, following points/ documents, relevant to tender, may please be noted and complied with while submitting offer.

1) Revised DATA SHEET –A FOR CW TREATMENT PLANT, revised DATA SHEET –A FOR GAS CHLORINATION and revised P& ID FOR CW TREATMENT PLANT drawing attached, superseding earlier version issued along with tender.

2) Revised `No deviation certificate' as per enclosed Annexure-2. Bidder shall submit no deviation certificate as per enclosed format only.

3) All other terms & conditions shall remain unchanged.

Thanking you,

Yours faithfully,
for BHARAT HEAVY ELECTRICALS LTD

Sr.Engineer (SCT)

Encl: As Above.

पावर सेक्टर पूर्वी क्षेत्र (मुख्यालय)
POWER SECTOR EASTERN REGION, DJ-9/1, SECTOR-II, SALT LAKE CITY, KOLKATA - 700 091
फैक्स/Fax : (033) 23211960 फोन/Phone : बोर्ड/EPABX : (033) 2339-8000/ 2339 8236

DATA SHEET - A FOR CW TREATMENT PLANT

S. NO.	DESCRIPTION	PARAMETERS
1.0	**SCALE INHIBITOR DAY TANK**	
1.1	Numbers To be provided	Two (2) nos.
1.2	Type	Vertical cylindrical atmospheric with dished ends with cover on top.
1.3	Liquid to handled	Scale Inhibiting Chemical
1.4	Location	To be designed for indoor duty.
1.5	Effective capacity, in liters (each tank)	600 Ltr.
1.6	Material of Construction	SS 316
1.7	Design standard	API 650 or equivalent
1.8	Thickness	3 mm (min.)
1.9	Instruments	As per P&ID.
1.10	Number & stirrers/ agitator	Motor driven with reduction gear unit; one per tank.
1.11	Accessories	SS 316 Dissolving basket, vent, overflow & drain connection with required valves as well as one dissolving basket & the feed funnel at top of the tank to feed the solution for each tank.
2.0	**SCALE INHIBITOR DOSING PUMPS**	
2.1	Total Number of Pumps	Two (2) [1W+1S] nos.
2.2	Location	To be designed for indoor duty.
2.3	Liquid to handled and concentration	Scale Inhibiting Chemical
2.4	Duty	Continuous.
2.5	Type of Pump	Positive displacement, Hydraulically operated Diaphragm.
2.6	Rated Capacity (minimum)	25 LPH (each).
2.7	Design standard	API 675
2.8	Range of capacity/ stroke adjustment	10-100% of capacity manually by micrometre dial.
2.9	Head	As required.
2.10	Pump stroke speed per minute	Maximum 100.
2.11	Accessories	Pulsation dampener and Safety Relief valves shall be provided at each pump discharge header.
2.12	Material of construction	
2.12.1	Liquid end (pump head, valve, valve housing, etc.)	Stainless steel (SS-316)
2.12.2	Diaphragm	PTFE
2.12.2	Packing	PTFE
2.12.2	Shaft	Hardened steel EN8-BS-970 / AISI-316
2..13	Type of drive	Electrical Motor
2.14	Rated speed (RPM)	1500 (maximum).
2.15	Strainer	Y-Type strainer of MOC- SS 304 (2X100 %, 50 BS).
3.0	**BIOCIDE MEASURING TANKS**	

3.1	Numbers to be provided	Two (2) nos.
3.2	Type	Vertical cylindrical atmospheric with dished ends with cover on top.
3.3	Liquid to handled	Biocide Chemical
3.4	Location	To be designed for Indoor duty.
3.5	Effective capacity, in liters (each tank)	600 Ltrs.
3.6	Material of Construction	SS 316
3.7	Design standard	API 650 or equivalent
3.8	Thickness	3 mm (min.)
3.9	Instruments	As per P&ID.
3.10	Number & Stirrers/agitator	Motor driven with reduction gear unit; one per tank.
3.11	Accessories	SS 316 Dissolving basket, vent, overflow & drain connection with required valves as well as one dissolving basket & the feed funnel at top of the tank to feed the solution for each tank.
4.0	**BIOCIDE DOSING PUMPS**	
4.1	Total Number of Pumps	Two (2) [1W+1S] nos.
4.2	Location	Indoor duty.
4.3	Liquid to handled and concentration	Biocide Chemical
4.4	Duty	Intermittent.
4.5	Type of Pump	Positive displacement, Hydraulically operated Diaphragm.
4.6	Rated Capacity (minimum)	250 LPH (each).
4.7	Design standard	API 675
4.8	Range of Capacity/Stroke Adjustment	10 -100% of capacity manually by micrometre dial.
4.9	Head	As required.
4.10	Pump stroke speed per minute	Maximum 100.
4.11	Accessories	Pulsation dampener and Safety Relief valves shall be provided at each pump discharge header.
4.12	Material of construction	
4.12.1	Liquid end (pump head, valve, valve housing, etc.)	Stainless steel (SS-316)
4.12.2	Diaphragm	PTFE
4.12.2	Packing	PTFE
4.12.2	Shaft	Hardened steel EN8-BS-970 / AISI-316
4.13	Type of drive	Electrical Motor
4.14	Rated speed (RPM)	1500 (maximum).
4.15	Strainer	Y-Type strainer of MOC- SS 304 (2X100 %, 50 BS).
5.0	**BIO DISPERSANT DOSING PUMPS**	
5.1	Total Number of Pumps	Two (2) [1W+1S] nos.
5.2	Location	To be designed for indoor duty.
5.3	Liquid to handled and concentration	Bio Dispersant Chemical
5.4	Duty	Continuous.

5.5	Type of Pump	Positive displacement, Hydraulically operated Diaphragm.
5.6	Rated Capacity (minimum)	25 LPH (each).
5.7	Design standard	API 675
5.8	Range of Capacity/Stroke Adjustment	10 -100% of capacity manually by micrometre dial.
5.9	Head	As required.
5.10	Pump stroke speed per minute	Maximum 100.
5.11	Accessories	Pulsation dampener and Safety Relief valves shall be provided at each pump discharge header.
5.12	Material of construction	
5.12.1	Liquid end (pump head, valve, valve housing, etc.)	Stainless steel (SS-316)
5.12.2	Diaphragm	PTFE
5.12.2	Packing	PTFE
5.12.2	Shaft	Hardened steel EN8-BS-970 / AISI-316
5.13	Type of drive	Electrical Motor
5.14	Rated speed (RPM)	1500 (maximum).
5.15	Strainer	Y-Type strainer of MOC- SS 304 (2X100 %, 50 BS).
6.0	**BIO DISPERSANT DOSING TANK**	
6.1	Numbers to be provided	Two (2) nos.
6.2	Type	Vertical cylindrical atmospheric with dished ends with cover on top.
6.3	Liquid to handled	Scale/ corrosion Inhibiting Chemical
6.4	Location	To be designed for indoor duty.
6.5	Effective capacity, in liters (each tank)	600 Ltr.
6.6	Material of Construction	SS 316
6.7	Design standard	API 650 or equivalent
6.8	Thickness	3 mm (min.)
6.9	Instruments	As per P&ID.
6.10	Number & Stirrers/agitator	Motor driven with reduction gear unit; one per tank.
6.11	Accessories	SS 316 Dissolving basket, vent, overflow & drain connection with required valves as well as one dissolving basket & the feed funnel at top of the tank to feed the solution for each tank.
7.0	**SCALE INHIBITOR STORAGE TANK**	
7.1	Numbers to be provided	One (1) no.
7.2	Type	Vertical cylindrical atmospheric with flat ends with cover on top.
7.3	Liquid to handled	Scale Inhibiting Chemical
7.4	Location	To be designed for indoor duty.
7.5	Effective capacity, in liters (each tank)	7.5 m^3
7.6	Material of Construction	FRP
7.7	Thickness	10 mm (min.)
7.8	Instruments	As per P&ID.

7.9	Accessories	Vent, overflow & drain connection with required valves for each tank.		
8.0	**BIO DISPERSANT INHIBITOR STORAGE TANK**			
8.1	Numbers to be provided	One (1) no.		
8.2	Type	Vertical cylindrical atmospheric with flat ends with cover on top.		
8.3	Liquid to handled	Bio dispersant Inhibiting Chemical		
8.4	Location	To be designed for indoor duty.		
8.5	Effective capacity, in liters (each tank)	5 m^3		
8.6	Material of Construction	FRP		
8.7	Thickness	10 mm (min.)		
8.8	Instruments	As per P&ID.		
8.9	Accessories	Vent, overflow & drain connection with required valves for each tank.		
9.0	**BIOCIDE STORAGE TANK**			
9.1	Numbers to be provided	One (1) no.		
9.2	Type	Vertical cylindrical atmospheric with flat ends with cover on top.		
9.3	Liquid to handled	Biocide Chemical		
9.4	Location	To be designed for indoor duty.		
9.5	Effective capacity, in liters (each tank)	1 m^3		
9.6	Material of Construction	FRP		
9.7	Thickness	6 mm (min.)		
9.8	Instruments	As per P&ID.		
9.9	Accessories	Vent, overflow & drain connection with required valves for each tank.		
10.0	**SUBMESIBLE PUMPS**			
10.1	Type	Submersible type motor driven		
10.2	Quantity	Two nos. (1W+1S)		
10.3	Capacity	2 $m^{3/}$hr.		
10.4	MOC casing	PP		
10.5	MOC impeller	PP		
10.6	MOC shaft	PP		
11.0	**BARREL PUMPS**			
11.1	Type	Electrically operated portable type		
11.2	Quantity	3 nos. (total)		
11.3	Capacity and Head (each)	20 LPM, 20 MWC		
11.4	MOC	SS316		
11.5	Flexible Hose	20 m for each pump of PVC		
12.0	**SAFETY SHOWER**			
12.1	Quantity	One no.		
12.2	Type	Water drench safety shower and eye bath, paddle type.		
13.0	**CHEMICAL DIFFUSER & MIXING**	Scale inhibitor	Biocide	Bio dispersant
13.1	Chemical Solution Supply Point	-----Circulating Water Channel at upstream of Forebay of CW pump house------		

13.2	Location of diffusers	---------Well below minimum water level--------
13.3	Material of construction	--------- PVC ------
14.0	**VALVES**	All valve shall be SS 316 construction for chemical application.
15.0	**PIPING**	
15.1	Scale Inhibiting Chemical/ Bio dispersant Chemical/ Biocide Chemical piping	SS 316 minimum sch. 40 Submerged portion of SS 316 pipe in CW forebay shall be of PVC MOC Sch. 80 min.
15.2	Service Water / Potable Water	CS Heavy grade

NOTE:

1. The dosing point shall be suitable for proper mixing in the forebay and for the same diffuser shall be provided by bidder.
2. All gasket used in the chemical site shall be from chemical proof material to relevant chemical.
3. All valves, piping, fitting and instrumentation shall be of minimum PN 10 rating.

DATA SHEET-A FOR GAS CHLORINATION

SNO.	PARTICULARS	DESCRIPTIONS
GAS CHLORINATION PLANT		
1.0	**CAPACITY AND NUMBER OF STREAMS**	
1.1	For River Water	2 Nos @ 95 Kg/ hr. (1W+1S)
1.2	PT Plant	2 Nos @ 16 Kg/ hr. (1W+1S)
1.3	For Circulating water	3 nos. @ 200 kg/ hr. (1W+ 2S) during continuous dosing & (2W+1S) during shock dosing
1.4	For Potable water	1 NaOCl dosing skid for Potable water (Plant) & 1 skid for Potable water (colony)
2.0	**DOSING**	
2.1	River water system	14 ppm continuous dosing
2.2	PT Plant (Inlet of Flash Mixer)	2 ppm continuous dosing.
2.3	Cooling water for the power plant	1 ppm continuous dosing and 5 ppm shock dosing
2.4	Potable water	0.8 LPH of NaOCl dosing for potable water (plant) & 4.8 LPH of NaOCl dosing for potable water (colony)
3.0	**TON CONTAINER/ CYLINDER**	
3.1	Type	Chlorine tonners
3.2	Nos.	86 Nos. (20 Nos. for River water chlorination + 60 Nos. for CW Chlorination + 6 Nos. for PT Chlorination)
3.3	Capacity	Not less than 930 Kg.
3.4	Mounting	Each Chlorine ton container shall be mounted on two nos. metallic brackets, each provided with two roller supports. These brackets will be mounted on civil foundation with all necessary anchor bolts, inserts and nuts.
4.0	**CHLORINE GAS FILTERS FOR CW AND PT CHLORINATION**	
4.1	Number	Two (2) for each Chlorinator (1W+1S).
4.2	Capacity of each strainer	100 % for each Chlorinator.
5.0	**CHLORINE GAS FILTERS RIVER WATER CHLORINATION**	
5.1	Number	Two (2) for each Chlorinator (1W+1S).
5.2	Capacity of each strainer	100 % for each Chlorinator.
6.0	**PRESSURE REGULATING VALVE**	
6.1	Number	One (1) for each stream.
6.2	Material of construction	
6.2.1	Body	Carbon Steel as per ASTM A 105.
6.2.2	Diaphragm	PTFE.
7.0	**CHLORINATOR**	
7.1	Nos. and Capacity	
7.1.1	For River Water	2 Nos @ 95 Kg/ hr. (1W+1S)
7.1.2	For PT Plant	2 Nos @ 16 Kg/ hr. (1W+1S)
7.1.3	For Circulating water	3 nos. @ 200 kg/ hr. (1W+ 2S) during continuous dosing & (2W+1S) during shock dosing
7.2	Type for River Water, Circulating water & PT Plant Chlorination	Vacuum solution feed type. The chlorinator shall be of fibreglass, self-coloured, resistant to corrosion by chlorine gas & chlorinated water solution.

7.3	Location	Indoor
7.4	Chlorine feed rate adjuster (manual)	Shall be provided.
8.0	**EJECTOR**	
8.1	Number	
8.1.1	For River Water	One for each chlorinator. (2 Nos. Total)
8.1.2	For Circulating water	One for each chlorinator. (3 Nos. Total)
8.1.3	For PT Plant	One for each chlorinator. (2 Nos. Total)
8.2	Material	PP / PVC / Equivalent
9.0	**MATERIAL OF CONSTRUCTION OF MAJOR COMPONENTS:**	
9.1	**Pressure vacuum regulator**	
9.1.1	Body	PVC
9.1.2	Diaphragm	Teflon
9.1.3	Plug	Hastelloy C
9.2	**Feed rate adjuster**	
9.2.1	Plug	Hastelloy C
9.2.2	Seat	Hastelloy C
9.3	**Ejector**	
9.3.1	Body	PVC / FRP / Ebonite
9.3.2	Nozzle	Solid ebonite
9.3.3	Chlorine gas pressure piping	Carbon steel to ASTM A 106 Gr B seamless
9.3.4	Chlorine gas vacuum piping	PVC
9.3.5	Cabinet	Fibre glass moulded design, steel framed with chlorinated rubber paint.
9.3.6	Filter	ASTM A 106 B Seamless , Sch. 80
10.0	**WATER BOOSTER PUMPS:**	
10.1.1	For River Water	Two (1W+1S)
10.1.2	For PT Plant	Two (1W+1S)
10.1.3	For Circulating water	Three [(1W+2S) for continuous and (2W+1S) during Shock].
10.2	Capacity	To suit the requirement of respective chlorinator.
10.3	Type of pump	Horizontal, Centrifugal
10.4	Type of casing	Radial split.
10.5	Type of impeller	Semi open or open.
10.6	Location	Indoor
10.7	**Material of construction:**	
10.7.1	Casing	ASTM B367 Ti Grade C3.
10.7.2	Shaft	Duplex SS 2205 UNS S31803.
10.7.3	Impeller	ASTM B367 Ti Grade C3.
10.7.4	Shaft Sleeve	ASTM B367 Ti Grade C3.
10.7.5	Base Plate	MS with Epoxy Paint.
10.7.6	Fastener	SS 316L
10.7.8	Rated speed	3000 rpm (max.)
10..7.9	Suction Strainer	Two nos. (2X100%)
11.0	**CHLORINATED WATER DIFFUSER AND MIXING SYSTEM**	
11.1	Device for injection of chlorinated	Diffusers.

	water	
11.2	Location of diffusers	Well below minimum water level.
11.3	Material of construction	HDPE / PP (Perforated) / CPVC
12.0	**SAFETY & SUPERVISORY INSTRUMENTS**	
12.1	Gas Mask and Oxygen Breathing equipment along with Breathing Apparatus	
12.1.1	Number	Four (4) sets
12.1.2	Capacity	1 hour
12.1.3	Accessories to be provided	Four sets of Full mask, full vision face pieces, Protective clothing valves and all other accessories as required.
12.2	Canister Type Breathing Apparatus	
12.2.1	Number	Two no (one for each Chlorination building)
12.2.2	Type	The moisture content from exhaled air of the User should react with granular chemical in Breathing Apparatus and liberates oxygen. The released Oxygen should enter a breathing bag from which the User can inhale.
12.3	Ammonia bottles	
12.3.1	Number	Four (4) nos.
12.3.2	Capacity	500 ml each.
12.3.3	Accessories to be provided	Filled up with commercial grade ammonia solution (26 deg. Be) to detect leakage of chlorine. Ammonia torch shall also be provided.
12.4	Moisture Absorbing Breathing Bottles	
12.4.1	Number	One (1) no. for each working Chlorine Ton-Container.
12.4.2	Capacity	Two (2) litres silica gel for each bottle.
12.4.3	Type	The moisture absorber shall be fitted to the connection pipe to the Chlorine Ton-Container, as soon as the container detached from the system. The breather shall absorb the moisture and allow dry air in the system to prevent corrosion of pipes and system.
12.4.4	Material of construction	Glass body.
12.5	Chlorine Residual Test Kit	
12.5.1	Number	Two nos.
12.5.2	Type	Colorimetric Test Comparator
12.5.3	Range	One 0 to 0.5 ppm in steps of 0.05 ppm and second 0.5 to 6 ppm in steps of 0.5 ppm.
12.6	**Chlorine Leak Detector**	
12.6.1	Number	For CW and PT chlorination 19 Numbers Chlorine leak detector (17 numbers in tonner area and 2 numbers in chlorinator room) with 4 probes each. For River water chlorination 6 Numbers Chlorine leak detector (5 numbers in tonner area and 1 number in chlorinator room) with 4 probes each.
12.6.2	Type	Electronic type.
12.6.3	Alarm	Shall be provided in case of leakage of Chlorine.
12.6.4	Interlock	Shall be provided.
12.7	Emergency Kit	

12.7.1	Number	Two nos.	
12.7.2	Accessories to be provided	All accessories shall be provided to seal off Chlorine Ton-Containers.	
13.0	**PIPING AND VALVES**		
13.1	Pipe handling chlorine:		
13.1.1	Material of construction:	Dry chlorine gas under pressure	Chlorinated water service.
13.1.2	Pipe	Carbon steel to ASTM A 106 Gr B seamless	PVC
13.1.3	Fittings	Carbon steel ASTM A 105 Gr I	PVC
13.1.4	Flanges	Carbon steel to ASTM A 181 Gr I	-----
13.2	Raw Water/ Motive Water Pipe	Refer P&ID.	
13.3	Potable water and service water	ASTM A-53, TYPE E, GR. B, GALVANIZED.	
13.2	**GAS CHLORINE LINES VALVE**		
13.2.1	Needle Valve		
13.2.1.1	Body	Aluminium Silicon Bronze	
13.2.1.2	Stem	Monel	
13.2.2	BALL VALVE:		
13.2.2.1	Body	ASTM A 105	
13.2.2.2	Standard	BS: 5651:86	
13.2.2.3	Ball	Monel	
13.2.2.4	Seat	Teflon	
13.2.2.5	Stem	Monel	
13.3	**WATER SERVICE VALVES**		
13.3.1	GLOBE/GATE/NRV for River Water and PT chlorination	Duplex SS	
13.3.2	GLOBE/GATE/NRV for Potable Water chlorination		
13.3.2.1	Body/Bonnet/cover	ASTM A 216 Gr. WCB for Cast body/ ASTM A 105 for Forged body	
13.3.2.2	Disc for non-return valve	ASTM A 216 Gr. WCB for Cast body/ ASTM A 105 for Forged body	
13.3.2.3	Trim	ASTM A 182 Gr F6 or Equivalent	
14.0	**CHLORINE ABSORPTION SYSTEM**		
a)	Quantity	Two (one for River Water chlorination and one for CW & PT Plant chlorination systems.	
b)	Type/Location	Packed counter-current absorption system /Outdoor.	
c)	Capacity to tonner max.	1000 kg of chlorine	
d)	Designed for leak rate at any time	One tonner at one time for River Water chlorination and One tonner at one time for CW & PT Plant chlorination systems.	
e)	Absorption capacity of absorbent for one filling	About 1000 kg of chlorine in one hour one hour (maximum).	
f)	Type of fluid to be handled	20% w/w (maximum) caustic solution and chlorine gas.	
14.1	**ABSORPTION TOWER**		
14.1.1	Numbers To be provided	Total Two (2) (One per absorption system)	
14.1.2	Type	Vertical Cylindrical Packed Absorption Tower. The Absorption Tower shall be mounted on the Caustic	

		Solution Preparation cum Recirculation Tank.
14.1.2.a	Type of fluid to be handled	20% w/w (maximum) caustic solution and chlorine gas.
14.1.2.b	Rated Absorption Capacity, kg of chlorine/hr.	Adequate for absorption of chlorine leaked from one (1) no. completely filled Chlorine Ton Container within one hour (maximum) for River Water chlorination and one (1) no. completely filled Chlorine Ton Container within one hour (maximum) for CW & PT Plant chlorination systems.
14.1.3.c	Caustic Flow Rate, m3/hr.	Adequate for absorption of chlorine leaked from one (1) no. Completely filled Chlorine Ton Container within one hour (maximum) for River Water chlorination and one (1) no. Completely filled Chlorine Ton Container within one hour (maximum) for CW & PT Plant chlorination systems.
14.1.3	Cl2 content at outlet of Chlorine Absorption Tower	Free residual chlorine shall not be more than 0.1 ppm.
14.1.4	Material of Construction	PP-FRP
14.1.5	Fill	Polypropylene Raschig / Pall rings along with baffle plates to keep entrainment loss less than 0.1% of circulating liquid flow rate.
14.2	**ABSORBENT**	
14.2.1	Chemicals	Sodium hydroxide
14.2.2	Concentration	NaOH / 20%w/w
14.3	**CAUSTIC SOLUTION PREPARATION CUM RECIRCULATION TANK**	
14.3.1	Numbers	Total Two (2) (One per absorption system)
14.3.2	Type	Vertical cylindrical with flat bottom.
14.3.3	Type of fluid to be handled	20% w/w (maximum) caustic solution.
14.3.4	Effective capacity, in m^3	Adequate for absorption of chlorine leaked from one (1) nos. completely filled Chlorine Ton Containers for River Water chlorination and one (1) no. Completely filled Chlorine Ton Container for CW & PT Plant chlorination systems.
14.3.5	Minimum Free Board, in mm	300.
14.3.6	Material of Construction	Body – MSRL as per IS 2062 Dissolving basket –SS: 316.
14.3.7	Agitator along with drive motor and other accessories	Agitator shall be motor driven through reduction gear. All wetted parts of the agitator shall be of SS-316 construction.
14.4	**BLOWERS:**	
14.4.1	Number	Total four (4) (Three (1W +1S) per absorption system)
14.4.2	Service	To transfer Chlorine Gas leaked from Chlorine Ton Container to Chlorine Absorption Tower.
14.4.3	Duty	Intermittent.
14.4.4	Type of Blower	Centrifugal.
14.4.5	Rated Capacity	Adequate for absorption of chlorine leaked from one (1) no. completely filled Chlorine Ton Container within one hour (maximum) for River Water chlorination and one (1) no. completely filled Chlorine Ton Container within one hour (maximum) for CW & PT Plant chlorination systems..
14.4.6	Head to be developed at rated	As per system requirement and shall be decided

	capacity	during detailed engineering.
14.4.7	Material of construction	
14.4.7.1	Casing	MS-RL or equivalent.
14.4.7.2	Impeller	MS-RL or equivalent.
14.4.8	Type of drive	Electrical Motor
14.4.9	Rated speed (RPM)	1500 (Sync.) maximum.
14.5	**CHLORINE GAS DUCT:**	
14.5.1	Material of construction	FRP-NP-6-Class
14.5.2	Nature of fluid	Mixture of Cl_2 gas and air
15.0	**RECIRCULATION PUMP FOR CAUSTIC SOLUTION:**	
15.1	Quantity	Total four (4) (Three (1W +1S) per absorption system)
	Type	Horizontal Centrifugal Non Clog type
15.2	Fluid handled	20% w/w (maximum) caustic solution.
15.3	Service	To absorb chlorine leaked from Chlorine Ton Containers.
16.4	Duty	Intermittent and to be suitable for parallel operation.
15.5	Rated Capacity, in m^3/hr.	Suitable for absorption of chlorine leaked from one (1) no. completely filled Chlorine Ton Container within one hour (maximum) for River Water chlorination and one (1) no. completely filled Chlorine Ton Container within one hour (maximum) for CW & PT Plant chlorination systems..
15.6	Head to be developed at rated capacity	Each pump to have adequate head to meet the requirements of chlorine absorption system
15.7	Material of construction	
15.8.1	Casing	SS
15.8.2	Impeller	SS
15.8.3	Shaft	EN-8 to BS-970.
15.9	Type of drive	Electrical Motor
15.10	Rated speed (RPM)	1500 (Sync.) maximum.
16.0	**LIFTING AND HANDLING DEVICES**	
16.1	Monorail hoist	
16.1.1	Number	Two nos. (i.e. One for Gas chlorination building near River water intake system and One for Gas Chlorination building near CW Pump house).
16.1.2	Type	Electrically operated.
16.1.3	Duty	To handle Chlorine Ton-Container.
16.1.4	Safe working load	3000 kg maximum.
17.0	**WEIGHTING SCALE**	
17.1	Number	Two nos. (One (1) no. for each chlorination building (i.e. Gas chlorination building near River water intake system and Gas Chlorination building near CW Pump house)
17.2	Type	Portable Platform Type Weighing Scale with electronic display.
17.3	Duty	To handle Chlorine Ton-Container.
17.4	Range	0 - 3000 kg.
18	**NaOCl DOSING SYSTEM FOR POTABLE WATER**	

18.1	NaOCl Dosing Tank MOC and Capacity	FRP [1 No @ 150 Ltrs. for Plant potable water, 1 No @ 500 Ltrs. for colony potable water.
18.2	Dosing Pumps	Electronic pumps of PP MOC [2 nos. (1W+1S) @ 10 LPH for Plant potable water and 2 nos. (1W+1S) @ 10 LPH for colony potable water].
18.3	Instrumentation	2 Nos. LT and LG shall be provided in each tank and PG shall be provided at each pump discharge.

NOTE:

1. All gasket used in the chemical site shall be from chemical proof material to relevant chemical.
2. All valves, piping, fitting and instrumentation shall be of minimum PN 10 rating.

SCALE INHIBITOR STORAGE TANK
CAPACITY: 14 DAYS STORAGE

SCALE/CORROSION INHIBITOR DOSING TANK
CAPACITY: 500 LTR EACH,; 3 MM THICK

SCALE INHIBITOR DOSING SKID

SCALE INHIBITOR DOSING PUMPS
2NOS.(2X100%)

MOTOR OPERATED PORTABLE BARREL PUMP WITH FLEXIBLE HOSE (20 METER) FOR SCALE INHIBITOR STORAGE TANK (TOTAL QTY=1 NO.)
20 LPM, 20 MWC

BIOCIDE STORAGE TANK
CAPACITY: 14 DAYS STORAGE

BIOCIDE DOSING TANK
CAPACITY: 500 LTR. EACH; 3 MM THICK

BIOCIDE DOSING SKID

BIOCIDE DOSING PUMPS
2NOS.(2X100%)

MOTOR OPERATED PORTABLE PUMP WITH FLEXIBLE HOSE (20 METER)
QTY=1 NO.)
20 LPM, 20 MWC

BIO DISPERSANT STORAGE TANK
CAPACITY: 14 DAYS STORAGE

BIO DISPERSANT DOSING TANK
CAPACITY: 500 LTR. EACH; 3 MM THICK

BIO DISPERSANT DOSING SKID

MOTOR OPERATED PORTABLE PUMP WITH FLEXIBLE HOSE (20 METER) FOR BIO DISPERSANT STORAGE TANK (TOTAL QTY=1 NO.)
20 LPM, 20 MWC

ALL DRAINS TO CHEMICAL PIT BY GRAVITY

CHEMICAL PIT PUMPS
(1W+1S)
CAP.- 2 M3/HR (EACH)
TYPE : SUBMERSIBLE SUMP PUMP
MOC : PP

CHEMICAL PIT
MOC : RCC

SERVICE WATER
MAITREE-OOP-MFB-421172N00(PEM)

SAFETY SHOWER
1NO.

CW FORBAY

(REF. PLANT WATER SYSTEM P&ID MAITREE-OOP-MFB-421172N001PEM)

ONLINE DEPOSIT MONITOR
ONLINE BIO FOULING MONITOR
ONLINE BIO FILM MONITOR

L E G E N D

	GATE VALVE NORMALLY OPEN
	GATE VALVE NORMALLY CLOSED
	NON RETURN VALVE
	GLOBE VALVE NORMALLY OPEN
	PRESSURE RELIEF VALVE
	VENT TO ATMOSPHERE
	FUNNEL
PG	PRESSURE GAUGE
LG	LEVEL GAUGE
M	MOTOR OPERATED (AC)
	GLOBE VALVE NORMALLY CLOSED
LT	LEVEL TRANSMITTER.
PT	PRESSURE TRANSMITTER.
LT	LEVEL TRANSMITTER. (DP TYPE)
DPT	DIFFERENTIAL PRESSURE INDICATING TRANSMITTER
ORP	OXIDATION REDUCTION POTENTIAL MONITOR
SI	SCALE INDICATOR
S	SOLENOID VALVE
	CHEMICAL SEAL
	SUBMERSIBLE POTABLE PUMP
CR	CORROSION RACK
	DIFFUSER
	Y-TYPE STRAINER
	AGITATOR
	MOTOR OPERATED POTABLE BARREL PUMP
	SAFETY SHOWER

NOTES:

1. WRAPPING/COATING/PROTECTION OF ALL BURIED PIPE SHALL BE AS PER AWWA C 203 OR EQUIVALENT INTERNATIONAL STANDARD.
2. THE INSTRUMENTS, VALVES, PIPE SIZE, ETC SHOWN IN P&ID ARE MINIMUM REQUIREMENT. ANY ADDITIONAL EQUIPMENT/VALVES/INSTRUMENTATION AS REQUIRED TO MEET THE SYSTEM AND FULLY AUTOMATIC CONTROL REQUIREMENT SHALL BE IN BIDDER'S SCOPE, WHICH SHALL BE SUBJECT TO APPROVAL BY CUSTOMER & BHEL DURING DETAILED ENGINEERING.
3. SAFETY RELIEF VALVE OF DOSING PUMPS SHALL BE PROVIDED.
4. KKS NUMBERING SHOULD BE DONE DURING DETAILED ENGINEERING.
5. PLEASE NOTE THAT THE PIPE & VALVE SIZES INDICATED MAY UNDERGO CHANGE BASED ON SYSTEM & PROCESS REQUIREMENT WHICH SHALL BE SUBJECT TO CUSTOMER & BHEL APPROVAL DURING DETAILED ENGINEERING.
6. FOR THE COMPLETE SYSTEM UNDER SCOPE, VENDOR MUST ENSURE THE FAIL SAFE OPERATION OF THE PLANT.
7. DOSING SYSTEM SHALL BE SKID MOUNTED.
8. CW TREATMENT PLANT SHALL BE LOCATED NEAR CW FORBAY.
9. ALL CHEMICAL SLIPPAGE DRAINS SHALL BE LED TO CHEMICAL PIT OF CW TREATMENT PLANT FOR FURTHER PUMPING TO CW FOREBAY THROUGH 2 X 100% SUBMERSIBLE PUMPS.
10. CW TREATMENT SYSTEM INDICATED IN THIS P&ID IS COMMON FOR BOTH THE UNITS.
11. PIPE : SS316 SCH. 40 ONLY.
12. ALL CHEMICAL STORAGE TANKS SHALL BE PLACED ON A RAISED PLATFORM TO ENSURE GRAVITY FLOW OF CHEMICALS TO RESPECTIVE DAY TANKS.
13. DRAIN HEADER SIZE SHALL BE 50NB (MIN.)
14. PRV CONNECTION TO RESPECTIVE DOSING TANKS SHALL BE PROVIDED BY THE BIDDER.
15. QUANTIES OF LEVEL GAUGES IN A TANK SHALL BE PROVIDED INLINE WITH C-C DISTANCE CRITERIA AS SPECIFIED IN TECHNICAL SPECIFICATION.
16. CHEMICAL SEALS FOR THE INSTRUMENTS SHALL BE PROVIDED AS PER SYSTEM AND TECHNICAL SPECIFICATION REQUIREMENTS.

1	DATE	ALTERED	CHECKED	APPROVED	NOTE

PROJECT
2x660MW MAITREE SUPER THERMAL POWER PROJECT, RAMPAL, BANGLADESH
(EPC MAIN PLANT PACKAGE)

OWNER CONSULTANT:
FICHTNER
M/s FICHTNER GmbH & Co KG,
Stuttgart,GERMANY

OWNER:
BANGLADESH-INDIA FRIENDSHIP POWER COMPANY (PVT.) LIMITED, BANGLADESH

BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NOIDA

SCALE: NTS
SHEET 1 OF 1

	DATE	NAME
DRAWN BY	19.10.16	DK
DESIGN BY	20.10.16	MA
CHECKED BY	20.10.16	AKS/JP
APPROVED BY	20.10.16	PK
SUPERSEDES:		
SUPERSEDED BY:		

TITLE
P&ID FOR CW TREATMENT PLANT

SYSTEM: COMPRESSED AIR SYSTEM	SIZE:	PROJECT NO.: 421
	ANNEX:	BHEL DRG. NO PE-DG-421-156-A001
		DRAWING NO.: MAITREE-00-PB-DB-110801-PEM-A
		REV 1

SIZE-A0

FILE:- C:\skc\compressedAirSystem\customerDVC\PidCompressorAlternative-I

ANNEXURE - 2

FORMAT FOR NO DEVIATION CERTIFICATE
(To be submitted in the bidder's letter head)

BHARAT HEAVY ELECTRICALS LIMITED,
Power Sector - Eastern Region,
Plot no 9/1, DJ Block, Sector – II, Salt Lake City,
Kolkata – 700 091

Sub	No Deviation Certificate.	
Job	Design, Engineering, Manufacturing, Supply, Erection, Commissioning etc. of Water Treatment Plant Packages for 2x660 MW Maitree STPP, Rampal, Bangladesh.	
Ref	1.0	Tender no PSER:SCT:KLN-M1864:17.
	2.0	BHEL's NIT, vide reference no PSER:SCT:KLN-M1864:6286 Date: 21-11-2017.
	3.0	BHEL's TCN-01, vide reference no PSER:SCT:KLN-M1864:TCN-01 Date: 08-12-2017.
	4.0	BHEL's TCN-02, vide reference no PSER:SCT:KLN-M1864:TCN-02 Date: 12-12-2017.
	5.0	BHEL's TCN-03, vide reference no PSER:SCT:KLN-M1864:TCN-03 Date: 18-12-2017.
	6.0	BHEL's TCN-04, vide reference no PSER:SCT:KLN-M1864:TCN-04 Date: 23-12-2017.
	7.0	BHEL's TCN-05, vide reference no PSER:SCT:KLN-M1864:TCN-05 Date: 26-12-2017.
	8.0	BHEL's TCN-06, vide reference no PSER:SCT:KLN-M1864:TCN-06 Date: 02-01-2018.
	9.0	BHEL's TCN-07, vide reference no PSER:SCT:KLN-M1864:TCN-07 Date: 12-01-2018.
	10.0	BHEL's TCN-08, vide reference no PSER:SCT:KLN-M1864:TCN-08 Date: 16-01-2018.
	11.0	All other pertinent issues till date.

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited site before submission of our offer and noted the job content & site conditions etc. We also confirm that we have not changed/ modified the tender documents as appeared in the website/ issued by you and in case of such observance at any stage, it shall be treated as null and void.

We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT. We hereby confirm our unqualified acceptance to all terms & conditions, unqualified compliance to technical specification, integrity pact (if applicable) and acceptance to reverse auctioning process.

In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted/uploaded offer/documents in accordance with tender instructions with acceptance of the terms & conditions of the tender by us and as per aforesaid references.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized
representative of the bidder)