

	TITLE: 1x800 MW WANAKBORI STPP TECHNICAL SPECIFICATION FOR CHLORINATION PLANT	SPEC NO: PE-TS-408-174-A001	
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	III. Diaphragm	10% of total quantity used for each type and size with minimum no. one (1) for each type and size.
3.6	III. Non return valves (NRV)	2 nos. of each size & type
	IV. Flaps for above NRV	2 nos. of each size & type
3.7	Gate/Globe/Ball valves/plug valve/needle valve	
	III. Up to 4"	10% of total quantity used for each type and size with minimum no. two (2) for each type and size.
	IV. Above 4"	1 no. each type and size.
3.8	Butter fly valve	
	III. Up to 4"	10% of total quantity used for each type and size with minimum no two (2) for each type size
	IV. Above 4"	1 no. each type and size
4.	Spares for Air Blowers (For Each Service)	
4.5	Impeller with shaft	1 Set
4.6	Bearings	1 Set
4.7	Oil seals	5 Sets
4.8	Filter	1 Set
5.	Pneumatic Control Valve	
5.11	Pneumatic Diaphragm for Diaphragm actuated valve	2 Nos. for each type of Actuator
5.12	Gland Packing	1 set for each type of Control Valve
5.13	Plug, Seat, Cage, Stem etc.	1 set for each type of Control Valve
5.14	Retainer Ring, Seal Ring etc.	1 set for each type of Control Valve
5.15	Gasket	2 Sets. for each type of Control Valve
5.16	Position Transmitter complete set	10% of total quantity used in the system for each type and model.
5.17	Control Valve E/P Positioner complete Set	10% of total quantity used in the system for each type and model.
5.18	Complete Set of Solenoid Valve for Pneumatic type On/Off Valve	2 Nos. for each type & ratings
5.19	Solenoid Coil for Pneumatic type On/Off Valve	5 Nos. for each type & ratings
5.20	Position Limit Switch for Pneumatic type On/Off Valve	10 Nos. for each type & ratings
6.	Control Panel/Desk Mounted Items	
6.9	Push Button	
	III. Complete assembly	5 Nos. for each colour
	IV. Contact Element (1NO + 1NC) Block	20 Nos.
6.10	Selector Switch	10Nos. for each type and rating
6.11	Meter (Analog or Digital)	
	VIII. Ammeter	10% for each type and range or minimum one (1) no. whichever is more

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	IX. Voltmeter	10% for each type and range or minimum one (1) no. whichever is more
	X. Frequency	10% for each type and range or minimum one (1) no. whichever is more
	XI. MW	10% for each type and range or minimum one (1) no. whichever is more
	XII. MVAR	10% for each type and range or minimum one (1) no. whichever is more
	XIII. Power Factor	10% for each type and range or minimum one (1) no. whichever is more
	XIV. Synchroscope	10% for each type and range or minimum one (1) no. whichever is more
6.12	Indicating Lamps complete assembly	10Nos. for each Colour and type
6.13	Mimic Lamps	10Nos. for each Colour and type
6.14	MCB	2Nos. for each type and rating
6.15	Door Limit Switch	2Nos.
6.16	Annunciation system	
	IV. Lamp Box with Facia & Lamps (LED type)	25Nos.
	V. Hooter	1No.
	VI. Each type of PCB (for non-PLC driven system)	1(one) no.
7.	Actuator	
7.8	Complete set of Actuator	1No. for each type and rating
7.9	Limit Switch	2 Nos each type and rating
7.10	Torque Switch	2 Nos each type and rating
7.11	Auxiliary Contact	1 no each type and rating
7.12	Motor	1 no each type and rating
7.13	Complete Seal kit	1Set for each type and rating
7.14	Complete O-Ring Set	1Set
8.	UPS (For BOP systems)	
8.7	Fuse	3 (Three) times of total quantity of each type of fuses used in the system (for all BOP systems).
8.8	SCR	10% of total quantity of each type used in the system or minimum 2(two) nos. whichever is more.
8.9	Diode	10% of total quantity of each type used in the system or minimum 2 two) nos. whichever is more.
8.10	IGBT	2 (two) nos.
8.11	Electronic Module/ PCB	
	X. Static Switch	1 (one) no. each type of Electronic Card/ PCB/ modules used in the system
	XI. Inverter	1 (one) no. each type of Electronic Card/ PCB/ modules used in the system
	XII. Static voltage Regulator	1 (one) no. each type of Electronic Card/ PCB/ modules used in the system used in the system

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	XIII. Charger	1 (one) no. each type of Electronic Card/ PCB/ modules used in the system
	XIV. UPS of 2 KVA rating or below.	One Complete set.
	XV. Selector Switch	1 (one) no. each type
	XVI. Digital Voltage/ Current Indicator (LCD type)	1 (one) no. each type
	XVII. Indication Lamp- Complete assembly (Red/ Green colour)	1 (one) no. each type
	XVIII. Cooling Fan - 240 VAC supply	1 (one) no. each type
8.12	UPS Battery	
	X. Battery Cell (Uncharged, Dry)	10% of total quantity of each BOP UPS.
	XI. Inter connecting cell strips	10 nos.
	XII. Rubber gloves	1 pair
	XIII. Voltmeter for measuring cell voltage (Centre zero type)	1 no.
	XIV. Apron & Goggles	1 set
	XV. Cell lifting puller	1 no.
	XVI. Insulated socket spanner with handle	1 no.
	XVII. Terminal screw with bellaville washer	10% of total quantity used
	XVIII. Thermometer	1 no.
9.	415 Volt Motor (above 30KW Rating upto 160KW)	
9.7	End Shield Cover Driving & Non-Driving End	1Set for each type and rating of Motor
9.8	Driving End & Non-Driving End Bearing	1Set for each type and rating of Motor
9.9	Cooling Fan	1No. for each type and rating of Motor
9.10	Motor Space Heater	1No. for each type and rating of Motor
9.11	Motor Terminal Block	1No. for each type and rating of Motor
9.12	Complete Set of Coupling	1Set for each Application
10.	415 Volt Motor (Up to 30KW Rating)	
10.5	Driving End & Non-Driving End Bearing	3Set for each type and rating of Motor
10.6	Cooling Fan	2No. for each type and rating of Motor
10.7	Motor Terminal Block	5No. for each type and rating of Motor
10.8	Complete Set of Coupling	1Set for each Application
11.	Field Instruments (Transmitters/temperature elements (TC / RTD) / Gauges / Switches etc. along with relevant accessories)	10 (ten) percent of total of each type or at least one (whichever is higher) of each type along with accessories.
12.	Control System (DCS, PLC etc.)	
12.10	2 (two) numbers each of keyboard and cursor control devices.	

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12.11	2 (two) numbers of LCD TFT (24") Monitors.	
12.12	10 (ten) sets of spare interface cables with connecting plugs for each type of peripherals & I / O hardware.	
12.13	10 (ten) percent of power supply modules of the total qty. offered for each type or 4 (four) numbers, whichever is Higher.	
12.14	10 (ten) percent of the total qty. offered for each type of electronic modules (I / O) or 5 (five) numbers of each Electronic type of module, whichever is higher.	
12.15	10 (ten) percent of total bus couplers and communication interface cards of each type or 2 (two) numbers of bus Couplers and communication interface cards whichever is higher.	
12.16	Controllers for DCS, Control panel ST, Boiler control system, Balance of plant system, PLC system/Sub-systems 10%of each type (at least 1 no. of each type) whichever is higher.	For applicable
13.	Control Valves	
12.17	2 (two) sets of spare control valve stem packing for each of the control valves, as offered.	
12.18	1 (one) set of spare valve trim (including cage, plug, stem, seat rings, guide bushings etc.) for both the units for Each of the control valves, as offered.	
14.	Control valve Actuators	
14.5	1 (one) set of spare actuators with drive of each type and rating.	
14.6	10 (ten) percent of valve positioners of each type.	
14.7	10 (ten) percent of position transmitters of each type.	
14.8	10 (ten) percent of limit switches/torque switches of each type.	

Note: Only applicable items shall be considered. Applicable items are those which are installed in the system.



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ANNEXURE-III

**PAINTING & COLOUR SCHEME
(REFER SECTION C2 B)**



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ANNEXURE-IV

LIST OF TOOLS & TACKLES

Bidder to consider necessary tools and tackles for mechanical, electrical and control & instrument as per their system requirement. In addition bidder to adhere relevant clauses of tender specification also. List of tools and tackles to be furnish by bidder during bid submission.



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**ANNEXURE-V
CLARIFIED WATER ANALYSIS
(REFER SECTION-C1)**



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ANNEXURE-VI

DRAWINGS / DOCUMENTS SUBMISSION PROCEDURE



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DRAWING/DOCUMENT SUBMISSION PROCEDURE (ANNEXURE-VI)

SL NO	DESCRIPTION	GSECL BARODA	GSECL WANAKBORI	DCPL KOLKATA	BHEL SITE	BHEL PEM
1	Correspondence- Technical					
	Vendor to BHEL	3+SC	3+SC	3+SC	3+SC	3+SC
2	Correspondence- Commercial					
	Vendor to BHEL	3+SC	3+SC	3+SC	3+SC	3+SC
3	Drawing/Document for approval					
	Vendor to BHEL	3+SC	3+SC	3+SC	--	5+SC
4	Drawing/Document (approved)					
	Vendor to BHEL	3+SC	3+SC	3+SC	3+SC	1+SC
5	Inspection/Test report					
	Vendor to BHEL	1+SC	1+SC	1+SC	1+SC	1+SC
6	O&M Manual					
	Vendor to BHEL	3+SC+CD	2+SC+CD	2+SC+CD	5+SC+CD	1+SC+CD
7	Final approved drawing/document (as built)	3+SC+CD	2+SC+CD	2+SC+CD	5+SC+CD	1+SC+CD

Note-1: SC: Soft copy, CD-Compact Disc.

Note-2: All soft copy (Autocad/EXCEL/Microsoft Word/Std/etc) document shall be submitted by bidder whenever required by BHEL/Customer/Consultant.



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**ANNEXURE-VII
QUALITY PLAN
(REFER SECTION C2 B)**



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ANNEXURE-VIII

**MASTER DRAWING LIST WITH SCHEDULE OF
SUBMISSION**



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SI No	DOCUMENT / DRAWING NO.	DRAWING / DOCUMENT TITLE	SCHEDULE OF SUBMISSION FROM LOI (WEEKS)	SIZE
GAS CHLORINATION				
1	PE-V0-408-174-A005	Manufacturing quality plan for valves FOR CHLORINATION PLANT	10	A4
2	PE-V0-408-174-A015	Data Sheet for Agitator for Caustic tank & G.A. Drg. FOR CHLORINATION PLANT	10	A4
3	PE-V0-408-174-A002	Equipment Layoutfor Chlorination plant (CW, RW, PW and Leak Absorption System)	4	A1
4	PE-V0-408-174-A017	Data Sheet for Safety items (Self contained breathing apparatus, cannister type gas mask, emergency shower & Eye Wash, Emergency repair kit etc.	10	A4
5	PE-V0-408-174-A011	Data sheet for chlorinator (RW,CW &PW) and evaporator (for CW).	10	A4
6	PE-V0-408-174-A012	Technical data sheet for horizontal centrifugal pumps	10	A4
7	PE-V0-408-174-A030	cablE tray / trench layout and earthing layout for chlorination plant	12	A1
8	PE-V0-408-174-A023	VALVE SCHEDULE FOR CHLORINATION PLANT	12	A4
9	PE-V0-408-174-A034	QAP for Control Cable & screened control cables	12	A4
10	PE-V0-408-174-A031	erection procedure FOR CHLORINATION PLANT	16	A4
11	PE-V0-408-174-A028	pipinG layout for chlorination plant	10	A1
12	PE-V0-408-174-A029	GA & WIRING DETAIL OF PLC & RIO PANEL,BI/O LIST, BOM, MIMIC DIAGRAM ETC. FOR CHLORINATION PLANT	12	A4
13	PE-V0-408-174-A010	Technical data sheet for weighing Machine, exhaust fan, electric hoist, ejector, tonners, tonner lift bar, flexible connector, trunnion, cylinders, expansion tank, spray catcher, crain weigh load indicator, basket type strainer, FRP h	10	A4
14	PE-V0-408-174-A001	P&I Diagram for Chlorination plant (CW, RW, PW and Leak Absorption System)	4	A1
15	PE-V0-408-174-A013	Data Sheet for Centrifugal Blower for leak absorption system and GA Drg, Characteristic Curve	10	A4
16	PE-V0-408-174-A007	Manufacturing quality plan for horizontal centrifugal pumps with motor FOR CHLORINATION PLANT	10	A4
17	PE-V0-408-174-A003	Manufacturing quality plan for Chlorinator	10	A4
18	PE-V0-408-174-A021	DATA SHEET FOR INSTRUMENTS FOR CHLORINATION PLANT	10	A4
19	PE-V0-408-174-A014	Data Sheet for Absorption Tower &Caustic Tank, G.A. Drg.Sizing calculation	10	A4
20	PE-V0-408-174-A016	data sheet for valves FOR CHLORINATION PLANT	10	A4
21	PE-V0-408-174-A020	ControlWrite-up for CW , RW, PW and leak absorption for Chlorination plant	6	A4
22	PE-V0-408-174-A019	data sheet for motor FOR CHLORINATION PLANT	10	A4
23	PE-V0-408-174-A006	Manufacturing quality plan for Blower with motor FOR CHLORINATION PLANT	10	A4
24	PE-V0-408-174-A009	PG test procedure for chlorinationplant	20	A4
25	PE-V0-408-174-A026	Cable schedule FOR CHLORINATION PLANT	16	A4



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26	PE-V0-408-174-A032	engineering BOQ FOR CHLORINATION PLANT	20	A4
27	PE-V0-408-174-A022	INSTRUMENT SCHEDULE FOR CHLORINATION PLANT	12	A4
28	PE-V0-408-174-A033	data sheetControl Cable & screened control cables	12	A4
29	PE-V0-408-174-A004	Manufacturing quality plan for Evaporator, gas filter, expansion chamber	10	A4
30	PE-V0-408-174-A008	Manufacturing quality plan for Absorption system tower with caustic solution tank	10	A4
31	PE-V0-408-174-A024	O&M MANUAL FOR CHLORINATION PLANT	24	A4
32	PE-V0-408-174-A018	Process Sizing Calculation FOR CHLORINATION PLANT	4	A4
33	PE-V0-408-174-A025	Electrical load data FOR CHLORINATION PLANT	8	A4

1. Any additional drawings-documents required during detailed engineering stage shall be provided by bidder without any commercial, technical and delivery implication to BHEL and customer.

2. Bidder to note that the successful bidder, during detail engineering, will submit the drg/doc through web based Document Management System in addition to hard copies to be submitted as per the Annexure IV of this specification. Bidder would be provided access to the DMS for drg/doc approval and adequate training for the same. Detailed methodology would be finalized during the kick-off meeting. Bidder to ensure following at their end.

- Internet explorer version – Minimum Internet Explorer 7
- Internet speed – 2 mbps (Minimum preferred)
- Pop ups from our external DMS IP (124.124.36.198) should not be blocked
- Vendor's internal proxy setting should not block DMS application's link (<http://124.124.36.198/wrenchwebaccess/login.aspx>)”
- DMS user manuals to be used by BHEL PEM vendors for uploading, viewing, revising, commenting and tracking documents on PEM's DMS have been uploaded on PEM internet website (www.bhelpem.com) under the Vendor session.
- For quick access bidder may refer the link <http://bhelpem.com/DMSManuals/DMSManuals.html>

3. Re-submission of drawing/document shall be done within 10 days by supplier.



**1x800 MW WANAKBORI STPP
TECHNICAL SPECIFICATION FOR
CW TREATMENT PLANT**

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ANNEXURE-IX

**FORMAT FOR OPERATION AND MAINTENANCE
MANUAL**



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TECHNICAL SPECIFICATION FOR
CW TREATMENT PLANT**

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Project name :
Project number :
Package Name :
PO reference :
Document number :
Revision number :

Sl.no. & Sections	Description	Tick (√)if included in Manual			Remarks
		Yes	No	Not Applicable	
1.	COVER PAGE				
1.1	Project Name				
1.2	Customer/consultant Name				
1.3	Name of Package				
1.4	Supplier details with phone, FAX ,email address , Emergency Contact number				
1.5	Name and sign of prepared by , checked by & approved by				
1.6	Revision history with approval Details				
2.0	INDEX				
2.1	showing the sections & related page nos All the pages should be numbered section wise				
3.0	DESCRIPTION OF PLANT/SYSTEM				
3.1	Description /write up of operating principle of system equipment/ associated sub-systems & accessories/controls system , operating conditions, performance parameters under normal , start up and special cases				
3.2	Equipment list and basic parameter with Tag numbers				
3.3	Data sheets approved by Customer/for information and catalogues provided by original manufacturer				
3.4	Associated other packages and Interface /terminal points				
3.5	P&ID & Process Diagrams				
3.6	GA Layout drawings, As-built drawings , Actual photograph of items/system (Drawings of A2 & bigger sizes are to be attached in the last)				
3.7	Single line/wiring diagrams				



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CW TREATMENT PLANT**

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Sl.no. & Sections	Description	Tick (√)if included in Manual			Remarks
		Yes	No	Not Applicable	
3.8	Control philosophy /control write-ups				
4.0	COMMISSIONING ACTIVITIES (IF NOT COVERED IN SEPARATE DOCUMENT I.E. ERECTION MANUAL, COMMISSIONING MANUAL)				
4.1	Pre-Commissioning Checks				
4.2	handling of items at site				
4.3	Storage at site				
4.4	Unpacking & Installation procedure				
5.0	OPERATION GUIDELINES FOR PLANT PERSONAL/USER/OPERATOR				
5.1	Interlock & Protection logic along with the limiting values of protection settings for the equipment along with brief philosophy behind the logic, drawings etc. to be provided.				
5.2	Start up, normal operation and shut down procedure for equipments along with the associated systems in step by step mode. Valve sequence chart, step list, interlocks etc. with Equipment isolating procedures to be mentioned.				
5.3	Do's & Don't of the equipments.				
5.4	Safety precautions to be taken during normal operation. Safety symbols, Emergency instructions on total power failure condition/lubrication failure/any other condition				
5.5	Parameters to be monitored with normal values and limiting values				
5.6	Trouble shooting with causes and remedial measures				
5.7	Routine operational checks, recommended logs & records				
5.8	Changeover schedule if more than one auxiliary for the same purpose is given				
5.9	Painting requirement and schedule				
5.10	Inspection, repair , Testing and calibration procedures				
6.0	MAINTENANCE GUIDELINES FOR PLANT				



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Sl.no. & Sections	Description	Tick (✓)if included in Manual			Remarks
		Yes	No	Not Applicable	
	PERSONAL				
6.1	List of Special Tools and Tackles required for Overhaul/Trouble shooting including special testing equipment required for calibration etc.				
6.2	Stepwise dismantling and re-assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained, clearances etc. to be mentioned. Tolerances for fitment of various components to be given.				
6.3	Preventive Maintenance & Overhauling schedules linked with running hours/calendar period along with checks to be given				
6.4	Long term maintenance schedules especially for structural, foundations etc.				
6.5	Consumable list along with the estimated quantity required during commissioning, normal running and during maintenance like Preventive Maintenances and Overhaul. Storage/handling requirement of consumables/self-life.				
6.6	List of lubricants with their Indian equivalent, Lubrication Schedule, Quantity required for each equipment for complete replacement is to be given				
6.7	List of vendors & Sub-vendors with their latest addresses, service centres ,Telephone Nos., Fax Nos., Mobile Nos., e-mail IDs etc.				
6.8	List of mandatory and recommended spare parts list				
6.9	Tentative Lead time required for ordering of spares from the equipment supplier				
6.10	Guarantee and warranty clauses				
7.0	Statutory and other specific requirements considerations.				
8.0	List of reference documents				
9.0	Binding as per requirement				



**1x800 MW WANAKBORI STPP
TECHNICAL SPECIFICATION FOR
CHLORINATION PLANT**

SPECIFICATION No: PE-TS-408-174-A001

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**ANNEXURE-X
SITE STORAGE AND PRESERVATION**

SITE STORAGE AND PRESERVATION GUIDELINES

FOR

MECHNANICAL BOPs

(Doc No: PE-DC-SSG-A001 REV.00)



PROJECT ENGINEERING MANAGEMENT, POWER SECTOR
BHARAT HEAVY ELECTRICALS LIMITED-NOIDA

CONTENT

- 1 SCOPE OF THE DOCUMENT
- 2 PURPOSE OF STORAGE & PRESERVATION
- 3 MEASURES TO BE TAKEN FOR STORAGE AND PRESERVATION
 - a) GENERAL STORAGE REQUIREMENTS
 - b) GENERAL PRESERVATION REQUIREMENTS
 - c) GENERAL INSPECTION REQUIREMENTS
- 4 TYPE OF STORAGE FOR VARIOUS EQUIPMENT
5. CONCLUSION
6. STACKING ARRANGEMENT FOR PLATES AND STRUCTURAL STEEL

1. SCOPE OF THE DOCUMENT

This guideline is prepared in intent to provide proper site storage and preservation of the Mechanical, Electrical and C & I items / equipment supplied under various bought out packages/items. This storage procedure shall be followed at different power plant sites by concerned agency for storage and preservation from the date of equipment received at site until the same are erected and handed over to the customer.

2. PURPOSE OF STORAGE & PRESERVATION

Many of the items may be required to be kept in stores for long period. It shall therefore be essential that proper methods of storage and preservation be applied so that items do not deteriorate, loose some of their properties and become unusable due to atmospheric conditions and biological elements.

3. MEASURES TO BE TAKEN FOR STORAGE, HANDLING & PRESERVATION

a) GENERAL STORAGE REQUIREMENTS

1. To the extent feasible, materials should be stored near the point of erection. The storage areas should have adequate unloading and handling facilities with adequate passage space for movement of material handling equipment such as cranes, fork lift trucks, etc. The storage of materials shall be properly planned to minimise time loss during retrieval of items required for erection.
2. The outdoor storage areas as well as semi-closed stores shall be provided with adequate drainage facilities to prevent water logging. Adequacy of these facilities shall be checked prior to monsoon.
3. The storage sheds shall be built in conformity with fire safety requirements. The stores shall be provided with adequate lights and fire extinguishers. 'No smoking' signs shall be placed at strategic locations. Safety precautions shall be strictly enforced.
4. Adequate lighting facility shall be provided in storage areas and storage sheds and security personnel positioned to ensure enforcement of security measures to prevent theft and loss of materials.
5. Adequate number of competent stores personnel and security staff shall be deployed to efficiently store and maintain the equipment / material.
7. The equipment shall be stored in an orderly manner, preserving their identification slips, tags and instruction booklets, etc., required during erection. The storage of materials shall be equipment-wise. Loose parts shall be stored in sheds on racks,

preserving the identification marks and tags in good condition. The group codes shall be displayed on the racks

6. At no time shall any materials be stored directly on ground. All materials shall be stored minimum 200 mm above the ground preferably on wooden sleepers

b) GENERAL PRESERVATION REQUIREMENTS

1. All special measures to prevent corrosion shall be taken like keeping material in dry condition, avoiding the equipment coming in contact with corrosive fluid like water, acid etc.
2. Materials which carry protective coating shall not be wrapped in paper, cloth, etc., as these are liable to absorb and retain moisture. The material shall be inspected and in case of signs of wear or damages to protective coating, that portion shall be cleaned with approved solution and coated with an approved protective paint. Complete record of all such observations and protective measures taken shall be maintained.
3. Generally equipment supplied at site are properly greased or rust protective oil is applied on machined/ fabricated components. However periodic inspection shall be carried out to ensure that protection offered is intact.
4. While handling the equipment, no dragging on the ground is permitted. Avoid using wire rope for lifting coated components. Use polyester slings (if possible) otherwise protective material (e.g. clothes, wood block etc.) should be used while handling the components with rope / slings
5. For Equipment supplied with finished paint, touch paint shall be done in case any surface paint gets peeled off during handling. Otherwise such surfaces shall necessarily be wrapped with polythene to avoid any corrosion. Further for equipment wherein finish coat is to be applied at site, site to ensure that equipment is received with primer coat applied.
6. It shall be ensured by periodic inspection that plastic inserts are intact in tapped holes, wherever applicable.
7. Pipes shall be blown with air periodically and it shall be ensured that there is no obstruction.
8. Silica gel or approved equivalent moisture absorbing material in small cotton bags shall be placed and tied at various points on the equipment, wherever necessary.
9. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion/jamming due to prolonged storage.

10. All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months and a record of such measured insulation values shall be maintained.
11. Following preservatives/preservation methods can be used depending upon type of equipment
 - a. Rust preventive fluid (RPF)
 - b. Rust protective paints
 - c. Tarpaulin covers, in case of outdoor storage
 - d. De-oxy aluminate for weld-ments

c) GENERAL INSPECTION REQUIREMENTS

1. Period inspection of materials with specific reference to –
 - Ingress of moisture and corrosion damages.
 - Damage to protective coating.
 - Open ends in pipes, vessels and equipment -
 - In case any open ends are noticed, same shall be capped.
2. Any damages to equipment / materials.
 - In case of any damages, these shall be promptly notified and in all cases, the repairs / rectification shall be carried out.
 - Any items found damaged or not suitable as per project requirements shall be removed from site. If required to store temporarily, they shall be clearly marked and stored separately to prevent any inadvertent use.

4. TYPE OF STORAGE FOR VARIOUS EQUIPMENT

The types of storage are broadly classified under the following heads:

i **Closed storage with dry and dust free atmosphere. (C)**

The closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated asbestos sheets / galvanised iron sheets for roofing. Brick walls / asbestos sheets can be used to cover all the sides. The floor of the shed can be finished with plain cement concrete suitably glazed. The shed shall be provided with proper ventilation and illumination.



ii **Semi-closed storage. (S)**

The semi closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated / asbestos sheets for roofing. The floor shall be brick paved. If required a small portion of sides can be covered to protect components from rainwater splashing onto the components.





iii Open storage (O)

The open yard shall be levelled, well consolidated to achieve raised ground with the provision of feeder roads for crane approach along with access roads running all sides. One part of the open yard shall be stone pitched, levelled and consolidated with raised ground suitable for storing / stacking heavier and critical components with due space to handle them by cranes etc . Adequate number of sleepers, concrete block etc. to be provided to make raised platforms to stack critical materials.

A separate yard to be identified as “scrap yard” slightly away from main open yard to store wooden/steel scraps, which are to be disposed off. This is required to avoid mix up with regular components as well as to avoid fire hazard.

Some of the components, which are having both machined & un-machined surfaces and are bulky, shall be stored in open storage area on a raised ground and suitably covered with water proof / fire retardant tarpaulin.



The equipment listed below shall be stored and inspected as per requirement mentioned in the table below.

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
Raw material /mechanical items like pipes, plates, structure sections etc.)				
1.	Steel pipes (lined/unlined)	S	Damage , paint, corrosion, rubber lining peeling	Provide end cap
2.	MS Plates	S	Damage, paint, corrosion	
3.	SS Plates	S	Damage	
4.	Non-metallic pipes	S	Damage, cracks	Provide end cap
5.	Stainless steel pipes	S	Damage ,	Provide end cap
6.	MS sections, beams	S	Damage, paint, corrosion	
7.	Cable trays	S	Damage, condition of preservations	
8.	Insulation sheets	S	Damage	
9.	Insulation	C	Damage, packing	
10.	Hangers Rods	S	Damage, paint, packing	
11.	Tubes	S	Damage, paint , packing	Provide end cap
12.	Hume pipes	O	Damage	
13.	Castings	O	Damage, paint, corrosion	
Fabricated mechanical items (pressure vessels, tanks etc.)				
14.	Pressure vessels (unlined)	O	Damage, paint, corrosion,	Covered nozzles
15.	Atmospheric storage tanks (unlined)	O	Damage, paint, corrosion	Covered nozzles

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
16.	Pressure vessels (lined)	S	Damage, paint, corrosion, rubber lining	
17.	Atmospheric storage tanks(lined)	S	Damage, paint, corrosion, rubber lining	
18.	Support structures	O	Damage , paint, corrosion	
19.	Flanges	C	Damage , paint, corrosion	
20.	Fabricated pipes	S	Damage , paint, corrosion	Provide end cap
21.	Vessels internals	C	Damage , paint, corrosion ,packing	
22.	Grills	S	Damage , paint, corrosion	
23.	Angles	S	Damage , paint, corrosion	
24.	Bridge mechanism/clarifier mechanism	O	Damage , paint, corrosion	
25.	Cranes, rails	S	Damage , paint, corrosion	
26.	Stair cases	O	Damage , paint, corrosion	
27.	Ladders/handrails	O	Damage , paint, corrosion	
28.	Fabricated ducts	S	Damage , paint, corrosion	
29.	Isolation Gates	O	Damage , paint, corrosion	
30.	Fabricated boxes/panels	S	Damage , paint, corrosion	
Mechanical components like valves, fittings, cables glands, spares etc.)				
31.	Valves	S	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
32.	Fittings	S	Damage , packing	Provide end cap
33.	Cable glands	C	Damage , packing	
34.	Tools & tackles	C	Damage , packing	
35.	Nut , bolts, washers,	C	Damage , packing	
36.	Gasket & Packings	C	Damage , packing	
37.	Copper tubes	C	Damage , packing, corrosion	Provide end cap
38.	SS tubing	C	Damage , packing	Provide end cap
Rotating assemblies (pumps, blowers, stirrers, fans, compressors etc.)				
39.	Pumps	S	Damage , packing, corrosion	Shaft rotation
40.	Blowers/Compressors	S	Damage , packing, corrosion	Shaft rotation
41.	Agitators/stirrers/radial launders	C	Damage , packing, corrosion	Shaft rotation
42.	Rollers for chlorine tonner mounting	C	Damage , packing, corrosion	
43.	Centrifuge	S	Damage , packing,	
44.	Gear box	C	Damage , packing, corrosion	
45.	Bearings	C	Damage , packing, corrosion	
46.	Fans	S	Damage , packing, corrosion	
47.	Dosing skids	S	Damage , packing, corrosion	
48.	Pump assemblies	S	Damage , packing, corrosion	
49.	Air washers(INTERNALS)	S	Damage , packing	
50.	Air conditioners (split)	C	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
51.	Elevators(CONTAINERIZED)	O	Damage , packing, corrosion	
52.	Chillers/VA machines	S	Damage , packing	
53.	Air handling Unit/Package unit	S	Damage , packing	
54.	Chlorinators & Evaporators	C	Damage , packing	
55.	Ejectors	C	Damage , packing	
56.	Electrolyser	C	Damage , packing	
Miscellaneous items like chain pulley blocks, hoists etc.				
57.	Chain pulley blocks	S	Damage, Packing	
58.	Electric hoists	S	Damage, Packing	
59.	Fire extinguishers	C	Damage, expiry date	
60.	Fork Lift Truck	S	Damage, Packing	
61.	Hydraulic Mobile Crane	O	Damage, Packing	
62.	Mobile Pick Up & Carry Crane	O	Damage, Packing	
63.	Motor boats	O	Damage, Packing	
64.	Safety showers	S	Damage, Packing	
65.	Diffusers/dampers	S	Damage, Packing	
Chemicals and consumables (acid, alkali, paints, oils, reagents and special chemicals)				
66.	Hydro Chloric Acid (HCl)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical
67.	Sulphuric acid (H ₂ SO ₄)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
68.	Sodium hydroxide (NaOH)	Store in canes/ storage tank in dyke area	Date of production/ leakage/ fumes/ breather	hazardous chemical ,breather to be checked for air ingress
69.	Sodium hypo chlorite	To be stored under shed	Date of production/ leakage/ fumes	hazardous chemical ,self-life normally 15-30 days after which strength of chemical decays
70.	Ammonia	S	Date of production/ leakage/ fumes	Store in closed storage tanks, hazardous chemical
71.	CW treatment chemicals	S	Date of production , Self-life	Store in closed canes
72.	RO/UF cleaning chemicals	S	Date of production , Self-life	Store in closed canes
73.	Lime	C	Damage to packing , seepage	Prevent moisture, rain
74.	Alum bricks	C	Damage to packing	Prevent moisture, rain
75.	Poly electrolyte	S		Store in closed storage tanks
76.	Laboratory chemicals(powder)	C	Damage, Packing self- life	
77.	Laboratory chemicals(liquid)	C	Damage, Packing self- life	
78.	Lubrication oils	C	Leakage	
79.	Paints	S	Leakage ,air tightness	
80.	Sand	O	Damage of packing	No hooks
81.	Salt (NaCl)	C	Damage of packing, water ingress	Prevent moisture, rain
82.	Anthracite	S	Damage of packing	
83.	Activated carbon	S	Damage of packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
84.	Thermal insulation	S	Damage of packing	
85.	Cement	C	Damage of packing	Prevent moisture, rain
86.	Gravels	O	Damage of packing	
87.	ION exchange resins	C	Damage , packing	Refer manufacturer guidelines
88.	RO membranes	C	Damage , packing	Refer manufacturer guidelines
89.	UF membranes	C	Damage , packing	Refer manufacturer guidelines
90.	Cleaning chemicals	C	Damage , packing	Refer manufacturer guidelines
91.	Chemicals for analysers/calibration	C	Damage , packing	Refer manufacturer guidelines
Electrical and C & I items (motors, cables etc.)				
92.	Motors	C	Damage , packing	
93.	Cable drums	O	Damage	
94.	Control Panel /control desk, UPS ,JB	S	Damage, Packing	
95.	Instruments(gauges/analysers)	C	Damage	
Special items		As per Manufacturer's item, like Hydrogen cylinders, Ozonator, Analyser, Chlorine dioxide generators etc.		

5. CONCLUSION

Concerned storage agency at site should make sure that loss in equipment performance and wear & tear are minimised through proper storage and preservation. The above are broad guidelines and cover major equipment / materials. However specific storage practices shall be followed as per manufacturer recommendation. All the necessary measures even in addition to the ones mentioned above, if found necessary, should be taken to achieve the objective.

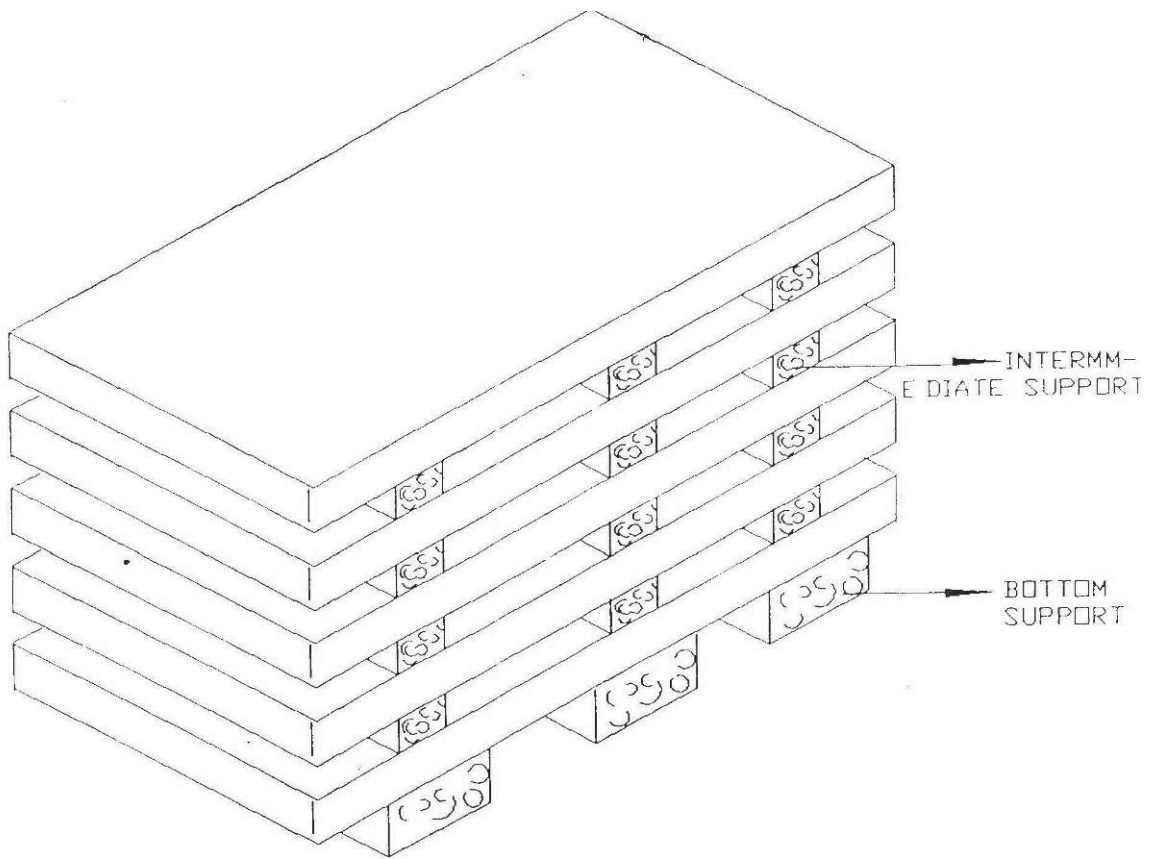


Figure - 1 - PLATE STACKING ARRANGEMENT

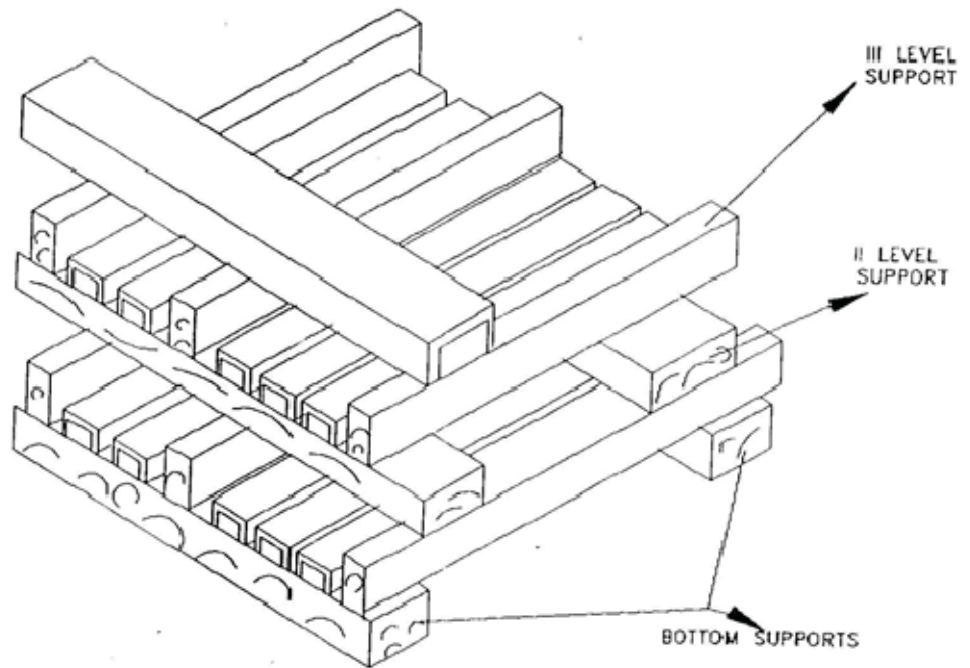


Figure - 2 - STRUCTURAL STEEL STACKING ARRANGEMENT



**1x800 MW WANAKBORI STPP
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CHLORINATION PLANT**

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ANNEXURE-XI
PACKING PROCEDURE
(COVERED UNDER SECTION C 2B)

	1x800 MW WANAKBORI STPP		
		VOLUME	
		SECTION	
		REV. NO. 00	DATE : 10.03.2015
		SHEET	OF

KKS PHILOSOPHY

1x800 MW WANAKBORI STPP

FORM No. PEM - 6100 -0

	DOCUMENT TITLE
	KKS NUMBERING PHILOSOPHY

KKS NUMBERING PHILOSOPHY

For identifying (tagging) an instrument / equipment in Power plant KKS numbering scheme is used. The purpose is to assign a unique number to every equipment in the power plant. For C&I equipment unique number are to be provided up to the signal level so that a unique number Input / Output exist in DCS for every signal.

Normally KKS number is a 10 digit alpha-numeric code and is typically split into the following:

X	X	X	AAY			YB	B		
---	---	---	-----	--	--	----	---	--	--

First three digits indicate the Sub-System. The Code for the major system are given as per **Annexure-1**.

Fourth and Fifth digits are the **Numerical Keys at System Code Level** and used to distinguish between main systems having same Alpha Codes.

Sixth and Seventh digits are the **Equipment / Apparatus / Measuring Circuit Code**. The code of various Equipment / Apparatus / Measuring Circuit is shown in **Annexure-2**

Eight, Nine and tenth digits are the **Numerical Keys at Equipment / Apparatus / Measuring Circuit Code** and used to distinguish between various instruments in the same sub-group. Numerical keys at System / Equipment / Apparatus / Measuring Circuit is shown in **Annexure-3**.

	DOCUMENT TITLE KKS NUMBERING PHILOSOPHY
---	---

ANNEXURE-1

List of System / Sub-System Codes used in Power Plant:

- 1) Compressed air system : QEA, QEC
- 2) Ventilation System : SAA TO SAZ
- 3) Fire Detection & Protection System + Fire Water pumps : SGM, SGN, SGO, SGP
- 4) Sewage Treatment : SJA TO SJZ
- 5) Pre-treatment Plant : GBI, GBM, GBV
- 6) RO DM Plant : GCI, GCM, GBV


ANNEXURE-2

Standard Equipment Codes:

AA	Valves including drives, also hand operated
AB	Seclusions, Lock, Gates, Doors
AC	Heat Exchanger
AE	Turning, Driving, Lifting equipment
AF	Continuous conveyors, Feeders
AG	Generator Units
AH	Heating and Cooling Units
AK	Pressing and Packaging equipment
AM	Mixer, Stirrer
AN	Blower, Air Pumps / Fans, Compressor Units
AP	Pump Units
AT	Purification, Drying, Filter
AV	Combustion Equipment e.g. grates

Standard Apparatus Codes:

BB	Vessels and Tank
BF	Foundation
BG	Boiler Heating Surfaces
BN	Injector, Ejector
BP	Flow and throughput limitation equipment (Orifice)
BQ	Holder, Carrying Equipment, Support
BR	Piping, Ducts, Chutes, Compensator
BS	Sound Absorber
BU	Insulations, Sheatings

	DOCUMENT TITLE
	KKS NUMBERING PHILOSOPHY

Standard Measuring Circuits Codes:

CD	Density
CE	Electrical Quantities
CF	Flow, throughput
CG	Distance, Length, Position
CK	Time
CL	Level
CM	Humidity
CQ	Analysis (SWAS)
CS	Speed, Velocity, Frequency
CT	Temperature
CY	Vibration, Expansion

ANNEXURE-3

Numerical Keys

A) Numerical Keys at System Code Level

- i) Use 10, 20, 30, To distinguish between main systems having same Alpha Codes. Examples:
 - a) Main Steam (Left) and Main Steam (Right)
 - b) BFP – A/B/C
 - c) ID Fan – A/B, FD Fan A/B, AH – A/B
- ii) For branch off from main system path having code say 10, keep the same alpha code and use 11, 12, 13 etc. Similarly for other branch off from main system path having code say 20, keep the same alpha code and use 21, 22, 23 etc and shall carry on further in the same way.
- iii) If the branch off from main system / sub system path is used for some other system, where different alpha codes can be applied, then in that case the said branch line will be designated by the alpha codes of the system to which it is providing the input.

B) Numerical keys at Equipment Code level:

There are three numerical keys available for each type of equipment code. Following has been agreed upon considering present practice, better flexibility and ease in sorting.


- i) Valves and Dampers --- *Equipment Code – AA*

N1

N2 N3

1x800 MW WANAKBORI STPP

FORM No. PEM - 6100 -0

	DOCUMENT TITLE		
	KKS NUMBERING PHILOSOPHY		
Motorised (<i>on/off duty</i>)	-	0	<i>01 to 50</i>
Motorised (<i>inching duty</i>)	-	0	<i>51 to 99</i>
Pneumatic (Control)	-	1	<i>01 to 50</i>
Motorised (<i>thyrestor Control</i>)	-	1	<i>51 to 99</i>
Sol. Operated (Open / Close duty (Valves, NRVs, Gate)	-	2	01 to 99
Hydraulic	-	3	01 to 99
NRV (Without actuation)	-	4	01 to 99
Manual	-	5	01 to 99
Manual	-	6	01 to 99
Relief & Safety Valves	-	7	01 to 99
Reserve	-	8	01 to 99
Reserve	-	9	01 to 99
 ii) Field Instruments			
Field Transmitters & Analog Signals	-	0	01 to 99
Field Switches & Binary Signals	-	1	00 to 99
PG Test Point	-	4	00 to 99
Gauges	-	5	00 to 99
Automatic Turbine Tester (ATT)-HWR	-	2	00 to 99
(Reserved for protection Signals used by Hardwar)			
 Example of Numerical Key Usage:			
<p>In line with the philosophy adopted for Valves / Dampers /instruments etc. pumps and fans in the main systems (having different system code) can be numbered as AP/N100 and as AP/N101, 102, Where system code is same.</p>			



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TECHNICAL SPECIFICATION FOR
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SPECIFICATION No: PE-TS-408-174-A001

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BIDDER SHOULD SUBMIT THE SIGNED AND STAMPED COPY OF THE FOLLOWING DOCUMENTS WITH BID:

1. Deviation if any strictly in the enclosed Schedule of deviation with cost of withdrawal only with mention of specification clause for which deviation is being asked. (Stamped & Signed)
2. Compliance certificate.(Stamped & Signed)
3. Schedule of Declaration. (Stamped & Signed)
4. Electrical Load data in BHEL format (Stamped & Signed)
5. Un Price Schedule duly filled in. (Stamped & Signed)
6. List of Start-up & commissioning spares if any. (Stamped & Signed)
7. List of Recommended spares if any. (Stamped & Signed).



**1x800 MW WANAKBORI STPP
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COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing / stamping this compliance certificate (every sheet) and furnish same with the offer.

- a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions, other than those mentioned under "exclusion and those resolved as per 'Schedule of Deviations', with regard to same.
- b) There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'
- c) Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL / CUSTOMER approval & customer hold points for inspection / testing shall be marked in the QP at the contract stage. Inspection / testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This is within the contracted price without any extra implications to BHEL after award of the contract.
- d) All drawings/ data-sheets / calculations etc. submitted along with the offer shall not be taken cognizance off.
- e) The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified / intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre-bid discussions, otherwise BHEL / Customer's decision shall be binding on the bidder whenever the deficiency is pointed out.

For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.

- f) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.
- g) All sub vendors shall be subject to BHEL / CUSTOMER approval in the event of order.
- h) Guarantee for plant/equipment shall be as per relevant clause of GCC / SCC / Other Commercial Terms & Conditions
- i) In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities within the scope of work as tender specification. This clause will apply in case during site



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commissioning, additional requirements emerges due to customer and / or consultant's comments. No extra claims shall be put on this account

- j) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's / Customer's / Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.
- k) As built drawings shall be submitted as and when required during the project execution.
- l) The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.
- m) Successful bidder shall furnish detailed erection manual for each of the equipment supplied under this contract at least 3 months before the scheduled erection of the concerned equipment / component or along with supply of concerned equipment / component whichever is earlier.
- n) Document approval by customer under Approval category or information category shall not absolve the vendor of their contractual obligations of completing the work as per specification requirement. Any deviation from specified requirement shall be reported by the vendor in writing and require written approval. Unless any change in specified requirement has been brought out by the vendor during detail engineering in writing while submitting the document to customer for approval, approved document (with implicit deviation) will not be cited as a reason for not following the specification requirement.
- o) In case vendor submits revised drawing after approval of the corresponding drawing, any delay in approval of revised drawing shall be to vendor's account and shall not be used as a reason for extension in contract completion.



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SCHEDULE OF PRE-BID CLARIFICATION

All clarification from the Technical Specification shall be filled in by the BIDDER clause by clause in this format only.

VOLUME	SECTION	CLAUSE NO.	PAGE NO.	SPECIFICATION REQUIREMENT	CLARIFICATION	REASONS FOR CLARIFICATION

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				COMPANY SEAL
NAME	DESIGNATION	SIGNATURE	DATE	

DEVIATION SHEET (COST OF WITHDRAWAL)



**PROJECT:-1x800 MW WANAKBORI STPP
TECHNICAL SPECIFICATION FOR CHLORINATION PLANT
PACKAGE:- CW TREATMENT PLANT [SECTION-4, VOLUME-III]**

TENDER ENQUIRY REFERENCE:-

NAME OF BIDDER:-

SL NO	VOULME/ SECTION	PAGE NO.	CLAUSE NO.	TECHNICAL SPECIFICATION/ TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWAL OF DEVIATION	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWAL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWAL OF DEVIATION (POSITIVE/ NEGATIVE)	REASON FOR QUOTING DEVIATION
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TECHNICAL DEVIATIONS

COMMERCIAL DEVIATIONS

PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE

NAME	DESIGNATIONS	SIGN & DATE

NOTES:

- For self manufactured items of bidder, cost of withdrawal of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.
- For directly dispatchable items, cost of withdrawal of deviation will be applicable on the basic price including taxes, duties & freight.
- All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format.
- Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of.
- Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawal of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable.
- Bidder shall furnish price copy of above format along with price bid.
- The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser.
- Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered.
- For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawal of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawal of deviation shall be taken as NIL.
- Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be accepted.
- All techno-commercial terms and conditions of NIT shall be deemed to have been accepted by the bidder, other than those listed in unpriced copy of this format.
- Cost of withdrawal is to be given separately for each deviation. In no event bidder should club cost of withdrawal of more than one deviation else cost of withdrawal of such deviations which have been clubbed together shall be considered as NIL.
- In case nature of cost of withdrawal (positive/negative) is not specified it shall be assumed as positive.
- In case of discrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.



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TECHNICAL SPECIFICATION FOR
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VOLUME **III**

SECTION-5

REV. NO. 00

SUGGESTIVE PRICE FORMAT FOR CHLORINATION PLANT FOR 1X800 MW WANAKBORI STPP.

Sl. No.	DESCRIPTION OF EQUIPMENT / ITEM	TOTAL PRICE FOR "FOR" SITE
(1)	(2)	(3)
1.0	Total lump-sum firm price on "FOR" site basis for design, engineering, manufacturing, painting, inspection & testing at manufacturer's works, supply, complete with all accessories including start up and commissioning spares as required, mandatory spares as specified in specification, packing, shipment and delivery to Power Station Site. In addition, the bidder's scope shall include erection and commissioning, unloading, storage and handling at site, site testing, trial run, performance and guarantee tests and handing over to customer the COOLING WATER (CW) AND RW WATER (RW) CHLORINATION PLANT & ABSORPTION SYSTEM for 1X800 MW WANAKBORI STPP as per Technical Specification PE-TS-408-174-A001 and as required for safe and trouble free smooth operation.	
NOTES:		
a	Bidder to note that total price indicated above at 1.0 shall be considered for evaluation and hence should be complete in all respect for the full scope defined and considering all terms and conditions agreed.	
b	In case, price indicated above does not match with item wise break-up given at 2.0, the highest price so calculated shall be considered for evaluation but in case of order, the same shall be placed at the lowest price.	
2.0	BREAK-UP OF PRICES GIVEN IN 1.0 ABOVE	
2.1	Total lump sum firm price for EQUIPMENT (SUPPLY) i.e. manufacture, inspection, testing at vendor / sub vendor works, packing, forwarding, including start up and commissioning spares as required, etc. but exclusive of all taxes & duties for the complete scope of supply of CW CHLORINATION PLANT AND ABSORPTION SYSTEM as defined in the BHEL tender specification (PE-TS-408-174-A001) for delivery up to site basis (freight included).	
2.2	Total lump sum firm price for EQUIPMENT (SUPPLY) i.e. manufacture, inspection, testing at vendor / sub vendor works, packing, forwarding, including start up and commissioning spares as required etc. but exclusive of all taxes & duties for the complete scope of supply of RW CHLORINATION PLANT AND ABSORPTION SYSTEM as defined in the BHEL tender specification (PE-TS-408-174-A001) for delivery up to site basis (freight included).	
2.3	Total lump sum firm price for supply of mandatory spares for COOLING WATER (CW) CHLORINATION PLANT & ABSORPTION SYSTEM as specified in Technical specification (PE-TS-408-174-A001).	
2.4	Total lump sum firm price for supply of mandatory spares for RW WATER (RW) CHLORINATION PLANT & ABSORPTION SYSTEM as specified in Technical specification (PE-TS-408-174-A001).	
2.5	Total lump sum firm price for Erection & Commissioning as indicated in technical specification and handing over to Purchaser the entire CW Chlorination plant with absorption system specified in Technical specification (PE-TS-408-174-A001) as required for safe and trouble free smooth operation.	
2.6	Total lump sum firm price for Erection & Commissioning as indicated in technical specification and handing over to Purchaser the entire RW Chlorination plant with absorption system specified in Technical specification (PE-TS-408-174-A001) as required for safe and trouble free smooth operation.	
2.7	Total lump sum firm price for PG test and handing over of COOLING WATER (CW) CHLORINATION PLANT & ABSORPTION SYSTEM.	
2.8	Total lump sum firm price for PG test and handing over of RAW WATER (RW) CHLORINATION PLANT & ABSORPTION SYSTEM.	
2.9	Taxes & duties etc.	



**1x800 MW WANAKBORI STPP
TECHNICAL SPECIFICATION FOR
CHLORINATION PLANT**

SPECIFICATION No: PE-TS-408-174-A001

VOLUME : III

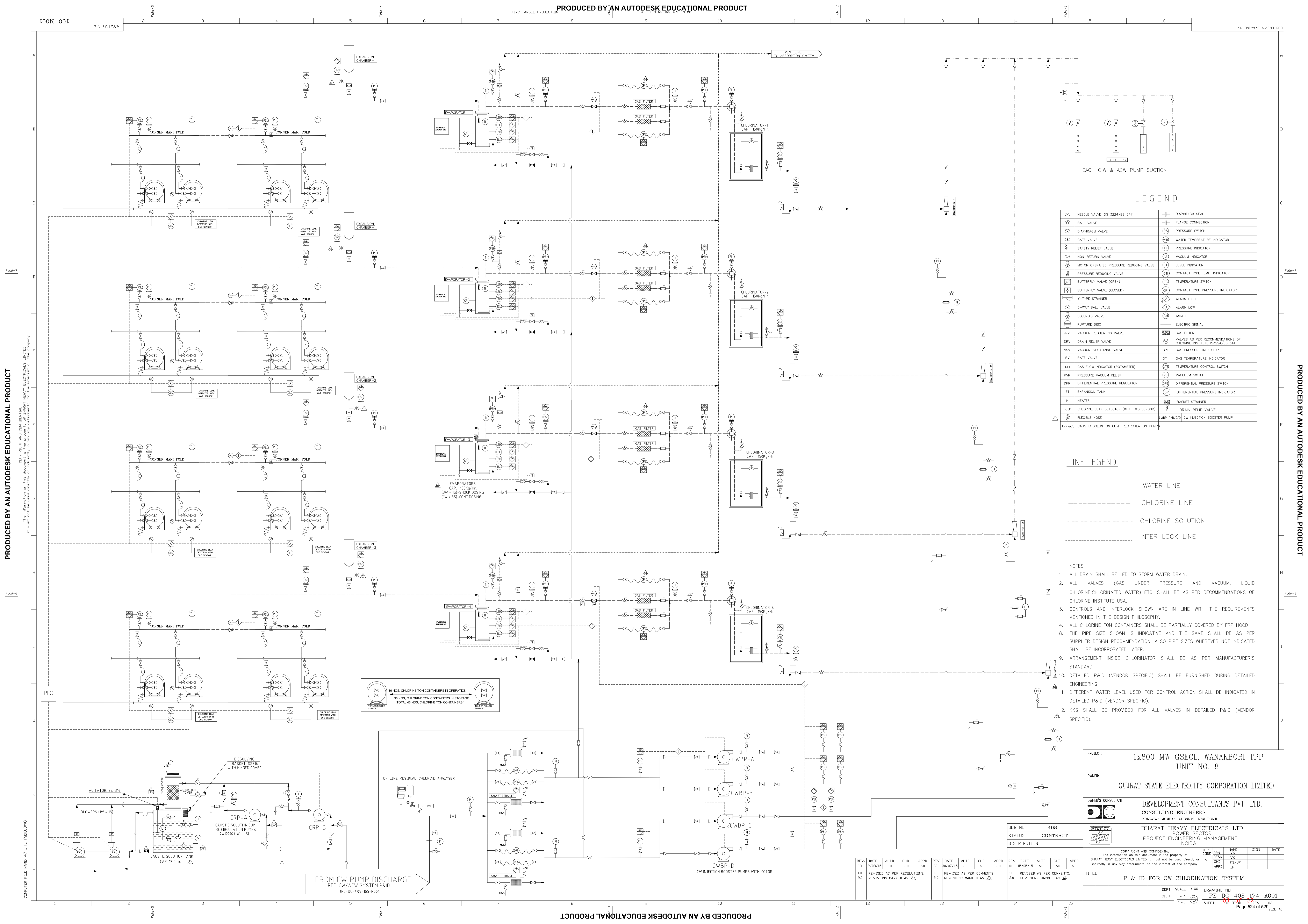
SECTION : 6

REV 00

DATE:

SHEET

**ELECTRICAL LOAD DATA
(REFER SCETION C3)**



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LEGEND

	NEEDLE VALVE (IS 3224/BS 341)		DIAPHRAGM SEAL
	BALL VALVE		FLANGE CONNECTION
	DIAPHRAGM VALVE		PRESSURE SWITCH
	GATE VALVE		WATER TEMPERATURE INDICATOR
	SAFETY RELIEF VALVE		PRESSURE INDICATOR
	NON-RETURN VALVE		VACUUM INDICATOR
	MOTOR OPERATED PRESSURE REDUCING VALVE		LEVEL INDICATOR
	PRESSURE REDUCING VALVE		CONTACT TYPE TEMP. INDICATOR
	BUTTERFLY VALVE (OPEN)		TEMPERATURE SWITCH
	BUTTERFLY VALVE (CLOSED)		CONTACT TYPE PRESSURE INDICATOR
	Y-TYPE STRAINER		ALARM HIGH
	3-WAY BALL VALVE		ALARM LOW
	SOLENOID VALVE		AMMETER
	RUPTURE DISC		ELECTRIC SIGNAL
	VRV VACUUM REGULATING VALVE		GAS FILTER
	DRV DRAIN RELIEF VALVE		VALVES AS PER RECOMMENDATIONS OF CHLORINE INSTITUTE USA
	VSV VACUUM STABILIZING VALVE		GAS PRESSURE INDICATOR
	RV RATE VALVE		GAS TEMPERATURE INDICATOR
	GFI GAS FLOW INDICATOR (ROTAMETER)		TEMPERATURE CONTROL SWITCH
	PVR PRESSURE VACUUM RELIEF		VACUUM SWITCH
	DPR DIFFERENTIAL PRESSURE REGULATOR		DIFFERENTIAL PRESSURE SWITCH
	ET EXPANSION TANK		DIFFERENTIAL PRESSURE INDICATOR
	H HEATER		BASKET STRAINER
	CLD CHLORINE LEAK DETECTOR (WITH TWO SENSORS)		DRAIN RELIEF VALVE
	FHX FLEXIBLE HOSE		CW INJECTION BOOSTER PUMP
	CRP-A/B CAUSTIC SOLUTION CIRCULATION PUMPS		

LINE LEGEND

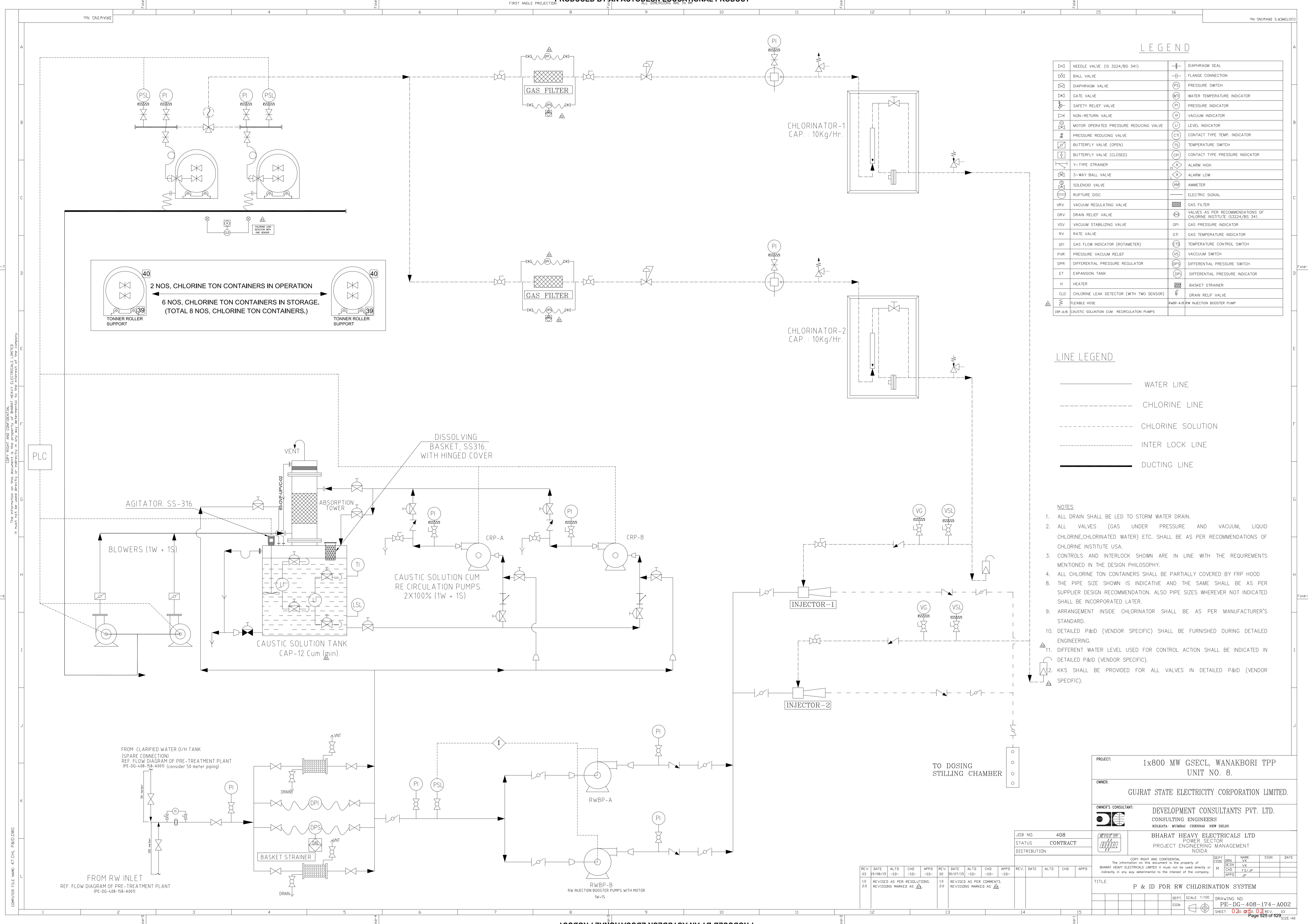
	WATER LINE
	CHLORINE LINE
	CHLORINE SOLUTION
	INTER LOCK LINE

- ### NOTES
- ALL DRAIN SHALL BE LED TO STORM WATER DRAIN.
 - ALL VALVES (GAS UNDER PRESSURE AND VACUUM, LIQUID CHLORINE, CHLORINATED WATER) ETC. SHALL BE AS PER RECOMMENDATIONS OF CHLORINE INSTITUTE USA.
 - CONTROLS AND INTERLOCK SHOWN ARE IN LINE WITH THE REQUIREMENTS MENTIONED IN THE DESIGN PHILOSOPHY.
 - ALL CHLORINE TON CONTAINERS SHALL BE PARTIALLY COVERED BY FRP HOOD.
 - THE PIPE SIZE SHOWN IS INDICATIVE AND THE SAME SHALL BE AS PER SUPPLIER DESIGN RECOMMENDATION. ALSO PIPE SIZES WHEREVER NOT INDICATED SHALL BE INCORPORATED LATER.
 - ARRANGEMENT INSIDE CHLORINATOR SHALL BE AS PER MANUFACTURER'S STANDARD.
 - DETAILED P&ID (VENDOR SPECIFIC) SHALL BE FURNISHED DURING DETAILED ENGINEERING.
 - DIFFERENT WATER LEVEL USED FOR CONTROL ACTION SHALL BE INDICATED IN DETAILED P&ID (VENDOR SPECIFIC).
 - KKS SHALL BE PROVIDED FOR ALL VALVES IN DETAILED P&ID (VENDOR SPECIFIC).

PROJECT: 1x800 MW GSECL, WANAKBORI TPP UNIT NO. 8.	
OWNER: GUJRAT STATE ELECTRICITY CORPORATION LIMITED.	
OWNER'S CONSULTANT: DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA - MUMBAI - CHENNAI - NEW DELHI	
BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA	
JOB NO: 408	STATUS: CONTRACT DISTRIBUTION
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DEPT: M	DESIGN: VK
CHKD: FSJ/JP	APPD: JP
TITLE: P & ID FOR CW CHLORINATION SYSTEM	
BEPT: SIGN	SCALE: 1:100
DRAWING NO: PE-DG-408-174-A001	
SHEET: 01 OF 04	
REV: 03	

REV	DATE	ALD	CHD	APPD	REV	DATE	ALD	CHD	APPD
03	19/08/15	-SD-	-SD-	-SD-	02	06/07/15	-SD-	-SD-	-SD-
10					10				
20					20				

COMPUTER FILE NAME: 47.CHL P&ID.DWG



LEGEND

	NEEDLE VALVE (IS 3224/BS 341)		DIAPHRAGM SEAL
	BALL VALVE		FLANGE CONNECTION
	DIAPHRAGM VALVE		PRESSURE SWITCH
	GATE VALVE		WATER TEMPERATURE INDICATOR
	SAFETY RELIEF VALVE		PRESSURE INDICATOR
	NON-RETURN VALVE		VACUUM INDICATOR
	MOTOR OPERATED PRESSURE REDUCING VALVE		LEVEL INDICATOR
	PRESSURE REDUCING VALVE		CONTACT TYPE TEMP. INDICATOR
	BUTTERFLY VALVE (OPEN)		TEMPERATURE SWITCH
	BUTTERFLY VALVE (CLOSED)		CONTACT TYPE PRESSURE INDICATOR
	Y-TYPE STRAINER		ALARM HIGH
	3-WAY BALL VALVE		ALARM LOW
	SOLENOID VALVE		AMMETER
	RUPTURE DISC		ELECTRIC SIGNAL
	VACUUM REGULATING VALVE		GAS FILTER
	DRAIN RELIEF VALVE		VALVES AS PER RECOMMENDATIONS OF CHLORINE INSTITUTE (IS3224/BS 341)
	VACUUM STABILIZING VALVE		GAS PRESSURE INDICATOR
	RATE VALVE		GAS TEMPERATURE INDICATOR
	GAS FLOW INDICATOR (ROTAMETER)		TEMPERATURE CONTROL SWITCH
	PRESSURE VACUUM RELIEF		VACUUM SWITCH
	DIFFERENTIAL PRESSURE REGULATOR		DIFFERENTIAL PRESSURE SWITCH
	EXPANSION TANK		DIFFERENTIAL PRESSURE INDICATOR
	HEATER		BASKET STRAINER
	CHLORINE LEAK DETECTOR (WITH TWO SENSOR)		DRAIN RELIEF VALVE
	FLEXIBLE HOSE		RW INJECTION BOOSTER PUMP
	CAUSTIC SOLUTION CUM RECIRCULATION PUMPS		

LINE LEGEND

- WATER LINE
- CHLORINE LINE
- CHLORINE SOLUTION
- INTER LOCK LINE
- DUCTING LINE

NOTES

- ALL DRAIN SHALL BE LED TO STORM WATER DRAIN.
- ALL VALVES (GAS UNDER PRESSURE AND VACUUM, LIQUID CHLORINE, CHLORINATED WATER) ETC. SHALL BE AS PER RECOMMENDATIONS OF CHLORINE INSTITUTE USA.
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- ALL CHLORINE TON CONTAINERS SHALL BE PARTIALLY COVERED BY FRP HOOD.
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- KKS SHALL BE PROVIDED FOR ALL VALVES IN DETAILED P&ID (VENDOR SPECIFIC).

PROJECT: 1x800 MW GSECL, WANAKBORI TPP UNIT NO. 8.

OWNER: GUJRAT STATE ELECTRICITY CORPORATION LIMITED.

OWNER'S CONSULTANT: DEVELOPMENT CONSULTANTS PVT. LTD. CONSULTING ENGINEERS KOLKATA - MUMBAI - CHENNAI - NEW DELHI

CONTRACTOR: BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NODA

JOB NO: 408
STATUS: CONTRACT
DISTRIBUTION

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REV.	DATE	ALD	CHD	APPD	REV.	DATE	ALD	CHD	APPD
03	19/08/15	-SD-	-SD-		02	09/07/15	-SD-	-SD-	
10					20				

REVISED AS PER RESOLUTIONS. REVISIONS MARKED AS

REVISED AS PER COMMENTS. REVISIONS MARKED AS

TITLE: P & ID FOR RW CHLORINATION SYSTEM

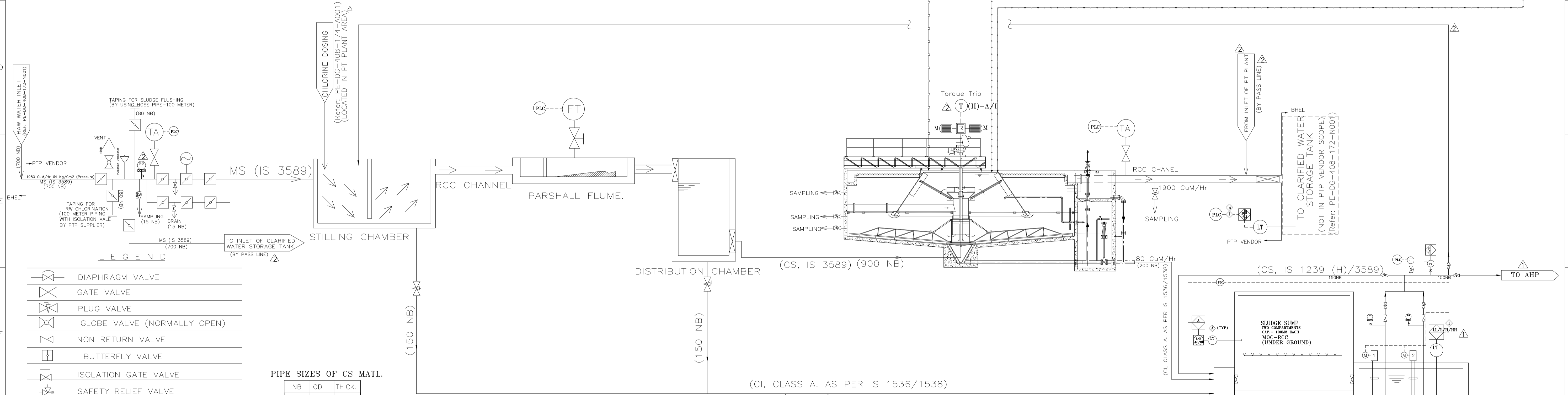
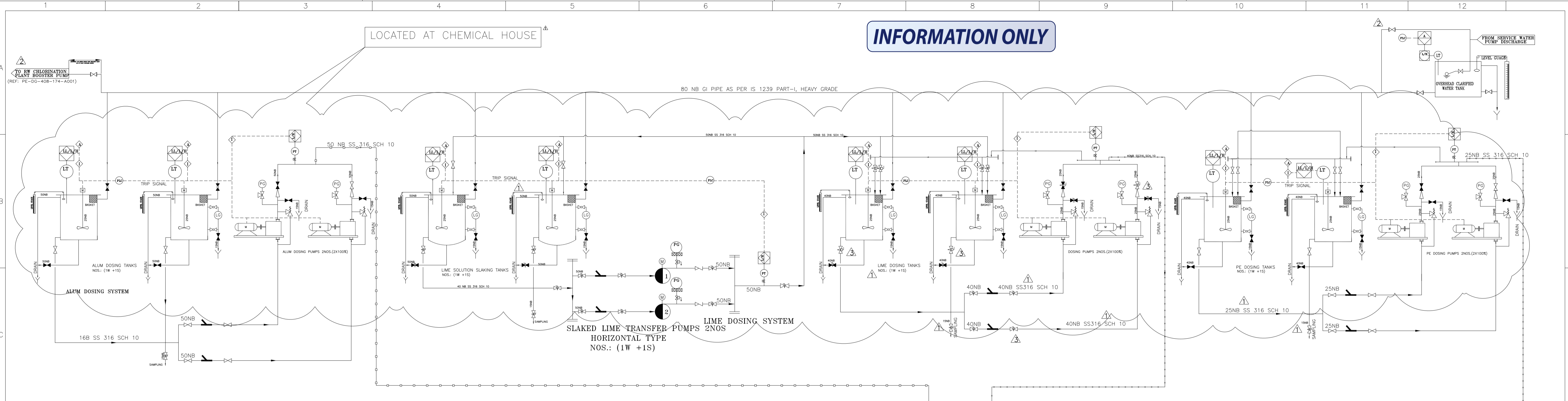
DEPT: PE SCALE: 1:100 DRAWING NO: PE-DG-408-174-A002
SIGN: SHEET: 02 OF 03 REV: 03
Page 525 of 529

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LOCATED AT CHEMICAL HOUSE



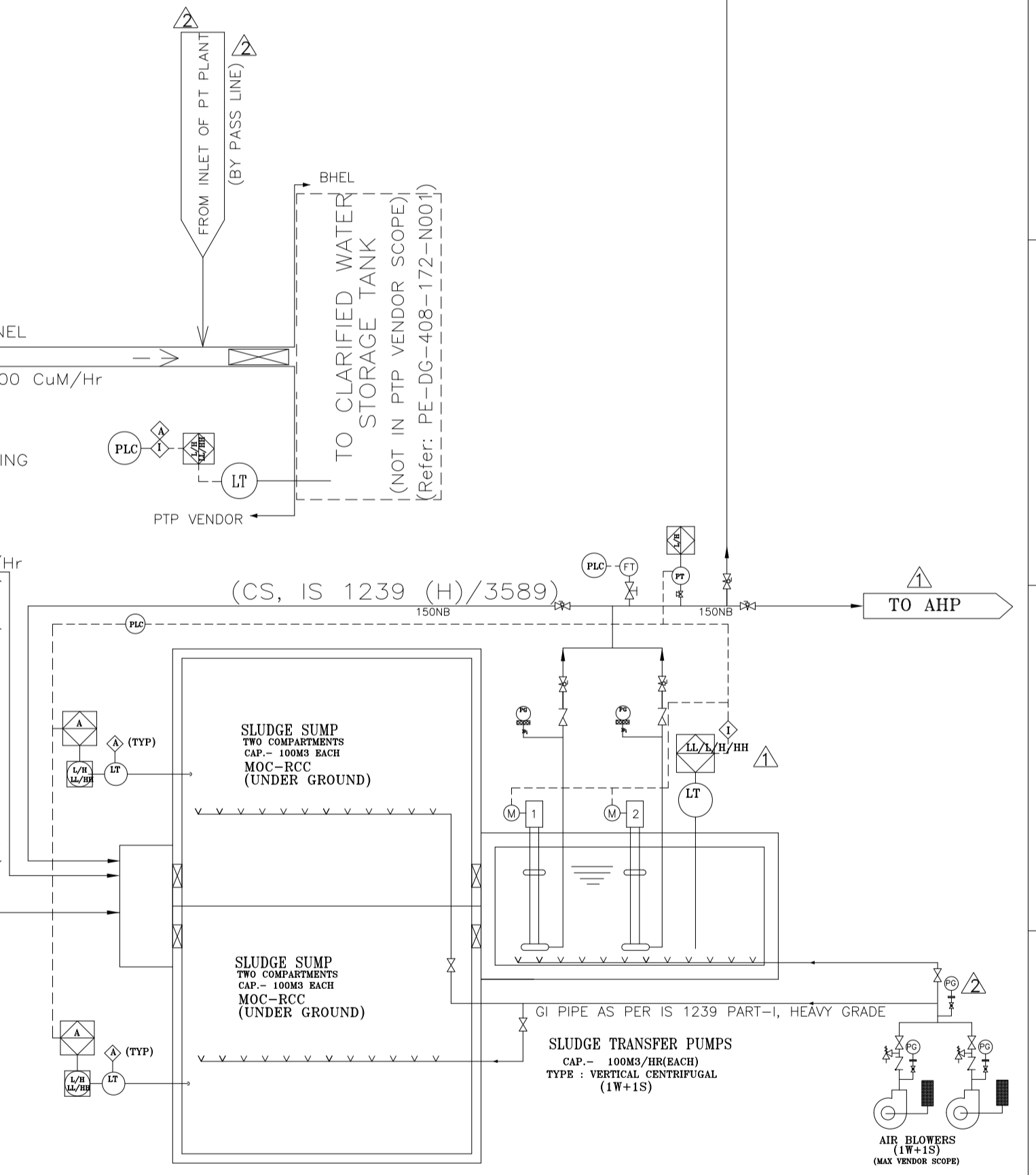
LEGEND

	DIAPHRAGM VALVE
	GATE VALVE
	PLUG VALVE
	GLOBE VALVE (NORMALLY OPEN)
	NON RETURN VALVE
	BUTTERFLY VALVE
	ISOLATION GATE VALVE
	SAFETY RELIEF VALVE
	STIRRER
	MOTOR OPERATED
	MOTOR OPERATED WITH GEAR
	LEVEL TRANSMITTER
	LEVEL SWITCH
	SLUICE GATE
	LEVEL INDICATOR
	PRESSURE INDICATOR
	ALARM
	INTERLOCK
	POSITIVE DISPLACEMENT PUMP
	CENTRIFUGAL PUMP (HORZ)
	CENTRIFUGAL PUMP (VERT)
	PRESSURE GAUGE
	FLOW TRANSMITTER
	TURBIDITY METER
	FLOAT VALVE

PIPE SIZES OF CS MATL.

NB	OD	THICK.
200	219.1	6.0
250	273.0	6.0
300	323.9	6.0
350	355.6	6.0
400	406.4	6.3
450	457.0	10.0
500	508.0	10.0
600	610.0	10.0
700	711.0	10.0
800	813.0	10.0
900	914.0	12.0
1000	1016	12.0

- NOTE-1: ALL RUBBER LINING IN PIPE SHALL BE MINIMUM 3 MM THICK (TWO LAYER @ 1.5 MM).
- NOTE-2: WRAPPING/COATING/PROTECTION OF ALL BURIED PIPE SHALL BE AS PER IS 10221 OR AWWA C 203.
- NOTE-3: THE INSTRUMENTS, VALVES, PIPE SIZE, ETC SHOWN IN FLOW DIAGRAM ARE TENTATIVE, MAY VARY BASED ON SUPPLIER RECOMMENDATION DURING DETAILED ENGINEERING.
- NOTE-4: ALL PIPES SHALL BE CARBON STEEL (AS PER IS 1239 H OR IS 3589) UNLESS EXCLUSIVELY MENTIONED.
- NOTE-5: THE FINAL P&ID AFTER FINALIZATION OF SUPPLIER SHALL BE SUBMITTED TO CUSTOMER.



JOB NO. 408

STATUS CONTRACT

DISTRIBUTION

REV	DATE	ALTD	CHD	APPD
3				

Revised as per M/s DCPL/GSECL comments dated-25/06/15.

1x800 MW SUPERCRITICAL THERMAL POWER PLANT
(UNIT #8 AT WANAKBORI THERMAL POWER STATION, GUJARAT)

GUJARAT STATE ELECTRICITY CORPORATION LIMITED
VADDODARA, GUJARAT

DEVELOPMENT CONSULTANTS PVT LTD.

BHARAT HEAVY ELECTRICALS LTD
POWER GROUP
PROJECTS ENGINEERING MANAGEMENT
NEW DELHI

DEPT CODE: DRN FS
MAX DESN FS
CHD JP
APPD KK/PK

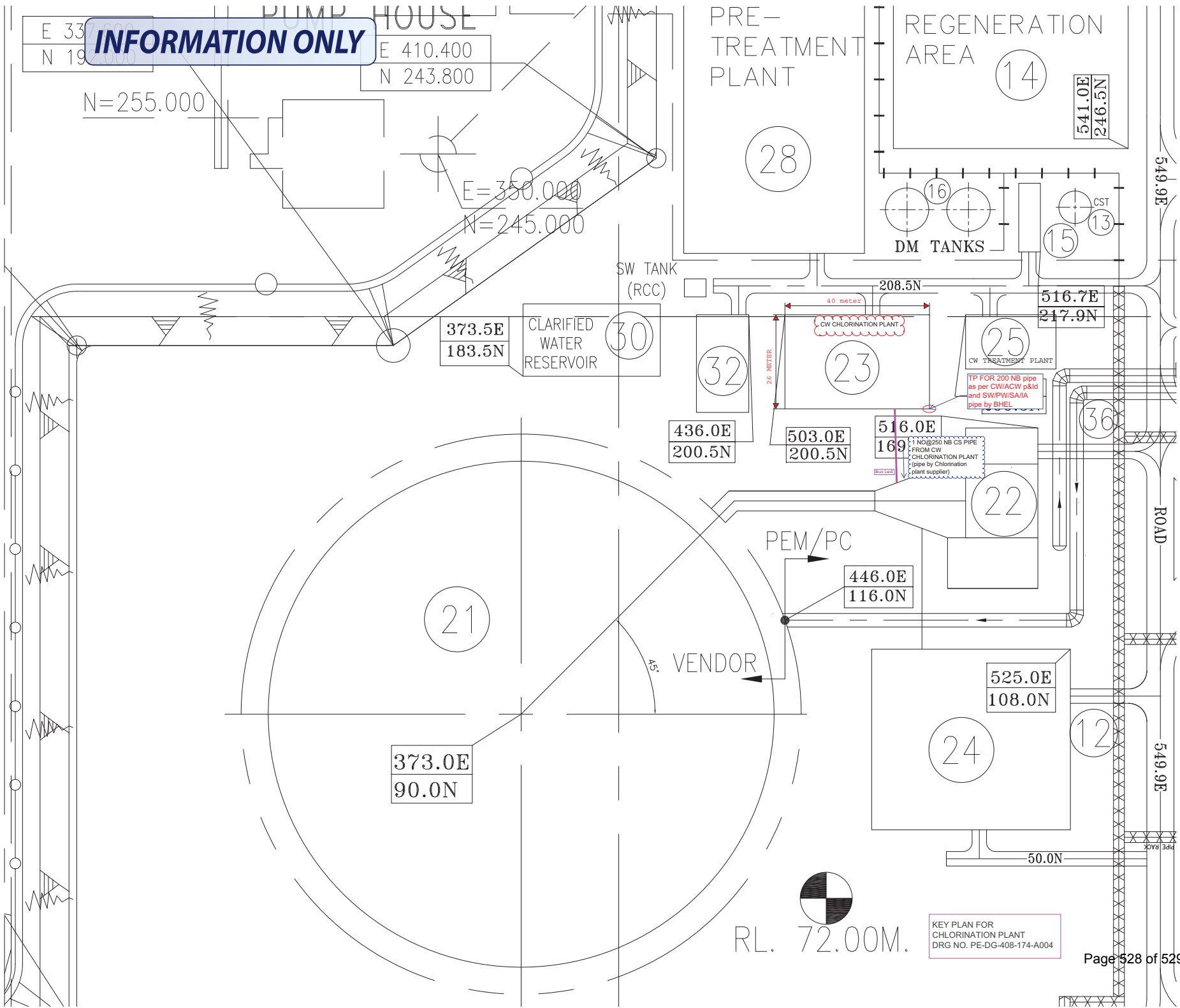
TITLE: **FLOW DIAGRAM FOR PRETREATMENT PLANT**

DEPT. SCALE: DRAWING NO. PE-DG-408-158-A001
SIGN: SHEET 1 OF 1
DATE: REV 3

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E 33
N 19

E 410.400
N 243.800

N=255.000

E=350.000
N=245.000

SW TANK
(RCC)

373.5E
183.5N

CLARIFIED
WATER
RESERVOIR

30

436.0E
200.5N

32

503.0E
200.5N

23

516.0E
169.0N

22

PEM/PC

446.0E
116.0N

VENDOR

373.0E
90.0N

21

45°

525.0E
108.0N

24

12

50.0N

549.9E

ROAD

549.9E

PIPE RACK

28

PRE-
TREATMENT
PLANT

REGENERATION
AREA

14

541.0E
246.5N

16

15

13

DM TANKS

CST

208.5N

516.7E
217.9N

25

CW TREATMENT PLANT

TP FOR 200 NB pipe
as per CW/ACW p&id
and SW/PWSA/IA
pipe by BHEI

36

1 NO@250 NB CS PIPE
FROM CW
CHLORINATION PLANT
(pipe by Chlorination
plant supplier)

Buried

40 meter

26 METER

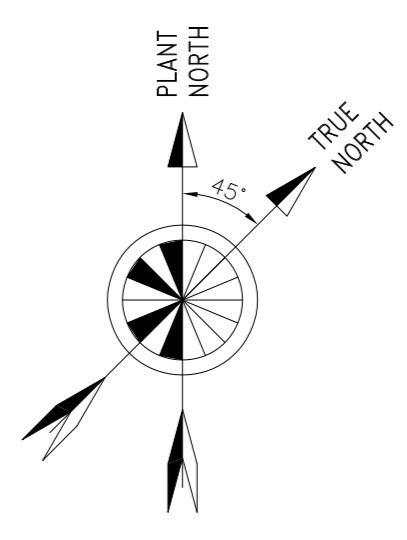
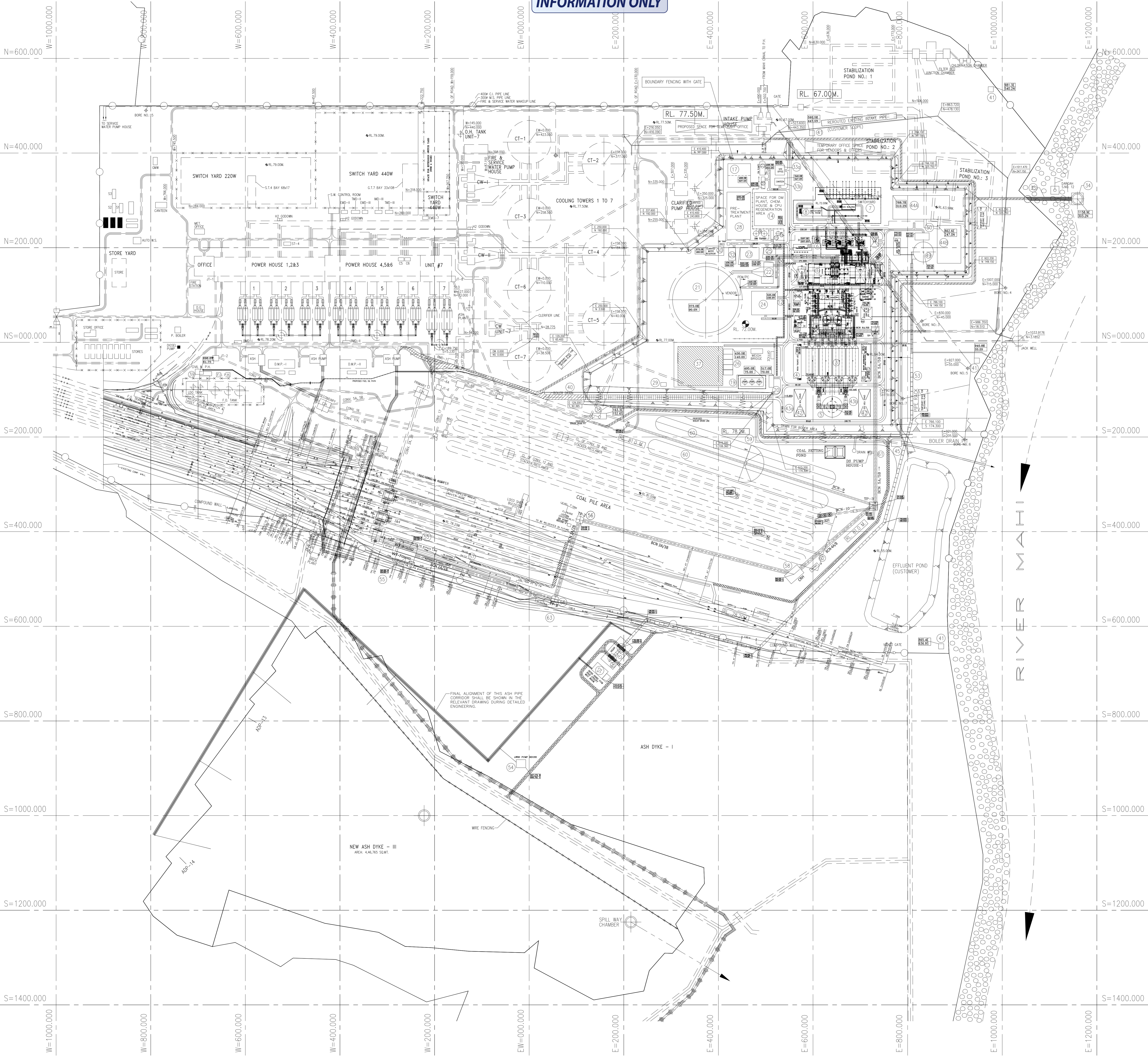
Buried



RL. 72.00M.

KEY PLAN FOR
CHLORINATION PLANT
DRG NO. PE-DG-408-174-A004

INFORMATION ONLY



- LEGEND**
- 1 STG BUILDING (1x800MW UNIT)
 - 2 BOILER
 - 3 ELECTROSTATIC PRECIPITATOR
 - 4 E.S.P. CONTROL ROOM
 - 5 CHIMNEY
 - 6 TRANSFORMER YARD
 - 7 SWITCH YARD (G S)
 - 8 SWITCH YARD CONT. ROOM
 - 9 SERVICE & TECHNICAL BUILDING
 - 10 IA/SA/ARS COMPRESSOR BUILDING
 - 11 DG SET
 - 12 PIPE RACK
 - 13 SPACE FOR CST
 - 14 SPACE FOR DM PLANT, CHEM. HOUSE & CPU REGENERATION AREA
 - 15 SPACE FOR DM PUMPS AND CST PUMP
 - 16 DMW STG. TANKS
 - 17 CLARIFIED CUM FIRE WATER STORAGE TANK (WITH EXISTING CLARIFIER)
 - 18 SPACE FOR CLARIFIED WATER PUMPS
 - 19 LFO / HFO DAY TANK
 - 20 FO PRESSURISING PUMP HOUSE
 - 21 ND COOLING TOWER
 - 22 CW & ADW PUMP HOUSE
 - 23 CW CHLORINATION PLANT
 - 24 SIDE STREAM FILTER
 - 25 CW TREATMENT PLANT
 - 26 STORES
 - 27 AUXILIARY BOILER
 - 28 PRE TREATMENT PLANT INCLUDING CLARIFIER
 - 29 HYDROGEN CYLINDER STORAGE SPACE
 - 30 CLARIFIED WATER RESERVOIR (WITH NEW CLARIFIER)
 - 31 SPACE FOR FIRE WATER PUMPS
 - 32 SPACE FOR SERVICE WATER PUMPS & NEW CLARIFIER PUMPS
 - 33 SITE OFFICE
 - 34 CANTEN
 - 35 NEW JACK WELL PUMP HOUSE
 - 36 PIPE CUM PASSAGE TO JACKWELL
 - 37 CW PIPE CORRIDOR
 - 38 EQUIPMENT LAYDOWN SPACE
 - 39 RETAINING WALL
 - 40 FO TRANSFER PUMP HOUSE
 - 41 LFO / HFO PIPE CORRIDOR
 - 42 WATCH TOWER
 - 43 PROPOSED SPACE FOR FGD
 - 44 PREASSEMBLY LAYDOWN SPACE
 - 45 EFFLUENT TREATMENT PLANT
 - 46 GUARD POND
 - 47 BOILER DRAIN PIT
 - 48 B.A. SLURRY PIT & PUMP HOUSE
 - 49 ASH WATER PUMP HOUSE
 - 50 AHP COMPRESSOR CUM VACUUM PUMP HOUSE
 - 51 ASH HANDLING PLANT MCC-1 CUM CONTROL ROOM
 - 52 AHP CLARIFIER
 - 53 CHEMICAL HOUSE
 - 54 FLY ASH SILO
 - 55 SILO UTILITY / HCSO SHED / MCC ROOM
 - 56 ASH PIPE CORRIDOR
 - 57 MCC ROOM CUM ASH WATER RECOVERY SYSTEM PUMP HOUSE
 - 58 WAGON TIPPLER
 - 59 TRANSFER POINT
 - 60 PENT HOUSE
 - 61 CRUSHER HOUSE
 - 62 STACKER/RECLAIMER
 - 63 CRUSHED COAL STOCK PILE
 - 64 COAL CONVEYOR
 - 65 GHP MAIN CONTROL ROOM CUM S/S
 - 66 ROAD FROM ASH SILO UNIT#8 TO EXISTING BRICK PLANT
 - 67 WEIGH BRIDGE
 - 68 FLY ASH EXTRACTION TOWER

AS INFORMED BY BHEL SITE, PROPOSED SPACE FOR FABRICATION YARD WILL BE BETWEEN GRID 200S TO 400N & 800E TO 1000E.

- LEGEND**
- FENCING
 - EXISTING FACILITIES
 - PROPOSED FACILITIES
 - RAILWAY TRACK
 - PIPE RACK (ENGG. BY PEM)
 - PIPE RACK (ISG)
 - ROAD
 - DIVERTED ROAD
 - ROAD BY ISG
 - PIPE PEDESTAL
 - AHP PIPE CORRIDOR

- NOTE:-**
- ALL DIMENSIONS AND CO-ORDINATES ARE IN METRES UNLESS NOTED OTHERWISE.
 - THE FINISHED GRADE LEVEL OF POWER BLOCK AREA IS RL. 72.00M.
 - THE FINISHED FLOOR LEVEL OF POWER HOUSE GROUND FLOOR EL. 0.00M WHICH CORRESPONDS TO RL. 72.3M
 - EXISTING FACILITIES WITHIN 800 MW PLANT AREA SHALL BE RE-LOCATED TO SUIT AT SITE CONDITION.
 - ANY BUILDING/ HEAVY STRUCTURE SHALL NOT BE LOCATED WITHIN 200.00M OF MAHI RIVER BANK AS PER CITATION NORMS.
 - READ THIS DRAWING IN CONJUNCTION WITH CUSTOMER DWG. NO. - WTPS: SEC.19.

- REFERENCE DWG.**
1. PLOT PLAN
 2. MAN PLANT EQUIPMENT LAYOUT PLAN AT EL. 0.00M
 3. LAYOUT PLAN & CROSS SECTION DWG FOR EXTENSION SWITCHYARD

9213R-DWG-M-002 REV-05 (CUST.)
 PE-DG-408-100-M002
 TB-3-375-510-060

PROGRESSIVE PRINT 05.06.2015

CUSTOMER: GUJARAT STATE ELECTRICITY CORPORATION LTD
 VADODARA, GUJARAT
 1x800 MW Wanakbori Thermal Power Station Extn. Unit-8

CONSULTANT: DEVELOPMENT CONSULTANTS PVT. LTD.
 CONSULTING ENGINEERS
 KOLKATA MUMBAI CHENNAI NEW DELHI

CLIENT: BHARAT HEAVY ELECTRICALS LTD
 POWER SECTOR
 PROJECT ENGINEERING MANAGEMENT
 NOIDA

JOB NO.	408
STATUS	CONTRACT
DISTRIBUTION	

REV.	DATE	ALTD	CHD	APPD	REV. DT	DATE	ALTD	CHD	APPD
					01	13.05.2015	NET	CHD	APPD

1. DRAWING REVIEWED IN LINE WITH CUSTOMER COMMENTS.
 2. FOR ANY FURTHER CHANGES TO BE MADE THE CUSTOMER SHALL BE ADVISED.
 3. REVISED DRAWING SHALL BE SUBMITTED WITHIN 10 DAYS.
 4. REVISED DRAWING SHALL BE SUBMITTED WITHIN 10 DAYS.
 5. REVISED DRAWING SHALL BE SUBMITTED WITHIN 10 DAYS.
 6. REVISED DRAWING SHALL BE SUBMITTED WITHIN 10 DAYS.
 7. REVISED DRAWING SHALL BE SUBMITTED WITHIN 10 DAYS.

TITLE	PLOT PLAN
DEPT.	SCALE 1:3000
SIGN	DRAWING NO.
	PE-DG-408-100-M001
SHEET	1 OF 1
REV.	01

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