

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
CENTRIFUGE MOTOR	STOP 2/91	'0' SA '1' FA AA '0' SE '1' FE AE STOP START DRIVE INTERFACE (UNIDIRECTIONAL) OWS BA BE 90GRS16AP001 10 SEC 1 0 & A	CENTRIFUGE MOTOR	STOP/MCC
CENTRIFUGE MOTOR OPRN SELECTED	LOCAL 2/80	& ≥1 & ≥1 10 SEC 1 0 & A	CENTRIFUGE MOTOR	START/MCC
CENTRIFUGE MOTOR	START/LOCAL		CENTRIFUGE MOTOR	FAIL TO START
CENTRIFUGE MOTOR	START/OWS			
CENTRIFUGE MOTOR	START/BUP			
CENTRIFUGE MOTOR	START 1/88			
CENTRIFUGE MOTOR OPRN SELECTED	REMOTE 1/80			
CENTRIFUGE MOTOR	OFF/MCC			
CENTRIFUGE MOTOR	REMOTE/OWS	S R	CENTRIFUGE MOTOR OPRN SELECTED	REMOTE 1/80
CENTRIFUGE MOTOR	LOCAL/OWS	1	CENTRIFUGE MOTOR OPRN SELECTED	LOCAL 2/80

81 44 5 47

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 549

CENTRIFUGE MOTOR

DRG. NO.

REV. NO.

SHT

PE-V0-412-673-A049

03

DATE: 29.01.2019

80 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
FLUSHING VALVE, V-234	OPEN 2/88	SINGLE COIL SOLENOID OPERATED VALVE	COMMAND	OPEN /IPR
FLUSHING VALVE, V-234	OPEN 5/90			
FLUSHING VALVE, V-234	CLOSE 3/88			
FLUSHING VALVE, V-234	CLOSE 1/91			

2 X 660 MW ENNORE SEZ STPP
 TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
 FLUSHING VALVE, V-234
 90GRS15AA202

DRG.
NO.
PE-V0-412-673-A049

REV. NO.	03	DATE:	29.01.2019
SHT	81	OF	95

INPUTS		LOGIC	OUTPUTS						
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.					
		'0' SA '1' FA '0' AA '0' SE '1' FE '0' AE STOP START DRIVE INTERFACE (UNIDIRECTIONAL) BA BE OVS	COMMAND COMMAND		STOP/MCC START/MCC				
		90GRN01AM001							
			2 X 660 MW ENNORE SEZ STPP		DRG. NO.	PE-V0-412-673-A049			
			TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 551 NaOCL DOSING TANK DT-01 AGITATOR		REV. NO.	03	DATE:	29.01.2019	
					SHT	82	OF	95	

INPUTS		LOGIC	OUTPUTS						
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.					
		'0' SA '1' FA '0' AA '0' SE '1' FE '0' AE STOP START DRIVE INTERFACE (UNIDIRECTIONAL) BA BE OVS	COMMAND COMMAND		STOP/MCC START/MCC				
		90GRN02AM001							
			2 X 660 MW ENNORE SEZ STPP		DRG. NO.	PE-V0-412-673-A049			
			TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 552 NaOCL DOSING TANK DT-02 AGITATOR		REV. NO.	03	DATE:	29.01.2019	
					SHT	83	OF	95	

INPUTS		LOGIC		OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.			DESCRIPTION	STATUS TO SIG/SHT NO.
POLYELECTROLYTE DOSING TANK DT-03 LEVEL	LOW 1/85	SA FA AA SE FE AE STOP START DRIVE INTERFACE (UNIDIRECTIONAL) OWS 90GRN03AP001		POLYELECTROLYTE DOSING PUMP	STOP/MCC
POLYELECTROLYTE DOSING PUMP	STOP 4/90			POLYELECTROLYTE DOSING PUMP	START/MCC
POLYELECTROLYTE DOSING TANK DT-03 LEVEL	ADEQ 3/85			POLYELECTROLYTE DOSING PUMP	FAIL TO START
POLYELECTROLYTE DOSING PUMP OPRN SELECTED	LOCAL 2/84			POLYELECTROLYTE DOSING PUMP OPRN SELECTED	REMOTE 1/84
POLYELECTROLYTE DOSING PUMP	START/LOCAL			POLYELECTROLYTE DOSING PUMP OPRN SELECTED	LOCAL 2/84
POLYELECTROLYTE DOSING PUMP	START/OWS	≥1 & ≥1 10 SEC 1 0 & 1			
POLYELECTROLYTE DOSING PUMP	START/2/89				
POLYELECTROLYTE DOSING PUMP OPRN SELECTED	REMOTE 1/84				
POLYELECTROLYTE DOSING PUMP	OFF/MCC				
POLYELECTROLYTE DOSING PUMP	REMOTE/OWS				
POLYELECTROLYTE DOSING PUMP	LOCAL/OWS				
		2 X 660 MW ENNORE SEZ STPP TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 553 POLYELECTROLYTE DOSING PUMP		DRG. NO.	PE-V0-412-673-A049
				REV. NO.	03
				SHT	84 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
01 POLYELECTROLYTE DOSING TANK LEVEL 90GRN03CL001	LOW /FIELD	S R &	A POLYELECTROLYTE DOSING TANK LEVEL 1 POLYELECTROLYTE DOSING TANK LEVEL	LOW 1/49 ADEQ 3/49
POLYELECTROLYTE DOSING PUMP 90GRN03AP001	ON /MCC		A POLYELECTROLYTE DOSING PUMP	TRIPPED
POLYELECTROLYTE DOSING PUMP 90GRN03AP001	STOP /OWS			
POLYELECTROLYTE DOSING PUMP 90GRN03AP001	OFF /MCC			

बीएसएल BHEL	2 X 660 MW ENNORE SEZ STPP		DRG. NO.	PE-V0-412-673-A049		
	TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 554 MISCELLANEOUS LOGIC		REV. NO.	03	DATE:	29.01.2019
			SHT	85	OF	95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
		'0' SA '1' FA '0' AA '0' SE '1' FE '0' AE STOP DRIVE INTERFACE (UNIDIRECTIONAL) BA BE OVS	COMMAND	STOP/MCC
			COMMAND	START/MCC
		90GRN03AM001		
		2 X 660 MW ENNORE SEZ STPP		DRG. NO.
		TITLE :- 555 CONTROL SCHEME FOR SEWAGE TREATMENT PLANT POLYELECTROLYTE DOSING TANK AGITATOR	REV. NO.	03
			SHT	86
			DATE:	29.01.2019
				OF 95

INPUTS		LOGIC		OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.			DESCRIPTION	STATUS TO SIG/SHT NO.
CENTRIFUGE START SEQUENCE	COMPLETED 5/89	AUTO CMD FDBK PERM START-UP OWS		CENTRIFUGE START SEQ ORDER	ON 1/88
CENTRIFUGE STOP SEQUENCE	COMPLETED 3/91			AUTO CMD FDBK PERM SHUT-DN	OPERATOR TO ENSURE THAT MANUAL VALVES V-188, V-190 & V-192 ARE OPEN
		GROUP CONTROL FUNCTION			

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
CENTRIFUGE START SEQ ORDER	ON 1/87	<pre> graph TD I1[CENTRIFUGE START SEQ ORDER] -- ON 1/87 --> S1[STEP No. 1] S1 -- "M.O. TIME 3 MIN" --> T1[STEP TIMER 3 MIN] T1 --> A1[AND] A1 --> S2[STEP No. 2] S2 -- "M.O. TIME 5 MIN" --> T2[STEP TIMER 5 MIN] T2 --> A2[AND] A2 --> S3[STEP No. 3] S3 --> O1[CLOSE 3/81] S3 --> O2[STEP NO. 4 ORDER ON 4/89] </pre>	CENTRIFUGE MOTOR	START 1/80
CENTRIFUGE MOTOR 90GRS16AP001	ON /MCC			
FLUSHING VALVE, V-234 90GRS15AA202	OPENED /FIELD			
FLUSHING VALVE, V-234 90GRS15AA202	CLOSED /FIELD			

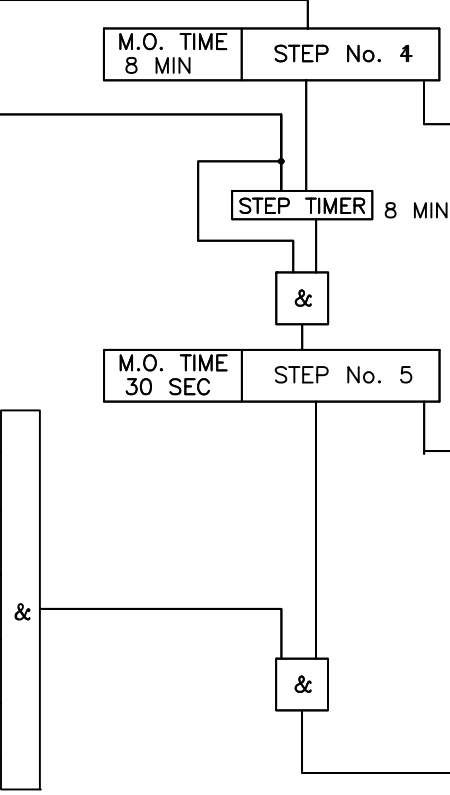


2 X 660 MW ENNORE SEZ STPP
 TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
 557 CENTRIFUGE START SEQUENCE

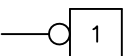
DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	88	OF	95

[illegible]

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
CENTRIFUGE STOP SEQ ORDER	ON 2/87	M.O. TIME 1 MIN STEP No. 1 & STEP TIMER 1 MIN & M.O. TIME 1 MIN STEP No. 2 & STEP TIMER 1 MIN & MO TIME 10 MIN STEP No. 3 STEP TIMER 10 MIN &	SLUDGE TRANSFER PUMP-A	STOP 1/38
SLUDGE TRANSFER PUMP-A	OFF /MCC		SLUDGE TRANSFER PUMP-B	STOP 2/39
SLUDGE TRANSFER PUMP-B	OFF /MCC			
NaOCL DOSING PUMP-2	OFF /MCC		NaOCL DOSING PUMP-2	STOP 3/50
POLYELECTROLYTE DOSING PUMP	OFF /MCC		POLYELECTROLYTE DOSING PUMP	STOP 4/84
FLUSHING VALVE, V-234 90GRS15AA202	OPENED /FIELD		FLUSHING VALVE, V-234	OPEN 5/81
			STEP NO. 4 ORDER ON	6/91
		2 X 660 MW ENNORE SEZ STPP TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 559 CENTRIFUGE STOP SEQUENCE DRG. NO. REV. NO. SHT PE-V0-412-673-A049 03 DATE: 29.01.2019 90 OF 95		

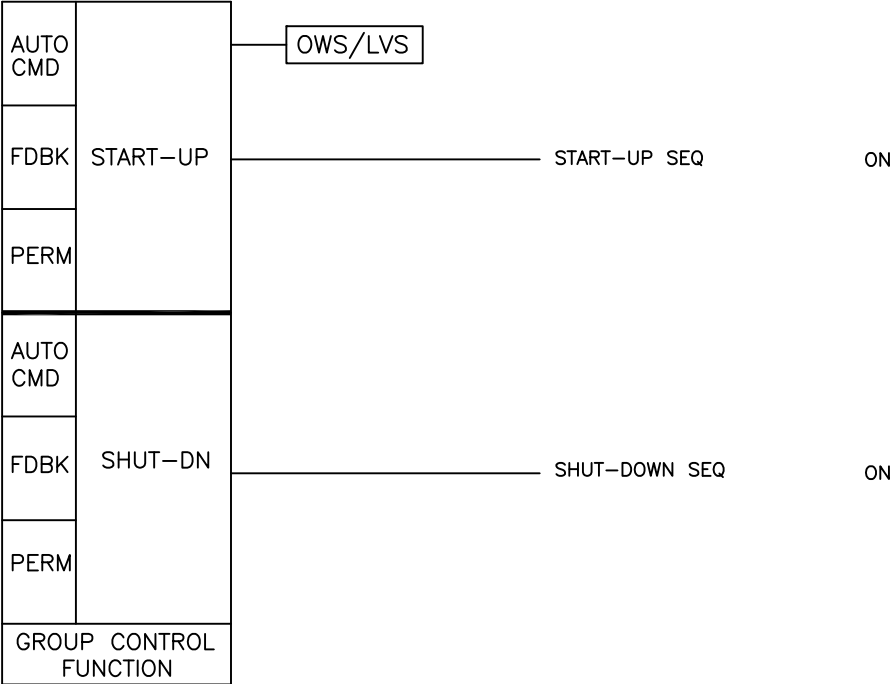
INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
STEP NO. 4 ORDER ON	ON 6/90		FLUSHING VALVE, V-234	CLOSE 1/81
FLUSHING VALVE, V-234 90GRS15AA202	CLOSED /FIELD			
CENTRIFUGE MOTOR 90GRS16AP001	OFF /MCC		CENTRIFUGE MOTOR	STOP 2/80
NaOCL DOSING PUMP-2 90GRN02AP001	OFF /MCC			
POLYELECTROLYTE DOSING PUMP 90GRN03AP001	OFF /MCC			
FLUSHING VALVE, V-234 90GRS15AA202	CLOSED /FIELD			
SLUDGE TRANSFER PUMP-A 90GRS15AP001	OFF /MCC			
SLUDGE TRANSFER PUMP-B 90GRS15AP002	OFF /MCC		CENTRIFUGE STOP SEQUENCE	COMPLETED 3/87
				
		2 X 660 MW ENNORE SEZ STPP		DRG. NO.
		TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 560 CENTRIFUGE STOP SEQUENCE		REV. NO.
				SHT
				PE-V0-412-673-A049
				03 DATE: 29.01.2019
				91 OF 95

LEGEND :

	AND GATE	LTUD	LOW TENSION UNIDIRECTIONAL DRIVE
	OR GATE	HTUD	HIGH TENSION UNIDIRECTIONAL DRIVE
	PULSE	BID	BIDIRECTIONAL DRIVE
	LIMIT VALUE MONITORING	ACTR	ACTUATOR
	SWITCH ON DELAY	MCC	MOTOR CONTROL CENTER
	SWITCH OFF DELAY	SWGR	SWITCH GEAR
	NOT GATE	MIN	MINIMUM
OWS	OPERATOR WORK STATION	MAN	MANUAL
	ALARM	LVS	LARGE VIDEO SCREEN
	S-R FLIP FLOP		
ACS	ANALOG CONTROL SCHEME		

NOTES :-

- 1. THIS BLOCK IS USED FOR INITIATING THE SEQUENCE START/STOP OF A 90GROUP OF DRIVES.
- 2. THE SEQUENCE START/STOP AND AUTO/MANUAL COMMANDS CAN BE INITIATED FROM OWS/LVS
- 3. GROUP CONTROL FUNCTION REPRESENTS THE CONTROLLER FOR THE SEQUENCE MASTER IN THE MAX CONTROL SYSTEM.
- 4. AUTO CMD AUTO SEQUENCE START-UP/SHUT-DOWN BASED ON ANY INTERLOCK ACTION/UPPER GROUP LEVEL COMMANDS (WHEREVER APPLICABLE)
- 5. FDBK ON/OFF FEED BACK OF A GROUP/SUB-GROUP OF SEQUENCE MASTER.
- 6. PERM REQUIRED PERMISSIVES FOR START-UP/SHUT-DOWN OF A SEQUENCE BY SEQUENCE MASTER AUTOMATICALLY/MANUALLY.
- 7. OWS/LVS MANUAL COMMAND FROM OWS/LVS FOR START-UP/SHUT-DOWN SEQUENCE THROUGH SEQUENCE MASTER.



2 X 660 MW ENNORE SEZ STPP

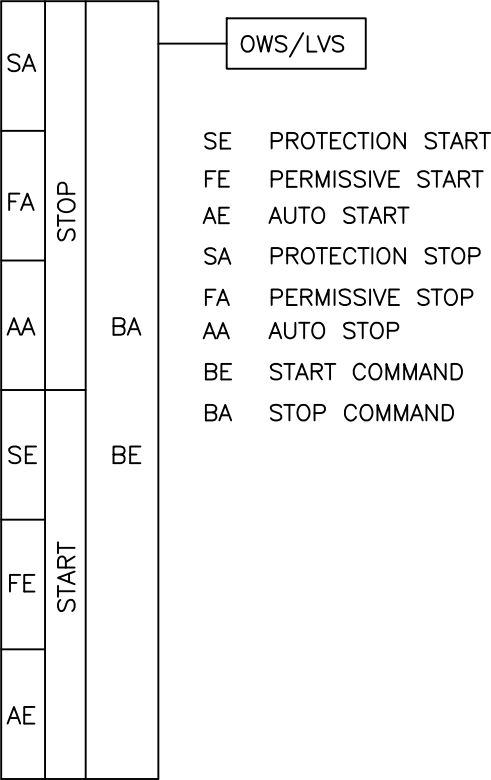
TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
562

LEGEND

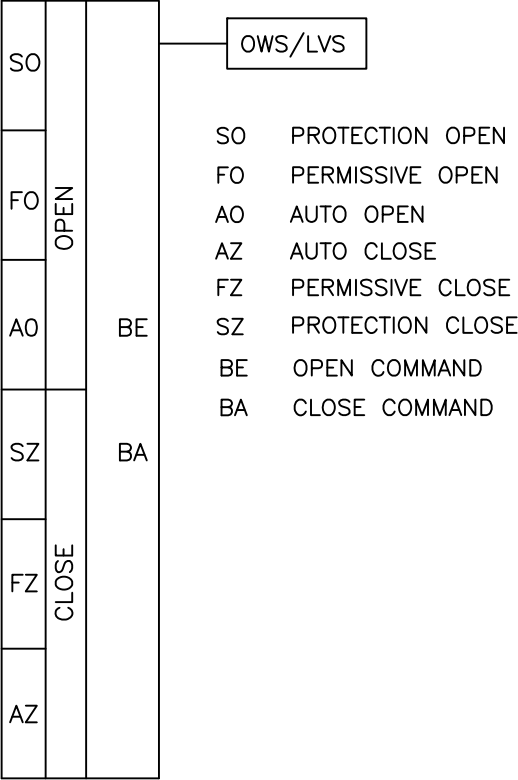
DRG. NO.	PE-V0-412-673-A049			
REV. NO.	03	DATE:	29.01.2019	
SHT	93	OF	95	

BINARY DRIVE CONTROL INTERFACE

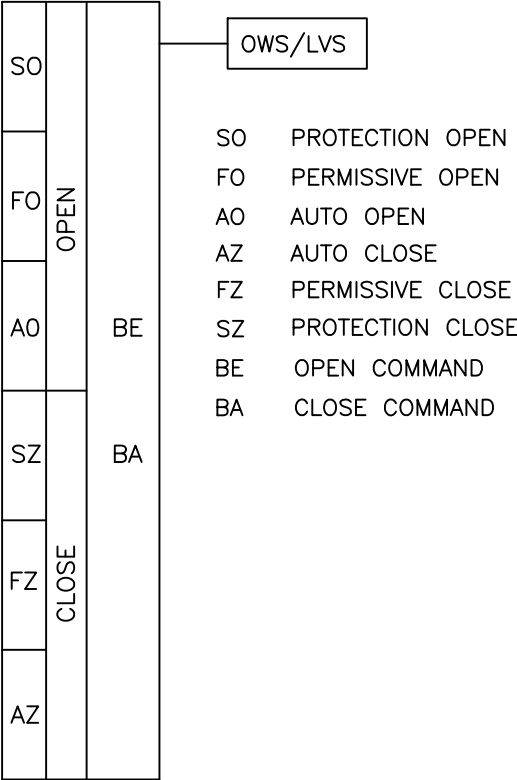
UNIDIRECTIONAL DRIVE
(NO COMMAND MEMORY)



SOLENOID DRIVE
(ONE/TWO COMMAND MEMORY)



BIDIRECTIONAL DRIVE
(TWO COMMAND MEMORY)

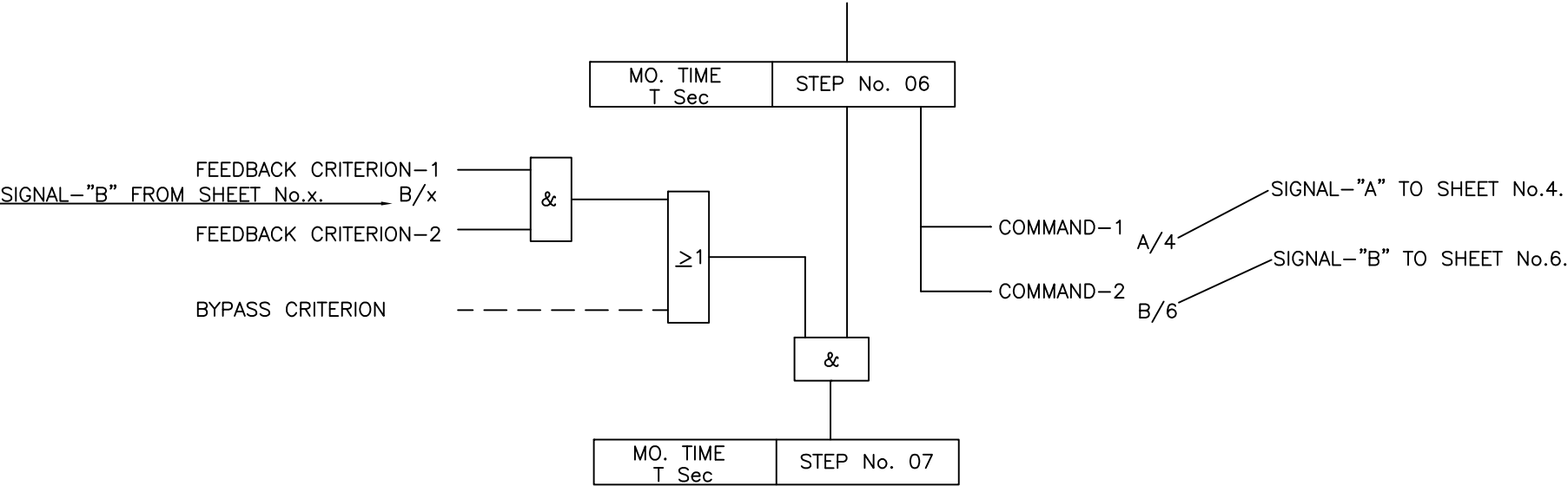


2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
563

LEGEND

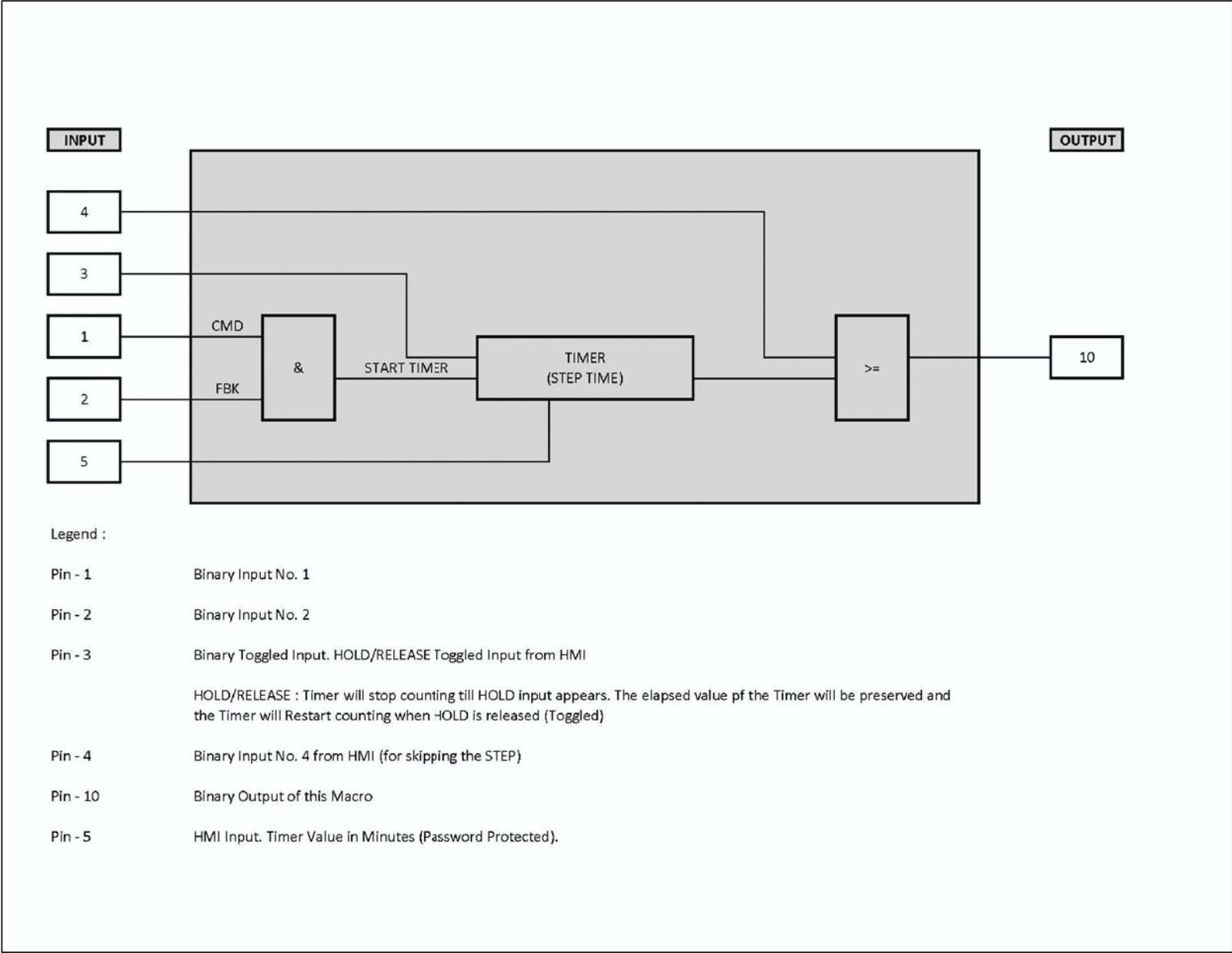
DRG. NO.	PE-V0-412-673-A049			
REV. NO.	03	DATE:	29.01.2019	
SHT	94	OF	95	



DESCRIPTION

- 1. TYPICAL SEQUENCE STEP CONTROLLER FUNCTIONS ARE DEPICTED (ABOVE FOR STEP NOS 06 AND 07).
- 2. STEP 07 IS SWITCHED 'ON' WHEN COMMANDs OF STEP 06 HAS BEEN EXECUTED AND CONFIRMED BY FULFILMENT OF FEEDBACK CRITERIA.
- 3. FEEDBACK CRITERIA MAY NOT EXACTLY CORRESPOND WITH COMMANDS. FOR EXAMPLE, COMMAND COULD BE 'START LUB OIL PUMP' BUT THE CORRESPONDING FEEDBACK CRITERION COULD WELL BE "LUB OIL PRESSURE ADEQUATE".
- 4. IN SOME STEPS COMMANDS ARE AUTOMATICALLY EXECUTED AT DRIVE LEVEL DUE TO INTERLOCK ACTION, IN SUCH CASES COMMANDS ARE NOT ISSUED FROM STEP CONTROLLER BUT FEEDBACK CRITERIA ARE CONSIDERED BEFORE SWITCHING NEXT STEP.
- 5. IF BYPASS CRITERION EXISTS, THEN COMMANDS 1 & 2 FROM STEP No.6 WILL NOT BE EXECUTED BECAUSE COMMANDS ARE ISSUED FROM STEP_s AFTER A DELAY OF 80 milliseconds.

		2 X 660 MW ENNORE SEZ STPP		DRG. NO.	PE-V0-412-673-A049			
		TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 564		REV. NO.	03	DATE:	29.01.2019	
		LEGEND		SHT	95	OF	95	



2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
565

LEGEND

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.19
SHT	95a	OF	95

Functionality of STEP TIMER BLOCK

Step Timer Block is a macro with 6 pins (ports).

Functionality of each pin /port for CPU Sequence Logics is defined as below:

Sl. No	PIN / PORT No.	Description
1	PIN / PORT - 1	Input to this port/pin is the START command of the sequence. The START command is communicated through soft MMI link.
2	PIN / PORT - 2	Input to this port/pin is the OPEN/ON or CLOSE/OFF feedback from the drives those are supposed to turn ON /OPEN or CLOSE/OFF in the respective step of the sequence.
3	PIN / PORT - 3	Input to this port/pin is the soft command from the HMI. In case the operator wishes to extend time of a particular step of the sequence, then the operator can press the HOLD/RELEASE button from HMI screen. In this case, the process will not proceed to next step (process will be stalled at the current step) until RELEASE button is pressed from HMI. In absence of this command input to timer will be normal process time. In case this command is initiated, the step time will be extended to the period for which HOLD/RELEASE remained pressed. It may be noted that on restart, original STEP TIME shall be restored.
4	PIN / PORT - 4	In case operator wishes to skip the particular step of sequence then operator can press "NEXT STEP PROCEED". As the operator presses "NEXT STEP PROCEED" the process jumps on to next step; bypassing the current step.
5	PIN / PORT - 10	From this port/pin, the output from the macro will emerge. This O/P shall act as an I/P for the subsequent step.
6	PIN / PORT - 5	I/P to this port/pin will be the value of the step time, which the operator will feed from the HMI. The input from the HMI will be password protected to ensure data security. For Timer the Least Count shall be 1 min. It may be noted that on restart, original STEP TIME shall be restored.



2 X 660 MW ENNORE SEZ STPP

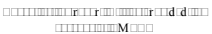
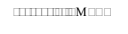
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566
LEGEND

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.19
SHT	95b	OF	95

APPROVED

1	08. 01. 2019	FOR APPROVAL	RAJ	NK	NK
0	04. 01. 2019	FOR APPROVAL	RAJ	NK	NK
REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.			
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED		
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI		
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA		
		SUB CONTRACTOR :	PENNAR ENVIRO Re-engineering Water, Environment & Energy Floor No. +3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad – 500 084		
		PACKAGE :	75 KLD SEWAGE TREATMENT PLANT		
DEPT.	CODE	SCALE	WEIGHT (KG)	REF DRG.	
--	A	--	--	--	
TITLE QAP FOR METERING PUMPS WITH MOTOR FOR SEWAGE TREATMENT PLANT					NAME
				PREP	PSR
				CHKD	SSY
				APPD	PAK
				DATE	
				08.01.2019	
				08.01.2019	
				08.01.2019	
DEPT.				CARD CODE	BHEL DOC NO.
SIGN					PE-V0-412-673-A027
DATE					REV
					1
NO. OF SHEETS – 02 (EXCLUDING COVER SHEET)					

PROJECT: 1X660MW ENNORE SEZ SSCTPP AT ASH DYKE OF NCTPS, CHENNAI		
ENDUSER : TAMILNADU GENERATION AND DISTRIBUTION COPORATION LTD		
CONSULTANT : DESEIN PRIVATE LTD		
CLIENT : BHARAT HEAVY ELECTRICALS LIMITED		
BHEL DOC NO: PE-V0-412-673-A027		
DOC NAME: QAP for Metering Pump with Motor for Sewage Treatment Plant		
COMMENTS RESOLUTION SHEET		
S.No.	TANGENDCO Comments	BHEL/PEL's Response
1	Metering pump is a Category B item. Witness of Final Testing shall be carried out by BHEL. Revise accordingly. 2.Revised QAP shall be uploaded in PEDM, after the approval of TDS (A015)	Noted. GA drg (A015) approval received from TANGEDCO Transmittal Ref : Lr.No.:SE/E/Th&HyP/EE-7/M/AEE/M/F.En SEZ STPP/D.751/19 dt.07.01.2019.

		Enduser: Tamilnadu Generation and Distribution Corp.Ltd(TANGEDCO) Consultant: Desein Pvt Ltd Client : Bharat Heavy Electricals Limited Project: 2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT						BHEL DOCUMENT NO: PE-V0-412-673-A027		MANUFACTURER: POSTIVE METERING PUMPS (I) PVT LTD 			
		NAME OF CONTRACT PACKAGE: 75 KLD SEWAGE TREATMENT PLANT						QUALITY PLAN FOR : METERING PUMP WITH MOTORS FOR SEWAGE TREATMENT PLANT					
		PACKAGE NO:		2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT		PEL DOC NO:		A4-PEL-1037-QAP-02					
		CONTRACTOR:		M/S PENNNAR ENVIRO LIMITED		REV.		1		DATE		8/1/2019	
SR. NO:	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	D	AGENCY			REMARKS
										M	P/B	T	
1	RAW MATERIALS	CHEMICAL, PHYSICAL PROPERTIES	MAJOR	RMTC/CHECK TESTSING	100%	RESPECTIVE MATERIAL SPECIFICATION	RESPECTIVE MATERIAL SPECIFICATION	MTC/ LAB TEST REPORT	✓	P	R	R	 
2	DIMENSION	WETTTEED AND DRIVE PARTS	MAJOR	Measurement	100%	AS PER DRAWING	AS PER DRAWING	STAGE INSPECTION REPORT	✓	P	R	R	
3	FINAL TESTING	FLOW AT 100% STROKE AND MAX PRESSURE	MAJOR	VISUAL	100%	APPROVED DATASHEET	APPROVED DATASHEET	INSPECTION REPORT	✓	P	W	R	
4		REPEATABILITY TEST	MAJOR	VISUAL	100%	APPROVED DATASHEET	APPROVED DATASHEET	INSPECTION REPORT	✓	P	W	R	
5		STEADY STATE ACCURACY	MAJOR	VISUAL	100%	APPROVED DATASHEET	APPROVED DATASHEET	INSPECTION REPORT	✓	P	W	R	
6		HYDROSTATIC PRESSURE TEST	MAJOR	VISUAL	100%	APPROVED DATASHEET	APPROVED DATASHEET	INSPECTION REPORT	✓	P	W	R	
7	FINAL DOCUMENTS	IRN	MAJOR	NA	100%	AS PER STANDARD	AS PER STANDARD	DATA DOSSIER	✓	P	H	H	
LEGENDS: - AGENCY (M-MANUFACTURER, P/B-PENNNAR/BHEL, T-TANGEDCO (END CUSTOMER) P-PERFORM, W-WITNESS R- REVIEW ✓(TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED, IRN - INSPECTION RELEASE NOTE, H-HOLD (IF ANY - APPLICABLE ONLY DURING REVIEW OF FINAL DOCUMENTS)							PREPARED BY VENDOR'S SIGNATURE & STAMP			APPROVED BY CUSTOMER'S SIGNATURE & STAMP			



APPROVED

1	08. 01. 2019	FOR APPROVAL	RAJ	N K	N K	
0	04. 01. 2019	FOR APPROVAL	RAJ	N K	N K	
REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.	
P O E C:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.				
		O N E: TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED				
		O N E: CON L AN: DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI				
		EPC CON AC O: BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA				
		PENNA ENVIRO Re-engineering Water, Environment & Energy Floor No. +3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084				
PAC A E:		75 KLD SEWAGE TREATMENT PLANT				
DEPT.	CODE	SCALE	WEIGHT (KG)	REF DRG.	ITEM	
--	A	--	--	--	--	
QAP FOR BLOWER WITH MOTOR FOR SEWAGE TREATMENT PLANT				NAME	SIGN	DATE
			PREP	PSR		08.01.2019
			CHKD	SSY		08.01.2019
			APPD	PAK		08.01.2019
DEPT.				CARD CODE	BHEL DOC NO. PE-V0-412-673-A028	REV
SIGN					PEL DOC NO. A4-PEL-1037-QAP-03	1
DATE					NO. OF SHEETS - 02 (EXCLUDING COVER SHEET)	

PROJECT: 1X660MW ENNORE SEZ SSCTPP AT ASH DYKE OF NCTPS, CHENNAI		
ENDUSER : TAMILNADU GENERATION AND DISTRIBUTION COPORATION LTD		
CONSULTANT : DESEIN PRIVATE LTD		
CLIENT : BHARAT HEAVY ELECTRICALS LIMITED		
BHEL DOC NO: PE-V0-412-673-A028		
DOC NAME: QAP for Blowers with Motor for Sewage Treatment Plant		
COMMENTS RESOLUTION SHEET		
☐ IN	☐ AN ☐ ENDCO C	☐ EL ☐ PEL
1	QP shall be uploaded after the approval of GA drg (A014)	Noted. GA drg (A014) approval received from TANGEDCO Trasmittal Ref : Lr.No.:SE/E/Th&HyP/EE-7/M/AEE/M/F.En SEZ STPP/D.751/19 dt.07 .01.2019.

		Enduser: Tamilnadu Generation and Distribution Corp.Ltd(TANGEDCO) Consultant: Desein Pvt Ltd Client : Bharat Heavy Electricals Limited Project: 2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT						BHEL DOCUMENT NO: PE-V0-412-673-A028		MANUFACTURER : EVEREST BLOWER 			
		NAME OF CONTRACT PACKAGE: 75 KLD SEWAGE TREATMENT PLANT						QUALITY PLAN FOR: BLOWER WITH MOTOR FOR SEWAGE TREATMENT PLANT					
NAME OF COMPANY: PENNNAR ENVIRO LIMITED		PACKAGE NO:		2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT		PEL DOC NO:		A4-PEL-1037-QAP-03					
CONTRACTOR:		M/S PENNNAR ENVIRO LIMITED		REV.		1		DATE		8/1/2019			
SR. NO:	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	D	AGENCY			REMARKS
										M	P	C	
1	RAW MATERIALS	CHEMICAL, PHYSICAL PROPERTIES	MAJOR	MEASUREMENT	100%	RESPECTIVE MATERIAL SPECIFICATION	RESPECTIVE MATERIAL SPECIFICATION	MTC/ LAB TEST REPORT	✓	P	R	R	
2	DYNAMIC BALANCING	IMPELLER BALANCING	MAJOR	MEASUREMENT	100%	APPROVED DATASHEET / DRAWING	APPROVED DATASHEET / DRAWING	INSPECTION REPORT	✓	P	R	R	
3	VISUAL	FOR WORKMANSHIP	MAJOR	VISUAL	100%	APPROVED DATASHEET / DRAWING	APPROVED DATASHEET / DRAWING	INSPECTION REPORT	✓	P	W	W	
4	DIMENSION	MEASUREMENT	MAJOR	VISUAL	100%	APPROVED DRAWING	APPROVED DRAWING	INSPECTION REPORT	✓	P	W	W	
5	PERFORMANCE TEST/ RUN TEST	PERFORMANCE	MAJOR	VISUAL	100%	APPROVED DATASHEET / DRAWING	APPROVED DATASHEET / DRAWING	INSPECTION REPORT	✓	P	W	W	
6	PAINTING	VISUAL	MAJOR	VISUAL	100%	APPROVED PAINT SCHEME	APPROVED PAINT SCHEME	PAINTING REPORT	✓	P	R	R	FOR CS PARTS ONLY
LEGENDS: - AGENCY (M-MANUFACTURER, P-PENNNAR, C-BHEL/DESEIN/TANGEDCO (END CUSTOMER) P-PERFORM, W-WITNESS R- REVIEW ✓(TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED							PREPARED BY			APPROVED BY			
							VENDOR'S SIGNATURE & STAMP			CUSTOMER'S SIGNATURE & STAMP			



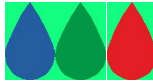
APPROVED

1	01. 01. 2019	FOR APPROVAL						
0	26. 09. 2018	FOR APPROVAL						
REV.	DATE			RAJ	N K	N K		
				PREP.	CHK.	APPR.		
PROJECT:			THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.					
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED					
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI					
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA					
		SUB CONTRACTOR :	PENNAR ENVIRO Re-engineering Water, Environment & Energy Floor No. +3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad – 500 084					
DEPT.	CODE		SCALE	WEIGHT (KG)	REF DRG.	ITEM		
--	A		--	--	--	--		
TITLE QAP FOR LAMELLA TUBE SETTLER & MBBR TANKS FOR STP						NAME	SIGN	DATE
					PREP	RAJ		01.01.2019
					CHKD	NIK		01.01.2019
					APPD	NIK		01.01.2019
DEPT.								
SIGN								
DATE								
CARD CODE —					BHEL DOC NO. PE-V0-412-673-A033		REV	
					PEL DOC NO. A4-PEL-1037-QAP-01		1	
					NO. OF SHEETS — 3 (EXCLUDING COVER SHEET)			

PROJECT: 1X660MW ENNORE SEZ SSCTPP AT ASH DYKE OF NCTPS, CHENNAI		
ENDUSER : TAMILNADU GENERATION AND DISTRIBUTION COPORATION LTD		
CONSULTANT : DESEIN PRIVATE LTD		
CLIENT : BHARAT HEAVY ELECTRICALS LIMITED		
BHEL DOC NO: PE-V0-412-673-A033		
DOC NAME: QAP for Lamella Tube Settler & MBBR Aeration Tank for Sewage Treatment Plant		
COMMENTS RESOLUTION SHEET		
S.No.	TANGENDCO Comments	BHEL/PEL's Response
1	QP shall be uploaded after the approval of GA drg (A034)	Noted. GA drg (A034) & (A039) approval received from TANGEDCO Trasmittal Ref : Lr.No.:SE/E/Th&HyP/EE-7/M/AEE/M/F.En SEZ STPP/D.747/18 dt.26 .12.2018. and Lr.No.:SE/E/Th&HyP/EE-7/M/AEE/M/F.En SEZ STPP/D.736/18 dt.12.12.2018.

		Enduser: Tamilnadu Generation and Distribution Corp.Ltd(TANGEDCO) Consultant: Desein Pvt Ltd Client : Bharat Heavy Electrical Limited Project: 2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT						BHEL DOCUMENT NO: PE-V0-412-673-A033						Page 1 of 2	
		NAME OF CONTRACT PACKAGE: 75 KLD SEWAGE TREATMENT PLANT						QUALITY PLAN FOR : Lamella Tube Settler & MBBR Aeration Tank for Sewage Treatment Plant							
PACKAGE:		2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT				DOC NO:		PEL DOCUMENT NO : A4-PEL-1037-QAP-01							
CONTRACTOR:		M/S PENNNAR ENVIRO LIMITED				REV.		1		DATE			1/1/2019		
SR. NO:	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	D	AGENCY			REMARKS		
										M	P	C			
1	PLATES, PIPES, FLANGES, FASTNERS, GASKET ETC.	MATERIAL PROPERTIES, VISUAL & DIMENSION	MAJOR	RMTC/LAB TESTING REPORT	100%	APPROVED DRG/MATERIAL SPECIFICATION	APPROVED DRG/MATERIAL SPECIFICATION	MTC	✓	P	R	R	MTC REVIEW. CHECK TEST REPORT IF MTC NOT AVAILABLE FOR PLATES & PIPES		
2	WPS/PQR/WPQ	WELDING PROCEDURE & WELDER'S ABILITY	MAJOR	MEASUREMENT	100%	ASME SEC IX	ASME SEC IX	WPS,PQR, WPQ	✓	P	R	R			
3	DISHED END	DIMENSIONS & DPT ON KNUCKLE RADIUS	MAJOR	VISUAL	100%	APPROVED DRG	APPROVED DRG	DIMENSION REPORT	✓	P	R	R	IF APPLICABLE		
4	CIRC SEAM & LONG SEAM	ALIGNMENT, OFFSET	MAJOR	VISUAL	100%	APPROVED DRAWING	APPROVED DRAWING	SET UP REPORT	✓	P	R	R			
5	NOZZLE SET UP	ORIENTATION, PROJECTION, ELEVATION	MAJOR	VISUAL	100%	APPROVED DRAWING / WPS	APPROVED DRAWING / WPS	SET UP REPORT	✓	P	R	R			
6	WELDING OF LS, CS, NOZZLES ETC.	SOUNDNESS OF WELDING, DP TEST	Major	VISUAL	100%	ASTM E 165	SEC VIII DIV.1	DP TEST REPORT	✓	P	R	R			
7	RADIOGRAPHY	WELD DEFECT	MAJOR	RT REVIEW REPORT	100%	API 620 / IS803	API 620 / IS803	RT REPORT	✓	P	R	R	IF APPLICABLE ONLY AS PER APPROVED DRAWING		
LEGENDS: - AGENCY (M-MANUFACTURER, P-PENNNAR, C-BHEL/DESEIN/TANGEDCO (END CUSTOMER) P-PERFORM, W-WITHNESS R- REVIEW ✓(TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED							PREPARED BY		APPROVED BY						
															

		Enduser: Tamilnadu Generation and Distribution Corp.Ltd(TANGEDCO) Consultant: Desein Pvt Ltd Client : Bharat Heavy Electrical Limited Project: 2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT						BHEL DOCUMENT NO: PE-V0-412-673-A033 Page 2 of 2					
 NAME OF COMPANY: PENNNAR ENVIRO LIMITED		NAME OF CONTRACT PACKAGE: 75 KLD SEWAGE TREATMENT PLANT						QUALITY PLAN FOR : Lamella Tube Settler & MBBR Aeration Tank for Sewage Treatment Plant					
		PACKAGE:		2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT			DOC NO:		PEL DOCUMENT NO : A4-PEL-1037-QAP-01				
		CONTRACTOR:		M/S PENNNAR ENVIRO LIMITED			REV.		1		DATE		1/1/2019
SR. NO:	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	D	AGENCY			REMARKS
										M	P	C	
8	FINAL ASSEMBLY DIMENSION WITH INTERNALS	OVERALL DIMENSION, SURFACE FINISH,WELD VISUAL	MAJOR	VISUAL	100%	APPROVED DRAWING	APPROVED DRAWING	DIMENSION REPORT	✓	P	W	W	
9	PNEUMATIC TEST OF RF PAD	LEAKAGE, PRESSURE DROP	MAJOR	VISUAL	100%	APPROVED DRAWING	APPROVED DRAWNG	PRESSURE TEST REPORT	✓	P	W	W	IF APPLICABLE
10	WATER FILL TEST	LEAKAGE	MAJOR	VISUAL	100%	APPROVED DRAWING	APPROVED DRAWNG	PRESSURE TEST REPORT	✓	P	W	W	
11	RUBBER LINING	VISUAL, SPARK TEST, THICKNESS, HARDNESS	MAJOR	VISUAL	100%	APPROVED DRAWING	IS 4682	RUBBERLININ G TEST REPORT	✓	P	W	W	FOR RUBBER LINED TANK ONLY
12	SURFACE PREPARATION & FINAL pAINTING	VISUAL, COLOUR SHADE	MAJOR	VISUAL	100%	APPROVED DRAWING	APPROVED DRAWING	PAINTING REPORT	✓	P	R	R	
13	RELEASE NOTE	DOCUMENT REVEIW	MAJOR	VISUAL	100%	AS PER QAP	AS PER QAP	INSPECTION REPORTS	✓	P	H	H	
LEGENDS: - AGENCY (M-MANUFACTURER, P-PENNNAR, C-BHEL/DESEIN/TANGEDCO (END CUSTOMER) P-PERFORM, W-WITHNESS R- REVIEW ✓(TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED							PREPARED BY						
							VENDOR'S SIGNATURE & STAMP		CUSTOMER'S SIGNATURE & STAMP				

		APPROVED			
0	08. 01. 2019	FOR APPROVAL			
REV.	DATE	DESCRIPTION		PREP.	CHK.
		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.		RAJ	NK
				PREP.	APPR.
PROJECT:					
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED		
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI		
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA		
		SUB CONTRACTOR :	PENNAR ENVIRO Re-engineering Water, Environment & Energy Floor No. +3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084		
		PACKAGE :	75 KLD SEWAGE TREATMENT PLANT		
DEPT.	CODE		SCALE	WEIGHT (KG)	REF DRG.
--	A		--	--	--
TITLE QAP FOR AGITATOR WITH MOTOR FOR SEWAGE TREATMENT PLANT					NAME
				PREP	PSR
				CHKD	SSY
				APPD	PAK
				DATE	
				08.01.2019	
				08.01.2019	
				08.01.2019	
DEPT.					
SIGN					
DATE					
N.A.				CARD CODE	
				BHEL DOC NO. PE-V0-412-673-A051	REV
				PEL DOC NO. A4-PEL-1037-QAP-05	0
				NO. OF SHEETS - 01 (EXCLUDING COVER SHEET)	

	MANUFACTURERS NAME & ADDRESS FFP ECO TECHNOLOGIES PVT. LTD. 55, B NANJI INDL. EST., KHARADPADA VILLAGE, ATHAL LUHARI ROAD, SILVASSA - 396 230		MANUFACTURING QUALITY PLAN					FFP CLIENT:PENNAR ENVIRO LIMITED PEL CLIENT:BHARAT HEAVY ELECTRICALS LIMITED75 KLD PROJECT: 75 KLD SEWAGE TREATMENT PLANT END USER:TAMIL NADU GENERATION & DISTRIBUTION CORP LTD DATE: 08.01.2019					
			ITEM: AGITATORS SUB-SYSTEM: NA		QAP.NO.: 05 REV.NO. R0 DATE: 08.01.2019 PAGE 1 OF 1		BHEL DOC NO:PE-V0-412-673-A051						
Sr. No.	Components & Operation	Characteristics	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norm	Format of Report	D*	Agency			Remarks
1	2	3	4	5	6	7	8	9		**	10		11
1.0	Raw Material Control												
1.1	Shaft & Blade	Chem & Mech. Properties	Major	Chem. & Mech Analysis	1/Heat or 1/Bar Size	Appd. drg / data sheet	Material Standard	Mfr TC / Lab Report		P	V	V	
2.0	In Process Control												
2.1	Machining of Components above	Dimensions	Major	Measurement	100%	Mfg.Drg.	Mfg.Drg.	IR		P	V	V	
2.2	Blade, Impeller Balancing	Static Balancing (For RPM < 300)	Major	Static Balancing	100%	Appd. drg / data sheet	Compliance	IR		P	V	V	
3.0	Complete Agitator												
3.1	Inspection Stage 1. Inspection with Gearbox	No Load Run Test a. Current drawn b. 30 Mins. In Air	Critical	Performance Test	Random / 1 Each Type	Appd. drg / data sheet	Appd. drg / data sheet	IR		P	W	W	Smooth Running without undue noise & vibration
3.2	Inspection Stage 2. Painting	DFT Color Shade	Minor Minor	Coat Thickness Shade	100% 100%	Appd. drg / data sheet Appd. doc.	Appd. drg / data sheet Appd. doc.	IR IR		P P	R R	R R	Painting shall be done after receipt of your dispatch clearance
		LEGEND: * RECORDS IDENTIFIED WITH "TICK" SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION ** M: FIBRE & FIBRE PRODUCTS N: BHEL C: PENNAR INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION AS APPROPRIATE R-REVIEW					FOR CLIENT USE	DOC NO.					
Manufacturer	Contractor												
Signature							REVIEWED BY	NAME & SIGN OF APPR. AUTH. & SEAL					

- Note:
1. Material Of Construction Shall be as per approved Drawing/Datasheet.
 2. Manufacturers' T.C. of gearbox from approved source for no load run test & oil leakage shall be furnished for review.
 3. Painting to be done after your clearance for painting. Painting witness shall be provided subsequently. For 1/Type
 4. Motor Routine T.C. in Manufacturer format shall be furnished for review.
 5. Run Test Shall be offered with either Primer Coat or No Painting.



		APPROVED			
0	08.01.2019	FOR APPROVAL			
REV.	DATE	DESCRIPTION		PAJ	NK
				PREP.	CHK.
PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.			
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED		
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI		
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA		
		SUB CONTRACTOR :	PENNAR ENVIRO Re-engineering Water, Environment & Energy Floor No. +3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084		
		PACKAGE :	75 KLD SEWAGE TREATMENT PLANT		
DEPT.	CODE	SCALE	WEIGHT (KG)	REF DRG.	ITEM
--	A	--	--	--	--
TITLE QAP OF CENTRIFUGE FOR SEWAGE TREATMENT PLANT					NAME
				PREP	PSR
				CHKD	SSY
				APPD	PAK
				DATE	
				08.01.2019	
				08.01.2019	
				08.01.2019	
DEPT.				CARD CODE	BHEL DOC NO.
SIGN					PE-V0-412-673-A052
DATE					PEL DOC NO.
					A4-PL-1037-QAP-06
					NO. OF SHEETS - 01 (EXCLUDING COVER SHEET)

Manufacturer's Name & Address:- M/s, MBE COAL & MINERAL TECHNOLOGY INDIA PVT. LTD. [Formerly Humboldt Wedag -Coal & Mineral Division] INDUSTRIAL GROWTH CENTRE, PLOT NO. 1A, SECTOR-B, NIMPURA, P.O. RAKHAJANGAL, KHARAGPUR-721301 (W.B.)						MBE COAL & MINERAL TECHNOLOGY INDIA PVT.LTD.						MBE QAP NO. : S-40-4454 /PS/18	
						QUALITY ASSURANCE PLAN						Dated:08.01.2019,R-0 P:1 OF 1 ELDOC NO : PE-00-41-673-A0	
CLIENT :- Tamilnadu Generation & Distribution Corp. Ltd.(TANGEDCO)				ITEM				PO No. : PEL-WP-BHEL-ENNORE-002 dtd. 18.12.2018					
PROJECT :- STP : 1x660 MW SEZ Coal Based STPP of NCTPS,Chennai.				DECANTER CENTRIFUGE : TYPE ~ S0-1 (Co-Current Flow)				Technical data Sheet No. : PE-V0-412-673-A042 , PEL DOC NO:A4-PEL-1037-QAP-06					
EPC Contractor :- Bharat Heavy Electricals Ltd, Noida				Quantity – 1 No.		Project :75 KLD STP							
Supplier : PENNAR ENVIRO , Hyderabad-500 084 (Telengana)				M.O.C – 304 SS									
Sl. No.	Components & Operations	Characteristics	Class	Type of Check	Quantum of Check	Reference Document	Acceptance Norms	Format of Record	Agency			Remarks	
									M	PEL	N		
1	2	3	4	5	6	7	8	9	D*	**	10	11	
MATERIAL IDENTIFICATION						Apprd. Drg. & Data Sheet	Apprd. Drg. & Data Sheet	LAB CHECK				* Housing (Casing) MOC as per IS:2062 :2011	
A	1. BOWL	Mechanical Properties &	MAJOR	UTS , YS, e % , BHN	1 /LOTS	ASTM A 240 Typ.304	ASTM A 240 Typ.304	TEST	√	P	R		R
	2. SCROLL	Chemical		Chemical Analysis		ASTM A182 Grade F 304	ASTM A182 Grade F 304	Report / Mill TC					
	3. HOUSING *	Composition		Visual									
IN-PROCESS INSPECTION						ASME Sec-IX	ASME Sec-IX	RELEVANT				MBE OR TPI QUALIFIED WPS/PQR SHALL BE USED.	
B	MARKING, CUTTING, EDGE PREPARATION, Welding & DYNAMIC BALANCING OF ROTORS	DIMENSIONAL CHECKING & Performing Dyn. Balancing	MAJOR	MEASUREMENT	100%	(As per Apprd. Drg. & Data Sheet)	(As per apprvd. Drg. & DATA SHEET)	Dynamic Balancing REPORT OF LAB	√	P	R		R
						IS/ISO:1940-1:2003	IS/ISO:1940-1:2003						
						AT GRADE – Z.5	AT GRADE – Z.5						
C	NON DESTRUCTIVE TEST :- UT & RT	UT Examination of Bowl All round "J" groove Weld Joints , RADIO GRAPHIC EXAMINATION of 'LS' & 'CS' Butt weld Joints.	MAJOR	RECORD REVIEW	100%	ULTRASONIC Report	ASME Sec – VIII,Div-I (ASTM E-114 / E-164)	T.C.	√	P	R	R	"LS" - Long Seam Weld joint "CS"- Circumferential Seam weld joint
			MAJOR	R T Report Review	30%	ASME SEC – V & VIII ,Div -1	ASME SEC- VIII CL. U W 51/52	RT Certificate	√	P	R	R	
D	FINAL INSPECTION ASSEMBLY OF MACHINE And PERFORMING NO LOAD RUN TEST AT OPERATING R.P.M.	MEASUREMENT	CRITICAL	Vibration, Noise Level Brg. Temp. & Bowl Speed	100%	Shop Floor Measurement at No Load Run Test for Two Hours	Shop Floor Measurement w.r.t HUMBOLDT"s standard	Internal Works Test Report	√	P	W	W	Vibration Level < 7.1 mm/Sec [On Pillow Blocks] Noise Level(lp) < 87 dB at 1.5M distance # Bearing Temp.< 95°C [On Pillow Blocks] Speed ~ Operating RPM of Machine Job Motor : 7.5 KW/IE3 RTC to be provided
E	Surface Preparation & External Painting Carbon Steel Construction of the Equipment : Grit Blasting and Painting.	GRIT / Abrasive BLASTING : SA - Z 1/2 Painting by SPRAY GUN PROCESS	MAJOR	VISUAL & DFT checking	100%	PRIME COAT :- 1)Two Coats of Zinc Silicat Primer @ 50µ, 2) FINAL Coat : Two coats of High Build Epoxy @ 90µ , Color : RAL 5012. Total DFT - 260 µ.(Min.)	Perform in accordance with BHEL Data Sheet PE-V0-411-673-A008	Compliance Certificate of painting.	√	P	—	—	# Due to NO LOAD condition. MBECMT guaranteed for Noise Level 85 dB at 1M , when the machine put on operation in Full Load condition at site.
DOCUMENTATION		FINAL INSPECTION											
		1.VISUAL 2.DIMENSIONAL (As per apprvd.GA Drg.) 3. No Load Run Test for ~2 hrs.											Colum "D" (QA Documents) to be Reviewed by PEL
F (√ Relevant Test certificates & documents to be submitted during Final Inspection)		4. Documents : Endorsed photo copies of Material Test Certificates,NDT Reports,Dynamic Balancing Reports to be submitted.											
		5. NO-LOAD RUN TEST AT OPERATING R.P.M				PERFORMANCE TEST AT SITE DURING COMMISSIONING.							
		6.Calibration Certificates of measuring instruments to be reviewed during Final Inspection at Work Shop.											
Manufacturer		CONTRACTOR	LEGEND : RECORDS IDENTIFIED "TICK" (√) SHALL BE -										
			ESSENTIALLY INCLUDED BY Manufacturer IN QA DOCUMENTATION.										
			** M: MANUFACTURER / SUBCONTRACTOR / VENDOR										
			PEL: Pennar Enviro Ltd.		580								
			N: CLIENT/ CLIENT NOMINATED INSPECTION AGENCY										Note:- Mfg. will be strictly as per approved
			"P" PERFORM, "W" WITNESS AND "R" REVIEW OF DOCUMENTS										Drawing / documents.
								SIGN & SEAL OF CLIENT	SIGN & SEAL OF CONTRACTOR				

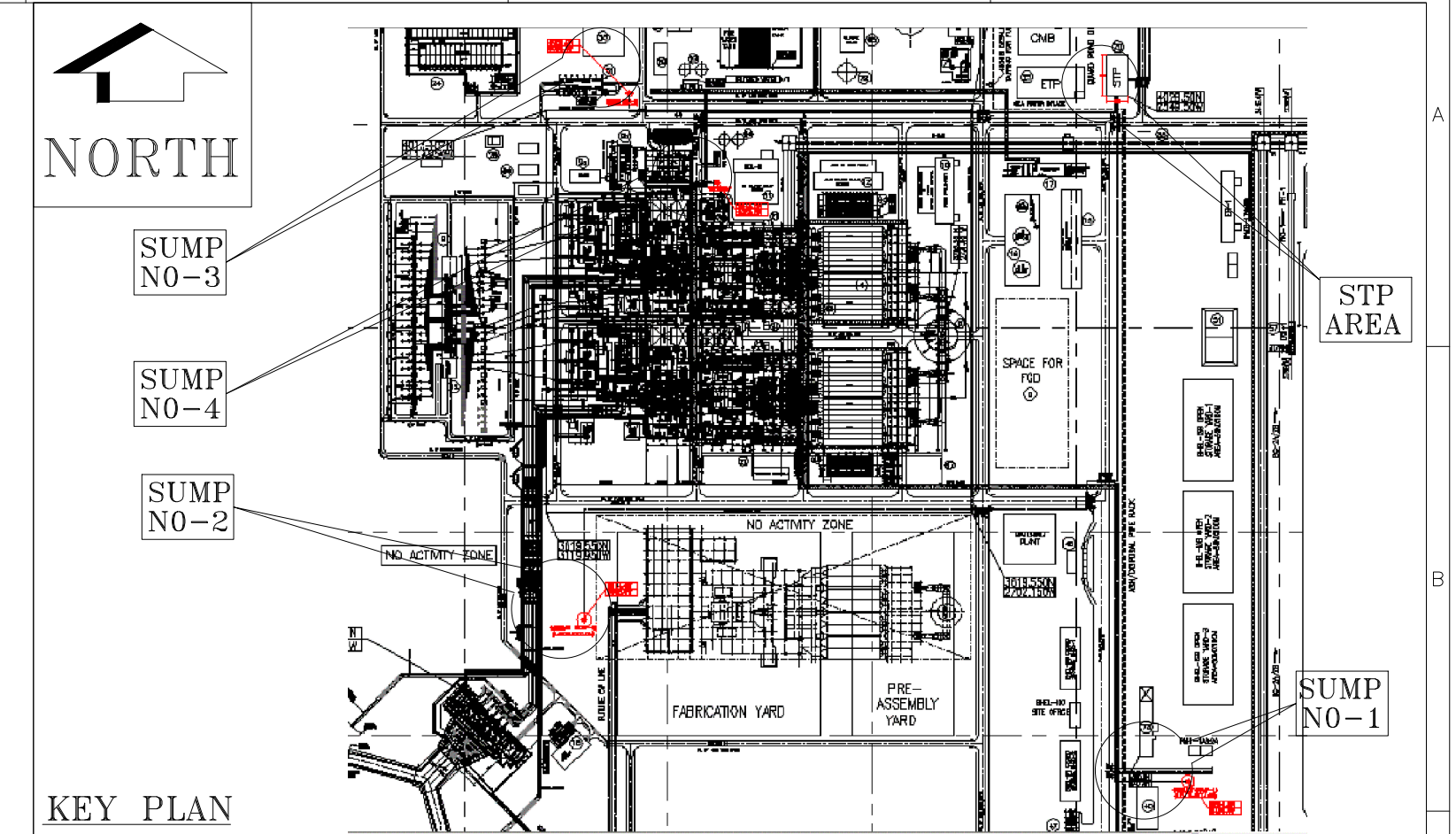
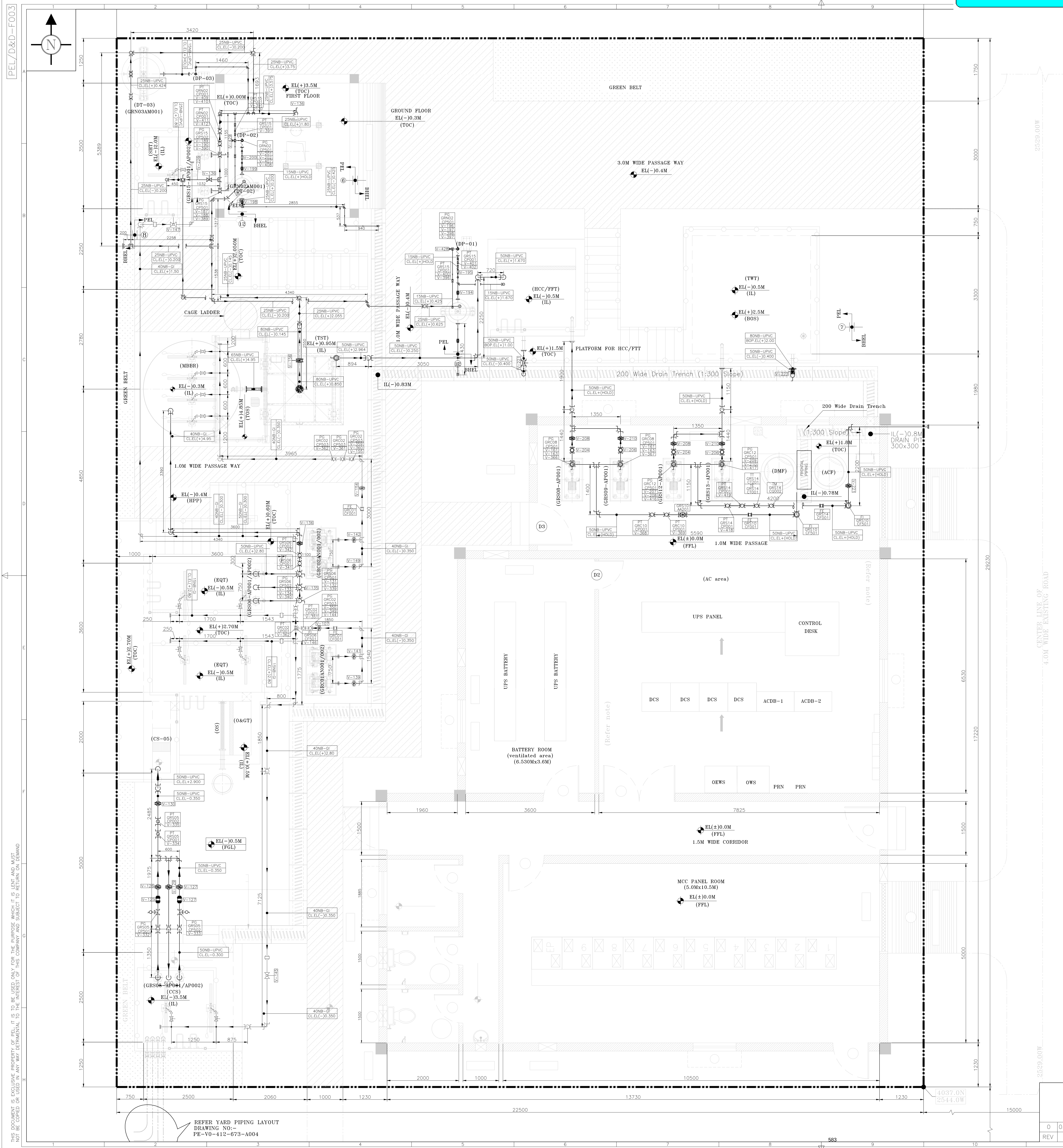
APPROVED WITH COMMENTS

0	26.09.2018	ISSUED FOR APPROVAL			
REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.			
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED		
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI		
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA		
		SUB CONTRACTOR :	PENNA R ENVIRO Re-engineering Water, Environment & Energy Floor No. +3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad – 500 084		
DEPT.	CODE	SCALE	WEIGHT (KG)	REF DRG.	ITEM
--	A	--	-	-	-
TITLE QAP FOR VALVES SEWAGE TREATMENT PLANT				DATE	DATE
A--				IIE	DATE
A--				IIE	DATE
DEPT.			CARD CODE	BHEL DOC NO. PE-V0-412-673-A035	
SIGN	N.A.			REV 0	
DATE			-	NO. OF SHEETS – 1 (EXCLUDING COVER SHEET)	

1.CS Valves above 8" is a Category B item. Witness of Hydrotest and pneumatic test shall be carried out by BHEL. Revise accordingly. 2.Revised QAP shall be resubmitted after the approval of DS of Valves (A010)

		Enduser: Tamilnadu Generation and Distribution Corp.Ltd(TANGEDCO) Consultant: Desein Pvt Ltd Project: 2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT						BHEL DOCUMENT NO: PE-V0-412-673-A035 PEL DOCUMENT NO : A4-PEL-1037-QAP-04						
 NAME OF COMPANY: PENNNAR ENVIRO LIMITED		NAME OF CONTRACT PACKAGE: 75 KLD SEWAGE TREATMENT PLANT						QUALITY PLAN FOR : Valves Sewage Treatment Plant						
		PACKAGE NO:		2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT			QAP NO:		QA/QAP/STP-04		DATE		26/09/2018	
		CONTRACTOR:		M/S PENNNAR ENVIRO LIMITED			REV.		0		DATE		26/09/2018	
SR. NO:	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	D	AGENCY			REMARKS	
										M	P	C		
1	RAW MATERIALS	CHEMICAL, PHYSICAL PROPERTIES	Major	RMTC / Check Testing	100%	RESPECTIVE MATERIAL SPECIFICATION	RESPECTIVE MATERIAL SPECIFICATION	mtc / LAB TEST REPORT	✓	P	R	R	Check testing report will be offered in absence of RMTC	
2	VISUAL	WORKMANSHIP	Major	Measurement	100%	MSS-SP-55	MSS-SP-55	INSPECTION REPORT	✓	P	W	R		
3	DIMENSION	MEASUREMENT	Major	Visual	100%	APPROVED DRG.	APPROVED DRG.	INSPECTION REPORT	✓	P	W	R		
4	HYDRO TEST OF BODY/SEAT/BACKSEAT	LEAKAGE, PRESSURE DROP	Major	Visual	100%	B 16.34 / API 598	B16.34 / API 598	PRESSURE TEST REPORT	✓	P	W	R	BACKSEAT WHEREVER IS APPLICABLE	
5	PNEUMATIC TEST SEAT	LEAKAGE, PRESSURE DROP	Major	Visual	100%	B 16.34 / API 598	B16.34 / API 598	PRESSURE TEST REPORT	✓	P	W	R		
6	PAINTING	SURFACE FINISH	Major	Visual	100%	AS PER APPROVED PAINT SCHEME	AS PER APPROVED PAINT SCHEME	PAINTING REPORT	✓	P	R	R		
LEGENDS: - AGENCY (M-MANUFACTURER, P-PENNNAR, C-BHEL/DESEIN/TANGEDCO (END CUSTOMER) P-PERFORM, W-WITHNESS R- REVIEW ✓(TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED							PREPARED BY			APPROVED BY				
							VENDOR'S SIGNATURE & STAMP			CUSTOMER'S SIGNATURE & STAMP				





TERMINATION POINTS				
TP	DESCRIPTION	LOCATION	FLOW / PRESSURE	END CONNN.
5	TREATED SEWAGE WATER	FROM TREATED WATER DISPOSAL PUMP TO HORTICULTURE NETWORK (MAX. DISTANCE PIPING 500 MTR.)	4 M3/HR @ 1.0-1.5 KG/CM2	
6	DEWATERED SLUDGE	AT THE CENTRIFUGE SLUDGE OUTLET	ATM	
7	INSTRUMENT AIR (PNEUMATIC AIR LINE)	AT ONE POINT (5 METER MAX. DISTANCE FROM STP PLANT BATTERY LIMIT)	1-5 M3/HR @ 5.0-6.0 KG/CM2	25NB FLANGED
8	SERVICE WATER	AT ONE POINT (5 METER MAX. DISTANCE FROM STP PLANT BATTERY LIMIT)	3-5 M3/HR @ 2.0 KG/CM2	50NB FLANGED
10	TREATED SEWAGE WATER	AT THE OUTLET OF REED BED TO GARDENING (MAX. DISTANCE PIPING 10 MTR.)	ATM	
11	DRAINS & OVERFLOW	AT THE RESPECTIVE DRAIN TRENCHES TO COMMON SEWAGE COLLECTION SUMP	ATM	

NOTES :-

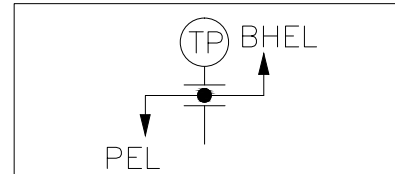
- ALL DIMENSIONS ARE IN mm AND LEVELS ARE IN M/S. UNLESS OTHERWISE NOTED.
- FGL (-10.50M).
- PLANT FINISH GRADED LEVEL (FGL) SHALL BE RL (+) 9.5M. POWER HOUSE (TG BUILDING) FINISH GROUND FLOOR LEVEL IS EL (+)0.00M, WHICH CORR. TO RL (+)10.0M.
- FOR PUMPS ALL THE DIMENSION INDICATED FROM DISCHARGE OF PUMPS.
- ALL CIVIL DESIGN & CONSTRUCTION ARE IN M/S. BHEL SCOPE.

REFERENCE DRAWINGS :-

- P&ID :- PEL-12171037-PRO-PID-001 /
PE-V0-412-673-A001
- HFD :- PEL-12171037-PRO-HFD-003 /
PE-V0-412-673-A007
- EQUIPMENT LAYOUT :- PE-V0-412-673-A002
- YARD PIPING LAYOUT :- PE-V0-412-673-A004

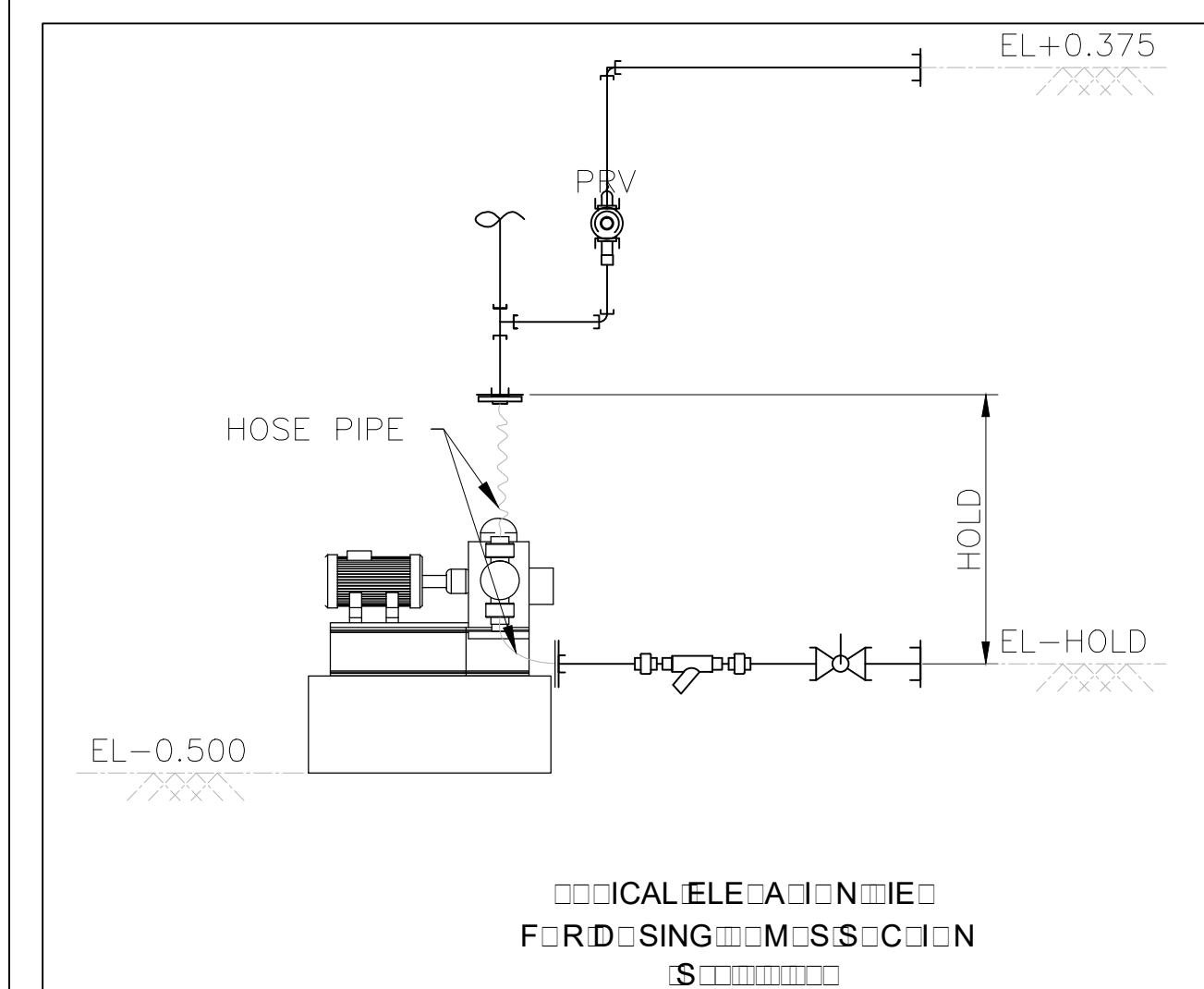
TEXT LEGENDS :-

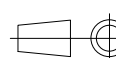
IL	:-INVERT LVL.
EL	:-ELEVATION.
FGL	:-FINISHED FLOOR LEVEL.
FGL	:-FINISHED GROUND LEVEL.
TYP	:-TYPICAL.
TOP	:-TOP OF CONCRETE.
TOS	:-TOP OF STEEL.
BOS	:-BOTTOM OF SLAB.



LINE LEGENDS:-

---	PLANT BOUNDARY
-----	----------------

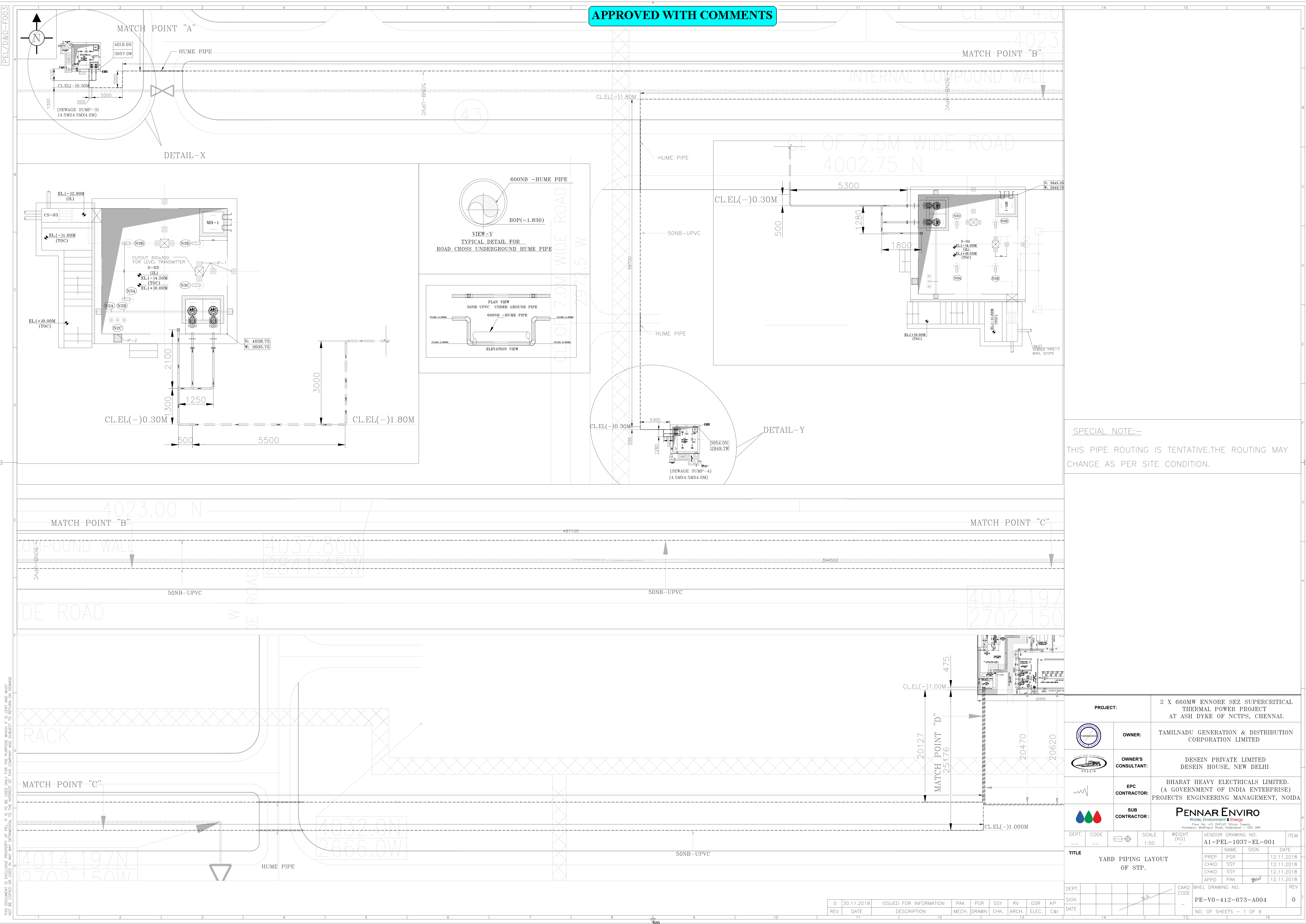


PROJECT:		2 X 460MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.				
	OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED				
	OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI				
	EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA				
	SUB CONTRACTOR:	PENNAIR ENVIRO <i>Water Environment & Energy</i> Floor No. +3, Dhruv Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084				
DEPT.	CODE	SCALE	WEIGHT (KG)	VENDOR DRAWING NO.		
--	--	 1:50	--	A1-PEL-1037-EL-001		
TITLE				NAME SIGN DATE		
PIPING LAYOUT FOR SEWAGE TREATMENT PLANT (Inside Area)				PREP	PSR	05.12.2018
				CHKD	SSY	05.12.2018
				CHKD	SSY	05.12.2018
				APPD	PAK	05.12.2018
DEPT.			CARD CODE	BHEL DRAWING NO.		REV
SIGN			--	PE-V0-412-673-A003		0
DATE				NO. OF SHEETS = 1		

COMMENTS ON PIPING
LAYOUT (INSIDE)

S No.	TANGEDCO COMMENTS
1	Remove all termination points and associated table since this is an EPC contract.
2	Indicate symbol legend
3	Indicate manholes at regular intervals.
4	Provide crossovers over piping as required.
5	Remove all holds in the drawing
6	BHEL to ensure that head room clearances are maintained for all overhead piping.
7	Indicate all piping supports.
8	Ensure that all valves are accessible for operation and maintenance. And are at man height.
9	Submit P & ID for review of piping layout.

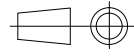
PEL/D&D-F003



APPROVED WITH COMMENTS

SPECIAL NOTE:-

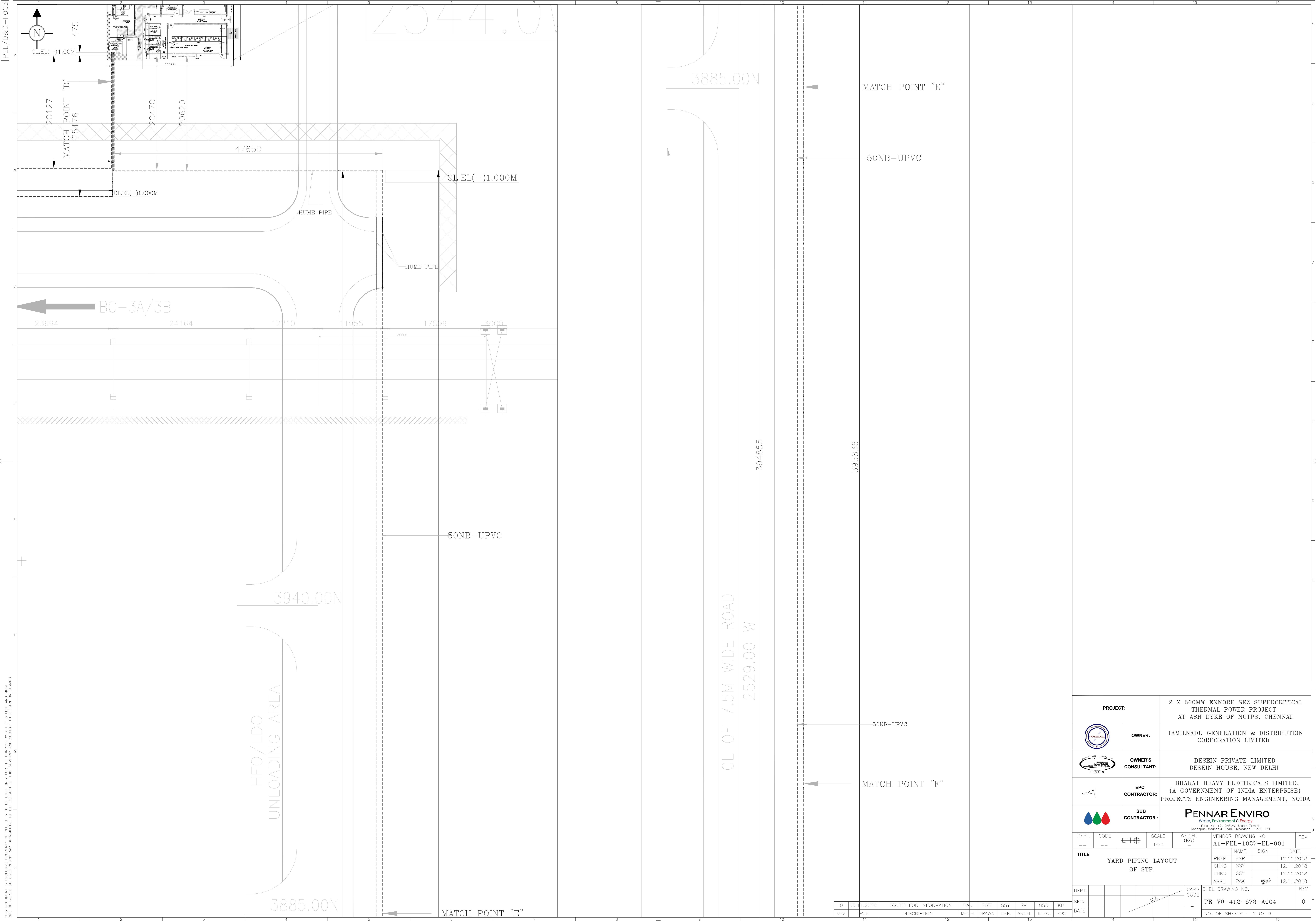
THIS PIPE ROUTING IS TENTATIVE.THE ROUTING MAY CHANGE AS PER SITE CONDITION.

PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.				
	OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED				
	OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI				
	EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA				
	SUB CONTRACTOR:	PENNAR ENVIRO Water, Environment & Energy Floor No. #2, GRIETVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084				
DEPT.	CODE		SCALE	WEIGHT (KG)	VENDOR DRAWING NO.	ITEM
	--		1:50	--	A1-PEL-1037-EL-001	
TITLE		YARD PIPING LAYOUT OF STP.				
DEPT.				CARD CODE	BHEL DRAWING NO.	REV
SIGN				--	PE-V0-412-673-A004	0
DATE					NO. OF SHEETS - 1 OF 6	

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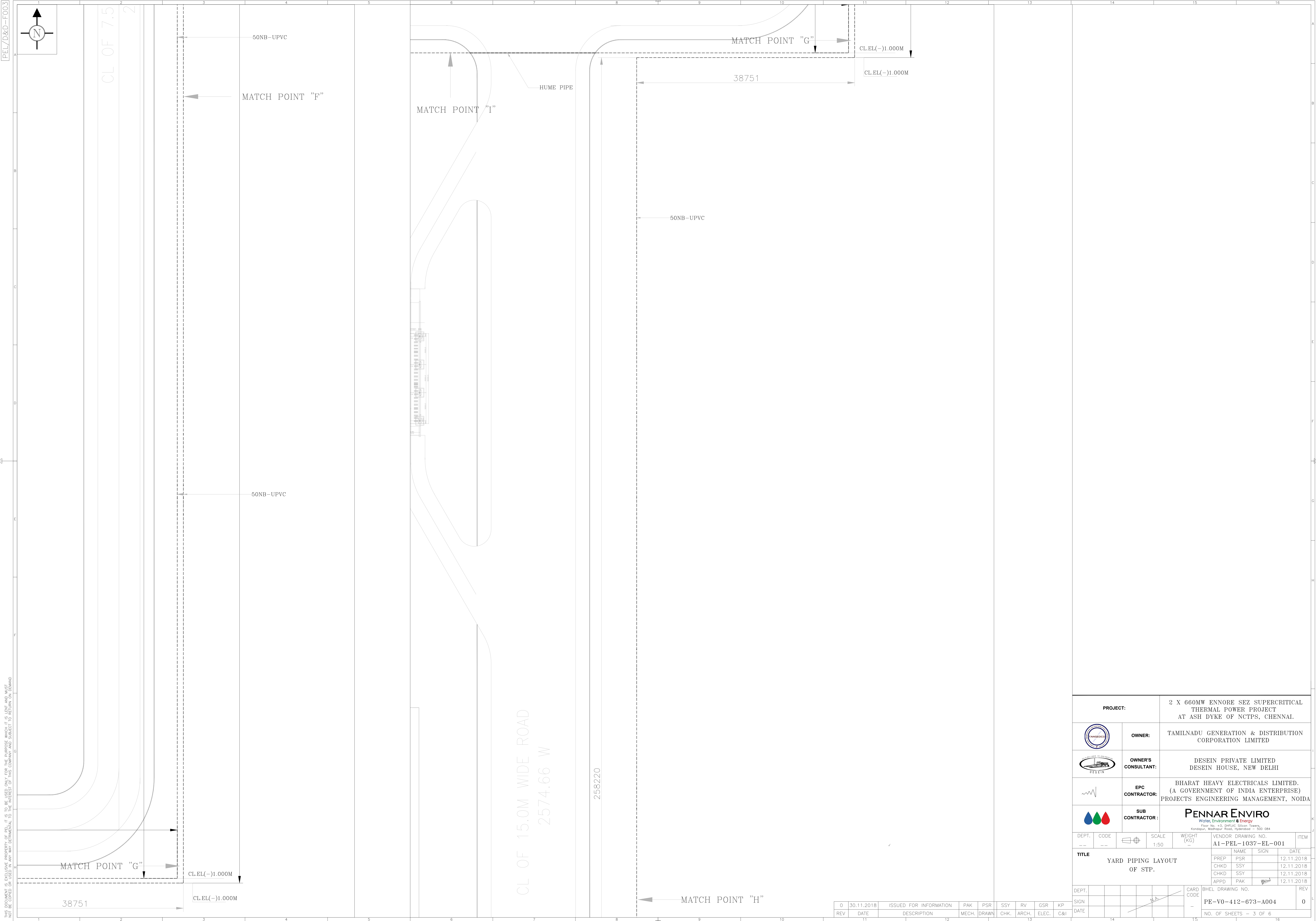


PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.			
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED		
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI		
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA		
		SUB CONTRACTOR:	PENNAR ENVIRO Water, Environment & Energy Floor No. -#2, GRIETVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084		
DEPT.	CODE		SCALE	WEIGHT (KG)	VENDOR DRAWING NO.
--	--		1:50	-	A1-PEL-1037-EL-001
TITLE			NAME		DATE
			PREP	PSR	12.11.2018
			CHKD	SSY	12.11.2018
			CHKD	SSY	12.11.2018
			APPD	PAK	12.11.2018
DEPT.				CARD CODE	BHEL DRAWING NO.
SIGN					PE-V0-412-673-A004
DATE					0
			NO. OF SHEETS - 2 OF 6		

0	30.11.2018	ISSUED FOR INFORMATION	PAK	PSR	SSY	RV	GSR	KP
REV	DATE	DESCRIPTION	MECH.	DRAWN	CHK.	ARCH.	ELEC.	C&I

PEL/D&D-F003

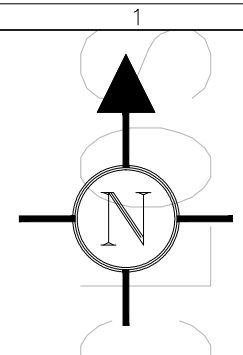
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PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.			
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED		
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI		
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA		
		SUB CONTRACTOR:	PENNAR ENVIRO Water, Environment & Energy Floor No. #2, GREENTEC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084		
DEPT.	CODE		SCALE	WEIGHT (KG)	VENDOR DRAWING NO.
--	--		1:50	-	A1-PEL-1037-EL-001
TITLE			NAME	SIGN	DATE
			PREP	PSR	12.11.2018
			CHKD	SSY	12.11.2018
			CHKD	SSY	12.11.2018
			APPD	PAK	12.11.2018
DEPT.				CARD CODE	BHEL DRAWING NO.
SIGN				-	PE-V0-412-673-A004
DATE					NO. OF SHEETS - 3 OF 6

0	30.11.2018	ISSUED FOR INFORMATION	PAK	PSR	SSY	RV	GSR	KP
REV	DATE	DESCRIPTION	MECH.	DRAWN	CHK.	ARCH.	ELEC.	C&I

[PEL/D&D-F003]



BHEL-ISC
STORAGE SHED

CL OF 15.0M
257

MATCH POINT "H"

50NB-UPVC

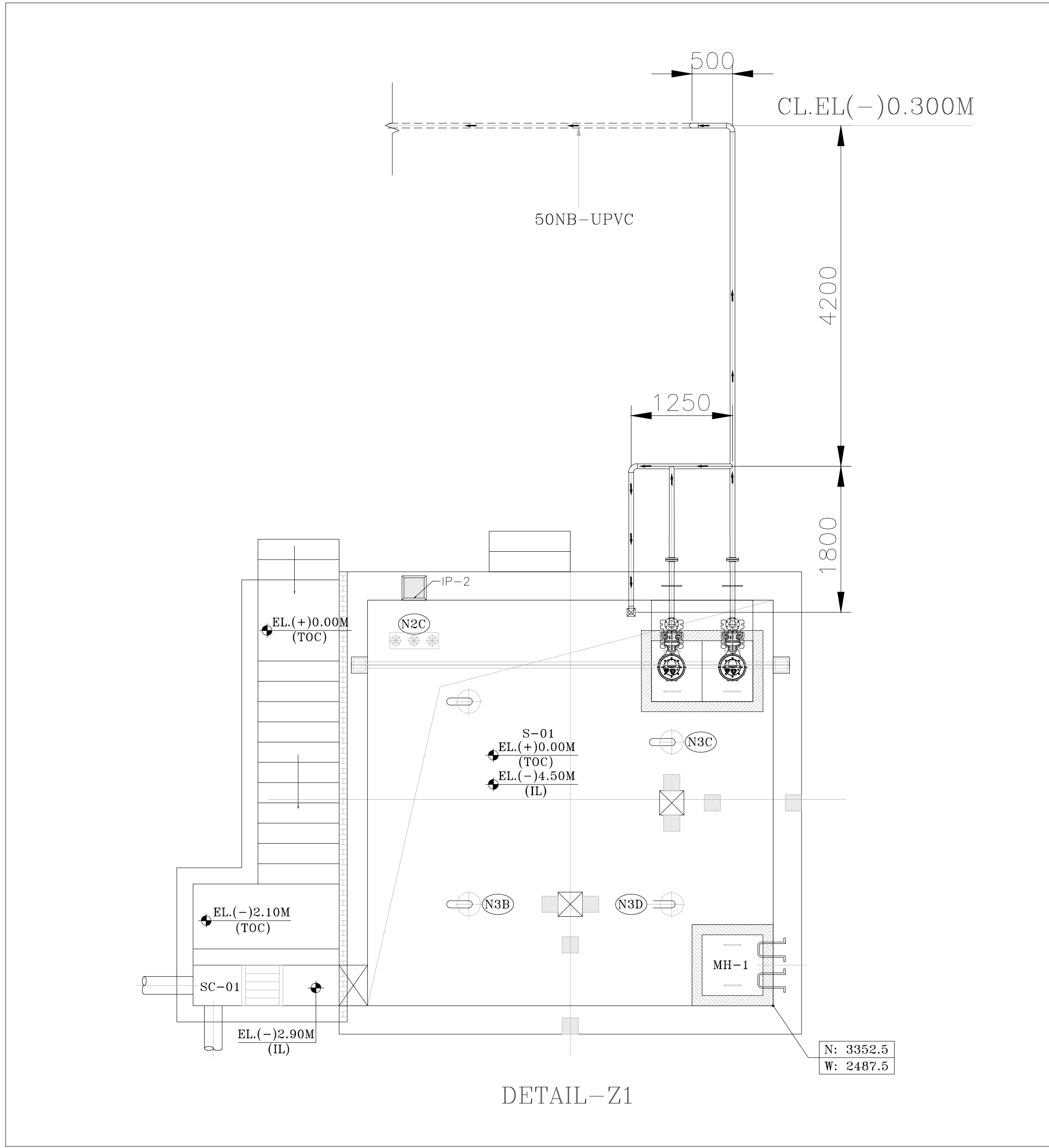
CL.EL.(+)1.000M

67800

50NB-UPVC

HUME PIPE

DETAIL-Z1



DETAIL-Z1

N: 3352.5
W: 2487.5

PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.			
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED		
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI		
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA		
		SUB CONTRACTOR:	PENNAR ENVIRO Water, Environment & Energy Floor No. #2, GRIEVANCE SILENT TOWERS, Kondapur, Madhapur Road, Hyderabad - 500 084		
DEPT.	CODE		SCALE 1:50	WEIGHT (KG) -	VENDOR DRAWING NO. A1-PEL-1037-EL-001
TITLE YARD PIPING LAYOUT OF STP.			NAME	SIGN	DATE
			PREP	PSR	12.11.2018
			CHKD	SSY	12.11.2018
			CHKD	SSY	12.11.2018
			APPD	PAK	12.11.2018
DEPT.				CARD CODE	BHEL DRAWING NO.
SIGN					PE-V0-412-673-A004
DATE					0
NO. OF SHEETS - 4 OF 6					

0	30.11.2018	ISSUED FOR INFORMATION	PAK	PSR	SSY	RV	GSR	KP
REV	DATE	DESCRIPTION	MECH.	DRAWN	CHK.	ARCH.	ELEC.	C&I

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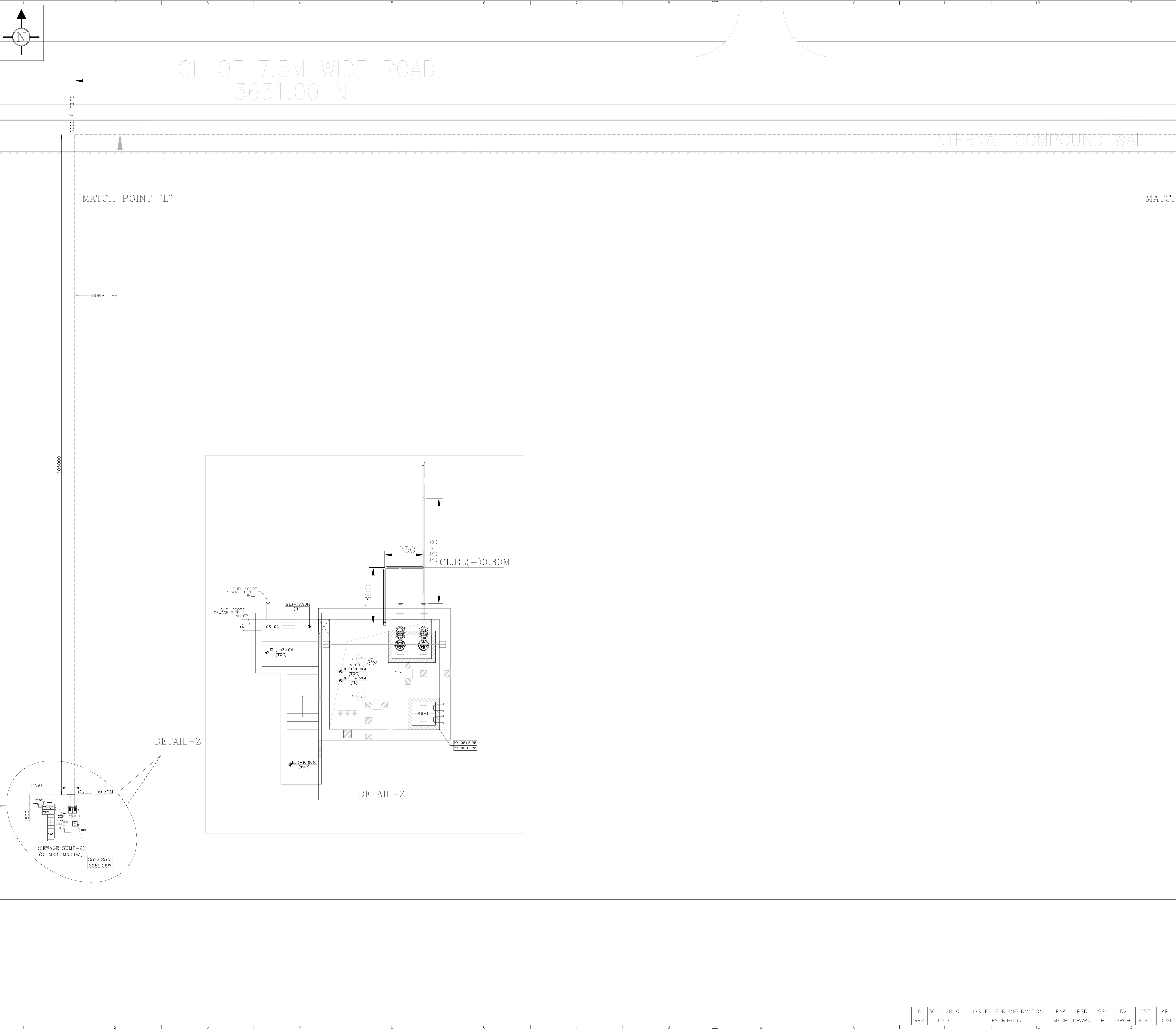


PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.			
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED		
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI		
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA		
		SUB CONTRACTOR:	PENNAR ENVIRO Water, Environment & Energy Floor No. -#2, GRIETVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084		
DEPT.	CODE		SCALE 1:50	WEIGHT (KG) -	VENDOR DRAWING NO. A1-PEL-1037-EL-001
TITLE YARD PIPING LAYOUT OF STP.			NAME	SIGN	DATE
			PREP	PSR	12.11.2018
			CHKD	SSY	12.11.2018
			CHKD	SSY	12.11.2018
			APPD	PAK	12.11.2018
DEPT.				CARD CODE	BHEL DRAWING NO.
SIGN					PE-V0-412-673-A004
DATE					NO. OF SHEETS - 5 OF 6

0	30.11.2018	ISSUED FOR INFORMATION	PAK	PSR	SSY	RV	GSR	KP
REV	DATE	DESCRIPTION	MECH.	DRAWN	CHK.	ARCH.	ELEC.	C&I

PEL/D&D-F003

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PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.				
	OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED				
	OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI				
	EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA				
	SUB CONTRACTOR:	PENNAR ENVIRO Water, Environment & Energy Floor No. #2, GRIETVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084				
DEPT.	CODE	SCALE	WEIGHT (KG)	VENDOR DRAWING NO.	ITEM	
--	--	1:50	-	A1-PEL-1037-EL-001		
TITLE YARD PIPING LAYOUT OF STP.				NAME	SIGN	DATE
				PREP	PSR	12.11.2018
				CHKD	SSY	12.11.2018
				CHKD	SSY	12.11.2018
				APPD	PAK	12.11.2018
DEPT.				CARD CODE	BHEL DRAWING NO.	REV
SIGN				-	PE-V0-412-673-A004	0
DATE					NO. OF SHEETS - 6 OF 6	

0	30.11.2018	ISSUED FOR INFORMATION	PAK	PSR	SSY	RV	CSR	KP
REV	DATE	DESCRIPTION	MECH.	DRAWN	CHK.	ARCH.	ELEC.	C&I

COMMENTS ON YARD PIPING LAYOUT

S No.	TANGEDCO COMMENTS
1	Submit P & ID for review of piping layout.
2	Indicate locational dimensions for all piping.
3	Indicate manholes at regular intervals.
4	Provide crossovers over piping as required.
5	Indicate elevations of all piping.
6	BHEL to ensure that head room clearances are maintained for all overhead piping.
7	Indicate all piping supports.
8	Ensure that all valves are accessible for operation and maintenance. And are at man height.
9	Indicate following note on the drawing "EL 0.00 M corresponds to RL 10.00 M which is FFL of TG Building"

		APPROVED WITH COMMENTS					
0-A	17.09.2018	ISSUED FOR APPROVAL		MKK	SSY	PAK	<i>PAK</i>
REV.	DATE	DESCRIPTION		PREP.	CHK.	APPR.	
PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.					
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED				
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI				
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA				
		SUB CONTRACTOR :	PENNA R ENVIRO Re-engineering Water, Environment & Energy Floor No. +3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084				
DEPT.	CODE	SCALE	WEIGHT (KG)	REF DRG.			ITEM
--	A	--	--	--			--
TITLE DATA SHEET OF VALVES SEWAGE TREATMENT PLANT					NAME	SIGN	DATE
				PREP	MKK		17.09.2018
				CHKD	SSY		17.09.2018
				APPD	PAK	<i>PAK</i>	17.09.2018
DEPT.				CARD CODE	BHEL DOC NO. PE-V0-412-673-A010		REV
SIGN					PEL DOC NO. A4-PEL-1037-DS-V-001		0-A
DATE					NO. OF SHEETS - 11 (EXCLUDING COVER SHEET)		



CONTENTS

SR.NO	DESCRIPTION	PAGES
1	Datasheet For Auto Ball Valve	1-2
2	Datasheet For Auto Diaphragm Valve- CSRL	3-4
3	Datasheet For Non Return Dual plate check Valve	5
4	Datasheet For Manual Ball valve	6
5	Datasheet For Manual Butterfly valve – C I	7-8
6	Datasheet for Manual Diaphragm Valve - CPVC	9
7	Datasheet For Non Return Valve _Ball Type CPVC	10

TANGEDCO Comments: All internal & External Hardware shall be SS 316. Indicate the same. NRV (Check valve) handling sewage/ treated sewage shall be rubberlined internally. Revise the same accordingly. Ball valve handling sewage/ treated sewage shall be rubberlined internally. Revise the same accordingly. Butterfly Valve handling sewage shall be rubberlined internally. Revise the same accordingly.

Project :	2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI		Date	12-09-2018
Customer :	TAMILNADU GENERATION & DISTRIBUTION CORPORATION		Rev No.:	0
Owner Consultant:	DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI		PEL/D & D- F 002	
EPC Contractor:	BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA			
Job No.:	12141037			
Document No.:	PE-V0-412-673-A010	PEL Doc. no:	A4-PEL-1037-DS-V-001	
Datasheet For Auto Ball Valve				
GENERAL DATA				
Service	Service water	Size Range	15NB to 40NB	
Line Specification	CS, MS	Quantity	As per approved P&ID	
Line Pressure (kg/cm2(g))	3.5	Pressure Class	150#	
Line Temperature (°C)	25			
VALVE DESIGN CONDITIONS				
Design Pressure (kg/cm2(g))	4.5	Design Code	EN ISO 17292/ BS 5159	
Design Temperature (°C)	50	Leakage Class	VI	
CONSTRUCTION FEATURES				
Type	Three Piece Ball Valve	Stem	Blow out proof	
Ends	Threded End NPT-F	Bore	Full Bore	
Body	Cast	Stem packing	Renewable	
Ball	Floating type	Position Indicator	Required	
Manual Override	Required	Operation	Pneumatically Actuated	
MATERIALS				
Body	ASTM A 216 Gr. WCB	Gland	ASTM A 216 Gr. WCB	
Ball	SS 304	Body Stud & nut	IS 1367 CI 4.6/4	
Ball Seat	PTFE	Gland Packing	PTFE/ Grafoil	
Stem	AISI 410	Lever/ Handwheel	CI/ SGI	
ACTUATOR				
Type	Pneumatic Actuator - Double Acting Rack& pinion type			
Air Connection	1/4"			
Air Pressure for Sizing	5.5 bar(g)			
Max. Allowable Pressure (Design Pressure) (bar(g))	7.5 bar(g)			
SOLENOID				
Solenoid Type	Namur type	Coil Insulation	F	
Material Body / Trim	Die Cast Aluminium	Coil Enclosure	IP 66	
Power Supply / Wattage	24 VDC @ 12W	Cable Entry	Side	
Process Connection	1/4 " NPT-F			
SWITCHES				
Switch Type	Microswitch 2 No.s of 1/2" NPT(F) Cable Entry, 2 Nos double compression gland of Brass Nickel Plated.			
Quantity	2 Nos (Open & Close Feedback)			
Rating	24 VDC @ 1A			
Actuation Points	Weather Proof IP 66	594		
Body (Enclosure)	Die Cast - Weather Proof, Cable Entry - 2 Nos - 1/2 NPTF			

Datasheet For Auto Ball Valve

TESTING

Testing as per standard	API 598 / EN ISO 12266 Part-I(BS 6755 Part-I)
Body Hydro-test Pressure	15 Bar (g)
Seat Test Pressure	11 Bar (g)

PAINTING SPECIFICATIONS

Surface Preparation	As per Painting specification
Primer Coating	As per Painting specification
Finish Coat	As per Painting specification
Finish Colour	As per Painting specification

INSPECTION

As per PEL Approved QAP/ Inspection & Test Plan.

NOTES

- Valves shall be equipped with adjustable mechanical stop limiting devices to prevent over travel of valve disc in Open/Closed position.
- The direction of rotation to close the valve shall be marked on the face of each handwheel.
- Actuator shall be sized for 5.5 bar(g) Air Pressure & Design for 7.5 bar(g), Available Air Pressure is 6 bar(g).

Rev	Date	Description	Made	Chkd	Appd
0	17-Sep-2018	For Approval	AAY	SSY	PAK

Project :	2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI		Date	12-09-2018
Customer :	TAMILNADU GENERATION & DISTRIBUTION CORPORATION		Rev No.:	0
Owner Consultant:	DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI		PEL/D & D- F 002	
EPC Contractor:	BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA			
Job No.:	12141037			
Document No.:	PE-V0-412-673-A010	PEL Doc. no:	A4-PEL-1037-DS-V-001	
Datasheet For Auto Diaphragm Valve_CSRL				
GENERAL DATA				
Service	Clarified sewage water	Size Range	50NB to 100NB	
Line Specification	CSRL	Quantity	As per approved P&ID	
Line Pressure (kg/cm2(g))	3.5	Pressure Class	PN 10	
Line Temperature (°C)	25			
VALVE DESIGN CONDITIONS				
Design Pressure (kg/cm2(g))	4.5	Design Code	BS 5156	
Design Temperature (°C)	50	Leakage Class	VI	
CONSTRUCTION FEATURES				
Type	Weir Type	Lining	Ebonite/ Natural Rubber Lined	
Ends	Flanged, ASME B 16.5, 150#, FF	Position Indicator	Required	
Diaphragm	Renewable	Operation	Pneumatically Actuated	
Manual Override	Required			
MATERIALS				
Body	CI IS 210, FG 260 +Rubber lining	Diaphragm	EPDM/ Nitrile/ Neoprane	
Bonnet	CI IS 210, FG 260 +Rubber lining	Body Stud & nut	IS 1367 CI 4.6/4	
Compressor	Silicon Aluminium	Stem Packing	NBR	
Stem	AISI 410	Lever/ Handwheel	CI/ SGI	
ACTUATOR				
Type	Pneumatic Actuator - Double Acting			
Air Connection	1/4"			
Air Pressure for Sizing	5.5 bar(g)			
Max. Allowable Pressure (Design Pressure) (bar(g))	7.5 bar(g)			
SOLENOID				
Solenoid Type	Namur type	Coil Insulation	F	
Material Body / Trim	Die Cast Aluminium	Coil Enclosure	IP 66	
Power Supply / Wattage	24 VDC @ 12W	Cable Entry	Side	
Process Connection	1/4 " NPT-F			
SWITCHES				
Switch Type	Microswitch 2 No.s of 1/2" NPT(F) Cable Entry, 2 Nos double compression gland of Brass Nickel Plated.			
Quantity	2 Nos (Open & Close Feedback)			
Rating	24 VDC @ 1A			
Actuation Points	Weather Proof IP 66			
Body (Enclosure)	Die Cast - Weather Proof, Cable Entry - 2 Nos - 1/2 NPTF			
TESTING				

Datasheet For Auto Diaphragm Valve_CSRL

Testing as per standard	BS 6755 -I				
Body Hydro-test Pressure	15 Bar (g)				
Seat Test Pressure	10 Bar (g)				
PAINTING SPECIFICATIONS					
Surface Preperation	As per Painting specification				
Primer Coating	As per Painting specification				
Finish Coat	As per Painting specification				
Finish Colour	As per Painting specification				
INSPECTION					
As per PEL Approved QAP/ Inspection & Test Plan.					
NOTES					
1. Valves shall be equipped with adjustable mechanical stop limiting devices to prevent over travel of valve disc in Open/Closed position.					
2.. The direction of rotation to close the valve shall be marked on the face of each handwheel.					
3. Actuator shall be sized for 5.5 bar(g) Air Pressure & Design for 7.5 bar(g), Available Air Pressure is 6 bar(g).					
Rev	Date	Description	Made	Chkd	Appd
0	12-Sep-2018	For Approval	AAY	SSY	PAK



Project :	2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI	Date	12-09-2018
Customer :	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED	Rev No.:	0
Owner Consultant:	DESEIN PRIVATE LIMITED, DESEIN HOUSE, NEW DELHI		
EPC Contractor:	BHARAT HEAVY ELECTRICALS LIMITED, PEM NOIDA		
Job No.:	12141037		
Document No.:	PE-V0-412-673-A010	PEL Doc. no:	A4-PEL-1037-DS-V-001

Datasheet For Non Return Dual plate check Valve

GENERAL DATA

Service	Sewage, Treated sewage	Size Range	50NB to 100 NB
Line MOC	CS , GI, CSRL	Quantity	As per approved P&ID
Line Pressure (kg/cm2(g))	9		
Line Temperature(°C)	35	Pressure Class	150#

VALVE DESIGN CONDITIONS

Design Pressure (kg/cm2(g))	18	Design Code	API 694
Design Temperature(°C)	55	Leakage	CLASS IV

CONSTRUCTION FEATURES

Type	Dual plate Check valve	Seat Ring	Resilient seated
Ends	Wafer type	Operation	Self
Body	Casting	Face to face	ASME B 16.10
Plate	Casting		

MATERIALS

Body	ASTM A 216 Gr WCB	Trim	ASTM A 216 Gr WCB
Plate	ASTM A 216 Gr WCB	Gasket	NA
Seat	EPDM	Spring	SS 316

TESTING

Testing as per	API 598
Shell Hydro-test Pressure	30 Bar (g)
Seat Test Pressure	22 Bar (g)

PAINTING :- AS PER PAINTING SPECIFICATION

INSPECTION & TESTING

As per PEL Approved QAP/ Inspection & Test Plan.

NOTES

1. All valves shall be provide with an flow direction on body.

Rev	Date	Description	Made	Chkd	Appd
0	15-Sep-2018	For Approval	SSY	SSY	PAK

Project :	2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI			Date	17-09-2018
Customer :	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED			Rev No.:	0
Owner Consultar	DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI			PEL/D & D- F 002	
EPC Contractor:	BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA				
Job No.:	12141037				
Document No.:	PE-V0-412-673-A010		PEL Doc. no:	A4-PEL-1037-DS-V-001	

Datasheet For Manual Ball valve

GENERAL DATA

Service	Air, water, Sewage	Size Range	15 NB to 40 NB
Line Specification	GI, MS	Quantity	See Bill of Materials
Line Pressure (kg/cm ² (g))	7		
Line Temperature(°C)	25	Pressure Class	150#

VALVE DESIGN CONDITIONS

Design Pressure (kg/cm ² (g))	7.5	Design Code	EN ISO 17292/ BS 5159
Design Temperature(°C)	50	Leakage Class	VI

CONSTRUCTION FEATURES

Type	Three Piece Ball Valve	Stem	Blow out proof
Ends	Threded End NPT-F	Stem Packing	Renewable
Body	Cast	Bore	Full bore
Ball	Floating Type	Operation	Lever operated
Ball seat	Soft Seated	Face to Face	As per mfg. standard

MATERIALS

Body	ASTM A 216 Gr. WCB	Gland	ASTM A 216 Gr. WCB
Ball	A 351 Gr CF8 / SS 304	Gland Packing	PTFE/GRAPHOIL
Ball Seat	PTFE	Body Stud/Nut	IS 1367 CL 4.6/4
Stem	SS 410/13% Cr	Lever	Ductile/MS with Plastic Cover

TESTING

Testing as per standard	API 598 / EN ISO 12266 Part-I(BS 6755 Part-I)
Shell Hydro-test Pressure	15
Seat Test Pressure	11
Pneumatic Pressure	7 Bar(g)

INSPECTION & TESTING

As per PEL approved QAP/ Inspection & Test Plan.

NOTES

1. Suitable stops shall be provided for both fully open and closed position.

Rev	Date	Description	Made	Chkd	Appd
0	17-09-2018	For Quotation	SSY	SSY	PAK

Project :	2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI	Date	12-09-2018
Customer :	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED	Rev No.:	0
Owner Consultant:	DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI	PEL/D & D- F 002	
EPC Contractor:	BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA		
Job No.:	12141037		
Document No.:	PE-V0-412-673-A010	PEL Doc. no:	A4-PEL-1037-DS-V-001

Datasheet For Manual Butterfly valve_CI+CI

GENERAL DATA

Service	Raw Sewage water, Service water, Sludge, Filter feed water, Blower air	Size Range	40 NB to 100 NB
Line Specification	MS , CS , GI & CSRL	Quantity	See Bill of Materials
Line Pressure (kg/cm2(g))	7.5	Manufacturer	VTs
Line Temperature (°C)	25	Pressure Class	PN 10

VALVE DESIGN CONDITIONS

Design Pressure (kg/cm2(g))	8.25	Design Code	AWWA-C-504/BS 5155(EN 593)
Design Temperature (°C)	55	Leakage	VI

CONSTRUCTION FEATURES

Type	Wafer lug	Face To Face	AWWA-C-504/BS 5155(EN 593)
Ends	Sandwiched between Flanged, ASME B16.5, 150#, FF	Disc Position Indicator	Required
Disc	Centric disc.	Operation	Hand lever
Disc Locking	Required	Anti-Blow Stem	Required
Seating /Lining	Soft seated ,Replaceable	Shaft	Blow out proof

MATERIALS

Body	CI, IS 210 FG 260 with 2% Ni & epoxy coated	Shaft Bearing	SS 316
Disc	CI, IS 210 FG 260 with 2% Ni & epoxy coated	Stem	AISI-410
Shaft	BS 970 431 S:291/EN57 or AISI-410	External Hardware	SS 316
Body Seat	Nitrilr Rubber	Internal Hardware	SS 316
Shaft Seal	Nitrilr Rubber	Hand lever	Malleable iron

TESTING

Testing as per standard	API 598/EN-12266 Part-1
Body Hydro-test Pressure	15 Bar(g)
Seat Test Pressure	10 Bar(g)

PAINTING SPECIFICATIONS

Surface Preperation	As per attached painting specification.
Primer Coating	As per attached painting specification.
Finish Coat	As per attached painting specification.
Finish Colour	As per attached painting specification.

INSPECTION

As per Approved QAP/ Inspection & Test Plan.

NOTES

1. Valves shall be equipped with adjustable mechanical stop limiting devices to prevent over travel of valve disc in open / closed position.

600

2. The direction of rotation to close the valve shall be marked on the face of each handwheel.



Project :	2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI			Date	12-09-2018
Customer :	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED			Rev No.:	0
Owner Consultant:	DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI			PEL/D & D- F 002	
EPC Contractor:	BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA				
Job No.:	12141037				
Document No.:	PE-V0-412-673-A010	PEL Doc. no:	A4-PEL-1037-DS-V-001		
Datasheet For Manual Butterfly valve_CI+CI					
3. Flow direction to be indicated on valve body.					
Rev	Date	Description	Made	Chkd	Appd
0	12/9/2018	For Approval	AAY	SSY	PAK

Project :	2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI		Date	06-09-2018	
Customer :	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED		Rev No.:	0	
Owner Consultant:	DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI		PEL/D & D- F 002		
EPC Contractor:	BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA				
Job No.:	12141037				
Document No.:	PE-V0-412-673-A010	PEL Doc. no:	A4-PEL-1037-DS-V001		
Datasheet for Manual Diaphragm Valve - CPVC					
GENERAL DATA					
Service	Hypo Solution	Size Range	15NB to 40 NB		
Line Specification	CPVC	Quantity	See Bill of Materials		
Line Pressure (kg/cm2(g))	4.5	Pressure Class	PN 10		
Line Temperature(°C)	35				
VALVE DESIGN CONDITIONS					
Design Pressure (kg/cm2(g))	7	Design Code	EN ISO 16138 / Equivalent		
Design Temperature(°C)	50	Leakage Class	VI		
CONSTRUCTION FEATURES					
Type	True union	Stem Packing	Renewable		
Ends	Socket End to suit ASTM Standard Pipe	Operation	Handwheel		
Diaphragm	Renewable	Face to Face	As per manufacture's std.		
MATERIALS					
Body	CPVC	Diaphragm	EPDM / PTFE		
Bonnet	CPVC	Hand wheel	PP/PVC		
Compressor	CPVC	Body Stud/Nut	CPVC with MS insert		
Stem	CPVC/SS	Stem seal	EPDM / PTFE		
TESTING					
Testing as per standard		ISO 9393-2 / Equivalent			
Shell Hydro-test Pressure		15 Bar (g)			
Seat Test Pressure		10 Bar (g)			
PAINTING SPECIFICATIONS - NA					
INSPECTION					
As per PEL approved QAP/Inspection & Test Plan.					
NOTES					
1. Suitable stops shall be provided for both fully open and closed position.					
2. The direction of rotation to close the valve shall be marked on the face of each handwheel.					
Rev	Date	Description	Made	Chkd	Appd
0	12-09-2018	For Approval	AAY	SSY	PAK



Project :	2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI			Date	12-09-2018
Customer :	TAMILNADU GENERATION & DISTRIBUTION CORPORATION			Rev No.:	0
Owner Consultant:	DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI			PEL/D & D- F 002	
EPC Contractor:	BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA				
Job No.:	12141037				
Document No.:	PE-V0-412-673-A010	PEL Doc. no:	A4-PEL-1037-DS-V001		

Datasheet For Non Return Valve _Ball Type CPVC

GENERAL DATA

Service	Hypo Solution	Size Range	15 NB to 40 NB
Line MOC	CPVC	Quantity	Refer bill of material
Line Pressure (kg/cm2(g))	4.5	Pressure Class	PN 10
Line Temperature(°C)	35		

VALVE DESIGN CONDITIONS

Design Pressure (kg/cm2(g))	7	Design Code	EN ISO 16137 / Equivalent
Design Temperature(°C)	50	Leakage	CLASS VI

CONSTRUCTION FEATURES

Type	True union,Ball type	Seat Ring	Soft seated
Ends	Socket end to suit ASME standard	Operation	Self
Body	Moulded	Face to face	As per Mfg. std

MATERIALS

Body	CPVC	Union nut	CPVC
Ball	CPVC	Ball seal	EPDM
End connector	CPVC	Body Seal	EPDM

TESTING

Testing as per	EN ISO 9393 Part -II
Shell Hydro-test Pressure	15 Bar(g)
Seat Test Pressure	11 Bar(g)

INSPECTION

As per PEL Approved QAP/ Inspection & Test Plan.

NOTES

1. All valves shall be provide with an flow direction on body.

Rev	Date	Description	Made	Chkd	Appd
0	12-Sep-2018	For Approval	AAY	SSY	PAK

APPROVED WITH COMMENTS

TANGEDCO COMMENTS on PE-V0-412-673-A012A

S.No	TANGEDCO Comments on Rev 02	BHEL Reply	TANGEDCO Comments
1.	Revise MOC of Sludge Transfer pump as per spec. vol.III,P.812 - (Vendor to refer page 256/257 of 434 of BHEL technical specifications)	The Casing 2% Ni-CI to IS:210 Gr FG 260 is not in vendor manufacturing range due volume of castings, size and pattern issues. The approved vendor regret/justification letters attached for reference below (1. ROTO Pumps - Technical deviation letter attached 2. UT Pumps – Technical deviation Letter attached 3. Tushaco - No response). Hence MOC as per tender is not possible to provide. Kindly accept and give acceptance/approval	In TDS of Horizontal / vertical centrifugal pumps for CPU, Drg.No:PE-V0-412-155-A021,PEM sub-vendor DWEIPL, New Delhi had accepted to provide MOC of pump casing as per spec. reqt. (2.5%Ni CI IS210FG). Also as per spec. reqt., the alternate material offered by bidder shall be superior to those specified with no extra cost . Hence MOC of casing shall be provided as SS316.
2.	Remove motor details from this document & shall be submitted in a separate document.	There is no separate document number for motors of Sludge transfer pumps and QAP. Hence the same is attached along with Technical datasheet. Kindly accept and give acceptance / approval.	Not acceptable. Provide separate document for motor details and remove the same from this document.

**ROTO PUMPS LTD.****Branch Office:**

Venkateshwara Complex
1157, G - Block, 2nd Floor
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Tel.: +91 44 2622 4606
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E-mail : contact@rotopumps.com
CIN - L28991UP1975PLC004152
www.rotopumps.com

Chn/Q/SP/18/45/0017

Dated 18th Dec. 2018

Pennar Enviro Limited | Floor No.-3, DHFLVC Silicon Towers|
Kondapur | Madhapur Road | Hyderabad - 500084.
Mobile:+91 96526 07722

Dear Sir,

Kind Attention: Rajesh kumar G | Engineer - Projects

Subject: Supply of pumps

Reference: Our offer no: Q/SP/18/45/0017

We refer to the above offer and hereby like to inform you that we have considered MOC of casing : MS Fabricated instead of 2% Ni-Cl ,IS 210 FG 260 due to volume of castings, size and pattern issues.

Hence we regret to inform you that casing MOC with 2% Ni-Cl - IS 210 FG 260 is not in our manufacturing range.

Regards,



Thyagarajan.B

Territory Manager – Project Sales

Regd. & Marketing Head Office : ROTO HOUSE, 13, Noida Special Economic Zone, Noida - 201 305 INDIA

Tel. : +91 120 2567902 - 05 Fax : +91 120 2567911

Noida Unit : B-14, Phase-II Extn., Noida - 201 305, U.P., INDIA, Tel. : +91 120 2567945 - 48, Fax : +91 120 2567911

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Domestic Branches : Mumbai | Kolkata | Vadodara

Overseas Branches : Manchester, UK Tel.: +44 161 4775511 Fax : +44 161 4747900 Email : sales@rotopumps.co.uk

Victoria, Australia : Tel. : +61 3 97945200 Fax: +61 3 97945900 E-mail : melb@rotopumps.com.au



UT PUMPS & SYSTEMS PVT. LTD.

Casing Material for Vertical Single Screw Pumps for Drain Oil Applications

Vertical mounted single screw pumps are suitable for mounting on tank top. These pumps are manufactured as per mounting dimensions required as per specific project requirements. Total length of pumps depends on depth of tank where the pumps are to be used which is a variable in different locations.

To meet the specific requirements pump casings are specially designed. Accordingly it is not possible to make these casings in casting design since pattern cost involved is very high.

As such casings for these pumps are always manufactured in fabricated design using seamless carbon steel pipes and carbon steel flanges. Vertical Pumps with Casings in fabricated design have better strength than casted casing.

For UT PUMPS & SYSTEMS PVT LTD

ATUL GUPTA
GM- Engg & Mktg

14/7, MATHURA ROAD, FARIDABAD-121 003, HARYANA (INDIA)
Tel. : 0129-4045831, 4046882, 2274861, 2258588, 3299731
Fax: 0129-2275877 / 2258584, E-mail: sales@utpsl.in Website: www.utpsl.in

3	28.11.2019	ISSUED FOR APPROVAL	PSR	SSY	PAK
2	9.9.2019	ISSUED FOR APPROVAL	PSR	SSY	PAK
1	06.02.2019	ISSUED FOR APPROVAL	PSR	SSY	PAK
0	04.09.2018	ISSUED FOR APPROVAL	MKK	SSY	PAK
REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.			
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED		
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI		
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA		
		SUB CONTRACTOR :	PENNAR INDUSTRIES LIMITED ENVIRO BUSINESS UNIT Floor No. +3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad – 500 084		
		PACKAGE :	75 KLD SEWAGE TREATMENT PLANT		
DEPT.	CODE	SCALE	WEIGHT (KG)	REF DRG.	ITEM
--	A	--	--	--	--
TITLE				NAME	SIGN
Technical Datasheet Of Screw & Horizontal Centrifugal Pumps-Part-1 (Vertical Screw Pump)			PREP	MKK	DATE
			CHKD	SSY	28.11.2019
			APPD	SDK	28.11.2019
DEPT.			CARD CODE	BHEL DOC NO.	
SIGN				PE-V0-412-673-A012A	
DATE				REV	
				PEL DOC NO.	
				A4-PEL-1037-DS-P002 to 003	
				3	
				NO. OF SHEETS – 17 (EXCLUDING COVER SHEET)	



PENNAR INDUSTRIES LIMITED

ENVIRO BUSINESS UNIT

Project :	2 x 660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI	Date : 28-11-2019
Customer :	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED	Rev No: 3
Owner Consultant :	DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI	PEL/D & D- F 002
EPC Contractor:	BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA	
Package:	75 KLD SEWAGE TREATMENT PLANT	
Document No.:	PE-V0-412-673-A012A	PEL Doc. no: A4-PEL-1037-DS-P003

Technical Datasheet For Sludge transfer pump (Vertical Screw Type)

GENERAL DATA	
Pump Designation	To Pump from Sludge Holding Tank to Centrifuge
Pump Tag Number	GRS15-AP001/AP002
Quantity (Total = W+S)	2 (1W+1S)
P & ID reference	PE-V0-412-673-A001
Pump Location (Indoor/Outdoor)	Out door
Duty (Continuous/Intermittent)	Intermittent
Pump Manufacturer	UT Pumps & System Pvt.LTD
Pump Model	EU 236
DESIGN CONDITIONS	
Pump Design Standard	Non API
Pump Testing Standard	HIS
Casing Design Pressure (Kg/cm2(g))	6.0 Kg/cm2
Casing Hydro test pressure (Kg/cm2(g))	9.0 Kg/cm2
MAWP Casing (Kg/cm2(g))	6.0 Kg/cm2
Design Temp°C	50
OPERATING CONDITIONS	
Fluid Handled	Sludge (2% w/v)
Operating Temp°C [min/nor/max]	25/ 35 / 50
Specific Gravity at operating temp (nor/max)	1.02
Viscosity at operating temp (nor/max)	1.0 to 1.2 cp
Solid particle size (mm)	5 to 10
Maximum allowable size of solids (mm)	10mm (Crushable in Nature)
pH of Fluid	7.0 - 8.0
Min/Max/Rated Flow (m3/hr)	2
Suction pressure (Kg/cm2(g))	Flooded
Discharge head (Kg/cm2(g))	3.0
Total differential pressure (Kg/cm2(g))	3.0
Head in mWC	30.0
Sump Depth in (mtr)	2 mtr
PERFORMANCE	
Speed of rotation (RPM)	284 Approx
Pump Relief Set Pressure(kg/cm2(g))	4 Kg/cm2
BKW at R.V set pressure	0.7 KW
Guaranteed power consumption at motor terminal (KW)	1.5 KW
Motor Rating	1.5 KW/ 4 Pole,IE-3
Volumetric Efficiency (%)	78%
Mechanical Efficiency (%)	35%
Overall Efficiency (%)	28%
CONSTRUCTION	
Type	Vertical Screw Pump
No of Screws	1
Drive arrangement	Couple thru Gear Box/motor
Suction and discharge arrangement	Bottom suction top discharge
Casing with inside liner	YES
Packing type	PTFE
Common base from pump & motor	MOTOR STOOL



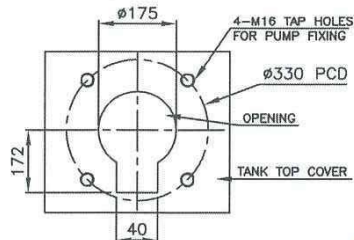
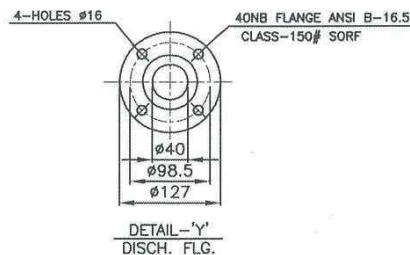
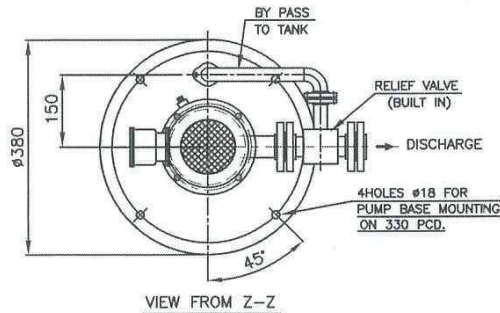
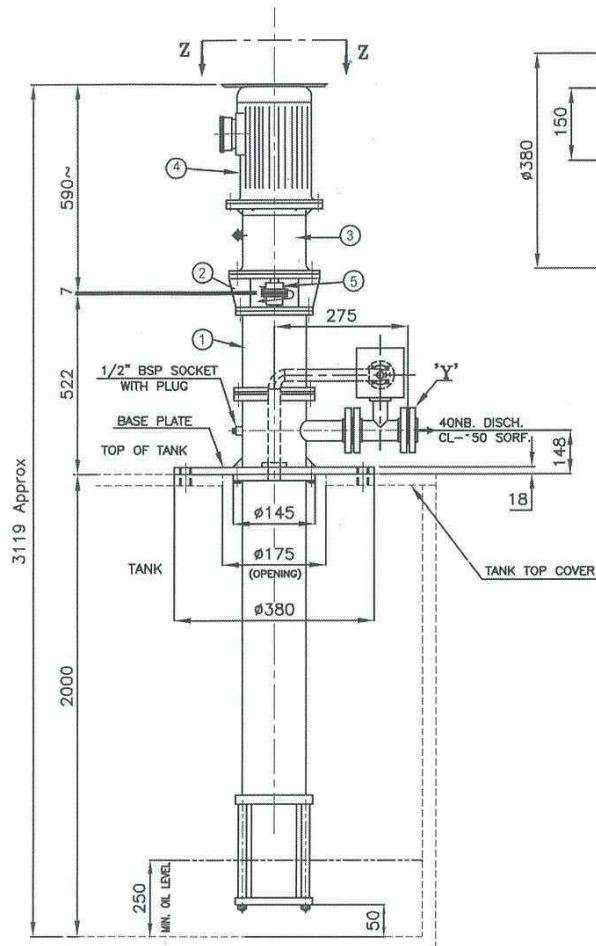
PENNAR INDUSTRIES LIMITED

ENVIRO BUSINESS UNIT

Project :	2 x 660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI			Date : 28-11-2019
Customer :	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED			Rev No: 3
Owner Consultant :	DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI			PEL/D & D- F 002
EPC Contractor:	BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA			
Package:	75 KLD SEWAGE TREATMENT PLANT			
Document No.:	PE-V0-412-673-A012A		PEL Doc. no:	A4-PEL-1037-DS-P003

Technical Datasheet For Sludge transfer pump (Vertical Screw Type)

NOZZLE SCHEDULE					
Suction Size / Orientation / End connection			Bottom/Flanged		
Discharge Size / Orientation / End connection			40NB/SIDE/ Flanged,ASME B 16.5,150#,FF		
MATERIALS					
Casing			CS Fabricated		
Screw /Rotor			SS 316		
Stator			EPDM		
Lantern ring			Not applicable		
Gland packing			PTFE		
Relief valve			IN BUILT		
Drive guard			MS fabricated ,IS 2062		
Base plate			MS fabricated ,IS 2062(Motor Stool)		
WEIGHTS / DIMENSIONS					
Weight of pump(kg)			40 kg(Apporx)		
Total Weight Pump+Motor+Accessories (kg)			120 kg(Apporx)		
Dimensions (L x W x H mm)			AS PER GA DRAWING		
Dynamic Load (Kg)			240 Kg (Approx)		
Rev	Date	Description	Prep	Chkd	Appd
1	6 February 2019	For APPROVAL	PSR	SSY	PAK
2	28 November 2019	For APPROVAL	PSR	SSY	SDK



PUMP FIXING DETAILS

S.No.	DESCRIPTION	TYPE/SIZE	QTY.	MAKE
01	PUMP (SINGLE SCREW)	EU-238	01	UTPSL
02	MOTOR STOOL	M.S. FABRICATED	01	UTPSL
03	GEAR BOX 1.5 KW, OUTPUT SPEED 284 RPM	VERTICAL FLANGE MTG. TYPE	01	PBL
04	MOTOR 1.5 KW, EFF. C.-IE3, 4 POLE, TEFC, AMB. TEMP 50°C	TEFC FLG. MTG. AMB. TEMP. 50°C	01	CGL
05	COUPLING (PIN BUSH TYPE)	RB-105-3	01	RATHI

TECHNICAL SPECIFICATIONS

PUMP MODEL	: EU-238
LIQUID	: SLUDGE (2% W/W)
VISCOSITY	: 1.0 - 1.2 CP
CAPACITY REQUIRED	: 2 m ³ /hr.
SUCTION PR.	: SUBMERGED
DISCH. PR.	: 3.0 kg/cm ² g
RV SET. PRESSURE	: 4.0 kg/cm ² g
DESIGN PRESSURE	: 3.0 kg/cm ² g
HYDERO TEST PRESSURE	: 9.0 kg/cm ² g
PUMP SPEED	: 284 RPM
POWER ABSORBED	: 3.6KW @ 20 CST
MOTOR RECOMMENDED	: 1.5KW/4 POLE
DIRECTION OF ROTATION	: CW (FROM DRIVE END)
TOTAL STATIC LOAD	: 120 Kg Approx.
TOTAL DYNAMIC LOAD	: 240 kg
STATIC LOAD PER BOLT	: 30 Kg
DYNAMIC LOAD PER BOLT	: 30 Kg

CUSTOMER : PENNAR ENVIRO LTD.
P.R. NO. : PEL/BHEL/12171037/PR-35/MECH-05 DT. 31.12.2018
PO. NO. : PEL_WP_BHEL_ENVIRO_006 DT. 21.01.2019
ITEM DESC. : SLUDGE TRANSFER PUMPS
TAG NO. : GRS15-AP0C1/AP002
QTY. : 02 NOS. (01W+01SB)

03			
02			
01			
REV.	MODIFICATIONS	NAME	DATE

2019	NAME	DATE	UT PUMPS & SYSTEMS PVT. LTD. FARIDABAD	
DRAWN	Abhang	01/02		
CHECKED				
APPROVED				
PUMP MODEL			DESCRIPTION	SCALE
EU-238			GA. DRAWING (SLUDGE TRANSFER PUMP)	NTS.
W.O.NO. 118243			DRAWING NO.	REV.
			GA-2193	0





UT PUMPS & SYSTEMS PVT. LTD.
14/7, Mathura Road,
Faridabad- 121 003

**PERFORMANCE CURVE FOR
SLUDGE TRANSFER PUMP
EU-236**

PC-118243

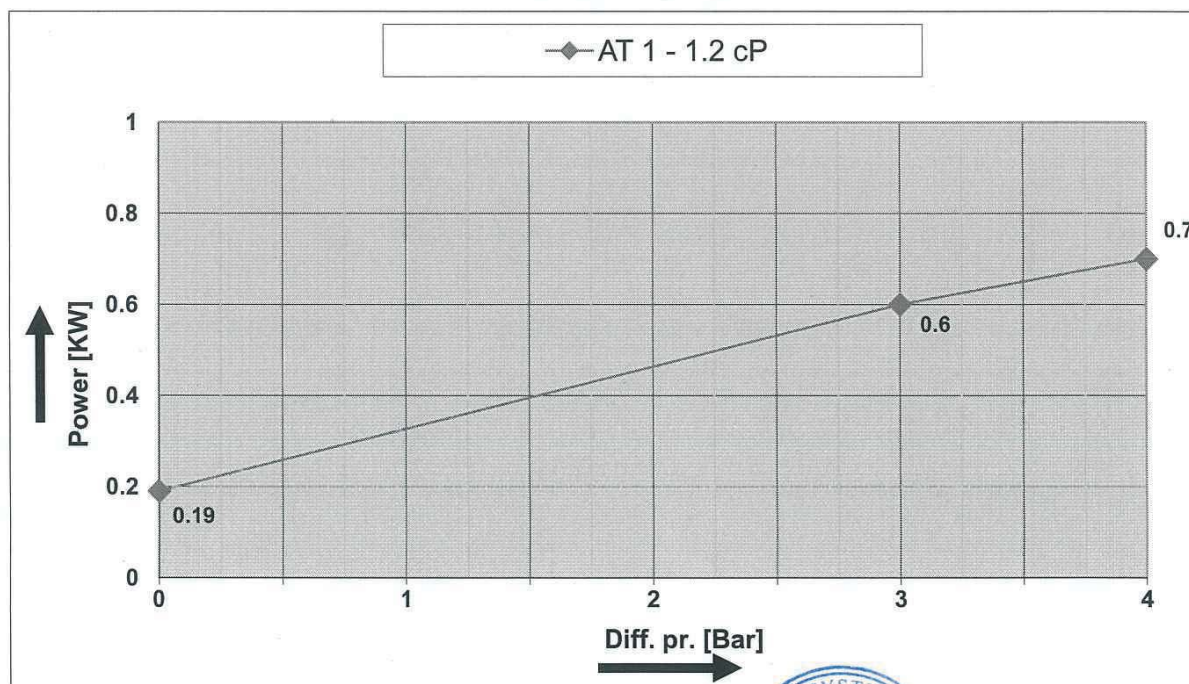
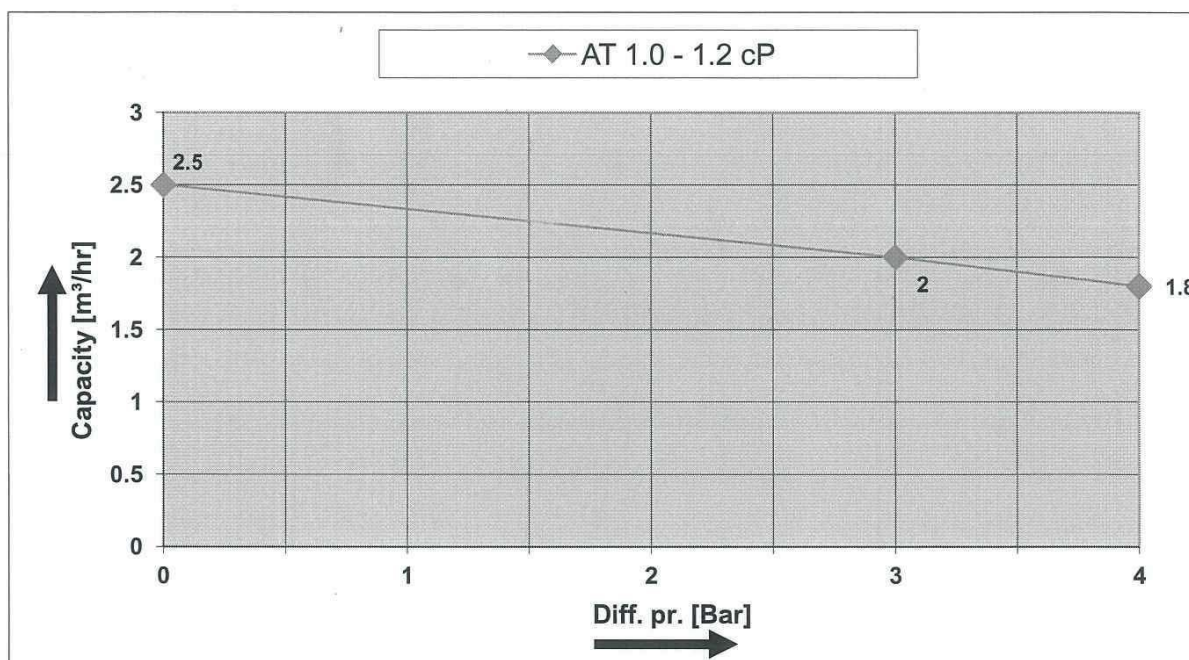
REV.
1

DATE
01-02-2019

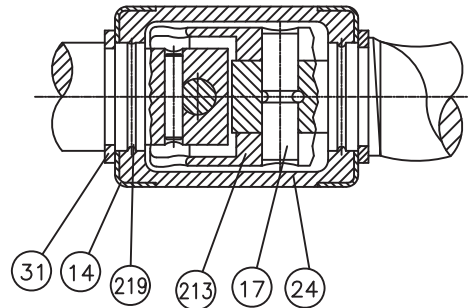
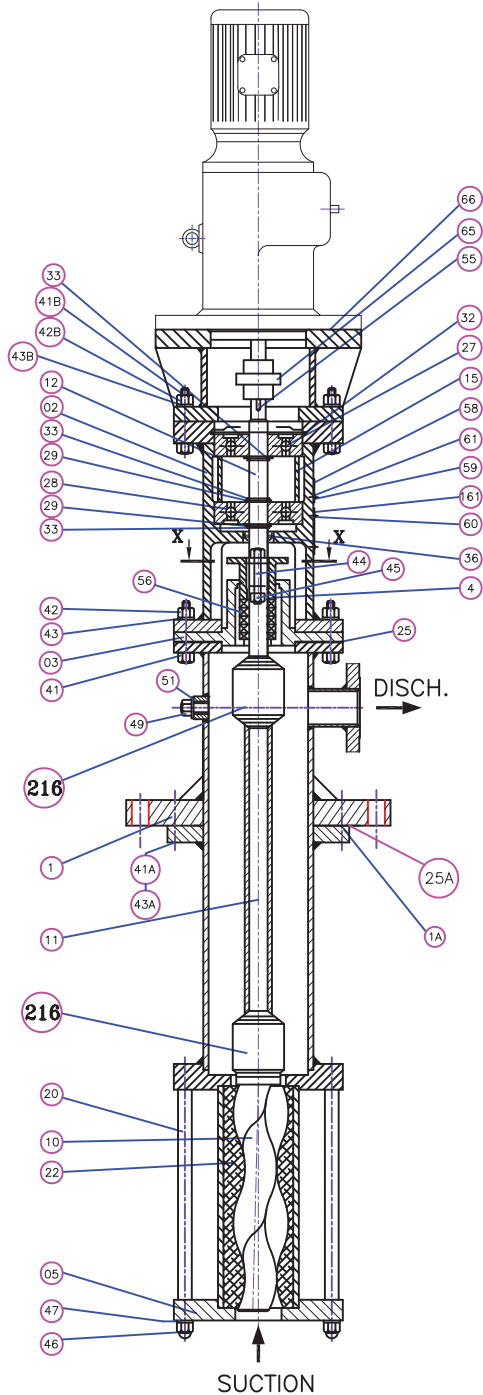
Guaranteed parameters are with tolerances as
per VDMA 24284 Gr II CL II on plotted value

n : 284 RPM

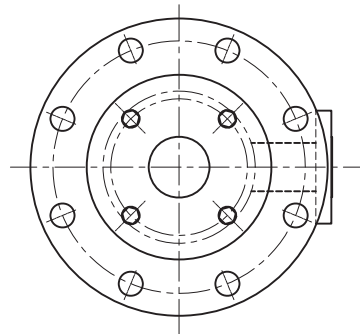
TAG No. : 90GRS15 AP001/ 90GRS15 AP002



Made By
UT Pumps & Systems Pvt. Ltd.



DETAIL OF PART NO. 216



SECTION XX

CUSTOMER	: M/S. PENNAR ENVIRO LIMITED
P.R.NO.	: PEL/BHEL/12171037/PR-05/MECH-05 Dt. 31.12.18
P.O.NO.	: PEL_WP_BHEL_ENVIRO_006 Dt. 21.01.2019
ITEM DESC.	: SLUDGE TRANSFER PUMPS
TAG. NO.	: GRS15-AP001/AP002
QTY.	: 02 NOS.

02			
01			
REV.	MODIFICATION	DATE	SIGN.

2019	NAME	DATE	UT PUMPS & SYSTEMS PVT. LTD. FARIDABAD	
DRN.	OMKAR	02/02		
CHD.				
APPD.				
PUMP MODEL			DESCRIPTION	SCALE
EU-236			SECTIONAL DRG.	NTS
W.O. NO.			DRAWING NO	REV.
118243			CS-118243	0

UT PUMPS & SYSTEMS PVT. LTD. 14/7, MATHURA ROAD FARIDABAD - 121003		PARTS LIST SINGLE SCREW PUMP MODEL EU-236		DOC NO.: CS-118243 SHEET: 2 of 3	
PART NO	DESCRIPTION	QTY/SET	MATL. SPECIFICATION, SIZE	REMARKS	
1	PUMP CASING	1	C.S. FABRICATED		
1A	EXT. PIPE	1	C.S.FABRICATED		
2	BEARING HOUSING	1	M.S.FABRICATED		
3	STUFFING BOX HOUSING	1	M.S.FABRICATED		
4	GLAND	1	C.I. Gr. FG-260,IS:210		
5	SUCTION FLANGE	1	M.S		
44	HAMMER BOLT	2	IS:1367 Gr. 8.8 / EN8		
45	HEX NUT	2	IS:1367 Gr. 8 / EN8		
56	PACKING RING	5	PTFE		
10	HELICAL ROTOR	1	AISI-316		
11	JOINT SHAFT	1	AISI-316		
12	DRIVE SHAFT	1	AISI-420		
15	DISTANCE BUSH	1	St-35		
20	TENSION ROD	4	EN8		
22	STATOR	1	EPDM RUBBER		
25	GASKET	1	PTFE		
25A	GASKET	1	PTFE		
27	RADIAL BALL BEARING	1	6306 2RSR		
28	RADIAL BALL BEARING	1	6306 2RSR		
29	SUPPORT RING	2	EN-42		
32	CIRCLIP FOR A BORE	1	SPRING STEEL		
33	CIRCLIPFOR A SHAFT	2	SPRING STEEL		
36	RADIAL SHAFT SEAL	1	NBR		
41	HEX. BOLT	4	IS:1367 Gr. 8.8 / EN8		
42	HEX. NUT	4	IS:1367 Gr. 8 / EN8		
43	SPRING WASHER	4	SPRING STEEL		
41A	H.S.H.C SCREW	4	IS:1367 Gr. 8.8 / EN8		
43A	SPRING WASHER	4	SPRING STEEL		
41B	HEX. BOLT	4	IS:1367 Gr. 8.8 / EN8		
42B	HEX. NUT	4	IS:1367 Gr. 8 / EN8		
43B	SPRING WASHER	4	SPRING STEEL		
46	HEX. NUT	4	IS:1367 Gr. 8 / EN8		
47	SPRING RING	4	SPRING STEEL		
49	SCREW PLUG	1	EN-8		
51	JOINT RING	1	COPPER		
55	KEY FOR COUPLING	1	STEEL		
58	IDENTIFICATION PLATE	1	ALUMINIUM		
59	INDICATOR PLATE	1	ALUMINIUM		
60	DIRECTION OF ROTATION INDICATOR	1	ALUMINIUM		
61	SELF TAPPING DRIVE SCREW	2	M.S		
65	COUPLING	1	FORGED STEEL		
66	MOTOR STOOL	1	MS FABRICATED		
613	SELF TAPPING DRIVE SCREW	4	M.S		

UT PUMPS & SYSTEMS PVT. LTD. 14/7, MATHURA ROAD FARIDABAD - 121003		PARTS LIST SINGLE SCREW PUMP MODEL EU-236		DOC NO.: CS-118243 SHEET: 3 of 3
PART NO	DESCRIPTION	QTY/SET	MATL. SPECIFICATION, SIZE	REMARKS
216	CARDON JOINT TYPE 'A1'	2	S/ASSY.	
	EACH NO. CONSISTING OF			
14	JOINT PROTECTION SLEEVE	2	AISI-304	
17	JOINT PIN	2	EN-19C	
24	PROTECTION BELLOW	1	NBR	
31	CIRCLIP FOR SHAFT	2	AISI-304	
213	JOINT PULLEY	1	BRONZE	
219	LOCKING SLEEVE	2	STEEL	


CG Power and Industrial Solutions Limited

 LT Motors Division
Ahmednagar

DATA SHEET OF 3 PHASE INDUCTION MOTOR

Customer : Ut Pumps & Systems Pvt. Ltd.

Frame	NG90L	Rated Output (kW)	1.5
Voltage (V)	415 +/-10%	Rated Current (A)	3.50
Rated Speed (RPM)	1430	No of poles	4
Frequency (Hz)	50 +/-5%	Duty	S1
Method of Cooling	IC411	Degree of Protection	IP55
Gas Group	Not applicable	Mounting	V1
Temp Class	T3		
Enclosure	TEFC Safe Area		

Load	100% Load	75% Load	50% Load
Efficiency	IE3 - 85.3 %	85.3 %	85 %
Power factor	0.70	0.60	0.50
AMB. Temp/Temp rise	50°C/70°C (By Resistance Method)		
Insulation class	F (Temp. rise limited to class 'B')		
Rated Torque (kg-m)	1.02		
Locked rotor current % FLC	750		
Starting torque % FLT	300		
Pull out torque % FLT	350		

Method of starting	Direct On Line
Winding connections	Star
No of terminals	6
Direction of rotation	Bidirectional

Motor GD Sq. (kg-m²)	0.02		
Load GD Sq. (kg-m²)	0.02		
Starting time @100% V (Sec)	0.1		
Locked rotor Withstand time hot (Sec.)	8		
Locked rotor Withstand time cold (Sec.)	16		
Stator Thermal / Cooling time constant (min)	30 / 60		
Terminal box position	RHS From DE		
Cable size	1 * 3C,6-MM²		
Bearing DE/ODE	6205ZZ-C3 / 6203ZZ		
Type of lubrication	Sealed Bearing. No Lubrication Required		
Shaft Material	EN8 OR C40	Stator Body Material	Cast Iron

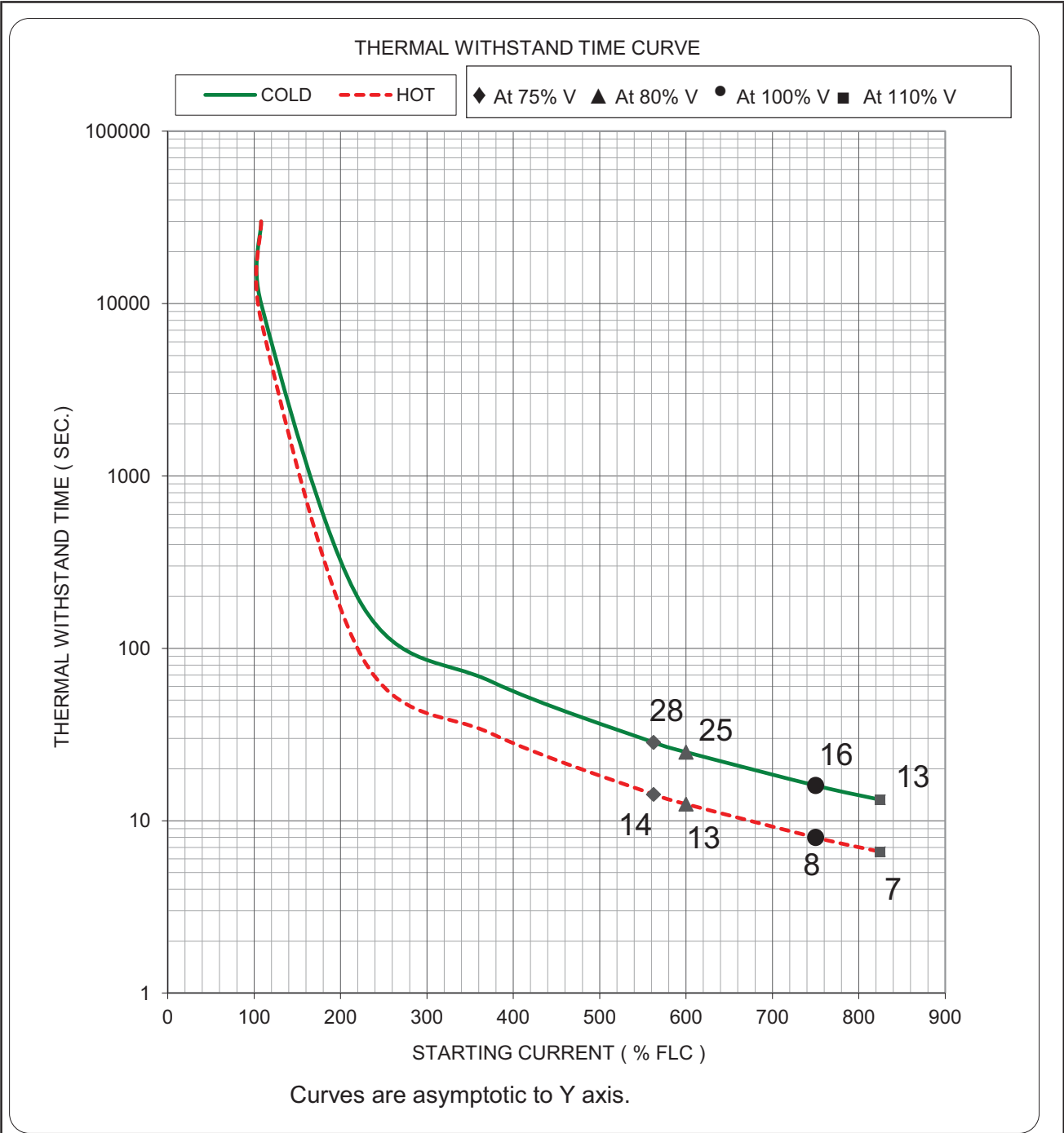
Net Weight (Approx.) kg	24		
Paint shade	RAL 7032		
Applicable standards	IS/IEC 60034,		
Space heaters	N.A		
Accessories	Customer Socket, Compres. Glands Req'd (Main+Aux).		

PROJECT : 2X660 MW ENNORE SEZ SUPER CRITICAL TPP (SEWAGE TREATMENT PLANT)
CLIENT : TAMILNADU GENERATION & DISTRIBUTION CORPORATION LTD.
CONSULTANT : DESEIN PVT. LTD, NEW DELHI
EPC CONTRACTOR : BHEL (BHARAT HEAVY ELECTRICALS LTD.)

All performance data is subject to tolerance as per IEC 60034
All performance shall be measured on sinusoidal supply
Temp rise test shall be carried at rated kW & voltage for 1 hour other than S1 duty

Customer specific paint shade and paint thickness will not be applicable on powder coated components.

Issued By :	Deepak Kumar
Date : 25/04/2019	LT Motors Division, Ahmadnagar



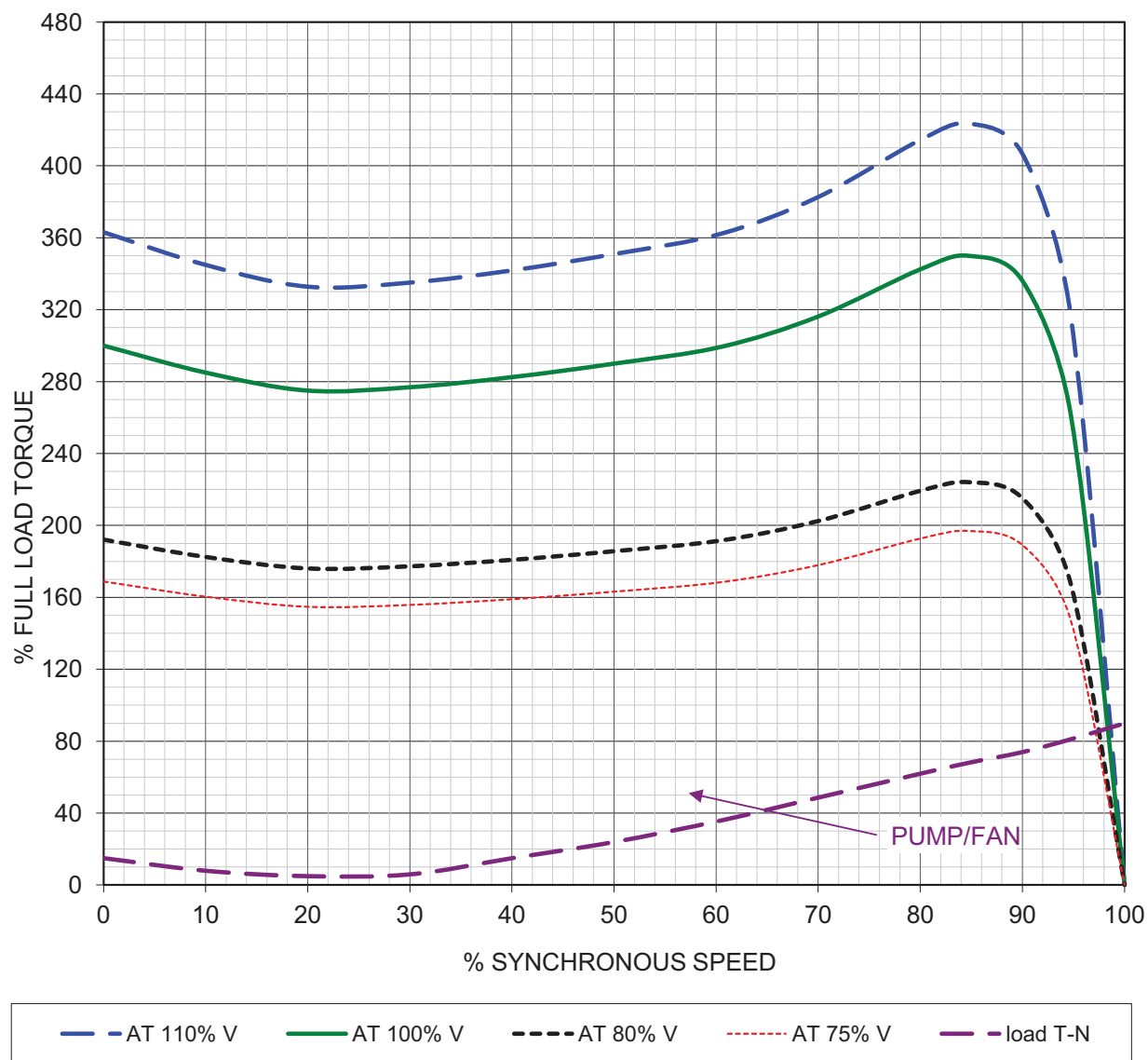
CUSTOMER	UT PUMPS & SYSTEMS PVT. LTD.			RATED O/P kW	1.5
CLIENT	DESEIN PVT.LTD.			NO OF POLES	4
END USER	TAMIL NADU GENERATION & DISTRIBUTION			FRAME	NG90L
PROJECT	2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL			TAG NO.	M-09 A/B
	NAME	DATE	TITLE		
DRN	PLP	25-Apr-19	THERMAL WITHSTAND TIME CURVE		
CHD	PLP	25-Apr-19			
APPROVED	RGV	25-Apr-19			
SC8/16/750					



CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

PROJECT : 2X660 MW ENNORE SEZ SUPER CRITICAL TPP (SEWAGE TREATMENT PLANT)
CLIENT : TAMILNADU GENERATION & DISTRIBUTION CORPORATION LTD.
CONSULTANT : DESEIN PVT. LTD, NEW DELHI
EPC CONTRACTOR : BHEL (BHARAT HEAVY ELECTRICALS LTD.)

SPEED VS TORQUE



CUSTOMER	UT PUMPS & SYSTEMS PVT. LTD.			RATED O/P kW	1.5
CLIENT	DESEIN PVT.LTD.			NO OF POLES	4
END USER	TAMIL NADU GENERATION & DISTRIBUTION			FRAME	NG90L
PROJECT	2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL			TAG NO.	M-09 A/B
	NAME	DATE	TITLE		
DRN	PLP	25-Apr-19	SUPERIMPOSED TORQUE SPEED CURVE SC300/750		
CHD	PLP	25-Apr-19			
APPROVED	RGV	25-Apr-19			
 CG Power and Industrial Solutions Limited LT Motors Division Ahmednagar					

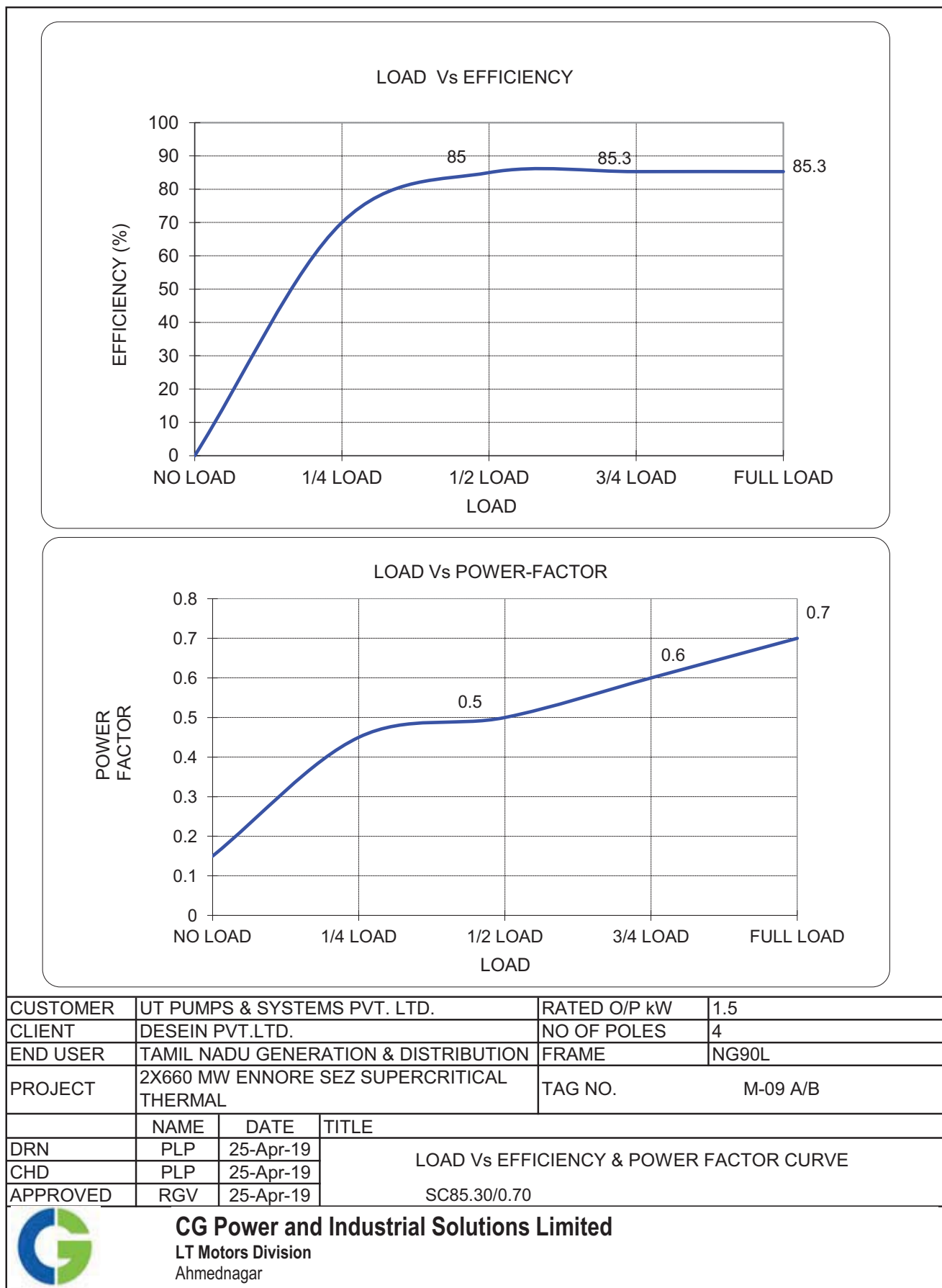
PROJECT : 2X660 MW ENNORE SEZ SUPER CRITICAL TPP (SEWAGE TREATMENT PLANT)

CLIENT : TAMILNADU GENERATION & DISTRIBUTION CORPORATION LTD.

CONSULTANT : DESEIN PVT. LTD, NEW DELHI

EPC CONTRACTOR : BHEL (BHARAT HEAVY ELECTRICALS LTD.)

617

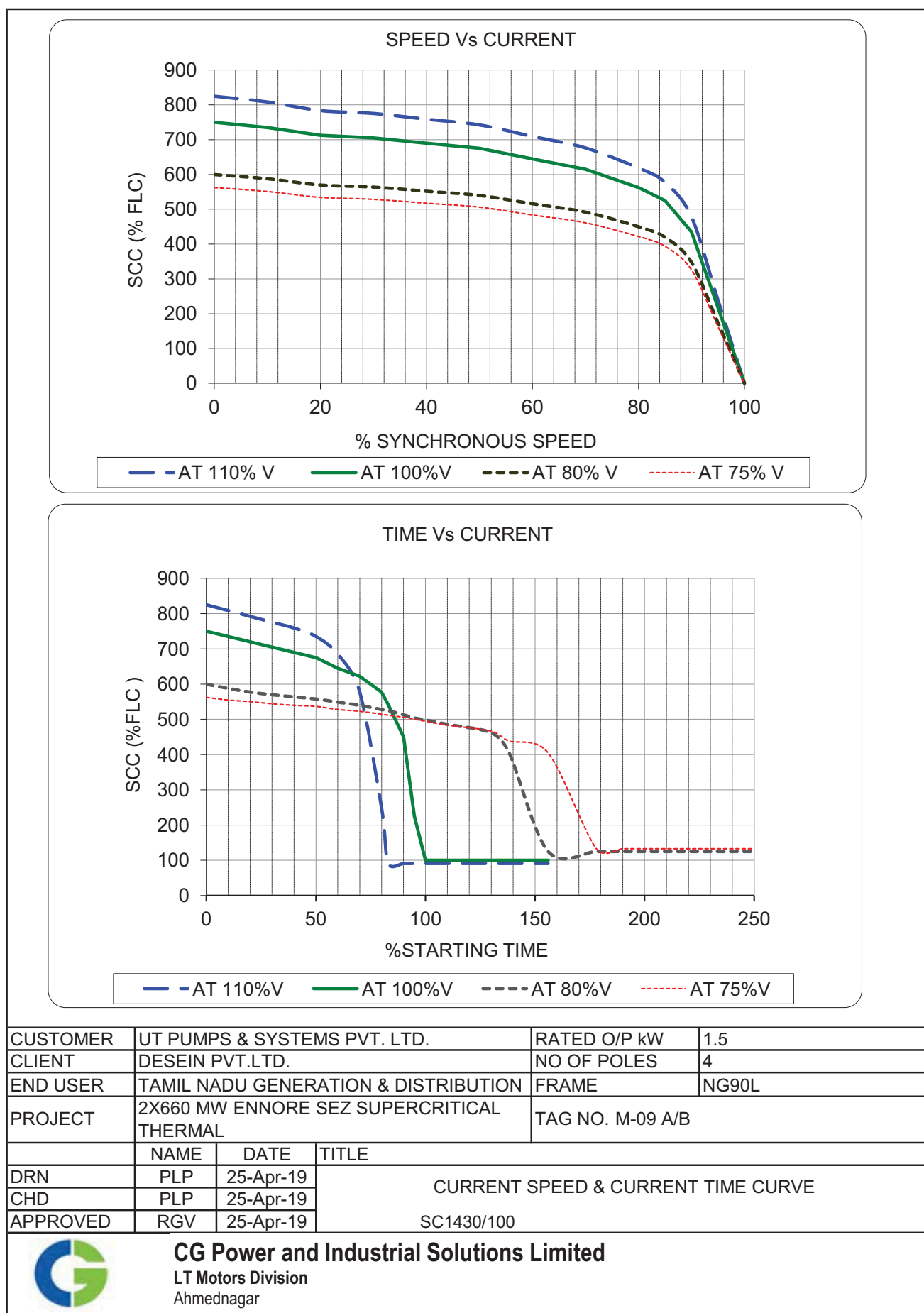


PROJECT : 2X660 MW ENNORE SEZ SUPER CRITICAL TPP (SEWAGE TREATMENT PLANT)

CLIENT : TAMILNADU GENERATION & DISTRIBUTION CORPORATION LTD.

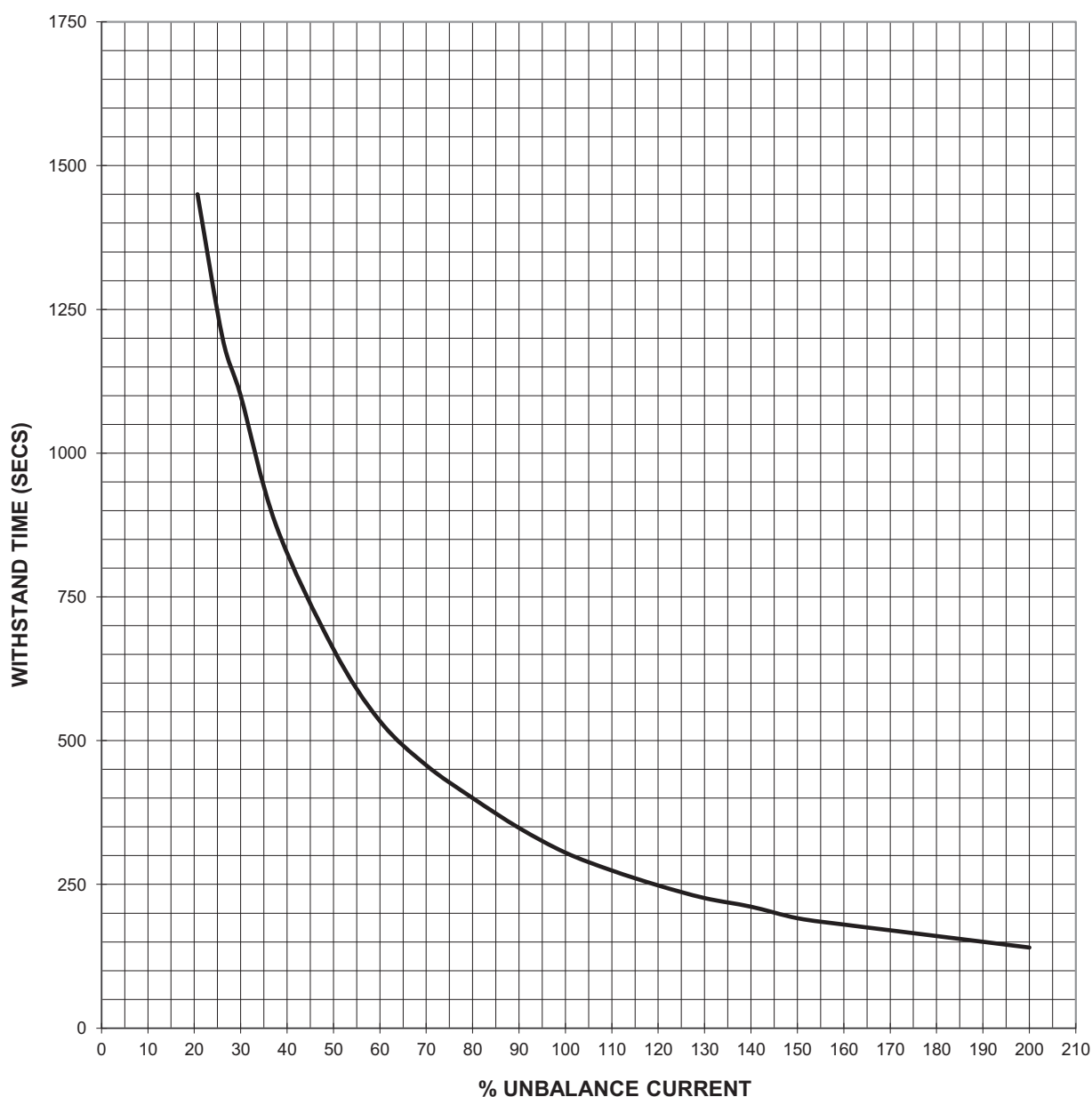
CONSULTANT : DESEIN PVT. LTD, NEW DELHI

EPC CONTRACTOR : BHEL (BHARAT HEAVY ELECTRICALS LTD.)



PROJECT : 2X660 MW ENNORE SEZ SUPER CRITICAL TPP (SEWAGE TREATMENT PLANT)
CLIENT : TAMILNADU GENERATION & DISTRIBUTION CORPORATION LTD.
CONSULTANT : DESEIN PVT. LTD, NEW DELHI 619
EPC CONTRACTOR : BHEL (BHARAT HEAVY ELECTRICALS LTD.)

NEGATIVE SEQUENCE CHARACTERISTICS



CUSTOMER	UT PUMPS & SYSTEMS PVT. LTD.		RATED O/P kW	1.5
CLIENT	DESEIN PVT.LTD.		NO OF POLES	4
END USER	TAMIL NADU GENERATION & DISTRIBUTION		FRAME	NG90L
PROJECT	2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL		TAG NO.	M-09 A/B
	NAME	DATE	TITLE	
DRN	PLP	25-Apr-19	NEGATIVE SEQUENCE CHARACTERISTICS	
CHD	PLP	25-Apr-19		
APPROVED	RGV	25-Apr-19		

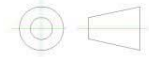


CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

PROJECT : 2X660 MW ENNORE SEZ SUPER CRITICAL TPP (SEWAGE TREATMENT PLANT)
CLIENT : TAMILNADU GENERATION & DISTRIBUTION CORPORATION LTD.
CONSULTANT : DESEIN PVT. LTD, NEW DELHI
EPC CONTRACTOR : BHEL (BHARAT HEAVY ELECTRICALS LTD.)

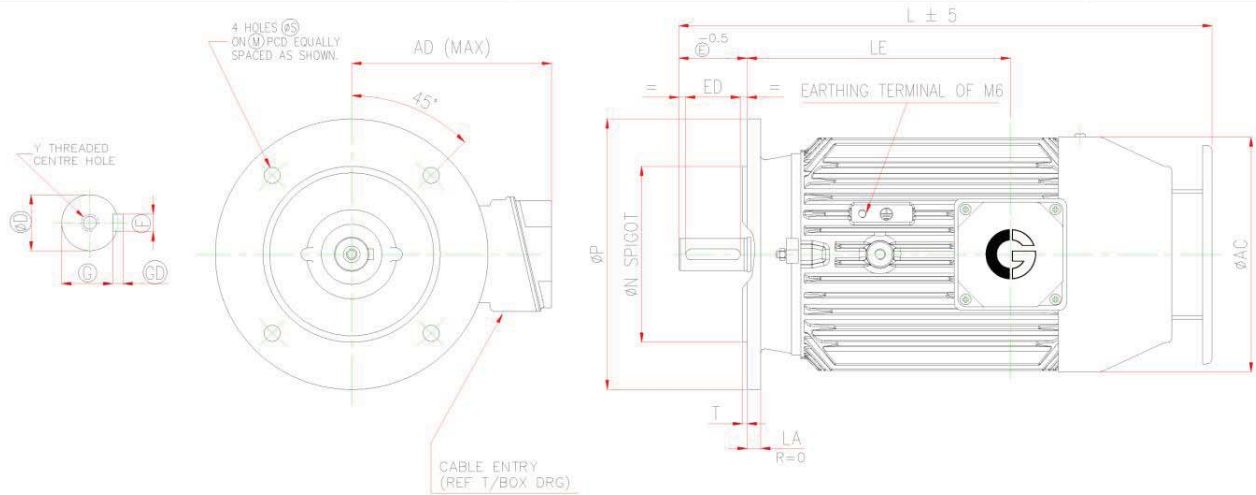
DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FLANGE MOUNTED CAST IRON INDUCTION MOTOR

PROJ.



DO NOT SCALE

PLEASE ASK, IF IN DOUBT



FRAME	FLANGE FIXING						OVER ALL					MOTOR wt (kg)
	M TOL	N TOL	P	S	T	LA	AD	AC	L	LE	HB	
NG90L	165.3 / 164.7	130.014 / 129.989	200	12	3.5	12	170	190	395	140	280	24

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
24.009 / 23.996	50	40	8.00 / 7.96	7.0 / 6.9	20.0 / 19.8	M8X19

NOTES TERMINAL BOX CAN BE ROTATED IN 360 DEG @90 DEG.
 ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.

PROJECT : 2X660 MW ENNORE SEZ SUPER CRITICAL TPP (SEWAGE TREATMENT PLANT)
CLIENT : TAMILNADU GENERATION & DISTRIBUTION CORPORATION LTD.
CONSULTANT : DESEIN PVT. LTD, NEW DELHI
EPC CONTRACTOR : BHEL (BHARAT HEAVY ELECTRICALS LTD.)

ALL DIMENSIONS ARE IN mm

RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CONCENTRICITY (MICRON)	100
PERPENDICULARITY (MICRON)	100
SHAFT RUNOUT (MICRON)	40

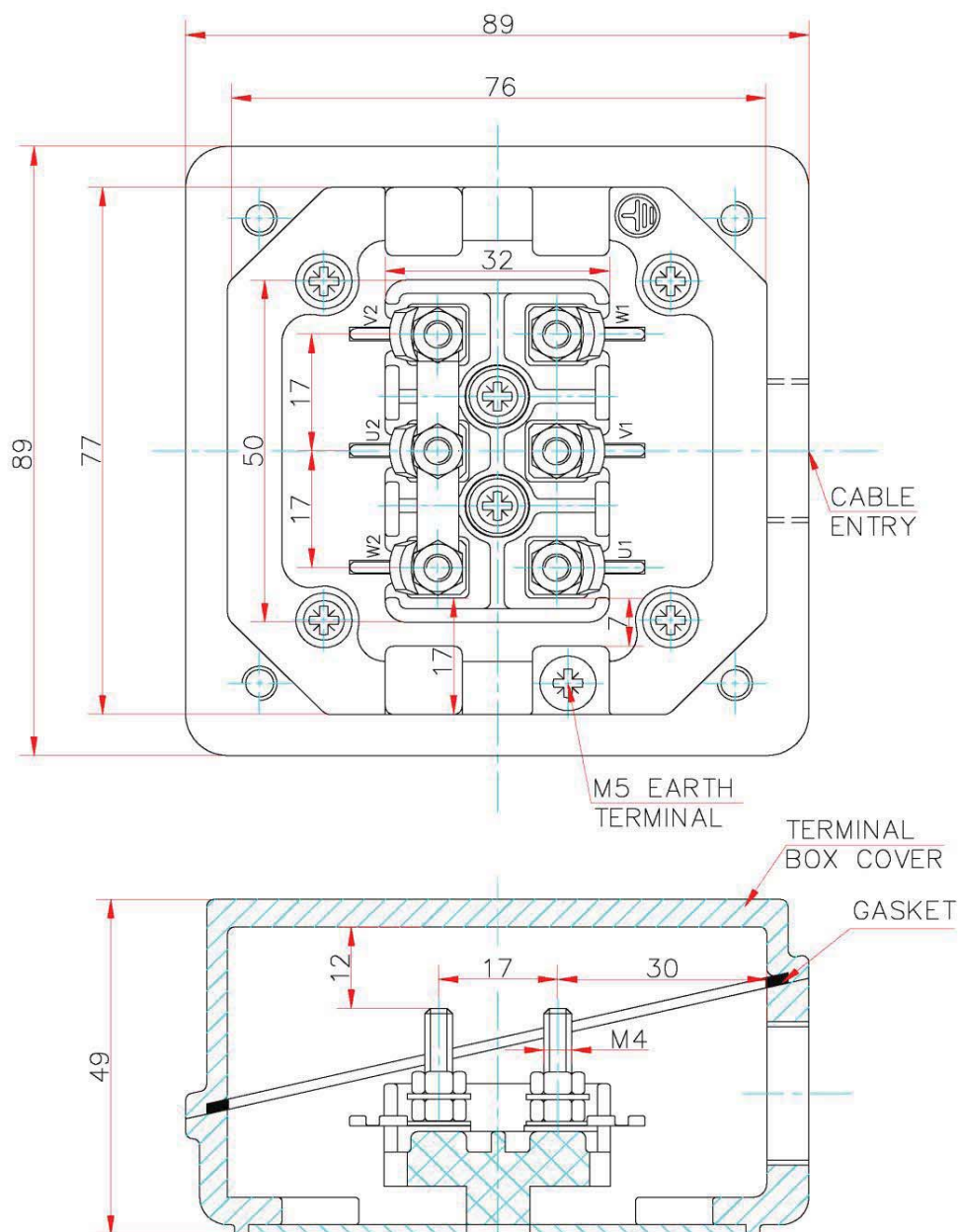
CUSTOMER	UT PUMPS & SYSTEMS PVT. LTD.		RATED O/P kW	1.5	
CLIENT	DESEIN PVT.LTD.		NO OF POLES	4	
END USER	TAMIL NADU GENERATION & DISTRIBUTION		FRAME	NG90L	MOUNTING V1
PROJECT	2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL		TAG NO.	M-09 A/B	
	NAME	DATE	REMARKS		TITLE DIMENSIONAL DRAWING
DRN	SBK	25-Apr-19			
CHD	SBK	25-Apr-19			
APPROVED	SSN	25-Apr-19			



CG Power and Industrial Solutions Limited
LT Motors Division
 Ahmednagar

DRG NO

REV



CREEPAGE = 20
CLEARNCE = 9

MATERIAL OF T/BOX
CAST IRON

ACCESSORIES	SPACE HEATER	THERMISTOR	RTD	
APPLICABLE	NA	NA	NA	
CABLE SIZE (ENTRY)	NA	NA	NA	
MAIN CABLE SIZE	1 * 3C,6-MM ²	CABLE ENTRY	M20X1.5P 1-No.	
CUSTOMER	UT PUMPS & SYSTEMS PVT. LTD.		RATED O/P kW	1.5
CLIENT	DESEIN PVT.LTD.		NO OF POLES	4
END USER	TAMIL NADU GENERATION & DISTRIBUTION		FRAME	NG90L
PROJECT	2X660 MW ENNORE SEZ SUPERCRITICAL THERMAL		Tag No.	M-09 A/B
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED	
DRAWN BY	AMR	25-04-19	TITLE : TERMINAL BOX ARRANGEMENT	
CHECKED BY	SBK	25-04-19		
APPROVED BY	SRB	25-04-19		
 CG Power and Industrial Solutions Limited LT Motors Division Ahmednagar				EA9105R0
				DRG No :

61901101

PROJECT : 2X660 MW ENNORE SEZ SUPER CRITICAL TPP (SEWAGE TREATMENT PLANT)

CLIENT : TAMILNADU GENERATION & DISTRIBUTION CORPORATION LTD.

CONSULTANT : DESEIN PVT. LTD, NEW DELHI

EPC CONTRACTOR : BHEL (BHARAT HEAVY ELECTRICALS LTD.)



UT PUMPS & SYSTEMS PVT. LTD.

14/7,MATHURA ROAD,

FARIDABAD -121003

CUSTOMER

PROJECT

P.O.NO.

PUMP MODEL

: M/s PENNAR ENVIRO LIMITED.

: 2X660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT.

: PEL_WP_BHEL_ENNORE_006 DATED : 21.01.19

: EU- 236

QAP NO.

DATE

REVISION

: UTPSL / 118243

: 04.02.19

: 00

PREPARED BY :-

Name :-

Sign. :-



LEGENDS :- P -Perform, W-Witness ,R- Review

1 -Inspection Agency / Client , 2 - UTPSL, 3 - Vendor

Notes :- 1 Pump shall be tested at rated speed with Job/Shop motor using water . Pump performance data thus obtained shall be converted to required speed if required.

Performance test will be witnessed one per model & Internal performance test report will be reviewed of other pumps.

APPROVED BY :-

Name :-

Sign. :-



TANGMEDCO & PEL will witness Performance Test as per this QAP.

TAMILNADU GENERATION AND DISTRIBUTION CORPORATION**APPROVED WITH COMMENTS**

From Er. N.Mala, B.E., Superintending Engineer/Electrical, Thermal Hydro Projects, TANGEDCO,5 th Floor, Western wing, 144,NPKRR Maaligai, Anna salai, Chennai-2 Tel: 044-28521591, Mobile:+919445857544. Email: sethhyp@tnebnet.org.	To Bharat Heavy Electricals Limited, POWER PROJECT ENGINEERING INSTITUTE HRD & ESI COMPLEX NOIDA - 201301(U.P)
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Lr.No.SE/E/THPro./EE2/AEE/F.BHEL/PEM/ D. 602 /19 dtd. 15 .06.2019

Project Title	2x660 MW ENNORE SEZ Supercritical TPP
TANGEDCO REFERENCE No.	LOA. Lr.No. CE/P/SE/M/P/EE-10/E/P/F.2x660 MW Ennore SEZ STPP/D.60/14,dt.27.09.2014
BHEL Reference No:	1. BHEL Email dated 08.06.2019 2. Desein Comment Ref.No .6423 dt .14.06.2019
Subject	TANGEDCO – Comments INSTRUMENT HOOK UP DRAWING FOR SEWAGE TREATMENT PLANT Documents / Drawings received from BHEL / PEM- Reg

Sir,
The Comments on the drawing/document submitted by M/s BHEL on the above subject vide BHEL transmittal under reference is furnished below.

Sl. No	DRG/DOC.No:	DESCRIPTION	Rev No.	Status	Remarks
01	PE-V0-412-673-A048	INSTRUMENT HOOK UP DRAWING FOR SEWAGE TREATMENT PLANT	01	03	M/s. BHEL is requested to submit the revised documents/ drawings after suitably incorporating the comments

Status : Category **1**- Approved. Category: **2** – Approved with comments, Resubmit for approval under, Category **1**. Category **3** – Not approved (See attachment Memo) Resubmit for approval. Category **4** – Information furnished is noted.

Yours faithfully,

....Sd.15.06.2019...

Superintending Engineer/Thhyp/Projects-I

Copy to Shri E.V. Anand/DESEIN Consultants India Pvt. Ltd.,DESEIN HOUSE,Greater Kailash-II New Delhi-48 (E-Mail)

Copy submitted to The Chief Engineer/Civil/Ennore SEZ/Chennai 600120.(E-Mail)

ANNEXURE

S. No.	TANGEDCO Comments	Bhel reply	TANGEDCO Comments
1.	Instrument Hook-up diagrams shall be updated as per final approved P&I Diagram for Sewage Treatment Plant, # PE-V0-412-673-A001, R03.	Noted and Updated	Noted. If any discrepancy at later stage is observed. Same shall be incorporated by BHEL without any implication.
2.	Snubbers/Pulsation dampners shall be used, where the process media is unstable for measurement such as the discharge of a pump as per technical specification Vol. V, cl.no. 3.03.01, 3.03.02, 3.03.03 and Technical specification/Contract Vol. VII, Installation drawings.	Noted and Updated	Noted. If any discrepancy at later stage is observed. Same shall be incorporated by BHEL without any implication.
3.	Globe valves shall be provided instead of Gate / ball valves in line with specification.	Noted	Comment is not incorporated. Please comply the requirements.
4.	BHEL to also note as per TANGEDCO's Letter no: SE/E/T&H(P)/EE-8 /F.2x660MW Ennore SEZ STPP/D 95 / 15 , dated 01.07.2015 for Sea/Saline water services, following shall be applicable:-	MOC of impulse tube & manifold considered SS316 and for other fittings MOC considered SS316/CS/UPVC as per the fluid applications.	Follow the contract specification.
i.	For Low Pressure application, MOC of impulse tubing & impulse pipe shall be CPVC (3/8") Sch 80 or better, Industrial grade up to manifold. MOC of impulse tubing, fittings (from manifold to instrument) and manifold shall be super duplex SS.		
ii.	As per EDN DOCUMENT, ASTM D1784 CPVC PIPE(INDUSTRIAL GRADE) - 1/2"NB SCH 80 SHALL be included.		
iii.	For High pressure application, MOC of Impulse tubing, impulse pipes, fittings and manifold shall be super duplex SS (1/2"). BHEL to follow the above requirements in totality.		
5.	In General 2 valve manifold shall be used for Pressure Gauges/switches/transmitters	Noted, however for Diaphragm Flanged Pressure Instruments, Manifold cannot be provided	Noted. If any discrepancy at later stage is observed. Same shall be incorporated by BHEL without any implication.
6.	BHEL shall provide valve manifold with all the pressure measuring instruments like pressure transmitters, Diff. Pressure Transmitters, Pressure switch, Diff. Pressure switch etc. as per technical specification Vol. V, cl.no. 3.03.01, 3.03.02, 3.03.03, 9.02.08, 9.02.09 and Technical specification/Contract Vol. VII, Installation drawings.	Noted and As per Technical Specification, for Pressure Transmitter we provided 2-valve SS316 manifold and for Differential Pressure Transmitter & Differential Flow Transmitter we provided 5-valve SS316 manifolds.	Noted. If any discrepancy at later stage is observed. Same shall be incorporated by BHEL without any implication.
7.	BHEL to indicate, if the instrument mounted is below or above the source point. Accordingly BHEL shall provide connections with a continuous slope to ensure a constant static head and hence shall indicate degree of both downward and upward slope as applicable as per technical specification, Vol. V, cl.no. 9.01.01 (iii-d, e) and Technical specification/Contract Vol. VII, Installation drawings.	Noted & Updated.	Noted. If any discrepancy at later stage is observed. Same shall be incorporated by BHEL without any implication.
8.	All welded and screwed fittings shall conform to ANSI B16.11 as per technical specification, Vol. V, cl.no. 9.01.01 (iii-j).	All Metallic piping welded and screwed fittings shall conform to ANSI B16.11	Complete notes shall be included as per comments.
9.	BHEL to provide globe valves for isolation and drain purpose as per technical specification, Vol. V, cl.no. 9.02.03 (v) and Technical specification/Contract Vol. VII, Installation drawings instead of ball valve as indicated.	Drain Valves are already Globe Valve & Isolation Valve for Metallic are Socket Welded & in Non-Metallic Pipeline since Globe Valve not available Ball Valve Provided.	Noted. If any discrepancy at later stage is observed. Same shall be incorporated by BHEL without any implication.
10.	Complete material selection shall be inline with technical specification Vol. V, Chapetr-9, Table 9.1. Revise the document accordingly.	Noted	Noted. If any discrepancy at later stage is observed. Same shall be incorporated by BHEL without any implication.
11.	BHEL shall provide 2 nos. root valves for line pressure > or = 40 bar or temperature > or = 425 deg. C as per technical specification Vol. V, cl.no. 9.05.00 instead of "above 40 bar" as indicated.	For Sewage Treatment Plant no line pressure Above or	Noted. If any discrepancy at later stage is observed. Same shall be incorporated by BHEL without any

625

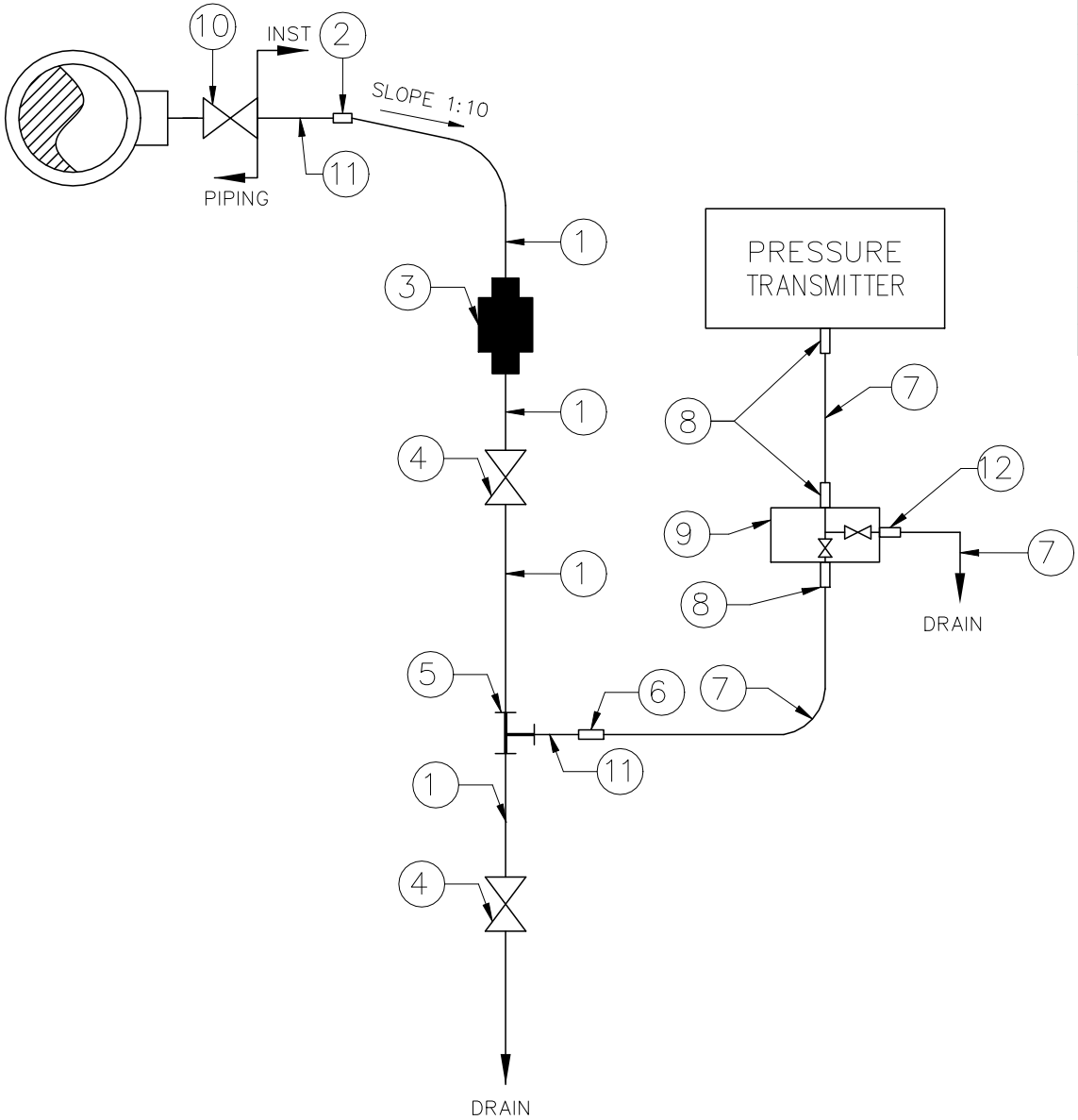
S. No.	TANGEDCO Comments	Bhel reply	TANGEDCO Comments
		equal 40 Bar	implication.
12.	Following notes shall be included in the drawing/document inline with specification. a. All material, shall conform to the latest editions of American National standard Code for pressure piping, power piping ANSI B 31.1, ANSI B16.11, ASME Boiler and pressure Vessel codes, IBR and other applicable ASME, ANSI and state standards in line with Technical specification, Vol. V, Chapter-9. BHEL to include a note in the document accordingly. b. All impulse pipes shall be of seamless type conforming to ANSI B36.10 for schedule numbers, sizes and dimensions etc. The size of impulse pipe shall be ½" for water applications in line with Technical specification, Vol. V, Chapter-9. c. SS316 tube shall be provided inside enclosures & racks from tee connection to valve manifold and then to instrument. The wall thickness of the tube shall be in accordance with the ANSI B31.1 standard. The bending radius of the tube shall be greater than 6D inline with Technical specification, Vol. V, Chapter-9. d. All fittings shall be forged steel and shall conform to ANSI B16.11 inline with Technical specification, Vol. V, Chapter-9.	a. All Metallic material shall conform to ANSI B16.11 b. All metallic impulse pipes shall be of seamless type conforming to ANSI B36.10 c. All Instrument are field Mounted on 2" Pipe d. All Metallic fittings shall be forged steel and shall conform to ANSI B16.11	Complete notes shall be included as per comments.
13.	Rating and specification of impulse pipes shall be revised as per specification, Vol. V, Chapter 9, cl. No. 9.02.01 and Table no. 9.1.	Noted & Updated.	Noted. If any discrepancy at later stage is observed. Same shall be incorporated by BHEL without any implication.
14.	GI material is not acceptable for tubes and erection hardware except for pipes.	Noted	Noted. If any discrepancy at later stage is observed. Same shall be incorporated by BHEL without any implication.

....Sd.15.06.2019...
Superintending Engineer/THHYP

1	29.05.2019	FOR INFORMATION		TT	SD	PAK		
0	23.03.2019	FOR INFORMATION		TT	KBP	PAK		
REV.	DATE			PREP.	CHK.	APPR.		
PROJECT:		THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.						
	OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED						
	OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI						
	EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA						
	PACKAGE	75 KLD SEWAGE TREATMENT PLANT						
	SUB CONTRACTOR :	PENNNAR ENVIRO Re-engineering Water, Environment & Energy Floor No. +3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084						
DEPT.	CODE		SCALE	WEIGHT (KG)	REF DRG.	ITEM		
--	A		--	--	--	--		
TITLE INSTRUMENT HOOK UP DRAWING FOR SEWAGE TREATMENT PLANT						NAME	SIGN	DATE
					PREP	TT		29.05.2019
					CHKD	SD		29.05.2019
					APPD	PAK		29.05.2019
DEPT.					CARD CODE	BHEL DOC NO. PE-V0-412-673-A048		REV
SIGN					-	PEL DOC NO. -----		1
DATE						NO. OF SHEETS - 16 (EXCLUDING COVER SHEET)		

PEL/D&O-F003

HOOK UP FOR PRESSURE TRANSMITTER



BILL OF MATERIAL				
ITEM NO.	DESCRIPTION	SIZE	MOC	QTY.
1	IMPULSE PIPE	IMPULSE PIPE 15 NB SCH.40	CS	5 Mtrs
2	COUPLING	PIPE COUPLING 1/2" SW	CS	1 No's
3	UNION	1/2" SW	CS	1 No's
4	GLOBE VALVE	GLOBE VALVE 1/2" SW	CS	2 No's
5	EQUAL TEE	EQUAL TEE 1/2" SW	CS	1 No's
6	CONNECTOR	1/2" NPT(F) x 1/2" OD	SS316	1 No's
7	IMPULSE TUBE	TUBE 1/2" OD	SS316	2 Mtrs
8	CONNECTOR	1/2" NPT(M) x 1/2" OD	SS316	3 No's
9	2 VALVE MANIFOLD	2 VALVE MANIFOLD 1/2" NPT(F)	SS316	1 No's
10	BALL VALVE	1/2" NPT(F) (PIPING SCOPE)	CS	-
11	NIPPLE	1/2" NPT(M) x 1/2" SW - 150MM	CS	2 No's
12	CONNECTOR	1/4" NPT(M) x 1/2" OD	SS316	1 No's

HOOK UP DRAWING BOM FOR PRESSURE TRANSMITTER

S.NO.	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90QFB-60-CP-001	AIR	PRESSURE TRANSMITTER INDICATION FOR INSTRUMENT AIR	GI

628

PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI

OWNER

TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED

CONSULTANT:

DESEIN PRIVATE LIMITED
DESEIN HOUSE, NEW DELHI

CONTRACTOR:

BHARAT HEAVY ELECTRICALS LTD
PROJECT ENGINEERING MANAGEMENT
NOKIA

APRD BY:

PAK

CHK BY:

MEC. MDA

CHK BY:

E&I KBP

CHK BY:

PROS HE

DRN BY:

NTS

SCALE:

NTS

DATE:

29.05.2019

PENNAR ENVIRO
Re-engineering
Floor No. 4/3, DHFLVC Silicon Towers,
Kandipur, Madhapur Road, Hyderabad - 500 084

TITLE:

INSTRUMENT HOOK UP DRAWING FOR STP

DRAWING NO:

PE-V0-412-673-A048

SHEET

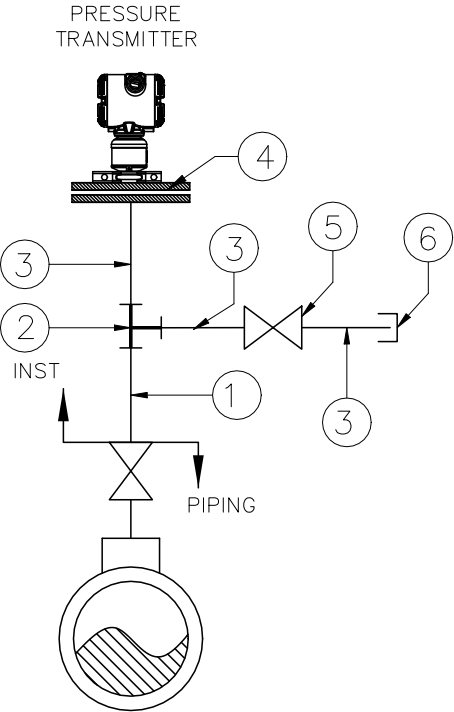
REV.

1 OF 16

R1

PEL/D&D-F003

HOOK UP FOR PRESSURE TRANSMITTER
(DIAPHRAGM SEAL)



HOOK UP DRAWING BOM FOR
PRESSURE TRANSMITTER

S.NO.	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRC-01-CP-001	AIR	COMMON HEADER OUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR COMMON SUMP,EQT&ST	GI
2	90GRC-01-CP-002	AIR	COMMON HEADER OUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR COMMON SUMP,EQT&ST	GI
3	90GRC-02-CP-001	AIR	COMMON HEADER OUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR MBBR AERATION TANK	GI
4	90GRC-02-CP-002	AIR	COMMON HEADER OUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR MBBR AERATION TANK	GI

BILL OF MATERIAL

ITEM NO.	DESCRIPTION	SIZE	MOC	QTY.
1	NIPPLE	1/2"NPT(M) - 150MM	CS	1 No's
2	EQUAL TEE	1/2"NPT(F)	CS	1 No's
3	NIPPLE	1/2"NPT(M)x1/2"SW - 150MM	CS	3 No's
4	FLANGE	1/2" SW FLANGE-ANSI 150#	CS	1 No's
5	GLOBE VALVE	1/2"SW	CS	1 No's
6	CAP	1/2"NPT(F)	CS	1 No's

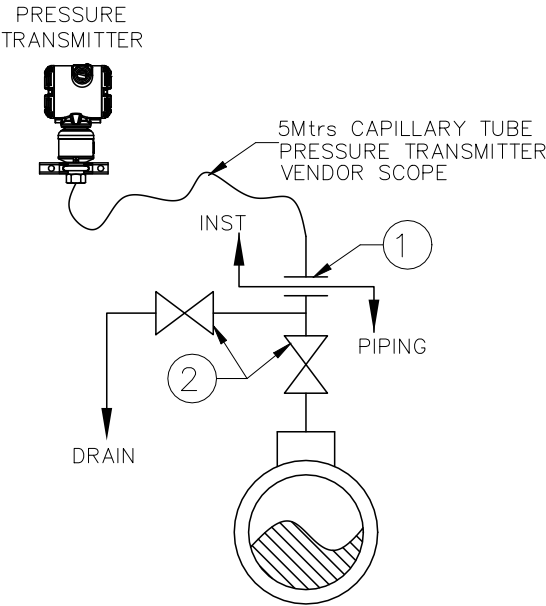
629

1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019	DRN BY	NS
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019	SCALE	NTS
REV	DESCRIPTION	DRN	CHK	APRD	DATE	DATE	29.05.2019

PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI	
OWNER	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
CONTRACTOR:	GH E&E SVS Bharat Heavy Electricals Company BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT NOIDA
APRD BY	PAK
CHK BY	MEC. MDA
CHK BY	E&I KBP
CHK BY	PROS HE
TITLE: INSTRUMENT HOOK UP DRAWING FOR STP	
DRAWING NO: PE-V0-412-673-A048	
SHEET	REV.
2 OF 16	R1

PEL/D&D-F003

HOOK UP FOR PRESSURE TRANSMITTER
(DIAPHRAGM SEAL)



HOOK UP DRAWING BOM FOR
PRESSURE TRANSMITTER

S.NO.	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRS-01-CP-001	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-1 SEWAGE TRANSFER PUMPS	UPVC
2	90GRS-01-CP-002	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-1 SEWAGE TRANSFER PUMPS	UPVC
3	90GRS-02-CP-001	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-2 SEWAGE TRANSFER PUMPS	UPVC
4	90GRS-02-CP-002	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-2 SEWAGE TRANSFER PUMPS	UPVC
5	90GRS-03-CP-001	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-3 SEWAGE TRANSFER PUMPS	UPVC
6	90GRS-03-CP-002	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-3 SEWAGE TRANSFER PUMPS	UPVC
7	90GRS-04-CP-001	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-4 SEWAGE TRANSFER PUMPS	UPVC
8	90GRS-04-CP-002	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-4 SEWAGE TRANSFER PUMPS	UPVC
9	90GRS-05-CP-001	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR COMMON COLLECTION SUMP PUMPS	UPVC
10	90GRS-05-CP-002	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR COMMON COLLECTION SUMP PUMPS	UPVC
11	90GRS-06-CP-001	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR MBBR FEED PUMP	UPVC
12	90GRS-06-CP-002	SEWAGE WATER	COMMON HEADER OUTLET PRESSURE INDICATION FOR MBBR FEED PUMP	UPVC
13	90GRS-10-CP-001	TREATED SEWAGE	COMMON HEADER OUTLET PRESSURE INDICATION FOR FILTER FEED PUMPS	UPVC
14	90GRS-10-CP-002	TREATED SEWAGE	COMMON HEADER OUTLET PRESSURE INDICATION FOR FILTER FEED PUMPS	UPVC
15	90GRS-14-CP-001	TREATED SEWAGE	COMMON HEADEROUTLET PRESSURE INDICATION FOR TREATED WATER DISPOSAL PUMPS	UPVC
16	90GRS-14-CP-002	TREATED SEWAGE	COMMON HEADEROUTLET PRESSURE INDICATION FOR TREATED WATER DISPOSAL PUMPS	UPVC
17	90GRS-15-CP-001	SEWAGE SLUDGE	COMMON HEADER OUTLET PRESSURE INDICATION FOR SLUDGE TRANSFER PUMPS	UPVC
18	90GRS-15-CP-002	SEWAGE SLUDGE	COMMON HEADER OUTLET PRESSURE INDICATION FOR SLUDGE TRANSFER PUMPS	UPVC

BILL OF MATERIAL

ITEM NO.	DESCRIPTION	SIZE	MOC	QTY.	REMARKS
1	FLANGE	2" FLANGE	-	1	PRESSURE TRANSMITTER VENDOR SCOPE
2	BALL VALVE	1/2" SE	UPVC	2	PIPING SCOPE

630

1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019	DRN BY	NS
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019	SCALE	NTS
REV	DESCRIPTION	DRN	CHK	APRD	DATE	DATE	29.05.2019

PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI

OWNER

TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED

CONSULTANT: DESEIN PRIVATE LIMITED

DESEIN HOUSE, NEW DELHI

CONTRACTOR:

BHARAT HEAVY ELECTRICALS LTD
PROJECT ENGINEERING MANAGEMENT
Noida

APRD BY

PAK

CHK BY

MEC

MDA

CHK BY

E&I

KBP

CHK BY

PROS

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TITLE:

INSTRUMENT HOOK UP DRAWING FOR STP

DRAWING NO:

PE-V0-412-673-A048

SHEET

3 OF 16

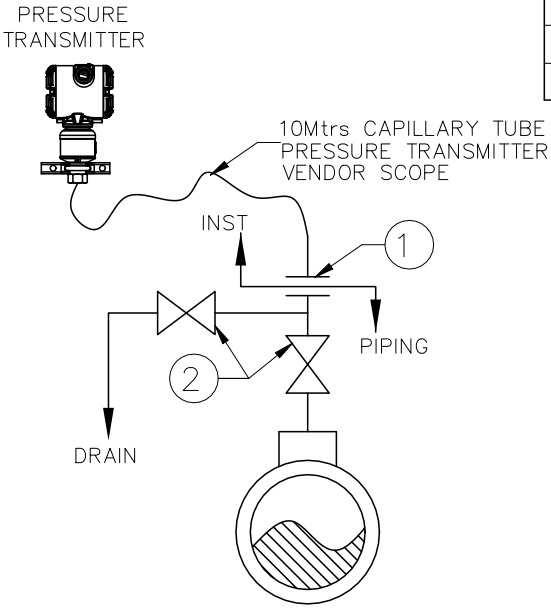
REV

R1

PEL/D&D-F003

HOOK UP FOR PRESSURE TRANSMITTER
(DIAPHRAGM SEAL)

HOOK UP DRAWING BOM FOR
PRESSURE TRANSMITTER



S.NO.	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRN-01-CP-001	HYPO	COMMON HEADER OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMPS	CPVC
2	90GRN-01-CP-002	HYPO	COMMON HEADER OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMPS	CPVC
3	90GRN-02-CP-001	HYPO	COMMON HEADER OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMPS	CPVC
4	90GRN-02-CP-002	HYPO	COMMON HEADER OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMPS	CPVC

BILL OF MATERIAL

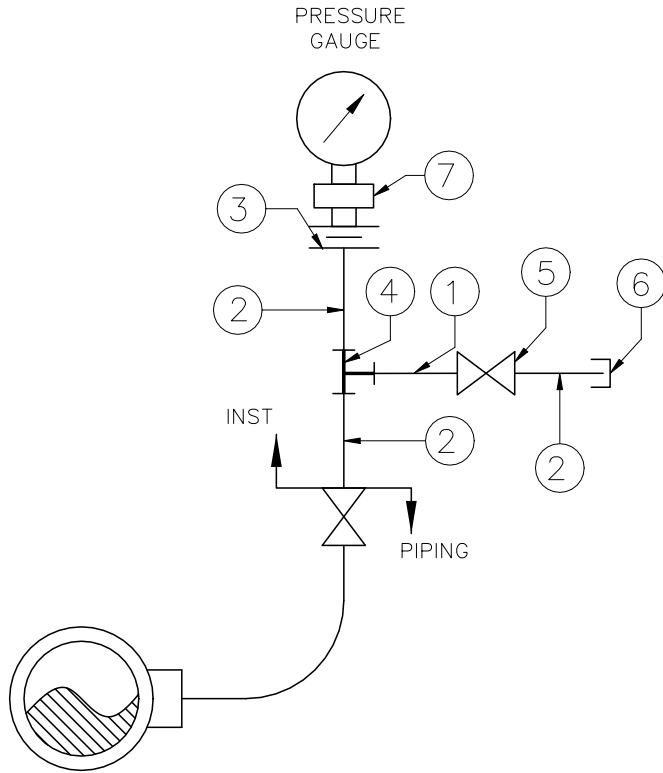
ITEM NO.	DESCRIPTION	SIZE	MOC	QTY.	REMARKS
1	FLANGE	2" FLANGE	-	1	PRESSURE TRANSMITTER VENDOR SCOPE
2	BALL VALVE	1/2" SE	CPVC	2	PIPING SCOPE

631

1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019	DRN BY	NS
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019	SCALE	NTS
REV	DESCRIPTION	DRN	CHK	APRD	DATE	DATE	29.05.2019

PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI	
OWNER	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
CONTRACTOR:	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT NOKIA
APRD BY	PAK
CHK BY	MEC. MDA
CHK BY	E&I KBP
CHK BY	PROS HE
TITLE: INSTRUMENT HOOK UP DRAWING FOR STP	
DRAWING NO: PE-V0-412-673-A048	
SHEET	REV.
4 OF 16	R1

HOOK UP DRAWING FOR PRESSURE
GAUGE (BOURDON)



BILL OF MATERIAL				
ITEM NO.	DESCRIPTION	SIZE	MOC	QTY.
1	PIPE	1/2" PL SCH.40-150MM	CS	1 No's
2	NIPPLE	1/2"NPT(M) X 1/2" SW-150MM	CS	2 No's
3	3 PIECE PIPE UNION	1/2" NPT(F)	CS	1 No's
4	EQUAL TEE	1/2" SW	CS	1 No's
5	GLOBE VALVE	1/2" SW	CS	1 No's
6	CAP	1/2" NPT(F)	CS	1 No's
7	SNUBBER/ PULSATING DAMPER	1/2" NPT(F) x 1/2" NPT(M)	SS316	1 No's

HOOK UP DRAWING BOM FOR BOURDON TYPE PRESSURE GAUGE				
S.NO	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRC-01-CP-501	AIR	OUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR COMMON SUMP, EQT & ST	GI
2	90GRC-01-CP-502	AIR	OUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR COMMON SUMP, EQT & ST	GI
3	90GRC-01-CP-503	AIR	COMMON DISCHARGE PRESSURE INDICATION FOR AIR BLOWERS FOR COMMON SUMP, EQT & ST	GI
4	90GRC-02-CP-501	AIR	OUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR MBBR AERATION TANK	GI
5	90GRC-02-CP-502	AIR	OUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR MBBR AERATION TANK	GI
6	90GRC-02-CP-503	AIR	COMMON DISCHARGE PRESSURE INDICATION FOR AIR BLOWERS FOR MBBR AERATION TANK	GI
7	90QFB-60-CP-501	AIR	OUTLET PRESSURE INDICATION FOR INSTRUMENT AIR	GI

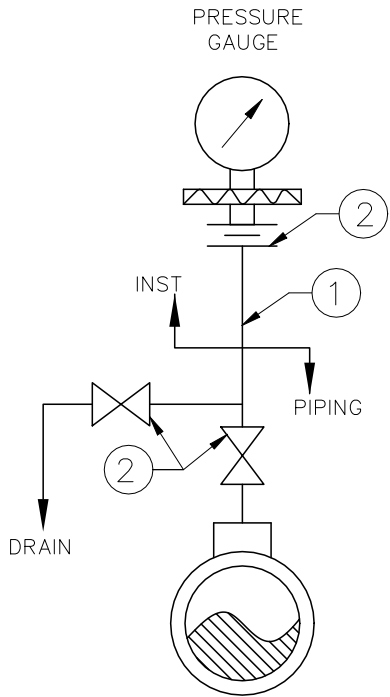
632

1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019	DRN BY	NS
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019	SCALE	NTS
REV	DESCRIPTION	DRN	CHK	APRD	DATE	DATE	29.05.2019

PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI	
OWNER	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
CONTRACTOR:	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT NOKIA
APRD BY	PAK
CHK BY	MEC, MDA
CHK BY	E&I, KBP
CHK BY	PROS, HE
DRN BY	NS
TITLE: INSTRUMENT HOOK UP DRAWING FOR STP	
DRAWING NO:	PE-V0-412-673-A048
SHEET	5 OF 16
REV.	R1

PEL/D&D-F003

HOOK UP DRAWING FOR PRESSURE
GAUGE (DIAPHRAGM)



HOOK UP DRAWING BOM FOR DIAPHRAGM TYPE PRESSURE GAUGE				
S.NO.	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRS-01-CP-501	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR SUMP-1 SEWAGE TRANSFER PUMPS	UPVC
2	90GRS-01-CP-502	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR SUMP-1 SEWAGE TRANSFER PUMPS	UPVC
3	90GRS-02-CP-501	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR SUMP-2 SEWAGE TRANSFER PUMPS	UPVC
4	90GRS-02-CP-502	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR SUMP-2 SEWAGE TRANSFER PUMPS	UPVC
5	90GRS-03-CP-501	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR SUMP-3 SEWAGE TRANSFER PUMPS	UPVC
6	90GRS-03-CP-502	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR SUMP-3 SEWAGE TRANSFER PUMPS	UPVC
7	90GRS-04-CP-501	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR SUMP-4 SEWAGE TRANSFER PUMPS	UPVC
8	90GRS-04-CP-502	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR SUMP-4 SEWAGE TRANSFER PUMPS	UPVC
9	90GRS-05-CP-501	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR COMMON COLLECTION SUMP PUMPS	UPVC
10	90GRS-05-CP-502	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR COMMON COLLECTION SUMP PUMPS	UPVC
11	90GRS-06-CP-501	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR EQUALIZATION TANK	UPVC
12	90GRS-06-CP-502	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR EQUALIZATION TANK	UPVC
13	90GRS-08-CP-501	TREATED SEWAGE	OUTLET PRESSURE INDICATION FOR FILTER FEED PUMPS	UPVC
14	90GRS-09-CP-501	TREATED SEWAGE	OUTLET PRESSURE INDICATION FOR FILTER FEED PUMPS	UPVC
15	90GRS-12-CP-501	TREATED SEWAGE	OUTLET PRESSURE INDICATION FOR TREATED WATER DISPOSAL PUMPS	UPVC
16	90GRS-13-CP-501	TREATED SEWAGE	OUTLET PRESSURE INDICATION FOR TREATED WATER DISPOSAL PUMPS	UPVC
17	90GRB-01-CP-501	TREATED SEWAGE	FEED INLET PRESSURE INDICATION FOR DUAL MEDIA FILTER	UPVC
18	90GRB-01-CP-502	TREATED SEWAGE	BACKWASH INLET & FEED OUTLET PRESSURE INDICATION FOR DUAL MEDIA FILTER	UPVC
19	90GRB-02-CP-501	TREATED SEWAGE	BACKWASH INLET & FEEDOUTLET FOR ACTIVATED CARBON FILTER	UPVC
20	90GRB-02-CP-502	TREATED SEWAGE	BACKWASH INLET & FEEDOUTLET PRESSURE INDICATION FOR ACTIVATED CARBON FILTER	UPVC
21	90GRS-15-CP-501	SLUDGE SEWAGE	OUTLET PRESSURE INDICATION FOR SLUDGE TRANSFER PUMPS	UPVC
22	90GRS-15-CP-502	SLUDGE SEWAGE	OUTLET PRESSURE INDICATION FOR SLUDGE TRANSFER PUMPS	UPVC

BILL OF MATERIAL

ITEM NO.	DESCRIPTION	SIZE	MOC	QTY.	REMARKS
1	NIPPLE	1/2" NPT(M)-150MM	UPVC	1	
2	3 PIECE PIPE UNION	1/2" NPT(F)	UPVC	1	
3	BALL VALVE	1/2" SE	UPVC	2	PIPING SCOPE

633

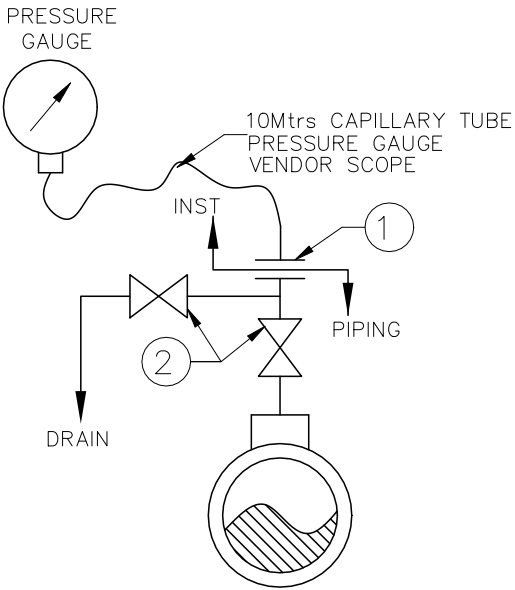
1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019	DRN BY	NS
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019	SCALE	NTS
REV	DESCRIPTION	DRN	CHK	APRD	DATE	DATE	29.05.2019

PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI	
OWNER	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
CONTRACTOR:	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT NOKIA
APRD BY	PAK
CHK BY	MEC. MDA
CHK BY	E&I KBP
CHK BY	PROS HE
TITLE: INSTRUMENT HOOK UP DRAWING FOR STP	
DRAWING NO: PE-V0-412-673-A048	
SHEET	REV.
6 OF 16	R1

PEL/D&D-F003

HOOK UP DRAWING FOR PRESSURE GAUGE (DIAPHRAGM)

HOOK UP DRAWING BOM FOR DIAPHRAGM TYPE PRESSURE GAUGE				
S.NO.	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRN-01-CP-501	HYPO	OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMP (DP-01)	CPVC
2	90GRN-02-CP-501	HYPO	OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMP (DP-02)	CPVC



BILL OF MATERIAL					
ITEM NO.	DESCRIPTION	SIZE	MOC	QTY.	REMARKS
1	FLANGE	1" ANSI 150# FLANGE	--	--	PRESSURE GAUGE VENDOR SCOPE
2	BALL VALVE	1/2" SE	CPVC	2	PIPING SCOPE

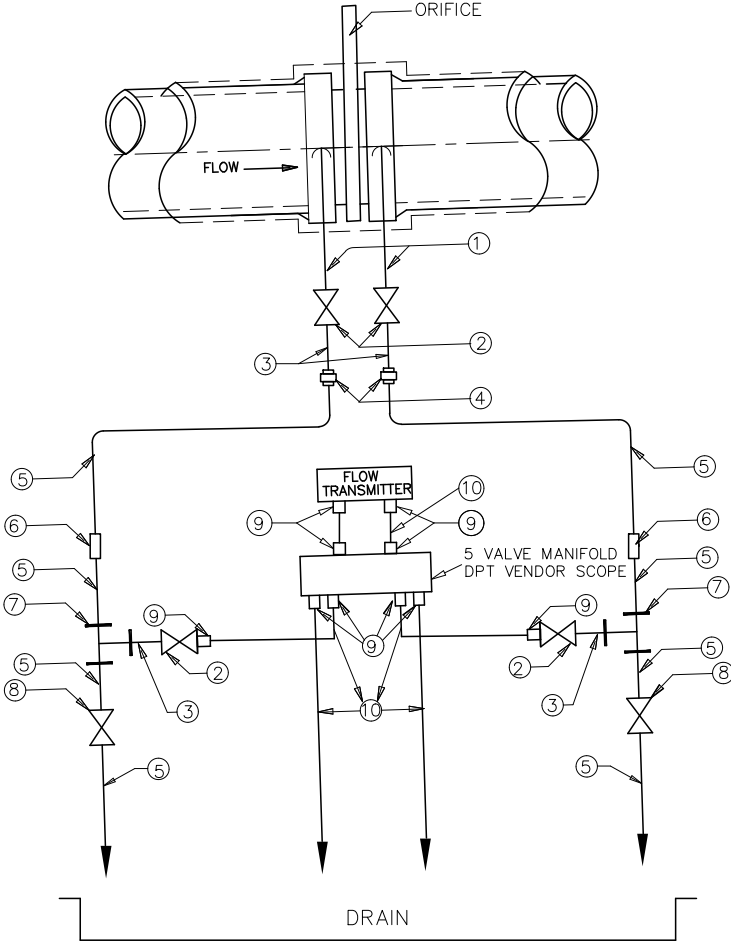
634

1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019	DRN BY	NS
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019	SCALE	NTS
REV	DESCRIPTION	DRN	CHK	APRD	DATE	DATE	29.05.2019

TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED	
CONSULTANT: DESEIN PRIVATE LIMITED	
DESEIN HOUSE, NEW DELHI	
CONTRACTOR: BHARAT HEAVY ELECTRICALS LTD	
PROJECT ENGINEERING MANAGEMENT NODA	
APRD BY	PAK
CHK BY	MEC. MDA
CHK BY	E&I KBP
CHK BY	PROS HE
DRN BY	NS
PENNAR ENVIRO	
Re-engineering & Environmental Solutions	
Floor No. 4/3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084	
TITLE: INSTRUMENT HOOK UP DRAWING FOR STP	
DRAWING NO: PE-V0-412-673-A048	
SHEET	REV.
7 OF 16	R1

PEL/D&O-F003

HOOK UP DRAWING FOR
DP FLOW TRANSMITTER
(G PIPELINE)



HOOK UP DRAWING BOM FOR
DP FLOW TRANSMITTER

S.NO	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRC-01-CF-001	AIR	COMMON HEADER DISCHARGE FLOW INDICATION FOR AIR BLOWERS FOR COMMON SUMP,EQT&ST(B-01A/B)	GI
2	90GRC-02-CF-001	AIR	COMMON HEADER DISCHARGE FLOW INDICATION FOR AIR BLOWERS FOR MBBR AERATION TANK (B-02A/B)	GI
3	90QFB-60-CF-001	AIR	FLOW INDICATION FOR INSTRUMENT AIR	GI

BILL OF MATERIAL

ITEM NO.	SIZE	QTY.
1	1/2"NPT(M) GI NIPPLE-150MM	2
2	1/2" NPT(F) CS GLOBE VALVE	4
3	1/2" NPT(M)x1/2" PL CS NIPPLE-150MM	4
4	1/2" SE CS UNION	2
5	1/2" PL CS PIPE	4 Mtrs.
6	1/2" SW CS BULK HEAD PIPE UNION	2
7	1/2" SW CS TEE	2
8	1/2" SW CS GLOBE VALVE	2
9	1/2" NPT(M)x1/2"OD TUBE COMPRESSION FITTINGS,SS-316	10
10	1/2" OD IMPULSE TUBE, SS 316	6 Mtrs.

PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI			
OWNER		TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED	
		CONSULTANT: DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI	
CONTRACTOR:		BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT NODA	
APRD BY:	PAK	 Re-engineering Floor No. 4/3, DHFLVC Silicon Towers, Kandipur, Madhapur Road, Hyderabad - 500 084	
CHK BY:	MEC, MDA		
CHK BY:	E&I, KBP		
CHK BY:	PROS, HE		
DRN BY:	NTS	TITLE: INSTRUMENT HOOK UP DRAWING FOR STP	
REV	DESCRIPTION	DATE	29.05.2019
1	REVISED AS PER COMMENTS	NS	SD
0	ISSUED FOR APPROVAL	NS	KBP
REV	DESCRIPTION	DRN	CHK
1	REVISED AS PER COMMENTS	NS	SD
0	ISSUED FOR APPROVAL	NS	KBP
REV	DESCRIPTION	DRN	CHK
1	REVISED AS PER COMMENTS	NS	SD
0	ISSUED FOR APPROVAL	NS	KBP
REV	DESCRIPTION	DRN	CHK

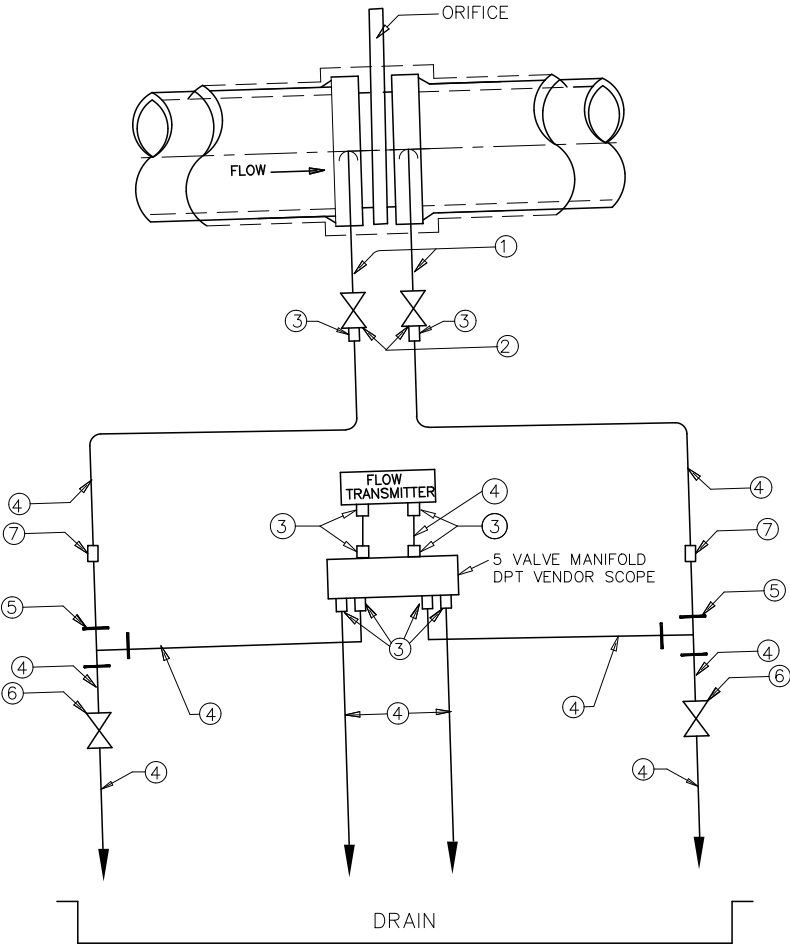
635

PEL/D&O-F003

HOOK UP DRAWING FOR
DP FLOW TRANSMITTER
(UPVC PIPELINE)

HOOK UP DRAWING BOM FOR
DP FLOW TRANSMITTER

S.NO	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRS-14-CF-001	TREATED SEWAGE	COMMON HEADER FLOW INDICATION FOR TREATED WATER DISPOSAL PUMPS	UPVC



BILL OF MATERIAL

ITEM NO.	SIZE	QTY.
1	1/2"NPT(M) UPVC NIPPLE, 150MM	2
2	1/2" NPT(F) UPVC BALL VALVE	2
3	1/2" NPT(M)X1/2"OD TUBE COMPRESSION FITTINGS,SS-316	10
4	1/2" OD IMPULSE TUBE, SS-316	8 Mtrs.
5	1/2" OD EQUAL TEE	2
6	1/2" OD NEEDLE VALVE	2
7	1/2" OD UNION SS316	2

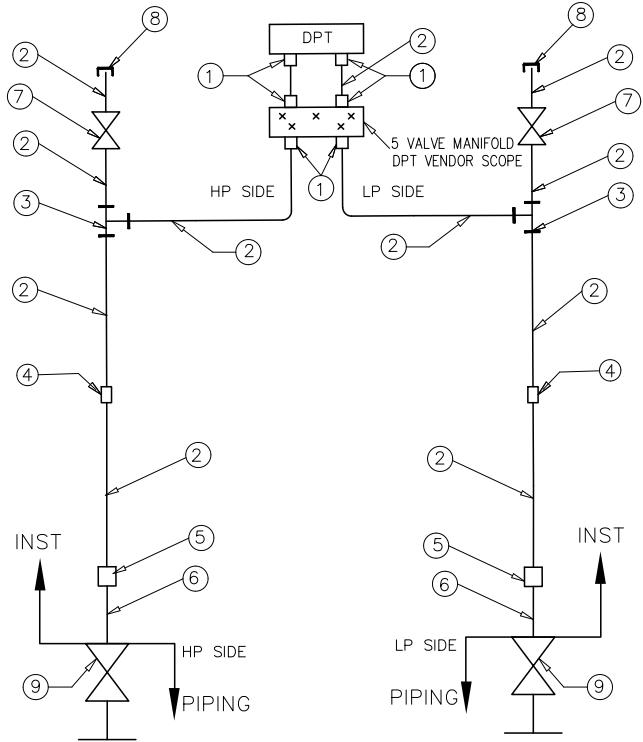
636

1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019	DRN BY	NS
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019	SCALE	NTS
REV	DESCRIPTION	DRN	CHK	APRD	DATE	DATE	29.05.2019

PROJECT:	2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI
OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
CONTRACTOR:	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT NOKIA
APRD BY:	PAK
CHK BY:	MEC, MDA
CHK BY:	E&I, KBP
CHK BY:	PROS, HE
DRN BY:	NS
TITLE:	INSTRUMENT HOOK UP DRAWING FOR STP
DRAWING NO:	PE-V0-412-673-A048
SHEET	9 OF 16
REV.	R1

PEL/D&D-F003

HOOK UP DRAWING FOR
DP TRANSMITTER



HOOK UP DRAWING BOM FOR
DP TRANSMITTER

S.NO	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRB-01-CP-001	TREATED SEWAGE	DIFFERENTIAL PRESSURE INDICATION FOR DUAL MEDIA FILTER	UPVC
2	90GRB-01-CP-002	TREATED SEWAGE	DIFFERENTIAL PRESSURE INDICATION FOR DUAL MEDIA FILTER	UPVC
3	90GRB-02-CP-001	TREATED SEWAGE	DIFFERENTIAL PRESSURE INDICATION FOR ACTIVATED CARBON FILTER	UPVC
4	90GRB-02-CP-002	TREATED SEWAGE	DIFFERENTIAL PRESSURE ACROSS ACTIVATED CARBON FILTER	UPVC

BILL OF MATERIAL

ITEM NO.	DESCRIPTION	QTY.
1	1/2" NPT(M)X1/2"OD TUBE COMPRESSION FITTINGS,SS-316	6
2	1/2"OD IMPULSE TUBE,SS-316	8Mtrs.
3	1/2" OD EQUAL TEE,SS316	2
4	1/2" OD UNION,SS316	2
5	CONNECTOR 1/2"NPT(F) X 1/2"OD	2
6	1/2"PL x NPT(M) UPVC PIPE-150MM	2
7	1/2" OD NEEDLE VALVE	2
8	1/2"OD CAP	2
9	BALL VALVE, SE - PIPING SCOPE	2

637

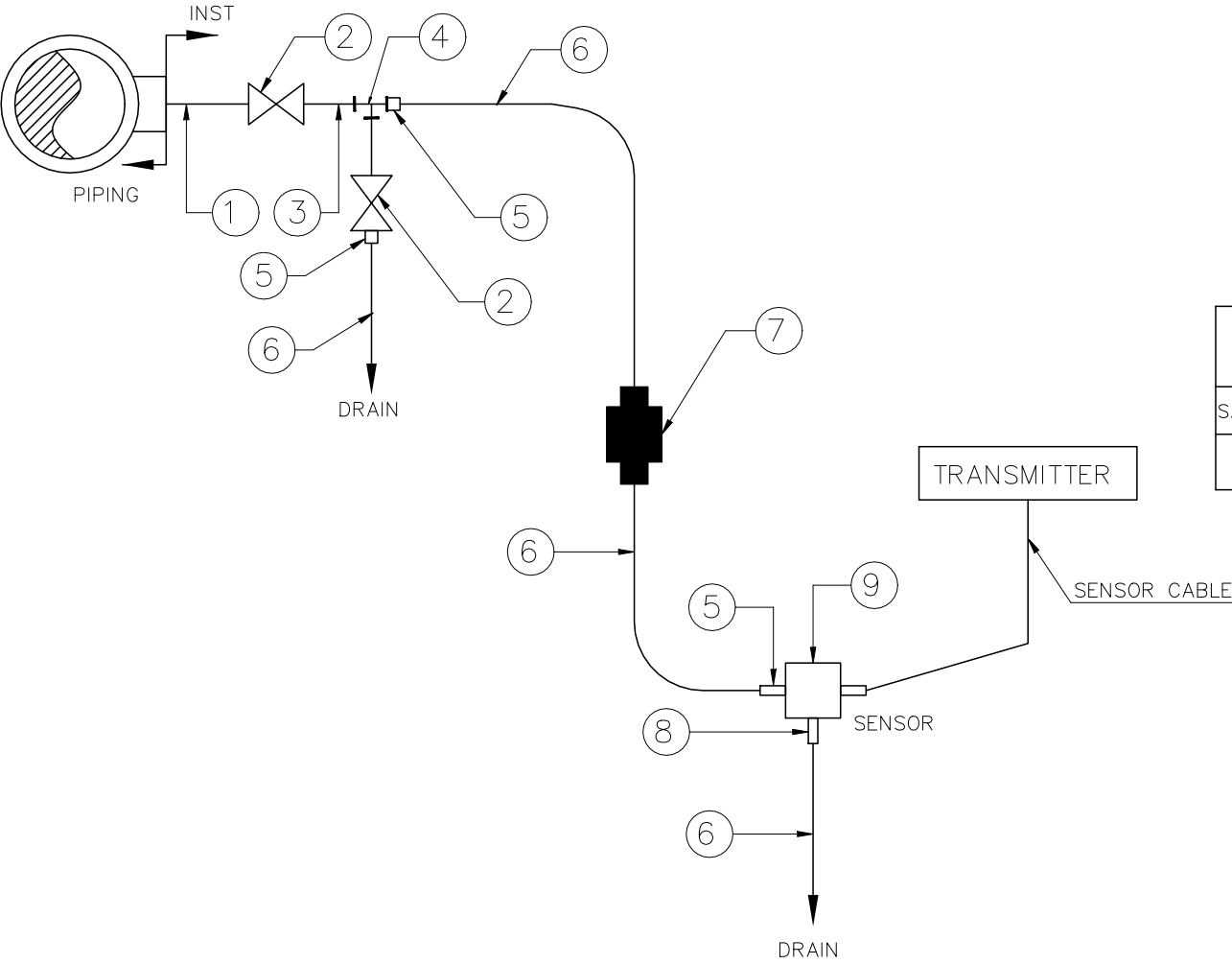
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0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019	SCALE	NTS
REV	DESCRIPTION	DRN	CHK	APRD	DATE	DATE	29.05.2019

PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI	OWNER: TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CONTRACTOR: BHARAT HEAVY ELECTRICALS LTD	CONSULTANT: DESEIN PRIVATE LIMITED
PROJECT ENGINEERING MANAGEMENT NOKIA	DESEIN HOUSE, NEW DELHI
APRD BY: PAK	CHK BY: MEC, MDA
CHK BY: E&I, KBP	CHK BY: PROS, HE
DRN BY: NS	SCALE: NTS
DATE: 29.05.2019	DATE: 29.05.2019

TITLE: INSTRUMENT HOOK UP DRAWING FOR STP
DRAWING NO: PE-V0-412-673-A048
SHEET 10 OF 16
REV. R1

PEL/D&D-F003

HOOK-UP FOR TURBIDITY ANALYZER



BILL OF MATERIAL				
ITEM NO.	DESCRIPTION	SIZE	MOC	QTY.
1	NIPPLE	1/2"SEx1/2"NPT(M) 150MM	UPVC	1 No's
2	BALL VALVE	1/2"NPT(F)	UPVC	2 No's
3	NIPPLE	1/2"NPT(M)-150MM	UPVC	1 No's
4	EQUAL TEE	1/2"NPT(F)	UPVC	1 No's
5	CONNECTOR	1/2"NPT(M)x1/2"OD	SS316	3 No's
6	IMPULSE TUBE	1/2"OD	SS316	4 Mts
7	UNION	1/2"OD	SS316	1 No's
8	CONNECTOR	1/4"NPT(M)x1/2"OD	SS316	1 No's
9	FLOW THROUGH,PP	VENDOR SCOPE	- -	1 No's

HOOK UP DRAWING BOM FOR TURBIDITY ANALYZER				
S.NO.	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRS-14-CQ-002	TREATED SEWAGE	TURBIDITY METER FOR OUTLET OF TREATED WATER DISPOSAL PUMPS	UPVC

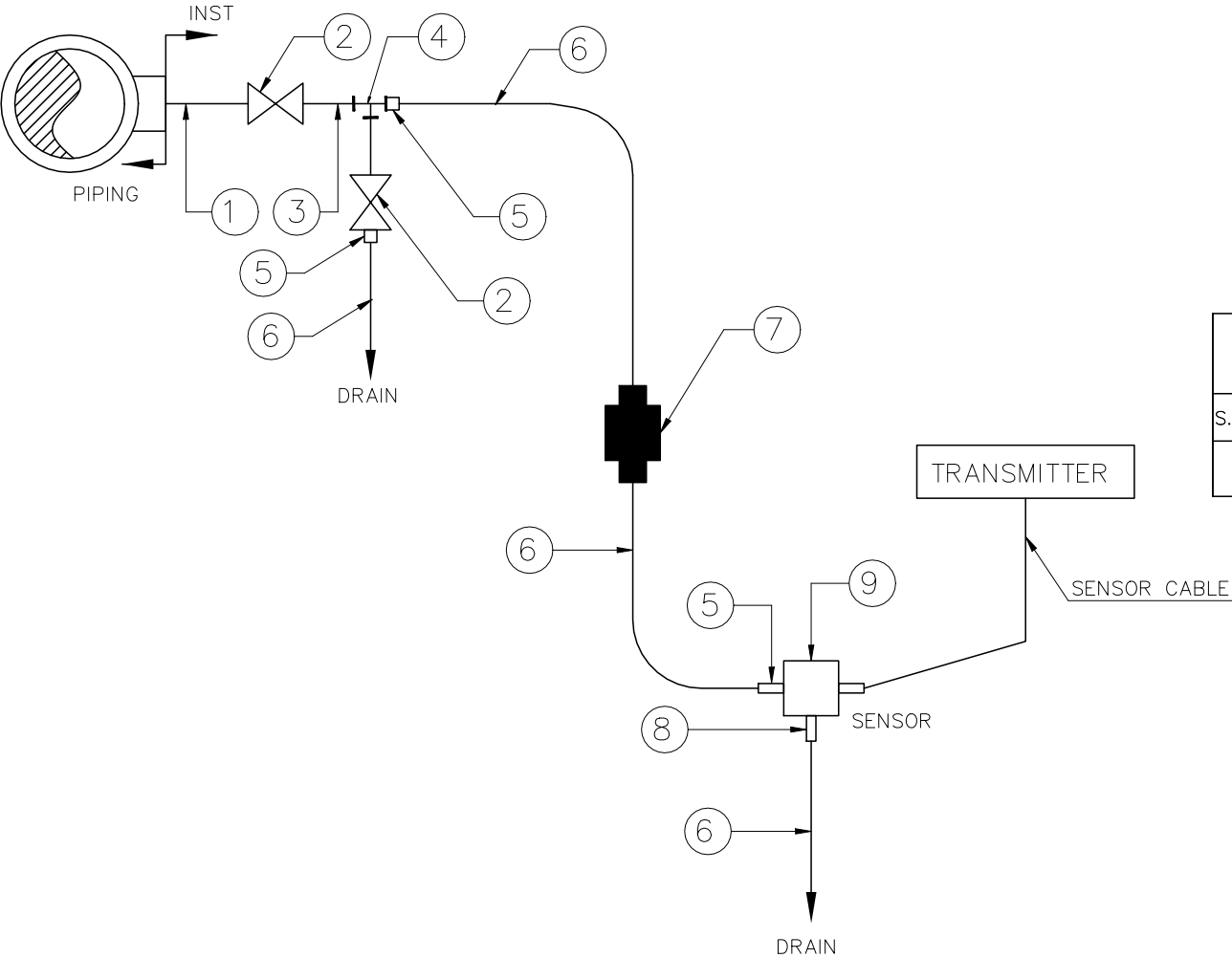
638

1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019	DRN BY	NS
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019	SCALE	NTS
REV	DESCRIPTION	DRN	CHK	APRD	DATE	DATE	29.05.2019

PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI	
OWNER	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CONSULTANT	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
CONTRACTOR	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT Noida
APRD BY	PAK
CHK BY	MEC. MDA
CHK BY	E&I KBP
CHK BY	PROS HE
DRN BY	NS
TITLE: INSTRUMENT HOOK UP DRAWING FOR STP	
DRAWING NO: PE-V0-412-673-A048	
SHEET	REV.
11 OF 16	R1

PEL/D&D-F003

HOOK-UP FOR pH ANALYZER



BILL OF MATERIAL				
ITEM NO.	DESCRIPTION	SIZE	MOC	QTY.
1	NIPPLE	1/2"SEx1/2"NPT(M) 150MM	UPVC	1 No's
2	BALL VALVE	1/2"NPT(F)	UPVC	2 No's
3	NIPPLE	1/2"NPT(M)-150MM	UPVC	1 No's
4	EQUAL TEE	1/2"NPT(F)	UPVC	1 No's
5	CONNECTOR	1/2"NPT(M)x1/2"OD	SS316	3 No's
6	IMPULSE TUBE	1/2"OD	SS316	4 Mts
7	UNION	1/2"OD	SS316	1 No's
8	CONNECTOR	1/4"NPT(M)x1/2"OD	SS316	1 No's
9	FLOW THROUGH,PP	VENDOR SCOPE	- -	1 No's

HOOK UP DRAWING BOM FOR pH ANALYZER				
S.NO.	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRS-14-CQ-001	TREATED SEWAGE	PH METER INDICATION FOR OUTLET OF TREATED WATER DISPOSAL PUMPS	UPVC

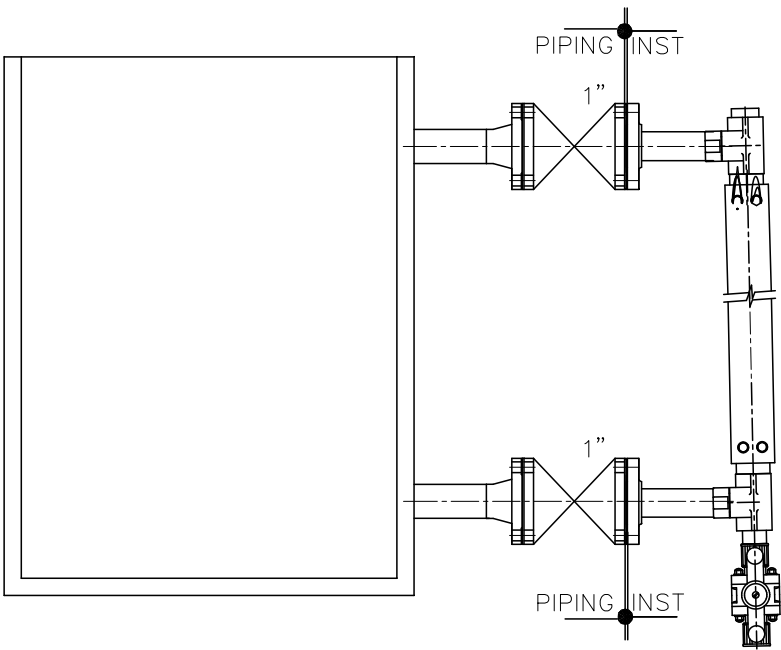
639

1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019	DRN BY	NS
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019	SCALE	NTS
REV	DESCRIPTION	DRN	CHK	APRD	DATE	DATE	29.05.2019

PROJECT:	2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI
OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
CONTRACTOR:	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT Noida
APRD BY:	PAK
CHK BY:	MEC. MDA
CHK BY:	E&I KBP
CHK BY:	PROS HE
DRN BY:	NS
SCALE:	NTS
DATE:	29.05.2019

TITLE:	INSTRUMENT HOOK UP DRAWING FOR STP
DRAWING NO:	PE-V0-412-673-A048
SHEET	12 OF 16
REV.	R1

HOOK UP DRAWING FOR TUBULAR TYPE LEVEL GAUGE



TANK

HOOK UP DRAWING BOM FOR
LEVEL GAUGE

BILL OF MATERIAL						
S.NO.	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.	CTC	TANK Ht.
1	90GRN-01-CL-101	HYPO	LEVEL INDICATION FOR SODIUM HYPO CHLORITE DOSING TANK (DT-01)	NA	400	625
2	90GRN-02-CL-101	HYPO	LEVEL INDICATION FOR HYPO DOSING TANK (DT-02)	NA	400	625
3	90GRN-03-CL-101	DWPE	LEVEL INDICATION FOR DWPE DOSING TANK (DT-03)	NA	600	955

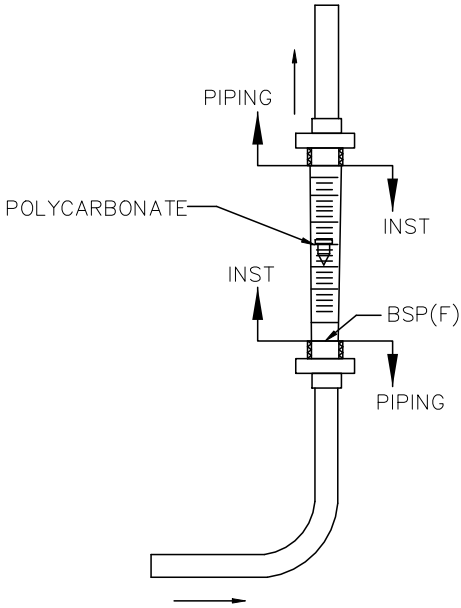
NOTES: -

1. Stud bolts and nuts shall be in piping scope
2. 1" Gasket shall be in piping scope

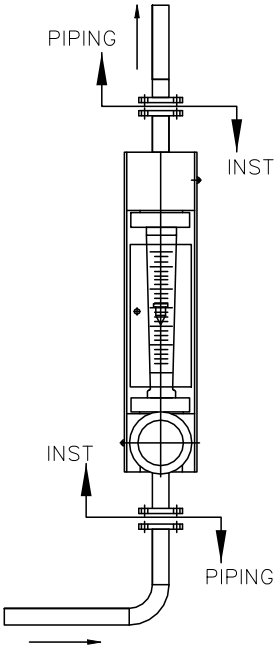
PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI	
OWNER	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
CONTRACTOR:	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT NOKIA
APRD BY:	PAK
CHK BY:	MEC. MDA
CHK BY:	E&I KBP
CHK BY:	PROS. HE
DRN BY:	NTS
SCALE:	NTS
DATE:	29.05.2019
TITLE: INSTRUMENT HOOK UP DRAWING FOR STP	
DRAWING NO:	PE-V0-412-673-A048
SHEET	REV.
13 OF 16	R1

PEL/D&D-F003

HOOK UP DRAWING FOR
ROTAMETER
FLOW INDICATOR



POLYCARBONATE ROTAMETER
(NON-METALIC)



GLASS TUBE ROTAMETER

HOOK UP DRAWING BOM FOR FLOW INDICATOR					
S.NO.	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.	FLANGE SIZE
1	90GRC-06-CF-501	AIR	DIFFUSER AIR FLOW INDICATION FOR EQUALIZATION TANK	GI	40NB
2	90GRS-10-CF-501	TREATED SEWAGE	INLET FLOW INDICATION FOR DUAL MEDIA FILTER	UPVC	50NB
3	90GRS-10-CF-502	TREATED SEWAGE	INLET FLOW INDICATION FOR ACTIVATED CARBON FILTER	UPVC	50NB
4	90GRS-14-CF-501	TREATED SEWAGE	COMMON OUTLET FLOW INDICATION FOR TREATED WATER DISPOSAL PUMPS (GRS12/13AP001)	UPVC	50NB

NOTES: -

1. For Online type Rotameters, the meter shall be mounted vertically for both horizontal as well as vertical flow direction.

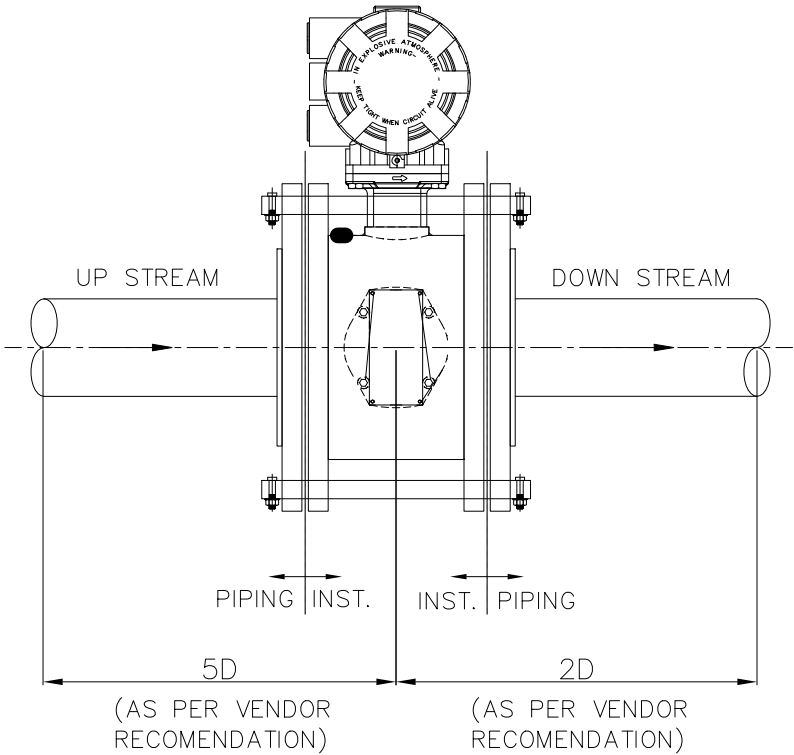
PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI					
OWNER		TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED			
		CONSULTANT: DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI			
CONTRACTOR		BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT NOKIA			
APRD BY	PAK	 PENNAR ENVIRO Re-engineering Floor No. 4/3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084			
CHK BY	MEC. MDA				
CHK BY	E&I KBP				
CHK BY	PROS HE				
DRN BY	NTS	TITLE: INSTRUMENT HOOK UP DRAWING FOR STP			
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019
REV	DESCRIPTION	DRN	CHK	APRD	DATE
1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019
REV	DESCRIPTION	DRN	CHK	APRD	DATE
1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019
REV	DESCRIPTION	DRN	CHK	APRD	DATE

641

PEL/D&D-F003

HOOK UP DRAWING FOR
MAGNETIC FLOW TRANSMITTER

S.NO	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90GRS-10-CF-001	TREATED SEWAGE	INLET FLOW INDICATION FOR DUAL MEDIA FILTER	UPVC
2	90GRS-10-CF-002	TREATED SEWAGE	INLET FLOW INDICATION FOR ACTIVATED CARBON FILTER	UPVC

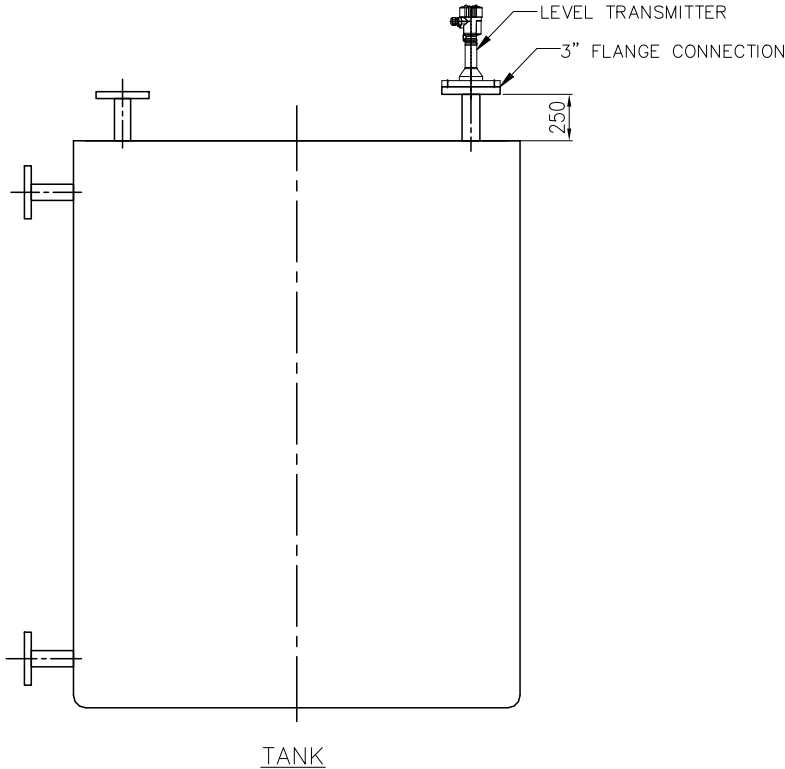


- NOTES: -
1. MINIMUM STRAIGHT LINE LENGTH OF 5D AND 2D SHALL BE MAINTAINED AT UP STREAM AND DOWN STREAM RESPECTIVELY.

PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI			
OWNER		TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED	
		CONSULTANT: DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI	
CONTRACTOR:		BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT Noida	
APRD BY:	PAK	 Re-engineering Floor No. 4/3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084	
CHK BY:	MEC. MDA		
CHK BY:	E&I KBP		
CHK BY:	PROS HE		
DRN BY:	NS	TITLE: INSTRUMENT HOOK UP DRAWING FOR STP	
0	ISSUED FOR APPROVAL	NS KBP PAK	23.03.2019
REV	DESCRIPTION	DRN CHK APRD	DATE
1	REVISED AS PER COMMENTS	NS SD PAK	29.05.2019
0	ISSUED FOR APPROVAL	NS KBP PAK	23.03.2019
REV	DESCRIPTION	DRN CHK APRD	DATE
1	REVISED AS PER COMMENTS	NS SD PAK	29.05.2019
0	ISSUED FOR APPROVAL	NS KBP PAK	23.03.2019
REV	DESCRIPTION	DRN CHK APRD	DATE

PEL/D&D-F003

HOOK UP DRAWING FOR
ULTRASONIC LEVEL TRANSMITTER



HOOK UP DRAWING BOM FOR
ULTRASONIC LEVEL TRANSMITTER

S.NO	TAG NO.	FLUID	SERVICE DESCRIPTION	LINE MOC.
1	90-GRS-01-CL-001	SEWAGE WATER	LEVEL INDICATION FOR SEWAGE SUMP S-01	NA
2	90-GRS-01-CL-002	SEWAGE WATER	LEVEL INDICATION FOR SEWAGE SUMP S-01	NA
3	90-GRS-02-CL-001	SEWAGE WATER	LEVEL INDICATION FOR SEWAGE SUMP S-02	NA
4	90-GRS-02-CL-002	SEWAGE WATER	LEVEL INDICATION FOR SEWAGE SUMP S-02	NA
5	90-GRS-03-CL-001	SEWAGE WATER	LEVEL INDICATION FOR SEWAGE SUMP S-03	NA
6	90-GRS-03-CL-002	SEWAGE WATER	LEVEL INDICATION FOR SEWAGE SUMP S-03	NA
7	90-GRS-04-CL-001	SEWAGE WATER	LEVEL INDICATION FOR SEWAGE SUMP S-04	NA
8	90-GRS-04-CL-002	SEWAGE WATER	LEVEL INDICATION FOR SEWAGE SUMP S-04	NA
9	90-GRS-05-CL-001	SEWAGE WATER	LEVEL INDICATION FOR COMMON COLLECTION SUMP	NA
10	90-GRS-05-CL-002	SEWAGE WATER	LEVEL INDICATION FOR COMMON COLLECTION SUMP	NA
11	90-GRS-06-CL-001	SEWAGE WATER	LEVEL INDICATION FOR EQUALIZATION TANK	NA
12	90-GRS-06-CL-002	SEWAGE WATER	LEVEL INDICATION FOR EQUALIZATION TANK	NA
13	90-GRS-07-CL-001	TREATED SEWAGE	LEVEL INDICATION FOR HYPO CONTACT (HC) /FILTER FEED TANK(FFT)	NA
14	90-GRS-07-CL-002	TREATED SEWAGE	LEVEL INDICATION FOR HYPO CONTACT (HC) /FILTER FEED TANK(FFT)	NA
15	90-GRS-15-CL-001	SEWAGE SUMP	LEVEL INDICATION FOR SLUDGE HOLDING TANK	NA
16	90-GRS-15-CL-002	SEWAGE SUMP	LEVEL INDICATION FOR SLUDGE HOLDING TANK	NA
17	90-GRN-01-CL-001	HYPO	LEVEL INDICATION FOR SODIUM HYPO CHLORITE DOSING TANK (DT-01)	NA
18	90-GRN-01-CL-002	HYPO	LEVEL INDICATION FOR SODIUM HYPO CHLORITE DOSING TANK (DT-01)	NA
19	90-GRN-02-CL-001	HYPO	LEVEL INDICATION FOR HYPO DOSING TANK (DT-02)	NA
20	90-GRN-02-CL-002	HYPO	LEVEL INDICATION FOR HYPO DOSING TANK (DT-02)	NA
21	90-GRS-11-CL-001	TREATED WATER	LEVEL INDICATION FOR TREATED WATER TANK	NA
22	90-GRS-11-CL-002	TREATED WATER	LEVEL INDICATION FOR TREATED WATER TANK	NA

643

1	REVISED AS PER COMMENTS	NS	SD	PAK	29.05.2019	DRN BY	NS
0	ISSUED FOR APPROVAL	NS	KBP	PAK	23.03.2019	SCALE	NTS
REV	DESCRIPTION	DRN	CHK	APRD	DATE	DATE	29.05.2019

PROJECT: 2x660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI
OWNER: TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
CONSULTANT: DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
CONTRACTOR: BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT NOIDA
APRD BY: PAK
CHK BY: MEC, MDA
CHK BY: E&I, KBP
CHK BY: PROS, HE
DRN BY: NS
SCALE: NTS
DATE: 29.05.2019
TITLE: INSTRUMENT HOOK UP DRAWING FOR STP
DRAWING NO: PE-V0-412-673-A048
SHEET 16 OF 16
REV. R1

TAMILNADU GENERATION AND DISTRIBUTION CORPORATION

APPROVED WITH COMMENTS

From Er. N.Mala, B.E., Superintending Engineer/Electrical, Thermal Hydro Projects, TANGEDCO, 5 th Floor, Western wing, 144,NPKRR Maaligai, Anna salai, Chennai-2 Tel: 044-28521591, Mobile:+919445857544. Email: sethhyp@tnebnet.org.	To Bharat Heavy Electricals Limited, POWER PROJECT ENGINEERING INSTITUTE HRD & ESI COMPLEX NOIDA - 201301(U.P)
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Lr.No.SE/E/THPro./EE2/AEE/F.BHEL/PEM/ D. 584 /19 dtd. 14 .06.2019					
Project Title	2x660 MW ENNORE SEZ Supercritical TPP				
TANGEDCO REFERENCE No.	LOA. Lr.No. CE/P/SE/M/P/EE-10/E/P/F.2x660 MW Ennore SEZ STPP/D.60/14,dt.27.09.2014				
BHEL Reference No:	1. BHEL Email dated 10.06.2019 2. Desein Comment Ref.No .2119 dt .11.06.2019				
Subject	TANGEDCO – TDS-INSTRUMENTS - PRESSURE GAUGES - STP (Part-2) Documents / Drawings received from BHEL / PEM- Reg				

Sir,
The Comments on the drawing/document submitted by M/s BHEL on the above subject vide BHEL transmittal under reference is furnished below.

Sl. No	DRG/DOC.No:	DESCRIPTION	Rev No.	Status	Remarks
01	PE-V0-412-673-A013B	TDS-INSTRUMENTS - PRESSURE GAUGES - STP (Part-2)	00	03	M/s. BHEL is requested to submit the revised documents/ drawings after suitably incorporating the comments

Status : Category **1**- Approved. Category: **2** – Approved with comments, Resubmit for approval under, Category **1**. Category **3** – Not approved (See attachment Memo) Resubmit for approval. Category **4** – Information furnished is noted.

Yours faithfully,

....Sd.14.06.2019...

Superintending Engineer/Thhyp/Projects-I

Copy to Shri E.V. Anand/DESEIN Consultants India Pvt. Ltd.,DESEIN HOUSE,Greater Kailash-II New Delhi-48 (E-Mail)

Copy submitted to The Chief Engineer/Civil/Ennore SEZ/Chennai 600120.(E-Mail)

ANNEXURE

S.No.	TANGEDCO Comments
1.	Snubbers/Pulsation dampers shall be used, where the process media is unstable for measurement such as the discharge of a pump as per technical specification Vol. V, cl.no. 3.03.01, 3.03.02, 3.03.03 and Technical specification/Contract Vol. VII, Installation drawings.
2.	BHEL to also note as per TANGEDCO's Letter no: SE/E/T&H(P)/EE-8 /F.2x660MW Ennore SEZ STPP/D 95 / 15 , dated 01.07.2015 for Sea/Saline water services, following shall be applicable:-
i.	For Low Pressure application, MOC of impulse tubing & impulse pipe shall be CPVC (3/8") Sch 80 or better, Industrial grade up to manifold. MOC of impulse tubing, fittings (from manifold to instrument) and manifold shall be super duplex SS.
ii.	As per EDN DOCUMENT, ASTM D1784 CPVC PIPE(INDUSTRIAL GRADE) - 1/2"NB SCH 80 SHALL be included.
iii.	For High pressure application, MOC of Impulse tubing, impulse pipes, fittings and manifold shall be super duplex SS (1/2"). BHEL to follow the above requirements in totality.
3.	In General 2 valve manifold shall be used for Pressure Gauges/switches/transmitters
4.	Material of Top chamber shall also be SS316.
5.	Scale detail shall be added like 270 degree dial rotation/deflection. Graduations in black lines on white dial provided with glass cover. Smallest scale division shall be one (1) percent of full scale value or smaller .Pointer stop for all gauges
6.	External zero adjustment shall be provided inline with technical specifications vol. V, Ch-3, cl. No. 3.03.03.
7.	As per technical specification, Vol. V, Ch-3, cl. No. 3.03.03, BHEL to provide Rubber blow out disc with open front construction for Ranges 5 to 20 Kg/cm2.
8.	As per technical specification, Vol. V, Ch-3, cl. No. 3.03.03, BHEL to provide Neoprene safety diaphragm at the back with solid front construction for Ranges above 20 Kg/cm2.

....Sd.14.06.2019...
 Superintending Engineer/THHYP

R0	27.05.2019	FOR INFORMATION						
REV.	DATE			TT	SD			
				PREP.	CHK.			
					PAK			
					APPR.			
PROJECT:			THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.					
		OWNER:	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED					
		OWNER'S CONSULTANT:	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI					
		EPC CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA					
		PACKAGE:	75 KLD SEWAGE TREATMENT PLANT					
		SUB CONTRACTOR :	PENNAR INDUSTRIES LIMITED ENVIRO BUSINESS UNIT HYDERABAD INDIA					
DEPT.	CODE		SCALE	WEIGHT (KG)	REF DRG.			
--	A		--	—	—			
TITLE TDS—INSTRUMENTS—PRESSURE GAUGES —STP— (PART-2)					NAME	SIGN	DATE	
					PREP	TT	27.05.2019	
					CHKD	SD	27.05.2019	
					APPD	PAK	27.05.2019	
DEPT.					CARD CODE	BHEL DOC NO. PE—V0—412—673—A013B		REV
SIGN					—	PEL DOC NO. -----		R0
DATE						NO. OF SHEETS— 7 (EXCLUDING COVER PAGE)		



PENNAR INDUSTRIES LIMITED

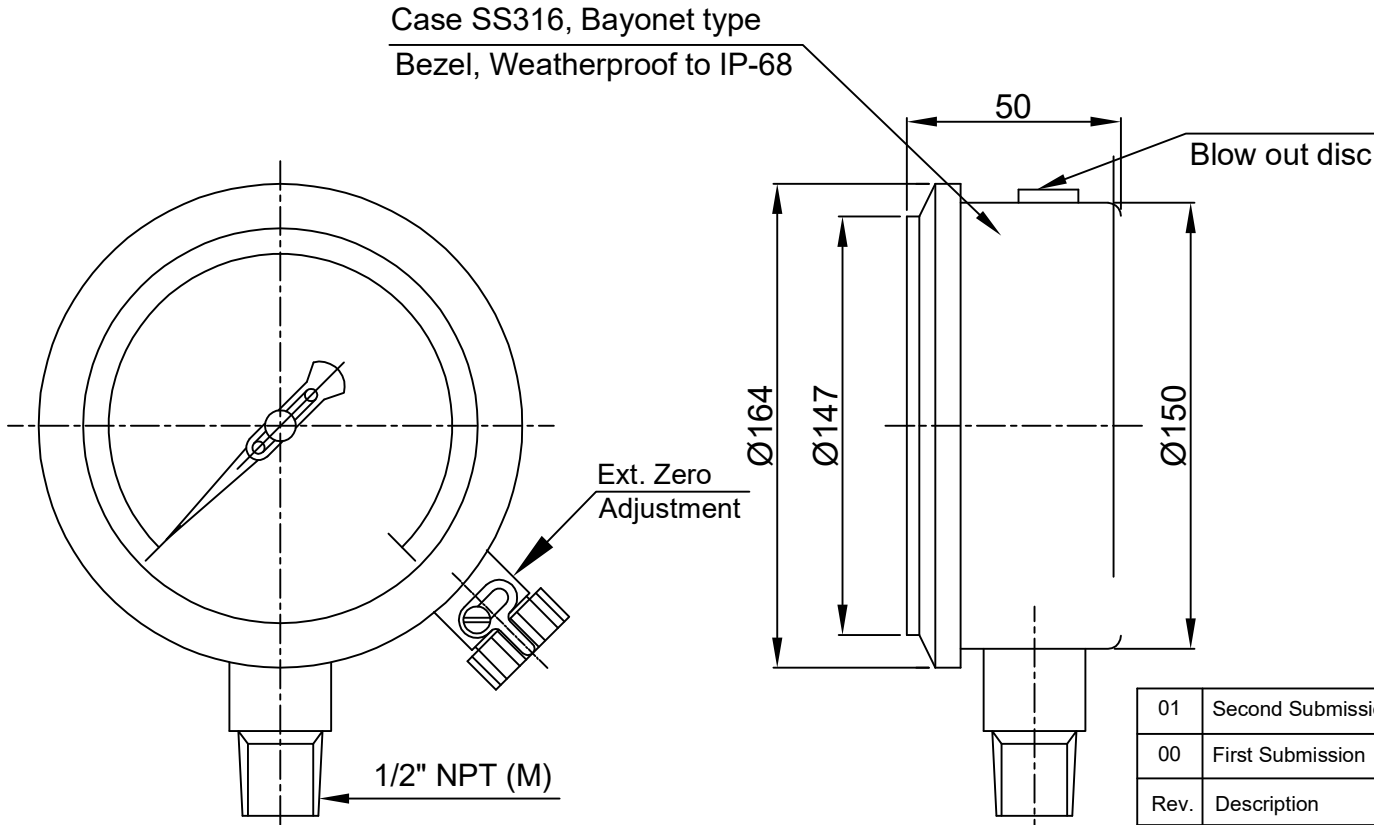
ENVIRO BUSINESS UNIT

1	PROJECT NAME	75 KLD SEWAGE TREATMENT PLANT	DATE	27.05.2019		
2	CLIENT	M/S. BHARAT HEAVY ELECTRICALS LTD, NEW DELHI	REV. NO	0		
3	CONTRACTOR	PENNAR INDUSTRIES LIMITED, ENVIRO BUSINESS UNIT, HYDERABAD, INDIA				
4	DATASHEET NO	PE-V0-412-673-A013B				
DATA SHEET FOR - PRESSURE GAUGE (BOURDON)						
5	GENERAL DATA	Tag No	As per Annexure-1			
6		Service	As per Annexure-1			
7		P&ID No	As per Annexure-1			
8		Equipment No/Line No	As per Annexure-1			
9		Quantity	As per Annexure-1			
10	PROCESS DATA	Medium/Service	As per Annexure-1			
11			Min	Normal	Max	
12		Temperature(°C)	10	35	50	
13		Operating Pressure(kg/cm ²)	See Annexure-1			
14	ENVIRONMENTAL CONDITION	Amb. Temp.(°C)	Min	Max	0	50
15		Rel. Humidity(%)	Min	Max	0	95
16	CONNECTION	Process Connection Size(inch)	1/2"NPT(F)			
17		Instruments Connection	1/2"NPT(M)			
18		Type	Threaded			
19	PURCHASE DATA	Manufacturer	GIC			
20		Model	As per Annexure-1			
22	GAUGE	Reference Standard	EN-837-1			
24		Mounting	Bottom Entry, Local Mounting			
25		Dial Size(mm)	6"(150mm) ,Aluminium, White Background with Black Marking			
26		Case & Bezel	SS316, Bayonet type bezel, Weatherproof to IP-68 as per IEC :60529			
27		Window Material	Shatterproof Glass			
28		Bourdon	SS 316			
29		Socket	SS 316			
30		Movement	SS 316			
31		Connection	1/2"NPT(M)			
32		Range	As per Annexure-1			
33		Accuracy	+/- 1% FSD			
34		Over Range	150% of full Scale			
35		Zero Reset	Micrometer Pointer			
36		Pointer	Light Weight Pointer with Black Colour			
37		Blow out Disc	Provided (Neoprene) on top of case			
38		ACCESSORIES	Tag Plate - (for all Gauges)	Provided - (SS Tag Plate)		
39			3 Way Needle Valve (For all gauges)	Provided -(Moc, SS 316 1/2"NPTFx1/2"NPTFx1/2"NPTF)		
40			External Zero Adjustment (For All Gauges)	Provided		
PREPARED BY		CHK BY	APPROVED BY	DATE	REMARKS	
TEJASWINI		SD	PK	27.05.2019	ISSUED FOR CLIENT APPROVAL	

Annexure -1 (PRESSURE GAUGE- BOURDON)										
SL.NO	KKS TAG NO.	P&ID NO.	INST. TYPE	FLUID	SERVICE	OPERATING RANGE IN Kg/cm ²	INSTRUMENT RANGE in kg/cm2	ACCESSORIES	MODEL NO.	REMARKS
1	90QFB60CP501	PEL-12171037-PRO-PID-001	BOURDON	AIR	OUTLET PRESSURE INDICATION FOR INSTRUMENT AIR	6	0-10	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-S6S-15NTM-Range (0-10)-KSC-L	
2	90GRC01CP501	PEL-12171037-PRO-PID-001	BOURDON	AIR	OUTLET PRESSURE INDICATION FOR AIR BLOWERS (90GRC01AN001) FOR COMMON SUMP, EQT & ST	0.4	0-1	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-S6S-15NTM-Range (0-1)-KSC-L	
3	90GRC01CP502	PEL-12171037-PRO-PID-001	BOURDON	AIR	OUTLET PRESSURE INDICATION FOR AIR BLOWERS (90GRC01AN002) FOR COMMON SUMP, EQT & ST	0.4	0-1	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-S6S-15NTM-Range (0-1)-KSC-L	
4	90GRC01CP503	PEL-12171037-PRO-PID-001	BOURDON	AIR	COMMON DISCHARGE PRESSURE INDICATION FOR AIR BLOWERS (90GRC01AN001/2) FOR COMMON SUMP, EQT & ST	0.4	0-1	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-S6S-15NTM-Range (0-1)-KSC-L	
5	90GRC02CP501	PEL-12171037-PRO-PID-001	BOURDON	AIR	OUTLET PRESSURE INDICATION FOR AIR BLOWERS (90GRC01AN002)FOR MBBR AERATION TANK	0.5	0-1	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-S6S-15NTM-Range (0-1)-KSC-L	
6	90GRC02CP502	PEL-12171037-PRO-PID-001	BOURDON	AIR	OUTLET PRESSURE INDICATION FOR AIR BLOWERS (90GRC02AN002)FOR MBBR AERATION TANK	0.5	0-1	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-S6S-15NTM-Range (0-1)-KSC-L	
7	90GRC02CP503	PEL-12171037-PRO-PID-001	BOURDON	AIR	COMMON DISCHARGE PRESSURE INDICATION FOR AIR BLOWERS (90GRC02AN002)FOR MBBR AERATION TANK	0.5	0-1	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-S6S-15NTM-Range (0-1)-KSC-L	
8	SPARE-1						0-10	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-S6S-15NTM-Range (0-10)-KSC-L	
9	SPARE-2						0-1	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-S6S-15NTM-Range (0-1)-KSC-L	
PREPARED BY		CHK BY		APPROVED BY			REV NO	Date		
TEJASWINI		SD		PK			0	27.05.2019		

Ø UNSPECIFIED TOLERANCE ± 1 mm

ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED



BSPG-V
Accuracy : ±1% FSD
Over Range : 150% FSD

01	Second Submission	PP	AM	AM	17.05.2019.
00	First Submission	AG	AM	AM	07.05.2019.
Rev.	Description	Drawn	Checked by	Approved by	Dated
Drawing No. : F000010 A					
Client	M/s. Pennar Enviro Limited				
Consultant	----				
Project	----				
End User	----				
Ref	PO.NO. PEL-WP-BHEL-ENNORE-010			Dated. 02.05.2019	
Title	Bourdon Sensing Pressure Gauges				
Gauges Bourdon (India) Pvt. Ltd. MFG UNIT OF GENERAL INSTRUMENTS CONSORTIUM Unit 1) Plot No.4,5,6 Jawahar Co-op.Indl.Estate,Near M.G.M College, 3744/3745 Fax:022-2742 1091,E-mail:gbipl@bom8.vsnl.net.in Unit 2) Plot No.144 Jawahar Co-op.Indl.Estate,Near M.G.M College, Mob-09819750005,E-mail:gbip2@general-gauges.com Kamothe,Panvel-410209,Ph.No.022-2742 1095/1903					



PENNAR INDUSTRIES LIMITED

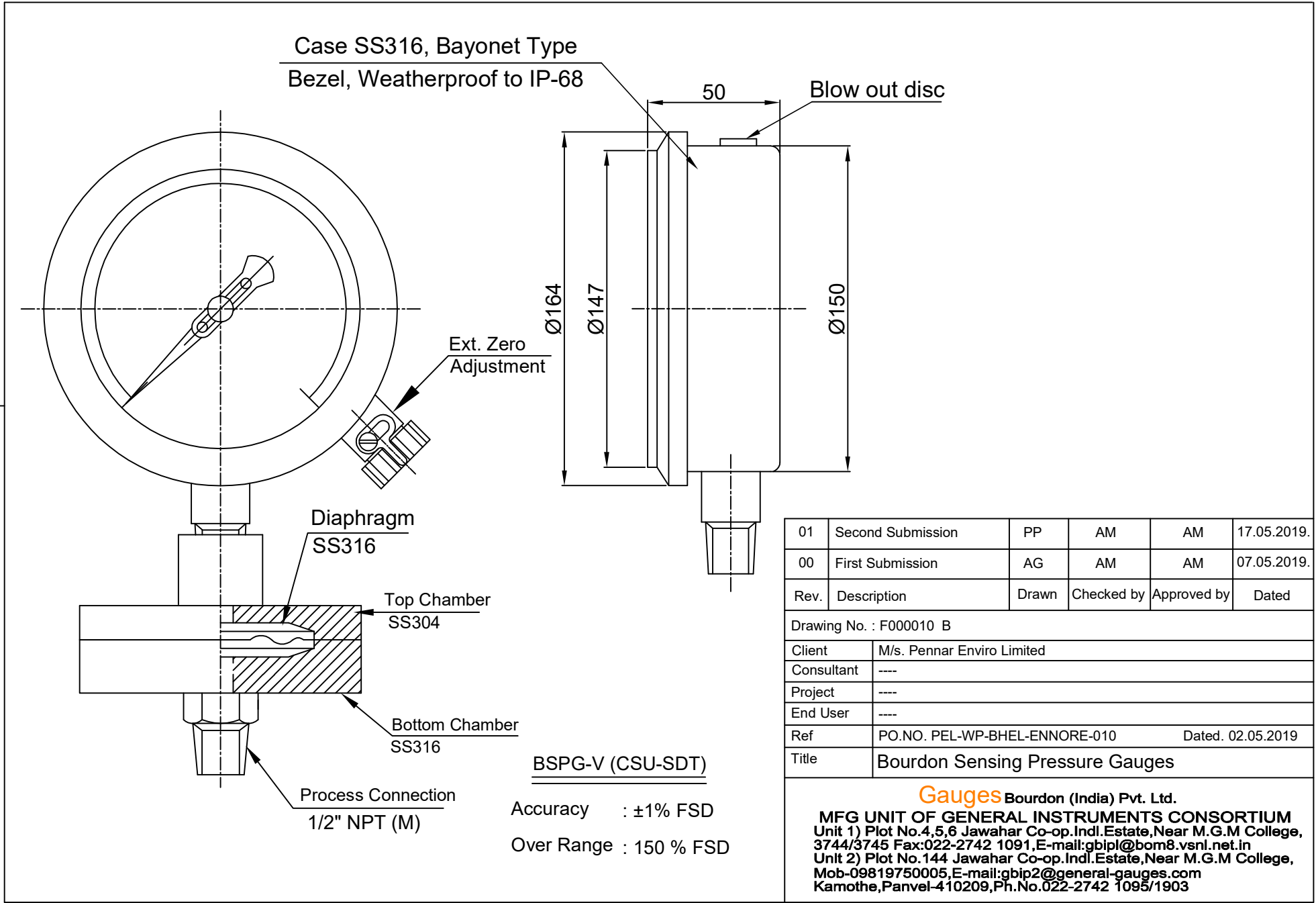
ENVIRO BUSINESS UNIT

1	PROJECT NAME	75 KLD SEWAGE TREATMENT PLANT		DATE	27.05.2019		
2	CLIENT	M/S. BHARAT HEAVY ELECTRICALS LTD, NEW DELHI		REV. NO	R0		
3	CONTRACTOR	PENNAR INDUSTRIES LIMITED, ENVIRO BUSINESS UNIT, HYDERABAD, INDIA					
4	DATASHEET NO	PE-V0-412-673-A013B					
DATA SHEET FOR - PRESSURE GAUGE (DIAPHRAGM)							
5	GENERAL DATA	Tag No	As Per Annexure -2				
6		Service	As Per Annexure -2				
7		P&ID No	As Per Annexure -2				
8		Equipment No/Line No	As Per Annexure -2				
9		Quantity	As Per Annexure -2				
10	PROCESS DATA	Medium/Service	As Per Annexure -2				
11			Min	Normal	Max		
12		Temperature(°C)	10	35	50		
13		Operating Pressure(kg/cm ²)	As Per Annexure -2				
14	ENVIRONMENTAL CONDITION	Amb. Temp.(°C)	Min	Max	0	50	
15		Rel. Humidity(%)	Min	Max	0	95	
16	CONNECTION	Process Connection Size(inch)	1/2"NPT(F)				
17		INSTRUMENT CONNECTION	1/2"NPT(M)				
18		Type	Threaded				
19	PURCHASE DATA	Manufacturer	GIC				
20		Model	As Per Annexure -2				
21	GAUGE	Type	Diaphragm				
22		Dial Size	6"(150mm),Aluminium,White background with Black Marking				
23		Case & Bezel	SS316,bayonet type bezel,Weather proof to IP-68 as per IEC:60529				
24		Window	Safety glass				
25		Bourdon / Socket	SS 316				
26		Movement	SS 316				
27		Range	As Per Annexure -2				
28		Accuracy	+/- 1% FSD				
29		Over Range	150 % FSD				
30		Zero Reset	Micrometer Pointer External Knob				
31		Blow out Disc	Provided (Neroprene) on the Top of the Case				
32		DIAPHRAGM SEAL UNIT FOR THE ABOVE GAUGE					
33		Model No	As Per Annexure -2				
34		Top Chamber	SS 304				
35		Diaphragm	SS 316				
36		Bottom Flange	SS 316				
37		Connection	1/2" NPT(M)				
38	Filling Fluid	Silicone Oil					
39							
40	ACCESSORIES	Tag Plate - (For all Gauges)	Provided - (SS Tag Plate)				
41		3 Way Needle Valve (For all gauges)	Provided -(Moc, SS 316 1/2"NPTFx1/2"NPTFx1/2"NPTF)				
42		External Zero Adjustment (For All Gauges)	Provided				
43		Armored Capillary of 10m for Corrosive Liquid Service	Provided for Tag No 90GRN01CP501 and 90GRN02CP501 (For Hypo fluids)				
PREPARED BY		CHK BY	APPROVED BY	DATE	REMARKS		
TEJASWINI		SD	650 PK	27.05.2019			

Annexure -2 (PRESSURE GAUGE- DIAPHRAGM)											
SL.NO	KKS TAG NO.	P&ID NO.	INST. TYPE	FLUID	SERVICE	OPERATING RANGE IN Kg/cm ²	INSTRUMENT RANGE in kg/cm2	ACCESSORIES	MODEL NO.	REMARKS	
1	90GRS05CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR COMMON COLLECTION SUMP PUMPS (90GRS05AP001)	1.2	0-2.5	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-2.5)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
2	90GRS05CP502	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR COMMON COLLECTION SUMP PUMPS (90GRS05AP002)	1.2	0-2.5	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-2.5)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
3	90GRS06CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR MBBR FEED PUMP (90GRS06AP001)	1.2	0-2.5	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-2.5)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
4	90GRS06CP502	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OUTLET PRESSURE INDICATION FOR MBBR FEED PUMP (90GRS06AP002)	1.2	0-2.5	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-2.5)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
5	SPARE-1	--	DIAPHRAGM	--	--	--	0-2.5	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-2.5)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
6	SPARE-2	--	DIAPHRAGM	--	--	--	0-2.5	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-2.5)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
7	90GRS12CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	TREATED SEWAGE	OUTLET PRESSURE INDICATION FOR TREATED WATER DISPOSAL PUMPS (90GRS12AP001)	2	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
8	90GRS13CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	TREATED SEWAGE	OUTLET PRESSURE INDICATION FOR TREATED WATER DISPOSAL PUMPS (90GRS12AP001)	2	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
9	90GRS01CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OULET PRESSURE INDICATION FOR SUMP-1 SEWAGE TRANSFER PUMPS (90GRS01AP001)	4	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
10	90GRS01CP502	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OULET PRESSURE INDICATION FOR SUMP-1 SEWAGE TRANSFER PUMPS (90GRS01AP002)	4	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
11	90GRS02CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OULET PRESSURE INDICATION FOR SUMP-2 SEWAGE TRANSFER PUMPS (90GRS02AP001)	4.9	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
12	90GRS02CP502	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OULET PRESSURE INDICATION FOR SUMP-2 SEWAGE TRANSFER PUMPS (GRS02AP002)	4.9	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
13	90GRS03CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OULET PRESSURE INDICATION FOR SUMP-3 SEWAGE TRANSFER PUMPS (90GRS03AP001)	3.3	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
14	90GRS03CP502	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OULET PRESSURE INDICATION FOR SUMP-3 SEWAGE TRANSFER PUMPS (90GRS03AP002)	3.3	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
15	90GRS04CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OULET PRESSURE INDICATION FOR SUMP-4 SEWAGE TRANSFER PUMPS (90GRS04AP001)	3.3	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
16	90GRS04CP502	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE WATER	OULET PRESSURE INDICATION FOR SUMP-4 SEWAGE TRANSFER PUMPS (90GRS04AP001)	3.3	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
17	90GRS08CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	TREATED SEWAGE	OUTLET PRESSURE INDICATION FOR FILTER FEED PUMPS (90GRS08AP001)	3.5	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
18	90GRS09CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	TREATED SEWAGE	OUTLET PRESSURE INDICATION FOR FILTER FEED PUMPS (90GRS09AP001)	3.5	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
19	90GRB01CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	TREATED SEWAGE	FEED INLET PRESSURE INDICATION FOR DUAL MEDIA FILTER	3.5	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
20	90GRB01CP502	PEL-12171037-PRO-PID-001	DIAPHRAGM	TREATED SEWAGE	BACKWASH INLET & FEED OUTLET PRESSURE INDICATION FOR DUAL MEDIA FILTER	3.5	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
21	90GRB02CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	TREATED SEWAGE	FEED INLET PRESSURE INDICATION FOR ACTIVATED CARBON FILTER	3	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
22	90GRB02CP502	PEL-12171037-PRO-PID-001	DIAPHRAGM	TREATED SEWAGE	BACKWASH INLET & FEEDOUTLET PRESSURE INDICATION FOR ACTIVATED CARBON FILTER	3	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-2.5)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
23	90GRS15CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE SLUDGE	OUTLET PRESSURE INDICATION FOR SLUDGE TRANSFER PUMPS(90GRS15AP001)	3	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
24	90GRS15CP502	PEL-12171037-PRO-PID-001	DIAPHRAGM	SEWAGE SLUDGE	OUTLET PRESSURE INDICATION FOR SLUDGE TRANSFER PUMPS (90GRS15AP002)	3	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
25	SPARE-3	--	DIAPHRAGM	--	--	--	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
26	SPARE-4	--	DIAPHRAGM	--	--	--	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
27	SPARE-5	--	DIAPHRAGM	--	--	--	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
28	SPARE-6	--	DIAPHRAGM	--	--	--	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-DC2L		
29	90GRN01CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	HYPO	OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMP (DP-01)	2	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment 4)Capillary - 10 mtrs	BSPG-V-150-S4S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-4AR(10 mtrs)-DC2		
30	90GRN02CP501	PEL-12171037-PRO-PID-001	DIAPHRAGM	HYPO	OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMP (DP-02)	4.5	0-6	1)Tag Plate 2) 3Way needvalve 3) Ext Adjustment 4)Capillary - 10 mtrs	BSPG-V-150-S6S-S6S-S6S-T15NTM-(Range 0-6)-KSC-CSU-SDT-S4S-S6S-S6S-T15NTM-4AR(10 mtrs)-DC2		
PREPARED BY				CHK BY			APD BY				
TEJASWINI				SD			PK				

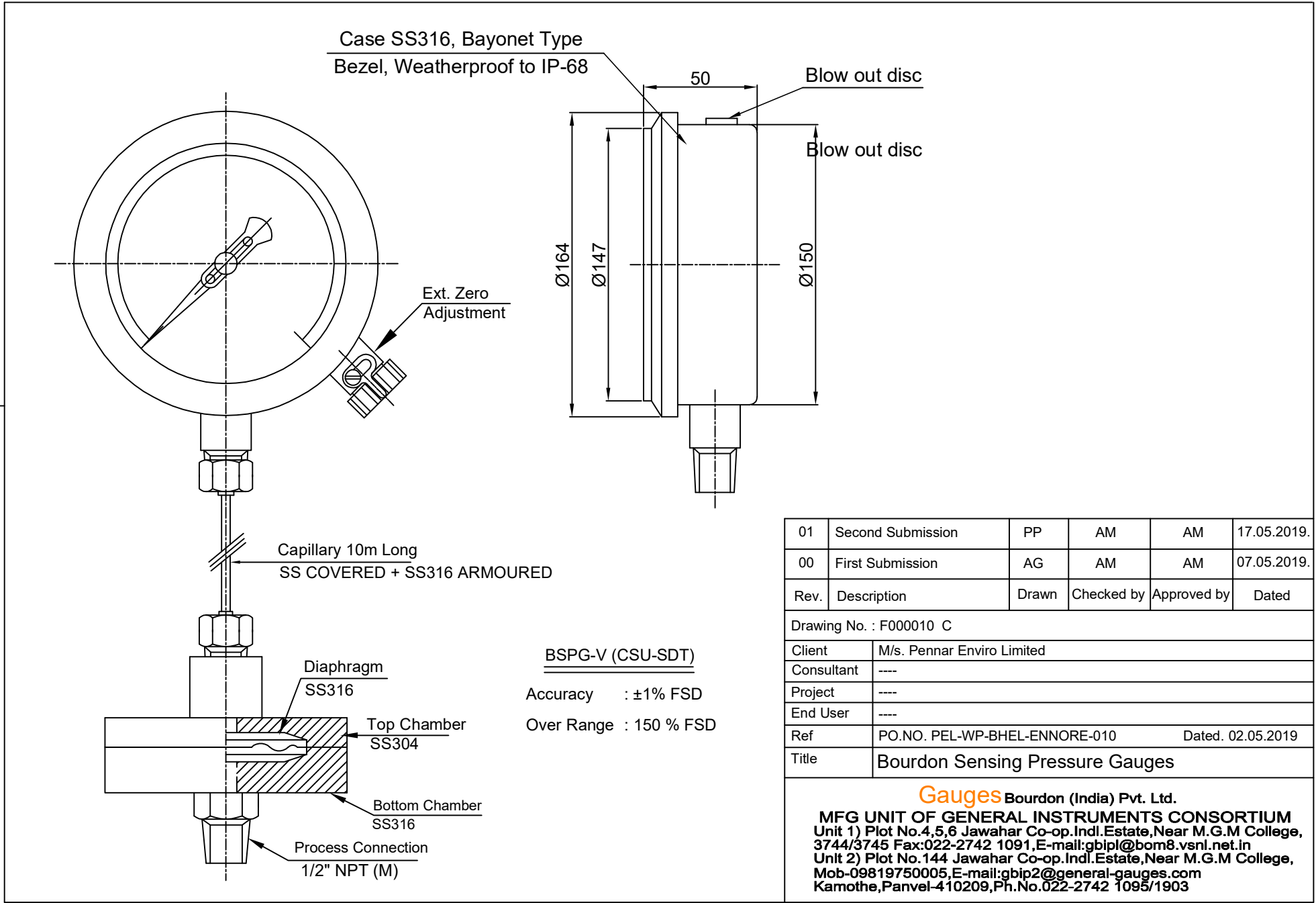
Ø UNSPECIFIED TOLERANCE ± 1 mm

ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED



Ø UNSPECIFIED TOLERANCE ± 1 mm

ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED





TITLE:
**TECHNICAL SPECIFICATION FOR
SEWAGE TREATMENT PLANT.**
2X660 MW ENNORE SEZ STPP, CHENNAI

BHEL DOCUMENTS NO.: PE-TS-412-673-A002	
VOLUME III	
REV. NO. 0.0	DATE:
Page	

LIST OF SCHEDULES



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**TECHNICAL SPECIFICATION FOR
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BHEL DOCUMENTS NO.: PE-TS-412-673-A002

VOLUME **III**

REV. NO. 0.0

DATE:

Page

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					
			655		
NAME	DESIGNATION	SIGNATURE	DATE		COMPANY SEAL



TITLE:

TECHNICAL SPECIFICATION FOR SEWAGE TREATMENT PLANT.

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BHEL DOCUMENTS NO.: PE-TS-412-673-A002

VOLUME **III**

REV. NO. 0.0

DATE:

Page

COMPLIANCE CUM CONFIRMATION SCHEDULE

The bidder shall confirm compliance with following by signing/ stamping this compliance certificate and furnishing 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/ deviations with regard to same.
- b.) QP/ test procedures shall be submitted in the event of order based on the guidelines given in the specification & QP enclosed therein.
QP will be subject to BHEL/Customer approval in the event of order & 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.
The charges for 3rd party inspection (Lloyds, TUV or equivalent) for imported components shall be included in the base price of the equipment by the bidder
- c.) All drawings/data – sheets etc. to be submitted during contract shall be subject to BHEL/Customer review/ approval. GA drawings, as submitted with offer at tender stage are for reference purpose only and shall be subject to approval during contract stage.
- d.) There are no deviations with respect to specification.
- e.) The offered materials shall be either equivalent or superior to those specified. Also for components where material is not specified it shall be suitable for intended duty, materials shall be subject to approval in the event of order.
- f.) The commissioning spares (if any) are supplied on 'As Required Basis' & prices for same included in the base price (If bidders reply to this is "No commissioning spares are required" and if some spares are actually required during commissioning same shall be supplied by bidder without any cost to BHEL).
- g.) All sub vendors shall be subject to BHEL/CUSTOMER approval.
- h.) Any special tools & tackles, if required, shall be in bidder's scope.
- i.) Demonstration parameters shall stand valid till the satisfactory completion of demonstration test and its acceptance by BHEL/Customer.

* SCHEDULE OF DECLARATIONS

VOL III

SHEET..... OF.....

DECLARATION

Bider's Name	The bidder hereby agrees to fully comply with the requirements and intent of this specification for the price indicated
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Page 643 of 643