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-A014		
DOC NAME: TECHNICAL DATASHEET OF BLOWER		
COMMENTS RESOLUTION SHEET		
S.NO	**TANGEDCO**	**BHEL/PEL REPLY**
1	BHEL to incorporate the package name in the document title.	Noted and Incorporated
2	BHEL to incorporate the make & model.	Noted and Incorporated
3	BHEL to furnish all the details where mentioned “AS per approved vendor & tender specification.”	Noted and Incorporated
4	BHEL to submit the pump GADs & curves.	Noted and Incorporated
5	BHEL to ensure that the capacity & head shall be in line with approved Process calculation.	Noted and confirmed
6	BHEL to provide Blower for DMF as commented on Process calculation	Process sizing calculation is approved and no blower is envisaged as per approval.

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

CONTENTS

1. BLOWERS

SR.NO	DESCRIPTION	PAGES
1.1	AIR BLOWER FOR COMMON SUMP,EQT & ST_ 90GRC01 AN001/02	4-7
1.2	AIR BLOWER FOR MBBR AERATION TANK 90GRC02 AN001/02	8-11

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**DATE :**	2-Jan-19
Customer	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LI**	**REV :**	1
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**		
Client Doc. no:	**PE-V0-412-673-A014**	**PEL Doc. no:**	**A4-PEL-1037-DS-B001**

Technical Data sheet of Blower for common collection sump,Eqt & ST

GENERAL DATA		
Blower Designation	Air Blower For common collection sump ,Equalizaion tank & sludge holding tank	
Blower Tag Number	GRC01AN001 / GRC01AN002	
Quantity (Total = W+S)	2(1W+1S)	
P & ID reference	PE-V0-412-673-A001	
Blower Location (Indoor / Outdoor)	Outdoor	
Duty (continuous/ intermittent)	Continuous	
Blower Manufacturer	EVEREST BLOWER PVT LTD	
Blower Model	M450/TWINLOBE	
DESIGN CONDITIONS		
Design Code	AS PER MFG STD	
Testing Code	BS 1571 PART II	
Hydro Test Pressure (Kg/cm2(g))	2XWORKING PRESSUE	
Safety valve set pressure (Kg/cm2(g))	0.44	
OPERATING CONDITIONS		
Fluid Handled	Air	
Temp°C [Min/ Nor /Max]	25 / 35 / 55	
Rated Flow (m3/hr)	50	
Discharge head [Min/ Nor /Max] mWC	4	
Compression Ratio	1	
Relative Humidity [Min/ Nor /Max]	95%	
PERFORMANCE		
Mechanical Efficiency %	80.50%	
Volumetric Efficiency %	61.80%	
BKW of Blower	1.40%	
Speed of rotation of Blower	1020	
Permissible Noise level	< 85 dBA at 1m Distance	
Maximum vibrations allowed	As per std code	
GD^2 (kg.m^2)	0.058	
CONSTRUCTION		
Blower Type	RotaryTwin Lobe Blower (Oil free type)	
Speed Reduction Arrangement	V belt drive.	
Rotation direction from motor end	CLOCKWISE	
Base frame	Common for blower and motor.	
NOZZLE SCHEDULE	**SIZE**	**TYPE**
Discharge	40MM	ANSI B16.5 150# ,RF

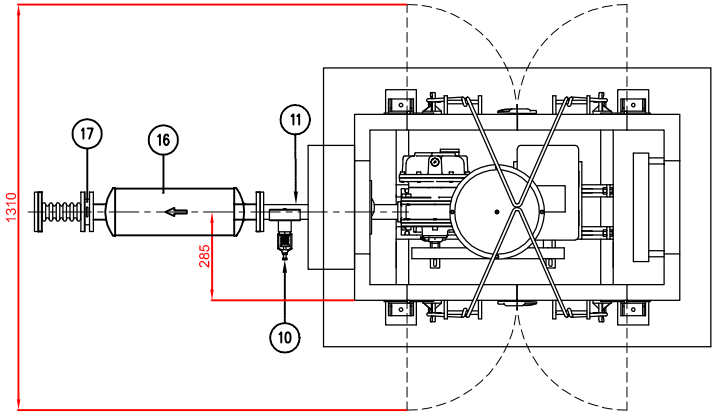
PENNAR ENVIRO
Re-engineering Water, Environment & Energy

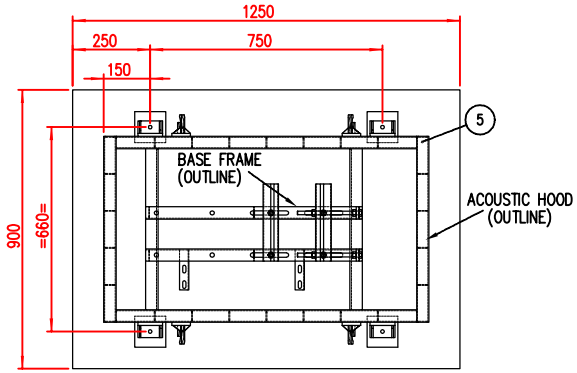
Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**DATE :**	2-Jan-19
Customer	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LI**	**REV :**	1
Owner Consultant:	**DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI**	**PEL/D & D- F 002**	
EPC Contractor	**BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA**		
Package:	**75 KLD SEWAGE TREATMENT PLANT**		
Client Doc. no:	**PE-V0-412-673-A014**	**PEL Doc. no:**	**A4-PEL-1037-DS-B001**

Technical Data sheet of Blower for common collection sump,Eqt & ST

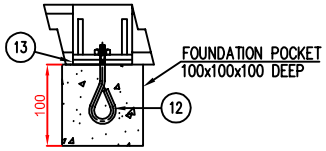
ACCESSORIES	
Common Acoustic hood	YES
Filter at suction	YES
Silencer at suction & Discharge	YES
NRV at discharge	YES
Base frame under Blower + Motor	YES
Pressure Gauge at Blower discharge with isolation valve	YES
Spring loaded Safety Valve	YES
Anti Vibration Pad	YES
Discharge Bellow	YES
Flexible coupling	YES
MATERIALS	
Casing	CI,IS 210 FG 260
Lobes	CI,IS 210 FG 260
Gear (Helical Type)	16Cr5Mn confirms to BS 970
Driving Shaft	EN 19 confirms to BS 970
Driver & driven Pulley	CI
Suction & Discharge Silencers	MS
Base Plate material	MS
Pulley Guard & V belt guard	MS
Foundation Bolts	MS /GI
Seal	LIP SEAL/NITRILE
Anivibration Pad	RUBBER
WEIGHTS / DIMENSIONS	
Weight of Blower+ Motor (kg)	180
Dynamic Load (Kg)	360

Rev	Date	Description	Made	Chkd	Appd
1	2-Jan-19	For Approval	AJP	SYY	PAK

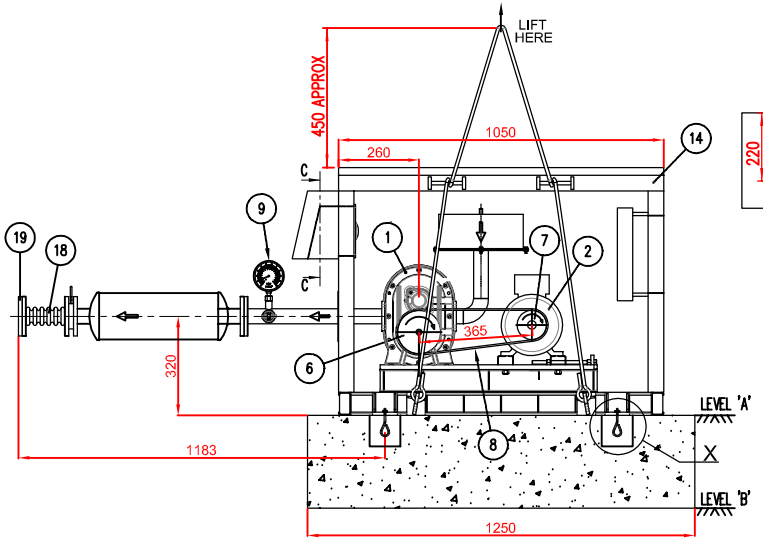


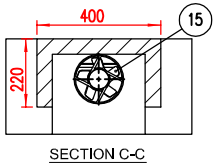


FOUNDATION PLAN LAYOUT

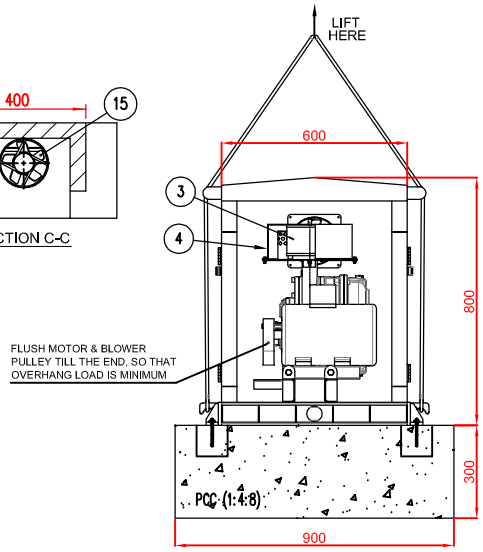


DETAIL X





SECTION C-C



CLIENT	:- PENNAR ENVIRO LIMITED
P.O NO.	:- PEL_WP_BHEL_ENNORE_001 DATED 17.12.2018
PROJECT	:- FOR THEIR PROJECT
TAG.NO.	:- 90GRC01 AN001 / 02

BLOWER DATA				
MODEL	M450		QUANTITY	2 Nos
CAPACITY	50 M3/HR		PRESSURE	4 MWC
SPEED	1020 RPM		BHP	1.9 BHP
R. MOTOR	3 HP / 1500 RPM			

S.NO	PART	DESCRIPTION	QTY	SCOPE OF SUPPLY
19	COMPANION FLANGE	40 NB, DRILLING AS PER ANSI B16.5 #150	1	EVEREST
18	BELLOW	SS BELLOW	1	EVEREST
17	NRV	DISC TYPE	1	EVEREST
16	DISCHARGE SILENCER	M.S.FABRICATED	1	EVEREST
15	EXHAUST FAN	STD.	1	EVEREST
14	ACOUSTIC HOOD	FOR BLOWER MODEL M450	1	EVEREST
13	ANTI VIBRATION PADS	RUBBER	4	EVEREST
12	FOUNDATION BOLT	FOUNDATION BOLT M10 x 100L	4	EVEREST
11	ICP	40 NB	1	EVEREST
10	PR. RELIEF VALVE	1" SPRING LOADED	1	EVEREST
9	PRESSURE GAUGE WITH ISOLATION VALVE	BOURDEN TYPE 0-1KG/ CM², GLYCERIN FILLED	1	EVEREST
8	V-BELTS	STD	1 set	EVEREST
7	MOTOR PULLEY	TAPER LOCKED PULLEY	1	EVEREST
6	BLOWER PULLEY	TAPER LOCKED PULLEY	1	EVEREST
5	BASE FRAME	M.S.FABRICATED	1	EVEREST
4	SUCTION SILENCER FOR ACOUSTIC HOOD	M.S.FABRICATED	1	EVEREST
3	AIR FILTER	DRY BAG TYPE	1	EVEREST
2	ELECTRIC MOTOR	3 HP / 1500 RPM - IE3	1	EVEREST
1	AIR BLOWER	M450	1	EVEREST

NOTES:-DO NOT SCALE THE DRAWING UNSPECIFIED DIMENSIONS TOL. ±25mm

NOTES & RECOMMENDATIONS :-
1. CLIENT SCOPE- FOUNDATION, DISCHARGE LINE & ITS TREATMENT FOR CORROSION PROTECTION & SOUND PROOFING .
2. BLOWER ROTATION CLOCKWISE AS VIEWED FROM PULLEY SHAFT END.
3. GROUND LEVEL WILL BE AT LEVEL 'A' FOR DIGOUT BASE AND AT LEVEL 'B' FOR RAISED BASE.
4. SUPPORT DISCHARGE LINE ADEQUATELY AT THE TIME OF INSTALLATION.
5. USE STEEL WIRE ROPE SLING, CAPACITY 1 TON WITH MIN HOOK TO HOOK LENGTH OF APPROX. 2 METERS (CUSTOMER SCOPE).

LOAD DETAILS :-
1. STATIC WEIGHT OF ASSEMBLY = 195 Kg (approx.)
2. DYNAMIC LOAD OF ASSEMBLY = 293 Kg (approx.)

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EVEREST PRESSURE & VACUUM SYSTEMS

SHEET:- A3

QTY:- 01 | SHEET:- 1 OF 1

SCALE TO SCALE

CAST WT. – | FINISH WT. -- KG

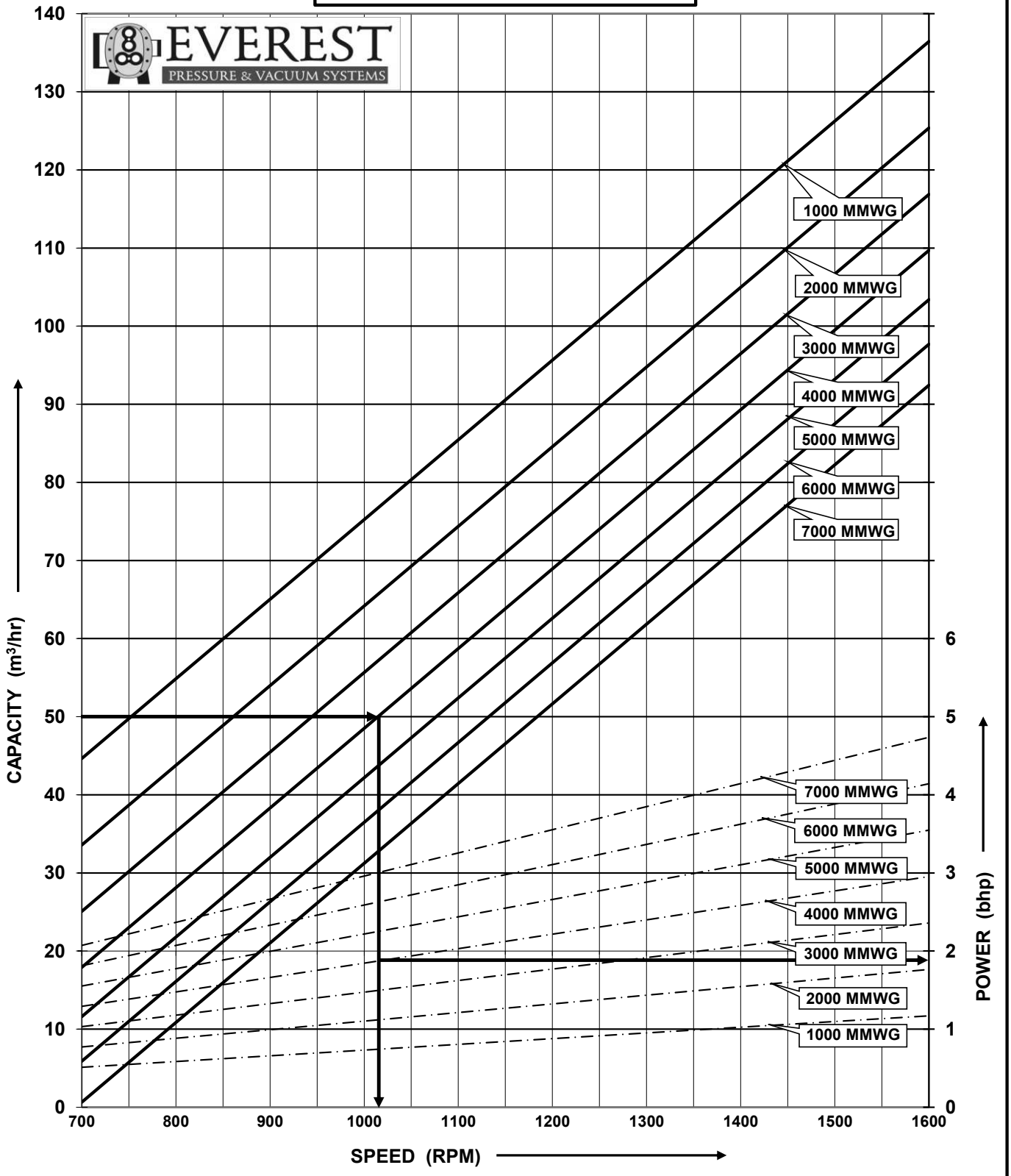
TITLE:- G.A.DRAWING FOR MODEL M450

DRN:- AJITH | DATE :- 29.12.2018

MATL.:- AS PER BOM | REV-01

CRR29005 A

PERFORMANCE CURVE
MODEL M450 EB EVEREST



EVEREST BLOWERS

FILE: PC5-M450EB Dt. 01.03.14

DUTY POINT DATA

CAPACITY: 50 M3/HR
PRESSURE: 4MWC
SPEED: 1020RPM
BHP: 1.9 BHP
R.MOTOR: 3HP @1500RPM

PROJECT DETAILS

CLIENT: PENNAR ENVIRO LIMITED
PROJECT: FOR THEIR PROJECT
P.O. REF. No.: PEL_WP_BHEL_ENNORE_001 DATED 17.12.2018
CRR No.: 29005A

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**DATE :**	2-Jan-19
Customer	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**REV :**	1
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**		
Client Doc. no:	**PE-V0-412-673-A014**	**PEL Doc. no:**	**A4-PEL-1037-DS-B002**

Technical Data sheet of Blower for MBBR Aeration Tank

GENERAL DATA		
Blower Designation	Air Blower for MBBR Aeration tank	
Blower Tag Number	GRC02AN001 / GRC02AN002	
Quantity (Total = W+S)	2(1W+1S)	
P & ID reference	PE-V0-412-673-A001	
Blower Location (Indoor / Outdoor)	Outdoor	
Duty (continuous/ intermittent)	Continuous	
Blower Manufacturer	EVEREST BLOWER PVT LTD	
Blower Model	M450/TWIN LOBE	
DESIGN CONDITIONS		
Design Code	AS PER MFG STD	
Testing Code	BS 1571 PART II	
Hydro Test Pressure (Kg/cm2(g))	2XWORKING PRESSUE	
Safety valve set pressure (Kg/cm2(g))	0.55	
OPERATING CONDITIONS		
Fluid Handled	Air	
Temp°C [Min/ Nor /Max]	25 / 35 / 55	
Rated Flow (m3/hr)	40	
Discharge head [Min/ Nor /Max] mWC	5	
Compression Ratio	1	
Relative Humidity [Min/ Nor /Max]	95%	
PERFORMANCE		
Mechanical Efficiency %	83.80%	
Volumetric Efficiency %	51.80%	
BKW of Blower	1.60%	
Speed of rotation of Blower	Max 1500	
Permissible Noise level	< 85 dBA at 1m Distance	
Maximum vibrations allowed	7.1 MM/SEC	
GD^2 (kg.m^2)	0.588	
CONSTRUCTION		
Blower Type	RotaryTwin Lobe Blower (Oil free type)	
Speed Reduction Arrangement	V belt drive.	
Rotation direction from motor end	CLOCK WISE FROM PULLEY END	
Base frame	Common for blower and motor.	
NOZZLE SCHEDULE	**SIZE**	**TYPE**
Discharge	40	ANSI B16.5 150# ,RF

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

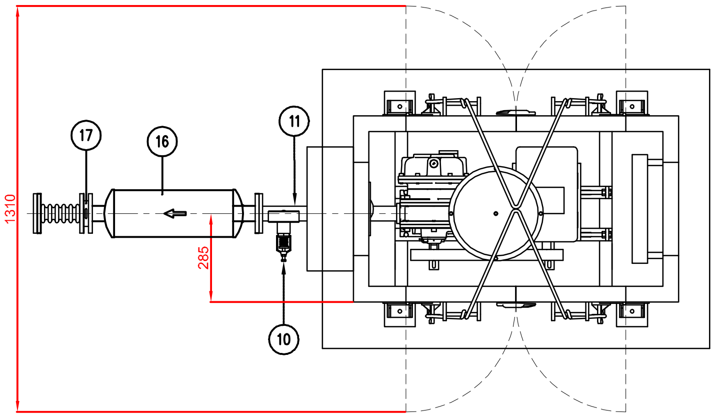
Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**DATE :**	2-Jan-19
Customer	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**REV :**	1
Owner Consultant:	**DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI**	**PEL/D & D- F 002**	
EPC Contractor	**BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA**		
Package:	**75 KLD SEWAGE TREATMENT PLANT**		
Client Doc. no:	**PE-V0-412-673-A014**	**PEL Doc. no:**	**A4-PEL-1037-DS-B002**

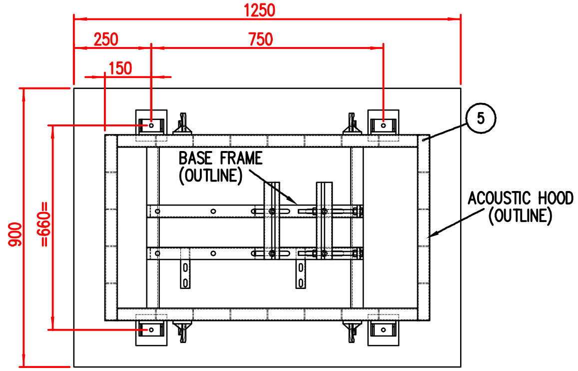
Technical Data sheet of Blower for MBBR Aeration Tank

ACCESSORIES	
Common Acoustic hood	YES
Filter at suction	YES
Silencer at suction & Discharge	YES
NRV at discharge	YES
Base frame under Blower + Motor	YES
Pressure Gauge at Blower discharge with isolation valve	YES
Spring loaded Safety Valve	YES
Anti Vibration Pad	YES
Discharge Bellow	YES
Flexible coupling	YES
MATERIALS	
Casing	CI,IS 210 FG 260
Lobes	CI,IS 210 FG 260
Gear (Helical Type)	SPUR GEAR 16Cr5Mn confirms to BS 970
Driving Shaft	EN19
Driver & driven Pulley	CI
Suction & Discharge Silencers	MS
Base Plate material	MS
Pulley Guard & V belt guard	MS
Foundation Bolts	GI
Seal	LIP SEAL/NITRILE
Anivibration Pad	RUBBER
WEIGHTS / DIMENSIONS	
Weight of Blower+ Motor (kg)	180
Dynamic Load (Kg)	360

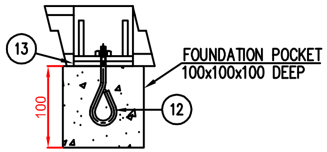
Rev	Date	Description	Made	Chkd	Appd
1	2-Jan-19	For Approval	AJP	SYY	PAK

1	2	3	4	5	6	7	8





FOUNDATION PLAN LAYOUT



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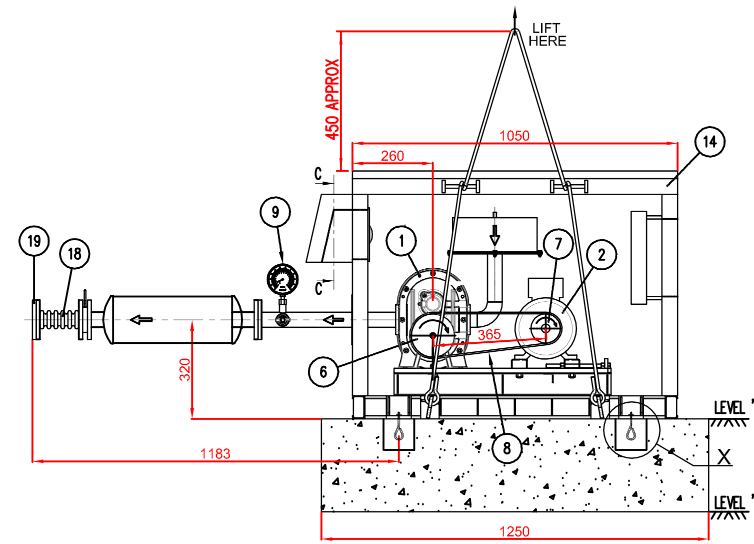
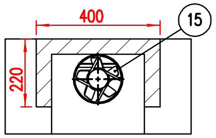
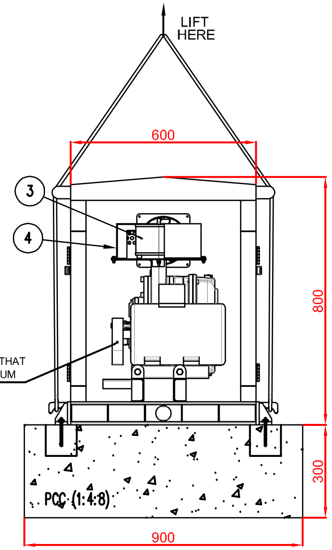




SECTION C-C



CLIENT	:- PENNAR ENVIRO LIMITED
P.O NO.	:- PEL_WP_BHEL_ENNORE_001 DATED 17.12.2018
PROJECT	:- FOR THEIR PROJECT
TAG.NO.	:- 90GRC02 AN001 / 02

BLOWER DATA			
MODEL	M450	QUANTITY	2 Nos
CAPACITY	40 M3/HR	PRESSURE	5 MWC
SPEED	980 RPM	BHP	2.2 BHP
R. MOTOR	3 HP / 1500 RPM		

S.NO	PART	DESCRIPTION	QTY	SCOPE OF SUPPLY
19	COMPANION FLANGE	40 NB, DRILLING AS PER ANSI B16.5 #150	1	EVEREST
18	BELLOW	SS BELLOW	1	EVEREST
17	NRV	DISC TYPE	1	EVEREST
16	DISCHARGE SILENCER	M.S.FABRICATED	1	EVEREST
15	EXHAUST FAN	STD.	1	EVEREST
14	ACOUSTIC HOOD	FOR BLOWER MODEL M450	1	EVEREST
13	ANTI VIBRATION PADS	RUBBER	4	EVEREST
12	FOUNDATION BOLT	FOUNDATION BOLT M10 x 100L	4	EVEREST
11	ICP	40 NB	1	EVEREST
10	PR. RELIEF VALVE	1" SPRING LOADED	1	EVEREST
9	PRESSURE GAUGE WITH ISOLATION VALVE	BOURDEN TYPE 0-1KG/ CM², GLYCERIN FILLED	1	EVEREST
8	V-BELTS	STD	1 set	EVEREST
7	MOTOR PULLEY	TAPER LOCKED PULLEY	1	EVEREST
6	BLOWER PULLEY	TAPER LOCKED PULLEY	1	EVEREST
5	BASE FRAME	M.S.FABRICATED	1	EVEREST
4	SUCTION SILENCER FOR ACOUSTIC HOOD	M.S.FABRICATED	1	EVEREST
3	AIR FILTER	DRY BAG TYPE	1	EVEREST
2	ELECTRIC MOTOR	3 HP / 1500 RPM - IE3	1	EVEREST
1	AIR BLOWER	M450	1	EVEREST

NOTES:-DO NOT SCALE THE DRAWING UNSPECIFIED DIMENSIONS TOL. ±25mm

EVEREST
PRESSURE & VACUUM SYSTEMS

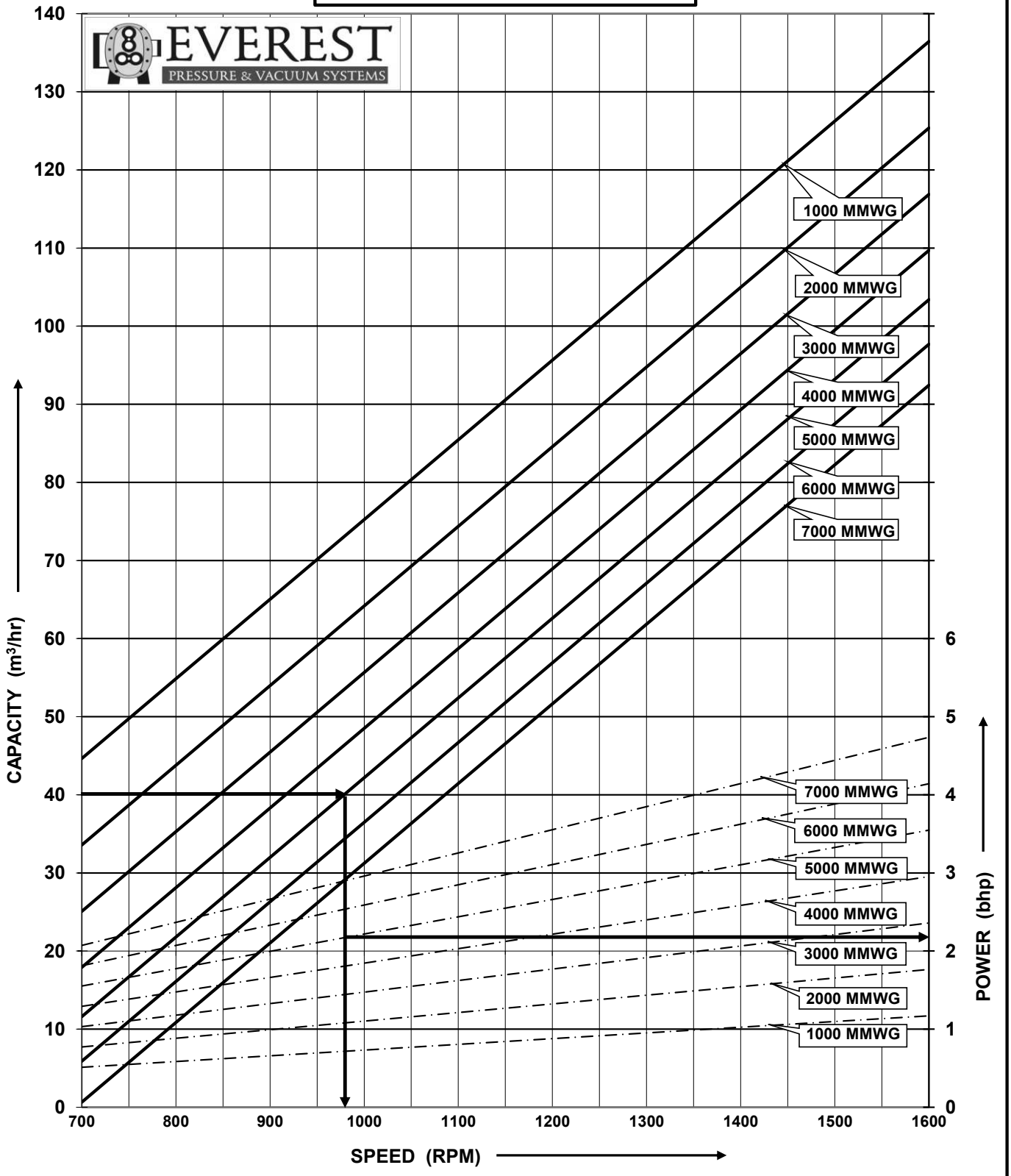
SHEET:- A3		
QTY:- 01	SHEET:- 1 OF 1	
	SCALE TO SCALE	
CAST WT. --	FINISH WT. -- KG	
TITLE:- G.A.DRAWING FOR MODEL M450		
DRN:- AJITH	DATE :- 29.12.2018	CRR29005 B
MATL.:- AS PER BOM	REV-01	

NOTES & RECOMMENDATIONS :-
1. CLIENT SCOPE- FOUNDATION, DISCHARGE LINE & ITS TREATMENT FOR CORROSION PROTECTION & SOUND PROOFING .
2. BLOWER ROTATION CLOCKWISE AS VIEWED FROM PULLEY SHAFT END.
3. GROUND LEVEL WILL BE AT LEVEL 'A' FOR DIGOUT BASE AND AT LEVEL 'B' FOR RAISED BASE.
4. SUPPORT DISCHARGE LINE ADEQUATELY AT THE TIME OF INSTALLATION.
5. USE STEEL WIRE ROPE SLING, CAPACITY 1 TON WITH MIN HOOK TO HOOK LENGTH OF APPROX. 2 METERS (CUSTOMER SCOPE)

LOAD DETAILS :-
1. STATIC WEIGHT OF ASSEMBLY = 195 Kg (approx.)
2. DYNAMIC LOAD OF ASSEMBLY = 293 Kg (approx.)

286

PERFORMANCE CURVE
MODEL M450 EB EVEREST



EVEREST BLOWERS

FILE: PC5-M450EB Dt. 01.03.14

DUTY POINT DATA

CAPACITY: 40 M3/HR
PRESSURE: 5MWC
SPEED: 980RPM
BHP: 2.2 BHP
R.MOTOR: 3HP @1500RPM

PROJECT DETAILS

CLIENT: PENNAR ENVIRO LIMITED
PROJECT: FOR THEIR PROJECT
P.O. REF. No.: PEL_WP_BHEL_ENNORE_001 DATED 17.12.2018
CRR No.: 29005B

APPROVED

REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
1	31.12.2018	ISSUED FOR APPROVAL	PSR	SSY	PAK

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

DEPT.	CODE		SCALE	WEIGHT (KG)	REF DRG.	ITEM
--	A		--	–	–	–

TITLE Technical Datasheet for Metering pumps

PACKAGE :75 KLD SEWAGE TREATMENT PLANT

	NAME	SIGN	DATE
PREP	PSR		31.12.18
CHKD	SSY		31.12.18
APPD	PAK		31.12.18

DEPT.							CARD CODE	BHEL DOC NO. PE-V0-412-673-A015	REV
SIGN				M.A.			–	PEL DOC NO. A4-PEL-1037-DS-DP001 to 003	1
DATE								NO. OF SHEETS – 23 (EXCLUDING COVER SHEET)	

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

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1. METERING PUMPS

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1.2	DATASHEET FOR HYPO DOSING PUMP_DP02	11-17
1.3	DATASHEET FOR DWPE DOSING PUMP_DP03	18-24

PROJECT: 1X660MW ENNORE SEZ SSCTPP AT ASH DYKE OF NCTPS, CHENNAI		Package: Sewage Treatment Plant	
Document Title: TECHNICAL DATASHEET OF METERING PUMPS			
Dr□□ □□□D□□□□ □□□N□□PE-V0-412-673-A015			
□r□N□□		□□□□	□□□ □r□□
1	BHEL to incorporate the package name in the document title.	Noted and Incorporated	
2	BHEL to incorporate the make & model.	Noted and Incorporated	
3	BHEL to furnish all the details where mentioned “AS per approved vendor & tender specification.”	Noted and Incorporated	
4	BHEL to submit the pump GADs & curves.	Noted and Incorporated	
5	BHEL to ensure that the capacity & head shall be in line with approved Process calculation.	Noted and confirmed	
6	BHEL to provide the pump for DMF as commented on Process calculation	Process calculation is approved, and as per latest approval pump/blower for DMF is not required.	

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**31/12/2018**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**01**
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-A015**	**PEL Doc. no:**	**A4-PEL-1037-DS-DP001**

Datasheet for Dosing Pumps_Hydraulically Actuated Diaphragm

GENERAL DATA	
Pump Designation	Hypo dosing pump for Hypo contact tank / Filter feed tank
Pump Tag Number	DP-01
Quantity	1 No
P & ID reference	PE-V0-412-673-A001
Pump Location (Indoor / Outdoor)	Outdoor
Duty (Continuous/ Intermittent)	Continious
Type	Hydraulic Actuated Diaphragm
Pump Manufacturer	Positive Metering Pumps (I) Pvt.Ltd
Pump Model	HD1011/SZ1
DESIGN CONDITIONS	
Design Standard	API 675
Testing Standard	API 675
OPERATING CONDITIONS	
Fluid Handled	Hypochlorite(8 % w/v)
Pumping Temp°C [nor/Oper./max]	25 / 35 / 50
Specific Gravity	1.2
Viscosity at pumping temp (cp)	2
pH of Fluid	11 to 13
Rated / Max Flow (LPH)	0 - 6 of Hypo Solution
Suction Press ($kg/cm^2(g)$)	Flooded
Discharge pressure ($kg/cm^2(g)$)	2
NPSH (A) (m)	Ample
PERFORMANCE	
Minimum Flow (LPH)	0.66
Plunger Speed (Stroke/min)	100(Max)
Length of Stroke (mm)	10
NPSH (R) (m)	Flooded
Pump Relief valve Set Pressure (Kg/cm2,g)	3.5
BKW at R.V Set Pressure	0.12
Volumetric Efficiency (%)	≥90%

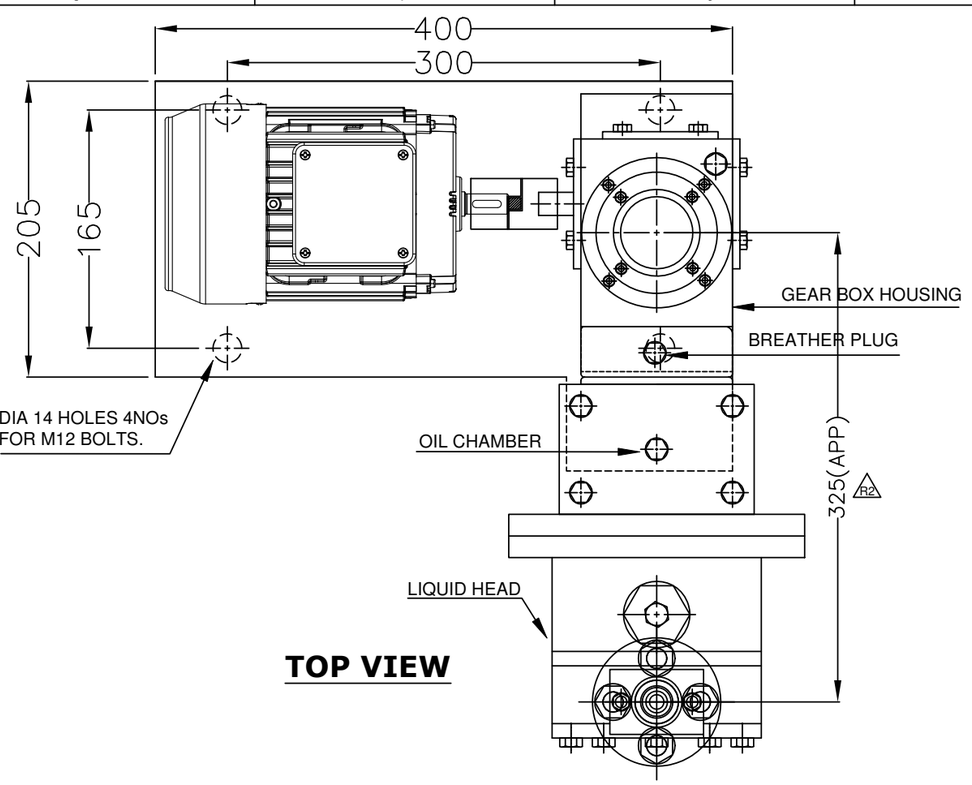
PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**31/12/2018**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**01**
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-A015**	**PEL Doc. no:**	**A4-PEL-1037-DS-DP001**

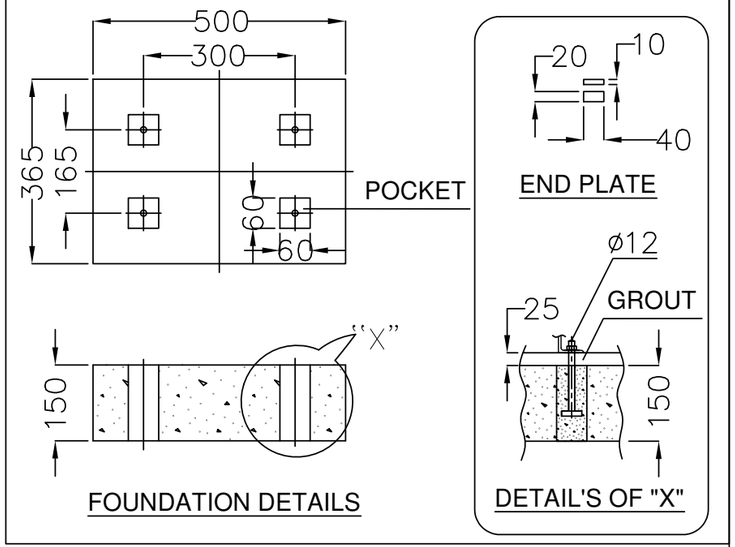
Datasheet for Dosing Pumps_Hydraulically Actuated Diaphragm

CONSTRUCTION	
No. of Stages	1
Pump Liquid EndType	Hydraulic Actuated Diaphragm
Diaphragm Type	Single
Plunger Diameter (mm)	16
Cylinder Diameter (mm)	16
NOZZLE SCHEDULE	
Suction (Size / End Connection)	15NB Flange ANSI B 16.5(FF) Flanged End,150, ASME B16.5, FF
Discharge (Size / End Connection)	15NB Flange ANSI B 16.5(FF) Flanged End,150, ASME B16.5, FF
ACCESSORIES	
Stroke adjustment	YES (Manual Arrangement, while pump is running)
Inbuilt Pressure Relief Valve	YES
External Pressure Relief Valve	YES
Common Base Frame for Pump & Motor	YES
Suction Strianer	YES
Antisyphon / Back pressure valve	YES
Motor + Coupling	YES
Capacity Control	YES
Level switch interlock arrangement	YES
MATERIALS	
Liquid Head	PP
Hydraulic Diaphragm	PTFE faced hypalon
Housing	CI IS 210-FG-260
Plunger	EN8
NRV(Double Ball type)	PP
Ball seat	PP
Suction strainer	UPVC/PP
Base frame	MS

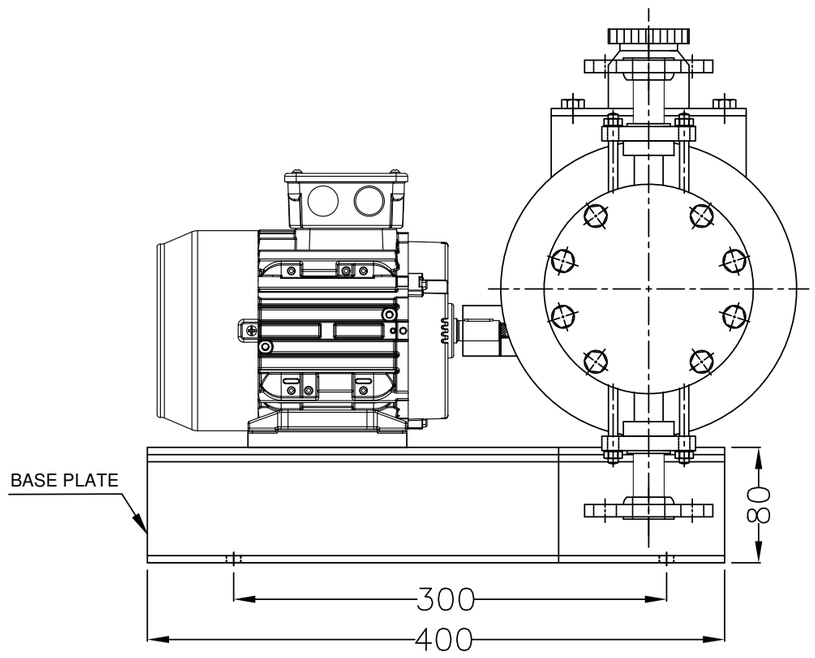
Rev	Date	Description	Made	Chkd	Appd
01	31-Dec-2018	For Approval	PSR	SSY	PAK



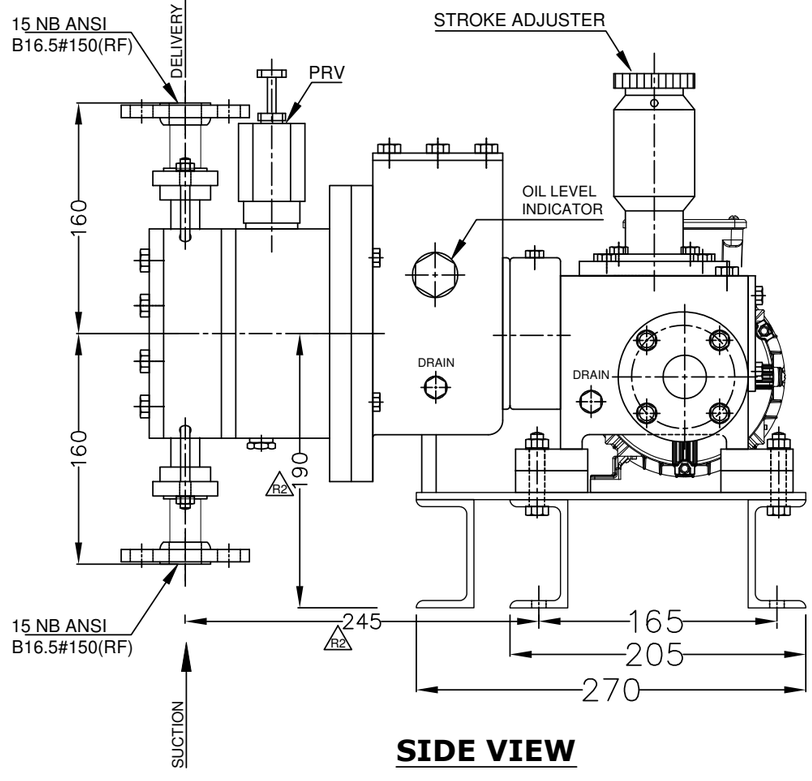
TOP VIEW



NOTE:
1.ALL DIMENSIONS ARE IN mm.
2.TOLERANCE FOR ALL DIMENSIONS ARE ±10mm
3.FOUNDATION BOLT SIZE Ø12mmX150mm
4.WIGHT OF THE PUMP 60KG APPROX. AND WIGHT OF MOTOR 7KG APPROX. R2



FRONT VIEW



SIDE VIEW

TECHNICAL SPECIFICATIONS

CUSTOMER NAME	:-	PENNAR ENVIRO LIMITED			
LIQUID	:-	HYPOCHLORITE (8% W/V)	TAG NO	:-	DP-01
PUMP TYPE	:-	HYDRAULIC DIAPHGRAM	COUPLING TYPE	:-	FLEXIBLE SPIDER
PUMP MODEL	:-	HD 1011/SZ1	QTY.	:-	1 No.
PUMP WETTED PART MOC	:-	PP			
FLOW RATE	:-	0-6 LPH			
DISCHARGE PRESSURE	:-	2 kg/cm2			
STROKE RANGE	:-	0-100% (MANUAL)			
MOTOR DESCRIPTION	:-	0.5 H.P.,3 PH, 415V, 50 HZ , 4-POLE,FOOT MOUNTED, IP55, IE3, STD TEFC,WEATHER PROOF,S1 DUTY,DOL START,CLASS-F AND TEMP RISE LIMITED TO CLASS -B			
END CONNECTION	:-	15NB FLANGE ANSI B16.5 #150 (RF) END ON SUCTION & DISCHARGE SIDE.			

Z	A	N	I
FINAL	ACCEPTED WITH COMMENTS	NOT ACCEPTABLE	FOR INFORMATION

POSITIVE METERING PUMPS (I) PVT.LTD.

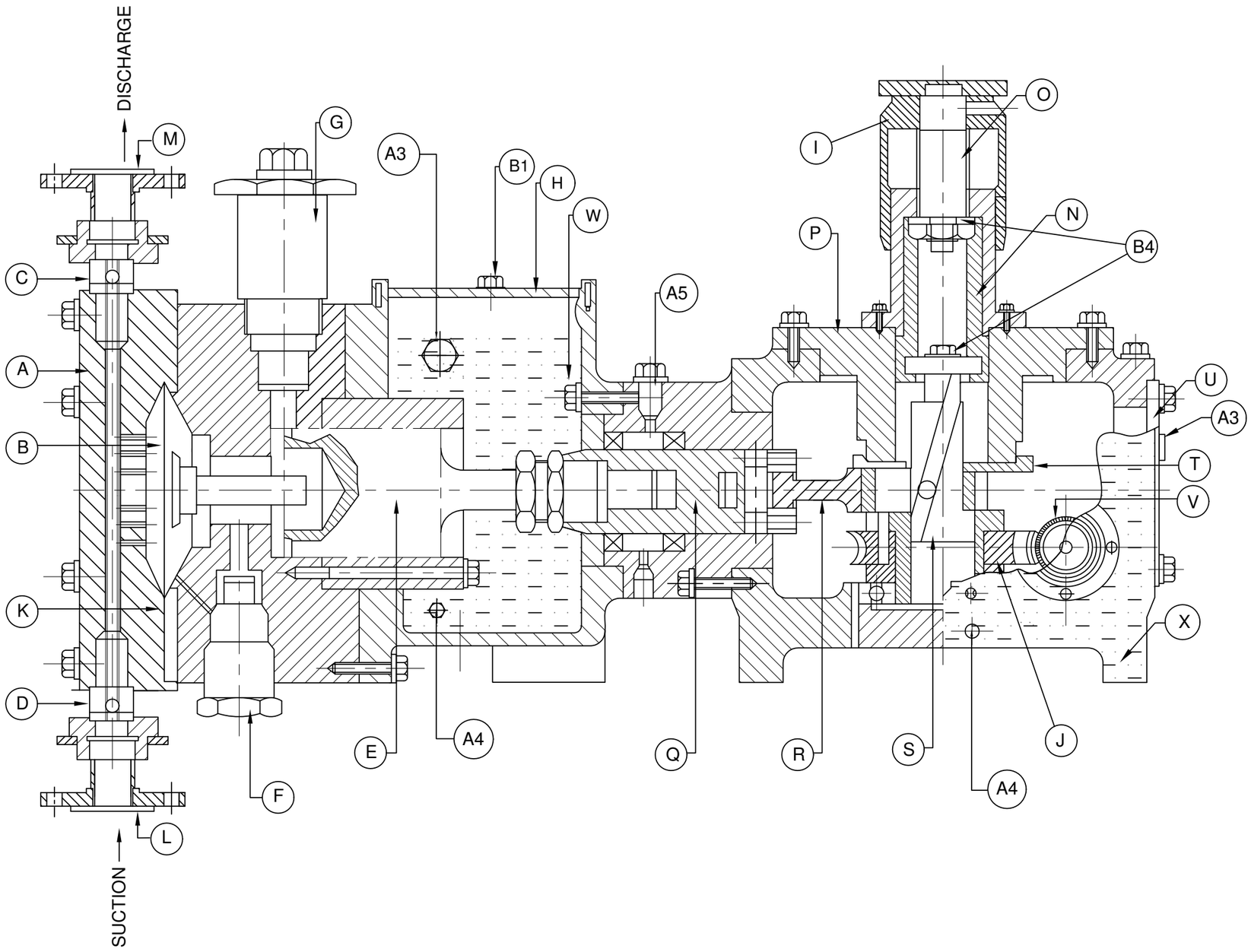
PLOT NO. M8, AMBAD M.I.D.C., , NASIK

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED BY
02	31.12.18		PUJ	TSN	TSN
01	27.12.18		PUJ	TSN	TSN

DRAWING TITLE :-	GA DRAWING		MODEL NO.:- HD1011_SZ1_PP	
DRAWING NO.:-	GA-HD1011-SZ1-IR9364-01	SCALE	SHEET	REV.
		NTS	01	02

293

A3-420X297



Sr. No.	Description	MOC	Qty.
B4	CIRCLIPE	EN8	01 No.
B1	Oil Filler	--	01 No.
A5	Breather Assembly	--	01 No.
A4	Oil Drain Plug	--	02 Nos.
A3	Oil Level Indicator	--	02 Nos.
X	OIL 460 Grade	---	--
W	OIL 20W40	---	--
V	Worm Shaft	EN8	01 No.
U	Back Plate	PP	01 No.
T	Thrust Plate	CI	01 No.
S	Slider	MS	01 No.
R	Ecc. Strap	CI	01 No.
Q	Cross Head	EN8	01 No.
P	Top Cover	CI	01 No.
O	SL.SCREW	EN8	01 No.
N	Sl. Guide	MS	01 No.
L/M	End Conne. Suction & Dis.	PP PP	01 No. Each
K	Center Ring	MS	01 No.
J	Worm Wheel	PB 2	01 No.
I	Stroke Adju.	CI	01 No.
H	Oil Chember	CI	01 No.
G	Inbuilt Pre. Safety Valve	EN8	01 No.
F	Vaccume Assl.	EN8	01 No.
E	Plunger	EN8	01 No.
D	Non Return Valve (Suc.)	PP	01Set
C	Non Return Valve (Dis.)	PP	01Set
B	Oil Side Diaphragm	PTFE	01 No.
A.	Liquid Head	PP	01 No.

TECHNICAL SPECIFICATIONS		
CUSTOMER NAME	:-	PENNAR ENVIRO LIMITED
TAG NO	:-	DP-01

294

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED BY
01	27.12.18		PUJ	TSN	TSN

Z FINAL | A ACCEPTED WITH COMMENTS | N NOT ACCEPTABLE | I FOR INFORMATION

POSITIVE METERING PUMPS (I) PVT.LTD.

PLOT NO. M8, AMBAD M.I.D.C., , NASIK

DRAWING TITLE :-	CS DRAWING		MODEL NO.:- HD1011_SZ1_PP	
DRAWING NO.:-	CS-HD1011-SZ1-IR9364-01	SCALE	SHEET	REV.
		NTS	01	01

A3-420X297

POSITIVE METERING PUMPS (I) PVT. LTD.

M-8, MIDC, AMBAD, NASIK - 422 010

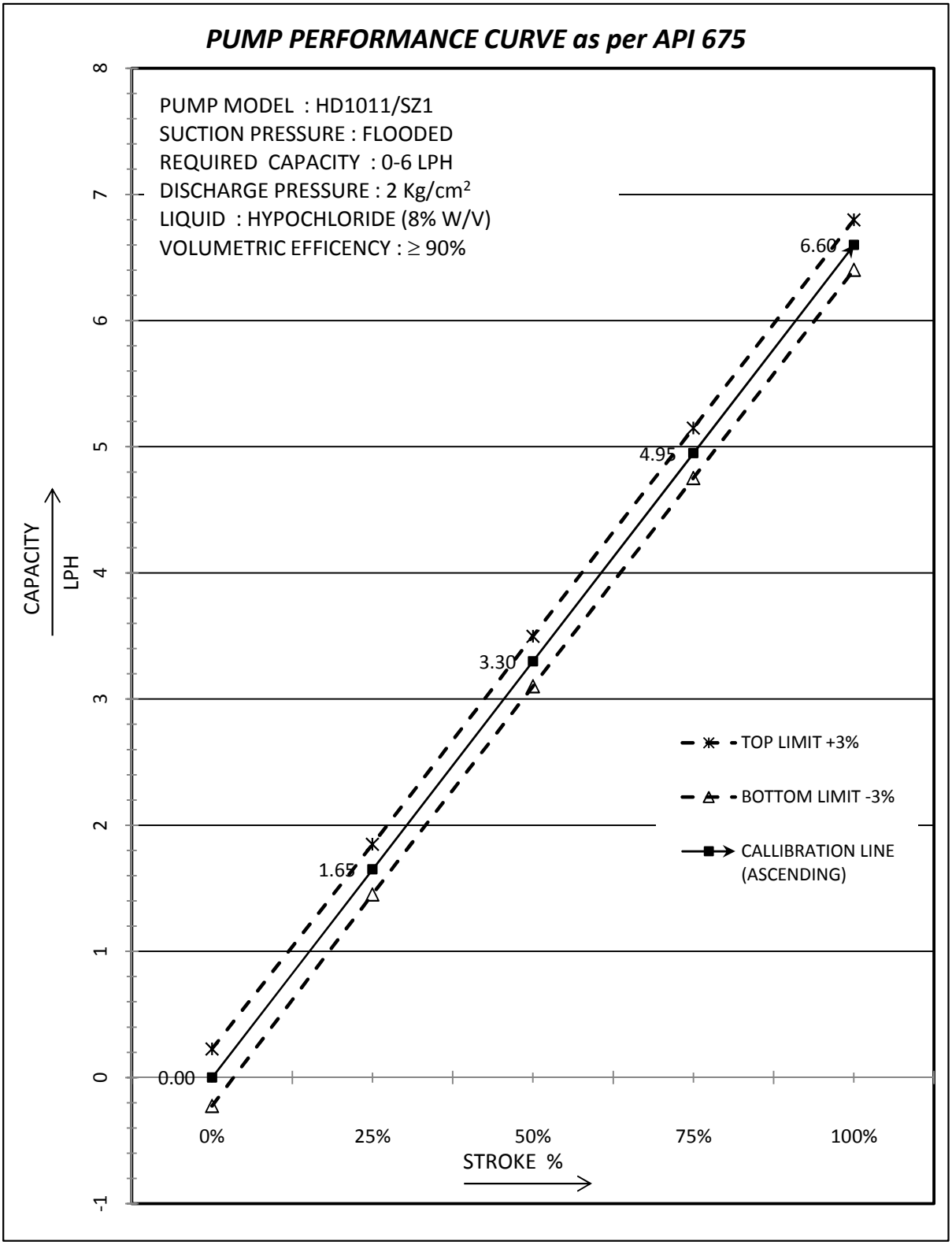
Email : sales@positivemetering.com Web: www.positivemetering.com

CUSTOMER : PENNAR ENVIRO LIMITED.

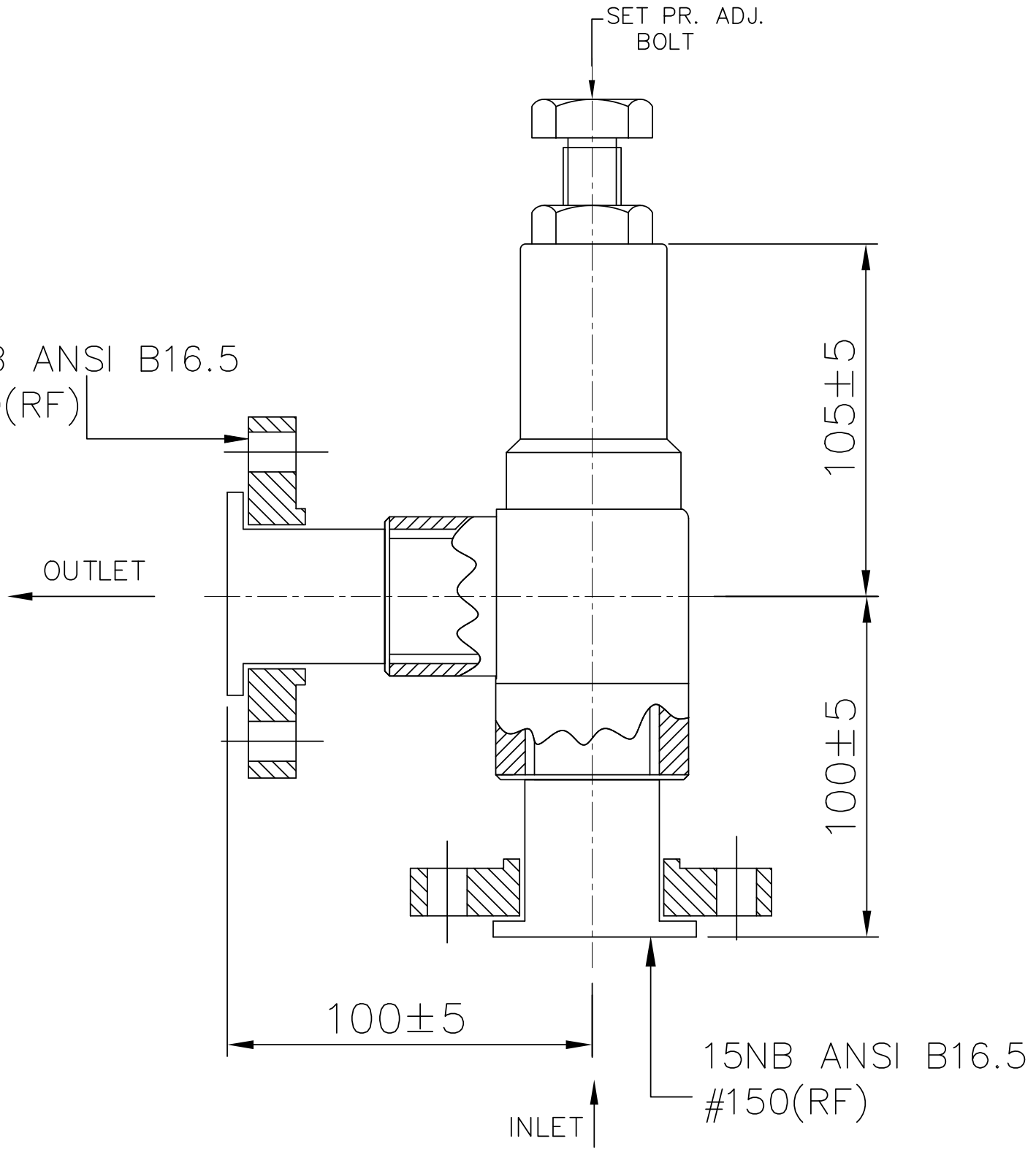
PROJECT NAME : 2X6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI

TAG NO. : DP-01

PUMP PERFORMANCE CURVE as per API 675



1) ALL DIMENSIONS ARE IN MM
2) TOLERANCES ON ALL DIMENSION ARE IN ±5



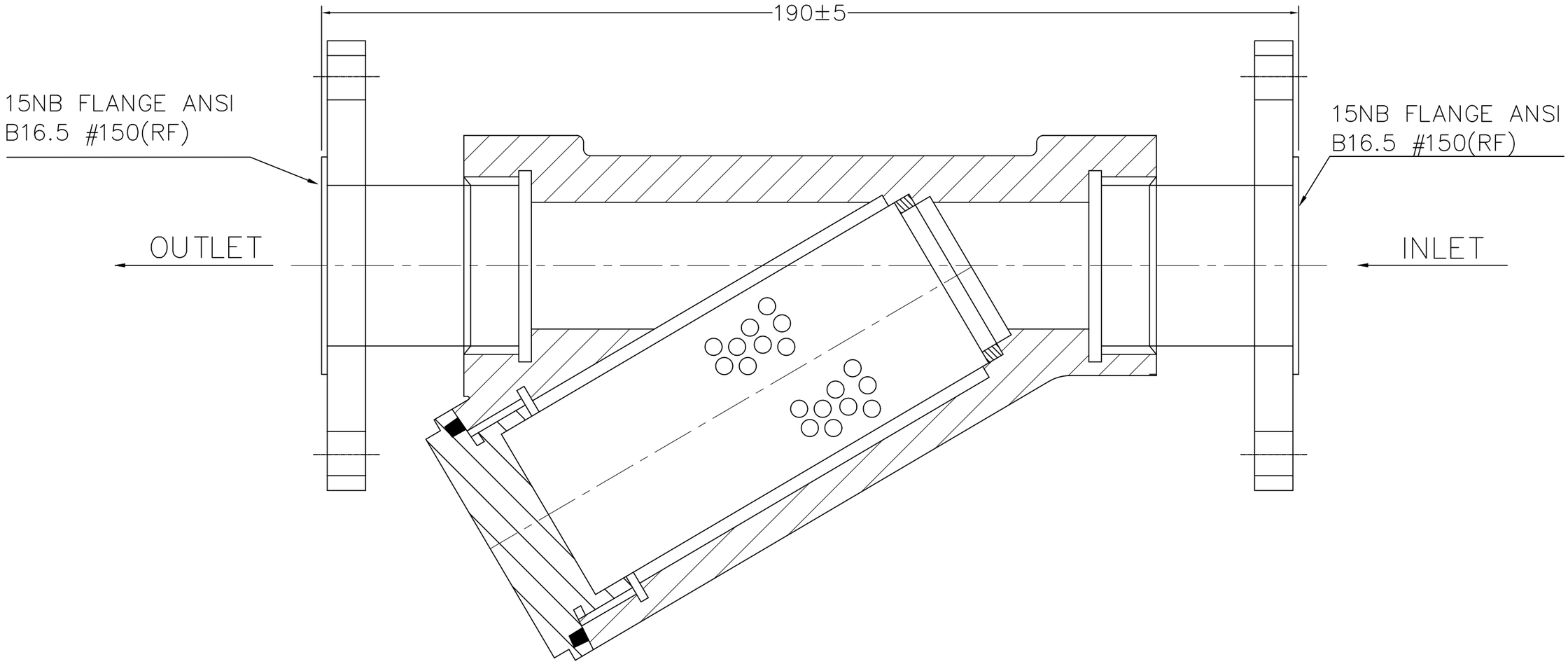
TECHNICAL SPECIFICATIONS

CUSTOMER NAME	:–	PENNAR ENVIO LIMITED			
MOC	:–	PP			
TYPE	:–	SPRING LOADED	QTY.	:–	01 NOS.
SET PRESSURE		3.5 Kg/cm²			

POSITIVE METERING PUMPS (I) PVT LTD.

AMBAD MIDC-PLOT No-M8,NASHIK-10

DRN.	PUJ	TITLE:– EXTERNAL PRESSURE RELIEF VALVE
CHD.	SBN	
APPD.	TSN	
SCALE	NTS	DRG.NO.: PMP–EPRV–IR9364–01
DATE	31.12.18	REV.–01



NOTE:
1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE FOR ALL DIMENSIONS ARE ±5mm

TECHNICAL SPECIFICATIONS

CUSTOMER NAME	:–	PENNAR ENVIRO LIMITED			
PO NO.	:–	PEL_WP_BHEL_ENNORE_004			
MOC	:–	PP	TAG NO.	:–	DP–01
TYPE	:–	Y–TYPE STRAINER			

POSITIVE METERING PUMPS (I) PVT LTD.
AMBAD MIDC–PLOT No–M8,NASHIK–10

DESIGN	PUJ	TITLE: – STRAINER
CHD	TSN	
APPD.	TSN	DRG.NO.: PMP–GA–STR–IR9364–01
DATE	31.12.18	REV.–00

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**31-12-18**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**01**
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-A015**	**PEL Doc. no:**	**A4-PEL-1037-DS-DP002**

Datasheet for Dosing Pumps_Hydraulically Actuated Diaphragm

GENERAL DATA	
Pump Designation	Hypo dosing pump for Centrifuge
Pump Tag Number	DP-02
Quantity	1 No
P & ID reference	PE-V0-412-673-A001
Pump Location (Indoor / Outdoor)	Indoor
Duty (Continuous/ Intermittent)	Intermittent
Type	Hydraulic Actuated Diaphragm
Pump Manufacturer	Positive Metering Pumps (I) Pvt.Ltd
Pump Model	HD1011/SZ0
DESIGN CONDITIONS	
Design Standard	API 675
Testing Standard	API 675
OPERATING CONDITIONS	
Fluid Handled	Hypochlorite(8 % w/v)
Pumping Temp°C [nor/Oper./max]	25 / 35 / 50
Specific Gravity	1.2
Viscosity at pumping temp (cp)	2
pH of Fluid	11 to 13
Rated / Max Flow (LPH)	0 - 4 of hypo Solution
Suction Press ($kg/cm^2(g)$)	Flooded
Discharge pressure ($kg/cm^2(g)$)	4.5
NPSH (A) (m)	Ample
PERFORMANCE	
Minimum Flow (LPH)	0.44
Plunger Speed (Stroke/min)	100SPM (Max 100)
Length of Stroke (mm)	10
NPSH (R) (m)	Flooded
Pump Relief valve Set Pressure (Kg/cm2,g)	4.5
BKW at R.V Set Pressure	0.12
Volumetric Efficiency (%)	≥90%

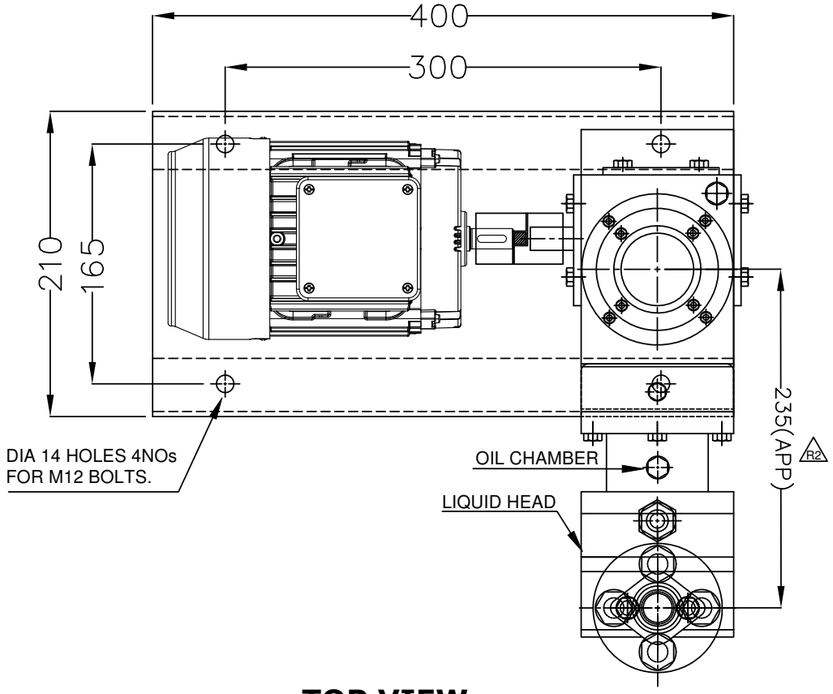
PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**31-12-18**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**01**
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-A015**	**PEL Doc. no:**	**A4-PEL-1037-DS-DP002**

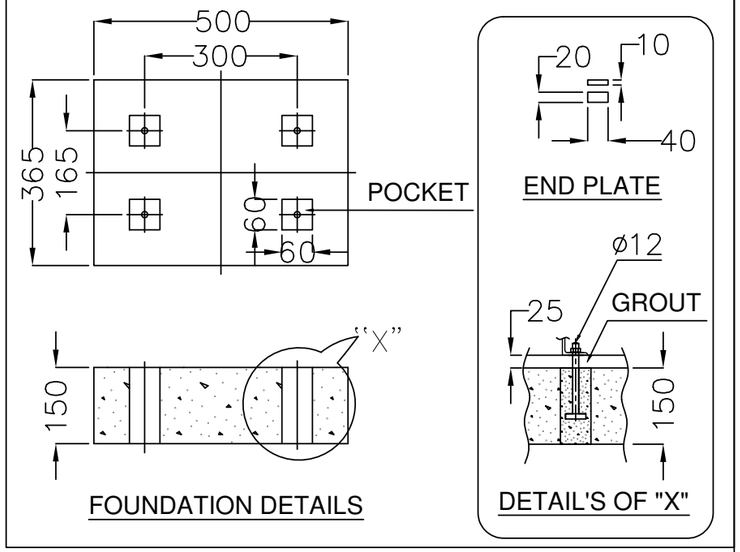
Datasheet for Dosing Pumps_Hydraulically Actuated Diaphragm

CONSTRUCTION	
No. of Stages	1
Pump Liquid EndType	Hydraulic Actuated Diaphragm
Diaphragm Type	Single
Plunger Diameter (mm)	12mm
Cylinder Diameter (mm)	12mm
NOZZLE SCHEDULE	
Suction (Size / End Connection)	15NB Flange ANSI B 16.5(FF) Flanged End,150, ASME B16.5, FF
Discharge (Size / End Connection)	15NB Flange ANSI B 16.5(FF) Flanged End,150, ASME B16.5, FF
ACCESSORIES	
Stroke adjustment	YES (Manual Arrangement, while pump is running)
Inbuilt Pressure Relief Valve	YES
External Pressure Relief Valve	YES
Common Base Frame for Pump & Motor	YES
Suction Strianer	YES
Antisyphon / Back pressure valve	YES
Motor + Coupling	YES
Capacity Control	YES
Level switch interlock arrangement	YES
MATERIALS	
Liquid Head	PP
Hydraulic Diaphragm	PTFE faced hypalon
Housing	CI IS 210-FG-260
Plunger	EN8
NRV(Double Ball type)	PP
Ball seat	PP
Suction strainer	UPVC/PP
Base frame	MS

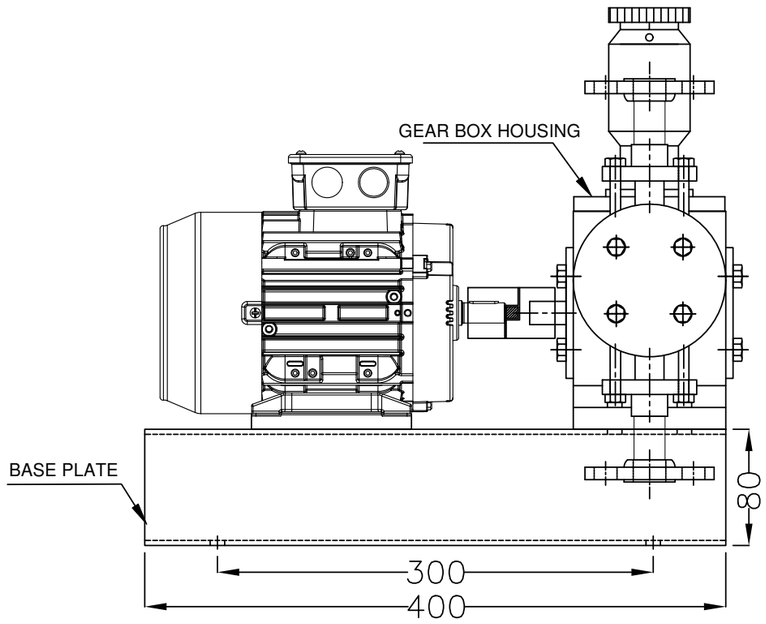
Rev	Date	Description	Made	Chkd	Appd
01	31-Dec-2018	For Approval	PSR	SSY	PAK

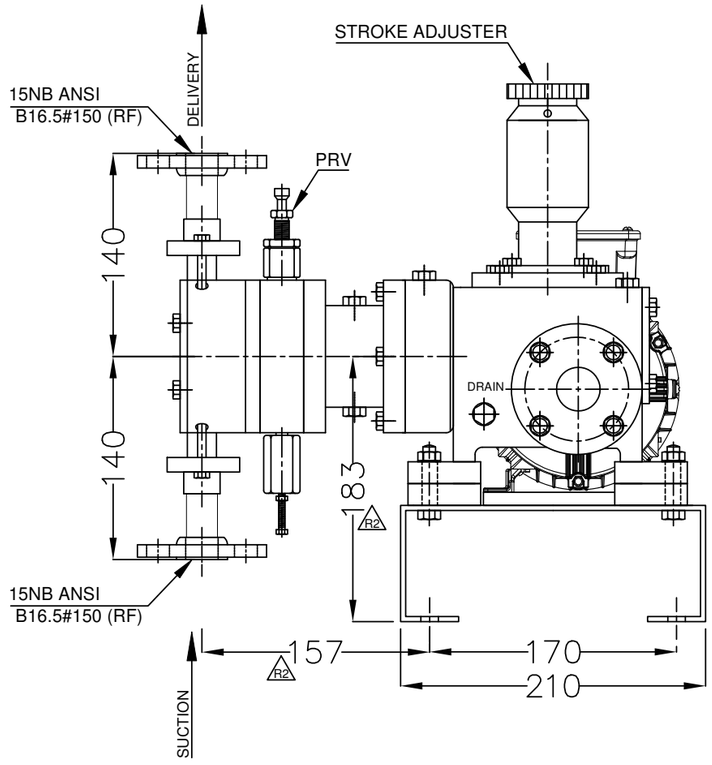


TOP VIEW



NOTE:
1.ALL DIMENSIONS ARE IN mm.
2.TOLERANCE FOR ALL DIMENSIONS ARE ±10mm
3.FOUNDATION BOLT SIZE Ø12mmX150mm
4.WIGHT OF THE PUMP 45KG APPROX. AND WIGHT OF MOTOR 7KG APPROX. R2





TECHNICAL SPECIFICATIONS

CUSTOMER NAME	:-	PENNAR ENVIRO LIMITED			
LIQUID	:-	HYPOCHLORITE (8% W/V)			
TAG NO	:-	DP-02			
PUMP TYPE	:-	HYDRAULIC DIAPHGRAM	COUPLING TYPE	:-	FLEXIBLE SPIDER
PUMP MODEL	:-	HD 1011/SZ0	QTY.	:-	1 No.
PUMP WETTED PART MOC	:-	PP			
FLOW RATE	:-	0-4 LPH			
DISCHARGE PRESSURE	:-	4.5 kg/cm2			
STROKE RANGE	:-	0-100% (MANUAL)			
MOTOR DESCRIPTION	:-	0.5 H.P.,3 PH, 415V, 50 HZ , 4-POLE,FOOT MOUNTED, IP55, IE3, STD TEFC,WEATHER PROOF,S1 DUTY,DOL START,CLASS-F AND TEMP RISE LIMITED TO CLASS -B			
END CONNECTION	:-	15NB FLANGE ANSI B16.5 #150 (RF) END ON SUCTION & DISCHARGE SIDE.			

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FINAL		ACCEPTED WITH COMMENTS		NOT ACCEPTABLE		FOR INFORMATION

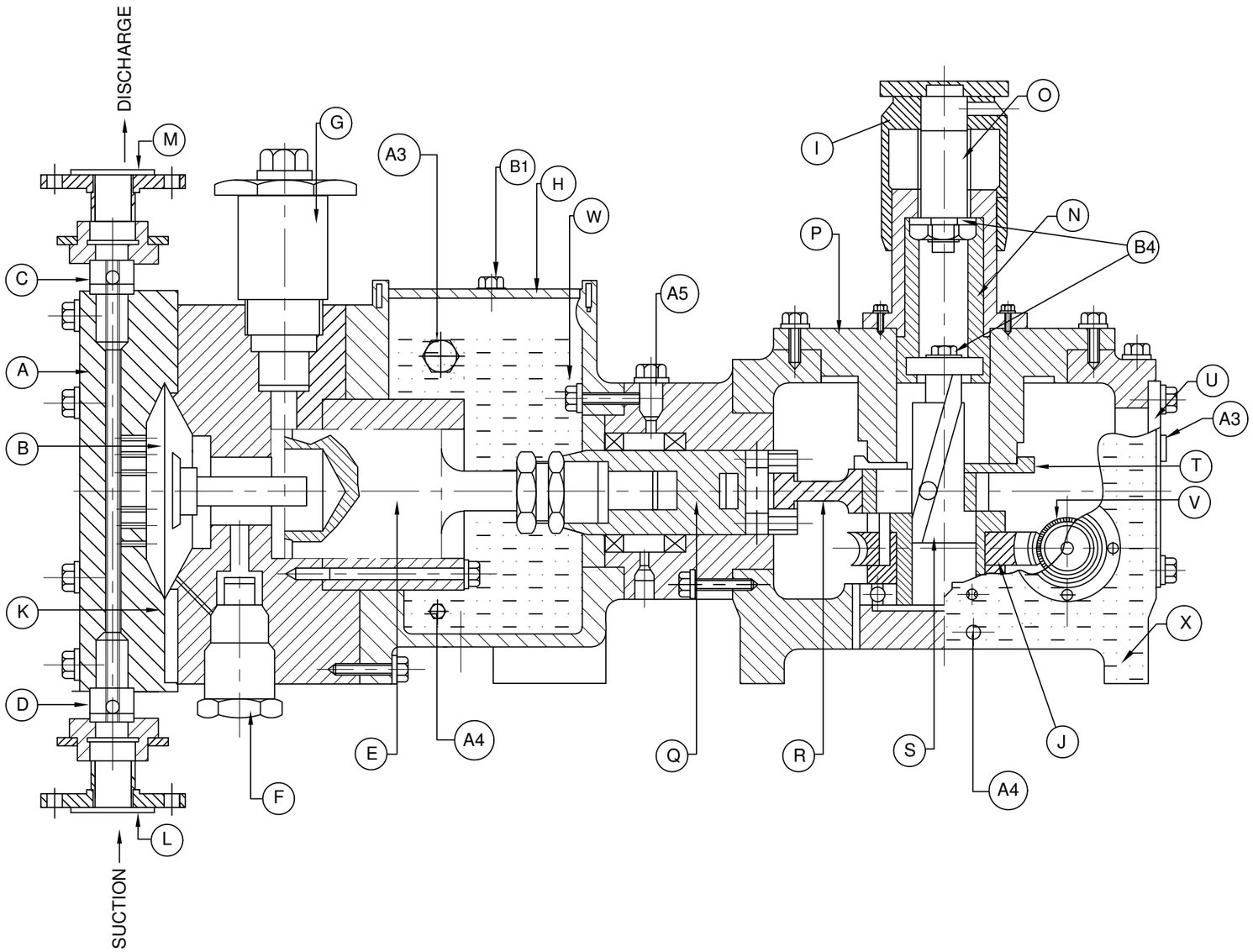
POSITIVE METERING PUMPS (I) PVT.LTD.

PLOT NO. M8, AMBAD M.I.D.C., , NASIK

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED BY
02	31.12.2018		PUJ	TSN	TSN
01	28.12.2018		PUJ	TSN	TSN

DRAWING TITLE :-	GA DRAWING		PUMP MODE:- HD1011_SZ0_PP	
DRAWING NO.:-	GA-HD1011-SZ0-IR9364-02	SCALE	SHEET	REV.
PO. NO.:-		NTS	01	02

300



B4	CIRCLIPE	EN8	01 No.
B1	Oil Filler	--	01 No.
A5	Breather Assembly	--	01 No.
A4	Oil Drain Plug	--	02 Nos.
A3	Oil Level Indicator	--	02 Nos.
X	OIL 460 Grade	---	--
W	OIL 20W40	---	--
V	Worm Shaft	EN8	01 No.
U	Back Plate	PP	01 No.
T	Thrust Plate	CI	01 No.
S	Slider	MS	01 No.
R	Ecc. Strap	CI	01 No.
Q	Cross Head	EN8	01 No.
P	Top Cover	CI	01 No.
O	SL.SCREW	EN8	01 No.
N	Sl. Guide	MS	01 No.
L/M	End Conne. Suction & Dis.	PP PP	01 No. Each
K	Center Ring	MS	01 No.
J	Worm Wheel	PB 2	01 No.
I	Stroke Adju.	CI	01 No.
H	Oil Chember	CI	01 No.
G	Inbuilt Pre. Safety Valve	EN8	01 No.
F	Vaccume Assl.	EN8	01 No.
E	Plunger	EN8	01 No.
D	Non Return Valve (Suc.)	PP	01Set
C	Non Return Valve (Dis.)	PP	01Set
B	Oil Side Diaphragm	PTFE	01 No.
A.	Liquid Head	PP	01 No.
Sr. No.	Description	MOC	Qty.

Z FINAL	A ACCEPTED WITH COMMENTS	N NOT ACCEPTABLE	I FOR INFORMATION

POSITIVE METERING PUMPS (I) PVT.LTD.

PLOT NO. M8, AMBAD M.I.D.C., , NASIK

TECHNICAL SPECIFICATIONS		
CUSTOMER NAME	:-	PENNAR ENVIRO LIMITED
TAG NO	:-	DP-02

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED BY
01	28.12.2018		PUJ	TSN	TSN

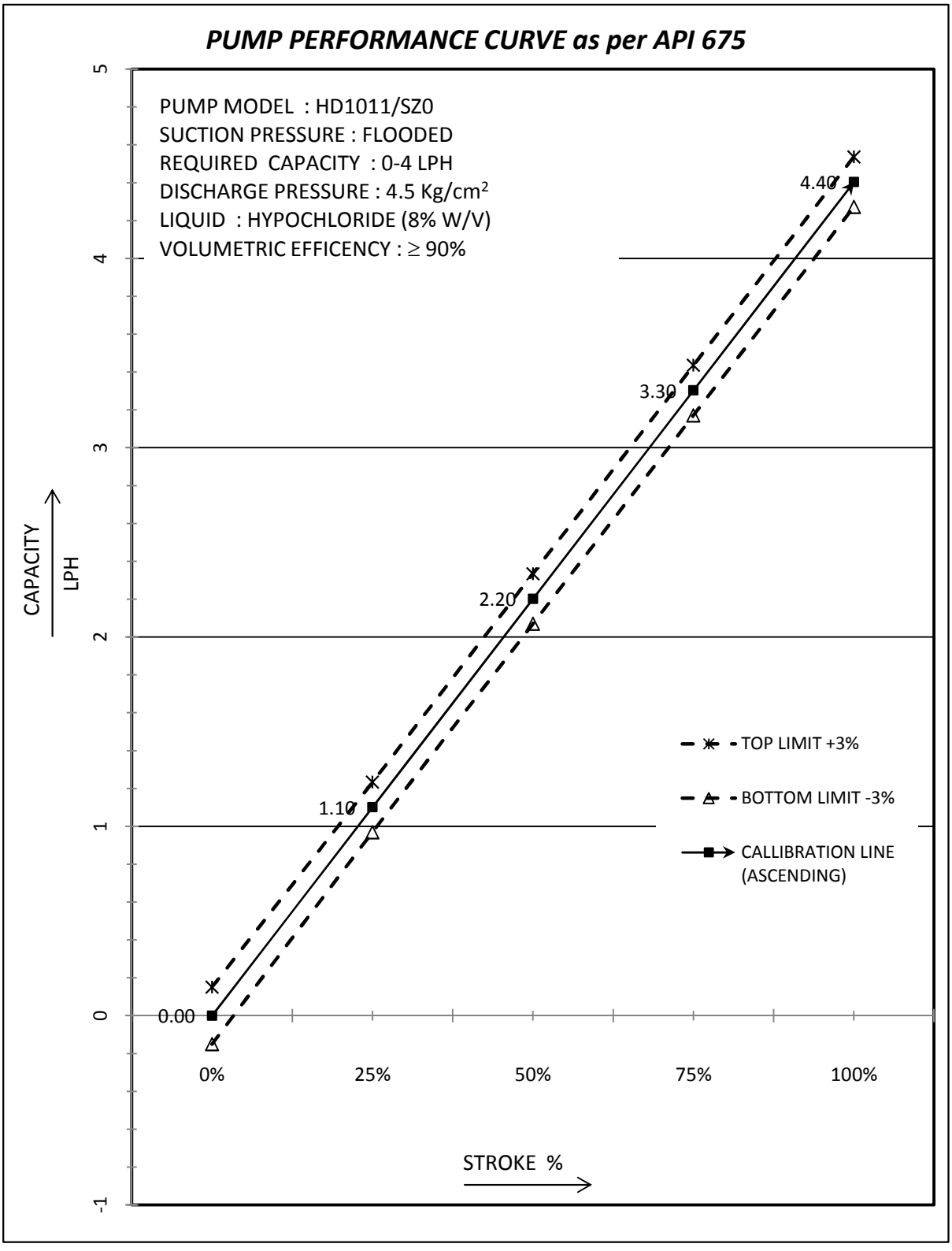
301

DRAWING TITLE :-	CS DRAWING			PUMP MODE:- HD1011_SZO_PP	
DRAWING NO.:-	CS-HD1011-SZO-IR9364-02		SCALE	SHEET	REV.
PO. NO.:-			NTS	01	01

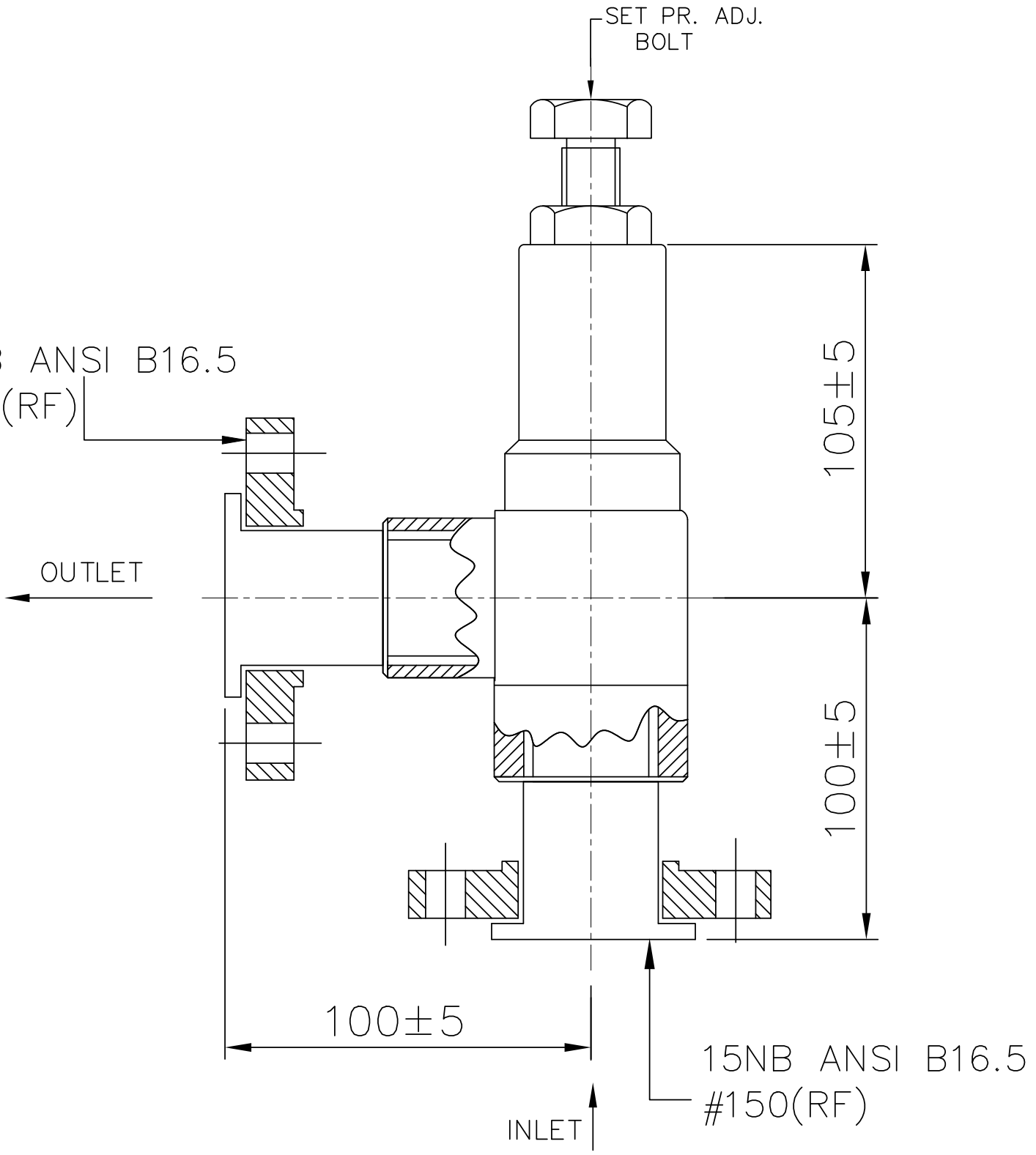
A3-420X297

POSITIVE METERING PUMPS (I) PVT. LTD.
M-8, MIDC, AMBAD, NASIK - 422 010
Email : sales@positivemetering.com Web: www.positivemetering.com

CUSTOMER : PENNAR ENVIRO LIMITED.
PROJECT NAME : 2X6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI
TAG NO. : DP-02



1) ALL DIMENSIONS ARE IN MM
2) TOLERANCES ON ALL DIMENSION ARE IN ±5



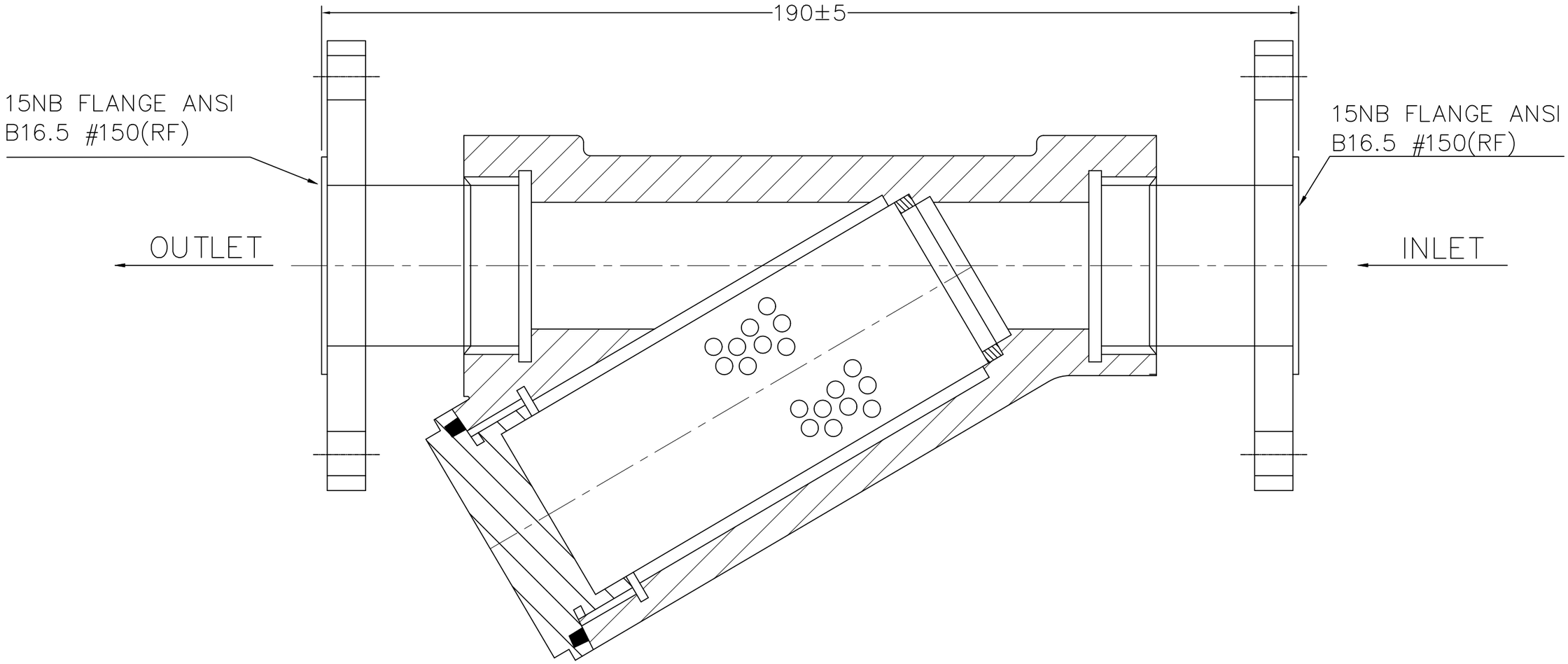
TECHNICAL SPECIFICATIONS

CUSTOMER NAME	:–	PENNAR ENVIRO LIMITED			
MOC	:–	PP			
TYPE	:–	SPRING LOADED	QTY.	:–	01 NOS.
SET PRESSURE		4.5 Kg/cm²			

POSITIVE METERING PUMPS (I) PVT LTD.

AMBAD MIDC-PLOT No-M8,NASHIK-10

DRN.	PUJ	TITLE:– EXTERNAL PRESSURE RELIEF VALVE
CHD.	SBN	
APPD.	TSN	
SCALE	NTS	DRG.NO.: PMP–EPRV–IR9364–02
DATE	31.12.18	REV.–01



TECHNICAL SPECIFICATIONS

CUSTOMER NAME	:–	PENNAR ENVIRO LIMITED			
PO NO.	:–	PEL_WP_BHEL_ENNORE_004			
MOC	:–	PP	TAG NO.	:–	DP–02
TYPE	:–	Y–TYPE STRAINER			

NOTE:
1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE FOR ALL DIMENSIONS ARE ±5mm

POSITIVE METERING PUMPS (I) PVT LTD. AMBAD MIDC–PLOT No–M8,NASHIK–10		
DESIGN	PUJ	TITLE: – STRAINER
CHD	TSN	
APPD.	TSN	DRG.NO.: PMP–GA–STR–IR9364–02
DATE	31.12.18	REV.–00

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**31/12/2018**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**01**
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-A015**	**PEL Doc. no:**	**A4-PEL-1037-DS-DP003**

Datasheet for DWPE Dosing Pump_Hydraulically Actuated Diaphragm

GENERAL DATA	
Pump Designation	DWPE dosing pump for Centrifuge
Pump Tag Number	DP-03
Quantity	1 No
P & ID reference	PE-V0-412-673-A001
Pump Location (Indoor / Outdoor)	Outdoor
Duty (Continuous/ Intermittent)	Continious
Type	Hydraulic Actuated Diaphragm
Pump Manufacturer	Positive Metering Pumps (I) Pvt.Ltd
Pump Model	HD1011/SZ1
DESIGN CONDITIONS	
Design Standard	API 675
Testing Standard	API 675
OPERATING CONDITIONS	
Fluid Handled	Dewatering Polyeletrolyte (0.1 % conc.)
Pumping Temp°C [nor/Oper./max]	25 / 35 / 50
Specific Gravity	1
Viscosity at pumping temp (cp)	20
pH of Fluid	5 to 8
Rated / Max Flow (LPH)	0 - 25
Suction Press ($kg/cm^2(g)$)	Flooded
Discharge pressure ($kg/cm^2(g)$)	4
NPSH (A) (m)	Ample
PERFORMANCE	
Minimum Flow (LPH)	2.75
Plunger Speed (Stroke/min)	100 SPM (Max100)
Length of Stroke (mm)	10
NPSH (R) (m)	Flooded
Pump Relief valve Set Pressure (Kg/cm2,g)	5.5
BKW at R.V Set Pressure	0.12
Volumetric Efficiency (%)	≥90%

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Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**01**
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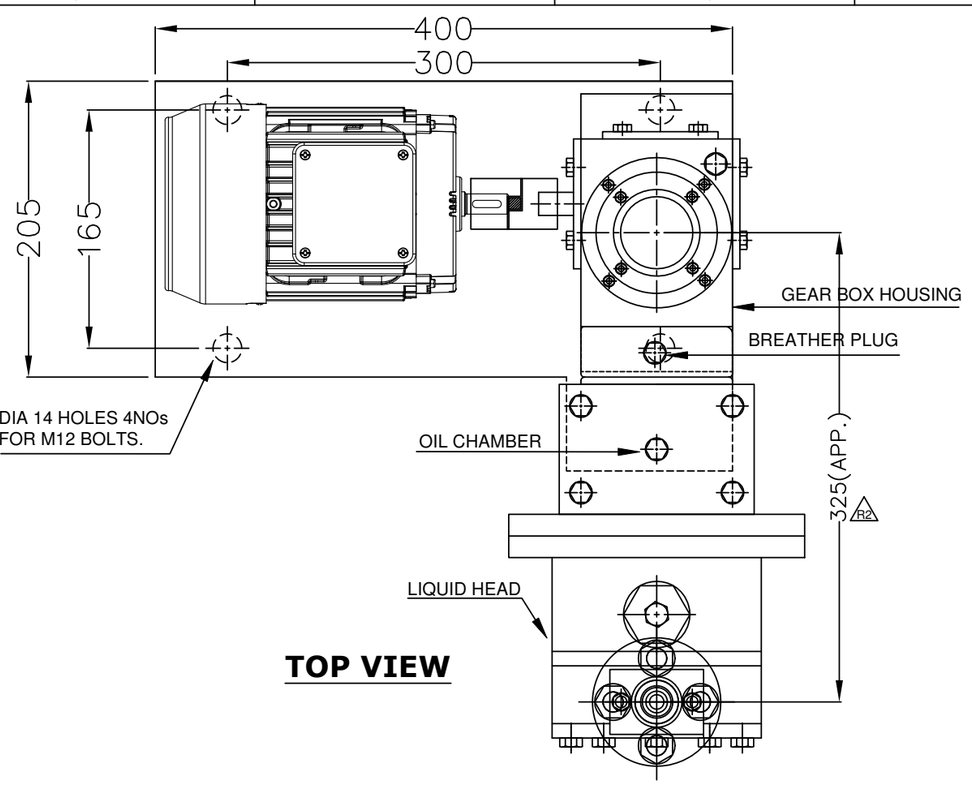
Package:	**75 KLD SEWAGE TREATMENT PLANT**		
Document No.:	**PE-V0-412-673-A015**	**PEL Doc. no:**	**A4-PEL-1037-DS-DP003**

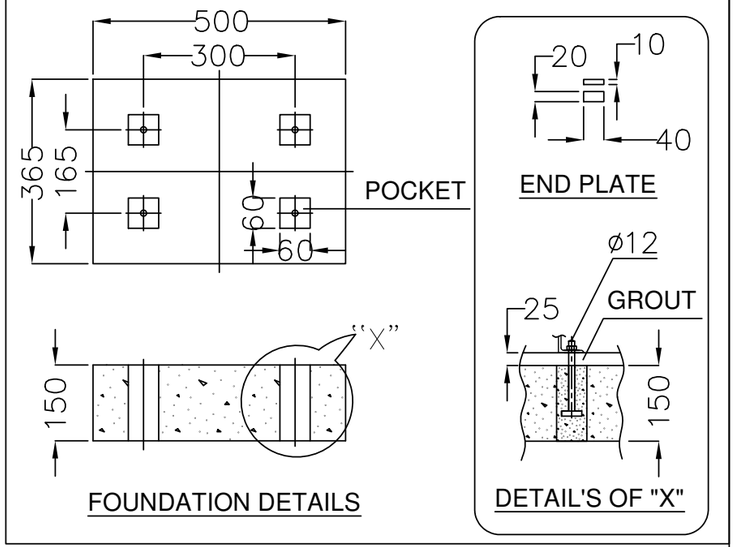
Datasheet for DWPE Dosing Pump_Hydraulically Actuated Diaphragm

CONSTRUCTION	
No. of Stages	1
Pump Liquid EndType	Hydraulic Actuated Diaphragm
Diaphragm Type	Single
Plunger Diameter (mm)	28
Cylinder Diameter (mm)	28
NOZZLE SCHEDULE	
Suction (Size / End Connection)	15NB Flange ANSI B 16.5(FF) Flanged End,150, ASME B16.5, FF
Discharge (Size / End Connection)	15NB Flange ANSI B 16.5(FF) Flanged End,150, ASME B16.5, FF
ACCESSORIES	
Stroke adjustment	YES (Manual Arrangement, while pump is running)
Inbuilt Pressure Relief Valve	YES
External Pressure Relief Valve	YES
Common Base Frame for Pump & Motor	YES
Suction Strianer	YES
Antisyphon / Back pressure valve	YES
Motor + Coupling	YES
Capacity Control	YES
Level switch interlock arrangement	YES
MATERIALS	
Liquid Head	PP
Hydraulic Diaphragm	PTFE faced hypalon
Housing	CI IS 210-FG-260
Plunger	EN8
NRV(Double Ball type)	PP (double NRV)
Ball seat	PP
Suction strainer	UPVC/PP
Base frame	MS

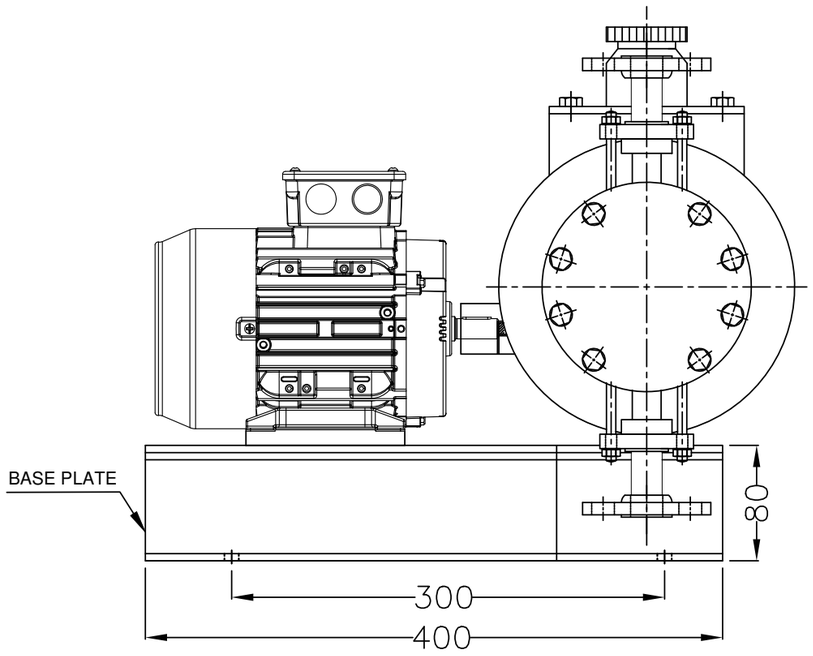
Rev	Date	Description	Made	Chkd	Appd
01	31-Dec-2018	For Approval	PSR	SSY	PAK



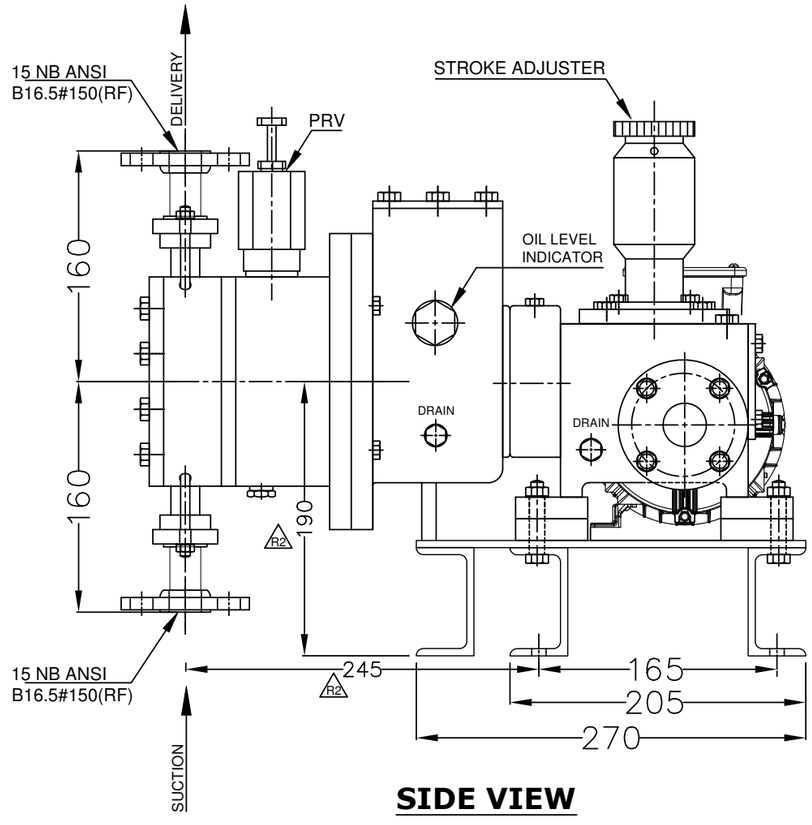
TOP VIEW



NOTE:
1.ALL DIMENSIONS ARE IN mm.
2.TOLERANCE FOR ALL DIMENSIONS ARE ±10mm
3.FOUNDATION BOLT SIZE Ø12mmX150mm
4.4.WIGHT OF THE PUMP 60KG APPROX. AND WIGHT OF MOTOR 7KG APPROX. R2



FRONT VIEW



SIDE VIEW

TECHNICAL SPECIFICATIONS

CUSTOMER NAME	:-	PENNAR ENVIRO LIMITED			
LIQUID	:-	DEWATERING POLYELECTROLYTE (0.1%CONC.)			
TAG NO	:-	DP-03			
PUMP TYPE	:-	HYDRAULIC DIAPHGRAM	COUPLING TYPE	:-	FLEXIBLE SPIDER
PUMP MODEL	:-	HD 1011/SZ1	QTY.	:-	1 No.
PUMP WETTED PART MOC	:-	PP			
FLOW RATE	:-	0-25 LPH			
DISCHARGE PRESSURE	:-	4 kg/cm2			
STROKE RANGE	:-	0-100% (MANUAL)			
MOTOR DESCRIPTION	:-	0.5 H.P.,3 PH, 415V, 50 HZ , 4-POLE,FOOT MOUNTED, IP55, IE3, STD TEFC,WEATHER PROOF,S1 DUTY,DOL START,CLASS-F AND TEMP RISE LIMITED TO CLASS -B			
END CONNECTION	:-	15NB FLANGE ANSI B16.5 #150 (RF) END ON SUCTION & DISCHARGE SIDE.			

Z	A	N	I
FINAL	ACCEPTED WITH COMMENTS	NOT ACCEPTABLE	FOR INFORMATION

POSITIVE METERING PUMPS (I) PVT.LTD.

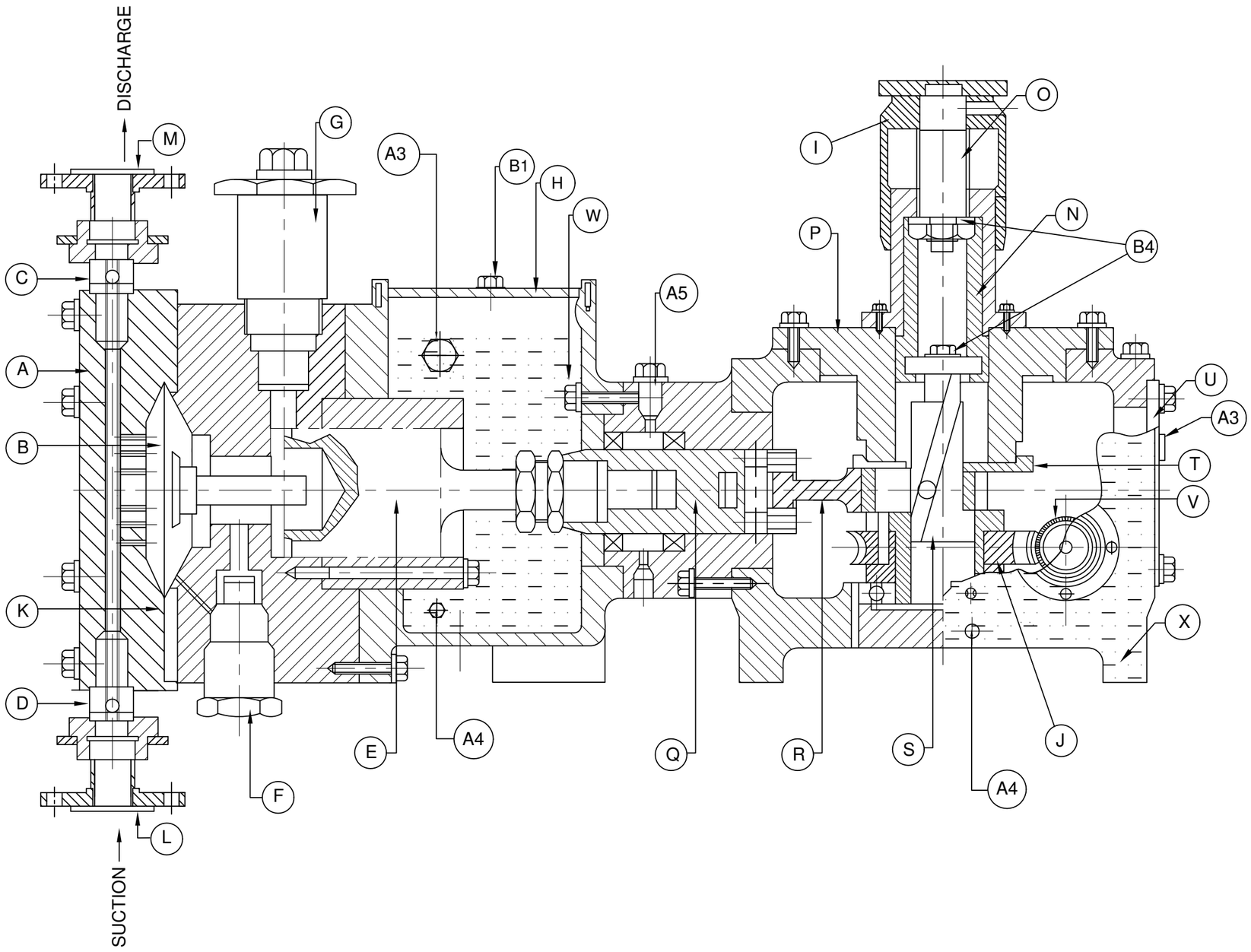
PLOT NO. M8, AMBAD M.I.D.C., , NASIK

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED BY
02	31.12.18		PUJ	TSN	TSN
01	27.12.18		PUJ	TSN	TSN

DRAWING TITLE :-	GA DRAWING		MODEL NO.:- HD1011_SZ1_PP	
DRAWING NO.:-	GA-HD1011-SZ1-IR9364-03	SCALE	SHEET	REV.
		NTS	01	02

307

A3-420X297



Sr. No.	Description	MOC	Qty.
B4	CIRCLIPE	EN8	01 No.
B1	Oil Filler	--	01 No.
A5	Breather Assembly	--	01 No.
A4	Oil Drain Plug	--	02 Nos.
A3	Oil Level Indicator	--	02 Nos.
X	OIL 460 Grade	---	--
W	OIL 20W40	---	--
V	Worm Shaft	EN8	01 No.
U	Back Plate	PP	01 No.
T	Thrust Plate	CI	01 No.
S	Slider	MS	01 No.
R	Ecc. Strap	CI	01 No.
Q	Cross Head	EN8	01 No.
P	Top Cover	CI	01 No.
O	SL.SCREW	EN8	01 No.
N	Sl. Guide	MS	01 No.
L/M	End Conne. Suction & Dis.	PP PP	01 No. Each
K	Center Ring	MS	01 No.
J	Worm Wheel	PB 2	01 No.
I	Stroke Adju.	CI	01 No.
H	Oil Chember	CI	01 No.
G	Inbuilt Pre. Safety Valve	EN8	01 No.
F	Vaccume Assl.	EN8	01 No.
E	Plunger	EN8	01 No.
D	Non Return Valve (Suc.)	PP	01Set
C	Non Return Valve (Dis.)	PP	01Set
B	Oil Side Diaphragm	PTFE	01 No.
A.	Liquid Head	PP	01 No.

TECHNICAL SPECIFICATIONS		
CUSTOMER NAME	:-	PENNAR ENVIRO LIMITED
TAG NO	:-	DP-03

308

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY	APPROVED BY
01	27.12.18		PUJ	TSN	TSN

Z FINAL | A ACCEPTED WITH COMMENTS | N NOT ACCEPTABLE | I FOR INFORMATION

POSITIVE METERING PUMPS (I) PVT.LTD.

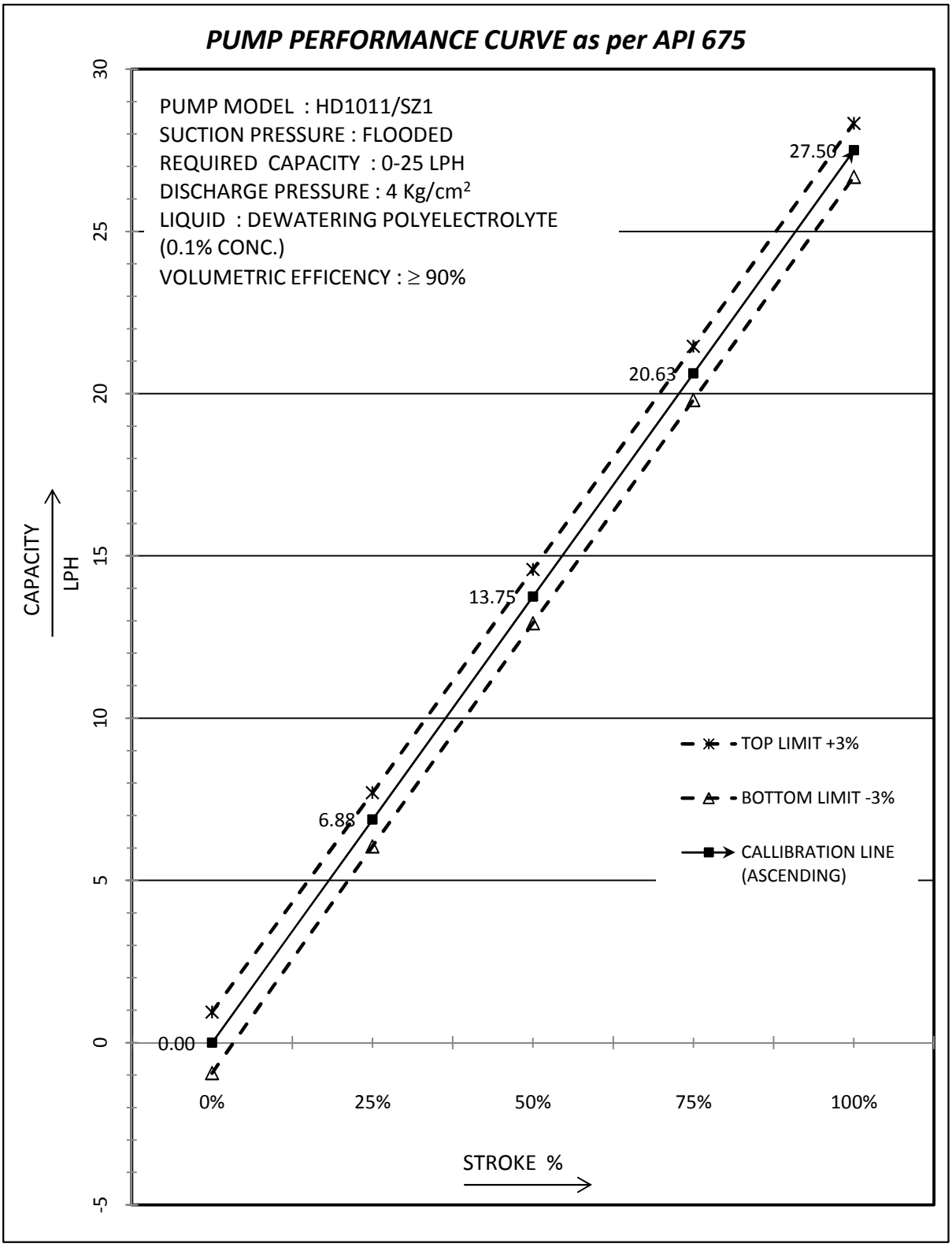
PLOT NO. M8, AMBAD M.I.D.C., , NASIK

DRAWING TITLE :-	CS DRAWING		MODEL NO.:- HD1011_SZ1_PP	
DRAWING NO.:-	CS-HD1011-SZ1-IR9364-03	SCALE	SHEET	REV.
		NTS	01	01

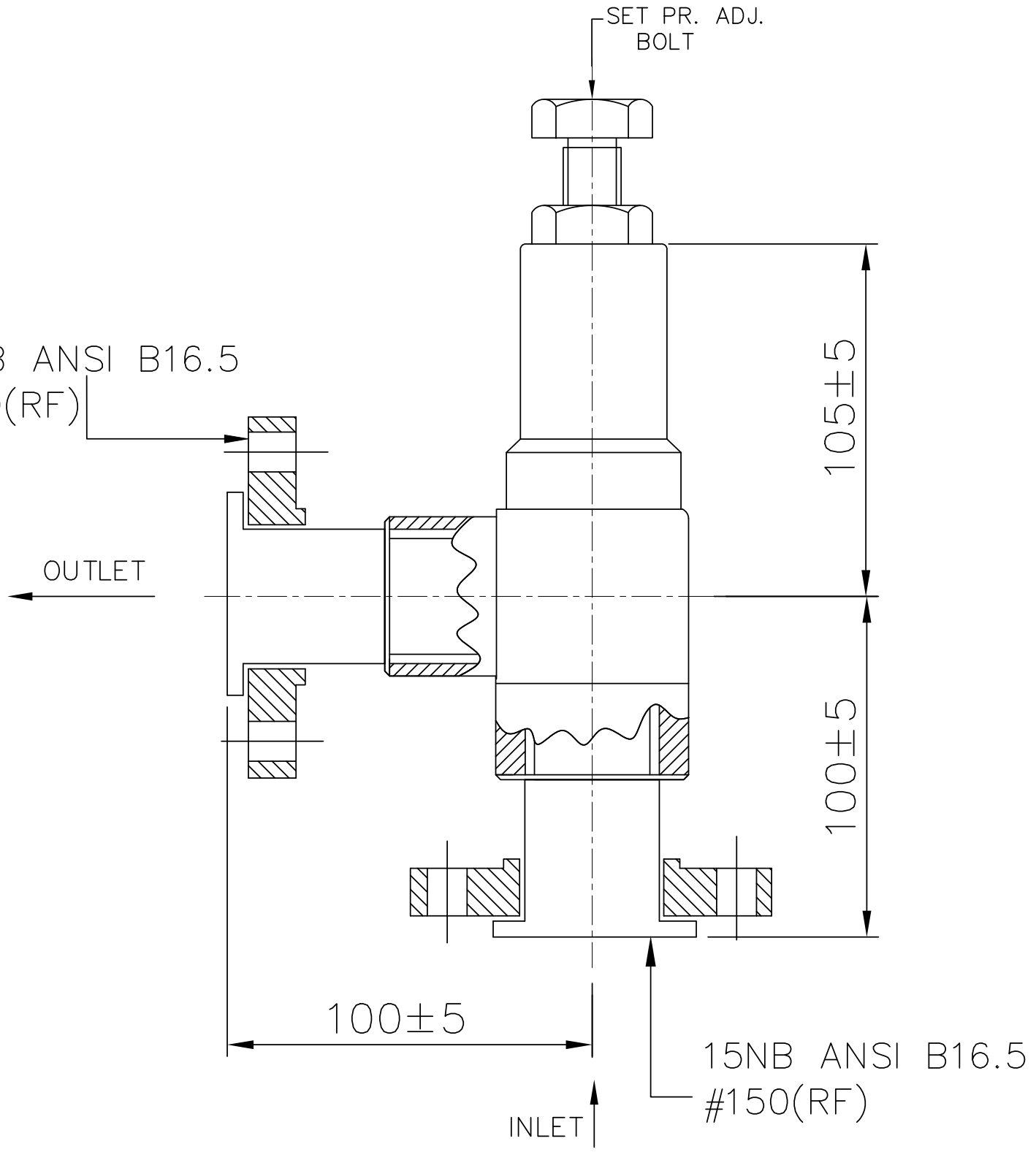
A3-420X297

POSITIVE METERING PUMPS (I) PVT. LTD.
M-8, MIDC, AMBAD, NASIK - 422 010
Email : sales@positivemetering.com Web: www.positivemetering.com

CUSTOMER : PENNAR ENVIRO LIMITED.
PROJECT NAME : 2X6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI
TAG NO. : DP-03



1) ALL DIMENSIONS ARE IN MM
2) TOLERANCES ON ALL DIMENSION ARE IN ±5



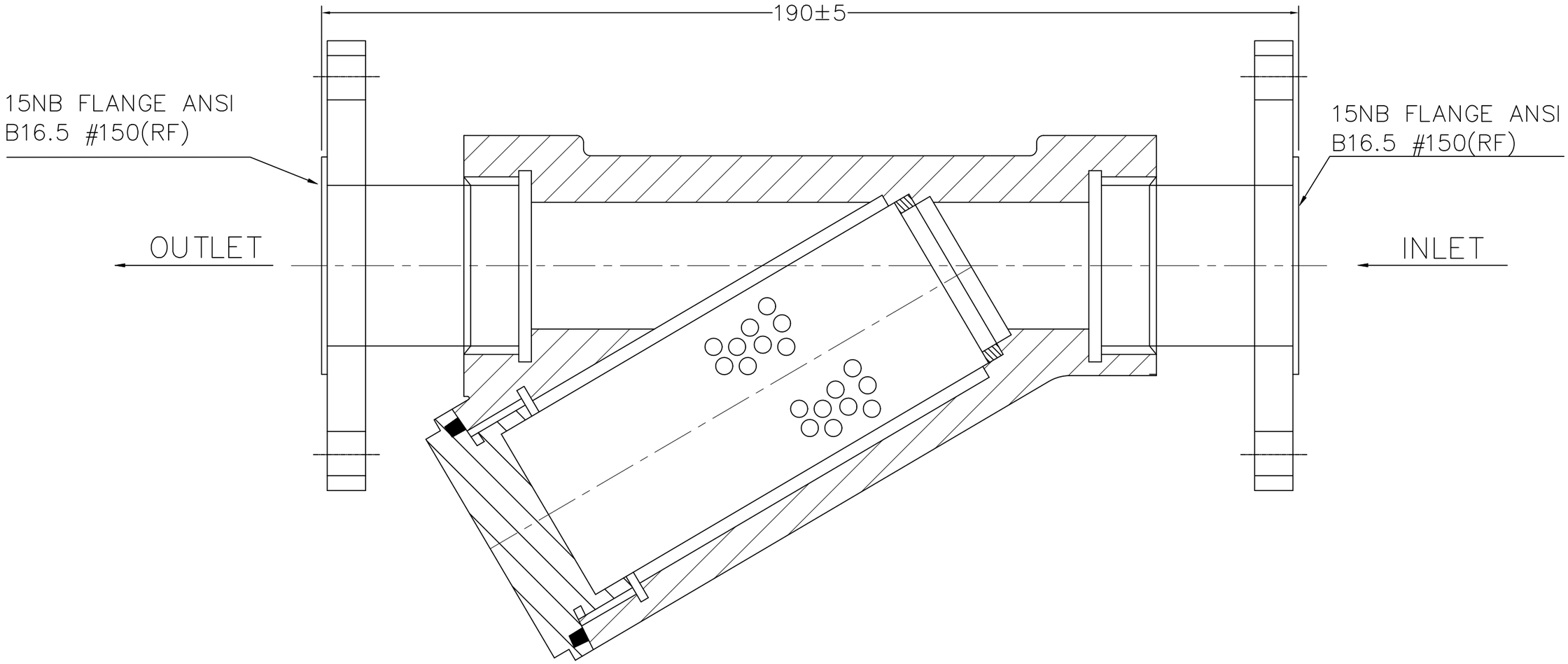
TECHNICAL SPECIFICATIONS

CUSTOMER NAME	:–	PENNAR ENVIRO LIMITED			
MOC	:–	PP			
TYPE	:–	SPRING LOADED	QTY.	:–	01 NOS.
SET PRESSURE		5.5 Kg/cm²			

POSITIVE METERING PUMPS (I) PVT LTD.

AMBAD MIDC-PLOT No-M8,NASHIK-10

DRN.	PUJ	TITLE:– EXTERNAL PRESSURE RELIEF VALVE
CHD.	SBN	
APPD.	TSN	
SCALE	NTS	DRG.NO.: PMP–EPRV–IR9364–03
DATE	31.12.18	REV.–01



TECHNICAL SPECIFICATIONS

CUSTOMER NAME	:–	PENNAR ENVIRO LIMITED			
PO NO.	:–	PEL_WP_BHEL_ENNORE_004			
MOC	:–	PP	TAG NO.	:–	DP–03
TYPE	:–	Y–TYPE STRAINER			

NOTE:
1. ALL DIMENSIONS ARE IN mm.
2. TOLERANCE FOR ALL DIMENSIONS ARE ±5mm

POSITIVE METERING PUMPS (I) PVT LTD. AMBAD MIDC–PLOT No–M8,NASHIK–10		
DESIGN	PUJ	TITLE: – STRAINER
CHD	TSN	
APPD.	TSN	DRG.NO.: PMP–GA–STR–IR9364–03
DATE	31.12.18	REV.–00

APPROVED

REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
1	03-01.2019	ISSUED FOR APPROVAL	PSR	SSY	PAK
0	04.09.2018	ISSUED FOR APPROVAL	MKK	SSY	PAK

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

DEPT.	CODE		SCALE	WEIGHT (KG)	REF DRG.	ITEM
--	A		--	–	–	–

TITLE

Technical Datasheet Of Agitators

75KLD SEWAGE TREATMENT PLANT

	NAME	SIGN	DATE
PREP	PSR		03.01.2019
CHKD	SSY		03.01.2019
APPD	PAK		03.01.2019

DEPT.							CARD CODE	BHEL DOC NO.	REV
SIGN				N.A.			–	PE-V0-412-673-A016	
DATE								PEL DOC NO. A4-PEL-1037-DS-AG001 to 003	1
								NO. OF SHEETS – 11 (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-A016
DOC NAME: TECHNICAL DATASHEET OF AGITATOR (Sewage Treatment Plant)

COMMENTS RESOLUTION SHEET

S.No.	TANGENDCO Comments	BHEL/PEL's Response
1	The agitators shall be motorized. Please indicate the same.	Noted and providing the same
2	Please indicate manufacturer and model no.	Noted and incorporated
3	Please indicate all data under “E. Manufacturer’s Data”.	Noted and incorporated
4	Indicate motor rating of agitator motor.	Noted and incorporated

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

CONTENTS

1.AGITATOR

SR.NO	DESCRIPTION	PAGES
1.1	TECHNICAL DATASHHET OF HYPO DOSING TANK AGITATOR AG-001	4-6
1.2	TECHNICAL DATASHHET OF HYPO DOSING TANK AGITATOR AG-002	7-9
1.3	TECHNICAL DATASHHET OF DWPE DOSING TANK AGITATOR AG-003	10-12

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**DATE :**	3-Jan-2019
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**REV :**	1
Owner Consultant:	**DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI**	**PEL/D & D- F 002**	
EPC Contractor:	**BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA**		
Package	**75KLD SEWAGE TREATMENT PLANT**		
Client Doc. no:	**PE-V0-412-673-A016**	**PEL Doc. no:**	**A4-PEL-1037-DS-AG001**

Technical Datasheet for Hypo Dosing Tank Agitator

A	**General Data**	
1	**Tag No.**	**0GRN01AM001**
2	Manufacturer	FFP Eco Technologies Pvt Ltd
3	Model	TAW -H Economy series
4	Quantity	1No
5	Location	Hypo Dosing tank for Hypo contact tank / Filter feed tank -Outdoor
6	Duty	Continuous
B	**Operating Condition**	
1	Service	8 % w/v Hypochlorite solution
2	Operating Temp°C [nor/max]	25 / 35
3	Design Temp deg C	50
4	Sp. Gravity	1.2
5	Viscosity (cp)	2
6	pH of liquid	11 to 13
7	Duty /Purpose	Continuous / Solution Preparation
C	**Vessel /Tank Data**	
1	Tank Size	0.475m(Dia) x 0.625m(Ht)
2	Tank Tag No.	DT-01
3	Bottom type	Flat
4	Top type	Close
5	Tank capacity (m3)	100 Ltr
6	Liquid Level From Bottom (mm)	565
7	Tank Moc	HDPE
8	Entry	~10:01
9	Agitator Mounting Level From Bottom (mm)	825

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

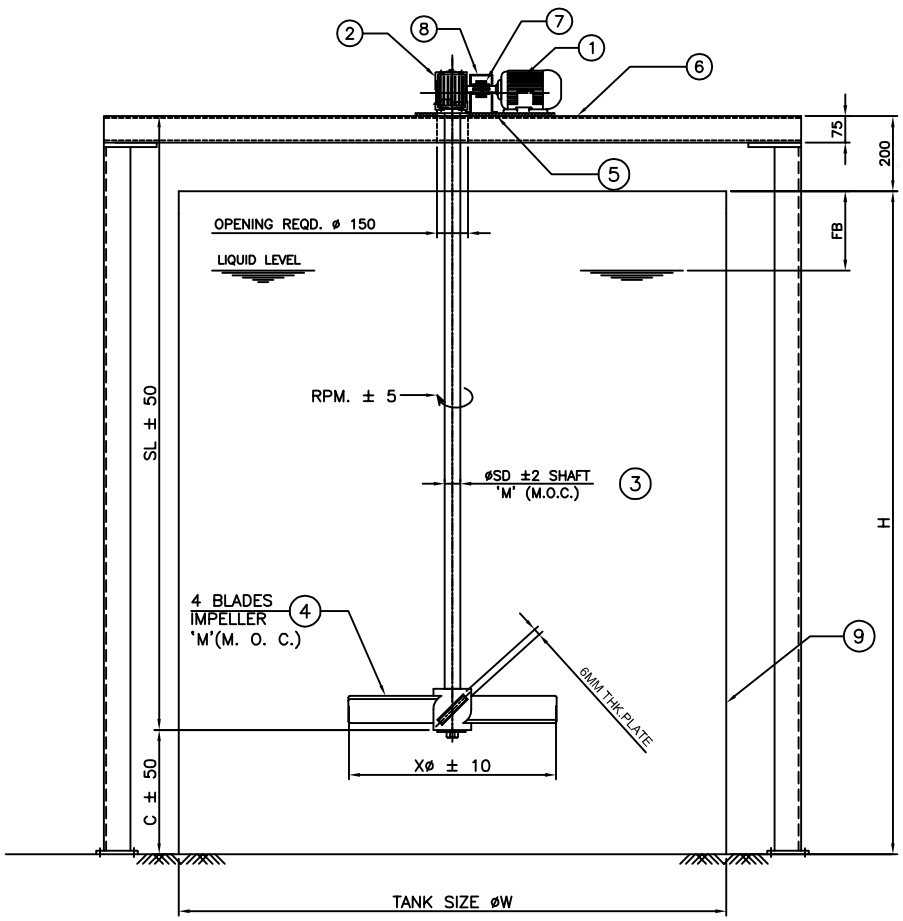
Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**DATE :**	3-Jan-2019
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**REV :**	1
Owner Consultant:	**DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI**	**PEL/D & D- F 002**	
EPC Contractor:	**BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA**		
Package	**75KLD SEWAGE TREATMENT PLANT**		
Client Doc. no:	**PE-V0-412-673-A016**	**PEL Doc. no:**	**A4-PEL-1037-DS-AG001**

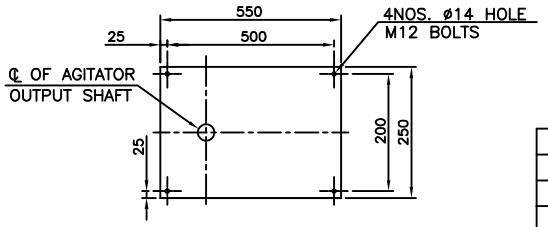
Technical Datasheet for Hypo Dosing Tank Agitator

D	**Manufacturer's Data**	
1	Impeller Type	Pitch blade turbine
2	Mounting	Vertical Concentric
3	Agitator Rotation speed rpm	~140 RPM
4	Diameter	~280+/-10mm
5	No. of Blades	4 Nos.
6	Shaft Diameter(mm)	28+/-2mm
7	Shaft Length max.(mm)	600+/-50mm
8	Coupling Bet GB & Agit Type	NA
9	Reduction Gear Box Ratio	~10:01
10	Reduction Gear Box S.F	Min 1.25
11	Reduction Gear Box Make	Preamium
E	**Materials of Construction**	
1	Blade Moc	SS 316
2	Shaft Moc	SS 316

Rev	Date	Description	Made	Checked	Appd
1	3-Jan-2018	For Approval	PSR	SSY	PAK

SR.	TANK	TAG NO.	øW	B	H	FB	SL	øSD	øX	'C'	*HP	RPM	'M' M.O.C.	GEAR BOX	RATIO	ISMC	MOTOR FRAME SIZE	QTY.	WT.(Kg.)
01	Hypo Dosing Tank Agitator 90	GRN01AM001	475	–	625	60	600	28	280	225	0.5	~140	SS 316	ALM–040	~10:01	75	71 (FOOT)	1	~85





DETAIL OF MOUNTING PLATE

NO.	DESCRIPTION	M.O.C	QTY.	REMARK
9	TANK	HDPE/PVC	1	
8	COUPLING GUARD	M.S.	1	
7	LOVE JOY COUPLING	C.I.	1	
6	MOUNTING STRUCTURE WITH BASE FRAME	M.S.	1	
5	MOUNTING PLATE	M.S.	1	8 ± 1 mm THK PLATE
4	IMPELLER	SS 316	1	PITCHED TURBINE
3	SHAFT	SS 316	1	
2	GEAR BOX (WORM TYPE)	MFR. STD.	1	MAKE: PREMIUM/Eq.
1	MOTOR CGL/Eq.	MFR. STD.	1	1500RPM, STD, 415V(+/–10%),50HZ (+)3% (–)5% IE–3, IP55,T.E.F.C, CLASS–F/B (IN FFP SCOPE)

BILL OF MATERIAL

NOTE:
1. ALL DIMENSION ARE IN MM. UNLESS INDICATED OTHERWISE.
2. PAINTING FOR NON WETTED PARTS : SURFACE PREPARATION: GRADE SA 2 1/2, TWO COATS OF ZINC SILICATE EPOXY PRIMER, DFT= 50 MICRONS/ COAT . + TWO COATS OF HIGH BUILD EPOXY @ 90 MICRONS DFT/COAT TOTAL DFT ~260 μ. (COLOUR SHADE–RAL 7032)
3. HARDWARE (M.O.C) :
   A) WETTED HARDWARE : SS 316
   B) NON–WETTED HARDWARE: AS PER IS:1367, CL.4.6/4,5. G.I.
   C) ALL HARDWARE WILL PROVIDED WITH WASHERS OF SAME MATERIAL.

PROJECT: 2 x 6600 MW STPS
PO NO.: PEL-WP-BHEL-ENNORE-003
CLIENT: TANGEDCO
CONTRACTOR: -
MANUFACTURER:
FFP ECO TECHNOLOGIES PVT. LTD.
(FORMERLY "FIBRE & FIBRE PRODUCTS")
MUMBAI: 400 063. E–MAIL: fibrein@gmail.com
SINCE 1977

PROJECTION:

TITLE: GA DRAWING FOR HYPO DOSING TANK AGITATOR (TAW–H ECONOMY SERIES)

REV. NO.	REV. BY	APPD. BY	DATE
R1	K.A.A	J.P.A.	31.12.18

DRAWN K.A.A. | CHECKED L.J.A. | APPROVED J.P.A. | DATE 25.12.18
DRG NO.: A3/18/189118
REV. NO.: 01
SCALE: NTS

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

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Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**REV :**	1
Owner Consultant:	**DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI**	**PEL/D & D- F 002**	
EPC Contractor:	**BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA**		
Package	**75KLD SEWAGE TREATMENT PLANT**		
Client Doc. no:	**PE-V0-412-673-A016**	**PEL Doc. no:**	**A4-PEL-1037-DS-AG001**

Technical Datasheet for Hypo Dosing Tank Agitator

A	**General Data**	
1	**Tag No.**	**0GRN02AM001**
2	Manufacturer	FFP Eco Technologies Pvt Ltd
3	Model	TAW Economy series
4	Quantity	1No
5	Location	Hypo Dosing tank for Centrifuge - Indoor
6	Duty	Continuous
B	**Operating Condition**	
1	Service	8 % w/v Hypochlorite solution
2	Operating Temp°C [nor/max]	25 / 35
3	Design Temp deg C	50
4	Sp. Gravity	1.2
5	Viscosity (cp)	2
6	pH of liquid	11 to 13
7	Duty /Purpose	Continuous / Solution Preparation
C	**Vessel /Tank Data**	
1	Tank Size	0.475m(Dia) x 0.625m(Ht)
2	Tank Tag No.	DT-02
3	Bottom type	Flat
4	Top type	Close
5	Tank capacity (m3)	100 Ltr
6	Liquid Level From Bottom (mm)	565
7	Tank Moc	HDPE
8	Entry	Top
9	Agitator Mounting Level From Bottom (mm)	825

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Re-engineering Water, Environment & Energy

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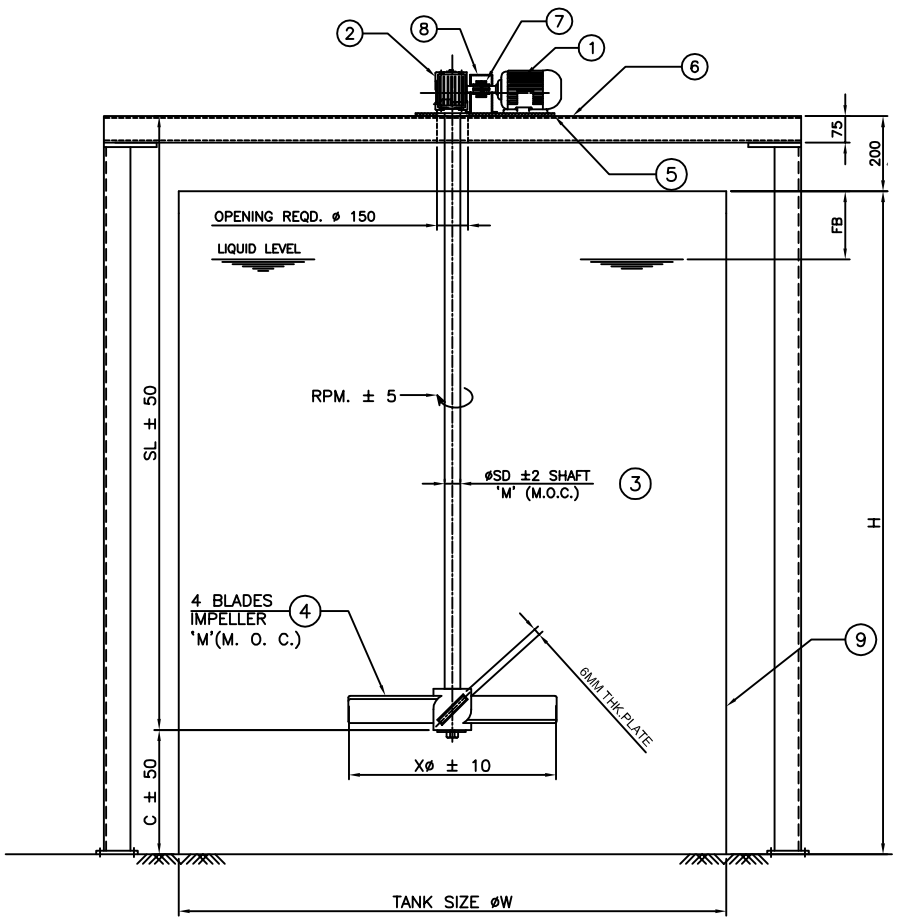
Owner Consultant:	**DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI**	**PEL/D & D- F 002**	
EPC Contractor:	**BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA**		
Package	**75KLD SEWAGE TREATMENT PLANT**		
Client Doc. no:	**PE-V0-412-673-A016**	**PEL Doc. no:**	**A4-PEL-1037-DS-AG001**

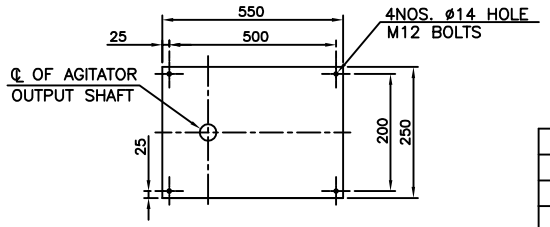
Technical Datasheet for Hypo Dosing Tank Agitator

D	**Manufacturer's Data**	
1	Impeller Type	Pitch blade turbine
2	Mounting	Vertical Concentric
3	Agitator Rotation speed rpm	~140 RPM
4	Diameter	~280+/-20mm
5	No. of Blades	4
6	Shaft Diameter(mm)	28+/-2mm
7	Shaft Length max.(mm)	600+/-50mm
8	Coupling Bet GB & Agit Type	NA
9	Reduction Gear Box Ratio	~10:01
10	Reduction Gear Box S.F	Min 1.25
11	Reduction Gear Box Make	Preamium
E	**Materials of Construction**	
1	Blade Moc	SS 316
2	Shaft Moc	SS 316

Rev	Date	Description	Made	Checked	Appd
1	3-Jan-2018	For Approval	PSR	SSY	PAK

SR.	TANK	TAG NO.	øW	B	H	FB	SL	øSD	øX	'C'	*HP	RPM	'M' M.O.C.	GEAR BOX	RATIO	ISMC	MOTOR FRAME SIZE	QTY.	WT.(Kg.)
01	Hypo Dosing Tank Agitator 90	GRN02AM001	475	–	625	60	600	28	280	225	0.5	~140	SS 316	ALM–040	~10:01	75	71 (FOOT)	1	~95





DETAIL OF MOUNTING PLATE

NO.	DESCRIPTION	M.O.C	QTY.	REMARK
9	TANK	HDPE/PVC	1	
8	COUPLING GUARD	M.S.	1	
7	LOVE JOY COUPLING	C.I.	1	
6	MOUNTING STRUCTURE WITH BASE FRAME	M.S.	1	
5	MOUNTING PLATE	M.S.	1	8 ± 1 mm THK PLATE
4	IMPELLER	SS 316	1	PITCHED TURBINE
3	SHAFT	SS 316	1	
2	GEAR BOX (WORM TYPE)	MFR. STD.	1	MAKE: PREMIUM/Eq.
1	MOTOR CGL/Eq.	MFR. STD.	1	1500RPM, STD, 415V(+/–10%),50HZ (+)3% (–)5% IE–3, IP55,T.E.F.C, CLASS–F/B (IN FFP SCOPE)

BILL OF MATERIAL

NOTE:
1. ALL DIMENSION ARE IN MM. UNLESS INDICATED OTHERWISE.
2. PAINTING FOR NON WETTED PARTS : SURFACE PREPARATION: GRADE SA 2 1/2,
   1 COAT OF INORGANIC ETHYL ZINC SILICATE SHOP PRIMER, DFT (25) MICRONS
   + TWO LAYERS OF ZINC PHOSPHATE EPOXY PRIMER, DFT (75) MICRONS +
   + TWO COATS OF CHLORINATED RUBBER PAINT IN APPROVED SHADE @ 30–40 MICRONS DFT/COAT (60–80 MICRONS)
   TOTAL DFT ~160–180µ).
   (COLOUR SHADE–RAL 7032)
3. HARDWARE (M.O.C) :
   A) WETTED HARDWARE : SS 316
   B) NON–WETTED HARDWARE: AS PER IS:1367, CL.4.6/4,5. G.I.
   C) ALL HARDWARE WILL PROVIDED WITH WASHERS OF SAME MATERIAL.

PROJECT: 2 x 6600 MW STPS
PO NO.: PEL-WP-BHEL-ENNORE-003
CLIENT: TANGEDCO
CONTRACTOR: -
MANUFACTURER:
FFP ECO TECHNOLOGIES PVT. LTD.
(FORMERLY "FIBRE & FIBRE PRODUCTS")
MUMBAI: 400 063. E–MAIL: fibrein@gmail.com
SINCE 1977

PROJECTION:

TITLE: GA DRAWING FOR HYPO DOSING TANK AGITATOR (TAW–H ECONOMY SERIES)

REV. NO.	REV. BY	APPD. BY	DATE
R1	K.A.A	J.P.A.	31.12.18

DRAWN K.A.A. | CHECKED L.J.A. | APPROVED J.P.A. | DATE 25.12.18
DRG NO.: A3/18/189119
REV. NO.: 01
SCALE: NTS

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**DATE :**	3-Jan-2019
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**REV :**	1
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**		
Client Doc. no:	**PE-V0-412-673-A016**	**PEL Doc. no:**	**A4-PEL-1037-DS-AG003**

Technical Datasheet for DWPE Dosing Tank Agitator

A	**General Data**	
1	**Tag No.**	**0GRN03AM001**
2	Manufacturer	FFP Eco Technologies Pvt Ltd
3	Model	TAW -H Economy series
4	Quantity	1No
5	Location	DWPE Dosing Tank -Outdoor
6	Duty	Continuous
B	**Operating Condition**	
1	Service	0.1 % w/v DWPE (Deawatering Polyelectrolyte) Solution
2	Operating Temp°C [nor/max]	25 / 35
3	Design Temp deg C	50
4	Sp. Gravity	1
5	Viscosity (cp)	20
6	pH of liquid	5 to 8
7	Duty /Purpose	Continuous / Solution Preparation
C	**Vessel /Tank Data**	
1	Tank Size	0.91m(Dia) x 0.995m(Ht)
2	Tank Tag No.	DT-03
3	Bottom type	Flat
4	Top type	Close
5	Tank capacity (m3)	500 Ltr
6	Liquid Level From Bottom (mm)	769
7	Tank Moc	HDPE
8	Entry	Top
9	Agitator Mounting Level From Bottom (mm)	1195

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

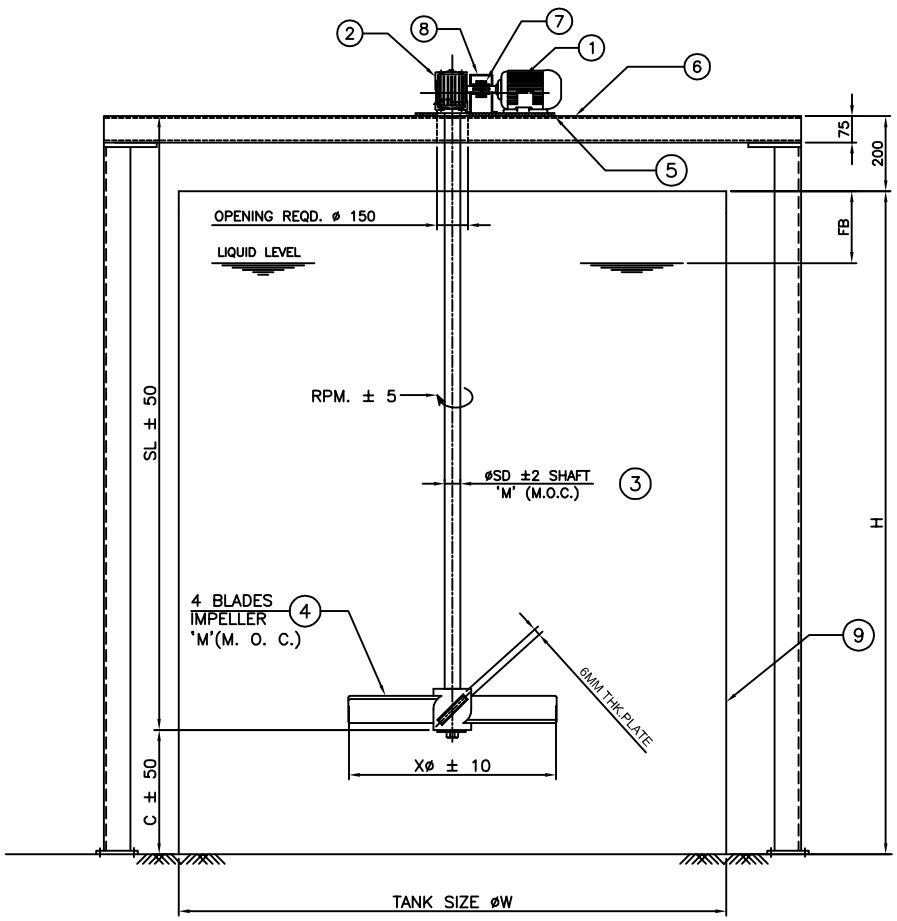
Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**DATE :**	3-Jan-2019TECHNIC
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**REV :**	1
Owner Consultant:	**DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI**	**PEL/D & D- F 002**	
EPC Contractor:	**BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA**		
package :	**75 KLD SEWAGE TREATMENT PLANT**		
Client Doc. no:	**PE-V0-412-673-A016**	**PEL Doc. no:**	**A4-PEL-1037-DS-AG003**

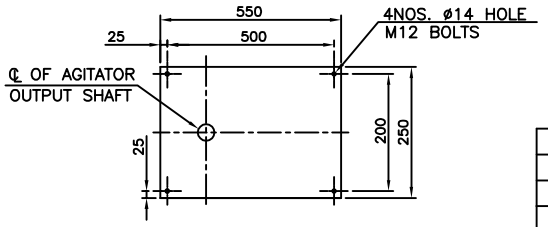
Technical Datasheet for DWPE Dosing Tank Agitator

D	**Manufacturer's Data**	
1	Impeller Type	Pitch blade turbine
2	Mounting	Vertical Concentric
3	Agitator Rotation speed rpm	~140 RPM
4	Diameter	~320+/-10mm
5	No. of Blades	4
6	Shaft Diameter(mm)	28+/-2mm
7	Shaft Length max.(mm)	950+/-50mm
8	Coupling Bet GB & Agit Type	Rigid
9	Reduction Gear Box Ratio	VTS
10	Reduction Gear Box S.F	Min 1.25
11	Reduction Gear Box Make	Preamium
E	**Materials of Construction**	
1	Blade Moc	SS 316
2	Shaft Moc	SS 316

Rev	Date	Description	Made	Checked	Appd
1	3-Jan-2018	For Approval	PSR	SSY	PAK

SR.	TANK	TAG NO.	øW	B	H	FB	SL	øSD	øX	'C'	*HP	RPM	'M' M.O.C.	GEAR BOX	RATIO	ISMC	MOTOR FRAME SIZE	QTY.	WT.(Kg.)
01	Dwpe Dosing Tank Agitator 90	GRN03AM001	910	–	995	226	950	28	320	245	0.5	~140	SS 316	ALM–040	~10:01	75	71 (FOOT)	1	~90





DETAIL OF MOUNTING PLATE

NO.	DESCRIPTION	M.O.C	QTY.	REMARK
9	TANK	HDPE/PVC	1	
8	COUPLING GUARD	M.S.	1	
7	LOVE JOY COUPLING	C.I.	1	
6	MOUNTING STRUCTURE WITH BASE FRAME	M.S.	1	
5	MOUNTING PLATE	M.S.	1	8 ± 1 mm THK PLATE
4	IMPELLER	SS 316	1	PITCHED TURBINE
3	SHAFT	SS 316	1	
2	GEAR BOX (WORM TYPE)	MFR. STD.	1	MAKE: PREMIUM/Eq.
1	MOTOR CGL/Eq.	MFR. STD.	1	1500RPM, STD, 415V(+/–10%),50HZ (+)3% (–)5% IE–3, IP55,T.E.F.C, CLASS–F/B (IN FFP SCOPE)

BILL OF MATERIAL

NOTE:
1. ALL DIMENSION ARE IN MM. UNLESS INDICATED OTHERWISE.
2. PAINTING FOR NON WETTED PARTS : SURFACE PREPARATION: GRADE SA 2 1/2, TWO COATS OF ZINC SILICATE EPOXY PRIMER, DFT= 50 MICRONS/ COAT + TWO COATS OF HIGH BUILD EPOXY @ 90 MICRONS DFT/COAT TOTAL DFT ~260 µ). (COLOUR SHADE–RAL 7032)
3. HARDWARE (M.O.C) :
   A) WETTED HARDWARE : SS 316
   B) NON–WETTED HARDWARE: AS PER IS:1367, CL.4.6/4,5. G.I.
   C) ALL HARDWARE WILL PROVIDED WITH WASHERS OF SAME MATERIAL.

PROJECT: **2X660 MW STPS** | PO NO.: **PEL-WP-BHEL-ENNORE-003**

CLIENT: **TANGEDCO**

CONTRACTOR: -

MANUFACTURER:
FFP ECO TECHNOLOGIES PVT. LTD.
(FORMERLY "FIBRE & FIBRE PRODUCTS")
MUMBAI: 400 063. E–MAIL: fibrein@gmail.com
SINCE 1977

PROJECTION:

TITLE: GA DRAWING FOR DWPE DOSING TANK AGITATOR (TAW–H ECONOMY SERIES)

REV. NO.	REV. BY	APPD. BY	DATE
R1	K.A.A	J.P.A.	31.12.18

DRAWN K.A.A. | CHECKED L.J.A. | APPROVED J.P.A. | DATE 25.12.18

DRG NO.: A3/18/189120
REV. NO.: 01
SCALE: NTS

323

APPROVED

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□N□□	C□□ □ □□□□	□□□□d□d 13□11□1□	C□□ □ □□□□	□□□□	
1□	BHEL to note that P&IDs have already been commented and revised drawing have not been received till date for approval. Hence Instrument schedule cannot be finalised in absence of these document/drawings. Instrument schedule shall be reviewed & approved as per final approved P&IDs.	Instrument Index Updated as per latest P&ID R1.	Instrument schedule shall be reviewed & approved as per final approved P&ID, Rev. 03.	Instrument Schedule updated as per latest approved Rev-03 P&ID & also as per comment at S.No.6 below.	
□□	Vortex type flow meter or on line flow meter shall be provided for air flow measurement instead of DP type Flow transmitter.	Kindly refer document PE-DC-412-673-A001 (DESIGN MEMO OF SEWAGE TREATMENT PLANT). DP type flow transmitter in line with doc PE-DC-412-673-A001 is indicated/provided in the P&ID. Same has been accepted in P&ID also. Kindly accept and clear this document too.	Instrument schedule shall be reviewed & approved as per final approved P&ID, Rev. 03.	Instrument Schedule updated as per latest approved Rev-03 P&ID.	
3□	EMF type Flow meter shall be provided as per specification.	It is reiterated that EMF type flowmeter has been asked specifically for DM water services and Doppler effect type flow meter is asked for sludge application. Further as per document PE-DC-412-673-A001 (DESIGN MEMO OF SEWAGE TREATMENT PLANT), flow orifice for clear water after HCT/FTT is provided for flow measurement which is sufficient and suitable for the application. Accordingly, based on above, it is requested to please approve the document.	Instrument schedule shall be reviewed & approved as per final approved P&ID, Rev. 03.	Instrument Schedule updated as per latest approved Rev-03 P&ID.	
4□	BHEL to note that the range of the instruments indicated in the instrument schedule shall be finalised as per the approved data sheets, and accordingly instrument schedule shall be revised.	Noted, if/as applicable.	Please include the operating and design parameters to finalise the range of Flow instruments.	Operating and design parameters are indicated in the document.	
□□	BHEL to include the column for design temperature and design pressure in addition to the operating temperature and pressure.	Updated	Noted.	Point closed.	

□N□□	C□□ □ □□□	□□□□d□d 13□11□1□	C□□ □ □□□	□□□□	
6□	BHEL to note that first unit's tag nos. shall have prefix 10 and second unit's tag nos. shall have prefix 20 only. Common system shall have prefix "90". Same philosophy is already confirmed by BHEL. BHEL to follow the prefix philosophy as per specification, Vol. V, Cl. No. 2.01.25 and indicate the each tag no. accordingly.	Tagging done as per P&ID & Philosophy as per BHEL	Please update the Instrument schedule as per comment.	Sewage system is common system for station, accordingly prefix "90" incorporated.	

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED: / CHECKED:	REV	DATE	ALTERED / CHECKED

STATUS : CONTRACT

JOB NO.: 412

2X660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI

TAMILNADU GENERATION AND DISTRIBUTION CORP. LTD.(TANGEDCO)

CONSULTANT: DESEIN PVT LTD, NEW DELHI.

BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT,NOIDA

DEPT.	CODE		SCALE	WEIGHT(KG)	REF DRG.	ITEM
--	A		-	-	-	-

INSTRUMENT SCHEDULE
SEWAGE TREATMENT PLANT

	NAME	SIGN	DATE
PREP	SK		29.12.18
CHKD	KBP		29.12.18
APPD	PK		29.12.18

DEPT.							CARD CODE	DRAWING NO.	REV
SIGN			N.A.				-	PE-V0-411-673-A017	2
DATE								NO. OF SHEETS EXCLUDING COVER PAGE	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
1	90GRS01CL001	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SEWAGE SUMP S-01	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
2	90GRS01CL002	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SEWAGE SUMP S-01	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
3	90GRS02CL001	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SEWAGE SUMP S-02	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
4	90GRS02CL002	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SEWAGE SUMP S-02	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
5	90GRS03CL001	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SEWAGE SUMP S-03	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
6	90GRS03CL002	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SEWAGE SUMP S-03	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
7	90GRS04CL001	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SEWAGE SUMP S-04	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
8	90GRS04CL002	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SEWAGE SUMP S-04	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
9	90GRS05CL001	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR COMMON COLLECTION SUMP	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
10	90GRS05CL002	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR COMMON COLLECTION SUMP	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
11	90GRS06CL001	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR EQUALIZATION TANK	SEWAGE WATER	0-3000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
12	90GRS06CL002	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR EQUALIZATION TANK	SEWAGE WATER	0-3000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
13	90GRS07CL001	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR HYPO CONTACT (HC) /FILTER FEED TANK(FFT)	TREATED SEWAGE	0-3000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
14	90GRS07CL002	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR HYPO CONTACT (HC) /FILTER FEED TANK(FFT)	TREATED SEWAGE	0-3000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
15	90GRS15CL001	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SLUDGE HOLDING TANK	SEWAGE SLUDGE	0-3000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
16	90GRS15CL002	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SLUDGE HOLDING TANK	SEWAGE SLUDGE	0-3000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
17	90GRN01CL001	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SODIUM HYPO CHLORITE DOSING TANK (DT-01)	HYPO	0-625	mm	1	Ambient	5 kg/cm2	ATM	NA	NA	3" FLANGED	2	
18	90GRN01CL002	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR SODIUM HYPO CHLORITE DOSING TANK (DT-01)	HYPO	0-625	mm	1	Ambient	5 kg/cm2	ATM	NA	NA	3" FLANGED	2	
19	90GRN02CL001	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR HYPO DOSING TANK (DT-02)	HYPO	0-625	mm	1	Ambient	5 kg/cm2	ATM	NA	NA	3" FLANGED	2	
20	90GRN02CL002	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR HYPO DOSING TANK (DT-02)	HYPO	0-625	mm	1	Ambient	5 kg/cm2	ATM	NA	NA	3" FLANGED	2	
21	90GRS11CL001	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR TREATED WATER TANK	TREATED WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
22	90GRS11CL002	LEVEL TRANSMITTER	ULTRASONIC	LEVEL INDICATION FOR TREATED WATER TANK	TREATED WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	3" FLANGED	2	
23	90GRS01CL501	LEVEL GUAGE	Float & Board	LEVEL INDICATION FOR SEWAGE SUMP S-01	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	25 NB FLANGED	2	
24	90GRS02CL501	LEVEL GUAGE	Float & Board	LEVEL INDICATION FOR SEWAGE SUMP S-02	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	25 NB FLANGED	2	
25	90GRS03CL501	LEVEL GUAGE	Float & Board	LEVEL INDICATION FOR SEWAGE SUMP S-03	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	25 NB FLANGED	2	
26	90GRS04CL501	LEVEL GUAGE	Float & Board	LEVEL INDICATION FOR SEWAGE SUMP S-04	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	25 NB FLANGED	2	
27	90GRS05CL501	LEVEL GUAGE	Float & Board	LEVEL INDICATION FOR COMMON COLLECTION SUMP	SEWAGE WATER	0-5000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	25 NB FLANGED	2	
28	90GRS06CL501	LEVEL GUAGE	Float & Board	LEVEL INDICATION FOR EQUALIZATION TANK	SEWAGE WATER	0-3000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	25 NB FLANGED	2	
29	90GRS07CL501	LEVEL GUAGE	Float & Board	LEVEL INDICATION FOR HYPO CONTACT (HC) /FILTER FEED TANK(FFT)	TREATED SEWAGE	0-3000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	25 NB FLANGED	2	
30	90GRS15CL501	LEVEL GUAGE	Float & Board	LEVEL INDICATION FOR SLUDGE HOLDING TANK	SEWAGE SLUDGE	0-3000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	25 NB FLANGED	2	
31	90GRS11CL501	LEVEL GUAGE	Float & Board	LEVEL INDICATION FOR TREATED WATER TANK	TREATED SEWAGE	0-3000	mm	1	Ambient	Atmosperic Pressure	ATM	NA	NA	25 NB FLANGED	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
32	90GRN01CL101	LEVEL GUAGE	TUBULAR TYPE	LEVEL INDICATION FOR SODIUM HYPO CHLORITE DOSING TANK (DT-01)	HYPO	0-625	mm	1	Ambient	5 kg/cm2	ATM	NA	NA	3/4" FLANGED	2	
33	90GRN03CL101	LEVEL GUAGE	TUBULAR TYPE	LEVEL INDICATION FOR DWPE DOSING TANK (DT-03)	DWPE	0-900	MM		Ambient	5 kg/cm2	ATM	NA	NA	3/4" FLANGED	2	
34	90GRN02CL101	LEVEL GUAGE	TUBULAR TYPE	LEVEL INDICATION FOR HYPO DOSING TANK (DT-02)	HYPO	0-625	mm	1	Ambient	5 kg/cm2	ATM	NA	NA	3/4" FLANGED	2	
35	90GRS10CF001	FLOW TRANSMITTER	MAGNETIC FLOW METER	INLET FLOW INDICATION FOR DUAL MEDIA FILTER	TREATED SEWAGE	0-6	m3/hr	1	Ambient	5 kg/cm2	3.5	50NB	CSRL	1/2" NPT	2	
36	90GRS10CF002	FLOW TRANSMITTER	MAGNETIC FLOW METER	INLET FLOW INDICATION FOR ACTIVATED CARBON FILTER	TREATED SEWAGE	0-6	m3/hr	1	Ambient	5 kg/cm2	3.5	50NB	CSRL	1/2" NPT	2	
37	90GRS14CF001	FLOW TRANSMITTER	Orifice-DP Type	COMMON HEADER FLOW INDICATION FOR TREATED WATER DISPOSAL PUMPS (GRS12/13AP001)	TREATED SEWAGE	0-6	m3/hr	1	Ambient	4 kg/cm2	2	50NB	CSRL	1/2" NPT	2	
38	90GRC01CF001	FLOW TRANSMITTER	Orifice-DP Type	COMMON HEADER DISCHARGE FLOW INDICATION FOR AIR BLOWERS FOR COMMON SUMP,EQT & ST (B-01A/B)	AIR	0-60	m3/hr	1	Ambient	1 kg/cm2	0.4	40NB	GI	1/2" NPT	2	
39	90GRC02CF001	FLOW TRANSMITTER	Orifice-DP Type	COMMON HEADER DISCHARGE FLOW INDICATION FOR AIR BLOWERS FOR MBBR AERATION TANK (B-02A/B)	AIR	0-50	m3/hr	1	Ambient	1 kg/cm2	0.5	40NB	GI	1/2" NPT	2	
40	90QFB60CF501	FLOW TRANSMITTER	Orifice-DP Type	FLOW INDICATION FOR INSTRUMENT AIR	AIR	0-25	m3/hr	1	Ambient	1 kg/cm2	7	25	GI	1/2" NPT	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
41	90GRC01CF501	FLOW INDICATOR	GLASS TUBE ROTAMETER	DIFFUSER AIR FLOW INDICATION FOR EQUALIZATION TANK	AIR	0-60	m3/hr	1	Ambient	1 kg/cm2	0.4	40NB	GI	NPT	2	
42	90GRS10CF501	FLOW INDICATOR	GLASS TUBE ROTAMETER	INLET FLOW INDICATION FOR DUAL MEDIA FILTER	TREATED SEWAGE	0-6	m3/hr	1	Ambient	1 kg/cm2	3.5	50	CSRL	NPT	2	
43	90GRS10CF502	FLOW INDICATOR	GLASS TUBE ROTAMETER	INLET FLOW INDICATION FOR ACTIVATED CARBON FILTER	TREATED SEWAGE	0-6	m3/hr	1	Ambient	5 kg/cm2	3.5	50	CSRL	NPT	2	
44	90GRS14CF501	FLOW INDICATOR	GLASS TUBE ROTAMETER	COMMON OUTLET FLOW INDICATION FOR TREATED WATER DISPOSAL PUMPS (GRS12/13AP001)	TREATED SEWAGE	0-6	m3/hr	1	Ambient	4 kg/cm2	2	50	CSRL	NPT	2	
45	90GRS01CP501	PRESSURE GUAGE	DIAPHRAGM	OULET PRESSURE INDICATION FOR SUMP-1 SEWAGE TRANSFER PUMPS (GRS01AP001)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	5.9	50	CS	25 NB Flanged	2	
46	90GRS01CP502	PRESSURE GUAGE	DIAPHRAGM	OULET PRESSURE INDICATION FOR SUMP-1 SEWAGE TRANSFER PUMPS (GRS01AP002)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	5.9	50	CS	25 NB Flanged	2	
47	90GRS02CP501	PRESSURE GUAGE	DIAPHRAGM	OULET PRESSURE INDICATION FOR SUMP-2 SEWAGE TRANSFER PUMPS (GRS02AP001)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	7.5	50	CS	25 NB Flanged	2	
48	90GRS02CP502	PRESSURE GUAGE	DIAPHRAGM	OULET PRESSURE INDICATION FOR SUMP-2 SEWAGE TRANSFER PUMPS (GRS02AP002)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	7.5	50	CS	25 NB Flanged	2	
49	90GRS03CP501	PRESSURE GUAGE	DIAPHRAGM	OULET PRESSURE INDICATION FOR SUMP-3 SEWAGE TRANSFER PUMPS (GRS03AP001)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	4.5	50	CS	25 NB Flanged	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
50	90GRS03CP502	PRESSURE GUAGE	DIAPHRAGM	OULET PRESSURE INDICATION FOR SUMP-3 SEWAGE TRANSFER PUMPS (GRS03AP002)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	4.5	50	CS	25 NB Flanged	2	
51	90GRS04CP501	PRESSURE GUAGE	DIAPHRAGM	OULET PRESSURE INDICATION FOR SUMP-4 SEWAGE TRANSFER PUMPS (GRS04AP001)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	4.5	50	CS	25 NB Flanged	2	
52	90GRS04CP502	PRESSURE GUAGE	DIAPHRAGM	OULET PRESSURE INDICATION FOR SUMP-4 SEWAGE TRANSFER PUMPS (GRS04AP001)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	4.5	50	CS	25 NB Flanged	2	
53	90GRS05CP501	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR COMMON COLLECTION SUMP PUMPS (GRS05AP001)	SEWAGE WATER	4 kg/cm2	kg/cm2	1	Ambient	4 kg/cm2	1.2	50	CS	25 NB Flanged	2	
54	90GRS05CP502	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR COMMON COLLECTION SUMP PUMPS (GRS05AP002)	SEWAGE WATER	4 kg/cm2	kg/cm2	1	Ambient	2 kg/cm2	1.2	50	CS	25 NB Flanged	2	
55	90GRS06CP501	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR MBBR FEED PUMP (GRS06AP001)	SEWAGE WATER	4 kg/cm2	kg/cm2	1	Ambient	2 kg/cm2	1.2	50	CS	25 NB Flanged	2	
56	90GRS06CP502	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR MBBR FEED PUMP (GRS06AP002)	SEWAGE WATER	4 kg/cm2	kg/cm2	1	Ambient	2 kg/cm2	1.2	50	CS	25 NB Flanged	2	
57	90GRC01CP501	PRESSURE GUAGE	BOURDON	OUTLET PRESSURE INDICATION FOR AIR BLOWERS (GRC01AN001) FOR COMMON SUMP, EQT & ST	AIR	0-1	kg/cm2	1	Ambient	1 kg/cm2	0.4	40	GI	1/2" NPT	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
58	90GRC01CP502	PRESSURE GUAGE	BOURDON	OUTLET PRESSURE INDICATION FOR AIR BLOWERS (GRC01AN002) FOR COMMON SUMP, EQT & ST	AIR	0-1	kg/cm2	1	Ambient	1 kg/cm2	0.4	40	GI	1/2" NPT	2	
59	90GRC01CP503	PRESSURE GUAGE	BOURDON	COMMON DISCHARGE PRESSURE INDICATION FOR AIR BLOWERS (GRC01AN001/2) FOR COMMON SUMP, EQT & ST	AIR	0-1	kg/cm2	1	Ambient	1 kg/cm2	0.4	40	GI	1/2' NPT	2	
60	90GRC02CP501	PRESSURE GUAGE	BOURDON	OUTLET PRESSURE INDICATION FOR AIR BLOWERS (GRC01AN002)FOR MBBR AERATION TANK	AIR	0-1	kg/cm2	1	Ambient	1 kg/cm2	0.5	40	GI	1/2" NPT	2	
61	90GRC02CP502	PRESSURE GUAGE	BOURDON	OUTLET PRESSURE INDICATION FOR AIR BLOWERS (GRC02AN002)FOR MBBR AERATION TANK	AIR	0-1	kg/cm2	1	Ambient	1 kg/cm2	0.5	40	GI	1/2" NPT	2	
62	90GRC02CP503	PRESSURE GUAGE	BOURDON	COMMON DISCHARGE PRESSURE INDICATION FOR AIR BLOWERS (GRC02AN002)FOR MBBR AERATION TANK	AIR	0-1	kg/cm2	1	Ambient	1 kg/cm2	0.5	40	GI	1/2" NPT	2	
63	90GRS08CP501	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR FILTER FEED PUMPS (GRS08AP001)	TREATED SEWAGE	0-6	kg/cm2	1	Ambient	5 kg/cm2	3.5	50	CSRL	25 NB Flanged	2	
64	90GRS09CP501	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR FILTER FEED PUMPS (GRS09AP001)	TREATED SEWAGE	0-6	kg/cm2	1	Ambient	5 kg/cm2	3.5	50	CSRL	25 NB Flanged	2	

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65	90GRB01CP501	PRESSURE GUAGE	DIAPHRAGM	FEED INLET PRESSURE INDICATION FOR DUAL MEDIA FILTER	TREATED SEWAGE	0-6	kg/cm2	1	Ambient	5 kg/cm2	3.5	50	CSRL	25 NB Flanged	2	
66	90GRB01CP502	PRESSURE GUAGE	DIAPHRAGM	BACKWASH INLET & FEED OUTLET PRESSURE INDICATION FOR DUAL MEDIA FILTER	TREATED SEWAGE	0-6	kg/cm2	1	Ambient	5 kg/cm2	3.5	50	CSRL	25 NB Flanged	2	
67	90GRB02CP501	PRESSURE GUAGE	DIAPHRAGM	FEED INLET PRESSURE INDICATION FOR ACTIVATED CARBON FILTER	TREATED SEWAGE	0-6	kg/cm2	1	Ambient	5 kg/cm2	**3**	50	CSRL	25 NB Flanged	2	
68	90GRB02CP502	PRESSURE GUAGE	DIAPHRAGM	BACKWASH INLET & FEEDOUTLET PRESSURE INDICATION FOR ACTIVATED CARBON FILTER	TREATED SEWAGE	0-6	kg/cm2	1	Ambient	5 kg/cm2	**3**	50	CSRL	25 NB Flanged	2	
69	90GRS15CP501	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR SLUDGE TRANSFER PUMPS(GRS15AP001)	SEWAGE SLUDGE	0-6	kg/cm2	1	Ambient	5 kg/cm2	3	25	CS	25 NB Flanged	2	
70	90GRS15CP502	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR SLUDGE TRANSFER PUMPS (GRS15AP002)	SEWAGE SLUDGE	0-6	kg/cm2	1	Ambient	5 kg/cm2	2.9	25	CS	25 NB Flanged	2	
71	90GRN01CP501	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMP (DP-01)	HYPO	4 kg/cm2	kg/cm2	1	Ambient	3 kg/cm2	2	15	CPVC	25 NB Flanged	2	
72	90GRN02CP501	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMP (DP-02)	HYPO	0-10	kg/cm2	1	Ambient	9 kg/cm2	4.5	15	CPVC	25 NB Flanged	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
73	90GRS12CP501	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR TREATED WATER DISPOSAL PUMPS (GRS12AP001)	TREATED SEWAGE	4 kg/cm2	kg/cm2	1	Ambient	3 kg/cm2	2	40	CSRL	25 NB Flanged	2	
74	90GRS13CP501	PRESSURE GUAGE	DIAPHRAGM	OUTLET PRESSURE INDICATION FOR TREATED WATER DISPOSAL PUMPS (GRS12AP001)	TREATED SEWAGE	4 kg/cm2	kg/cm2	1	Ambient	3 kg/cm2	**2**	40	CSRL	25 NB Flanged	2	
75	90QFB60CP501	PRESSURE GUAGE	BOURDON	OUTLET PRESSURE INDICATION FOR INSTRUMENT AIR	AIR	0-10	kg/cm2	1	Ambient	10 kg/cm2	7	25NB	GI	1/2" NPT	2	
76	90GRB01CP001	DIFFERENTIAL PRESSURE TRANSMITTER	TRANSMITTER	DIFFERENTIAL PRESSURE INDICATION FOR DUAL MEDIA FILTER	TREATED SEWAGE	0-4	kg/cm2	1	Ambient	5 kg/cm2	3	50	CSRL	1/2" NPT	2	
77	90GRB01CP002	DIFFERENTIAL PRESSURE TRANSMITTER	TRANSMITTER	DIFFERENTIAL PRESSURE INDICATION FOR DUAL MEDIA FILTER	TREATED SEWAGE	0-4	kg/cm2	1	Ambient	5 kg/cm2	3	50	CSRL	1/2" NPT	2	
78	90GRB02CP001	DIFFERENTIAL PRESSURE TRANSMITTER	TRANSMITTER	DIFFERENTIAL PRESSURE INDICATION FOR ACTIVATED CARBON FILTER	TREATED SEWAGE	0-4	kg/cm2	1	Ambient	5 kg/cm2	2.5	50	CSRL	1/2" NPT	2	
79	90GRB02CP002	DIFFERENTIAL PRESSURE TRANSMITTER	TRANSMITTER	DIFFERENTIAL PRESSURE INDICATION FOR ACTIVATED CARBON FILTER	TREATED SEWAGE	0-4	kg/cm2	1	Ambient	5 kg/cm2	2.5	50	CSRL	1/2" NPT	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
80	90GRS01CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-1 SEWAGE TRANSFER PUMPS (GRS01AP001/2)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	5.9	50	CS	1/2" NPT	2	
81	90GRS01CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-1 SEWAGE TRANSFER PUMPS (GRS01AP001/2)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	5.9	50	CS	1/2' NPT	2	
82	90GRS02CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-2 SEWAGE TRANSFER PUMPS (GRS02AP001/2)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	7.5	50	CS	1/2" NPT	2	
83	90GRS02CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-2 SEWAGE TRANSFER PUMPS (GRS02AP001/2)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	7.5	50	CS	1/2" NPT	2	
84	90GRS03CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-3 SEWAGE TRANSFER PUMPS (GRS03AP001/2)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	4.5	50	CS	1/2" NPT	2	
85	90GRS03CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-3 SEWAGE TRANSFER PUMPS (GRS03AP001/2)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	4.5	50	CS	1/2" NPT	2	
86	90GRS04CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-4 SEWAGE TRANSFER PUMPS (GRS04AP001/2)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	4.5	50	CS	1/2" NPT	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
87	90GRS04CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR SUMP-4 SEWAGE TRANSFER PUMPS (GRS04AP001/2)	SEWAGE WATER	0-10	kg/cm2	1	Ambient	9 kg/cm2	4.5	50	CS	1/2" NPT	2	
88	90GRS05CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR COMMON COLLECTION SUMP PUMPS (GRS05AP001/2)	SEWAGE WATER	0-6	kg/cm2	1	Ambient	3 kg/cm2	1.2	50	CS	1/2" NPT	2	
89	90GRS05CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR COMMON COLLECTION SUMP PUMPS (GRS05AP001/2)	SEWAGE WATER	0-6	kg/cm2	1	Ambient	3 kg/cm2	1.2	50	CS	1/2" NPT	2	
90	90GRS06CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR MBBR FEED PUMP (GRS05AP001/2)	SEWAGE WATER	0-6	kg/cm2	1	Ambient	3 kg/cm2	1.2	50	CS	1/2" NPT	2	
91	90GRS06CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR MBBR FEED PUMP (GRS05AP001/2)	SEWAGE WATER	0-6	kg/cm2	1	Ambient	3 kg/cm2	1.2	50	CS	1/2" NPT	2	
92	90GRC01CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADEROUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR COMMON SUMP, EQT & ST (GRC01AN001/2)	AIR	0-1	kg/cm2	1	Ambient	1 kg/cm2	0.4	40	GI	1/2" NPT	2	
93	90GRC01CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADEROUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR COMMON SUMP, EQT & ST (GRC01AN001/2)	AIR	0-1	kg/cm2	1	Ambient	1 kg/cm2	0.4	40	GI	1/2" NPT	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
94	90GRC02CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR MBBR AERATION TANK (GRC02AN001/2)	AIR	0-1	kg/cm2	1	Ambient	1 kg/cm2	0.5	40	GI	1/2" NPT	2	
95	90GRC02CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR AIR BLOWERS FOR MBBR AERATION TANK (GRC02AN001/2)	AIR	0-1	kg/cm2	1	Ambient	1 kg/cm2	0.5	40	GI	1/2" NPT	2	
96	90GRS10CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR FILTER FEED PUMPS (GRS08AP001/02)	TREATED SEWAGE	0-6	kg/cm2	1	Ambient	5 kg/cm2	3.5	50	CSRL	1/2" NPT	2	
97	90GRS10CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR FILTER FEED PUMPS (GRS08AP001/02)	TREATED SEWAGE	0-6	kg/cm2	1	Ambient	5 kg/cm2	3.5	50	CSRL	1/2" NPT	2	
98	90GRS15CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR SLUDGE TRANSFER PUMPS (GRSAP001/02)	SEWAGE SLUDGE	0-6	kg/cm2	1	Ambient	3 kg/cm2	2.9	25	CS	1/2" NPT	2	
99	90GRS15CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR SLUDGE TRANSFER PUMPS (GRSAP001/02)	SEWAGE SLUDGE	0-6	kg/cm2	1	Ambient	3 kg/cm2	2.9	25	CS	1/2" NPT	2	
100	90GRS14CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADEROUTLET PRESSUIRE INDICATION FOR TREATED WATER DISPOSAL PUMPS (GRS12AP001)	TREATED SEWAGE	0-6	kg/cm2	1	Ambient	3 kg/cm2	2	50	CSRL	1/2" NPT	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
101	90GRS14CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADEROUTLET PRESSUIRE INDICATION FOR TREATED WATER DISPOSAL PUMPS (GRS13AP001)	TREATED SEWAGE	0-6	kg/cm2	1	Ambient	3 kg/cm2	2	50	CSRL	1/2" NPT	2	
102	90GRN01CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMPS (DP-01)	HYPO	0-6	kg/cm2	1	Ambient	3 kg/cm2	2	15	CVPC	1/2" NPT	2	
103	90GRN01CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMPS (DP-01)	HYPO	0-6	kg/cm2	1	Ambient	3 kg/cm2	2	15	CPVC	1/2" NPT	2	
104	90GRN02CP001	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMPS (DP-02)	HYPO	0-10	kg/cm2	1	Ambient	9 kg/cm2	4.5	15	CVPC	1/2" NPT	2	
105	90GRN02CP002	PRESSURE TRANSMITTER	DIAPHRAGM	COMMON HEADER OUTLET PRESSURE INDICATION FOR HYPO DOSING PUMPS (DP-02)	HYPO	0-10	kg/cm2	1	Ambient	9 kg/cm2	4.5	15	CPVC	1/2" NPT	2	
106	90QFB60CP001	PRESSURE TRANSMITTER	DIAPHRAGM	PRESSURE TRANSMITTER INDICATION FOR INSTRUMENT AIR	AIR	0-10	kg/cm2	1	Ambient	9 kg/cm2	7	25	GI	1/2" NPT	2	
107	90GRS14CQ001	PH ANALYZER	TRANSMITTER	PH METER INDICATION FOR OUTLET OF TREATED WATER DISPOSAL PUMP (GRS12/13AP001)	TREATED SEWAGE	0-14	PH	1	Ambient	3 kg/cm2	2	50	CSRL	1/2"NPT	2	

S No.	Tag No.	Inst. Description	Inst. Type	Description/Service	Fluid	INST Range	UNIT	Qty.	Design Temperature (Deg C)	Design Pressure (kg/cm2)	Operating Pressure (kg/cm²)	Line Size in NB	LINE MOC	Process Connection	Rev no.	Remarks
108	90GRS14CQ002	TURBIDITY METER	TRANSMITTER	TURBIDITY METER FOR OUTLET OF TREATED WATER DISPOSAL PUMPS(GRS12/13AP001)	TREATED SEWAGE	0-50	NTU	1	Ambient	3 kg/cm2	2	50	CSRL	1/2" NPT	2	
109	90GRS14CT001	TEMPERATURE ELEMENT	RTD	TEMPERATURE FOR OUTLET OF TREATED WATER DISPOSAL PUMPS(GRS12/13AP001)	TREATED SEWAGE	0-50	DEGREE CENTIGRADE	1	Ambient	3 kg/cm2	2	50	CSRL	1/2" NPT	2	
110	90GRS14CT201	TEMPERATURE TRANSMITTER	Transmitter	TEMPERATURE FOR OUTLET OF TREATED WATER DISPOSAL PUMPS(GRS12/13AP001)	TREATED SEWAGE	0-50	DEGREE CENTIGRADE	1	Ambient	3 kg/cm2	2	50	CSRL	NA	2	
111	90GRN03CL001	LEVEL SWITCH	SIDE MOUNTED	LEVEL INDICATION FOR DWPE DOSING TANK (DT-03)	SEWAGE WATER			1	Ambient	Atmosperic Pressure	ATM	NA	NA	50 NB	2	

APPROVED

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-A018			
DOC NAME: Cable Schedule FOR SEWAGE TREATMENT PLANT			
COMMENTS RESOLUTION SHEET			
□N□□	**□AN□ENDCO C□□ □ □□□□**	**□□EL□PEL□□ □□□□□□□□**	
1	Please clarify the Difference between F Type and G Type cables.	F type is individual & overall shielded & G type is only overall shielded	
2	Paired cables shall be provided for all type of signals i.e. digital, analog or RTD signals.	Noted and incorporated	
3	BHEL to provide Temperature transmitters, wherever Temperature measurement is required for monitoring purpose as per SPECIFICATION, Vol. V. cl.no. 3.02.00 (xxi), and Post Bid resolution Annex-7 (Point no. 27). Type of JB shall be selected accordingly.	Provided	
4	Document shall be revised as per comments on I/O list and Instrument List respectively.	Noted and incorporated	
5	KKS tag no. shall be indicated only.	Noted and incorporated	
6	Cables for drives shall be indicated as per BHEL (PEM)'s approved drive control philopshy.	Noted and incorporated	
7	Cable for power supply to each solenoid valves shall be control cable of 3C x 2.5 Sq.mm copper conductor size.	Noted and incorporated	
8	For cables single length more than 500 meters, the size of conductor shall be 1.5 sq. mm only irrespective of type of signals.	No cables single length more than 500mtrs in sewage treatment plant	
9	Cables for binary signals in relay based system and Fire protection & detection system shall be instrumentation cable of 1.5 Sq.mm conductor size, overall shielded.	Relay signal is not presented in binary system in sewage treatment plant	
10	i. All spare contacts/terminals on relays, control switches, limit switches or similar devices, process switches, duplex RTDs & Duplex T/Cs shall be wired to accessible terminal blocks/JBs for Owner's future connections. ii. All wiring leaving a junction box or enclosure shall leave from terminal blocks and not from other devices in the enclosure. iii. Two (2) pair (individual & overall shielded) cables shall be provided for terminating the thermocouples, transmitters & switches i.e Analog & Binary signals to local JBs. iv. Similarly four (4) pair (individual & overall shielded) cables shall be provided for terminating the Duplex (3/4 wire) RTD to local JBs.	Noted and confirmed Noted and confirmed Noted and confirmed Not applicable in sewage treatment plant	
11	Cable data sheets shall also be furnished for approval.	Noted and cable data sheets shall be submitted in separate document.	

R1	28.03.2019	FOR INFORMATION			
			TT	KBP	PAK
REV.	DATE		PREP.	CHK.	APPR.

PROJECT:		THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.
TANGEDCO	**OWNER:**	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
DESEIN	**OWNER'S CONSULTANT:**	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
BHEL	**EPC CONTRACTOR:**	BHARAT HEAVY ELECTRICALS LIMITED. (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA
	PACKAGE:	**75 KLD SEWAGE TREATMENT PLANT**
	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

CABLE SCHEDULE & INTERCONNECTION FOR SEWAGE TREATMENT PLANT

	NAME	SIGN	DATE
PREP	TT		28.03.2019
CHKD	KBP		28.03.2019
APPD	PAK		28.03.2019

DEPT.							CARD CODE	BHEL DOC NO. PE-V0-412-673-A018	REV
SIGN				M.A.				PEL DOC NO. ----------	R1
DATE							–	NO. OF SHEETS– 14(EXCLUDING COVER PAGE)	

CABLE SCHEDULE

Sl No	Unit Cable No	From	To	Purpose	Cable Type	Remarks	Length(m)
1	C1	90GRS-10CF-001	AI-JB-01	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE FLOW AT DMF INLET	5
2	C2	90GRS-01CP-001	AI-JB-01	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	DP ACROSS DMF	5
3	C3	90GRS-01CP-002	AI-JB-01	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	DP ACROSS DMF	5
4	C4	90GRS-10CF-002	AI-JB-01	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE FLOW AT ACF INLET	6
5	C5	90GRS-02CP-001	AI-JB-01	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	DP ACROSS ACF	6
6	C6	90GRS-02CP-002	AI-JB-01	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	DP ACROSS ACF	6
7	C7	90GRS-10CP-001	AI-JB-01	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	FILTER FEED PUMP P-07A/B DISCH HDR PR	8
8	C8	90GRS-10CP-002	AI-JB-01	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	FILTER FEED PUMP P-07A/B DISCH HDR PR	8
9	C9	90QFB-60CF-501	AI-JB-01	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	INSTRUMENT AIR TO STP LINE FLOW	16
10	C10	90QFB-60CP-001	AI-JB-01	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	INSTRUMENT AIR TO STP LINE PR	16
11	**C11**	**AI-JB-01**	**STP DDCMIS**	**SIGNAL CABLE**	**12PX0.5 Sq.mm2 (F Type) Individual & Overall Shielded**		29
12	C12	90GRS-11CL-001	AI-JB-02	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	TREATED WATER TANK LEVEL	11
13	C13	90GRS-11CL-002	AI-JB-02	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	TREATED WATER TANK LEVEL	11
14	C14	90GRS-14CP-001	AI-JB-02	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	TREATED WATER DISPOSAL PUMP P-08A/B DISCH HDR PR	9
15	C15	90GRS-14CP-002	AI-JB-02	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	TREATED WATER DISPOSAL PUMP P-08A/B DISCH HDR PR	9
16	C16	90GRS-14CQ-001	AI-JB-02	CONTROL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	TURBIDITY METER FOR OUTLET OF FILTER FEED PUMPS	9
17	C17	90GRS-14CF-001	AI-JB-02	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	TREATED WATER DISPOSAL PUMP P-08A/B DISCH HDR FLOW	9
18	C18	90GRS-14CQ-001	AI-JB-02	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	pH AT TREATED WATER DISPOSAL PMP DISCH HDR	7
19	C19	90GRS-14CT-201	AI-JB-02	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	TREATED WATER DISPOSAL PMP DISCH HDR TEMP	7
20	**C20**	**AI-JB-02**	**STP DDCMIS**	**SIGNAL CABLE**	**8PX0.5 Sq.mm2 (F Type) Individual & Overall Shielded**		30
21	**C20A**	**AI-JB-02**	**STP DDCMIS**	**SIGNAL CABLE**	**2PX0.5 Sq.mm2 (F Type) Individual & Overall Shielded**		30
22	C21	90GRC-01CF-001	AI-JB-03	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	AIR BLOWER B-01A/B DISCH HDR FLOW	8
23	C22	90GRC-01CP-001	AI-JB-03	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	AIR BLOWER B-01A/B DISCH HDR PR	8
24	C23	90GRC-01CP-002	AI-JB-03	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	AIR BLOWER B-01A/B DISCH HDR PR	8
25	C24	90GRC-02CF-001	AI-JB-03	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	AIR BLOWER B-02A/B DISCH HDR FLOW	10
26	C25	90GRC-02CP-001	AI-JB-03	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	AIR BLOWER B-02A/B DISCH HDR PR	10
27	C26	90GRC-02CP-002	AI-JB-03	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	AIR BLOWER B-02A/B DISCH HDR PR	10
28	**C27**	**AI-JB-03**	**STP DDCMIS**	**SIGNAL CABLE**	**8PX0.5 Sq.mm2 (F Type) Individual & Overall Shielded**		18
29	C28	90GRN-01CL-001	AI-JB-04	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	NaOCL DOSING TANK DT-01 LEVEL	12
30	C29	90GRN-01CL-002	AI-JB-04	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	NaOCL DOSING TANK DT-01 LEVEL	12
31	C30	90GRN-01CP-001	AI-JB-04	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	NaOCL DOSING PUMP DP-01 DISCH PR	12
32	C31	90GRN-01CP-002	AI-JB-04	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	NaOCL DOSING PUMP DP-01 DISCH PR	12
33	C32	90GRN-02CL-001	AI-JB-04	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	NaOCL DOSING TANK DT-02 LEVEL	14
34	C33	90GRN-02CL-002	AI-JB-04	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	NaOCL DOSING TANK DT-02 LEVEL	14
35	C34	90GRN-02CP-001	AI-JB-04	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	NaOCL DOSING PUMP DP-02 DISCH PR	14
36	C35	90GRN-02CP-002	AI-JB-04	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	NaOCL DOSING PUMP DP-02 DISCH PR	14
37	**C36**	**AI-JB-04**	**STP DDCMIS**	**SIGNAL CABLE**	**12PX0.5 Sq.mm2 (F Type) Individual & Overall Shielded**		35
38	C37	90GRS-05CP-001	AI-JB-05	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	COMMON COLLECTION SUMP PUMP P-05A/B DISCH HDR PR	10
39	C38	90GRS-05CP-002	AI-JB-05	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	COMMON COLLECTION SUMP PUMP P-05A/B DISCH HDR PR	10
40	C39	90GRS-05CL-001	AI-JB-05	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	COMMON COLLECTION SUMP LEVEL	10
41	C40	90GRS-05CL-002	AI-JB-05	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	COMMON COLLECTION SUMP LEVEL	10
42	C41	90GRS-06CP-001	AI-JB-05	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	MBBR FEED PUMP P-06A/B DISCH HDR PR	8
43	C42	90GRS-06CP-002	AI-JB-05	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	MBBR FEED PUMP P-06A/B DISCH HDR PR	8
44	C43	90GRS-06CL-001	AI-JB-05	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	EQUALIZATION TANK LEVEL	8
45	C44	90GRS-06CL-002	AI-JB-05	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	EQUALIZATION TANK LEVEL	8
46	**C45**	**AI-JB-05**	**STP DDCMIS**	**SIGNAL CABLE**	**12PX0.5 Sq.mm2 (F Type) Individual & Overall Shielded**		15
47	C46	90GRS-15CL-001	AI-JB-06	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SLUDGE HOLDING TANK LEVEL	14
48	C47	90GRS-15CL-002	AI-JB-06	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SLUDGE HOLDING TANK LEVEL	14
49	C48	90GRS-15CP-001	AI-JB-06	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SLUDGE TRANSFER PUMP P-09A/B DISCH HDR PR	14
50	C49	90GRS-15CP-001	AI-JB-06	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SLUDGE TRANSFER PUMP P-09A/B DISCH HDR PR	14
51	C50	90GRS-07CL-001	AI-JB-06	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	HYPO CONTACT(HC)/FILTER FEED TANK(FFT) LEVEL	14
52	C51	90GRS-07CL-002	AI-JB-06	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	HYPO CONTACT(HC)/FILTER FEED TANK(FFT) LEVEL	14
53	**C52**	**AI-JB-06**	**STP DDCMIS**	**SIGNAL CABLE**	**8PX0.5 Sq.mm2(F Type) Individual & Overall Shielded**		38
54	**C52A**	**AI-JB-06**	**STP DDCMIS**	**SIGNAL CABLE**	**4PX0.5 Sq.mm2(F Type) Individual & Overall Shielded**		38

CABLE SCHEDULE

Sl No	Unit Cable No	From	To	Purpose	Cable Type	Remarks	Length(m)
55	C53	90GRS-01CL-001	AI-JB-07	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE SUMP S-01 LEVEL	4
56	C54	90GRS-01CL-002	AI-JB-07	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE SUMP S-01 LEVEL	4
57	C55	90GRS-01CP-001	AI-JB-07	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE TRANSFER PUMP P-01A/B DISCH HDR PR	4
58	C56	90GRS-01CP-002	AI-JB-07	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE TRANSFER PUMP P-01A/B DISCH HDR PR	4
59	**C57**	**AI-JB-07**	**CHP DDCMIS**	**SIGNAL CABLE**	**8PX0.5 Sq.mm2 (F Type) Individual & Overall Shielded**		20
60	C58	90GRS-02CL-001	AI-JB-08	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE SUMP S-02 LEVEL	6
61	C59	90GRS-02CL-002	AI-JB-08	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE SUMP S-02 LEVEL	6
62	C60	90GRS-02CP-001	AI-JB-08	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE TRANSFER PUMP P-02A/B DISCH HDR PR	6
63	C61	90GRS-02CP-002	AI-JB-08	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE TRANSFER PUMP P-02A/B DISCH HDR PR	6
64	**C62**	**AI-JB-08**	**CWPH DDCMIS**	**SIGNAL CABLE**	**8PX0.5 Sq.mm2 (F Type) Individual & Overall Shielded**		20
65	C63	90GRS-03CL-001	AI-JB-09	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE SUMP S-03 LEVEL	5
66	C64	90GRS-03CL-002	AI-JB-09	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE SUMP S-03 LEVEL	5
67	C65	90GRS-03CP-001	AI-JB-09	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE TRANSFER PUMP P-03A/B DISCH HDR PR	5
68	C66	90GRS-03CP-002	AI-JB-09	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE TRANSFER PUMP P-03A/B DISCH HDR PR	5
69	**C67**	**AI-JB-09**	**RODM DDCMIS**	**SIGNAL CABLE**	**8PX0.5 Sq.mm2 (F Type) Individual & Overall Shielded**		21
70	C68	90GRS-04CL-001	AI-JB-10	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE SUMP S-04 LEVEL	7
71	C69	90GRS-04CL-002	AI-JB-10	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE SUMP S-04 LEVEL	7
72	C70	90GRS-04CP-001	AI-JB-10	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE TRANSFER PUMP P-04A/B DISCH HDR PR	7
73	C71	90GRS-04CP-002	AI-JB-10	SIGNAL CABLE	2P x 0.5 sq.mm2 (F Type) Individual & Overall Shielded	SEWAGE TRANSFER PUMP P-04A/B DISCH HDR PR	7
74	**C72**	**AI-JB-10**	**MAIN PLANT DDCMIS**	**SIGNAL CABLE**	**8PX0.5 Sq.mm2 (F Type) Individual & Overall Shielded**		21
75	C73	90GRS-15AA-202	DO-JB-01	CONTROL CABLE	3C X 2.5 SQMM2	SERVICE WATER FOR FLUSING INLET VALVE OF CENTRIFUGE (CF)	10
76	C74	90GRS10AA201-SOV	DO-JB-01	CONTROL CABLE	3C X 2.5 SQMM2	FILTER FEED PUMP P-07A/B OUTLET AUTO VALVE COMMAND	10
77	C75	90GRS01AA201-SOV	DO-JB-01	CONTROL CABLE	3C X 2.5 SQMM2	DMF FEED INLET AUTO VALVE COMMAND	10
78	C76	90GRS01AA202-SOV	DO-JB-01	CONTROL CABLE	3C X 2.5 SQMM2	DMF BACKWASH INLET AUTO VALVE COMMAND	10
79	C77	90GRS01AA203-SOV	DO-JB-01	CONTROL CABLE	3C X 2.5 SQMM2	DMF BACKWASH OUTLET AUTO VALVE COMMAND	10
80	C78	90GRS01AA204-SOV	DO-JB-01	CONTROL CABLE	3C X 2.5 SQMM2	DMF DRAIN / RINSE OUTLET AUTO VALVE COMMAND	10
81	C79	90GRS01AA205-SOV	DO-JB-01	CONTROL CABLE	3C X 2.5 SQMM2	DMF FEED OUTLET AUTO VALVE COMMAND	10
82	C80	90GRS01AA206-SOV	DO-JB-01	CONTROL CABLE	3C X 2.5 SQMM2	DMF VENT AUTO VALVE COMMAND	10
83	C81	90GRS10AA202-SOV	DO-JB-01	CONTROL CABLE	3C X 2.5 SQMM2	DMF OUTLET AUTO VALVE COMMAND	10
84	**C82A**	**DO-JB-01**	**STP DDCMIS**	**CONTROL CABLE**	**3CX2.5 Sq.mm2**		29
85	**C82B**	**DO-JB-01**	**STP DDCMIS**	**CONTROL CABLE**	**12CX2.5 Sq.mm2**		29
86	**C82C**	**DO-JB-01**	**STP DDCMIS**	**CONTROL CABLE**	**12CX2.5 Sq.mm2**		29
87	C83	90GRS02AA201-SOV	DO-JB-02	CONTROL CABLE	3C X 2.5 SQMM2	ACF FEED INLET AUTO VALVE COMMAND	10
88	C84	90GRS02AA202-SOV	DO-JB-02	CONTROL CABLE	3C X 2.5 SQMM2	ACF BACKWASH INLET AUTO VALVE COMMAND	10
89	C85	90GRS02AA203-SOV	DO-JB-02	CONTROL CABLE	3C X 2.5 SQMM2	ACF BACKWASH OUTLET AUTO VALVE COMMAND	10
90	C86	90GRS02AA204-SOV	DO-JB-02	CONTROL CABLE	3C X 2.5 SQMM2	ACF DRAIN / RINSE OUTLET AUTO VALVE COMMAND	10
91	C87	90GRS02AA205-SOV	DO-JB-02	CONTROL CABLE	3C X 2.5 SQMM2	ACF FEED OUTLET AUTO VALVE COMMAND	10
92	C88	90GRS02AA206-SOV	DO-JB-02	CONTROL CABLE	3C X 2.5 SQMM2	ACF VENT AUTO VALVE COMMAND	10
93	**C89A**	**DO-JB-02**	**STP DDCMIS**	**CONTROL CABLE**	**12CX2.5 Sq.mm2**		32
94	**C89B**	**DO-JB-02**	**STP DDCMIS**	**CONTROL CABLE**	**5CX2.5 Sq.mm2**		32
95	C90	90GRS10AA201-OP/CL	DI-JB-01	MONITORING	4Px0.5 sq.mm2(G TYPE)	FILTER FEED PUMP P-07A/B OUTLET VLV OPEN INDICATION	10
96	**C91**	**DI-JB-01**	**STP DDCMIS**	**MONITORING**	**4PX0.5 Sq.mm2 (G Type) Overall Shielded**		33
97	C92	90GRS01AA201-CL	DI-JB-02	MONITORING	4Px0.5 sq.mm2 (G TYPE)	DMF FEED INLET VLV OPEN/CLOSE INDICATION	
98	C93	90GRS01AA202-CL	DI-JB-02	MONITORING	4Px0.5 sq.mm2(G TYPE)	DMF BACKWASH INLET VLV OPEN/CLOSE INDICATION	
99	C94	90GRS01AA203-CL	DI-JB-02	MONITORING	4Px0.5 sq.mm2(G TYPE)	DMF BACKWASH OUTLET VLV OPEN/CLOSE INDICATION	
100	C95	90GRS01AA204-CL	DI-JB-02	MONITORING	4Px0.5 sq.mm2(G TYPE)	DMF DRAIN / RINSE OUTLET VIV OPEN/CLOSE INDICATION	
101	**C96**	**DI-JB-02**	**STP DDCMIS**	**MONITORING**	**12PX0.5 Sq.mm2 (G Type) Overall Shielded**		
102	C97	90GRS01AA205-CL	DI-JB-03	MONITORING	4Px0.5 sq.mm2(G TYPE)	DMF FEED OUTLET VLV OPEN/CLOSE INDICATION	
103	C98	90GRS01AA206-CL	DI-JB-03	MONITORING	4Px0.5 sq.mm2(G TYPE)	DMF VENT VLV OPEN/CLOSE INDICATION	
104	C99	90GRS10AA202-CL	DI-JB-03	MONITORING	4Px0.5 sq.mm2(G TYPE)	DMF OUTLET VLV OPEN/CLOSE INDICATION	
105	**C100**	**DI-JB-03**	**STP DDCMIS**	**MONITORING**	**8PX0.5 Sq.mm (G Type) Overall Shielded**		29

CABLE SCHEDULE

Sl No	Unit Cable No	From	To	Purpose	Cable Type	Remarks	Length(m)
106	C101	90GRS02AA201-CL	DI-JB-04	MONITORING	4Px0.5 sq.mm2(G TYPE)	ACF FEED INLET VALVE OPEN/CLOSE INDICATION	
107	C102	90GRS02AA202-CL	DI-JB-04	MONITORING	4Px0.5 sq.mm2(G TYPE)	ACF BACKWASH INLET VLV OPEN/CLOSE INDICATION	
108	C103	90GRS02AA203-CL	DI-JB-04	MONITORING	4Px0.5 sq.mm2(G TYPE)	ACF BACKWASH OUTLET VLV OPEN/CLOSE INDICATION	
109	**C104**	**DI-JB-04**	**STP DDCMIS**	**MONITORING**	**8pX0.5 Sq.mm2 (G Type) Overall Shielded**		32
110	C105	90GRS02AA204-CL	DI-JB-05	MONITORING	4Px0.5 sq.mm2(G TYPE)	ACF DRAIN / RINSE OUTLET VLV OPEN/CLOSE INDICATION	
111	C106	90GRS02AA205-CL	DI-JB-05	MONITORING	4Px0.5 sq.mm2(G TYPE)	ACF FEED OUTLET VLV OPEN/CLOSE INDICATION	
112	C107	90GRS02AA206-CL	DI-JB-05	MONITORING	4Px0.5 sq.mm2(G TYPE)	ACF VENT VLV OPEN/CLOSE INDICATION	
113	C108	**DI-JB-05**	**STP DDCMIS**	**MONITORING**	**8PX0.5 Sq.mm2 (G Type) Overall Shielded**		32
114	C109	90GRS-15AA-202-CL	DI-JB-06	MONITORING	4Px0.5 sq.mm2(G TYPE)	SERVICE WATER FOR FLUSING INLET VALVE OF CENTRIFUGE (CF) OPEN/CLOSE INDICATION	10
115	C110	90GRN-03CL-001	DI-JB-06	MONITORING	4P x 0.5 sq.mm2 (G Type) Overall Shielded	DWPE DOSING TANK -DT-03 LEVEL	10
116	**C111**	**DI-JB-06**	**STP DDCMIS**	**MONITORING**	**4PX0.5 Sq.mm2(G Type) Overall Shielded**		30
117	**C111A**	**DI-JB-06**	**STP DDCMIS**	**MONITORING**	**4PX0.5 Sq.mm2(G Type) Overall Shielded**		30
118	C112	90GRS01AP001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	SEWAGE TRANSFER PUMPS -1A	15
119	C113	90GRS01AP001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	SEWAGE TRANSFER PUMPS -1A	28
120	C114	90GRS01AP002-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	SEWAGE TRANSFER PUMPS -1B	15
121	C115	90GRS01AP002-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	SEWAGE TRANSFER PUMPS -1B	28
122	C116	90GRS02AP001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	SEWAGE TRANSFER PUMPS -2A	15
123	C117	90GRS02AP001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	SEWAGE TRANSFER PUMPS -2A	27
124	C118	90GRS02AP002-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	SEWAGE TRANSFER PUMPS -2B	15
125	C119	90GRS02AP002-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	SEWAGE TRANSFER PUMPS -2B	27
126	C120	90GRS03AP001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	SEWAGE TRANSFER PUMPS -3A	15
127	C121	90GRS03AP001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	SEWAGE TRANSFER PUMPS -3A	26
128	C122	90GRS03AP002-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	SEWAGE TRANSFER PUMPS -3B	15
129	C123	90GRS03AP002-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	SEWAGE TRANSFER PUMPS -3B	26
130	C124	90GRS04AP001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	SEWAGE TRANSFER PUMPS -4A	15
131	C125	90GRS04AP001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	SEWAGE TRANSFER PUMPS -4A	25
132	C126	90GRS04AP002-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	SEWAGE TRANSFER PUMPS -4B	15
133	C127	90GRS04AP002-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	SEWAGE TRANSFER PUMPS -4B	25
134	C128	90GRS05AP001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	COMMON COLLECTION SUMP PUMPS-1	15
135	C129	90GRS05AP001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	COMMON COLLECTION SUMP PUMPS-1	24
136	C130	90GRS05AP002-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	COMMON COLLECTION SUMP PUMPS-2	15
137	C131	90GRS05AP002-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	COMMON COLLECTION SUMP PUMPS -2	24
138	C132	90GRS06AP001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	MBBR FEED PUMPS-1	15
139	C133	90GRS06AP001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	MBBR FEED PUMPS-1	35
140	C134	90GRS06AP002-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	MBBR FEED PUMPS-2	15
141	C135	90GRS06AP002-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	MBBR FEED PUMPS-2	35
142	C136	90GRS08AP001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	FILTER FEED PUMPS-1	15
143	C137	90GRS08AP001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	FILTER FEED PUMPS-1	31
144	C138	90GRS09AP001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	FILTER FEED PUMPS-2	15
145	C139	90GRS09AP001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	FILTER FEED PUMPS-2	31
146	C140	90GRS12AP001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	TREATED WATER DISPOSAL PUMPS-1	15
147	C141	90GRS12AP001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	TREATED WATER DISPOSAL PUMPS-1	33
148	C142	90GRS13AP001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	TREATED WATER DISPOSAL PUMPS-2	15
149	C143	90GRS13AP001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	TREATED WATER DISPOSAL PUMPS-2	47
150	C144	90GRS15AP001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	SLUDGE TRANSFER PUMPS-1	15
151	C145	90GRS15AP001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	SLUDGE TRANSFER PUMPS-1	43
152	C146	90GRS15AP002-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	SLUDGE TRANSFER PUMPS-2	15
153	C147	90GRS15AP002-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	SLUDGE TRANSFER PUMPS-2	43
154	C148	90GRN01AM001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	NAOCL DOSING TANK-1 AGITATOR	15
155	C149	90GRN01AM001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	NAOCL DOSING TANK-1 AGITATOR	34
156	C150	90GRN02AM001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	NAOCL DOSING TANK-2 AGITATOR	15
157	C151	90GRN02AM001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	NAOCL DOSING TANK-2 AGITATOR	36
158	C152	90GRN03AM001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	POLYELECTROLYTE DOSING TANK AGITATOR	15
159	C153	90GRN03AM001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	POLYELECTROLYTE DOSING TANK AGITATOR	40
160	C154	DP-01-OP-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	HYPO DOSING PUMPS	15
161	C155	DP-01-OP-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	HYPO DOSING PUMPS	34
162	C156	DP-02-OP-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	HYPO DOSING PUMPS	15
163	C157	DP-02-OP-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	HYPO DOSING PUMPS	36
164	C158	DP-03-OP-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	DWPE DOSING PUMPS	15
165	C159	DP-03-OP-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	DWPE DOSING PUMPS	40
166	C160	90GRC01AN001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	AIR BLOWERS FOR COMMON SUMP, EQT & ST-1	15
167	C161	90GRC01AN001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	AIR BLOWERS FOR COMMON SUMP, EQT & ST-1	22
168	C162	90GRC01AN002-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	AIR BLOWERS FOR COMMON SUMP, EQT & ST-2	15
169	C163	90GRC01AN002-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	AIR BLOWERS FOR COMMON SUMP, EQT & ST-2	22
170	C164	90GRC02AN001-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	AIR BLOWERS FOR MBBR AERATION TANK-1	15
171	165	90GRC02AN001-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	AIR BLOWERS FOR MBBR AERATION TANK-1	24
172	C166	90GRC02AN002-MCC	STP DDCMIS	MONITORING	8P X 0.5 SQMM2 - G TYPE	AIR BLOWERS FOR MBBR AERATION TANK-2	15
173	C167	90GRC02AN002-LSPB	STP DDCMIS	MONITORING	2P X 0.5 SQMM2 - F TYPE	AIR BLOWERS FOR MBBR AERATION TANK-2	24

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90GRS10CF001	SEWAGE FLOW AT DMF INLET	C1	PENNAR	2P,F	SIG+	BL	AI-JB-01	TB-01	C11	12P,F	BHEL	CRB51	1DTBB1:39(T)	1BLUE	
					SIG-	RD		TB-02					1DTBB1:40(T)	1RED	
90GRB01CP001	DP ACROSS DMF	C2	PENNAR	2P,F	SIG+	BL		TB-03				CRB51	1DTBB1:33(T)	1GREY	
					SIG-	RD		TB-04					1DTBB1:34(T)	1YELLOW	
90GRB01CP002	DP ACROSS DMF	C3	PENNAR	2P,F	SIG+	BL		TB-05				CRB51	1DTBB1:17(T)	1GREEN	
					SIG-	RD		TB-06					1DTBB1:18(T)	1BROWN	
90GRS10CF002	SEWAGE FLOW AT ACF INLET	C4	PENNAR	2P,F	SIG+	BL		TB-07				CRB51	1DTBB1:23(T)	1WHITE	
					SIG-	RD		TB-08					1DTBB1:24(T)	1BLACK	
90GRB02CP001	DP ACROSS ACF	C5	PENNAR	2P,F	SIG+	BL		TB-09				CRB51	1DTBA1:43(T)	2BLUE	
					SIG-	RD		TB-10					1DTBA1:44(T)	2RED	
90GRB02CP002	DP ACROSS ACF	C6	PENNAR	2P,F	SIG+	BL		TB-11				CRB51	1DTBA1:27(T)	2GREY	
					SIG-	RD		TB-12					1DTBA1:28(T)	2YELLOW	
90GRS10CP001	FILTER FEED PUMP P-07A/B DISCH HDR PR	C7	PENNAR	2P,F	SIG+	BL		TB-13				CRB51	1DTBB1:37(T)	2GREEN	
					SIG-	RD		TB-14					1DTBB1:38(T)	2BROWN	
90GRS10CP002	FILTER FEED PUMP P-07A/B DISCH HDR PR	C8	PENNAR	2P,F	SIG+	BL		TB-15				CRB51	1DTBB1:21(T)	2WHITE	
					SIG-	RD		TB-16					1DTBB1:22(T)	2BLACK	
90QFB60CF001	INSTRUMENT AIR TO STP LINE FLOW	C9	PENNAR	2P,F	SIG+	BL		TB-17				CRB51	1DTBB1:27(T)	3BLUE	
					SIG-	RD		TB-18					1DTBB1:28(T)	3RED	
90QFB60CP001	INSTRUMENT AIR TO STP LINE PR	C10	PENNAR	2P,F	SIG+	BL		TB-19				CRB51	1DTBB1:43(T)	3GREY	
					SIG-	RD		TB-20					1DTBB1:44(T)	3YELLOW	
90GRS-11CL-001	TREATED WATER TANK LEVEL	C12	PENNAR	2P,F	SIG+	BL	AI-JB-02	TB-01	C20	8P,F	BHEL	CRB52	2DTBB1:69(T)	1BLUE	
					SIG-	RD		TB-02					2DTBB1:70(T)	1RED	
90GRS-11CL-002	TREATED WATER TANK LEVEL	C13	PENNAR	2P,F	SIG+	BL		TB-03				CRB52	2DTBB1:83(T)	1GREY	
					SIG-	RD		TB-04					2DTBB1:84(T)	1YELLOW	
90GRS-14CP-001	TREATED WATER DISPOSAL PUMP P-08A/B DISCH HDR PR	C14	PENNAR	2P,F	SIG+	BL		TB-05				CRB52	2DTBB1:81(T)	1GREEN	
					SIG-	RD		TB-06					2DTBB1:82(T)	1BROWN	
90GRS-14CP-002	TREATED WATER DISPOSAL PUMP P-08A/B DISCH HDR PR	C15	PENNAR	2P,F	SIG+	BL		TB-07				CRB52	2DTBB1:67(T)	1WHITE	
					SIG-	RD		TB-08					2DTBB1:68(T)	1BLACK	
90GRS-14CQ-001	TURBIDITY METER FOR OUTLET OF FILTER FEED PUMPS	C16	PENNAR	2P,F	SIG+	BL		TB-09				CRB52	2DTBB1:85(T)	2BLUE	
					SIG-	RD		TB-10					2DTBB1:86(T)	2RED	
90GRS-14CF-001	TREATED WATER DISPOSAL PUMP P-08A/B DISCH HDR FLOW	C17	PENNAR	2P,F	SIG+	BL		TB-11				CRB52	2DTBB1:65(T)	2GREY	
					SIG-	RD		TB-12					2DTBB1:66(T)	2YELLOW	
90GRS-14CT-201	TREATED WATER DISPOSAL PMP DISCH HDR TEMP	C19	PENNAR	2P,F	SIG+	BL		TB-15				CRB52	2DTBB1:59(T)	2GREEN	
					SIG-	RD		TB-16					2DTBB1:60(T)	2BROWN	
90GRS-14CQ-001	pH AT TREATED WATER DISPOSAL PMP DISCH HDR	C18	PENNAR	2P,F	SIG+	BL		TB-13	C20A	2P,F	BHEL	CRB51	1DTBB1:59(T)	1BLUE	
					SIG-	RD		TB-14					1DTBB1:60(T)	1RED	
90GRC-01CF-001	AIR BLOWER B-01A/B DISCH HDR FLOW	C21	PENNAR	2P,F	SIG+	BL	AI-JB-03	TB-01	C27	8P,F	BHEL	CRB51	1DTBA1:17(T)	1BLUE	
					SIG-	RD		TB-02					1DTBA1:18(T)	1RED	
90GRC-01CP-001	AIR BLOWER B-01A/B DISCH HDR PR	C22	PENNAR	2P,F	SIG+	BL		TB-03				CRB51	1DTBA1:33(T)	1GREY	
					SIG-	RD		TB-04					1DTBA1:34(T)	1YELLOW	
90GRC-01CP-002	AIR BLOWER B-01A/B DISCH HDR PR	C23	PENNAR	2P,F	SIG+	BL		TB-05				CRB51	1DTBA1:19(T)	1GREEN	
					SIG-	RD		TB-06					1DTBA1:20(T)	1BROWN	
90GRC-02CF-001	AIR BLOWER B-02A/B DISCH HDR FLOW	C24	PENNAR	2P,F	SIG+	BL		TB-07				CRB51	1DTBA1:35(T)	1WHITE	
					SIG-	RD		TB-08					1DTBA1:36(T)	1BLACK	
90GRC-02CP-001	AIR BLOWER B-02A/B DISCH HDR PR	C25	PENNAR	2P,F	SIG+	BL		TB-09				CRB51	1DTBA1:37(T)	2BLUE	
					SIG-	RD		TB-10					1DTBA1:38(T)	2RED	
90GRC-02CP-002	AIR BLOWER B-02A/B DISCH HDR PR	C26	PENNAR	2P,F	SIG+	BL		TB-11				CRB51	1DTBA1:21(T)	2GREY	
					SIG-	RD		TB-12					1DTBA1:22(T)	2YELLOW	
90GRN-01CL-001	NaOCL DOSING TANK DT-01 LEVEL	C28	PENNAR	2P,F	SIG+	BL	AI-JB-04	TB-01	C36	12P,F	BHEL	CRB51	1DTBB1:71(T)	1BLUE	
					SIG-	RD		TB-02					1DTBB1:72(T)	1RED	
90GRN-01CL-002	NaOCL DOSING TANK DT-01 LEVEL	C29	PENNAR	2P,F	SIG+	BL		TB-03				CRB51	1DTBB1:55(T)	1GREY	
					SIG-	RD		TB-04					1DTBB1:56(T)	1YELLOW	
90GRN-01CP-001	NaOCL DOSING PUMP DP-01 DISCH PR	C30	PENNAR	2P,F	SIG+	BL		TB-05				CRB51	1DTBB1:67(T)	1GREEN	
					SIG-	RD		TB-06					1DTBB1:68(T)	1BROWN	
90GRN-01CP-002	NaOCL DOSING PUMP DP-01 DISCH PR	C31	PENNAR	2P,F	SIG+	BL		TB-07				CRB51	1DTBB1:51(T)	1WHITE	
					SIG-	RD		TB-08					1DTBB1:52(T)	1BLACK	
90GRN-02CL-001	NaOCL DOSING TANK DT-02 LEVEL	C32	PENNAR	2P,F	SIG+	BL		TB-09				CRB51	1DTBB1:73(T)	2BLUE	
					SIG-	RD		TB-10					1DTBB1:74(T)	2RED	
90GRN-02CL-002	NaOCL DOSING TANK DT-02 LEVEL	C33	PENNAR	2P,F	SIG+	BL		TB-11				CRB51	1DTBB1:57(T)	2GREY	
					SIG-	RD		TB-12					1DTBB1:58(T)	2YELLOW	
90GRN-02CP-001	NaOCL DOSING PUMP DP-02 DISCH PR	C34	PENNAR	2P,F	SIG+	BL		TB-13				CRB51	1DTBB1:53(T)	2GREEN	
					SIG-	RD		TB-14					1DTBB1:54(T)	2BROWN	
90GRN-02CP-002	NaOCL DOSING PUMP DP-02 DISCH PR	C35	PENNAR	2P,F	SIG+	BL		TB-15				CRB51	1DTBB1:69(T)	2WHITE	
					SIG-	RD		TB-16					1DTBB1:70(T)	2BLACK	

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90GRS-05CP-001	COMMON COLLECTION SUMP PUMP P-05A/B DISCH HDR PR	C37	PENNAR	2P,F	SIG+	BL	AI-JB-05	TB-01	C45	12P,F	BHEL	CRB51	1DTBA1:25(T)	1BLUE	
					SIG-	RD		TB-02					1DTBA1:26(T)	1RED	
90GRS-05CP-002	COMMON COLLECTION SUMP PUMP P-05A/B DISCH HDR PR	C38	PENNAR	2P,F	SIG+	BL		TB-03				CRB51	1DTBA1:41(T)	1GREY	
					SIG-	RD		TB-04					1DTBA1:42(T)	1YELLOW	
90GRS-05CL-001	COMMON COLLECTION SUMP LEVEL	C39	PENNAR	2P,F	SIG+	BL		TB-05				CRB51	1DTBA1:23(T)	1GREEN	
					SIG-	RD		TB-06					1DTBA1:24(T)	1BROWN	
90GRS-05CL-002	COMMON COLLECTION SUMP LEVEL	C40	PENNAR	2P,F	SIG+	BL		TB-07				CRB51	1DTBA1:39(T)	1WHITE	
					SIG-	RD		TB-08					1DTBA1:40(T)	1BLACK	
90GRS-06CP-001	MBBR FEED PUMP P-06A/B DISCH HDR PR	C41	PENNAR	2P,F	SIG+	BL		TB-09				CRB51	1DTBB1:65(T)	2BLUE	
					SIG-	RD		TB-10					1DTBB1:66(T)	2RED	
90GRS-06CP-002	MBBR FEED PUMP P-06A/B DISCH HDR PR	C42	PENNAR	2P,F	SIG+	BL		TB-11				CRB51	1DTBB1:49(T)	2GREY	
					SIG-	RD		TB-12					1DTBB1:50(T)	2YELLOW	
90GRS-06CL-001	EQUALIZATION TANK LEVEL	C43	PENNAR	2P,F	SIG+	BL		TB-13				CRB51	1DTBB1:35(T)	2GREEN	
					SIG-	RD		TB-14					1DTBB1:36(T)	2BROWN	
90GRS-06CL-002	EQUALIZATION TANK LEVEL	C44	PENNAR	2P,F	SIG+	BL		TB-15				CRB51	1DTBB1:19(T)	2WHITE	
					SIG-	RD		TB-16					1DTBB1:20(T)	2BLACK	
90GRS-15CL-001	SLUDGE HOLDING TANK LEVEL	C46	PENNAR	2P,F	SIG+	BL	AI-JB-06	TB-01	C52	8P,F	BHEL	CRB52	2DTBB1:55(T)	1BLUE	
					SIG-	RD		TB-02					2DTBB1:56(T)	1RED	
90GRS-15CL-002	SLUDGE HOLDING TANK LEVEL	C47	PENNAR	2P,F	SIG+	BL		TB-03				CRB52	2DTBB1:41(T)	1GREY	
					SIG-	RD		TB-04					2DTBB1:42(T)	1YELLOW	
90GRS-15CP-001	SLUDGE TRANSFER PUMP P-09A/B DISCH HDR PR	C48	PENNAR	2P,F	SIG+	BL		TB-05				CRB52	2DTBB1:57(T)	1GREEN	
					SIG-	RD		TB-06					2DTBB1:58(T)	1BROWN	
90GRS-15CP-001	SLUDGE TRANSFER PUMP P-09A/B DISCH HDR PR	C49	PENNAR	2P,F	SIG+	BL		TB-07				CRB52	2DTBB1:43(T)	1WHITE	
					SIG-	RD		TB-08					2DTBB1:44(T)	1BLACK	
90GRS-07CL-001	HYPO CONTACT(HC)/FILTER FEED TANK(FFT) LEVEL	C50	PENNAR	2P,F	SIG+	BL		TB-09	C52A	4P,F	BHEL	CRB51	1DTBB1:25(T)	2BLUE	
					SIG-	RD		TB-10					1DTBB1:26(T)	2RED	
90GRS-07CL-002	HYPO CONTACT(HC)/FILTER FEED TANK(FFT) LEVEL	C51	PENNAR	2P,F	SIG+	BL		TB-11				CRB51	1DTBB1:41(T)	2GREY	
					SIG-	RD		TB-12					1DTBB1:42(T)	2YELLOW	
90GRS-01CL-001	SEWAGE SUMP S-01 LEVEL	C53	PENNAR	2P,F	SIG+	BL	AI-JB-07	TB-01	C57	8P,F	BHEL	CRB52	2DTBA1:37(T)	1BLUE	
					SIG-	RD		TB-02					2DTBA1:38(T)	1RED	
90GRS-01CL-002	SEWAGE SUMP S-01 LEVEL	C54	PENNAR	2P,F	SIG+	BL		TB-03				CRB52	2DTBA1:51(T)	1GREY	
					SIG-	RD		TB-04					2DTBA1:52(T)	1YELLOW	
90GRS-01CP-001	SEWAGE TRANSFER PUMP P-01A/B DISCH HDR PR	C55	PENNAR	2P,F	SIG+	BL		TB-05				CRB52	2DTBB1:33(T)	1GREEN	
					SIG-	RD		TB-06					2DTBB1:34(T)	1BROWN	
90GRS-01CP-002	SEWAGE TRANSFER PUMP P-01A/B DISCH HDR PR	C56	PENNAR	2P,F	SIG+	BL		TB-07				CRB52	2DTBA1:59(T)	1WHITE	
					SIG-	RD		TB-08					2DTBA1:60(T)	1BLACK	
90GRS-02CL-001	SEWAGE SUMP S-02 LEVEL	C58	PENNAR	2P,F	SIG+	BL	AI-JB-08	TB-09	C62	8P,F	BHEL	CRB52	2DTBA1:53(T)	1BLUE	
					SIG-	RD		TB-10					2DTBA1:54(T)	1RED	
90GRS-02CL-002	SEWAGE SUMP S-02 LEVEL	C59	PENNAR	2P,F	SIG+	BL		TB-11				CRB52	2DTBA1:39(T)	1GREY	
					SIG-	RD		TB-12					2DTBA1:40(T)	1YELLOW	
90GRS-02CP-001	SEWAGE TRANSFER PUMP P-02A/B DISCH HDR PR	C60	PENNAR	2P,F	SIG+	BL		TB-13				CRB52	2DTBB1:49(T)	1GREEN	
					SIG-	RD		TB-14					2DTBB1:50(T)	1BROWN	
90GRS-02CP-002	SEWAGE TRANSFER PUMP P-02A/B DISCH HDR PR	C61	PENNAR	2P,F	SIG+	BL		TB-15				CRB52	2DTBB1:35(T)	1WHITE	
					SIG-	RD		TB-16					2DTBB1:36(T)	1BLACK	
90GRS-03CL-001	SEWAGE SUMP S-03 LEVEL	C63	PENNAR	2P,F	SIG+	BL	AI-JB-09	TB-01	C67	8P,F	BHEL	CRB52	2DTBA1:41(T)	1BLUE	
					SIG-	RD		TB-02					2DTBA1:42(T)	1RED	
90GRS-03CL-002	SEWAGE SUMP S-03 LEVEL	C64	PENNAR	2P,F	SIG+	BL		TB-03				CRB52	2DTBA1:55(T)	1GREY	
					SIG-	RD		TB-04					2DTBA1:56(T)	1YELLOW	
90GRS-03CP-001	SEWAGE TRANSFER PUMP P-03A/B DISCH HDR PR	C65	PENNAR	2P,F	SIG+	BL		TB-05				CRB52	2DTBB1:51(T)	1GREEN	
					SIG-	RD		TB-06					2DTBB1:52(T)	1BROWN	
90GRS-03CP-002	SEWAGE TRANSFER PUMP P-03A/B DISCH HDR PR	C66	PENNAR	2P,F	SIG+	BL		TB-07				CRB52	2DTBB1:37(T)	1WHITE	
					SIG-	RD		TB-08					2DTBB1:38(T)	1BLACK	
90GRS-04CL-001	SEWAGE SUMP S-04 LEVEL	C68	PENNAR	2P,F	SIG+	BL	AI-JB-10	TB-09	C72	8P,F	BHEL	CRB52	2DTBA1:57(T)	1BLUE	
					SIG-	RD		TB-10					2DTBA1:58(T)	1RED	
90GRS-04CL-002	SEWAGE SUMP S-04 LEVEL	C69	PENNAR	2P,F	SIG+	BL		TB-11				CRB52	2DTBA1:43(T)	1GREY	
					SIG-	RD		TB-12					2DTBA1:44(T)	1YELLOW	
90GRS-04CP-001	SEWAGE TRANSFER PUMP P-04A/B DISCH HDR PR	C70	PENNAR	2P,F	SIG+	BL		TB-13				CRB52	2DTBB1:53(T)	1GREEN	
					SIG-	RD		TB-14					2DTBB1:54(T)	1BROWN	
90GRS-04CP-002	SEWAGE TRANSFER PUMP P-04A/B DISCH HDR PR	C71	PENNAR	2P,F	SIG+	BL		TB-15				CRB52	2DTBB1:39(T)	1WHITE	
					SIG-	RD		TB-16					2DTBB1:40(T)	1BLACK	

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90GRS-15AA-202-SOV	SERVICE WATER FOR FLUSING INLET VALVE OF CENTRIFUGE (CF)	C73	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1	DO-JB-01	TB-01	C82A	3CX2.5 SQMM2	BHEL	CRB54	4DTBA3:01(T)	CORE-1	
					-24VDC	CORE-2		TB-02					4DTBA3:02(T)	CORE-2	
90GRS-10AA-201-SOV	FILTER FEED PUMP P-07A/B OUTLET AUTO VALVE COMMAND	C74	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-03	C82B	12CX2.5 SQMM2	BHEL	CRB53	3FTBD:37(P)	CORE-1	
					-24VDC	CORE-2		TB-04					3DTBC2:89(T)	CORE-2	
90GRB-01AA-201-SOV	DMF FEED INLET AUTO VALVE COMMAND	C75	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-05				CRB53	3DTBA2:73(T)	CORE-3	
					-24VDC	CORE-2		TB-06					3DTBA2:74(T)	CORE-4	
90GRB-01AA-202-SOV	DMF BACKWASH INLET AUTO VALVE COMMAND	C76	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-07				CRB53	3DTBA2:75(T)	CORE-5	
					-24VDC	CORE-2		TB-08					3DTBA2:76(T)	CORE-6	
90GRB-01AA-203-SOV	DMF BACKWASH OUTLET AUTO VALVE COMMAND	C77	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-09				CRB53	3DTBA2:81(T)	CORE-7	
					-24VDC	CORE-2		TB-10					3DTBA2:82(T)	CORE-8	
90GRB-01AA-204-SOV	DMF DRAIN / RINSE OUTLET AUTO VALVE COMMAND	C78	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-11	C82C	12CX2.5 SQMM2	BHEL	CRB53	3DTBA2:83(T)	CORE-1	
					-24VDC	CORE-2		TB-12					3DTBA2:84(T)	CORE-2	
90GRB-01AA-205-SOV	DMF FEED OUTLET AUTO VALVE COMMAND	C79	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-13				CRB53	3DTBA2:73(T)	CORE-3	
					-24VDC	CORE-2		TB-14					3DTBA2:90(T)	CORE-4	
90GRB-01AA-206-SOV	DMF VENT AUTO VALVE COMMAND	C80	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-15				CRB53	3DTBA2:73(T)	CORE-5	
					-24VDC	CORE-2		TB-16					3DTBA2:92(T)	CORE-6	
90GRS-10AA-202-SOV	DMF OUTLET AUTO VALVE COMMAND	C81	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-17				CRB53	3DTBA2:73(T)	CORE-7	
					-24VDC	CORE-2		TB-18					3DTBC2:92(T)	CORE-8	
90GRB02AA201-SOV	ACF FEED INLET AUTO VALVE COMMAND	C83	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1	DO-JB-02	TB-01	C89A	12CX2.5 SQMM2	BHEL	CRB54	4DTBA2:77(T)	CORE-1	
					-24VDC	CORE-2		TB-02					4DTBA2:78(T)	CORE-2	
90GRB02AA202-SOV	ACF BACKWASH INLET AUTO VALVE COMMAND	C84	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-03				CRB54	4DTBA2:85(T)	CORE-3	
					-24VDC	CORE-2		TB-04					4DTBA2:86(T)	CORE-4	
90GRB02AA203-SOV	ACF BACKWASH OUTLET AUTO VALVE COMMAND	C85	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-05				CRB54	4DTBA2:93(T)	CORE-5	
					-24VDC	CORE-2		TB-06					4DTBA2:94(T)	CORE-6	
90GRB02AA204-SOV	ACF DRAIN / RINSE OUTLET AUTO VALVE COMMAND	C86	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-07				CRB54	4DTBA3:05(T)	CORE-7	
					-24VDC	CORE-2		TB-08					4DTBA3:06(T)	CORE-8	
90GRB02AA205-SOV	ACF FEED OUTLET AUTO VALVE COMMAND	C87	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-09	C89B	5CX2.5 SQMM2	BHEL	CRB54	4DTBA3:13(T)	CORE-1	
					-24VDC	CORE-2		TB-10					4DTBA3:14(T)	CORE-2	
90GRB02AA206-SOV	ACF VENT AUTO VALVE COMMAND	C88	PENNAR	3C X 2.5 SQMM2	+24VDC	CORE-1		TB-11				CRB54	4DTBA3:11(T)	CORE-3	
					-24VDC	CORE-2		TB-12					4DTBA3:12(T)	CORE-4	
90GRS10AA201-OP	FILTER FEED PUMP P-07A/B OUTLET VLV OPEN INDICATION	C90	PENNAR	4P,G	SIG+	BL	DI-JB-01	TB-01	C91	4P,G	BHEL	CRB53	3DTBC2:41(T)	1BLUE	
					SIG-	RD		TB-02					3DTBC2:42(T)	1RED	
90GRS10AA201-CL					SIG+	BL		TB-03					3DTBC2:43(T)	1GREY	
					SIG-	RD		TB-04					3DTBC2:44(T)	1YELLOW	
90GRB01AA201-OP	DMF FEED INLET VLV OPEN/CLOSE INDICATION	C92	PENNAR	4P,G	SIG+	BL	DI-JB-02	TB-01	C96	12P,G	BHEL	CRB53	3DTBA2:33(T)	1BLUE	
					SIG-	RD		TB-02					3DTBA2:34(T)	1RED	
90GRB01AA201-CL					SIG+	BL		TB-03					3DTBA2:35(T)	1GREY	
					SIG-	RD		TB-04					3DTBA2:36(T)	1YELLOW	
90GRB01AA202-OP	DMF BACKWASH INLET VLV OPEN/CLOSE INDICATION	C93	PENNAR	4P,G	SIG+	BL		TB-05					3DTBA2:37(T)	1GREEN	
					SIG-	RD		TB-06					3DTBA2:38(T)	1BROWN	
90GRB01AA202-CL					SIG+	BL		TB-07					3DTBA2:39(T)	1WHITE	
					SIG-	RD		TB-08					3DTBA2:40(T)	1BLACK	
90GRB01AA203-OP	DMF BACKWASH OUTLET VLV OPEN/CLOSE INDICATION	C94	PENNAR	4P,G	SIG+	BL		TB-09					3DTBA2:41(T)	2BLUE	
					SIG-	RD		TB-10					3DTBA2:42(T)	2RED	
90GRB01AA203-CL					SIG+	BL		TB-11					3DTBA2:49(T)	2GREY	
					SIG-	RD		TB-12					3DTBA2:50(T)	2YELLOW	
90GRB01AA204-OP	DMF DRAIN / RINSE OUTLET VIV OPEN/CLOSE INDICATION	C95	PENNAR	4P,G	SIG+	BL		TB-13					3DTBA2:51(T)	2GREEN	
					SIG-	RD		TB-14					3DTBA2:52(T)	2BROWN	
90GRB01AA204-CL					SIG+	BL		TB-15					3DTBA2:53(T)	2WHITE	
					SIG-	RD		TB-16					3DTBA2:54(T)	2BLACK	
90GRB01AA205-OP	DMF FEED OUTLET VLV OPEN/CLOSE INDICATION	C97	PENNAR	4P,G	SIG+	BL	DI-JB-03	TB-01	C100	8P,G	BHEL	CRB53	3DTBA2:55(T)	1BLUE	
					SIG-	RD		TB-02					3DTBA2:56(T)	1RED	
90GRB01AA205-CL					SIG+	BL		TB-03					3DTBA2:57(T)	1GREY	
					SIG-	RD		TB-04					3DTBA2:58(T)	1YELLOW	
90GRB01AA206-OP	DMF VENT VLV OPEN/CLOSE INDICATION	C98	PENNAR	4P,G	SIG+	BL		TB-05					3DTBA2:17(T)	1GREEN	
					SIG-	RD		TB-06					3DTBA2:18(T)	1BROWN	
90GRB01AA206-CL					SIG+	BL		TB-07					3DTBA2:19(T)	1WHITE	
					SIG-	RD		TB-08					3DTBA2:20(T)	1BLACK	
90GRS10AA202-OP	DMF OUTLET VLV OPEN/CLOSE INDICATION	C99	PENNAR	4P,G	SIG+	BL		TB-09					3DTBC2:49(T)	2BLUE	
					SIG-	RD		TB-10					3DTBC2:50(T)	2RED	
90GRS10AA202-CL					SIG+	BL		TB-11					3DTBC2:51(T)	2GREY	
					SIG-	RD		TB-12					3DTBC2:52(T)	2YELLOW	

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90GRB02AA201-OP	ACF FEED INLET VALVE OPEN/CLOSE INDICATION	C101	PENNAR	4P,G	SIG+	BL	DI-JB-04	TB-01	C104	8P,G	BHEL	CRB54	4DTBA2:33(T)	1BLUE	
					SIG-	RD		TB-02					4DTBA2:34(T)	1RED	
90GRB02AA201-CL					SIG+	BL		TB-03					4DTBA2:35(T)	1GREY	
					SIG-	RD		TB-04					4DTBA2:36(T)	1YELLOW	
90GRB02AA202-OP	ACF BACKWASH INLET VLV OPEN/CLOSE INDICATION	C102	PENNAR	4P,G	SIG+	BL		TB-05					4DTBA2:37(T)	1GREEN	
					SIG-	RD		TB-06					4DTBA2:38(T)	1BROWN	
90GRB02AA202-CL					SIG+	BL		TB-07					4DTBA2:39(T)	1WHITE	
					SIG-	RD		TB-08					4DTBA2:40(T)	1BLACK	
90GRB02AA203-OP	ACF BACKWASH OUTLET VLV OPEN/CLOSE INDICATION	C103	PENNAR	4P,G	SIG+	BL		TB-09					4DTBA2:41(T)	2BLUE	
					SIG-	RD		TB-10					4DTBA2:42(T)	2RED	
90GRB02AA203-CL					SIG+	BL		TB-11					4DTBA2:49(T)	2GREY	
					SIG-	RD		TB-12					4DTBA2:50(T)	2YELLOW	
90GRB02AA204-OP	ACF DRAIN / RINSE OUTLET VLV OPEN/CLOSE INDICATION	C105	PENNAR	4P,G	SIG+	BL	DI-JB-05	TB-01	C108	8P,G	BHEL	CRB54	4DTBA2:51(T)	1BLUE	
					SIG-	RD		TB-02					4DTBA2:52(T)	1RED	
90GRB02AA204-CL					SIG+	BL		TB-03					4DTBA2:53(T)	1GREY	
					SIG-	RD		TB-04					4DTBA2:54(T)	1YELLOW	
90GRB02AA205-OP	ACF FEED OUTLET VLV OPEN/CLOSE INDICATION	C106	PENNAR	4P,G	SIG+	BL		TB-05					4DTBA2:55(T)	1GREEN	
					SIG-	RD		TB-06					4DTBA2:56(T)	1BROWN	
90GRB02AA205-CL					SIG+	BL		TB-07					4DTBA2:57(T)	1WHITE	
					SIG-	RD		TB-08					4DTBA2:58(T)	1BLACK	
90GRB02AA206-OP	ACF VENT VLV OPEN/CLOSE INDICATION	C107	PENNAR	4P,G	SIG+	BL		TB-09					4DTBA2:17(T)	2BLUE	
					SIG-	RD		TB-10					4DTBA2:18(T)	2RED	
90GRB02AA206-CL					SIG+	BL		TB-11					4DTBA2:19(T)	2GREY	
					SIG-	RD		TB-12					4DTBA2:20(T)	2YELLOW	
90GRS-15AA-202-OP	SERVICE WATER FOR FLUSING INLET VALVE OF CENTRIFUGE (CF) OPEN/CLOSE INDICATION	C109	PENNAR	4P,G	SIG+	BL	DI-JB-06	TB-01	C111	4P,G	BHEL	CRB54	4DTBA2:25(T)	1BLUE	
					SIG-	RD		TB-02					4DTBA2:26(T)	1RED	
90GRS-15AA-202-CL					SIG+	BL		TB-03				CRB54	4DTBA2:27(T)	1GREY	
					SIG-	RD		TB-04					4DTBA2:28(T)	1YELLOW	
90GRN-03CL-001	DWPE DOSING TANK -DT-03 LEVEL	C110	PENNAR	4P,G	SIG+	BL		TB-05	C111A	4P,G	BHEL	CRB52	2DTBA1:35(T)	1BLUE	
					SIG-	RD		TB-06					2DTBA1:36(T)	1RED	
90GRS01AP001-STP DDCMIS	COMMAND START	SEWAGE TRANSFER PUMPS-1A					MCC		C112	8P,G	BHEL	CRB52	2DTBA2:73(T)	1BLUE	
													2DTBA2:74(T)	1RED	
	COMMAND STOP											CRB52	2DTBA2:75(T)	1GREY	
													2DTBA2:76(T)	1YELLOW	
	FDBK ON											CRB52	2DTBA2:33(T)	1GREEN	
													2DTBA2:34(T)	1BROWN	
	FDBK OFF											CRB52	2DTBA2:35(T)	1WHITE	
													2DTBA2:36(T)	1BLACK	
	MCC DISTBD											CRB52	2DTBA1:69(T)	2BLUE	
													2DTBA1:70(T)	2RED	
	MCC AVLBL											CRB52	2DTBA1:71(T)	2GREY	
													2DTBA1:72(T)	2YELLOW	
	EPB OPTD											CRB52	2DTBA1:67(T)	2GREEN	
													2DTBA1:68(T)	2BROWN	
	LSPB						LSPB	+	C113	2P,F		CRB52	2DTBA1:65(T)	1BLUE	
								-					2DTBA1:66(T)	1RED	
90GRS01AP002-STP DDCMIS	COMMAND START	SEWAGE TRANSFER PUMPS-1B					MCC		C114	8P,G	BHEL	CRB52	2DTBA2:81(T)	1BLUE	
													2DTBA2:82(T)	1RED	
	COMMAND STOP											CRB52	2DTBA2:83(T)	1GREY	
													2DTBA2:84(T)	1YELLOW	
	FDBK ON											CRB52	2DTBA2:37(T)	1GREEN	
													2DTBA2:38(T)	1BROWN	
	FDBK OFF											CRB52	2DTBA2:39(T)	1WHITE	
													2DTBA2:40(T)	1BLACK	
	MCC DISTBD											CRB52	2DTBA1:83(T)	2BLUE	
													2DTBA1:84(T)	2RED	
	MCC AVLBL											CRB52	2DTBA1:85(T)	2GREY	
													2DTBA1:86(T)	2YELLOW	
	EPB OPTD											CRB52	2DTBA1:81(T)	2GREEN	
													2DTBA1:82(T)	2BROWN	
	LSPB						LSPB	+	C115	2P,F		CRB52	2DTBA1:73(T)	1BLUE	
								-					2DTBA1:74(T)	1RED	

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90GRS02AP001-STP DDCMIS	COMMAND START	SEWAGE TRANSFER PUMPS-2A					MCC		C116	8P,G	BHEL	CRB52	2DTBA2:89(T)	1BLUE	
													2DTBA2:90(T)	1RED	
	COMMAND STOP											CRB52	2DTBA2:91(T)	1GREY	
													2DTBA2:92(T)	1YELLOW	
	FDBK ON											CRB52	2DTBA2:41(T)	1GREEN	
													2DTBA2:42(T)	1BROWN	
	FDBK OFF											CRB52	2DTBA2:49(T)	1WHITE	
													2DTBA2:50(T)	1BLACK	
	MCC DISTBD											CRB52	2DTBA2:01(T)	2BLUE	
													2DTBA2:02(T)	2RED	
	MCC AVLBL											CRB52	2DTBA2:03(T)	2GREY	
													2DTBA2:04(T)	2YELLOW	
	EPB OPTD											CRB52	2DTBA1:89(T)	2GREEN	
													2DTBA1:90(T)	2BROWN	
	LSPB						LSPB	+	C117	2P,F		CRB52	2DTBA1:87(T)	1BLUE	
								-					2DTBA1:88(T)	1RED	
90GRS02AP002-STP DDCMIS	COMMAND START	SEWAGE TRANSFER PUMPS-2B					MCC		C118	8P,G	BHEL	CRB52	2DTBA3:01(T)	1BLUE	
													2DTBA3:02(T)	1RED	
	COMMAND STOP											CRB52	2DTBA3:03(T)	1GREY	
													2DTBA3:04(T)	1YELLOW	
	FDBK ON											CRB52	2DTBA2:51(T)	1GREEN	
													2DTBA2:52(T)	1BROWN	
	FDBK OFF											CRB52	2DTBA2:53(T)	1WHITE	
													2DTBA2:54(T)	1BLACK	
	MCC DISTBD											CRB52	2DTBA2:09(T)	2BLUE	
													2DTBA2:10(T)	2RED	
	MCC AVLBL											CRB52	2DTBA2:17(T)	2GREY	
													2DTBA2:18(T)	2YELLOW	
	EPB OPTD											CRB52	2DTBA2:07(T)	2GREEN	
													2DTBA2:08(T)	2BROWN	
	LSPB						LSPB	+	C119	2P,F		CRB52	2DTBA2:05(T)	1BLUE	
								-					2DTBA2:06(T)	1RED	
90GRS03AP001-STP DDCMIS	COMMAND START	SEWAGE TRANSFER PUMPS-3A					MCC		C120	8P,G	BHEL	CRB52	2DTBA3:09(T)	1BLUE	
													2DTBA3:10(T)	1RED	
	COMMAND STOP											CRB52	2DTBA3:11(T)	1GREY	
													2DTBA3:12(T)	1YELLOW	
	FDBK ON											CRB52	2DTBA2:55(T)	1GREEN	
													2DTBA2:56(T)	1BROWN	
	FDBK OFF											CRB52	2DTBA2:57(T)	1WHITE	
													2DTBA2:58(T)	1BLACK	
	MCC DISTBD											CRB52	2DTBA2:23(T)	2BLUE	
													2DTBA2:24(T)	2RED	
	MCC AVLBL											CRB52	2DTBA2:25(T)	2GREY	
													2DTBA2:26(T)	2YELLOW	
	EPB OPTD											CRB52	2DTBA2:21(T)	2GREEN	
													2DTBA2:22(T)	2BROWN	
	LSPB						LSPB	+	C121	2P,F		CRB52	2DTBA2:19(T)	1BLUE	
								-					2DTBA2:20(T)	1RED	
90GRS03AP002-STP DDCMIS	COMMAND START	SEWAGE TRANSFER PUMPS-3B					MCC		C122	8P,G	BHEL	CRB52	2DTBC2:73(T)	1BLUE	
													2DTBC2:74(T)	1RED	
	COMMAND STOP											CRB52	2DTBC2:75(T)	1GREY	
													2DTBC2:76(T)	1YELLOW	
	FDBK ON											CRB52	2DTBC2:33(T)	1GREEN	
													2DTBC2:34(T)	1BROWN	
	FDBK OFF											CRB52	2DTBC2:35(T)	1WHITE	
													2DTBC2:36(T)	1BLACK	
	MCC DISTBD											CRB52	2DTBC1:69(T)	2BLUE	
													2DTBC1:70(T)	2RED	
	MCC AVLBL											CRB52	2DTBC1:71(T)	2GREY	
													2DTBC1:72(T)	2YELLOW	
	EPB OPTD											CRB52	2DTBC1:67(T)	2GREEN	
													2DTBC1:68(T)	2BROWN	
	LSPB						LSPB	+	C123	2P,F		CRB52	2DTBC1:65(T)	1BLUE	
								-					2DTBC1:66(T)	1RED	

CA□LE □N□E□CONNEC□□ON □C□□ED□LE															
□A□ NAME	**DE□C□□P□□ON**	**□□ELD CA□LE NO**	**□□ELD CA□LE □□COPE**	**□□ELD CA□LE □□PE**	**□□ELD □□DE □□**	**CO□E COLO□**	**□□ NO□MCC□L□P□ □□**	**□□□MCC□L□P□ □□**	**□□□N□ CA□LE N□M□E□**	**□□□N□ CA□LE □□PE**	**□□□N□ CA□LE □COPE**	**DC□ PNL**	**DC□ □□**	**CO□E COLO□**	**REMARK**
90GRS04AP001-STP DDCMIS	COMMAND START	SEWAGE TRANSFER PUMPS-4A					MCC		C124	8P,G	BHEL	CRB52	2DTBC2:81(T)	1BLUE	
													2DTBC2:82(T)	1RED	
	COMMAND STOP											CRB52	2DTBC2:83(T)	1GREY	
													2DTBC2:84(T)	1YELLOW	
	FDBK ON											CRB52	2DTBC2:37(T)	1GREEN	
													2DTBC2:38(T)	1BROWN	
	FDBK OFF											CRB52	2DTBC2:39(T)	1WHITE	
													2DTBC2:40(T)	1BLACK	
	MCC DISTBD											CRB52	2DTBC1:83(T)	2BLUE	
													2DTBC1:84(T)	2RED	
	MCC AVLBL											CRB52	2DTBC1:85(T)	2GREY	
													2DTBC1:86(T)	2YELLOW	
	EPB OPTD											CRB52	2DTBC1:81(T)	2GREEN	
													2DTBC1:82(T)	2BROWN	
	LSPB						LSPB	+	C125	2P,F		CRB52	2DTBC1:73(T)	1BLUE	
								-					2DTBC1:74(T)	1RED	
90GRS04AP002-STP DDCMIS	COMMAND START	SEWAGE TRANSFER PUMPS-4B					MCC		C126	8P,G	BHEL	CRB52	2DTBC2:89(T)	1BLUE	
													2DTBC2:90(T)	1RED	
	COMMAND STOP											CRB52	2DTBC2:91(T)	1GREY	
													2DTBC2:92(T)	1YELLOW	
	FDBK ON											CRB52	2DTBC2:41(T)	1GREEN	
													2DTBC2:42(T)	1BROWN	
	FDBK OFF											CRB52	2DTBC2:49(T)	1WHITE	
													2DTBC2:50(T)	1BLACK	
	MCC DISTBD											CRB52	2DTBC2:01(T)	2BLUE	
													2DTBC2:02(T)	2RED	
	MCC AVLBL											CRB52	2DTBC2:03(T)	2GREY	
													2DTBC2:04(T)	2YELLOW	
	EPB OPTD											CRB52	2DTBC1:89(T)	2GREEN	
													2DTBC1:90(T)	2BROWN	
	LSPB						LSPB	+	C127	2P,F		CRB52	2DTBC1:87(T)	1BLUE	
								-					2DTBC1:88(T)	1RED	
90GRS05AP001-STP DDCMIS	COMMAND START	COMMON COLLECTION SUMP PUMPS-5A					MCC		C128	8P,G	BHEL	CRB52	2DTBC3:01(T)	1BLUE	
													2DTBC3:02(T)	1RED	
	COMMAND STOP											CRB52	2DTBC3:03(T)	1GREY	
													2DTBC3:04(T)	1YELLOW	
	FDBK ON											CRB52	2DTBC2:51(T)	1GREEN	
													2DTBC2:52(T)	1BROWN	
	FDBK OFF											CRB52	2DTBC2:53(T)	1WHITE	
													2DTBC2:54(T)	1BLACK	
	MCC DISTBD											CRB52	2DTBC2:09(T)	2BLUE	
													2DTBC2:10(T)	2RED	
	MCC AVLBL											CRB52	2DTBC2:17(T)	2GREY	
													2DTBC2:18(T)	2YELLOW	
	EPB OPTD											CRB52	2DTBC2:07(T)	2GREEN	
													2DTBC2:08(T)	2BROWN	
	LSPB						LSPB	+	C129	2P,F		CRB52	2DTBC2:05(T)	1BLUE	
								-					2DTBC2:06(T)	1RED	
90GRS05AP002-STP DCMIS	COMMAND START	COMMON COLLECTION SUMP PUMPS-5B					MCC		C130	8P,G	BHEL	CRB52	2DTBC3:09(T)	1BLUE	
													2DTBC3:10(T)	1RED	
	COMMAND STOP											CRB52	2DTBC3:11(T)	1GREY	
													2DTBC3:12(T)	1YELLOW	
	FDBK ON											CRB52	2DTBC2:55(T)	1GREEN	
													2DTBC2:56(T)	1BROWN	
	FDBK OFF											CRB52	2DTBC2:57(T)	1WHITE	
													2DTBC2:58(T)	1BLACK	
	MCC DISTBD											CRB52	2DTBC2:23(T)	2BLUE	
													2DTBC2:24(T)	2RED	
	MCC AVLBL											CRB52	2DTBC2:25(T)	2GREY	
													2DTBC2:26(T)	2YELLOW	
	EPB OPTD											CRB52	2DTBC2:21(T)	2GREEN	
													2DTBC2:22(T)	2BROWN	
	LSPB						LSPB	+	C131	2P,F		CRB52	2DTBC2:19(T)	1BLUE	
								-					2DTBC2:20(T)	1RED	

CABLE INTERCONNECTION CABLED															
TAG NAME	DESCRIPTION	FIELD CABLE NO	FIELD CABLE CORE	FIELD CABLE TYPE	FIELD CODE	CORE COLOR	TO NODE MCC/LP	TO MCC/LP	TO NODE CABLE NAME	TO NODE CABLE TYPE	TO NODE CABLE CORE	DCS PNL	DCS	CORE COLOR	REMARK
90GRS06AP001-STP DDCMIS	COMMAND START	MBBR FEED PUMPS-6A					MCC		C132	8P,G	BHEL	CRB53	3DTBA3:01(T)	1BLUE	
													3DTBA3:02(T)	1RED	
	COMMAND STOP											CRB53	3DTBA3:03(T)	1GREY	
													3DTBA3:04(T)	1YELLOW	
	FDBK ON											CRB53	3DTBA2:21(T)	1GREEN	
													3DTBA2:22(T)	1BROWN	
	FDBK OFF											CRB53	3DTBA2:23(T)	1WHITE	
													3DTBA2:24(T)	1BLACK	
	MCC DISTBD											CRB53	3DTBA1:69(T)	2BLUE	
													3DTBA1:70(T)	2RED	
	MCC AVLBL											CRB53	3DTBA1:71(T)	2GREY	
													3DTBA1:72(T)	2YELLOW	
	EPB OPTD											CRB53	3DTBA1:67(T)	2GREEN	
													3DTBA1:68(T)	2BROWN	
	LSPB						LSPB	+	C133	2P,F		CRB53	3DTBA1:65(T)	1BLUE	
								-					3DTBA1:66(T)	1RED	
90GRS06AP002-STP DDCMIS	COMMAND START	MBBR FEED PUMPS-6B					MCC		C134	8P,G	BHEL	CRB53	3DTBA3:09(T)	1BLUE	
													3DTBA3:10(T)	1RED	
	COMMAND STOP											CRB53	3DTBA3:11(T)	1GREY	
													3DTBA3:12(T)	1YELLOW	
	FDBK ON											CRB53	3DTBA2:25(T)	1GREEN	
													3DTBA2:26(T)	1BROWN	
	FDBK OFF											CRB53	3DTBA2:27(T)	1WHITE	
													3DTBA2:28(T)	1BLACK	
	MCC DISTBD											CRB53	3DTBA1:85(T)	2BLUE	
													3DTBA1:86(T)	2RED	
	MCC AVLBL											CRB53	3DTBA1:87(T)	2GREY	
													3DTBA1:88(T)	2YELLOW	
	EPB OPTD											CRB53	3DTBA1:83(T)	2GREEN	
													3DTBA1:84(T)	2BROWN	
	LSPB						LSPB	+	C135	2P,F		CRB53	3DTBA1:81(T)	1BLUE	
								-					3DTBA1:82(T)	1RED	
90GRS08AP001-STP DDCMIS	COMMAND START	FILTER FEED PUMPS-7A					MCC		C136	8P,G	BHEL	CRB53	3DTBC2:73(T)	1BLUE	
													3DTBC2:74(T)	1RED	
	COMMAND STOP											CRB53	3DTBC2:75(T)	1GREY	
													3DTBC2:76(T)	1YELLOW	
	FDBK ON											CRB53	3DTBC2:33(T)	1GREEN	
													3DTBC2:34(T)	1BROWN	
	FDBK OFF											CRB53	3DTBC2:35(T)	1WHITE	
													3DTBC2:36(T)	1BLACK	
	MCC DISTBD											CRB53	3DTBC1:69(T)	2BLUE	
													3DTBC1:70(T)	2RED	
	MCC AVLBL											CRB53	3DTBC1:71(T)	2GREY	
													3DTBC1:72(T)	2YELLOW	
	EPB OPTD											CRB53	3DTBC1:67(T)	2GREEN	
													3DTBC1:68(T)	2BROWN	
	LSPB						LSPB	+	C137	2P,F		CRB53	3DTBC1:65(T)	1BLUE	
								-					3DTBC1:66(T)	1RED	
90GRS09AP001-STP DDCMIS	COMMAND START	FILTER FEED PUMPS-7B					MCC		C138	8P,G	BHEL	CRB53	3DTBC2:81(T)	1BLUE	
													3DTBC2:82(T)	1RED	
	COMMAND STOP											CRB53	3DTBC2:83(T)	1GREY	
													3DTBC2:84(T)	1YELLOW	
	FDBK ON											CRB53	3DTBC2:37(T)	1GREEN	
													3DTBC2:38(T)	1BROWN	
	FDBK OFF											CRB53	3DTBC2:39(T)	1WHITE	
													3DTBC2:40(T)	1BLACK	
	MCC DISTBD											CRB53	3DTBC1:81(T)	2BLUE	
													3DTBC1:82(T)	2RED	
	MCC AVLBL											CRB53	3DTBC1:83(T)	2GREY	
													3DTBC1:84(T)	2YELLOW	
	EPB OPTD											CRB53	3DTBC1:75(T)	2GREEN	
													3DTBC1:76(T)	2BROWN	
	LSPB						LSPB	+	C139	2P,F		CRB53	3DTBC1:73(T)	1BLUE	
								-					3DTBC1:74(T)	1RED	

CA□LE □N□E□CONNEC□ON □C□ED□LE																
□A□ NAME	**DE□C□P□ON**	**□ELD CA□LE NO**	**□ELD CA□LE □COPE**	**□ELD CA□LE □□PE**	**□ELD □DE □□**	**CO□E COLO□**	**□□ NO□MCC□L□P□ □□**	**□□□MCC□L□P□ □□**	**□□□N□ CA□LE N□M□E□**	**□□□N□ CA□LE □□PE**	**□□□N□ CA□LE □COPE**	**DC□ PNL**	**DC□ □□**	**CO□E COLO□**	**REMARK**
90GRS12AP001-STP DDCMIS	COMMAND START	TREATED WATER DISPOSAL PUMPS-8A					MCC		C140	8P,G	BHEL	CRB53	3DTBC3:01(T)	1BLUE	
													3DTBC3:02(T)	1RED	
	COMMAND STOP											CRB53	3DTBC3:03(T)	1GREY	
													3DTBC3:04(T)	1YELLOW	
	FDBK ON											CRB53	3DTBC2:53(T)	1GREEN	
													3DTBC2:54(T)	1BROWN	
	FDBK OFF											CRB53	3DTBC2:55(T)	1WHITE	
													3DTBC2:56(T)	1BLACK	
	MCC DISTBD											CRB53	3DTBC1:89(T)	2BLUE	
													3DTBC1:90(T)	2RED	
	MCC AVLBL											CRB53	3DTBC1:91(T)	2GREY	
													3DTBC1:92(T)	2YELLOW	
	EPB OPTD											CRB53	3DTBC1:87(T)	2GREEN	
													3DTBC1:88(T)	2BROWN	
	LSPB						LSPB	+	C141	2P,F		CRB53	3DTBC1:85(T)	1BLUE	
								-					3DTBC1:86(T)	1RED	
90GRS13AP001-STP DDCMIS	COMMAND START	TREATED WATER DISPOSAL PUMPS-8B					MCC		C142	8P,G	BHEL	CRB53	3DTBC3:09(T)	1BLUE	
													3DTBC3:10(T)	1RED	
	COMMAND STOP											CRB53	3DTBC3:11(T)	1GREY	
													3DTBC3:12(T)	1YELLOW	
	FDBK ON											CRB53	3DTBC2:57(T)	1GREEN	
													3DTBC2:58(T)	1BROWN	
	FDBK OFF											CRB53	3DTBC2:59(T)	1WHITE	
													3DTBC2:60(T)	1BLACK	
	MCC DISTBD											CRB53	3DTBC2:05(T)	2BLUE	
													3DTBC2:06(T)	2RED	
	MCC AVLBL											CRB53	3DTBC2:07(T)	2GREY	
													3DTBC2:08(T)	2YELLOW	
	EPB OPTD											CRB53	3DTBC2:03(T)	2GREEN	
													3DTBC2:04(T)	2BROWN	
	LSPB						LSPB	+	C143	2P,F		CRB53	3DTBC2:01(T)	1BLUE	
								-					3DTBC2:02(T)	1RED	
90GRS15AP001-STP DDCMIS	COMMAND START	SLUDGE TRANSFER PUMPS-9A					MCC		C144	8P,G	BHEL	CRB54	4DTBA2:73(T)	1BLUE	
													4DTBA2:74(T)	1RED	
	COMMAND STOP											CRB54	4DTBA2:75(T)	1GREY	
													4DTBA2:76(T)	1YELLOW	
	FDBK ON											CRB54	4DTBA2:01(T)	1GREEN	
													4DTBA2:02(T)	1BROWN	
	FDBK OFF											CRB54	4DTBA2:03(T)	1WHITE	
													4DTBA2:04(T)	1BLACK	
	MCC DISTBD											CRB54	4DTBA1:69(T)	2BLUE	
													4DTBA1:70(T)	2RED	
	MCC AVLBL											CRB54	4DTBA1:71(T)	2GREY	
													4DTBA1:72(T)	2YELLOW	
	EPB OPTD											CRB54	4DTBA1:67(T)	2GREEN	
													4DTBA1:68(T)	2BROWN	
	LSPB						LSPB	+	C145	2P,F		CRB54	4DTBA1:65(T)	1BLUE	
								-					4DTBA1:66(T)	1RED	
90GRS15AP002-STP DDCMIS	COMMAND START	SLUDGE TRANSFER PUMPS-9B					MCC		C146	8P,G	BHEL	CRB54	4DTBA2:81(T)	1BLUE	
													4DTBA2:82(T)	1RED	
	COMMAND STOP											CRB54	4DTBA2:83(T)	1GREY	
													4DTBA2:84(T)	1YELLOW	
	FDBK ON											CRB54	4DTBA2:05(T)	1GREEN	
													4DTBA2:06(T)	1BROWN	
	FDBK OFF											CRB54	4DTBA2:07(T)	1WHITE	
													4DTBA2:08(T)	1BLACK	
	MCC DISTBD											CRB54	4DTBA1:81(T)	2BLUE	
													4DTBA1:82(T)	2RED	
	MCC AVLBL											CRB54	4DTBA1:83(T)	2GREY	
													4DTBA1:84(T)	2YELLOW	
	EPB OPTD											CRB54	4DTBA1:75(T)	2GREEN	
													4DTBA1:76(T)	2BROWN	
	LSPB						LSPB	+	C147	2P,F		CRB54	4DTBA1:73(T)	1BLUE	
								-					4DTBA1:74(T)	1RED	

CA□LE □N□E□CONNEC□□ON □C□□ED□LE																
□A□ NAME	**DE□C□□P□□ON**	**□□ELD CA□LE NO**	**□□ELD CA□LE □□COPE**	**□□ELD CA□LE □□PE**	**□□ELD □□DE □□**	**CO□□E COLO□**	**□□ NO□MCC□L□P□ □□**	**□□□MCC□L□P□ □□**	**□□□N□ CA□LE N□M□E□**	**□□□N□ CA□LE □□PE**	**□□□N□ CA□LE □COPE**	**DC□ PNL**	**DC□ □□**	**CO□E COLO□**	**REMARK**
90GRN01AP001-STP DDCMIS	COMMAND START	HYPO DOSING PUMPS-DP-01					MCC		C148	8P,G	BHEL	CRB51	1DTBC2:81(T)	1BLUE	
													1DTBC2:82(T)	1RED	
	COMMAND STOP											CRB51	1DTBC2:83(T)	1GREY	
													1DTBC2:84(T)	1YELLOW	
	FDBK ON											CRB51	1DTBC2:29(T)	1GREEN	
													1DTBC2:30(T)	1BROWN	
	FDBK OFF											CRB51	1DTBC2:31(T)	1WHITE	
													1DTBC2:32(T)	1BLACK	
	MCC DISTBD											CRB51	1DTBC1:75(T)	2BLUE	
													1DTBC1:76(T)	2RED	
	MCC AVLBL											CRB51	1DTBC1:77(T)	2GREY	
													1DTBC1:78(T)	2YELLOW	
	EPB OPTD											CRB51	1DTBC1:73(T)	2GREEN	
													1DTBC1:74(T)	2BROWN	
	LSPB						LSPB	+	C149	2P,F		CRB51	1DTBC1:65(T)	1BLUE	
								-					1DTBC1:66(T)	1RED	
90GRN02AP001-STP DDCMIS	COMMAND START	HYPO DOSING PUMPS-DP-02					MCC		C150	8P,G	BHEL	CRB51	1DTBC2:89(T)	1BLUE	
													1DTBC2:90(T)	1RED	
	COMMAND STOP											CRB51	1DTBC2:91(T)	1GREY	
													1DTBC2:92(T)	1YELLOW	
	FDBK ON											CRB51	1DTBC2:33(T)	1GREEN	
													1DTBC2:34(T)	1BROWN	
	FDBK OFF											CRB51	1DTBC2:41(T)	1WHITE	
													1DTBC2:42(T)	1BLACK	
	MCC DISTBD											CRB51	1DTBC1:89(T)	2BLUE	
													1DTBC1:90(T)	2RED	
	MCC AVLBL											CRB51	1DTBC1:91(T)	2GREY	
													1DTBC1:92(T)	2YELLOW	
	EPB OPTD											CRB51	1DTBC1:81(T)	2GREEN	
													1DTBC1:82(T)	2BROWN	
	LSPB						LSPB	+	C151	2P,F		CRB51	1DTBC1:79(T)	1BLUE	
								-					1DTBC1:80(T)	1RED	
90GRN03AP001-STP DDCMIS	COMMAND START	DWPE DOSING PUMPS-DP-03					MCC		C152	8P,G	BHEL	CRB51	1DTBC3:09(T)	1BLUE	
													1DTBC3:10(T)	1RED	
	COMMAND STOP											CRB51	1DTBC3:11(T)	1GREY	
													1DTBC3:12(T)	1YELLOW	
	FDBK ON											CRB51	1DTBC2:47(T)	1GREEN	
													1DTBC2:48(T)	1BROWN	
	FDBK OFF											CRB51	1DTBC2:49(T)	1WHITE	
													1DTBC2:50(T)	1BLACK	
	MCC DISTBD											CRB51	1DTBC2:15(T)	2BLUE	
													1DTBC2:16(T)	2RED	
	MCC AVLBL											CRB51	1DTBC2:17(T)	2GREY	
													1DTBC2:18(T)	2YELLOW	
	EPB OPTD											CRB51	1DTBC2:13(T)	2GREEN	
													1DTBC2:14(T)	2BROWN	
	LSPB						LSPB	+	C153	2P,F		CRB51	1DTBC2:11(T)	1BLUE	
								-					1DTBC2:12(T)	1RED	
90GRC01AN001-STP DDCMIS	COMMAND START	AIR BLOWERS FOR COMMON SUMP, EQT & ST-B-01A					MCC		C154	8P,G	BHEL	CRB51	1DTBA2:65(T)	1BLUE	
													1DTBA2:66(T)	1RED	
	COMMAND STOP											CRB51	1DTBA2:67(T)	1GREY	
													1DTBA2:68(T)	1YELLOW	
	FDBK ON											CRB51	1DTBA2:17(T)	1GREEN	
													1DTBA2:18(T)	1BROWN	
	FDBK OFF											CRB51	1DTBA2:19(T)	1WHITE	
													1DTBA2:20(T)	1BLACK	
	MCC DISTBD											CRB51	1DTBA1:53(T)	2BLUE	
													1DTBA1:54(T)	2RED	
	MCC AVLBL											CRB51	1DTBA1:55(T)	2GREY	
													1DTBA1:56(T)	2YELLOW	
	EPB OPTD											CRB51	1DTBA1:51(T)	2GREEN	
													1DTBA1:52(T)	2BROWN	
	LSPB						LSPB	+	C155	2P,F		CRB51	1DTBA1:49(T)	1BLUE	
								-					1DTBA1:50(T)	1RED	

CA□LE □N□E□CONNEC□□ON □C□□ED□LE															
□A□ NAME	**DE□C□□P□□ON**	**□□ELD CA□LE NO**	**□□ELD CA□LE □□COPE**	**□□ELD CA□LE □□PE**	**□□ELD □□DE □□**	**CO□□E COLO□**	**□□ NO□MCC□L□P□ □□**	**□□□MCC□L□P□ □□**	**□□□N□ CA□LE N□M□E□**	**□□□N□ CA□LE □□PE**	**□□□N□ CA□LE □□COPE**	**DC□ PNL**	**DC□ □□**	**CO□E COLO□**	**REMARK**
90GRC01AN002-STP DDCMIS	COMMAND START	AIR BLOWERS FOR COMMON SUMP, EQT & ST-B-01B					MCC		C156	8P,G	BHEL	CRB51	1DTBA2:73(T)	1BLUE	
													1DTBA2:74(T)	1RED	
	COMMAND STOP											CRB51	1DTBA2:75(T)	1GREY	
													1DTBA2:76(T)	1YELLOW	
	FDBK ON											CRB51	1DTBA2:21(T)	1GREEN	
													1DTBA2:22(T)	1BROWN	
	FDBK OFF											CRB51	1DTBA2:23(T)	1WHITE	
													1DTBA2:24(T)	1BLACK	
	MCC DISTBD											CRB51	1DTBA1:67(T)	2BLUE	
													1DTBA1:68(T)	2RED	
	MCC AVLBL											CRB51	1DTBA1:69(T)	2GREY	
													1DTBA1:70(T)	2YELLOW	
	EPB OPTD											CRB51	1DTBA1:65(T)	2GREEN	
													1DTBA1:66(T)	2BROWN	
	LSPB						LSPB	+	C157	2P,F		CRB51	1DTBA1:57(T)	1BLUE	
								-					1DTBA1:58(T)	1RED	
90GRC02AN001-STP DDCMIS	COMMAND START	AIR BLOWERS FOR MBBR AERATION TANK-B-02A					MCC		C158	8P,G	BHEL	CRB51	1DTBA2:81(T)	1BLUE	
													1DTBA2:82(T)	1RED	
	COMMAND STOP											CRB51	1DTBA2:83(T)	1GREY	
													1DTBA2:84(T)	1YELLOW	
	FDBK ON											CRB51	1DTBA2:25(T)	1GREEN	
													1DTBA2:26(T)	1BROWN	
	FDBK OFF											CRB51	1DTBA2:33(T)	1WHITE	
													1DTBA2:34(T)	1BLACK	
	MCC DISTBD											CRB51	1DTBA1:81(T)	2BLUE	
													1DTBA1:82(T)	2RED	
	MCC AVLBL											CRB51	1DTBA1:83(T)	2GREY	
													1DTBA1:84(T)	2YELLOW	
	EPB OPTD											CRB51	1DTBA1:73(T)	2GREEN	
													1DTBA1:74(T)	2BROWN	
	LSPB						LSPB	+	C159	2P,F		CRB51	1DTBA1:71(T)	1BLUE	
								-					1DTBA1:72(T)	1RED	
90GRC02AN002-STP DDCMIS	COMMAND START	AIR BLOWERS FOR MBBR AERATION TANKB-02B					MCC		C160	8P,G	BHEL	CRB51	1DTBA2:89(T)	1BLUE	
													1DTBA2:90(T)	1RED	
	COMMAND STOP											CRB51	1DTBA2:91(T)	1GREY	
													1DTBA2:92(T)	1YELLOW	
	FDBK ON											CRB51	1DTBA2:35(T)	1GREEN	
													1DTBA2:36(T)	1BROWN	
	FDBK OFF											CRB51	1DTBA2:37(T)	1WHITE	
													1DTBA2:38(T)	1BLACK	
	MCC DISTBD											CRB51	1DTBA1:89(T)	2BLUE	
													1DTBA1:90(T)	2RED	
	MCC AVLBL											CRB51	1DTBA2:01(T)	2GREY	
													1DTBA2:02(T)	2YELLOW	
	EPB OPTD											CRB51	1DTBA1:87(T)	2GREEN	
													1DTBA1:88(T)	2BROWN	
	LSPB						LSPB	+	C161	2P,F		CRB51	1DTBA1:85(T)	1BLUE	
								-					1DTBA1:86(T)	1RED	
90GRN03AM001-STP DDCMIS	COMMAND START	POLYELECTROLYTE DOSING TANK AGITATOR					MCC		C162	8P,G	BHEL	CRB51	1DTBC3:01(T)	1BLUE	
													1DTBC3:02(T)	1RED	
	COMMAND STOP											CRB51	1DTBC3:03(T)	1GREY	
													1DTBC3:04(T)	1YELLOW	
	FDBK ON											CRB51	1DTBC2:43(T)	1GREEN	
													1DTBC2:44(T)	1BROWN	
	FDBK OFF											CRB51	1DTBC2:45(T)	1WHITE	
													1DTBC2:46(T)	1BLACK	
	MCC DISTBD											CRB51	1DTBC2:01(T)	2BLUE	
													1DTBC2:02(T)	2RED	
	MCC AVLBL											CRB51	1DTBC2:09(T)	2GREY	
													1DTBC2:10(T)	2YELLOW	
	EPB OPTD											CRB51	1DTBC1:95(T)	2GREEN	
													1DTBC1:96(T)	2BROWN	
	LSPB						LSPB	+	C163	2P,F		CRB51	1DTBC1:93(T)	1BLUE	
								-					1DTBC1:94(T)	1RED	

CA□LE □N□E□CONNEC□□ON □C□□ED□LE																
□A□ NAME	**DE□C□□P□□ON**	**□□ELD CA□LE NO**	**□□ELD CA□LE □COPE**	**□□ELD CA□LE □□PE**	**□□ELD □□DE □□**	**CO□E COLO□**	**□□ NO□MCC□L□P□ □□**	**□□□MCC□L□P□ □□**	**□□□N□ CA□LE N□M□E□**	**□□□N□ CA□LE □□PE**	**□□□N□ CA□LE □COPE**	**DC□ PNL**	**DC□ □□**	**CO□E COLO□**	**REMARK**
90GRN01AM001-STP DDCMIS	COMMAND START	NAOCL DOSING TANK-1 AGITATOR					MCC		C164	8P,G	BHEL	CRB51	1DTBA3:01(T)	1BLUE	
													1DTBA3:02(T)	1RED	
	COMMAND STOP											CRB51	1DTBA3:03(T)	1GREY	
													1DTBA3:04(T)	1YELLOW	
	FDBK ON											CRB51	1DTBA2:39(T)	1GREEN	
													1DTBA2:40(T)	1BROWN	
	FDBK OFF											CRB51	1DTBA2:41(T)	1WHITE	
													1DTBA2:42(T)	1BLACK	
	MCC DISTBD											CRB51	1DTBA2:07(T)	2BLUE	
													1DTBA2:08(T)	2RED	
	MCC AVLBL											CRB51	1DTBA2:09(T)	2GREY	
													1DTBA2:10(T)	2YELLOW	
	EPB OPTD											CRB51	1DTBA2:05(T)	2GREEN	
													1DTBA2:06(T)	2BROWN	
	LSPB						LSPB	+	C165	2P,F		CRB51	1DTBA2:03(T)	1BLUE	
								-					1DTBA2:04(T)	1RED	
90GRN02AM001-STP DDCMIS	COMMAND START	NAOCL DOSING TANK-2 AGITATOR					MCC		C166	8P,G	BHEL	CRB51	1DTBC2:73(T)	1BLUE	
													1DTBC2:74(T)	1RED	
	COMMAND STOP											CRB51	1DTBC2:75(T)	1GREY	
													1DTBC2:76(T)	1YELLOW	
	FDBK ON											CRB51	1DTBC2:25(T)	1GREEN	
													1DTBC2:26(T)	1BROWN	
	FDBK OFF											CRB51	1DTBC2:27(T)	1WHITE	
													1DTBC2:28(T)	1BLACK	
	MCC DISTBD											CRB51	1DTBC1:61(T)	2BLUE	
													1DTBC1:62(T)	2RED	
	MCC AVLBL											CRB51	1DTBC1:63(T)	2GREY	
													1DTBC1:64(T)	2YELLOW	
	EPB OPTD											CRB51	1DTBC1:59(T)	2GREEN	
													1DTBC1:60(T)	2BROWN	
	LSPB							+				CRB51	1DTBC1:57(T)	1BLUE	
							LSPB	-	C167	2P,F			1DTBC1:58(T)	1RED	
90GRS16AP001	COMMAND START	CENTRIFUGE MOTOR					MCC		C168	8P,G	BHEL	CRB54	4DTBA2:89(T)	1BLUE	
													4DTBA2:90(T)	1RED	
	COMMAND STOP											CRB54	4DTBA2:91(T)	1GREY	
													4DTBA2:92(T)	1YELLOW	
	FDBK ON											CRB54	4DTBA2:09(T)	1GREEN	
													4DTBA2:10(T)	1BROWN	
	FDBK OFF											CRB54	4DTBA2:11(T)	1WHITE	
													4DTBA2:12(T)	1BLACK	
	MCC DISTBD											CRB54	4DTBA1:89(T)	2BLUE	
													4DTBA1:90(T)	2RED	
	MCC AVLBL											CRB54	4DTBA1:91(T)	2GREY	
													4DTBA1:92(T)	2YELLOW	
	EPB OPTD											CRB54	4DTBA1:87(T)	2GREEN	
													4DTBA1:88(T)	2BROWN	
	LSPB						LSPB	+	C169	2P,F		CRB54	4DTBA1:85(T)	1BLUE	
								-					4DTBA1:86(T)	1RED	

APPROVED

1	16.05.19	FOR INFORMATION	RSJ	GSR	KP
0–B	05.09.18	FOR INFORMATION	RSJ	GSR	KP
0–A	16.05.18	FOR INFORMATION	RSJ	GSR	KP
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
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

ELECTRICAL LOAD DATA FOR SEWAGE TREATMENT PLANT

	NAME	SIGN	DATE
PREP	RSJ		16.05.2019
CHKD	GSR		16.05.2019
APPD	KP		16.05.2019

DEPT.							CARD CODE	BHEL DOC NO. PE–V0–412–673–A019 REV
SIGN				N.A.				PEL DOC NO. ––––––––––––––––––– 1
DATE							–	NO. OF SHEETS – 2 (EXCLUDING COVER SHEET)

PROJECT NAME:	**2X660 MW ENNORE SEZ**
CLIENT	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LTD.**
CONSULTANT	**DESEIN PVT. LTD, NEW DELHI**
EPC CONTRACTOR	**BHEL (BHARAT HEAVY ELECTRICALS LTD.)**
TITLE	**ELECTRICAL LOAD LIST**
DOCUMENT NO.(BHEL)	**PE-V0-412-673-A019**
DATE OF DOCUMENT RECEIPT	**05-01-2019**
DATE OF REVISED COMMENTS	**16-05-2019**

COMMENTS RESPONSE SHEET

Sr.No	COMMENTS / OBSERVATIONS	RESOLUTION / ACTION
1	Please fill in all data indicated as DDE.	Noted & revised the document as per comment. Please note that columns 13 to 19 are removed from this document, as the relevant related details shall be submitted in STP-MCC GA and SLD by BHEL-EPD.

SR.No	LOAD TITLE	RATING(KW/A)		UNIT(U) / STN(S)	NO.S		VOLTAGE CODE*	FEEDER CODE**	EMER.LOAD(Y)	CONT.(C) / INTT.(I)	STARTING TIME > 5 SECS(Y)	LOCATION	VERIFICATION FROM MOTOR DATASHEET (Y/N)	KKS NO.
		NAME PLATE	MAX CONT. DEMAND (MCR)		RUNNING	STANDBY								
	1	2	3	4	5	6	7	8	9	10	11	12	20	21
1	Sewage tranfer pump for S-1 sump	7.50	5.50	U	1	1	D	U	N/A	I	Y	Sewage sump (S-1)	Y	90GRS01 AP001 / 90GRS01 AP002
2	Sewage tranfer pump for S-2 sump	9.30	7.50	U	1	1	D	U	N/A	I	Y	Sewage sump (S-2)	Y	90GRS02 AP001 / 90GRS02 AP002
3	Sewage tranfer pump for S-3 sump	5.50	3.70	U	1	1	D	U	N/A	I	Y	Sewage sump (S-3)	Y	90GRS03 AP001 / 90GRS03 AP002
4	Sewage tranfer pump for S-4 sump	5.50	3.70	U	1	1	D	U	N/A	I	Y	Sewage sump (S-4)	Y	90GRS04 AP001 / 90GRS04 AP002
5	Common collection sump pump	1.10	0.75	U	1	1	D	U	N/A	C	Y	STP area	Y	90GRS05 AP001 / 90GRS05 AP002
6	MBBR feed pump	1.10	0.75	U	1	1	D	U	N/A	C	Y	STP area	Y	90GRS06 AP001 / 90GRS06 AP002
7	Filter feed pump	2.20	1.50	U	1	1	D	U	N/A	C	Y	STP area	Y	90GRS08 AP001 / 90GRS09 AP001
8	Treated water disposal pump	1.10	0.75	U	1	1	D	U	N/A	C	Y	STP area	Y	90GRS12 AP001 / 90GRS13 AP001
9	Sludge transfer pump	1.50	1.10	U	1	1	D	U	N/A	I	Y	STP area	Y	90GRS15 AP001 / 90GRS15 AP002
10	Hypo dosing pump	0.37	0.25	U	1	0	E	U	N/A	C	Y	STP area	Y	-
11	Hypo dosing pump	0.37	0.25	U	1	0	E	U	N/A	C	Y	STP area	Y	-
12	DWPE dosing pump	0.37	0.25	U	1	0	D	U	N/A	C	Y	STP area	Y	-
13	Agitator for hypo dosing tank	0.37	0.25	U	1	0	D	U	N/A	I	Y	STP area	Y	90GRN01 AM001
14	Agitator for hypo dosing tank	0.37	0.25	U	1	0	D	U	N/A	I	Y	STP area	Y	90GRN02 AM001
15	Agitator DWPE dosing tank	0.37	0.25	U	1	0	D	U	N/A	C	Y	STP area	Y	90GRN03 AM001
16	Air blower for common sump, equalization tank & sludge sump	2.20	1.50	U	1	1	D	U	N/A	C	Y	STP area	Y	90GRC01 AN001 / 90GRC01 AN002
17	Air blower for MBBR aeration tank	2.20	1.50	U	1	1	D	U	N/A	C	Y	STP area	Y	90GRC02 AN001 / 90GRC02 AN001
18	Centrifuge	7.50	5.50	U	1	0	D	U	N/A	I	Y	STP area	Y	-
19	Misc	0.55	0.37	U	1	1	D	U	N/A	C	Y	STP area	Y	-

1 . Columns 1 to 12 & 18 shall be filled by requistner (originating agency), remaining columns are to be filled up by PEM (electrical)

2. Abbreviations :

* Voltage code (7) : (ac) A = 11 kV, B = 6.6 kV, C = 3.3 kV, D = 415 V, E = 240 V (1 PH), F = 110 V
(dc) G = 220 V, H = 110 V, J = 48 V, K = +24 V, L = -24 V

**FEEDER CODE (8) : U = Unidirectional starter, B = Bi-Directional starter, S = Supply feeder, D = Supply feeder (Contractor controlled)

LOAD DATA (ELECTRICAL)	JOB NO	412	ORIGINATING AGENCY		PEM (ELECTRICAL)	
	PROJECT TITLE	2 X 660 MW ENNORE SEZ	NAME	RSJ	DATA FILLED UP ON	16-05-2019
	SYSTEM	SEWAGE TREATMENT PLANT	SIGN		DATA ENTERED ON	16-05-2019
	DEPTT/SECTION	DESIGN & DETAILING ENGINEERING / ELECTRICAL	SHEET 1 OF 1	REV 1	DE'S SIGN & DATE	

Replies to Customer Comments on: Valve Schedule Sewage Treatment Plant, (Doc No. PE-V0-412-673-A021)

APPROVED

S.No.	Comments dtd 07.12.18	BHEL Reply dtd 27.3.19	Comments
1	Indicate MOC of Valves	Noted and incorporated	
2	Please note that piping material has changed. Update the schedule accordingly.	Noted and incorporated	

REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
01	26. 03. 2019	FOR APPROVAL	SHIV	SSY	PAK

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

VALVE SCHEDULE FOR
FOR SEWAGE TREATMENT PLANT

	NAME	SIGN	DATE
PREP	SHIV		26.03.2019
CHKD	SSY		26.03.2019
APPD	PAK		26.03.2019

DEPT.							CARD CODE	BHEL DOC NO.	REV
SIGN				N.A.			–	PE-V0-412-673-A021	
DATE								PEL DOC NO. ----------	01
								NO. OF SHEETS – 05 (EXCLUDING COVER SHEET)	

PENNAR ENVIRO
Water, Environment & Energy

OWNER :	2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI	**DATE :**	26/03/2019
CUSTOMER :	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED.	**REV :**	01
OWNER CONSULTANT :	DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI.	**JOB No. :**	1037
EPC CONTRACTOR :	BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA.	**PEL/D & D- F 002**	
BHEL DOCUMENT No. :	PE-V0-412-673-A021 **PEL DOCUMENT No.:** A3-PEL-1037-VS-01		

Title: Valve Schedule Sewage Treatment plant

REF. P&ID NO. & REV.	UNIT TAG NO.	VALVE TAG NO.	SERVICE / DESCRIPTION	PIPING CLASS	SIZE NB	QTY. NO.	MODE OF OPRN.	VALVE TYPE	MOC	END CONNECTION	VALVE RATING	LINE PR. IN KG/CM2
PEL-1217037-PRO-PID-001-R1	GRS01-AP001/AP002	V-101/V-103	DISCHARGE	UPVC	50	2	Self	NRV	BODY & BALL: UPVC, Seat: EPDM	True union socket end	PN10	5.9
PEL-1217037-PRO-PID-001	GRS01-AP001/AP002	V-304/V-305	PG ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	5.9
PEL-1217037-PRO-PID-001	GRS01-AP001/AP002	V-102/V-104	DISCHARGE LINE	UPVC	50	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	5.9
PEL-1217037-PRO-PID-001	S-01	V-105	RECIRCULATION LINE	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	5.9
PEL-1217037-PRO-PID-001	GRS01-AP001/AP002	V-306,V-307	PT ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	5.9
PEL-1217037-PRO-PID-001	GRS01-AP001/AP002	V-106	DISCHARGE HEADER	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	5.9
PEL-1217037-PRO-PID-001	GRS02-AP001/AP002	V-107/V-109	DISCHARGE	UPVC	50	2	Self	NRV	BODY & BALL: UPVC, Seat: EPDM	True union socket end	PN10	7.5
PEL-1217037-PRO-PID-001	GRS02-AP001/AP002	V-311/V-312	PG ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	7.5
PEL-1217037-PRO-PID-001	GRS02-AP001/AP002	V-108/V-110	DISCHARGE LINE	UPVC	50	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	7.5
PEL-1217037-PRO-PID-001	S-02	V-111	RECIRCULATION LINE	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	7.5
PEL-1217037-PRO-PID-001	GRS02-AP001/AP002	V-313,V-314	PT ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	7.5
PEL-1217037-PRO-PID-001	GRS02-AP001/AP002	V-112	DISCHARGE HEADER	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	7.5
PEL-1217037-PRO-PID-001	GRS03-AP001/AP002	V-113/V-115	DISCHARGE	UPVC	50	2	Self	NRV	BODY & BALL: UPVC, Seat: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	GRS03-AP001	V-318	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	GRS03-AP002	V-319	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	GRS03-AP001/AP002	V-114/V-116	DISCHARGE LINE	UPVC	50	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	4.5
PEL-1217037-PRO-PID-001	S-03	V-117	RECIRCULATION LINE	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	4.5
PEL-1217037-PRO-PID-001	GRS03-AP001/AP002	V-320,V-321	PT ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	GRS03-AP001/AP002	V-118	DISCHARGE HEADER	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	4.5
PEL-1217037-PRO-PID-001	GRS04-AP001/AP002	V-119/V-121	DISCHARGE	UPVC	50	2	Self	NRV	BODY & BALL: UPVC, Seat: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	GRS04-AP001	V-325	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	4.5

REF. P&ID NO. & REV.	UNIT TAG NO.	VALVE TAG NO.	SERVICE / DESCRIPTION	PIPING CLASS	SIZE NB	QTY. NO.	MODE OF OPRN.	VALVE TYPE	MOC	END CONNECTION	VALVE RATING	LINE PR. IN KG/CM2
PEL-1217037-PRO-PID-001	GRS04-AP002	V-326	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	GRS04-AP001/AP002	V-120/V-122	DISCHARGE LINE	UPVC	50	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	4.5
PEL-1217037-PRO-PID-001	S-04	V-123	RECIRCULATION LINE	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	4.5
PEL-1217037-PRO-PID-001	GRS04-AP001/AP002	V-327,V-328	PT ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	GRS04-AP001/AP002	V-124	DISCHARGE HEADER	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	4.5
PEL-1217037-PRO-PID-001	GRS05-AP001/AP002	V-125/V-127	DISCHARGE	UPVC	50	2	Self	NRV	BODY & BALL: UPVC, Seat: EPDM	True union socket end	PN10	1.2
PEL-1217037-PRO-PID-001	GRS05-AP001	V-332	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	1.2
PEL-1217037-PRO-PID-001	GRS05-AP002	V-333	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	1.2
PEL-1217037-PRO-PID-001	GRS05-AP001/AP002	V-126/V-128	DISCHARGE LINE	UPVC	50	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	1.2
PEL-1217037-PRO-PID-001	CCS	V-129	RECIRCULATION LINE	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	1.2
PEL-1217037-PRO-PID-001	GRS05-AP001/AP002	V-334,V-335	PT ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	1.2
PEL-1217037-PRO-PID-001	GRS05-AP001/AP002	V-130	DISCHARGE HEADER	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	1.2
PEL-1217037-PRO-PID-001	GRS06-AP001/AP002	V-131/V-133	DISCHARGE	UPVC	50	2	Self	NRV	BODY & BALL: UPVC, Seat: EPDM	True union socket end	PN10	1.2
PEL-1217037-PRO-PID-001	GRS06-AP001	V-339	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	1.2
PEL-1217037-PRO-PID-001	GRS06-AP002	V-340	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	1.2
PEL-1217037-PRO-PID-001	GRS06-AP001/AP002	V-132/V-134	DISCHARGE LINE	UPVC	50	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	1.2
PEL-1217037-PRO-PID-001	EQT	V-135	RECIRCULATION LINE	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	1.2
PEL-1217037-PRO-PID-001	GRS06-AP001/AP002	V-341,V-342	PT ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	1.2
PEL-1217037-PRO-PID-001	GRS06-AP001/AP002	V-136	DISCHARGE HEADER	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	1.2
PEL-1217037-PRO-PID-001	MBBR	V-227	SLUDGE LINE	UPVC	80	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	ATM
PEL-1217037-PRO-PID-001	GRCO1-AN001/AN002	V-139/V-142	DISCHARGE LINE	GI	40	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	0.4
PEL-1217037-PRO-PID-001	GRCO1-AN001/AN002	V-143	DISCHARGE HEADER	GI	40	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	0.4
PEL-1217037-PRO-PID-001	GRCO1-AN001/AN002	V-349,V-350	PG ISOLATION	GI	15	2	MANUAL	BALL VALVE	Body: CI/CS, Ball: SS304, Seat: PTFE	Screwed NPT (F)	150#	0.4
PEL-1217037-PRO-PID-001	GRCO1-AN001/AN002	V-144	AIR RELEASE	GI	15	1	MANUAL	BALL VALVE	Body: CI/CS, Ball: SS304, Seat: PTFE	Screwed NPT (F)	150#	0.4
PEL-1217037-PRO-PID-001	GRCO1-AN001/AN002	V-351,352	PT ISOLATION	GI	15	2	MANUAL	BALL VALVE	Body: CI/CS, Ball: SS304, Seat: PTFE	Screwed NPT (F)	150#	0.4
PEL-1217037-PRO-PID-001	GRCO1-AN001/AN002	V-145	AIR LINE FOR CCS	GI	15	1	MANUAL	BALL VALVE	Body: CI/CS, Ball: SS304, Seat: PTFE	Screwed NPT (F)	150#	0.4
PEL-1217037-PRO-PID-001	GRCO1-AN001/AN002	V-146	AIR LINE FOR EQT	GI	40	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	0.4
PEL-1217037-PRO-PID-001	GRCO1-AN001/AN002	V-147	AIR LINE FOR SHT	GI	15	1	MANUAL	BALL VALVE	Body: CI/CS, Ball: SS304, Seat: PTFE	Screwed NPT (F)	150#	0.4

REF. P&ID NO. & REV.	UNIT TAG NO.	VALVE TAG NO.	SERVICE / DESCRIPTION	PIPING CLASS	SIZE NB	QTY. NO.	MODE OF OPRN.	VALVE TYPE	MOC	END CONNECTION	VALVE RATING	LINE PR. IN KG/CM2
PEL-1217037-PRO-PID-001	GRCO2-AN001/AN002	V-150/V-153	DISCHARGE LINE	GI	40	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	0.5
PEL-1217037-PRO-PID-001	GRCO2-AN001/AN002	V-154	DISCHARGE HEADER	GI	40	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	0.5
PEL-1217037-PRO-PID-001	GRCO2-AN001/AN002	V-359,V-360	PG ISOLATION	GI	15	2	MANUAL	BALL VALVE	Body: CI/CS, Ball: SS304, Seat: PTFE	Screwed NPT (F)	150#	0.5
PEL-1217037-PRO-PID-001	GRCO2-AN001/AN002	V-155	AIR RELEASE	GI	15	1	MANUAL	BALL VALVE	Body: CI/CS, Ball: SS304, Seat: PTFE	Screwed NPT (F)	150#	0.5
PEL-1217037-PRO-PID-001	GRCO2-AN001/AN002	V-361,V-362	PT ISOLATION	GI	15	2	MANUAL	BALL VALVE	Body: CI/CS, Ball: SS304, Seat: PTFE	Screwed NPT (F)	150#	0.5
PEL-1217037-PRO-PID-001	TST	V-156	SLUDGE LINE	UPVC	80	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	ATM
PEL-1217037-PRO-PID-001	GRS15-AP001/AP002	V-187/V-189	DISCHARGE	UPVC	25	2	Self	NRV	BODY & BALL: UPVC, Seat: EPDM	True union socket end	PN10	2.9
PEL-1217037-PRO-PID-001	GRS15-AP001/AP002	V-389/V-390	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	2.9
PEL-1217037-PRO-PID-001	GRS15-AP001/AP002	V-188/V-190	DISCHARGE LINE	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	2.9
PEL-1217037-PRO-PID-001	GRS15-AP001/AP002	V-191/V-226	RECIRCULATION LINE	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	2.9
PEL-1217037-PRO-PID-001	GRS15-AP001/AP002	V-391/V-392	PT ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	2.9
PEL-1217037-PRO-PID-001	GRS15-AP001/AP002	V-192	DISCHARGE HEADER	UPVC	25	1	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	2.9
PEL-1217037-PRO-PID-001	HCT/FFT	V-221	DRAIN LINE	UPVC	50	1	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	ATM
PEL-1217037-PRO-PID-001	GRS08-AP001/AP002	V-157/V-159	SUCTION LINE	UPVC	50	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	3.5
PEL-1217037-PRO-PID-001	GRS08-AP001/AP002	V-161/V-163	DISCHARGE	UPVC	50	2	SELF	NRV	BODY & BALL: UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	GRS08-AP001	V-366	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	GRS08-AP002	V-367	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	GRS08-AP001/AP002	V-162/V-164	DISCHARGE LINE	UPVC	50	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	3.5
PEL-1217037-PRO-PID-001	GRS08-AP001/AP002	V-368,V-369	PT ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	GRS10AA201	GRS10 AA201	DISCHARGE HEADER	UPVC	50	1	DOUBLE ACTING	DIAPHRAGM VALVE	Body: CIRL, Diaphragm: EPDM/ Nitrile/ Neoprene	Flanged, ASME B 16.5, 150#, FF	PN10	3.5
PEL-1217037-PRO-PID-001	GRS10AA202	GRS10 AA202	INLET LINE	UPVC	50	1	DOUBLE ACTING	DIAPHRAGM VALVE	Body: CIRL, Diaphragm: EPDM/ Nitrile/ Neoprene	Flanged, ASME B 16.5, 150#, FF	PN10	3.5
PEL-1217037-PRO-PID-001	GRB01AA201/ GRB02AA201	GRB01/02 AA201	INLET	UPVC	50	2	DOUBLE ACTING	DIAPHRAGM VALVE	Body: CIRL, Diaphragm: EPDM/ Nitrile/ Neoprene	Flanged, ASME B 16.5, 150#, FF	PN10	3.5
PEL-1217037-PRO-PID-001	GRB01AA202/ GRB02AA202	GRB01/02 AA202	BACKWASH INLET	UPVC	50	2	DOUBLE ACTING	DIAPHRAGM VALVE	Body: CIRL, Diaphragm: EPDM/ Nitrile/ Neoprene	Flanged, ASME B 16.5, 150#, FF	PN10	3.5
PEL-1217037-PRO-PID-001	GRB01AA203/ GRB02AA203	GRB01/02 AA203	BACKWASH OUTLET	UPVC	50	2	DOUBLE ACTING	DIAPHRAGM VALVE	Body: CIRL, Diaphragm: EPDM/ Nitrile/ Neoprene	Flanged, ASME B 16.5, 150#, FF	PN10	3.5
PEL-1217037-PRO-PID-001	GRB01AA204/ GRB02AA204	GRB01/02 AA204	RINSE OUTLET	UPVC	50	2	DOUBLE ACTING	DIAPHRAGM VALVE	Body: CIRL, Diaphragm: EPDM/ Nitrile/ Neoprene	Flanged, ASME B 16.5, 150#, FF	PN10	3.5
PEL-1217037-PRO-PID-001	GRB01AA205/ GRB02AA205	GRB01/02 AA205	FRONTAL OUTLET	UPVC	50	2	DOUBLE ACTING	DIAPHRAGM VALVE	Body: CIRL, Diaphragm: EPDM/ Nitrile/ Neoprene	Flanged, ASME B 16.5, 150#, FF	PN10	3.5
PEL-1217037-PRO-PID-001	DMF/ACF	V-376/V-377 / V-384/V-385	PG ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	DMF/ACF	V-174/V-175 / V-186/V-185	SAMPLING VALVE	UPVC	15	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5

REF. P&ID NO. & REV.	UNIT TAG NO.	VALVE TAG NO.	SERVICE / DESCRIPTION	PIPING CLASS	SIZE NB	QTY. NO.	MODE OF OPRN.	VALVE TYPE	MOC	END CONNECTION	VALVE RATING	LINE PR. IN KG/CM2
PEL-1217037-PRO-PID-001	GRB01-CP001	V-372,V-373	DPT ISOLATION	UPVC	15	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	GRB01-CP002	V-374,V-375	DPT ISOLATION	UPVC	15	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	DMF	V-173	OUTLET MEDIA TRAP	UPVC	25	1	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	DMF	V-172	DRAIN MEDIA TRAP	UPVC	25	1	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	GRB01AA206/ GRB02AA206	GRB01/02 AA206	AIR RELEASE	UPVC	50	2	DOUBLE ACTING	DIAPHRAGM VALVE	Body: CIRL, Diaphragm: EPDM/ Nitrile/ Neoprene	Flanged, ASME B 16.5, 150#, FF	PN10	3.5
PEL-1217037-PRO-PID-001	GRB02-CP001	V-380,V-381	DPT ISOLATION	UPVC	15	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	GRB02-CP002	V-382,V-383	DPT ISOLATION	UPVC	15	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	ACF	V-184	OUTLET CARBON TRAP	UPVC	25	1	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	ACF	V-183	DRAIN CARBON TRAP	UPVC	25	1	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	3.5
PEL-1217037-PRO-PID-001	TWT	V-223	DRAIN LINE	UPVC	50	1	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	ATM
PEL-1217037-PRO-PID-001	GRS12/GRS13-AP001	V-203/V-205	SUCTION LINE	UPVC	50	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	2.0
PEL-1217037-PRO-PID-001	GRS12/GRS13-AP001	V-207/V-209	DISCHARGE	UPVC	50	2	SELF	NRV	BODY & BALL: UPVC, Seat: EPDM	True union socket end	PN10	2.0
PEL-1217037-PRO-PID-001	GRS12-AP001	V-416	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	2.0
PEL-1217037-PRO-PID-001	GRS13-AP001	V-417	PG ISOLATION	UPVC	25	2	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	2.0
PEL-1217037-PRO-PID-001	GRS12/GRS13-AP001	V-208/V-210	DISCHARGE LINE	UPVC	50	2	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	2.0
PEL-1217037-PRO-PID-001	GRS12/GRS13-AP001	V-418,V-419	PT ISOLATION	UPVC	25	4	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	2.0
PEL-1217037-PRO-PID-001	GRS12/GRS13-AP001	V-211	DISCHARGE HEADER	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	2.0
PEL-1217037-PRO-PID-001	SERVICE WATER	V-220	TO STP PLANT	UPVC	50	1	MANUAL	BUTTERFLY VALVE	BODY & DISC:CI, IS 210 FG 260 with 2% Ni & epoxy coated, Seat: Nitrile Rubber	Wafer lugged, Sandwitched between Flanged, ASME B16.5, 150#, FF	PN10	2.0
PEL-1217037-PRO-PID-001	INSTRUMENT AIR	V-212	TO STP PLANT	GI	25	1	AUTO	PRESSURE REGULATING VALVE	Body & Trim: A105 OR As per manufacturers standard	Screwed NPT (F)	150#	6.0
PEL-1217037-PRO-PID-001	INSTRUMENT AIR	V-424	PG ISOLATION	GI	15	1	MANUAL	BALL VALVE	Body: CI/CS, Ball: SS304, Seat: PTFE	Screwed NPT (F)	150#	6.0
PEL-1217037-PRO-PID-001	INSTRUMENT AIR	V-425	PT ISOLATION	GI	15	1	MANUAL	BALL VALVE	Body: CI/CS, Ball: SS304, Seat: PTFE	Screwed NPT (F)	150#	6.0
PEL-1217037-PRO-PID-001	INSTRUMENT AIR	V-219	TO STP	GI	25	1	SELF	NRV	Body & Trim: A105	Screwed NPT (F)	800#	6.0
PEL-1217037-PRO-PID-001	INSTRUMENT AIR	V-213,V-215,V-216,V-218,	CONTROL STATION	GI	25	4	MANUAL	GATE VALE	Body & Trim: A105	Screwed NPT (F)	800#	6.0
PEL-1217037-PRO-PID-001	INSTRUMENT AIR	V-214,V-217	CONTROL STATION	GI	25	2	MANUAL	PRESSURE REDUCING VALVE	Body & Trim: A105 OR As per manufacturers standard	Screwed NPT (F)	150#	6.0
PEL-1217037-PRO-PID-001	DP-01	V-194	SUCTION LINE	CPVC	15	1	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	2.0
PEL-1217037-PRO-PID-001	DP-01	V-428	RECIRCULATION LINE	CPVC	15	1	SELF	PRESSURE RELIEF VALVE	By Dosing pump vendor		150#	2.0
PEL-1217037-PRO-PID-001	GRN01-CP501	V-397,V-398	PG ISOLATION	CPVC	15	2	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	2.0
PEL-1217037-PRO-PID-001	DP-01	V-196	DISCHARGE	CPVC	15	1	SELF	NRV	Body & ball: CPVC, Seat: EPDM	True union socket end	PN10	2.0

REF. P&ID NO. & REV.	UNIT TAG NO.	VALVE TAG NO.	SERVICE / DESCRIPTION	PIPING CLASS	SIZE NB	QTY. NO.	MODE OF OPRN.	VALVE TYPE	MOC	END CONNECTION	VALVE RATING	LINE PR. IN KG/CM2
PEL-1217037-PRO-PID-001	DP-01	V-197	DISCHARGE LINE	CPVC	15	1	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	2.0
PEL-1217037-PRO-PID-001	GRN01-CP001	V-401,V-402	PT ISOLATION	CPVC	15	2	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	2.0
PEL-1217037-PRO-PID-001	GRN01-CP002	V-400,V-399	PT ISOLATION	CPVC	15	2	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	2.0
PEL-1217037-PRO-PID-001	DT-01	V-224	SERVICE WATER	UPVC	25	1	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	2.0
PEL-1217037-PRO-PID-001	GRN01-CL101	V-393,V-394	LG ISOLATION	CPVC	20	2	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	ATM
PEL-1217037-PRO-PID-001	DT-01	V-193	DRAIN LINE	CPVC	15	1	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	ATM
PEL-1217037-PRO-PID-001	DP-02	V-199	SUCTION LINE	CPVC	15	1	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	DP-02	V-429	RECIRCULATION LINE	CPVC	15	1	SELF	PRESSURE RELIEF VALVE	By Dosing pump vendor		150#	4.5
PEL-1217037-PRO-PID-001	GRN02-CP501	V-407,V-408	PG ISOLATION	CPVC	15	2	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	DP-02	V-201	DISCHARGE	CPVC	15	1	SELF	NRV	Body & ball: CPVC, Seat: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	DP-02	V-202	DISCHARGE LINE	CPVC	15	1	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	GRN02-CP001	V-409,V-410	PT ISOLATION	CPVC	15	2	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	GRN02-CP002	V-411,V-412	PT ISOLATION	CPVC	15	2	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	4.5
PEL-1217037-PRO-PID-001	DT-02	V-225	SERVICE WATER	UPVC	25	1	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	2.0
PEL-1217037-PRO-PID-001	GRN02-CL101	V-403,V-404	LG ISOLATION	CPVC	20	2	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	ATM
PEL-1217037-PRO-PID-001	DT-02	V-198	DRAIN LINE	CPVC	15	1	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	ATM
PEL-1217037-PRO-PID-001	DT-03	V-228	SERVICE WATER	UPVC	25	1	MANUAL	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	ATM
PEL-1217037-PRO-PID-001	GRN03-CL101	V-430,V-431	LG ISOLATION	CPVC	20	2	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	ATM
PEL-1217037-PRO-PID-001	DT-03	V-229	DRAIN LINE	CPVC	15	1	MANUAL	DIAPHRAGM VALVE	Body: CPVC, Diaphragm: EPDM	True union socket end	PN10	ATM
PEL-1217037-PRO-PID-001	-	V-234	SERVICE WATER FOR FLUSHING	UPVC	25	1	AUTO	BALL VALVE	Body & ball UPVC, Seat: EPDM	True union socket end	PN10	ATM

REV	DATE	ALTERED: AJP	REV	DATE	ALTERED
0	17.05.18	CHECKED: SSY	1	05.12.18	CHECKED

APPROVED

STATUS : CONTRACT

JOB NO.: 412

2X660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI

TAMILNADU GENERATION AND DISTRIBUTION CORP. LTD.(TANGEDCO)

CONSULTANT: DESEIN PVT LTD, NEW DELHI.

BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT,NOIDA

DEPT.	CODE	SCALE	WEIGHT(KG)	REF DRG.	ITEM
--	A	-	-	-	-

PAINTING SCHEDULE FOR SEWAGE TREATMENT PLANT

	NAME	SIGN	DATE
PREP	AJP		17.05.18
CHKD	SSY		17.05.18
APPD	PAK		17.05.18

DEPT.							CARD CODE	DRAWING NO.	REV
SIGN			N.A.				367	PE-VO-412-673-A023	1
DATE								NO. OF SHEETS 3 EXCLUDING COVER PAGE	

COMMENTS RESOLUTION SHEET			
PROJECT: 1X800 MW SUPERCRITICAL THERMAL POWER PROJECT			
BHEL DOC NO: PE-V0-411-673-A008			
PEL DOC NO: PEL-12171037-PRO-PC-002			
DOC NAME: HYDRAULIC FLOW DIAGRAM FOR STP			
S.No.	**BHEL's Comments Dt. 27.02.2017**	**PEL's Response**	
1	S. No. 1, External Painting of Steel Structures etc.shall be revised as follows 1. Abrasive blasting SA 2- ½ 2. Primer Coat Zinc Silicate (2 Coats) - each of DFT 50 Microns. 3. Final Paint - 2 Coats of High Building Epoxy (each of 90 DFT thickness). 4. Minimum Total DFT shall be 260 microns C19	Comment Noted & Incorporated	
2	S. No. 3 - External Painting of Outdoor Equipmentetc.shall be revised as follows 1. Abrasive blasting SA 2- ½ 2. Primer Coat Zinc Silicate (2 Coats) - each of DFT 50 Microns. 3. Final Paint - 2 Coats of High Building Epoxy (each of 90 DFT thickness). 4. Minimum Total DFT shall be 260 microns	Comment Noted & Incorporated	

PENNAR ENVIRO
Water, Environment & Energy

PAINTING SPECIFICATION

1	**External Painting** (For MS,Carbon steel & Low Alloy Steel Uninsulated) - Applicable to **Steel Structures Supports, walkways, platform, Handrails, ladder** etc Operating up to Temp. of 80 Deg. C.
1.1	Surface Preparation :- Abrasive Blasting as per SIS05-5900, Grade SA 2 1/2
1.2	Primer-Two coats of Zinc Silicate Primer,@ 50 Microns DFT/Coat
1.3	Finish coat :- Two coats of High Buld epoxy paint @ 90 Microns DFT/Coat
1.4	**Total DFT** = 260 Microns (Minimum)
2	**External Painting** (For MS,Carbon Steel & Low Alloy Steel Uninsulated) - Applicable to Indoor Equipment Such as **Pumps, Blower, Agitator, Motor, Fabricated Tanks, Valves, Electrical Equipments/Parts** etc Operating upto Temp. of 80 Deg. C.
2.1	Surface Preparation :- Abrasive Blasting as per SIS05-5900,Grade SA 2 1/2 ,1 coat of inorganic ethyl zinc silicate shop primer,DFT=25 microns (Minimum).
2.2	Primer-Two Layers of Zinc Phosphate Epoxy Primer,DFT=75 Microns
2.3	Finish coat:- Two coats of chlorinated Rubber Paint in approved shade @ 30-40 Microns DFT/Coat (60-80 Microns)
2.4	**Total DFT** = 160-180 Microns
Note - For Brought out items manufacturers standard specification can be accepted if the quality of this application system is corresponding with quality of the above mentioned system.	
3	**External Painting** (For MS,Carbon Steel & Low Alloy Steel Uninsulated) - Applicable to Outdoor Equipment Such as **Pumps, Blower, Agitator, Motor, Tanks, Fabricated Tanks, Valves, Electrical Equipments/Part**s etc Operating up to Temp. of 80 Deg. C.
3.1	Surface Preparation :- Abrasive Blasting as per SIS05-5900, Grade SA 2 1/2
3.2	Primer- Two Coats of Zinc Silicate Epoxy Primer, DFT= 50 Microns/ Coat
3.3	Finish Coat:- Two coats of high build epoxy @ 90 Microns DFT/Coat
3.4	**Total DFT** = 260 Microns Minimum
Note - For Brought out items manufacturers standard specification can be accepted if the quality of this application system is corresponding with quality of the above mentioned system.	
4	**Painting(For MS, carbon steel & low alloy steel-Un insulated) -** Applicable to Pipes & fittings & Operating up to Temp. of 80 Deg. C
4.1	**Buried Piping**
a.	**External Surfaces(wrapping as per IS 10221)**

PENNAR ENVIRO
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PAINTING SPECIFICATION

(i)	Surface Preparation :- Abrasive Blasting SA 2 1/2.
(ii)	Primer :- 2 Coats of Coal Tar Primer Compatible with Coal Tar Enamel Grade @ 35 Micron DFT/Coat (2 x 35 = 70 Microns)
(iii)	First coat of coal tar enamel with 2 mm min. thickness.
(iv)	First layer of inner wrapping with glass fiber tissue of 0.3 mm min. thickness
(v)	Final coat of coal tar enamel with 1 mm min. thickness
(v)	Outer wrap coal tar impregnated glass fiber with 0.7 mm min. thickness .
(vii)	Total thickness of coal tar enamel and wrapping shall be of 4.0 mm min. thickness.
	Note-Single spiral wrap of glass fiber tissues shall be applied overlapping at least 25 mm ensuring impregnation of glass fiber tissue in the first coat.
4.2	**Over ground Piping**
a.	**External Surfaces**
(i)	Surface Preparation :- Abrasive Blasting SA 2 1/2.
(ii)	Primer :- 2 Coats of Epoxy Primer @ 35 Micron DFT/Coat @ 35 Micron DFT/Coat (2 x 35 = 70 Microns)
(iii)	Finish paint :- 2 Coats of High Build Epoxy Paint @ 40 microns DFT/coat (2 x 40 = 80Microns)
(iv)	Total DFT = 150 Microns.

COLOUR SELECTION SCHEME

Sr. No.	Service	Recommended Colour	Colour Code (IS-5)	Colour (Band)
1.0	Steel Structures, Platforms, Ladders and Hand rails.	Dark Admiralty Grey	632	
2.0	Trolley & Hook	Crimson	540	
3.0	Blowers, Pumps, Agitators, Motors & etc.	Light Grey	631	
4.0	Valves	As per manufacturers std.		
5.0	**Tanks (Without Insulation & Cladding)**			
5.1	Outdoor	Aluminum	…	
6	**Piping**			
6.1	Air	Sky blue	101	
6.2	Sewage Water	Sea Green	217	

NOTES :-

1. Coating thickness indicated are minimum dry film thickness.

PENNAR ENVIRO
Water, Environment & Energy

PAINTING SPECIFICATION

2. Painting shall not be applicable for Non -ferrous materials, Austenitic stainless steel, Plastic and /or plastic coated materials & FRP/GRP

3. Shade colour of HDPE, CPVC,PVC (tanks, pipes & Valves) shall be as per manufacturers std.

APPROVED

INSPECTION CATEGORISATION PLAN
AND SUB VENDOR LIST

TAMIL NADU GENERATION AND DISTRIBUTION CORPORATION LIMITED

From
Er.K.SUBASH CHANDRA BOSE,M.E.,
Chief Engineer/Projects,
V Floor, Western Wing,
144, Anna Salai,
Chennai-600 002.
Fax No : 044- 28520878
Cell No: 9445857543
Email ID: cepr@tnebnet.org

To
Er.Perminder Singh, GM/PEM,
M/s. Bharat Heavy Electrical Limited,
Project Engineering Management
PPEI Building, HRDI & ESI Complex,
Plot No.25, Sector-16A, Noida-201301(U.P)
Fax : 0120-423522
E mail : pmgus@bhel.in,permindersingh@bhel.in,
vkumar@bhel.in,deveshverma@bhel.in,
pmgsalil@bhel.in, karuna.kaushik@bhel.in

Lr.No.CE/P/SE/E/T&H(P)/EE-6/E/P/AEE/M/F. Ennore SEZ Vendor Appl/D.597/18,dt 22.11.18

Sir,

Sub: TANGEDCO - Setting up of 2x660 MW Ennore SEZ Coal based super critical thermal power project at ash dyke of North Chennai Thermal Power Station (Kattupalli) – EPC cum Debt Finance Contract awarded to M/s.BHEL on 27.09.2014 - Inspection Categorisation approval sought by BHEL/PEM for " SEWAGE TREATMENT PLANT " - Approval accorded –Reg.

Ref:
1) Lr.No. CE/P/SE/M/P/EE-10/E/P/F.2x660 MW Ennore SEZ STPP/D.60/14,dt.27.09.2014
2) Your letter Ref: MS-1-13-E-0005 dated 27.09.2014.
3) Lr.No.CE/P/SE/E/T&H(P)/EE-6/E/P/F. 2X660 Ennore SEZ STPP/D. 115 /14,dt 19.12.14
4) BHEL/PEM Lr.No PEM-412-ENNORE-24/17 dated 29.05.2017 (Hard copy received on 31.05.17)
5) Lr.No.CE/P/SE/E/T&H(P)/EE-6/E/P/AEE/M/F. 2X660 Ennore SEZ STPP/D. 186 /17,dt 13.06.17.
6) Lr.No.CE/P/SE/E/T&H(P)/EE-6/E/P/AEE/M/F. 2X660 Ennore SEZ STPP/D. 227 /17,dt 07.07.17.
7) BHEL/PEM Lr.No PEM-412-ENNORE-30/17 dated 28.11.2017 (Hard copy received on 04.12.17)
8) Lr.No.CE/P/SE/E/T&H(P)/EE-6/E/P/AEE/M/F. 2X660 Ennore SEZ STPP/D. 227 /17,dt 07.07.17.
9) Your Lr No:PEM/PG-I/412//PMG/12 Dated 06.10.18
10) Lr.No.CE/P/SE/E/T&H(P)/EE-6/E/P/AEE/M/F. 2X660 Ennore SEZ STPP/D. 571 /17,dt 14.11.18.

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Please refer to the letters cited above.

The final order has been placed by M/s BHEL/PEM on the vendor M/s PENNAR ENVIRO LIMITED for SEWAGE TREATMENT PLANT based on the vendor approval accorded by TANGEDCO vide Ref (3,5,6 & 8) . Then the Sub Vendor Items approval was accorded by TANGEDCO as per the Annexure, for SEWAGE TREATMENT PLANT vide Ref (10). Now the Inspection Categorisation Plan approval is accorded as per the Annexure for SEWAGE TREATMENT PLANT Package to the subject project 2X660 MW Ennore SEZ STPP.

Encl: As above (2 Pages)

Yours faithfully,

22/11/18

CHIEF ENGINEER /PROJECTS I

Copy to the CE/Civil/Ennore Sez/Chennai -120. (by email)
Copy to the SE/Civil/Ennore Sez/Chennai -120(by email)
Copy to the SE/Electrical/Ennore Sez/Chennai -120(by email)
Copy to M/S.Desein Pvt Ltd, New Delhi. (by email)

INSPECTION CATEGORISATION PLAN AND SUB VENDOR LIST

2X660MW ENNORE SEZ STPP				
Inspection Categorisation Plan approval to BHEL/PEM for Sewage Treatment Plant				
This is Annexure to Lr.No CE/PI/SE/E/T & H(P)/EE6/E/P/AEE/M/F.Ennore SEZ MDCC appl/D 597/18 dt 22.11.18				
BHEL/PEM DOC Ref :PE-V0-412-673-A025				
SR.NO	**DESCRIPTION**	**Inspection CATEGORY indicated by BHEL**	**REMARKS**	**TANGEDCO approved Inspection Category**
MECHANICAL ITEMS				
1	TANK (MSRL/CSRL/EP)	B		II
2	Pressure Vessel (FRP)	B		II
3	Metering Pump	B		II
4	AGITATOR/Mixer - CS/SS	~~C~~		II
5	CENRIFUGAL PUMP - Vertical/Horizontal	A		I
6	VALVES CS/SS (up to 6 inch)	C	Gate/Globe/NRV/Ball/Plug/BFV/ Diaphragm	III
7	VALVES CS/SS (above 8 inch)	B	Gate/Globe/NRV/Ball/Plug/BFV/ Diaphragm	II
8	Valves - CPVC/PVC/UPVC/PP/FRP	C	Gate/Globe/NRV/Ball/Plug/BFV/ Diaphragm	III
9	Coarse Screen	C		III
10	Centrifuge	~~B~~		I
11	Air blower	B		II
12	Pipes - CS/MS/GI/UPVC/CPVC/HDPE/ FRP	C		III
13	FITTINGS (CS/MS/GI/UPVC/CPVC/HDPE /FRP	C		III
14	LT MOTORS	~~Note : 5~~		II
15	SWITCHES	C		III
16	Gauges	C		III

2X660MW ENNORE SEZ STPP

Inspection Categorisation Plan approval to BHEL/PEM for Sewage Treatment Plant

This is Annexure to Lr.No CE/PI/SE/E/T & H(P)/EE6/E/P/AEE/M/F.Ennore SEZ MDCC appl/D 597/18 dt 22.11.18

BHEL/PEM DOC Ref :PE-V0-412-673-A025

SR.NO	DESCRIPTION	Inspection CATEGORY indicated by BHEL	REMARKS	TANGEDCO approved Inspection Category
17	Indicator	C		III
18	Analyser	C		II
19	Transmitter	C		II
20	Instrument cable	C		III

1) Category I – Quality Plan approval & Physical Inspection by TANGEDCO as agreed in the Quality Plan are envisaged. Based on Inspection/Inspection Test Report approval, TANGEDCO will issue MDCC.

2) Category II – Quality Plan approval & Physical Inspection by BHEL as agreed in the Quality Plan are envisaged. Test Reports to be submitted by BHEL & got it approved by TANGEDCO before the issuance of MDCC by TANGEDCO.

3) Category III - Quality Plan approval & Physical Inspection by TANGEDCO are not envisaged. MDCC to be obtained from TANGEDCO Based on submission of Certificate of Celearance (COC) by BHEL.

22/11/18

CHIEF ENGINEER/PROJECTS I

TAMIL NADU GENERATION AND DISTRIBUTION CORPORATION LIMITED

From
Er.K.SUBASH CHANDRA BOSE,M.E.,
Chief Engineer/Projects,
V Floor, Western Wing,
144, Anna Salai,
Chennai-600 002.
Fax No : 044- 28520878
Cell No: 9445857543
Email ID: cepr@tnebnet.org

To
Er.Perminder Singh, GM/PEM,
M/s. Bharat Heavy Electrical Limited,
Project Engineering Management
PPEI Building, HRDI & ESI Complex,
Plot No.25, Sector-16A, Noida-201301(U.P)
Fax : 0120-423522
E mail : pmgus@bhel.in,permindersingh@bhel.in,
vkumar@bhel.in,deveshverma@bhel.in,
pmgsalil@bhel.in, karuna.kaushik@bhel.in

Lr.No.CE/P/SE/E/T&H(P)/EE-6/E/P/AEE/M/F. Ennore SEZ Vendor Appl/D. 571 /18,dt 14.11.18

Sir,

Sub: TANGEDCO - Setting up of 2x660 MW Ennore SEZ Coal based super critical thermal power project at ash dyke of North Chennai Thermal Power Station (Kattupalli) – EPC cum Debt Finance Contract awarded to M/s.BHEL on 27.09.2014 - Sub Vendor Items approval sought by BHEL/PEM for " SEWAGE TREATMENT PLANT " - Approval accorded –Reg.

Ref:
1) Lr.No. CE/P/SE/M/P/EE-10/E/P/F.2x660 MW Ennore SEZ STPP/D.60/14,dt.27.09.2014
2) Your letter Ref: MS-1-13-E-0005 dated 27.09.2014.
3) Lr.No.CE/P/SE/E/T&H(P)/EE-6/E/P/F. 2X660 Ennore SEZ STPP/D. 115 /14,dt 19.12.14
4) BHEL/PEM Lr.No PEM-412-ENNORE-24/17 dated 29.05.2017 (Hard copy received on 31.05.17)
5) Lr.No.CE/P/SE/E/T&H(P)/EE-6/E/P/AEE/M/F. 2X660 Ennore SEZ STPP/D. 186 /17,dt 13.06.17.
6) Lr.No.CE/P/SE/E/T&H(P)/EE-6/E/P/AEE/M/F. 2X660 Ennore SEZ STPP/D. 227 /17,dt 07.07.17.
7) BHEL/PEM Lr.No PEM-412-ENNORE-30/17 dated 28.11.2017 (Hard copy received on 04.12.17)
8) Lr.No.CE/P/SE/E/T&H(P)/EE-6/E/P/AEE/M/F. 2X660 Ennore SEZ STPP/D. 227 /17,dt 07.07.17.
9)Your Lr No:PEM/PG-I/412//PMG/12 Dated 06.10.18

****

Please refer to the letters cited above.

The final order has been placed by M/s BHEL/PEM on the vendor M/s PENNAR ENVIRO LIMITED based on the vendor approval accorded by TANGEDCO vide Ref (3,5,6 & 8). Now the Sub Vendor Items approval is accorded as per the Annexure, as submitted by BHEL/PEM for SEWAGE TREATMENT PLANT vide Ref (9). After receiving the Consultant's Comments the Inspection Criteria approval will be processed.

Encl: As above (12 Pages)

Yours faithfully,

14/11/25

CHIEF ENGINEER /PROJECTS I

Copy to the CE/Civil/Ennore Sez/Chennai -120. (by email)
Copy to the SE/Civil/Ennore Sez/Chennai -120(by email)
Copy to the SE/Electrical/Ennore Sez/Chennai -120(by email)
Copy to M/S.Desein Pvt Ltd, New Delhi. (by email)

2X660MW ENNORE SEZ STPP				
Sub Vendor Items List approval to BHEL/PEM for Sewage Treatment Plant				
This is Annexure to Lr.No CE/PI/SE/E/T & H(P)/EE6/E/P/AEE/M/F.Ennore SEZ Vendor appl/D571 /18 dt 14.11.18				
BHEL/PEM DOC Ref :PE-V0-412-673-A025				
SR. NO.	ITEM	VENDOR NAME	PLACE	TANGEDCO Remarks on Ennore SEZ
1	**PRESSURE VESSELS**	GLOBAL STRUCTURE & COMPOSITE LTD	-	Approved
		JASMINO POLYMER TECH	TALOJA	Not Approved
		SYSCON ENGINEERS	AMBERNATH	Not Approved
		S.V.FABRICATORS	NAVI MUMBAI	Approved
		SPARK FABRICATORS/STELLCON	-	Not Approved
		ANUP ENGINEERING	AHMEDABAD	Not Approved
		MURTHAL TANKS & VESSELS	SONEPAT	Approved
		TITAN ENGG.	DURGAPUR	Not Approved
		RISHI INDUSTRIES	BAHALGARH	Approved
		UNIVERSAL HEAT EXCHANGERS		Not Approved
		ATS CHEM	SALEM/HOSUR	Approved
		CHEM PROCESS SYSTEM	SANAND	Not Approved
		PROGEN	CHENNAI	Approved
		CRYSTAL ENGINNERING	HOSUR	Not Approved
		ISHAN EQUIPMENTS	VADODARA	Not Approved
2	**ATMOSPHERIC/ STORAGE TANKS**	GLOBAL STRUCTURES & COMPOSITE LTD	-	Approved
		JASMINO POLYMERTECH	TALOJA	Not Approved
		SYSCON ENGINEERS	AMBERNATH	Not Approved
		S.V. FABRICATORS	NAVI MUMBAI	Approved
		SPARK FABRICATORS / STEELCON	-	Not Approved
		ANUP ENGINEERING	AHMEDABAD	Not Approved
		MURTHAL TANKS & VESSELS	SONEPAT	Approved
		TITAN ENGG.	DURGAPUR	Not Approved
		RISHI INDUSTRIES	BAHALGARH	Approved
		UNIVERSAL HEAT EXCHANGERS	-	Not Approved
		ATS CHEM	SALEM/HOSUR	Approved
		CHEM PROCESS SYSTEM	SANAND	Not Approved
		PROGEN	CHENNAI	Approved
		CRYSTAL ENGINEERING	HOSUR	Not Approved
		ISHAN EQUIPMENTS	VADODARA	Not Approved
3	**RUBBER LINING (AT SHOP)**	TEMSEC	KOLKATA	Approved
		RISHI INDUSTRIES	SONEPAT	Approved
		CORI ENGINEERS	CHENNAI	Approved
		POLY RUBBER	MUMBAI	Not Approved
		INDUSTRIAL LINING	VADODARA	Not Approved
		ARUL RUBBERS	CHENNAI	Approved
		JASMINO POLYMERTECH	TALOJA	Not Approved
		WESTERN RUBBER	NAVI MUMBAI	Not Approved
		ELASTOMER LINNING	AMBERNATH	Not Approved
		EMKAY RUBBER	MUMBAI	Not Approved
		SWAN PNEUMATIC	NOIDA	Approved

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2X660MW ENNORE SEZ STPP				
Sub Vendor Items List approval to BHEL/PEM for Sewage Treatment Plant				
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BHEL/PEM DOC Ref :PE-V0-412-673-A025				
SR. NO.	ITEM	VENDOR NAME	PLACE	TANGEDCO Remarks on Ennore SEZ
4	AIR BLOWERS (TWIN LOBE TYPE)	EVEREST TRANSMISSION	NEW DELHI	Not Approved
		KAY INTERNATIONAL	NEW DELHI / SONEPAT	Approved
		EVEREST BLOWER	BAHADURGARH	Approved
		KULKARNI POWER TOOLS	KOLHAPUR/ PUNE	Not Approved
5	METERING PUMPS	VK PUMPS	NASIK	Approved
		MILTON ROY INDIA	CHENNAI	Approved
		SWELLORE	AHMEDABAD	Approved
		POSITIVE METERING PUMPS	NASIK	Approved
		METACHEM	MUMBAI	Not Approved
6	AGITATOR	REMI PEOCESS PLANT & M/C	MUMBAI	Approved
		FIBRE & FIBRE	MUMBAI / SILVASA	Approved
		CEECONS	CHENNAI	Approved
		CHEMIX	-	Not Approved
		AGITATOR & MIXING SOLUTION	HOOGHLY	Not Approved
		STANDARD ENGINEERS	MUMBAI	Not Approved
7	HORIZONTAL CENTRIFUGAL PUMPS	BEST AND CROMPTON ENGG LTD.	CHENNAI	Approved
		SAM TURBO	COIMBATORE	Approved
		JOHNSON PUMPS	AHMEDABAD	Not Approved
		BHARAT PUMPS & COMPRESSORS LTD	ALLAHABAD	Not Approved
		FLOWMORE LTD.	GURGAON	Approved
		FLOWSERVE INDIA CONTROLS PVT. LTD.	COIMBATORE	Approved
		JYOTI LTD.	VADODARA	Approved
		KIRLOSKAR BROTHERS LTD	PUNE	Approved
		WILO MATHER & PLATT PUMPS PVT. LTD.	PUNE	Approved
		V-FLO PUMPS & SYSTEMS CO. LTD.,	BEIJING-CHINA	Not Approved
		WPIL LIMITED	KOLKATA	Approved
8	SCREW PUMP	UT PUMP	HARYANA	Approved
		ALPHA HELICAL	COIMBATORE	Not Approved
		ROTO PUMPS	NOIDA	Approved
		TUSHACO	-	Approved
9	UNDER BED NOZZLE	JONSONS SCREEN	AUSTRALIA/ IRELAND	Approved
10	COATING & WRAPPING MATERIAL TAPE	IWL LTD.	CHENNAI	Approved
		MP TAR PRODUCT	BHILAI	Not Approved
		PORWAL INDUSTRIES	RAIPUR	Not Approved
		RUSTECH	KOLKATA	Not Approved
		STP	JAMSHEDPUR	Not Approved
11	CLARIFIER/ THICKENER	CLEAR WATER	DELHI	Approved
		TRIVENI	NOIDA	Approved

2X660MW ENNORE SEZ STPP

Sub Vendor Items List approval to BHEL/PEM for Sewage Treatment Plant

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BHEL/PEM DOC Ref :PE-V0-412-673-A025

SR. NO.	ITEM	VENDOR NAME	PLACE	TANGEDCO Remarks on Ennore SEZ
	MECHANISM	PBJ ASSOCIATE	PUNE	Not Approved
12	**CENTRIFUGE**	HUMBOLT	-	Approved
		HILLER	-	Approved
13	**CAST IRON GATE/GLV/NRV/SRV**	A.V. VALVES LTD	AGRA	Approved
		ATAM VALVES PVT. LTD.	JALANDHAR	Not Approved
		WEIR BDK	HUBLI	Approved
		TECHNO VALVE	PUNE	Approved
		HAWA	MUMBAI	Approved
		MICON	MUMBAI	Approved
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	Approved
		G.M. DALUI AND SONS PVT.LTD.	HOWRAH	Not Approved
		H.SARKER AND COMPANY	HOWRAH	Approved
		LEADER VALVES LTD.	JALANDHAR	Approved
		VENUS PUMPS AND ENGG. WORKS	KOLKATA	Approved
14	**BALL VALVE (MANUAL /PNEUMATIC/ ELECTRIC) CLASS 150**	A.V. VALVES LTD	AGRA	Approved
		AKAY INDUSTRIES PVT.LTD.	DHARWAD	Not Approved
		TECHNO VALVES	PUNE	Approved
		MICON	MUMBAI	Approved
		BELGAUM AQUA VALVES PVT. LTD.	BELGAUN	Not Approved
		ASIAN INDUSTRIAL VALVES & INSTRUMENTS.	CHENNAI	Not Approved
		ATAM VALVES PVT. LTD.	JALANDHAR	Not Approved
		DEMBLA VALVES LTD.	THANE	Approved
		M/S GM ENGINEERING	RAJKOT	Approved
		HAWA VALVES (INDIA) PVT. LTD.	NAVI MUMBAI	Approved
		INTERVALVE (INDIA) LTD.	PUNE	Approved
		LEADER VALVES LTD.	JALANDHAR	Approved
		MICROFINISH VALVES PVT LTD.	HUBLI	Not Approved
		NILON VALVES PRIVATE LIMITED	AHMEDABAD	Not Approved
		SURYA VALVES AND INSTRUMENTS MFG CO.	CHENNAI	Not Approved
		UNIFLOW	CHENNAI	Not Approved
		VALTECH INDUSTRIES	MUMBAI	Approved
		VAAS AUTOMATION PVT. LTD.	NEW DELHI	Not Approved
		WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD.	NEW DELHI	Approved
15	**ELECTRIC MOTOR**	CROMPTON GREAVES	AHMEDNAGAR	Approved
		LAXMI HYDRAULICS PVT. LTD	MAHARASTRA	Not Approved
		RAJINDRA ELECT INDUSTRIES	MUMBAI	Not Approved
		GE-POWER	CHENNAI	Approved
		BHARAT BIJLEE LTD.	NEW DELHI	Approved
		SIEMENS	GURGAON	Approved

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SR. NO.	ITEM	VENDOR NAME	PLACE	TANGEDCO Remarks on Ennore SEZ
		NGEF	NEW DELHI	Not Approved
		KIRLOSKAR ELECTRIC CO LTD.	BANGALORE	Approved
		ASEA BROWN BOVERI(ABB)	HARYANA	Approved
		MARATHON	FARIDABAD	Approved
16	BUTTER-FLY VALVE	ADVANCE VALVES PVT. LTD.	NOIDA	Approved
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	Approved
		HAWA	MUMBAI	Approved
		TECHNO VALVE	PUNE	Not Approved
		MICON	MUMBAI	Not Approved
		INSTRUMENTATION LTD.	PALAKKAD	Approved
		INTERVALVE (INDIA) LTD.	PUNE	Approved
		R AND D MULTIPLES (METAL CAST) PVT LTD	MUMBAI	Not Approved
		SURYA VALVES AND INSTRUMENTS MFG CO.	CHENNAI	Not Approved
		PENTAIR VALVES AND CONTROLS INDIA PRIVATE LIMITED	NAVI MUMBAI	Not Approved
		UPADHAYA VALVES MANUFACTURERS PRIVATE LIMITED.	KOLKATA	Not Approved
		VENUS PUMPS AND ENGG. WORKS	KOLKATA	Not Approved
		WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD.	NEW DELHI/HUBLI	Approved
17	DIAPHRAGM VALVE (MANUAL / PNEUMATIC) CLASS 150	WEIR BDK	HUBLI	Approved
		CRANE FLOW PROCESS	SATARA	Approved
		TECHNO VALVES	PUNE	Approved
		MICON	MUMBAI	Not Approved
		PROCON	MUMBAI	Approved
		MAJESTIC VALVES (LABLINE)	-	Not Approved
		HAWA ENGINEERS	AHMEDABAD	Not Approved
18	DUAL PLATE CHECK VALVES	ADVANCE VALVES PVT. LTD.	NOIDA	Approved
		MICON	MUMBAI	Approved
		TECHNO VALVE	PUNE	Approved
		FLUIDLINE VALVES COMPANY PVT.LTD.	GHAZIABAD	Approved
		R AND D MULTIPLES (METAL CAST) PVT LTD	MUMBAI	Not Approved
		VENUS PUMPS AND ENGG. WORKS	MUMBAI	Not Approved
		OTOKLIN GLOBAL BUSINESS LIMITED	MUMBAI	Not Approved
		GRAND PRIX	NEW DELHI	Approved
		JAYPEE	NEW DELHI	Approved
		GREAVES COTTON	MUMBAI	Approved
		PSN ENERGY	NODIA	Not Approved

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19	**Y-TYPE STRAINER / STRAINER (WATER SERVICE)**	SRI VENKATA ENGINEERS	HYDERABAD	Not Approved
		MULTITEX FILTRATION ENGINEERS LIMITED,	NEW DELHI / NOIDA	Approved
		FILTERATION ENGINEERS (I) PVT. LTD	MUMBAI	Approved
		FLUIDNYE	-	Not Approved
		SUNGOV ENGINEERING PVT. LTD.	DELHI	Not Approved
		GRAND PRIX	FARIDABAD	Not Approved
		JAYPEE INDUSTRIES PVT. LTD.	DELHI	Not Approved
		BHATIA ENGINEERING CO.	DELHI	Approved
20	**RUBBER FLAP TYPE CHECK VALVES**	ASHVIK VALVES	-	Not Approved
		FLOW WAY VALVES	-	Approved
		BDK	HOBLI	Approved
		MAJESTIC VALVES (LABLINE INST)	-	Not Approved
		ADVANCE VALVES	-	Approved
21	**SOLENOID VALVES**	ROTEX	-	Approved
		AVCON	-	Approved
22	**CABLE GLAND**	ALLIED TRADERS & EXPORTERS	NOIDA (U.P.)	Not Approved
		ARUP ENGG & FOUNDARY WORKS	CALCUTTA	Approved
		BALIGA LIGHTING EQPT.PVT.LTD	CHENNAI	Approved
		COMMET BRASS PRODUCTS	MUMBAI	Approved
		DOWELLS	MUMBAI	Not Approved
		ELECTROMAC INDUSTRIES	MUMBAI	Not Approved
		INCAB	KOLKATA	Approved
23	**CABLE LUGS**	DOWELLS	MUMBAI	Not Approved
		UNIVERSAL MACHINES LTD.	KOLKATA	Approved
24	**MS PLATES**	SAIL	-	Approved
		ESSAR STEEL	-	Approved
		TISCO	-	Approved
		RINL	-	Not Approved
		JINDAL	-	Approved
		LLOYD	-	Not Approved
		ISPAT	-	Not Approved
		INDIAN IRON & STEEL CO. LTD	-	Approved
25	**CS PIPE (ASTM A 106 GR. B)**	INDIAN SEAMLESS METAL TUBES	AHMEDABAD	Approved
		MAHARASHTRA SEAMLESS	RAIGAD	Approved
		HEAVY METALS	-	Not Approved
		ANAND TUBES	AHMEDABAD	Not Approved
		SURYA ROSHINI	BAHADUR GARH	Approved
		SAIL	ROURKELA	Not Approved
		JINDAL	GHAZIBAD/HISSAR	Approved
		SURYA ROSHNI	BAHADUR GARH	Approved

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SR. NO.	ITEM	VENDOR NAME	PLACE	TANGEDCO Remarks on Ennore SEZ
26	MS PIPES (IS: 1239 & 3589)	TATA TUBE	JAMSHEDPUR	Approved
		PSL	CHENNAI/VIZAG/KUTCH/DAMAN	Not Approved
		LALIT PROFILE	THANE	Not Approved
		SAMSHI PIPES INDUSTRIES	VADODARA	Not Approved
		MUKUT PIPES	RAJPURA	Not Approved
		INDUS TUBES	G B NAGAR	Not Approved
		MANN IND	INDORE	Not Approved
		SURENDRA ENGG	RAJPURA	Not Approved
		PRATIBHA PIPES & STRUCTURE PVT LTD	THANE	Not Approved
		JCO GAS PIPE	CHINDWARA	Not Approved
		NUKAT TANKS AND VESSELS	TARAPUR	Not Approved
		DADU PIPES	SIKRANDRABAD	Not Approved
		GOOD LUCK TUBES	SIKANDRABAD	Not Approved
		ADVANCE STEEL TUBES	SAHIBABAD	Approved
		BIHAR TUBES	SIKANDRABAD	Not Approved
		HI TECH PIPES	SIKANDRABAD	Approved
		RATNAMANI	KUTCH/AHMEDABAD/CHHATRAL	Approved
		MAHARASHTRA SEAMLESS	RAIGAD	Approved
		WELSPUN	ANJAR/BHARUCH	Approved
27	SS PIPES / TUBES	APEX TUBES	BEHROR (ALWAR)	Not Approved
		RATNAMANI	CHATTRAL	Approved
		SUBHALAKSHMI METALS	-	Not Approved
		METALS TUBES	-	Not Approved
		HEAVY METALS	AHMEDABAD	Not Approved
		PRAKASH STEELAGE	-	Approved
		REMI	TARAPUR	Approved
28	SAFETY SHOWER	UNICARE	-	Approved
		CREATIVE ENGINEERS	-	Not Approved
		FRANCIS LESLIE	-	Not Approved
		MOHAN INDUSTRIES	-	Approved
		SUPER SAFETY SERVICES	-	Approved
29	FRP TANKS & FITTINGS	GLOBAL COMPOSITE	-	Approved
		EPP	-	Approved
		DEEPA COMPOSITE	-	Not Approved
		COROSEAL INDUSTRIES	-	Not Approved
		CHEMICAL PROCESS & EQUIPMENT PVT LTD	-	Approved
		J.R FIBRE INDUSTRIES PVT LTD	-	Approved
		EXTRA COMPOSITE	-	Not Approved
		SANTOM ENTERPRISES	-	Not Approved
		POLYPLAST	-	Not Approved

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SR. NO.	ITEM	VENDOR NAME	PLACE	TANGEDCO Remarks on Ennore SEZ
30	**EJECTOR**	ESSEM TECHNOLOGIES	-	Approved
		RATNA PRASAD	-	Approved
31	**TANK (FRP)**	INDUSTRIAL SERVICE	KOLKATA	Approved
		SUNRISE	BARODA	Approved
		GANDHI & ASSOCIATES	AHMEDABAD	Approved
		EXTRA COMPOSITE	-	Not Approved
		SANTOM ENTERPRISES	-	Not Approved
		FIBRO PLAST	-	Approved
		MODERN EQUIPMENTS	CHENNAI	Approved
		EAGLE PLAST	PUNE	Approved
		OMEGA PLAST	MUMBAI	Approved
32	**STROKE CONTROLLER**	V K PUMPS	NASIK	Approved
		METACHEM	MUMBAI	Not Approved
		SWELORE	AHMEDABAD	Approved
		MILTON ROY INDIA	CHENNAI	Approved
33	**SAFETY VALVES/RELIEF VALVES**	METACHEM	MUMBAI	Not Approved
		NIRMAL INDUSTRIES	-	Not Approved
		KEYSTONE	BARODA	Approved
		V K PUMPS	NASIK	Approved
		MILTON ROY	CHENNAI	Approved
34	**DUPLEX STRAINER**	JAYPEE INDUSTRIES PVT. LTD.	NEW DELHI	Approved
		MULTITEX FILTRATION ENGINEERS LIMITED,	NEW DELHI	Approved
		PSN ENERGY	-	Not Approved
		OTOKLIN GLOBAL BUSINESS LIMITED	MUMBAI	Approved
		SUNGOV ENGINEERING PVT. LTD.	CHENNAI	Not Approved
35	**STEEL GATE/GLOBE/NR VALVES**	A.V. VALVES LTD	AGRA	Approved
		ATAM VALVES PVT. LTD.	JALANDHAR	Not Approved
		HAWA	MUMBAI	Approved
		TECHNO VALVE	PUNE	Not Approved
		MICON	HUBLI	Approved
		FLUIDLINE VALVES COMPANY PVT.LTD.	KAUSHAMBI	Approved
		M/S GM ENGINEERING	RAJKOT	Not Approved
		INTERVALVE (INDIA) LTD.	PUNE	Approved
		LEADER VALVES LTD.	JALANDHAR	Approved
		NITON VALVE INDUSTRIES PVT LTD	MUMBAI	Not Approved
		NSSL LIMITED.	NAGPUR	Not Approved
		STEEL STRONG VALVES (I) PVT.LTD.,	NAVI MUMBAI	Not Approved
		VENUS PUMPS AND ENGG. WORKS	KOLKATA	Not Approved
		VALTECH INDUSTRIES.	MUMBAI	Approved

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SR. NO.	ITEM	VENDOR NAME	PLACE	TANGEDCO Remarks on Ennore SEZ
		V.K. VALVES PVT. LTD.,	JALANDHAR	Not Approved
		WEIR BDK VALVES- A UNIT OF WEIR INDIA PVT. LTD.	NEW DELHI	Approved
36	SLUICE GATE	H SARKAR	KOLKATA	Approved
		JASH ENGINEERING	-	Approved
		ORBINOX INIDA PRIVATE LIMITED	-	Not Approved
		YASHWANT INDUSTRIES	-	Approved
37	3 WAY VALVE	HI TECH	AHMEDABAD	Not Approved
		ADVANCE VALVES PVT.LTD	NOIDA	Approved
		BDK	HUBLI	Approved
		HAWA	MUMBAI	Approved
		TECHNO VALVE	PUNE	Approved
		FOURESS ENGG.INDIA LTD.	MUMBAI	Approved
		FLUIDLINEVALVES COMPANY PRIVATE LTD.,	MUMBAI	Approved
		INSTRUMENTATION LTD.	PALAKAD	Approved
		KIRLOSKAR BROTHERS LTD.	PUNE	Approved
		VENUS PUMP & ENGG. WORKS	KOLKATA	Approved
		SURYA VALVES AND INSTRUMENTS MANUFACTURING COMPANY	CHENNAI	Not Approved
		STAFFORD CONTROLS LIMITED	PUNE	Not Approved
		MICON VALVES (INDIA) PVT.LTD	MUMBAI	Not Approved
38	PLUG VALVE(MANUAL)	BDK	HUBLI	Approved
		TECHNO VALVES	PUNE	Approved
		HAWA ENGINEERS / MARCK & CARE	HUBLI	Approved
		MICON VALVES (INDIA) PVT.LTD	MUMBAI	Not Approved
39	FITTINGS (CS/SS)	M.S. FITTINGS	KOLKATA	Approved
		METAL LLOYDS	MUMBAI	Approved
		TRUE FORGE	FARIDABAD	Approved
		TUBE PRODUCTS	BARODA	Approved
		NL HAZRA	KOLKATA	Approved
		GUJRAT INFRA PIPES	BARODA	Approved
		EDWARDS	USA	Approved
		PIPEFIT ENGINEERS	BARODA	Approved
		SIDDARTH & GAUTAM	FARIDABAD	Approved
		MULTIMETAL	-	Approved
		CSA FITTINGS	-	Approved
		TUBE TURN	-	Approved
		TOPAZ	-	Approved
		EFTEN	-	Approved
		EBY	MUMBAI	Approved

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40	FLANGES (SS/CS)	PRADEEP METALS LTD	MUMBAI	Approved
		TUBE PRODUCT INCOROPORATION	BARODA	Approved
		PARAMOUNT FORGE	-	Approved
		CD INDUSTRIES	-	Approved
		METAL FORGE	-	Approved
		MS FITTINGS	KOLKATA	Approved
		HAWA ENGINEERING	-	Approved
		ALIANCE PIPE & PLANGES	KOLKATA	Approved
		JAI AMBE	MUMBAI	Approved
41	PIPE & FILLTING	GEROGE FISHCHER	DELHI	Approved
		ASTRAL	AHMEDABAD	Approved
		SUPREME	-	Not Approved
	(PP,HDPE,PVC & CPVC)	ASTROL PLYTECHINC LTD	AHMEDABAD	Approved
		JAIN IRRIGATION	-	Not Approved
		ORIPLAST	-	Not Approved
42	VALVES (GATE/GLOBE/NRV/BA LL) (PP,HDPE,PVC & CPVC)	GEROGE FISHCHER IPING SYSTEMS PVT LTD	DELHI	Approved
		ASTROL PLYTECHINC LTD	AHMEDABAD	Approved
		CEPEX	-	Not Approved
		UNP POLYVALVES	-	Not Approved
		FIP	-	Not Approved
		JAIN IRRIGATION	-	Not Approved
		ORIPLAST	-	Not Approved
43	FILTER MEDIA	GLOBAL ABSORBENT	KOLKATA	Approved
		BHARAT MINERALS	-	Approved
44	SIGHT FLOW INDICATORS	B.K.EQUIPMENTS PVT.LTD.	CHENNAI	Approved
		BLISS ANAND PVT. LTD.	GURGAON	Approved
		FLOWTECH INSTRUMENTS SERVICRS	VADODARA	Approved
		INSTRUMENTATION ENGINEERS PVT LTD	VADODARA	Approved
		SIGMA INSTRUMENTS CO.	MUMBAI	Approved
		SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	NAVI MUMBAI	Approved
		TELACE EQUIPMENT PVT.LTD.	CHENNAI	Approved
45	PAINT	ASIAN PAINTS (I) LTD.		Approved
		BERGER PAINTS INDIA LTD		Approved
		GOODLASS NEROLAC		Approved
		JENSON & NICHOLSON (I) LTD		Approved
		CDC CARBOLINE (I) LTD.		Approved
		SHALIMAR PAINTS LTD.		Approved
		ADDISON PAINTS LTD		Not Approved
		GRAND POLYCOAT		Not Approved

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		BOMBAY PAINTS		Not Approved
		HEMPLE PAINTS (SINGAPORE)		Approved
		JOTUN PAINTS		Approved
46	PNEUMATIC ACTUATOR	PROCON ENGINEERS		Approved
		TYCO		Not Approved
		CRANE PROCESS		Approved
		BDK		Not Approved
		INTERVALVE		Not Approved
		BRAY CONTROL		Not Approved
47	GI CONDUITS	BIS APPROVED MAKE		Approved
48	JUNCTION BOXES (NON FLAME PROOF)	JASPER ENGNIREES PVT. LTD.	NOIDA	Approved
		Electro Controls & Devices	GREATER NOIDA	Approved
		M/S SHRENIK & CO.	AHMEDABAD	Approved
		M/s PHOENIX MECANO LTD.,	PUNE	Approved
		ADROIT CONTROL ENGINEERS PVT.LTD.	FARIDABAD	Not Approved
		M/s PHOENIX MECANO LTD.	PUNE	Not Approved
		MIKA ENGINEERS	MUMBAI	Not Approved
		M/s PHOENIX MECANO LTD.	PUNE	Not Approved
		BAJAJ ELECTRICALS	NEW DELHI	Approved
		AJMERA INDUSTRIES & ENGG. WORKS	NAVI MUMBAI	Approved
		S.B. ELECTRICAL ENGINEERING CORPORATION	MUMBAI	Not Approved
49	JUNCTION BOXES (FLAME PROOF)	SUDHIR SWITCHGEAR	MUMBAI	Approved
50	FRP CABLE TRAYS & ACCESSORIES	EPP COMPOSITES PRIVATE LIMITED	RAJKOT-GUJARAT	Approved
		SUMIP COMPOSITES PVT.LTD.	AHMEDABAD-GUJARAT	Approved
		SATYAM COMPOSITIES PVT LTD		Not Approved
		AERON		Not Approved
		ERCON COMPOSITES	JODHPUR RAJASTHAN	Not Approved
	Control & Instrumentation			
1	ULTRASONIC FLOW TRANSMITTERS	New Package		Not Approved
		ELECTRONET		Not Approved
		V AUTOMAT		Approved
2	LOCAL CONTROL PANELS	C and S ELECTRIC LTD.		Not Approved
		PYROTECH ELECTRONICS PVT. LTD.		Approved
		PROCON INSTRUMENTATION PVT. LTD.		Approved

2X660MW ENNORE SEZ STPP				
Sub Vendor Items List approval to BHEL/PEM for Sewage Treatment Plant				
This is Annexure to Lr.No CE/PI/SE/E/T & H(P)/EE6/E/P/AEE/M/F.Ennore SEZ Vendor appl/D 571/18 dt 14.11.18				
BHEL/PEM DOC Ref :PE-V0-412-673-A025				
SR. NO.	ITEM	VENDOR NAME	PLACE	TANGEDCO Remarks on Ennore SEZ
		INDUSTRIAL CONTROLS & APPLIANCES PVT LTD		Approved
3	ANALYSERS (ALL TYPES)	ABB INDUSTRIES AG		Approved
		ROSEMOUNT ANALYTICAL INC		Approved
		ELECTRONET EQUIPMENTS		Not Approved
		B&H		Not Approved
		FORBES MARSHALL		Approved
		ENDRESS + HAUSER INDIA PVT. LTD.		Not Approved
		HACH LANGE S.A.R.L CH-1222,		Approved
		SWAN Analytische Instrumente AG, CH-8340		Approved
		METTLER-TOLEDO INDIA PVT. LTD.,		Not Approved
		THERMO ORION INC		Approved
4	UPS	EMERSON NETWORK POWER,		Approved
		HITACHI-HIREL,		Approved
		KELTRON,		Approved
		CONSUL NEOWATT POWER SOLUTIONS,		Approved
5	MOTORISED ACTUATOR	ROTARK		Approved
		AUMA		Approved
		WEIR BDK VALVES		Approved
		LIMITORQUE		Approved
6	AIR FILTER REGULATOR	PLACKA		Approved
		SHAVO-NORGREN		Approved
		SCHRADER SCHORILL DUNCAN LTD.		Not Approved
		FAIRCHILD		Approved
		SMC PNEUMATICS		Approved
7	SOLENOID VALVE	ASCO		Approved
		ROTEX		Approved
		SCHRADER		Approved
		AVCON		Approved
		HERION-NORGREN		Approved
		IMI-NORGREN		Approved
		JAFFERSON		Approved
8	PRESSURE GUAGE	GIC		Approved
		AKVALO		Not Approved
9	PRESSURE TRANSMITTER / DIFFERENTIAL PRESSURE TRANMSITTER	ABB INDUSTRIES		Approved
		V AUTOMAT		Not Approved
		EMERSON		Approved
		PANAM		Not Approved
		E&H		Approved
		ELECTRONET		Not Approved

2X660MW ENNORE SEZ STPP

Sub Vendor Items List approval to BHEL/PEM for Sewage Treatment Plant

This is Annexure to Lr.No CE/PI/SE/E/T & H(P)/EE6/E/P/AEE/M/F.Ennore SEZ Vendor appl/D 571 /18 dt 14.11.18

BHEL/PEM DOC Ref :PE-V0-412-673-A025

SR. NO.	ITEM	VENDOR NAME	PLACE	TANGEDCO Remarks on Ennore SEZ
10	**LEVEL TRANSMITTER (ULTRASONIC)**	ABB INDUSTRIES		Approved
		V AUTOMAT		Approved
		EMERSON		Approved
		E&H		Approved
		ELECTRONET		Not Approved
11	**LEVEL GUAGE / LEVEL SWITCH**	PUNE TECHTROL		Approved
12	**TURBIDITY METER**	ELECTRONET		Not Approved
		B&H		Approved
13	**TEMP. ELEMENT**	GAUGE BOURDON		Approved
		PYRO ELECTRICAL		Approved
		THERMAL		Not Approved
		TOSHNIWAL		Approved
		TECHNO		Approved
		BAUMER		Approved

CHIEF ENGINEER/PROJECTS I

APPROVED

REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
0	02.11.2018	ISSUED FOR INFORMATION	GRK	RRK	VLP

PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.
TANGEDCO	**OWNER:**	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
DESEIN	**OWNER'S CONSULTANT:**	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
BHEL	**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
--	I		--	–	–	–

TITLE

ERECTION PROCEDURE FOR SEWAGE TREATMENT PLANT

	NAME	SIGN	DATE
PREP	GRK		02.11.2018
CHKD	RRK		02.11.2018
APPD	VLP		02.11.2018

							CARD CODE	BHEL DOC NO.	REV
DEPT.								PE-V0-412-673-A030	
SIGN				N.A.			–	PEL DOC NO. ----------	0-A
DATE								NO. OF SHEETS – 17 (EXCLUDING COVER SHEET)	

ERECTION PROCEDURE FOR

SEWAGE TREATMENT PLANT

DOCUMENT : ERECTION PROCEDURE	DOCUMENT NO. PE-V0-412-673-A030
TITLE : ERECTION PROCEDURE FOR SEWAGE TRAETMENT PLANT	REV/DATE : REV.0 / 02.11.2018 PAGES : 2 OF 17

1.0 SCOPE

1.1 This specification covers general instructions and guidelines for Erection, Testing and Commissioning of mechanical equipments of BHEL plant within battery limits of the plant. This includes site storage, handling of equipments at site, Erection, Testing and Commissioning of various types of equipments used in the project.

1.2 Work shall be performed in accordance with the terms and conditions set forth in this document.

2.0 GENERAL

2.1 Equipment should be unloaded and stored at location allotted by the client.

2.2 Equipment/ Parts shall be unpacked, cleaned.

2.3 The equipment/Parts shall be lifted/shifted to appropriate location.

2.4 The parts of equipments wherever called for are to be assembled to form complete equipment.

2.5 Before start shall check finish levels and sizes of the foundation and foundation bolt location on which the equipments are to be erected and report to the site Incharge any nonconformity/discrepancies.

3.0 RELATED DOCUMENTS

The following document shall be referred during the installation work as and when required.

a. Equipment List
b. Equipment general arrangement drawing
c. Foundation drawing related to equipment installation
d. Piping Layout drawings
e. Manufacturer’s installation instruction

4.0 BEFORE TAKING UP ERECTION

a. Finalize sequence of equipment erection. This will avoid "HOLD" on erection of interior equipments.

b. Assess the erection of Equipment under roof /buildings. Hold the sheeting/Purlin Works for heavy erections, if the same has to be lowered only from top.

c. Hold erections of interfering structures/purlins etc.

d. Superimpose Equipment/Piping Area drawings with Civil Drawings for orientation, elevation correctness etc.

5.0 POINTS TO BE CHECKED ON RECEIPT OF THE EQUIPMENTS AT SITE

a. Check whether any damages are occurred. Record damage report, bring it to the notice of Project Manager.

b. Remove loose items kept inside the equipments.

c. Spare Parts and pre-commissioning spares enclosed along with packages shall not be used. Those should be kept separately.

d. Construction structure as required for installations, shall be checked for its correctness and taken over.

6.0 LIFTING ARRANGEMENT FOR TRANSPORTATION AND INSTALLATION

a. Inspection of lifting and shifting machines and tools.

b. The erection supervisor shall select the safe and proper place according to the size of the equipment to open the package at Site of installation or at other appropriate place.

c. Take Proper Precautions while Lifting.

The Lifting and Shifting Machine, especially crane shall be used within the permitted capacity considering the crane capacity and length of boom. Lifting of equipments by Cranes are preferred.

The Position of hook of crane shall be right above the centre of gravity. Ready-made lifting lugs shall be used. In case the lifting lugs are not attached with the equipment, the following points shall be confirmed.

i. To confirm the centre of gravity of equipment.
ii. To use the common base, in case of lifting such as the rotary machines as pumps, compressors etc.
iii. In case of height installation of equipments, leading rope shall be attached to prevent the swing of lifted equipment.
iv. The protection of surfaces of painted equipment should be taken care.
v. The lifting rope shall not have direct contact to the equipment nozzle. A wooden/rubber packing shall be used in such cases.

7.0 ACCEPTANCE EXAMINATION AND FOUNDATION

Inspection of Foundation shall be performed according to following points:

a. Dimensions & Location Examination
The foundation of equipment shall be checked in accordance with Approved Drawings as applicable.

b. Joint Inspection Record to be maintained.

c. Ensure center line of the foundation. References level marking shall be done on either side of the Foundation.

d. For horizontal equipments where sliding arrangements are envisaged, check the sliding end thoroughly and sliding plate shall be supplied duly machined and bored to the size.

8.0 DRIVES

8.1 All reducer and motor will be aligned with shims using spirit level.

8.2 Coupling run out are to be checked using dial gauge. Also shall ensure that both angular and parallel misalignment is removed. Tolerance of run out shall be as specified by the equipment manufacturer.

9.0 ROTARY EQUIPMENT

9.1 Rotary equipment if arrived at site in more than one part. The unit shall be assembled on roller on the ground and welded in position after ensuring proper alignment as per procedure given in the relevant specification provided to the contractor.

9.2 Ring gear and pinion of rotary equipment should be installed as per relevant specification provided. Ensure that proper clearances are maintained between the gear and pinion.

9.3 Air seal assembly should be installed as per relevant specification and drawing provided.

9.4 After completion of installation no load test is to be carried out.

10.0 SHOP FABRICATED EQUIPMENT (GENERAL)

10.1 Tanks, hopper, cyclones, scrubber ducting, fume stack, clarifiers, thickeners, agitators, Clarifloculator and supporting structure/scraper and fabricated items which are received in knocked down condition or suitable section, shall be assembled, aligned and bolted as per the drawing provided to the contractor.

11.0 SITE FABRICATED EQUIPMENT

11.1 Site fabricated equipments will be fabricated as per the drawings and procedure given in the specification.

11.2 Site fabricated equipments will be hydraulically tested if required as per the procedure given in the jobwise specifications. If there is non-conformity, the procedure for inspection given in the specification will be followed.

12.0 BOUGHT OUT EQUIPMENT

12.1 All bought out equipments should be installed and tested as per manufacturer's installation instruction.

12.2 Equipment like pumps, fans, agitators are to be checked for free rotation of impeller/shaft prior to start up.

13.0 PAINTING

13.1 Before painting shall carry out surface preparation as required before painting and apply required coats of the paints to various equipments as per the approved paint specifications.

13.2 To be ensure the manufacturers recommendation for mixing of paint and time duration for application of paint is strictly adhered to.

13.3 The contractor (PEL-sub) will provide all equipments like profilometer and DFT meter for measurement of surface contour and paint thickness.

13.4 The finish coat provided will have the colour as per the colour code scheme approved by the client.

14.0 RUBBERLINING

14.1 Before start shall prepare the surface and provide the rubber lining as per rubber lining procedures provided to the contractor.

14.2 The testing of rubber lining will be carried out by the contractor (PEL-sub) as per following:

a. Spark test for ensuring continuity of rubber lining.
b. Hardness test.
c. Strength test for testing adherence of rubber lining to the parent material.

15.0 INSTALLATION OF EQUIPMENT

15.1 Installation Preparation

Before installation, the following shall be checked and confirmed as discussed in points 4.0 to 7.0. Make a check as follows:

a. Inspection of equipment.
b. Inspection of foundation
c. Foundation shall be chipped to get roughness if necessary.
d. Confirmation of base line. After cleaning the surfaces of the foundation and anchor bolts, it shall be confirmed whether base lines and centre lines for installation marked on the foundation are correct and clear.
e. Instruments as required shall be mounted on the vessels, as per Drawings.
f. Ensure that vessel is completely painted as per specifications. Any touch up required to be done shall be carried out.
g. Ensure the orientation of sliding end and openings before installation and necessary leveling of both pedestals are made with shim.
h. Cross check whether any of nozzle foul with the foundation.
i. Equipment center line punch marks shall be identified and painted for clarity during erection.

15.2 Installation

Erection of equipment shall be carried out as detail in 6.0. Wherever required, manufacturer's installation instruction/manual, drawings, specifications, instructions and proper sequence for assembly and erection shall be followed.

15.3 Location of Equipments

a. Orientation of equipment shall be confirmed alongwith the location of anchor bolts and also the base lines.
b. After confirmation of correct orientation, the equipment shall be kept to the base lines.

i) Ensure that foundation bolt pockets are cleaned before erection.
ii) Adjustment and levelling of equipment shall be carried out.
iii) Adjustment of vertical and horizontal position of equipment shall be carried out.
iv) If necessary, for levelling or alignment of equipment, shims shall be inserted between the equipment and base plate.

15.4 Fixing of anchor bolts

a. Anchor bolts shall be fixed in anchor pockets with cement mortars after setting and centering equipment the mix design as specified in spec. shall be used unless otherwise specified by equipment manufacturer. However, non-shrink grouting is to be provided for heavy equipment.

b. Before pouring cement mortar inside the anchor pockets, it shall be cleaned and kept wet.

c. Normal hardening period of cement mortar shall be atleast 5 days.

15.5 Adjustment of installation

a. All anchor bolts shall be fastened uniformly and then vertical and horizontal position of equipment shall be checked.
b. Tightening sequence shall be in accordance with manufacturer's instruction.
c. According to the results of measurement, setting of equipment shall be adjusted until the deviation is within the allowable tolerance.

16.0 ALIGNMENT OF EQUIPMENTS

16.1 Static equipment

a. Check foundation bolts at slide end of equipment are at the correct location so that expansion as envisaged is possible.
b. Center line checks foundation versus equipment.
c. Level equipment with water tube for horizontal vessel/structure. (If slope is envisaged check horizontal levels as per Approved Drawings.
d. Check alignment reading when full tightness of the foundation bolts and shims are achieved. In case MS plates are used of the thickness more than 25 mm, the shims shall be tacked between each other.
e. Shims shall be used wherever required.
f. As regards vertical equipments, the verticality shall be checked by plumb bob.
g. Packing shall be provided in adequate ensuring that it should not be obstruction during grouting.
h. Do not touch any preassembled flange such as shell/tube end of exchanger.
i. Maintain the alignment record as per Exibit CON-M-03.

j. Sump tank / Equipment where agitating / vertical pumps are installed, special care shall be taken to achieve vertically within spirit level reading of these nozzles.

16.2 Rotary Equipments

a Foundation shall be chipped to required level.
b. Before erection of base frames of the pumps, ensure provision for grouting between frames is available.
c. Flanges of agitator mounted equipment to be checked by spirit levels.
e. Pump erection is to be done in stages as follows:

i) Preliminary

Alignment to ensure	-	Location/Co-ordination
	-	Elevation
	-	Distance between two pumps
On acceptance	-	It is released for foundation bolts grouting

ii) Secondary Alignment

With driving motor	-	Using dial gauge
	-	Ensure radial, axial Alignment and coupling gaps are within limits
On acceptance	-	It is released for full grouting

iii) Final Alignment with and Without pipe connections

To check: Suction and delivery line shall be completed including pipe supports upto its connected header.

On completion of the pump and motor alignment, suction and delivery lines welding, if the last flange connection with pump (s/o) shall be done in co-ordination with the dial gauge check.

Flanges shall be bolted and further pipe spools shall be tacked in position.

However Dial Gauges shall be removed during welding operation.

This is to ensure that no stress comes to pump due to pipe supports.

Acceptance of Final Alignment means that Pump is cleared for Trial run. Inspection report shall be maintained as per BHEL site recommendations.

iv) While carrying out Hydro-Test of the suction/delivery spools, proper care shall be taken that their nozzle are not disturbed.

v) However Contractor shall carry out Final Alignment after removal of the blanks used for Testing. Check reading with and without Bolting of Flanges.

vi) All accessories connected to rotary equipment shall be fixed.

16.3 Cement jointing shall be done after alignment.

17.0 TOLERANCES

17.1 The following tolerances are considered while erecting the equipment:

a.	Plumbness to check verticality	:	0.25 mm/M
b.	Spirit level	:	0.02 mm/M to 0.1 mm/M
c.	Run out on turnnion of drum	:	0.25 mm
d	Water tube	:	1 mm approx.
e	Coupling alignment	:	0.05 to 0.1 mm
f	Feeler gauge	:	0.01 to 1mm

17.2 The above tolerance will be general for equipments, and for bought-out equipment such as coupling alignment of all rotating equipments, plumbness and water tube check for all type of equipments

17.3 For equipments like Pressure Sand Filters, Activated carbon Filters, should follow suppliers approved drawings and instruction manuals for filling sequence of various size filter media and its frontal piping's.

18.0 AS BUILT DRAWING

Site Incharge will mark changes done at site, if any, on the GA/layout drawing and hand sketches for preparing as built drawing to engineering department.

DOCUMENT : ERECTION PROCEDURE	DOCUMENT NO. PE-V0-412-673-A030
TITLE : ERECTION PROCEDURE FOR SEWAGE TRAETMENT PLANT	REV/DATE : REV.0 / 02.11.2018 PAGES : 12 OF 17

RECORD OF FOUNDATION ACCEPTANCE

Project : No.
Client :

Unit No. ----------on Drg. No. ----------
--

Foundation Designation / Equipment ----------

Date of checking----------Page----------of----------

Inclination	Horizontal X	Y		/1000			Vertical :		/1000		

Bolt Pocket Dimensions as per Drg. D + mm, d= mm

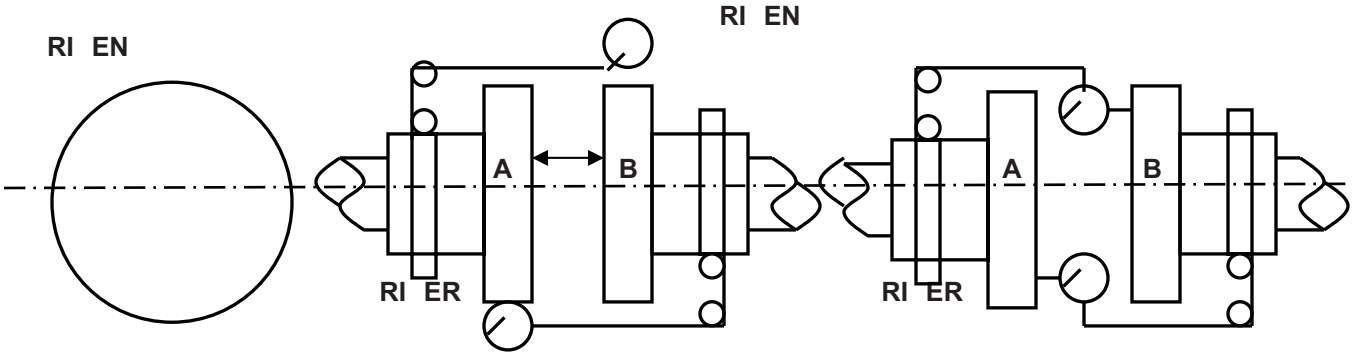
Inclination	Horizontal X	Y		/1000			Vertical :		/1000		

PEL	CLIENT
Signature : Name : Date :	Signature : Name : Date :

DOCUMENT : ERECTION PROCEDURE	DOCUMENT NO. PE-V0-412-673-A030
TITLE : ERECTION PROCEDURE FOR SEWAGE TRAETMENT PLANT	REV/DATE : REV.0 / 02.11.2018 PAGES : 13 OF 17

MACHINERY ALIGNMENT RECORD

Project :
Client :
Tag No. : _____ **On Drg. No.** _____
Machine Designation : _____
Manufacturer : _____ **Mtr's Drg. No.** _____
Mtr's Serial no. : _____ **Weight** _____ **kg**
Type of Coupling : _____ **Distance D** _____ **mm**
Directed on : **Drive HP/RPM**
Aligned & ground on : _____ **Page** _____ **of**

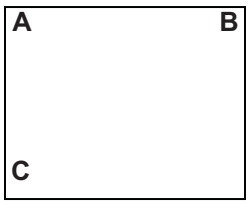


CONCENTRICIT **PARALLELISM**

R r	W				W			
	C r		P r		C r		P r	
	A		A		A		A	

E M :

MACHINERY LEVELING



L r
A
B
C

DOCUMENT : ERECTION PROCEDURE	DOCUMENT NO. PE-V0-412-673-A030
TITLE : ERECTION PROCEDURE FOR SEWAGE TRAETMENT PLANT	REV/DATE : REV.0 / 02.11.2018 PAGES : 14 OF 17

VESSEL ALIGNMENT RECORD

Project : NO.

Client :

TagNo._____DRG.No._____

Foundation designation / Equipment

_____

Date of Checking: _____Page _____ of

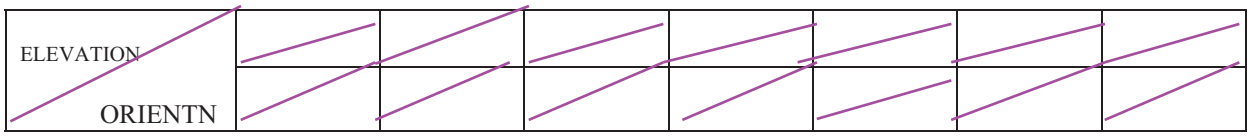
_____

VESSEL SKETCH

Date of erection

Check Item	Result	Check Item	Result
Co-ordinates		Accessories	
Vertical Alignment		Anchor Bolts & Nuts	
Horizontal Alignment		Grouting	

Nozzle No. in Mfr's Drg.



PEL	CLIENT
Signature : Name : Date :	Signature : Name : Date :

PROCEDURE FOR PIPING INSTALLATION

DOCUMENT : ERECTION PROCEDURE	DOCUMENT NO. PE-V0-412-673-A030
TITLE : ERECTION PROCEDURE FOR SEWAGE TRAETMENT PLANT	REV/DATE : REV.0 / 02.11.2018 PAGES : 16 OF 17

1.0 General

This specification serves to give a broad outline for the fabrication, erection, inspection and testing of piping systems.

Generally all pipes, pipe fittings, flanges, permanent gaskets, fasteners, valves, specialties and in-line instruments will be supplied to site. Structural steel required for fabrication of pipe supports and all the hardware items like U bolts, pipe clamps, bolts, nuts, spring supports, rod hangers, beam attachments etc

1.1 Drawings

- Piping layout

- Isometric drawings for rubber lined piping, steam (IBR) piping and special material piping.

All the other working isometrics have to be developed by PEL from the above drawings supplied.

Changes on the drawings and furnish “As Built” drawing marked up prints.

1.2 Tools, Tackles and Consumables

Before start ensure all tools, tackles and consumables required for the execution of the contract including:

1. Welding materials like electrodes, gas, and cutoff and grinding wheels.

2. Joining materials for screwed joints.

3. Isotopes for gamma-ray or x-ray equipment, liquid dye penetrant and other testing materials and equipment.

4. Erection tools, tackles and materials including welding machines, gas cutting sets, chain pulley blocks, jacks, derricks, pulley blocks, hydraulic test pumps, pressure gauges, H.P. Hoses, Air compressors etc.

1.3 **Erection**

The ends of Pipes to be welded are to be prepared in accordance to the kind of weld joint to be made. Only qualified welders are permitted to do the welding. All slag or flux remaining on any bead of welding shall be removed before laying down the next successive bead.

When several pipelines are laid parallel, the flanged joints are to be staggered. Bending of C.S and S.S pipes to be done in such a way as to produce bends which are free from wrinkles, bulges, cracks, buckles, flat spots, etc.

Flanged connections at the equipment such as pumps, tanks, heat exchangers etc. shall be made in such a way as not to induce any stresses on the equipment due to mis-alignments, excessive gaps, etc. Location and arrangement of supports shown in Layout Drawings and Support Drawings should be strictly adhered to. Soft seated valves to be welded to the line strictly as per manufacturer's recommendation. All piping shall be arranged and aligned in accordance with the drawings. Dimensions must be held as closely as possible. Necessary platform to be provided at site for the valves for operating which are beyond the reason of operation.

1.4 **Inspection**

The work shall at any time be available for inspection. All welds not upto the standard will be rejected

NOTE: THE ABOVE PROCEDURE IS GENERAL ERECTION PROCEDURE OF SEWAGE TREATMENT PLANT. THIS STANDARD PROCEDURE WILL BE FOLLOWED GENERALLY AT SITE.

APPROVED

REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
0	17. 11. 2018	ISSUED FOR INFORMATION			
0-A	02. 11. 2018	ISSUED FOR INFORMATION	GRK	RRK	VLP

PROJECT:		2 X 660MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.
TANGEDCO	**OWNER:**	TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED
DESEIN	**OWNER'S CONSULTANT:**	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI
BHEL	**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
– –	I		– –	–	–	–

TITLE

PG TEST PROCEDURE FOR SEWAGE TREATMENT PLANT

	NAME	SIGN	DATE
PREP	GRK		02.11.2018
CHKD	RRK		02.11.2018
APPD	VLP		02.11.2018

								CARD CODE	BHEL DOC NO.	REV
DEPT.									PE-V0-412-673-A031	
SIGN			N.A.					–	PEL DOC NO. A4-PEL-1037-PGT-01	0
DATE									NO. OF SHEETS – 6 (EXCLUDING COVER SHEET)	

TABLE OF CONTENT

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OBJECTIVE

The objective of the PG Test is to ensure that the system is performing well, with respect to pump capacity and head and meeting/delivering the required parameters of product Treated Sewage from final treatment Units. Tube settlers of the respective unit as prescribed in the customer's purchase order.

The system is closely monitored to ensure trouble free and optimum/efficient performance of all the electrical & mechanical equipments, accuracy of all instruments and functioning of all process interlocks for system reliability and integrity. Further, the PG test will also establish that the consumption of power is as per commitment with in tolerance limits.

ANNEXURE-I

A. The quality of sewage shall conform to the following standards.

Sl. No.	Parameters	Unit	Permissible Limit
1	BOD (5 days at 20°C)	mg/L	Not more than 10
2	COD	mg/L	Not more than 100
3	TSS	mg/L	Not more than 20
4	pH	-	6.5-8.0
5	NH4-N	mg/L	Not more than 05
6	N- TOTAL	mg/L	Not more than 10
7	COLIFORM	(MPN/1000m1)	Not more than 10^3
8	Oil and Grease	mg/L	-

A. The quality of sewage at inlet of Sewage Treatment plant.

Sl. No.	Parameters	Unit	Value
1	BOD (5 days at 20°C)	mg/L	300
2	COD	mg/L	600
3	TSS	mg/L	300
4	pH	-	7.0 to 8.0
5	COLIFORM	MPN / 1000ml mg/L	10^6 – 10^7
6	Oil and Grease	mg/L	Not more than 50 mg/L
7	NH4-N	mg/L	-
8	N- TOTAL	mg/L	-

ANNEXURE-II

STANDARD OPERATING PROCEDURE (SOP) FOR CONDUCTING THE P.G. TEST

STEP 1: COMPLETION OF ERECTION OF MECHANICAL AND ELECTRICAL EQUIPMENTS

Certify that all equipments (Mechanical/Electrical/Instrumentation as indicated in O & M manual for STP) have been erected and the plant is ready for PG test.

STEP 2: CALIBRATION OF INSTRUMENTS AND INTERLOCKS

Certify that all instruments (as indicated in O&M manual for STP) have been calibrated and all interlocks are provided and tested.

STEP 3: COLLECTION OF SAMPLES AT FEED TO SEWAGE TREATMENT PLANT.

These homogenized samples will be collected at the time of the PG Test. Sampling will be done jointly once in 4 hours at the respective collection sump. Testing of those samples shall be carried by PEL in the laboratory.

STEP 4: LOG SHEET CERTIFICATION

All readings noted will be jointly signed by the representatives of PEL, BHEL & TANGEDCO.

STEP 5: AUTHORIZATION OF TEAM FOR PG TEST

PEL:

BHEL:

TANGEDCO:

LOG SHEET

FOR SEWAGE TREATMENT PLANT

Sl. No.	Date	Flow M3/hr	Raw Sewage				Treated Sewage			
			pH	BOD in ppm	COD in ppm	TSS in ppm	pH	BOD in ppm	COD in ppm	TSS in ppm

GENERAL CONDITIONS

1) Influent Sewage analysis to STP should be provided by client prior to the startup of the P.G. test.

2) For BOD and COD analysis, samples to be sent to the nearest authorized laboratory jointly agreed by TANGEDCO and BHEL.

3) Required quality and quantity of waste water (as mentioned in Annexure-I) power (as per approved load list of both three and single phase) & air (compressed air to run the pneumatically operated equipments) must be available on continuous basis.

   In case of non-availability of the same or in case of any interruption during the PG test, the breakage in sequence will be considered as a part of the PG test.

4) All interlocks are process and safety interlocks.

5) Necessary calibrated tool and Portable instrument required for PG test shall be arranged by M/s. PEL as per contract, however, if facility as available in M/s. TANGEDCO lab can be used with prior permission from M/s. TANGEDCO.

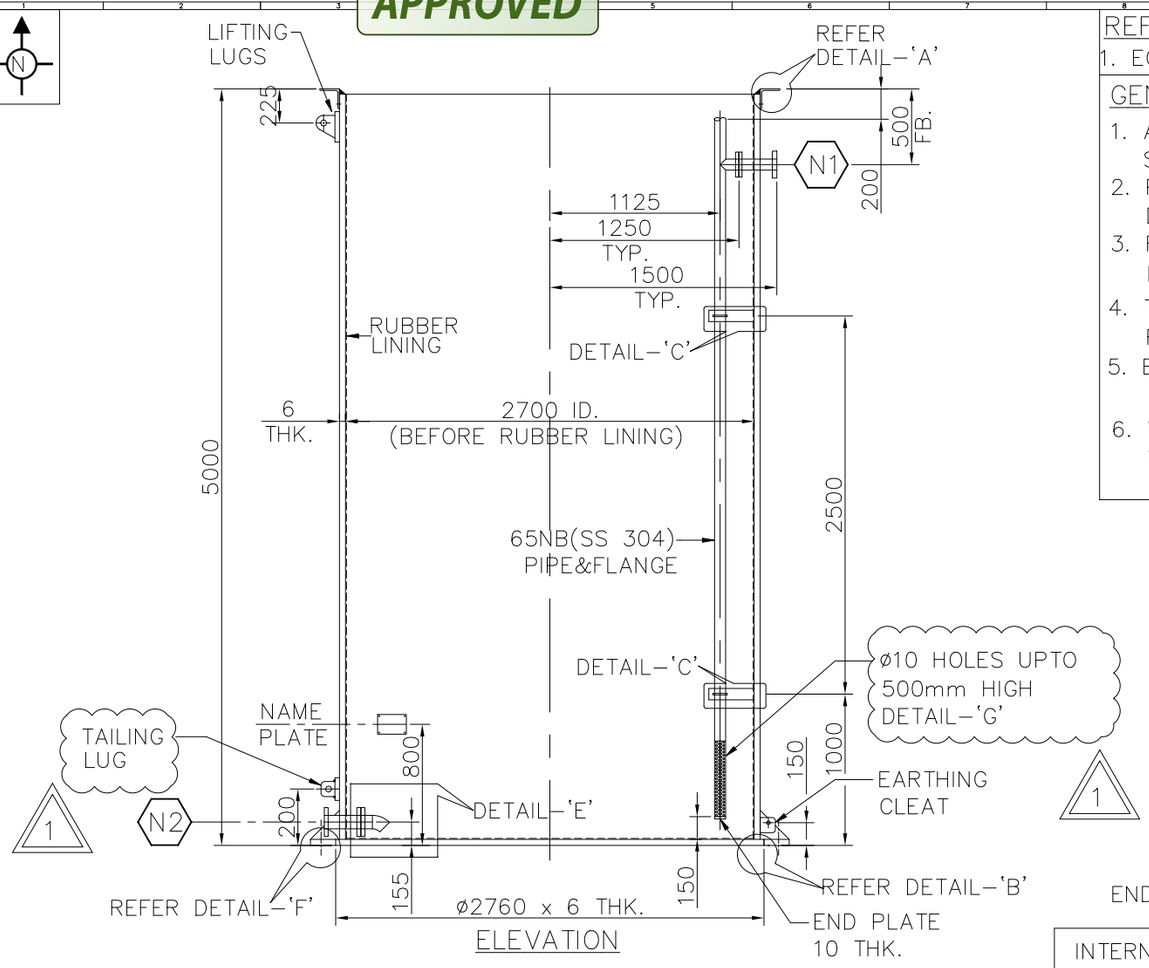
6) PG Test will be conducted for a period of 48 hours. In case of any disruption in between the test, the time lapsed earlier shall be counted for full PG test.

7) At the end of the PG test, if the objective mentioned in the beginning of this PG test procedure is established, an MOM (minutes of meeting) will be signed off between BHEL/ TANGEDCO & PEL mentioning that PG test has been completed & that the plant has been taken over for operation by customer. Punch points, if any, may be mentioned in the said MOM to enable PEL to subsequently address the same. These punch points will not have any effect on the success of the PG Test.

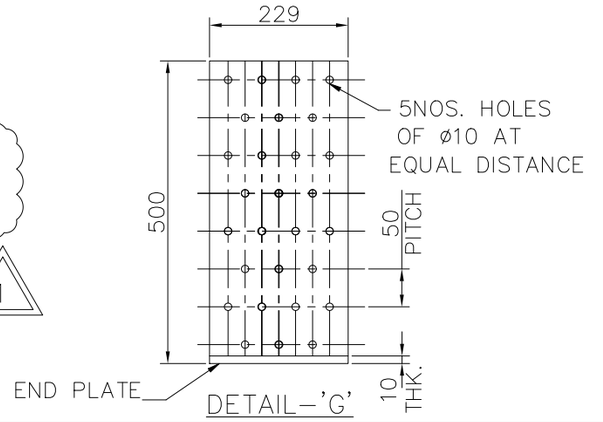
8) Noise level of all pumps and blowers at rated duty point shall be demonstrated at site.

APPROVED

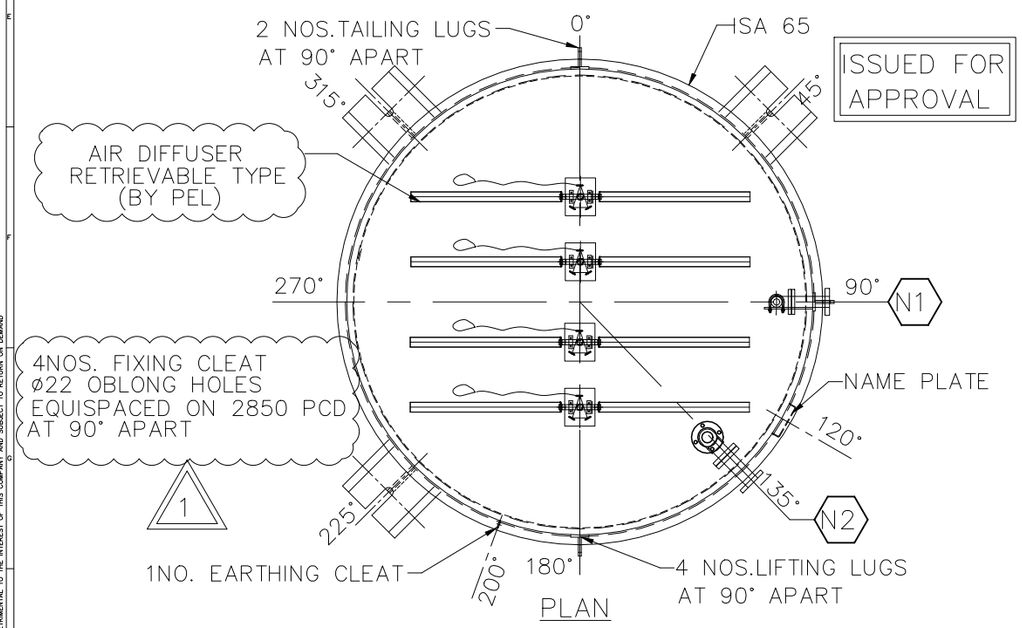
PEL/D&D-F003



ELEVATION



DETAIL–'G'



PLAN

ISSUED FOR APPROVAL

REFERENCE DRAWINGS:

1. EQUIPMENT LAYOUT : A1–PEL–1037–EL–001

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE SPECIFIED.
2. PLEASE DO NOT SCALE THE DRAWING. REFER DIMENSIONS ONLY.
3. FOR EQUIPMENT LOCATION & ORIENTATION REFER EQUIPMENT LAYOUT.
4. THE TOTAL STRUCTURE TO BE MOUNTED ON THE RCC FOUNDATION.
5. BOTTOM PLATE NEED TO BE PAINTED FROM BOTTOM SIDE BY TWO COATS OF COAL TAR EPOXY PAINT.
6. WELD SEAM OF THE SHELL SHOULD NOT FOUL WITH NOZZLE OPENINGS AND OTHER DETAILS LIKE LIFTING LUGS, ETC.

LIST OF NOZZLE CONNECTIONS

MK.NO.	DESCRIPTION	SIZE (NB)	SCH. /THK.	QTY. NOS.	REMARKS
N1	OUTLET	65NB	HEAVY	1	
N2	DRAIN	80NB	HEAVY	1	

DESIGN DATA

DESIGN CODE	: IS:803 1
DESIGN PRESSURE	: ATM
DESIGN TEMPERATURE	: 50°C (Atmospheric)
FLANGES EXTERNAL	: ANSI B16.5 150# SOFF. OFF CRS.
FLANGES INTERNAL	: BS.10 TABLE 'D' SOFF OFF THK. 12THK. MIN.
INSPECTION	: AS PER APPROVED QAP BY PEL.
EMPTY WEIGHT	: 2415 kgs.
OPERATING WEIGHT	: 32000 kgs.
EXT. PAINTING AREA	: 57 Sq.M
INT. R/L AREA	: 60 Sq.M

MATERIAL OF CONSTRUCTION

SHELL/BASE PLATE	: IS 2062 Gr. B
FLANGES EXTERNAL	: IS 2062 Gr. B
FLANGES INTERNAL	: IS 2062 Gr. B
NOZZLE NECKS	: IS 1239 PART–1 HVY. DUTY ERW
EXT. ATTACHMENTS	: IS 2062 Gr. B
INT. ATTACHMENTS	: SS 304 (PIPE & U–CLAMPS)
U–BOLTS,BOLTS & NUTS EXT:	IS 1367 CLASS 4.6/4,GALV.
U–BOLTS,BOLTS & NUTS INT.:	SS 304
GASKETS	: 3 mm THK. NATURAL RUBBER
INTERNAL LINING	: 4.5 THK. NATURAL RUBBER IN 3 LAYERS,HARDNESS 65°±5° SHORE 'A' AS PER IS:4682 PART–I

INTERNAL SURFACE PREPARATION	: ABRASIVE BLASTING AS PER SA 2 1/2.

EXTERNAL PAINTING:

SURFACE PREPARATION	: ABRASIVE BLASTING AS PER SIS05–5900, GRADE SA 2 1/2, 1 COAT OF INORGANIC ETHYL ZINC SILICATE SHOPE PRIMER,DFT =15–25 MICRONS (MIN.)
PRIMER	: 2 COATS OF ZINC PHOSPHATE EPOXY PRIMER, DFT= 75 MICRONS
INTERMEDIATE COAT	: 1 COAT 2 PACK HIGH BUILD EPOXY POLYAMIDE MIO @ 100 MICRONS DFT/ COAT(1x100=100 MICRONS)
FINISH COAT	: 2 COATS OF CHLORINATED RUBBER PAINT APPROVED SHADE @ 50 MICRONS DFT/COAT (2x50=100 MICRONS)
TOTAL DFT	: 290–300 MICRONS.
COLOUR SHADE	: ALUMINIUM

FABRICATOR SCOPE OF SUPPLY:–

FOUNDATION BOLTS FOR LEGS M20x 260 LG.WITH 2 NUTS & 1 WASHER EACH – 4 SETS
GASKET FOR NOZZLE N1 : 1 NO.
GASKET FOR NOZZLE N2 : 1 NO.
1BOLT+1NUT+2WASHERS FOR NOZZLE N1 M16x70 LG. – 4 SETS
1BOLT+1NUT+2WASHERS FOR NOZZLE N2 M16x70 LG. – 4 SETS
65NB U– CLAMP 2NUTS & 1 WASHER EACH –2NOS.

UNIT LIST

TAG.NO.	DESCRIPITON	SIZE	QTY.	MATERIAL
MBBR	MBBR AERATION TANK	ø2.7Mx4.5M LD +0.5M FB	1NO.	MSRL

REV	DATE	DESCRIPTION	MECH.	DRAWN	CHK.
1	05.11.2018	REVISED AS PER COMMENTS	PAK	MKK	SSY
0	25.09.2018	ISSUED FOR APPROVAL	PAK	KVK	SSY

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

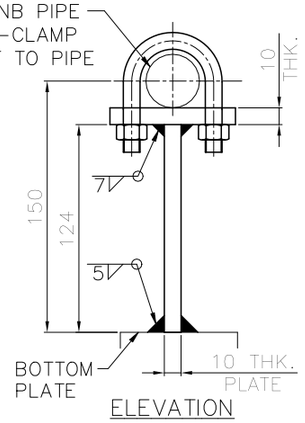
DEPT.	CODE		SCALE	WEIGHT (KG)	VENDOR DRAWING NO.	ITEM
--	--		1:25	–	A3–PEL–1037–FGA–003	

TITLE: FABRICATION DRAWING FOR MBBR TANK

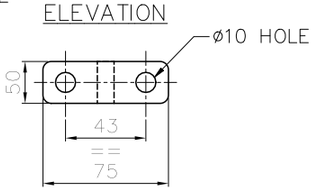
	NAME	SIGN	DATE
PREP	KVK		25.09.2018
CHKD	SSY		25.09.2018
CHKD	PAK		25.09.2018
APPD	PAK		25.09.2018

DEPT.	CARD CODE	BHEL DRAWING NO.	REV
SIGN	–	PE–V0–412–673–A039	1
DATE		NO. OF SHEETS – 1 OF 2	

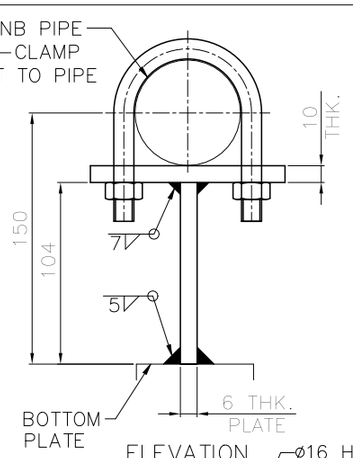
PEL/D&D-F003



ELEVATION



PLAN
(SUPPORT S-1)
(QTY.-12 NOS.)



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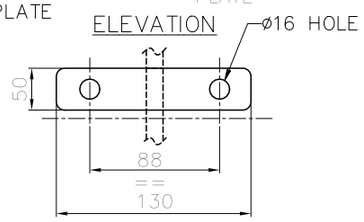
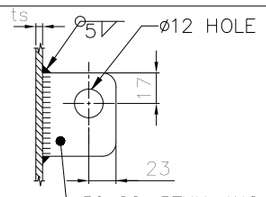
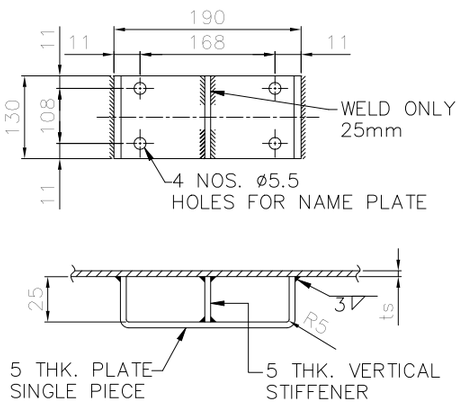


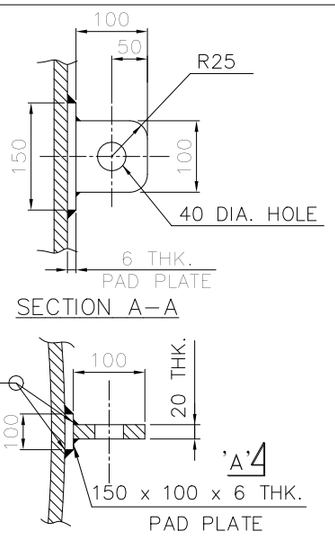
PLAN
(SUPPORT S-2)
(QTY.-2 NOS.)



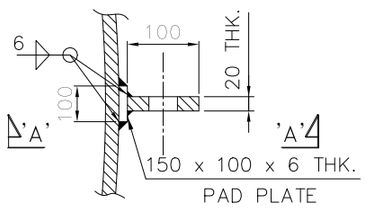
EARTHING CLEAT



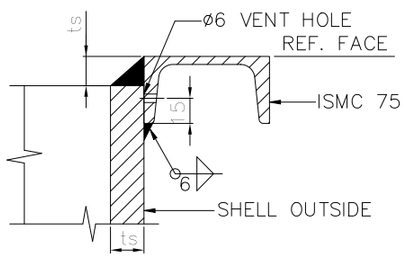
NAME PLATE BRACKET



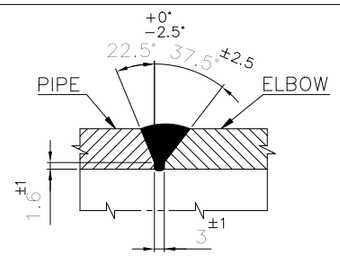
SECTION A-A



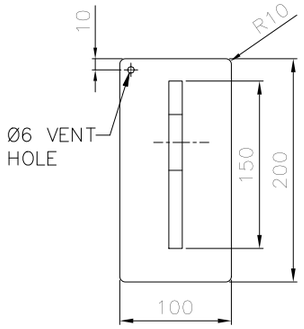
TAILING LUG



TYP. DETAIL-'A'



PIPE TO ELBOW
WELD DETAIL



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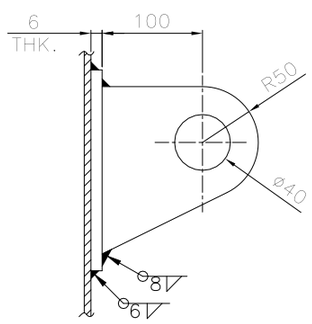
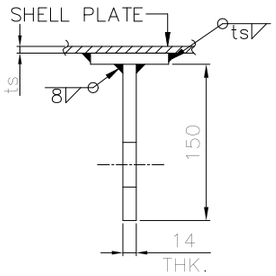
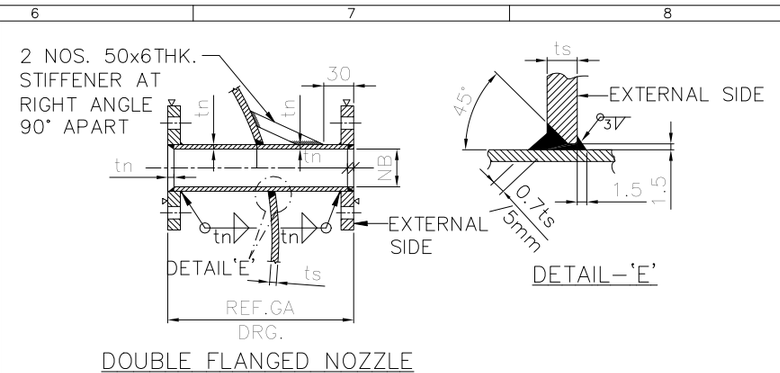


SIDE VIEW

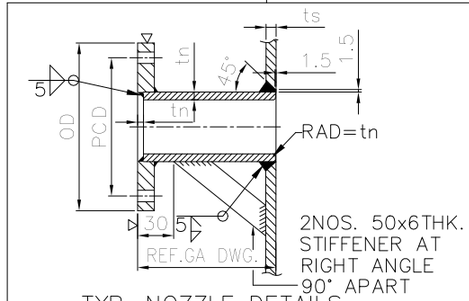


PLAN

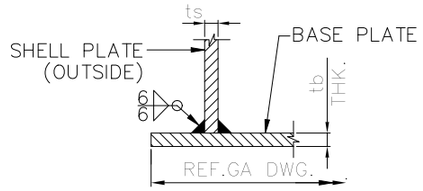
DETAIL OF LIFTING LUG



DOUBLE FLANGED NOZZLE

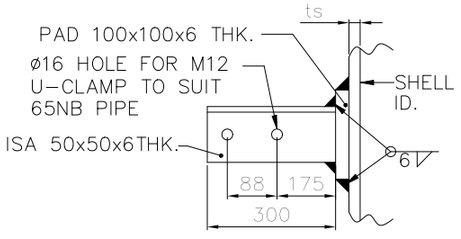


TYP. NOZZLE DETAILS
(WITHOUT COMPENSATING PAD)
(UP TO 65 NB)

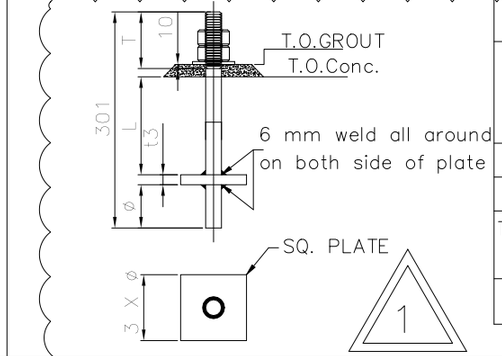


TYP. DETAIL-'B'

TYP. WELDING DETAILS OF
SHELL TO BOTTOM PLATE

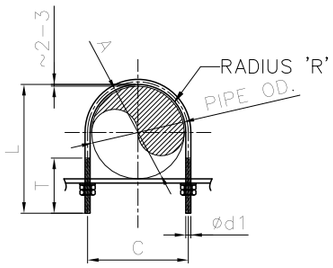


DETAIL-'C'
DETAIL FOR PIPE
SUPPORT CLEAT



M20 BOLT DIMENSION	
DIMENSION (in mm)	BOLT DIA (ø) in mm
	20
L	130mm
t3	16mm
T(Threaded length) DOUBLE NUT	110mm
Total Qty.	04 nos.

FOUNDATION BOLT DETAIL

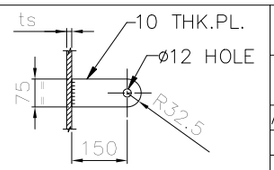


U-CLAMP DETAILS

DETAIL OF U-BOLT

S.NO.	NOMINAL BORE (NB)	NOMINAL BORE (IN)	PIPE OD. (mm)	Thread length (mm) T	ROD DIA. (mm) d1	RADIUS (mm)			HOLE DIA. (mm) d2	Thread Size (mm) Metric
1	25	1	33.4	50	6	19	43	67	ø10	M6
2	65	2 1/2	73	65	12	38	88	115	ø16	M12

LEGEND:
ts :- SHELL THK.
tn :- NOZZLE THK.
tb :- BOTTOM PLATE THK.



TYP. DETAILS OF
LADDER SUPPORT CLEAT

ISSUED FOR QUOTATION

1	REVISED AS PER CLIENT COMMENTS	MKK	SSY	08-11-2018	
0	ISSUED FOR FABRICATION	AP	SSY	17-08-18	
REV	DESCRIPTION	DRN	CHK	DATE	

CLIENT:	M/S TATA PROJECTS LIMITED HYDERABAD,TELANGANA.
PROJECT:	350 (2x175) KLD SEWAGE TREATMENT PLANT
APRD BY	PAK
CHK BY	MEC. SSY
CHK BY	E&I --
CHK BY	PROS. --
DRN BY	AP
SCALE	1:25
DWG.SIZE	A3
DATE	17-08-18

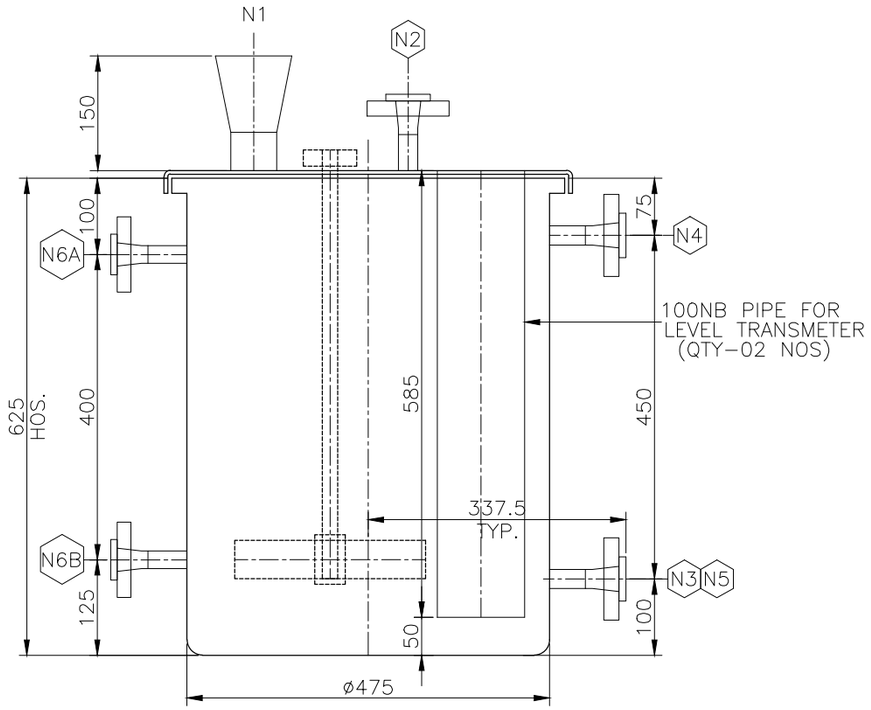
PENNAR ENVIRO
Re-engineering Water, Environment & Energy
Floor No. +3, DHFLVC Silicon Towers, KondMKKur, MadhMKKur Road, Hyderabad - 500 084

TITLE: WELDING DETAILS FOR MBBR TANK - 01 & 02

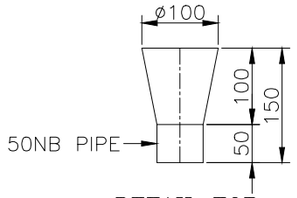
DRAWING NO: A3-PEL-1058-WLD-001 | SHEET 1 OF 1 | REV. 0

COMMENTS RESOLUTION SHEET [CRS]			APPROVED
PROJECT NAME	2 X 660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI.		
DOCUMENT NUMBER	PE-V0-412-673-A040	**DATE**	13-12-2018
DOCUMENT TITLE	GA DRAWING OF HYPO DOSING TANKS	**REVISION**	**R-1**

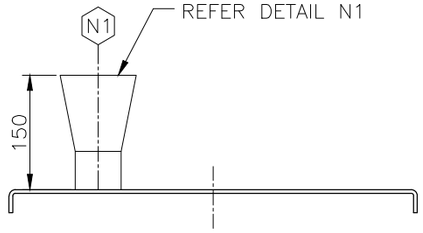
No.	CLIENT COMMENT	PEL RESPONSE
1.	Indicate empty and filled weight of each tank.	Noted & Incorporated.



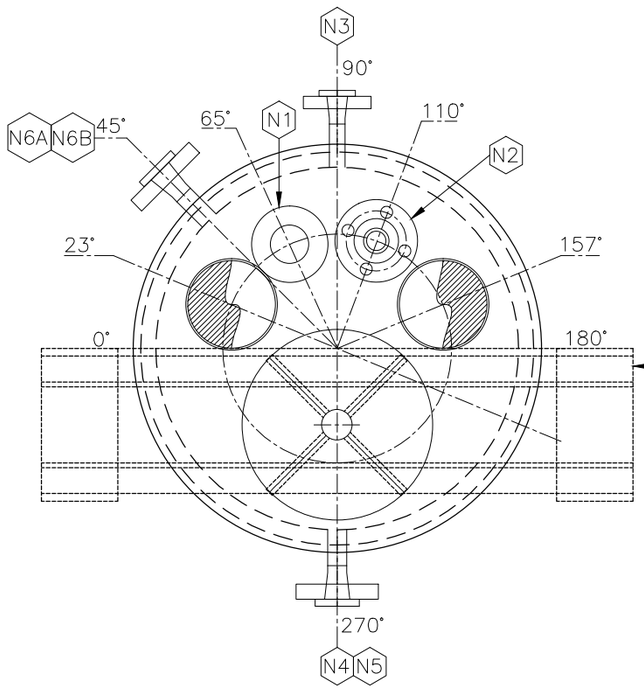
SECTIONAL ELEVATION



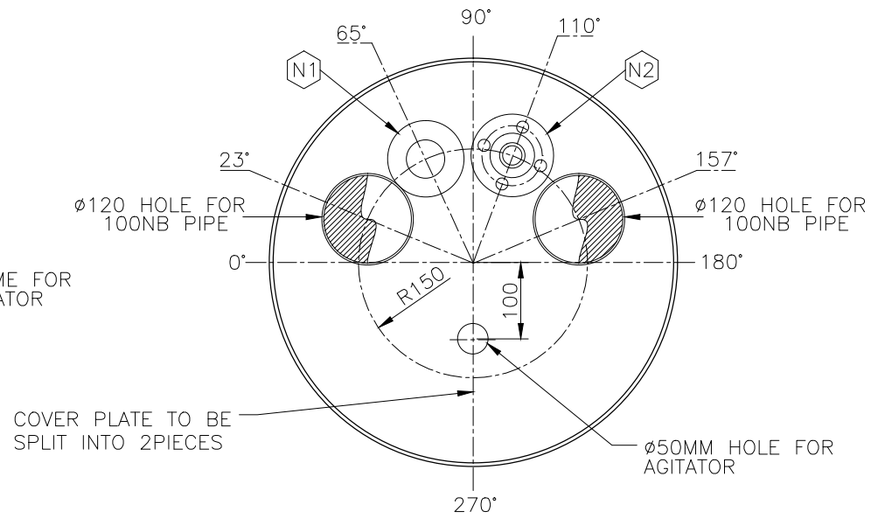
DETAIL FOR
INLET NOZZLE(N1)



ELEVATION



NOZZLE ORIENTATION PLAN
(100 Ltrs. LDPE TANK)
(ø475X625 HOS.)



PLAN DETAILS OF
TOP COVER

NOZZLE SCHEDULE

NOZZLE NO.	QTY.	DESCRIP-TION	PIPE		STUB END		BACKING FLANGE		
			SIZE NB	RATING	SIZE NB	RATING	SIZE NB	RATING	STD
N1	01	CHEMICAL INLET	100X50	PN10	--	--	--	--	--
N2	01	SERVICE WATER	25	PN10	25	PN10	25	150#	ANSI B16.5
N3	01	OUTLET	15	PN10	15	PN10	15	150#	ANSI B16.5
N4	01	OVER FLOW	25	PN10	25	PN10	25	150#	ANSI B16.5
N5	01	DRAIN	15	PN10	15	PN10	15	150#	ANSI B16.5
N6A/B	02	LEVEL GAUGE	20	PN10	20	PN10	20	150#	ANSI B16.5

NOTES:-

1. THIS DRAWING SHALL BE USED ONLY FOR NOZZLE ORIENTATION ITS LOCATION AND ANY ADDITIONS TO THE BOUGHTOUT TANK.
2. LEAKAGE TEST SHALL BE CARRIED OUT WITH WATER FILLUP ATLEAST
3. ALL FLANGES TO BE PROVIDED LOOSE WITH COLLAR
4. WORKMANSHIP SHOULD BE GOOD TO AVOID ANY CRACKING OF PIPES & FLANGES.
5. ALL DIMENSIONS ARE IN MM & TO BE MAINTAINED WITHIN ± 2MM. WELDING QUALITY AND STRENGTH SHOULD BE GOOD TO AVOID ANY LEAKAGES FROM WELD JOINTS

REFERENCE DWG. NOS.:-

1. P&ID :-PEL-12171037-PRO-PID-001
2. EQUIPMENT LAYOUT :-A1-PEL-1037-EL-001

BILL OF MATERIALS(BOM)

S.NO	ITEM	DESCRIPTION	SIZE NB	QTY LENGHT(m)	REMARKS
1	PIPE	UPVC/ASTM D 1785,SCH 40, ONE SIDE PLANE END & ONE SIDE THREADED END.(NPT-M)	100	1.17	PERFORATED

TAG NO	:- DT-01&02
QTY	:- 02 NO.
MOC	:- LDPE.
CAP	:- 100 LTRS.
SIZE	:- 475 ø x 625 HOS.
TYPE	:- CYLINDRICAL VERTICAL TANK
EMPTY WEIGHT (EACH TANK)	:- 20 KG'S
OPERATING WEIGHT: (EACH TANK)	:- 150 KG'S

R1

ISSUED FOR APPROVAL

PROJECT	2x660MW 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
	BHARAT HEAVY ELECTRICALS LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA
	PENNAR ENVIRO Re-engineering Water, Environment & Energy Floor No. +3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad - 500 084

DEPT.	CODE	SCALE	WEIGHT (KG)	VENDOR DRAWING NO.	ITEM
--	--	AS SHOWN	-	A3-PEL-1037-TGA-001	

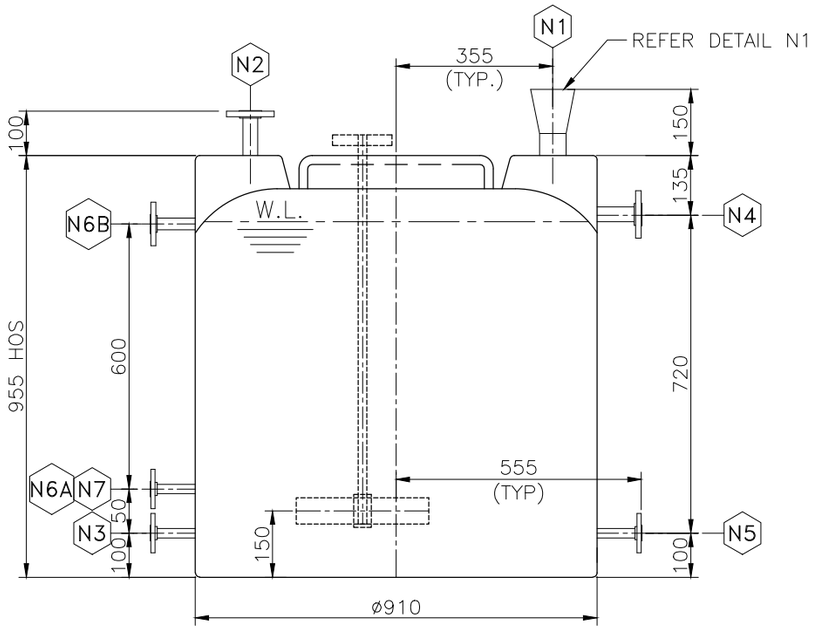
TITLE

G.A. DRAWING OF
HYPO DOSING TANKS(DT-01&02)

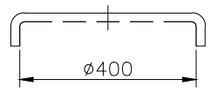
	NAME	SIGN	DATE
PREP	KVK		24.09.2018
CHKD	AAY		24.09.2018
CHKD	SSY		24.09.2018
APPD	PAK		24.09.2018

REV	DATE	DESCRIPTION	MECH.	DRAWN	CHK.	ARCH.	ELEC.	C&I
1	12-13-18	REVISED AS PER TANGEDCO COMMENTS	PAK	PSR	SSY	-	GSR	KBP
0	24-09-18	ISSUED FOR APPROVAL	PAK	KVK	SSY	-	GSR	KBP

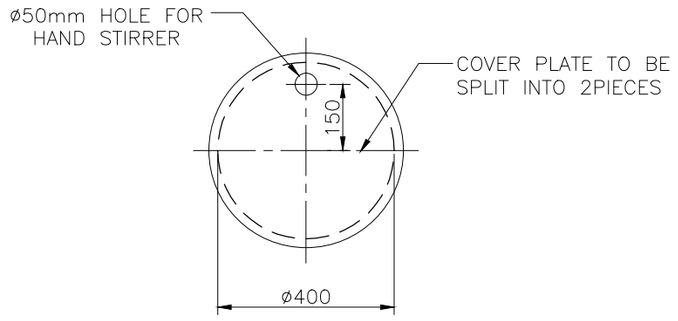
DEPT.	CARD CODE	BHEL DRAWING NO.	REV
SIGN	-	PE-V0-412-673-A040	1
DATE		NO. OF SHEETS - 1 OF 2	



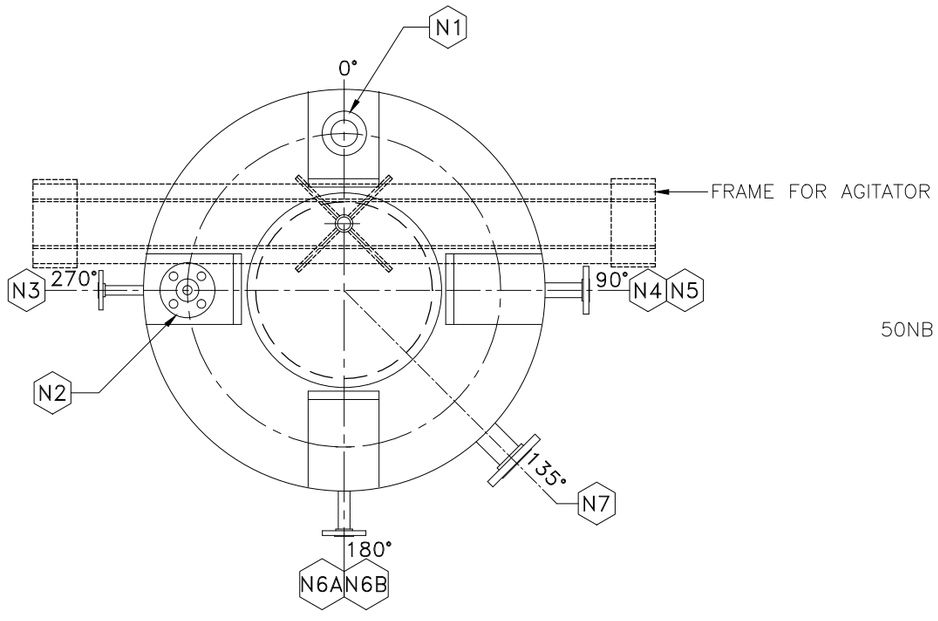
SECTIONAL ELEVATION



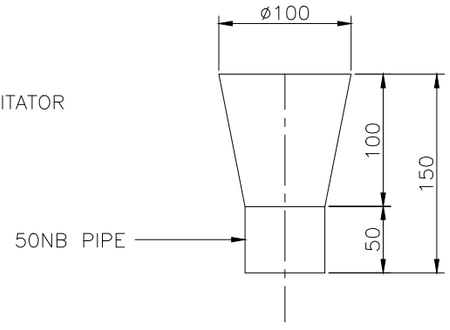
ELEVATION



PLAN DETAILS OF
MANHOLE COVER



NOZZLE ORIENTATION PLAN
500LITRES HDPE TANK
(ø910X955 HOS)



DETAIL FOR
INLET NOZZLE(N1)

NOZZLE SCHEDULE

NOZZLE NO.	QTY.	DESCRIPTION	PIPE SIZE NB	PIPE RATING	STUB END SIZE NB	STUB END RATING	BACKING FLANGE SIZE NB	BACKING FLANGE RATING	BACKING FLANGE STD
N1	01	CHEMICAL INLET	100X50	PN10	--	--	--	--	--
N2	01	SERVICE WATER	25	PN10	25	PN10	25	150#	ANSI B16.5
N3	01	OUTLET	15	PN10	15	PN10	15	150#	ANSI B16.5
N4	01	OVER FLOW	25	PN10	25	PN10	25	150#	ANSI B16.5
N5	01	DRAIN	15	PN10	15	PN10	15	150#	ANSI B16.5
N6A/B	02	LEVEL GAUGE	20	PN10	20	PN10	20	150#	ANSI B16.5
N7	01	LEVEL SWITCH	50	PN10	50	PN10	50	150#	ANSI B16.5

NOTES:-

1. THIS DRAWING SHALL BE USED ONLY FOR NOZZLE ORIENTATION ITS LOCATION AND ANY ADDITIONS TO THE BOUGHTOUT TANK.
2. LEAKAGE TEST SHALL BE CARRIED OUT WITH WATER FILLUP ATLEAST
3. ALL FLANGES TO BE PROVIDED LOOSE WITH COLLAR
4. WORKMANSHIP SHOULD BE GOOD TO AVOID ANY CRACKING OF PIPES & FLANGES.
5. ALL DIMENSIONS ARE IN MM & TO BE MAINTAINED WITHIN ± 2MM. WELDING QUALITY AND STRENGTH SHOULD BE GOOD TO AVOID ANY LEAKAGES FROM WELD JOINTS

REFERENCE DWG. NOS.:-

1. P&ID :-PEL-12171037-PRO-PID-001
2. EQUIPMENT LAYOUT :-A1-PEL-1037-EL-001

TAG NO	:- DT-03
QTY	:- 01 NO.
MOC	:- HDPE.
CAP	:- 500 LTRS.
SIZE	:- 910 ø x 955 HOS.
TYPE	:- CYLINDRICAL VERTICAL FLAT BOTTOM TANK
EMPTY WEIGHT (EACH TANK)	:- 50 KG'S
OPERATING WEIGHT (EACH TANK)	:- 650 KG'S

R1

ISSUED FOR APPROVAL

PROJECT	2x660MW 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
	BHARAT HEAVY ELECTRICALS LIMITED (A GOVERNMENT OF INDIA ENTERPRISE) PROJECTS ENGINEERING MANAGEMENT, NOIDA
	PENNAR ENVIRO Re-engineering Water, Environment & Energy Floor No. +3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad – 500 084

DEPT.	CODE	SCALE	WEIGHT (KG)	VENDOR DRAWING NO.	ITEM
--	--	AS SHOWN	-	A3-PEL-1037-TGA-001	

TITLE: G.A. DRAWING OF DWPE DOSING TANK

	NAME	SIGN	DATE
PREP	KVK		24.09.2018
CHKD	AAY		24.09.2018
CHKD	SSY		24.09.2018
APPD	PAK		24.09.2018

REV	DATE	DESCRIPTION	MECH.	DRAWN	CHK.	ARCH.	ELEC.	C&I
1	13-12-18	REVISED AS PER TANGEDCO COMMENTS	PAK	PSR	SSY	-	GSR	KBP
0	24-09-18	ISSUED FOR APPROVAL	PAK	KVK	SSY	-	GSR	KBP

DEPT. / SIGN / DATE: N.A.

CARD CODE: -

BHEL DRAWING NO.: PE-V0-412-673-A040 REV: 1

NO. OF SHEETS – 2 OF 2

PEL/D&D–F003

APPROVED

REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
1	16.02.2019	ISSUED FOR APPROVAL	PSR	SSY	
0	04.09.2018	ISSUED FOR APPROVAL	MKK	SSY	PAK

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. +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

Datasheet for Diffuser & Tube settler Media

	NAME	SIGN	DATE
PREP	PSR		16.02.2019
CHKD	SSY		16.02.2019
APPD	PAK		16.02.2019

DEPT.							CARD CODE	BHEL DOC NO.	REV
SIGN				N.A.			–	PE-V0-412-673-A041	
DATE								PEL DOC NO. A4-PEL-1037-DS-DF001 A4-PEL-1037-DS-DF002 A4-PEL-1037-DS-TSM001	1
								NO. OF SHEETS – 11 (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-A041
DOC NAME: Datasheet & GA for Diffuser & Tube Settler Media

COMMENTS RESOLUTION SHEET

S.No.	TANGENDCO Comments	BHEL/PEL's Response
1	Indicate freeboard of tube settler	Noted & incorporated
2	Indicate MOC of tube settler	Noted & incorporated
3	Indicate Rise rate and weight of tube settler.	Noted & incorporated

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

CONTENTS

1. Diffusers & Tube Settler Media

SR.NO	DESCRIPTION	PAGES
1.1	TECHNICAL DATA SHEET FOR FINE BUBBLE DIFFUSERS WITH RETRIEVABLE ARRANGMENT	1-3
1.2	TECHNICAL DATA SHEET FOR CORSE BUBBLE DIFFUSERS WITH RETRIEVABLE ARRANGMENT	4-7
1.3	TECHNICAL DATASHHET FOR TUBE SETTLER MEDIA	8-9
1.4	TECHNICAL DATASHHET FOR MBBR MEDIA	10-11

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**16-02-19**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**1**
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-A041**	**PEL Doc. no:**	**A4-PEL-1037-DS-DF001**

Datasheet for Coarse bubble diffusers with Retrievable Arrangement

General Data			
Manufacturer	Chennai floating	Size of bubble	10 to 12 mm
Service	Air	Type of diffuser	Tubular
Type of bubble	Coarse bubble	Type of air discharge	Upward

Properties of Liquid	
Service	Sewage
Temp.[nor/max] in Deg.C	35/50
Density (kg/m3)	1000
ph	7.0 - 8.0
Viscosity at operating temp (cp)	1 to 1.1

Diffuser Details

Tank	Tank Size	Air Requirement	Diffuser quantity(in nos.)	Flow per diffuser(m3/hr.) Average/Max.	Size of Tube (mm)	SIZE/End connection(NPT-M)
Common collection sump	2.5m(L) x 2.5m(W) x 1.6m(SWD)+1.9m(FB)	13.5 m3/hr @ 0.4 kg/cm2	2	10	Dia90mm x 750mm	1"BSP
Equalization Tank	3.6m(L) x 3.6(W)m x 2.5m(SWD)+0.7m(FB)	29.2 m3/hr @ 0.4 kg/cm2	4	10	Dia90mm x 750mm	1"BSP
Sludge Holding tank	2.0m(L) x 2.0(W)m x 1.5m(SWD)+0.5m(FB)	5.4 m3/hr @ 0.4 kg/cm2	2	10	Dia90mm x 750mm	1"BSP
Pressure Drop across Diffuser			100mmwc			

Materials of Construction	
Diffuser Tube	PP
Membrane	EPDM
Membrane support	ABS/PVC
Hook ,clamp, fasteners,foundation bolt & other accessories	SS 304
Air inlet hose	PVC
Rope	PP

Rev	Date	Description	Made	Chkd	Appd
1	16.02.2019	For Approval	PSR	SSY	PAK

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**16-02-19**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**1**
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-A041**	**PEL Doc. no:**	**A4-PEL-1037-DS-DF002**

Datasheet for Fine bubble diffusers with Retrievable Arrangement

General Data			
Manufacturer	Chennai floating	Size of bubble	2 to 3mm
Service	Air	Type of diffuser	Tubular
Type of bubble	Fine bubble	Type of air discharge	Upward

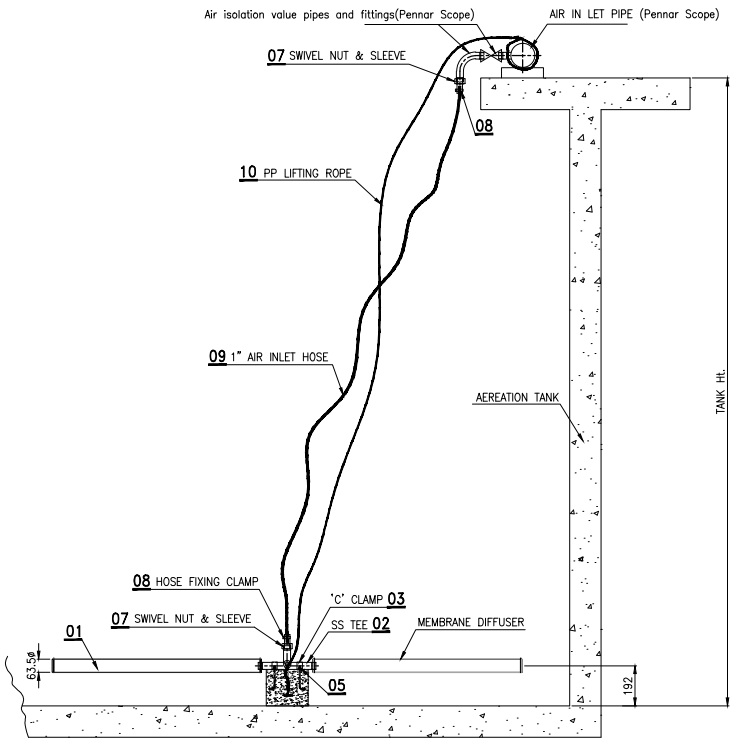
Properties of Liquid	
Service	Sewage
Temp.[nor/max] in Deg.C	35/50
Density (kg/m3)	1000
ph	7.0 - 8.0
Viscosity at operating temp (cp)	1 to 1.1

Diffuser Details

Tank	Tank Size	Air Requirement	Diffuser quantity(in nos.)	Flow per diffuser (m3/hr.) Average/Max.	Size of Tube (mm)	SIZE/End connection(NPT-M)
MBBR Aeration Tank	2.7m(Dia) x 4.5m (SWD)+0.5m (FB)	38.7 m3/hr @ 0.5 kg/cm2	4	10	Dia 910mm x 1m	1" NPT
Pressure Drop across Diffuser			30mmwc			

Materials of Construction	
Diffuser Tube	PP
Membrane	Silicon
Membrane support	ABS/PVC
Hook ,clamp, fasteners,foundation bolt & other accessories	SS 304
Air inlet hose	PVC
Rope	PP

Rev	Date	Description	Made	Chkd	Appd
1	16.02.2019	For Approval	PSR	SSY	PAK



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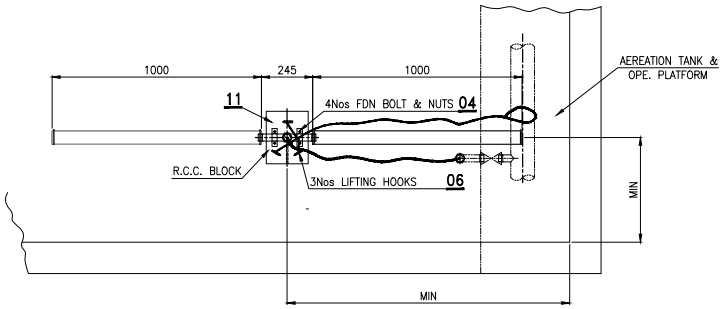
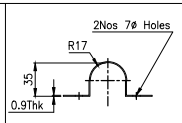
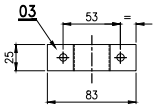
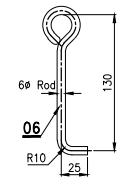


PLAN VIEW

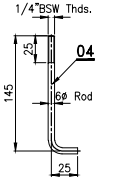




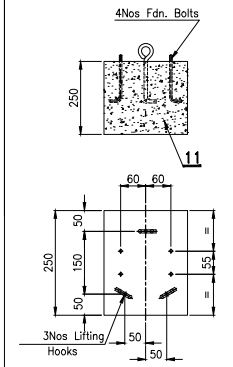
'C' CLAMP ARRG.



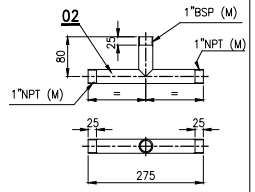
LIFTING HOOK



FDN. BOLTS



R.C.C BLOCK ARRG.



DIFFUSER FIXING TEE ARRG.

NOTES
1. ALL DIEMENSIONS ARE IN mm, UNLESS SPECIFIED OTHERWISE.
2. NECESSARY REINFORCEMENT RODS SHALL BE PROVIDED IN THE R.C.C BLOCK
3. THE R.C.C BLOCK SIZE IS 200 Width x 250 Length x 250 Ht.
4. THE MINIMUM WEIGHT OF THE R.C.C BLOCK REQUIRED IS : 22KGS

P. No.	DESCRIPTION	SIZE	MATERIAL / MAKE	QTY	WEIGHT	REMARK
11	R.C.C. BLOCK	200 x 250 x 250	CONCRETE	2	Pennar	Scope
10	ROPE	1" x 6 Mtrs Lg	PP	2		
09	AIR INLET HOSE	1" x 5 Mtrs Lg	–	2		
08	HOSE FIXING CLAMP	1" BSP x STD	SS 304	4		
07	SWIVEL NUT + SLEEVE	1" BSP x STD	ABS	4		
06	LIFTING HOOKS	6ø ROD x AS SHOWN	SS 304	6		
05	HEX. NUTfor Fdn. Bolt	1/4" BSW x STD	SS 304	8		
04	FDN BOLT	6ø ROD WITH 1/4" BSW	SS 304	8		
03	'C' CLAMP	25 x 1Thk x AS SHOWN	SS 304	4		
02	EQUAL TEE	25NB x Clo 40 x AS SHOWN	SS 304	2		
01	DIFFUSER UNIT	63.5 OD x 1000 Lg x STD	SILICONE	4		

BILL OF MATERIALS

Chennai Floating Media and Tube Settlers
www.chennaicfm.com

TITLE : Fine bubble diffusers with retrievable arrangement

CLIENT : M/s. –

SCALE: 1 : 15 | DATE: | PROJECT : –

DRAWN. G.RAVI. 09.05.2018 | JOB. NO. –

ENGINEER.

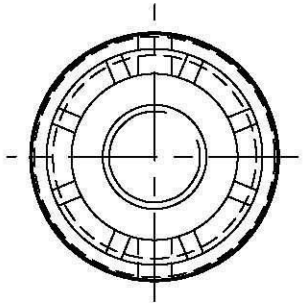
APPROVED.

CAD FILE NAME:

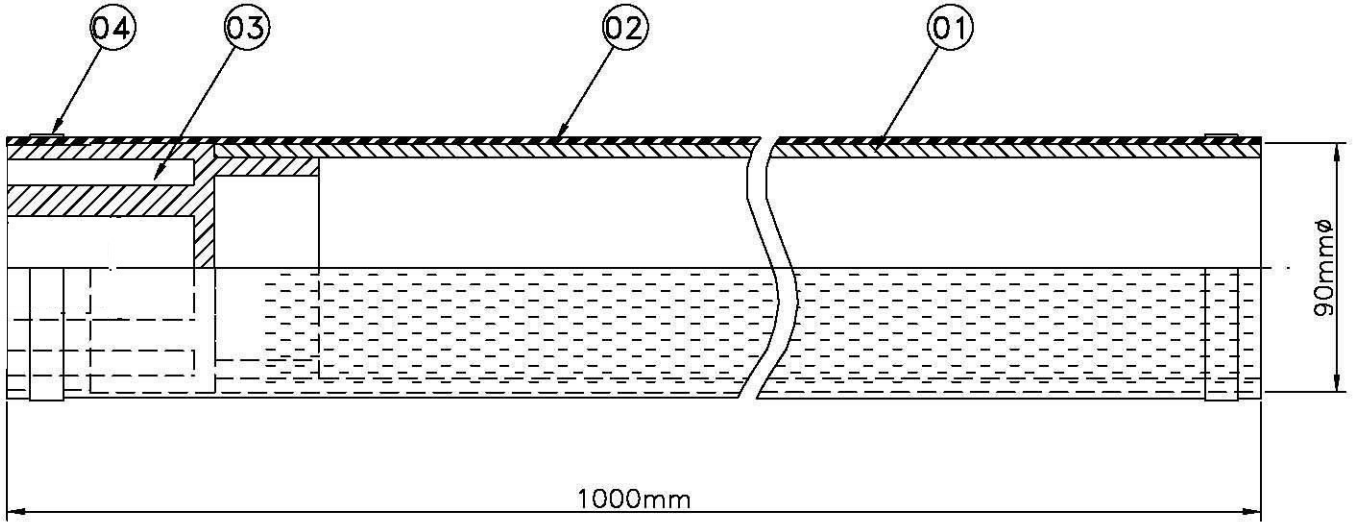
DRAWING NO: CFMTS–AE–03–007A | REV 0

SL.NO	DATE	DESCRIPTION	BY	CHD

REVISION DETAILS



SIDE VIEW



SECTIONAL ELEVATION

04	EAR CLAMP	SS 304	
03	HUB	ABS	
02	MEMBRANE	SILICONE	
01	SUPPORT TUBE	PVC	
PART No.	DESCRIPTION	MATERIAL	REMARKS

1. ALL DIMENSIONS ARE IN mm, AND INCHES DESIGNATED WITH " MARKS

REV. No.	DATE	DESCRIPTION	BY	CHECKED

REVISION DETAILS

PROJECT

CLIENT

DRG NO. CFMTS-STD-003A

TITLE **DIFFUSER DIA90MM X 1000MM**

WITH SILICONE MEMBRANE

CHENNAI FLOATING MEDIA AND TUBE SETTLERS

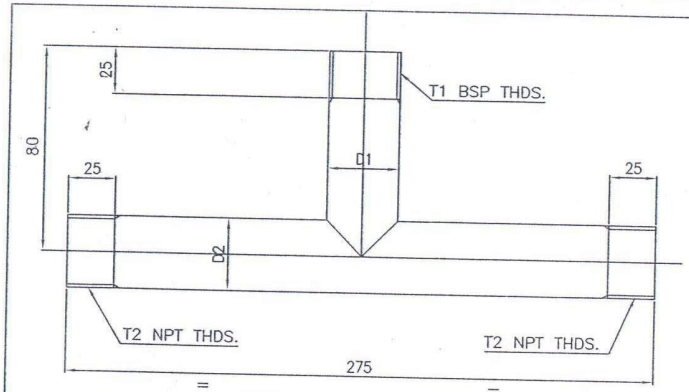
Survey No 474/2A1B1, Plot No 11, Highways Nagar 11, Valarpuram 602105
Sriperumpudur Taluk Kancheepuram Dist Tamilnadu

DRAWN : SARO

APPROVED : SARO

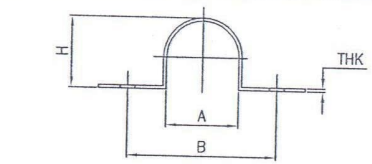
CAD FILE NAME :

426

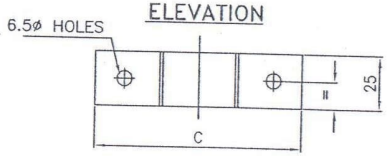


TYPE	D1	D2	T1	T2	Matl.
TYPE–II	25NB	25NB	1"BSP	1"NPT	SS 304

TEE FITTINGS ARRG.



ELEVATION

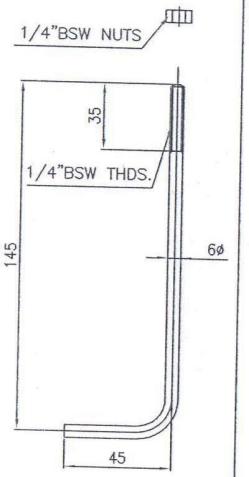


PLAN

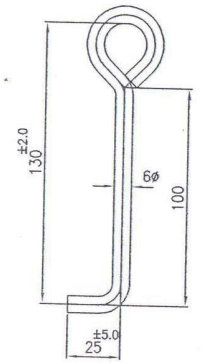
PIPE OD	A	B	C	H	THK	
33.4	34	55	85	35	0.9	

MATERIAL : SS 304

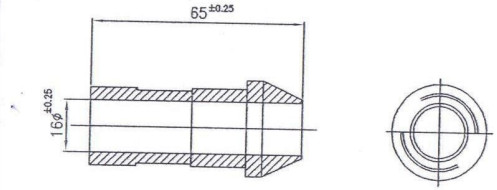
CLAMPS



FOUNDATION BOLT
MATERIAL : SS 304

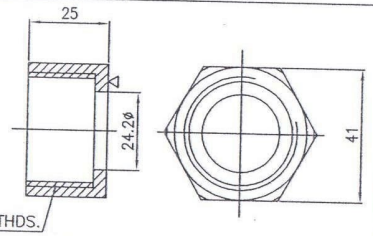


LIFTING HOOK BOLT
MATERIAL : SS 304



MATERIAL : ABS

SLEEVE



MATERIAL : ABS

NUT

NOTES

1. ALL DIMENSIONS ARE IN mm, UNLESS OTHERWISE SPECIFIED.
2. GENERAL TOLERANCE IS CONSIDERED ±1mm, WHEREVER IS NOT MENTIONED.

SL.NO	DATE	DESCRIPTION	BY	CHD

REVISION DETAILS

CHENNAI FLOATING MEDIA AND TUBE SETTLERS
42/1, KANNAN NAGAR II CROSS, MADHURAVOYAL, CHENNAI 600 095

TITLE : STD FITTING COMPONENTS OF DIFFUSERS

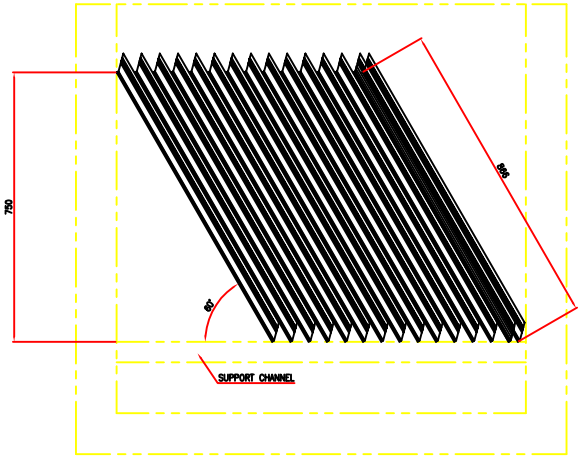
SCALE: 1 : 2		DATE:	CLIENT : M/s.SDC LTD
DRAWN.	G.RAVI.	07.02.09	MAKERS NO : –
ENGINEER.			
APPROVED.			DRAWING NO: CFMTS–AE–03–007 REV 0

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

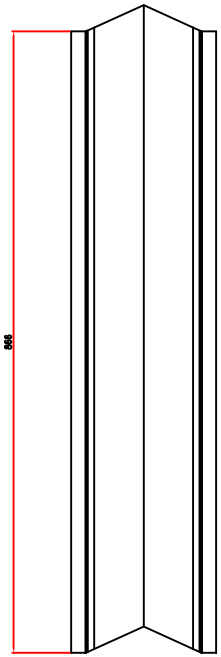
Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date**	**11-04-18**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**1**
Owner Consultant:	**DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI**	**PEL/D & D- F 002**	
EPC Contractor:	**BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA**		
Package	**75 KLD SEWAGE TREATMENT PLANT**		
Document No:	**PE-V0-412-673-A041**	**PEL Doc. no:**	**A4-PEL-1037-DS-TSM001**

TECHNICAL DATA		
Manufacture	Chennai floating	
Model	EETST866	
Flow (m3/hr.)	4	
Tube settler media volume(m3)	3	
Plant Settling Area of Media (60 deg. Slop)	11.0 m2/m3	
Cross Sectional Area	120 mm x 44 mm	
Shape	Hexagonal Chevron Tube	
Hydraulic Radius	15mm	
MOC of Media	UV Stabilized PVC	
Thickness	1.1mm (+/- 0.1)	
Fitting Arrangement	Tongue & Groove	
Max. Continous operating temp.	50 Deg. C	
Colour	Black	
Distance between adjacent Tubes	Horizontal	120 mm
	Vertical	44 mm
Required Height of tube settler Media (Vetrical)	0.75	
Design Surface loading rate	2 m3/hr-m2	
Rise rate	2 m3/hr-m2	
Weight (kg/m3)	52 Kg/cm3	
TUBE SETTLER TANK DETAILS		
Tube settler dimension	1.8 (L) x 1.8 m(W) X 2.25 m (SWD)+0.5 m(FB)	

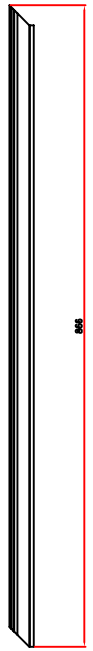
Rev	Date	Description	Made	Chkd	Appd
1	21-Apr-2018	For Approval	PSR	SSY	PAK



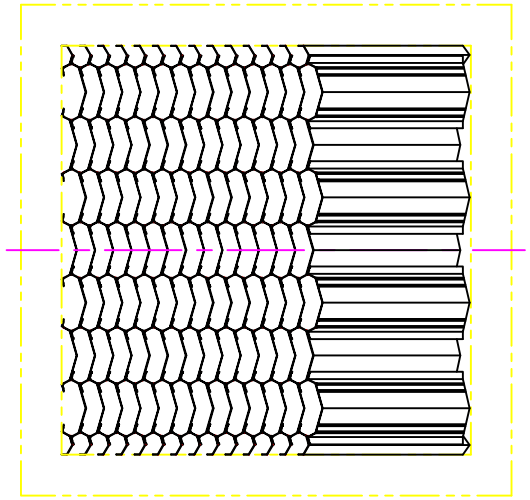
SECTIONAL ELEVATION



ELEVATION



SIDE VIEW



PLAN VIEW

NOTES

1. ALL DIEMENSIONS ARE IN mm, UNLESS SPECIFIED OTHERWISE.
2. THE PVC PLATE THICKNESS IS CONSIDERED 1mm AS MINIMUM.
3. WHILE ASSEMBLY OF THE PLATES JOINING WITH RELEVANT SOLUTION TO AVOID THE PLATES DISLOCATION.

CHENNAI FLOATING MEDIA AND TUBE SETTLERS			
www.chennaicfm.com			
TITLE :	TUBE SETTLER MEDIA 866MM		
CLIENT :	M/s. –		
SCALE: 1 : 6	DATE:	PROJECT :	–
DRAWN. G.RAVI.	09.08.2011	JOB. NO.	–
ENGINEER.			
APPROVED.		DRAWING NO:	CFMTS–STD–TS–866 REV 0
CAD FILE NAME:			

SL.NO	DATE	DESCRIPTION	BY	CHD
REVISION DETAILS				

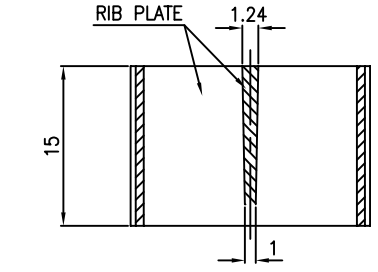
PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**16-02-19**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**1**
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-A041**	**PEL Doc. no:**	**A4-PEL-1037-DS-DF001**

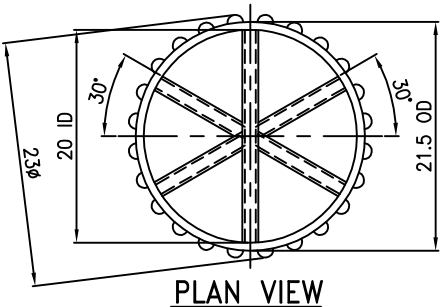
Datasheet for MBBR Media

General Data			
Floting Media Size	Dia 22mm x 15mm	Bio Surface Area	400m2/m3
Shape	Cylindrical	Material	PP Reciprocated
Colour	Black		
Media Weight	100kg/cm2		
Media Quantity	62500PCS/M3 and it will cover-60% Physical Volume		

Rev	Date	Description	Made	Chkd	Appd
1	16.02.2019	For Approval	PSR	SSY	PAK



SECTIONAL ELEVATION



PLAN VIEW
FAB MEDIA

1. ALL DIMENSIONS ARE IN mm, UNLESS SPECIFIED OTHERWISE.
2. MATERIAL OF CONSTRUCTION IS : POLY PROPLENE [PP]
3. COLOUR OF THE PRDDUCT : BLACK

Chennai Floating Media and Tube Settlers www.chennaicfm.com			
TITLE : FAB MEDIA			
CLIENT : –			
SCALE: 1 : 1		DATE:	PROJECT : –
DRAWN.	G.RAVI.	18.03.2012	JOB. NO. –
ENGINEER.			
APPROVED.			DRAWING NO: AE-CFMTS-4-012 REV 0
CAD FILE NAME: AE-EE-4-012			

APPROVED

REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
1	02. 01. 2019	ISSUED FOR APPROVAL	MKK	SSY	PAK
0	04. 09. 2018	ISSUED FOR APPROVAL	MKK	SSY	PAK

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

DEPT.	CODE		SCALE	WEIGHT (KG)	REF DRG.	ITEM
--	A		--	–	–	–

TITLE Technical Datasheet for Centrifuge

	NAME	SIGN	DATE
PREP	PSR		02.01.2019
CHKD	SSY		02.01.2019
APPD	PAK		02.01.2019

PACKAGE :75 KLD SEWAGE TREATMENT PLANT

DEPT.							CARD CODE	BHEL DOC NO.	REV
SIGN				N.A.			–	PE-V0-412-673-A042	
DATE								PEL DOC NO. A4-PEL-1037-DS-CF001	1
								NO. OF SHEETS – 7 (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-A042		
DOC NAME: Datasheet & GA for Centrifuge		
COMMENTS RESOLUTION SHEET		
S.No.	**TANGENDCO Comments**	**BHEL/PEL's Response**
1	Indicate inlet & outlet concentration	Noted and Incoporated
2	Please indicate manufacturer and model no.	Noted and Incoporated
3	Please indicate all data under Performance Data, Nozzle Schedule.	Noted and Incoporated
4	Indicate motor rating	Noted and Incoporated
5	Indicate Solid Output in kg/hr with 80% moisture and pressure required at centrifuge inlet (KG/ cm2 (g)) under Operating Conditions	Noted and Incoporated

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

CONTENTS

SR.NO	DESCRIPTION	PAGES
1.1	TECHNICAL DATASHHET FOR CENTRIFUGE	4-5
1.2	GA DRAWING OF CENTRIFUGE	6
1.3	CROSS SECTION DRAWING FOR CENTRIFUGE	7

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**02.01.2019**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**1**
Owner Consultant:	**DESEIN PRIVATE LIMITED,DESEIN HOUSE,NEW DELHI**	**PEL/D & D- F 002**	
EPC Contractor:	**BHARAT HEAVY ELECTRICALS LIMITED,PEM NOIDA**		
Package :	**75KLD SEWAGE TREATMENT PLANT**		
Document No.:	**PE-V0-412-673-A042**	**PEL Doc. no:**	**A4-PEL-1037-DS-CF001**

Datasheet for Decanter Centrifuge

GENERAL DATA	
Type of centrifuge	Decanter Type
Tag Number	CF
Quantity	1 No
P & ID reference	PE-V0-412-673-A001
Location (Indoor / Outdoor)	Indoor
Duty (continuous/ intermittent)	Intermittent
Manufacturer	Humboldt (MBE COAL & MINERAL Technology)
Model No.	S0-1
DESIGN CONDITIONS	
Design Standard	As Per Manufacturer Std.
Testing Standard	As Per Manufacturer Std.
OPERATING CONDITIONS	
Slurry Handled	STP sludge(Biological) consistancy 1 - 2 % (Wt/Wt)
Operating Temp°C [Nor/Max]	25 / 50
Viscosity of Sludge (cp)	1 to 1.2
pH of Slurry	7.0 to 8.0
% Solids in Slurry	1 -2 % (Wt/Wt)
Min and Max Solid Size	0.5 to 2 mm
Sp. Gravity of Sludge	1.02
Nature of Solids	Soft
Centrifuge Inlet flow(m3/hr)	2
Hours of operation	2 Hrs
Cake Moisture Content	Max. 80 %
Soild output in kg/hr with 80 % moisture	190
Pressure required at centrifuge inlet(kg/cm2(g))	1
PERFORMANCE	
Overall Efficiency (%)	1.0
Speed of Centriguge Bowl (RPM)	4400.0
Critical Speed of Centrifuge (RPM)	4500.0
Acceleration G force	2689 G
Product Required	Filtrate
Maximum Sound level (dB)	< 85 dBA at 1.0m Distance
Main/Bowl Motor rating (KW) & RPM	7.5/2930

Document No.:	PE-V0-412-673-A042	PEL Doc. no:	A4-PEL-1037-DS-CF001

Datasheet for Decanter Centrifuge

CONSTRUCTION		
Centrifuge Type	Batch Operated	
Soild/Cake Discharge Type	Bottom discharge	
Centrifuge Mounting	On RCC Foundation	
Bowl Dia	250 mm	
Bowl Length	750 mm	
Cone angle	8 Deg	
Scroll drive	Reduction V-Belt Drive & Gear box	
NOZZLE SCHEDULE	**SIZE**	**TYPE**
Inlet	25 mm	Flange, ASME B 16.5, 150#, FF.
Outlet (Filterate)	380x125mm	
Cake	380x218mm	
MATERIALS		
Centrifuge Body/Cover (Non wetted)	MSEP	
Centrifuge Bowl	SS 304	
Screw conveyor	SS 304	
Other Wetted part	SS 304	
MOTOR DATA : Refer GA drawing		
WEIGHTS / DIMENSIONS		
Weight of Centrifuge(kg)	850	
Total Weight Centrifuge+Motor+Accessories (kg)	SS 304	
Dimensions [LxWxH](mm)	SS 304	
Dynamic Load of Assembly (kg)	1700	
PAINTING SPECIFICATIONS : As Per Approved painting Specification Doc. No. PE-V0-412-673-A023-R1		
SPARES REQUIRED		

Comissioning spares / special tools & tackles

* Sets of Pulleys --- 4 Nos
* Hand Grease gun with hose --- 1 No
* Fusible Plug of the Hydraulic coupling --- 2 Nos
* V Belt of SPA 1800 --- 4 Nos
* Grease of 1 Kg
* Seal Ring 58 x 72 x 10 --- 1 No
* Needle Bearing with inner 50 x 58 x 40 --- 1 set
* Circlip A50 --- 1 No
* Suitable withdrawl & mount bolts of the hydraulic Coupling --- 1 Set

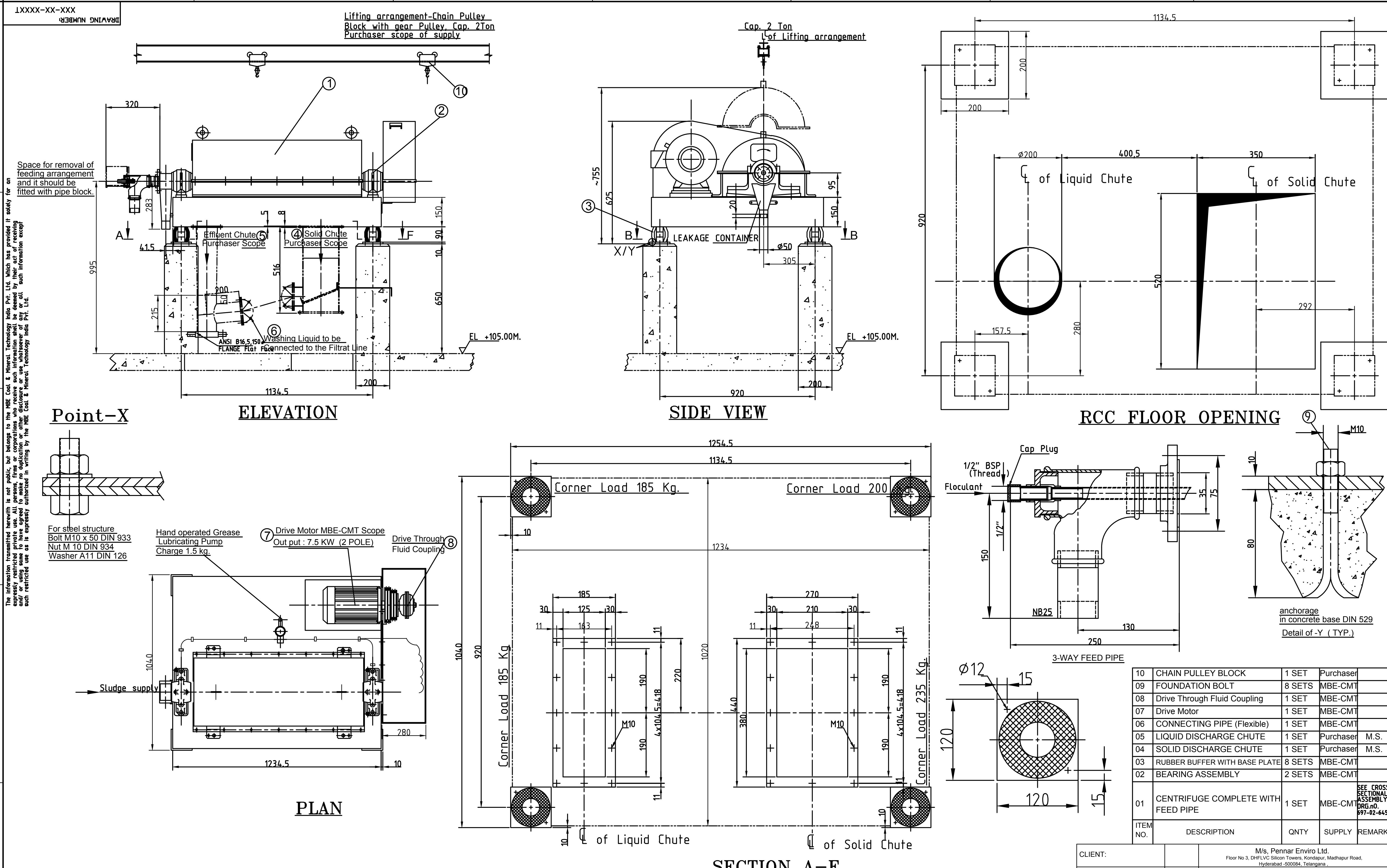
INSPECTION & TESTING

As per PEL approved QAP/Inspection & Test Plan.

SCOPE OF SUPPLY

☑ Centrifuge Assembly	☑ V-Belt & Pulley's/Gear box	☑ Lifting Lug
☑ Mounting Base	☑ Foundation Bolts	☑ O&m Manual
☑ Motors	☑ Lifting Lug	☑ Lubrication Schedule
☑ Coupling Guard	☑ First fill of lubricants	

Rev	Date	Description	Made	CHK.	APP
1	02.01.2019	Issued For Approval	AJP	SSY	PAK



ITEM NO.	DESCRIPTION	QNTY	SUPPLY	REMARK
10	CHAIN PULLEY BLOCK	1 SET	Purchaser	
09	FOUNDATION BOLT	8 SETS	MBE-CMT	
08	Drive Through Fluid Coupling	1 SET	MBE-CMT	
07	Drive Motor	1 SET	MBE-CMT	
06	CONNECTING PIPE (Flexible)	1 SET	MBE-CMT	
05	LIQUID DISCHARGE CHUTE	1 SET	Purchaser	M.S.
04	SOLID DISCHARGE CHUTE	1 SET	Purchaser	M.S.
03	RUBBER BUFFER WITH BASE PLATE	8 SETS	MBE-CMT	
02	BEARING ASSEMBLY	2 SETS	MBE-CMT	
01	CENTRIFUGE COMPLETE WITH FEED PIPE	1 SET	MBE-CMT	SEE CROSS SECTIONAL ASSEMBLY DRG.nO. 697-02-645A

NOTE

Weight of the Machine 690 Kg.
Load assumed in vertical direction:Weight of machine x 1,5(Dynamic)
Load assumed in horizontal direction:10%of the vertical load assumption(Dynamic)
Natural frequency of the platform in vertical and horizontal direction between 600 and 800 r.p.m
All pipe and chute connections shall be flexible (10mm in every direction)
Heaviest component: Base frame 300Kg.; rotor with gear 250Kg.
Minimum 1 Meter space required every sides of the m/c for maintenance and servicing.

DO NOT SCALE. IF IN DOUBT PLEASE ASK MBE - CMT WILL NOT BE RESPONSIBLE FOR DIMENSIONS OTHER THAN THOSE MENTIONED BY US.

Minimum 1Metre space required on all sides of the m/c for maintenance and servicing.

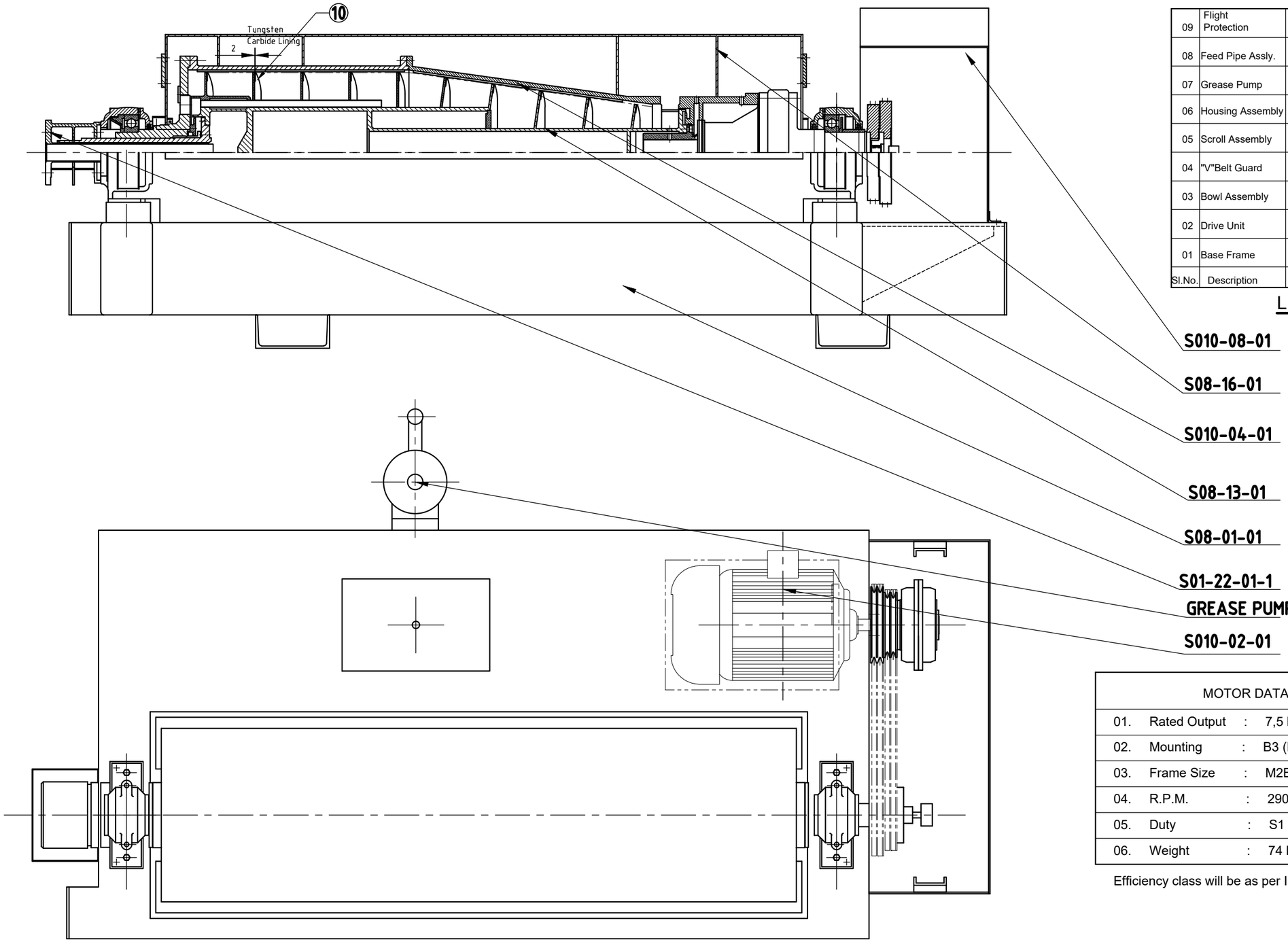
Note: -
Regarding Painting Please Go Through DATA sheet
MOTOR detail also available at DATA Sheet

MODEL SO-1

REV.NO.	SUFFIX	DATE	DESCRIPTION	BY.	CHKD.	APPD.	DATE

CLIENT:	M/s, Pennar Enviro Ltd. Floor No 3, DHFLVC Silicon Towers, Kondapur, Madhapur Road, Hyderabad -500084, Telangana ,
CONTRACTOR:	MBE-COAL & MINERAL TECHNOLOGY India Pvt. Ltd. KOLKATA.
PROJECT:	Dewatering of ETP Biological Slurry.
SCALE 1:10,1:5	DRAWING TITLE: General Arrangement and Out Line Foundation Plan for Centrifuge S0-1
DRAWN S.Samaddar	
CHECKED S. Sarkar	ISSUED FOR: INFORMATION / APPROVAL / REFERENCE / RECORD / CONSTRUCTION / FABRICATION
APPROVED X.XXX	
DATE (R0) 20.12.2082018	DRAWING NO S010-09-01 — SHEET 1 OF X
CATEGORY XXXXXX	REV. R1

JOB No. 40-4454



Sl.No.	Description	Drg.No.	M.O.C	REMARKS
09	Flight Protection		Tungsten Carbide Lining	
08	Feed Pipe Assly.	S01-22-01-1	SS-304	--
07	Grease Pump	---	--	--
06	Housing Assembly	S08-16-01	C.S.	--
05	Scroll Assembly	S08-13-01	SS-304	--
04	"V"Belt Guard	S010-08-01	I.S. 2062	--
03	Bowl Assembly	S010-04-01	SS-304	--
02	Drive Unit	S010-02-01	I.S. 2062	--
01	Base Frame	S08-01-01	I.S. 2062	--

LEGEND

MOTOR DATA (1)			
01.	Rated Output	:	7,5 kw
02.	Mounting	:	B3 (Foot)
03.	Frame Size	:	M2BAX 132SMB2
04.	R.P.M.	:	2905
05.	Duty	:	S1
06.	Weight	:	74 kg (Approx.)

Efficiency class will be as per IE-3

Model S0-1

PROJECT: Dewatering of ETP Biological Slurry.
--

MBE Coal & Mineral Technology India Pvt. Ltd.
Formerly Humboldt Wedag India Private Limited - coal & Minerals Division
Ecospace Campus-2B, 11F/2 (Old plot No. AA II/Blk-3) New Town Rajarhat
North 24- Parganas, Kolkata - 700156 India

DRG.NO.	REFERENCES	SUFFIX	REVISIONS	BY	APP.	DATE	ISSUED FOR	BY	DATE
		1	As per CLIENT'S comments.	B.M.	T.D.	01.01.19			

CLIENT: M/s, Pennar Enviro Ltd.
Floor No 3, DHFLVC Silicon Towers, Kondapur,
Madhapur Road,Hyderabad -500084, Telangana ,

TITLE: CROSS SECTIONAL ASSEMBLY FOR CENTRIFUGE
(Equipment No. S0-1)

SCALE	NTS	DATE	DRAWING NUMBER / REV.
DRAWN	S.Samaddar	20.12.2018	697-02-645 A / 1
CHECKED			
APPROVED	S.Sarkar	---	

Job.no. 40-4454

APPROVED

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-A043
DOC NAME: Technical datasheet for Dual media filter & Activated carbon filter

COMMENTS RESOLUTION SHEET

S.No.	TANGENDCO Comments	BHEL/PEL's Response
1	Indicate Model no. for DMF & ACF	Noted and Incoporated
2	Indicate datails of media for DMF	Noted and Incoporated
3	Indicate details of media & supporing media for ACF.	Noted and Incoporated
4	Indicate free boad for DMF & ACF	Noted and Incoporated
5	Indicate surface flow rate for DMF & ACF	For DMF:10m3/hr-m2 For ACF:12m3/hr-m2
6	Indicate Hydro Test Pressure and Pressure drop across vessel for DMF & ACF.	Noted and Incoporated

REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
1	28.08.2019	ISSUED FOR APPROVAL	PSR	SSY	PAK
0	04.09.2018	ISSUED FOR APPROVAL	MKK	SSY	PAK

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 TRATMENT PLANT**

DEPT.	CODE		SCALE	WEIGHT (KG)	REF DRG.	ITEM
--	A		--	–	–	–

TITLE
Data sheet for Dual Media Filter & Activated Carbon Filter

	NAME	SIGN	DATE
PREP	PSR		28.08.2019
CHKD	SSY		28.08.2019
APPD	PAK		28.08.2019

DEPT.							CARD CODE	BHEL DOC NO. PE-V0-412-673-A043	REV
SIGN				N.A.			–	PEL DOC NO. A4-PEL-1037-DS-DMF001 A4-PEL-1037-DS-ACF001	1
DATE								NO. OF SHEETS – 2 (EXCLUDING COVER SHEET)	

PENNAR INDUSTRIES LIMITED
ENVIRO BUSINESS UNIT

CONTENTS

1. FILTERS

SR.NO	DESCRIPTION	PAGES
1.1	TECHNICAL DATASHHET OF DUEL MEADIA FILTER	2-5
1.2	TECHNICAL DATASHHET OF ACTIVATED CARBON FILTER	6-7

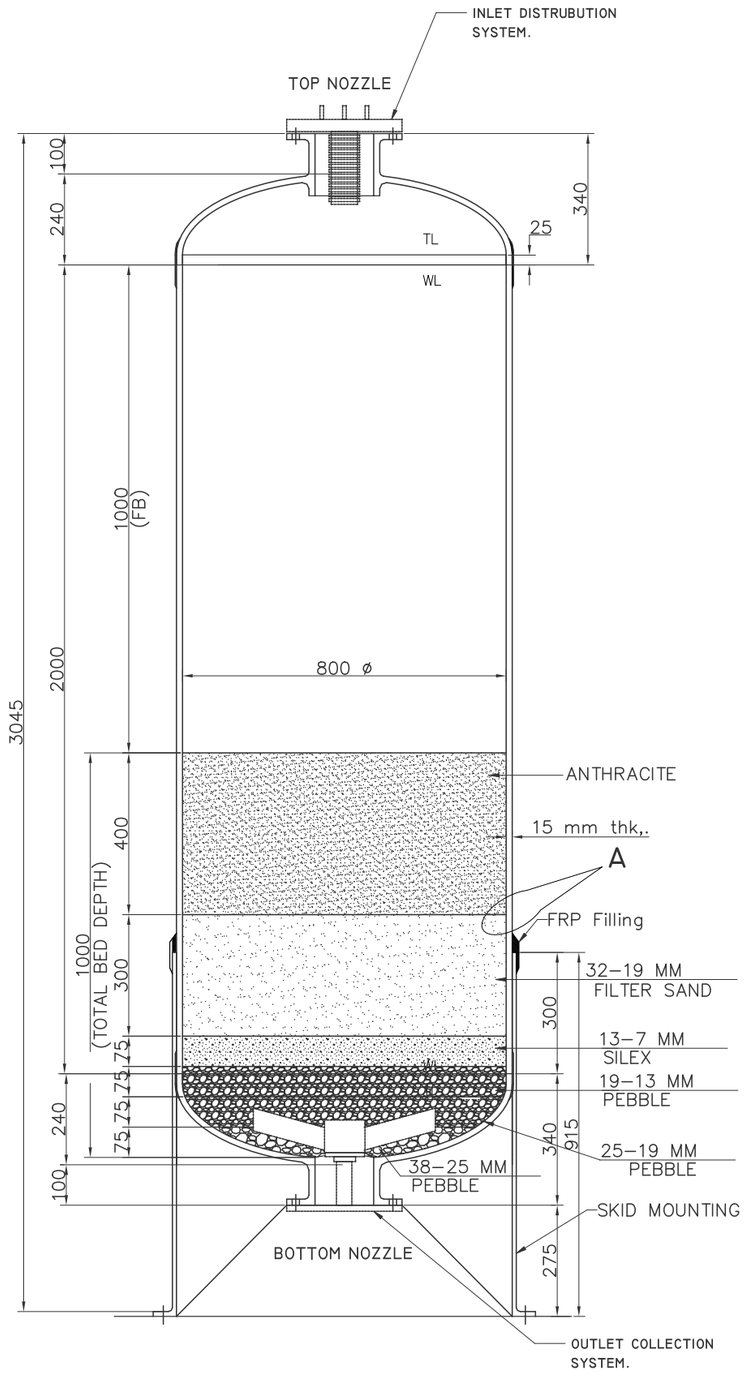
PENNAR INDUSTRIES LIMITED
ENVIRO BUSINESS UNIT

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**28/08/2018**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**1**
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-A043**	**PEL Doc. no:**	**A4-PEL-1037-DS-DMF001**

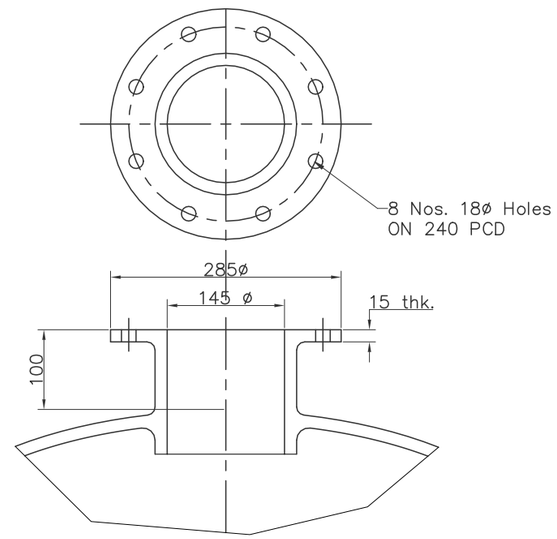
Datasheet for FRP Vessel_Dual media Filter

A	**General Data**	
1	Item	Dual media filter
2	Tag No.	DMF
3	Qty.(No.)	1
4	Model	FPI-PV
5	Size	0.8 m (Dia) x 2.0 m (HOS)
B	**Operating Condition**	
1	Service	Sewage Water
2	Feed Flow Rate(m3/hr)	4
3	Backwash Flow Rate(m3/hr)	8
4	Viscosity at operating temp.(cp)	1
5	Operating Temperature(deg.C)	35
6	Operating Pressure(Kg/cm2)	4.5
7	Ph	7.0 to 8.0
C	**Design Condition**	
1	Design Code	ASME SEC X / BS 4994
2	Design Pressure(Kg/cm2)(g)	6
3	Hydrotest Pressure(Kg/cm2)(g)	9
4	Pressure drop across vessel (inlet to outlet nozzle)	0.5
D	**Materials of Construction**	
1	Filter / Vessel Shell & Dish	FRP (Isopthalic Resin)
2	Nozzle & othre Attachment	FRP (Isopthalic Resin)
3	Lifting Lug	Reinforced FRP
E	**Nozzle Schedule**	
1	Inlet Nozzle Size & End Connection	150 NB / ASME B 16.5,150#,FF
2	Outlet Nozzle Size & End Connection	150 NB / ASME B 16.5,150#,FF
F	**Weight/Dimension**	
1	Weight of filter	180 KGS. APPROX.
2	Weight of filter with media	PEL SCOPE
G	**Scop of Supply**	
1	Filter	Yes
2	Media	Yes (Bed depth -1 mtr)
6	Other Internal accessories	Yes
H	**Colour**	
1	Shade	Natural color

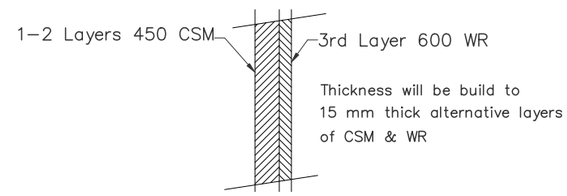
Rev	Date	Description	Made	Chkd	Appd
1	28-Aug-2019	For Approval	PSR	SSY	PAK



SECTIONAL ELEVATION



DETAILS OF TOP & BOTTOM NOZZLES



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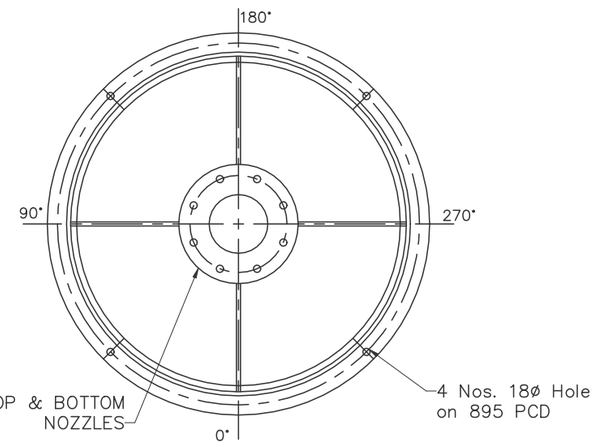
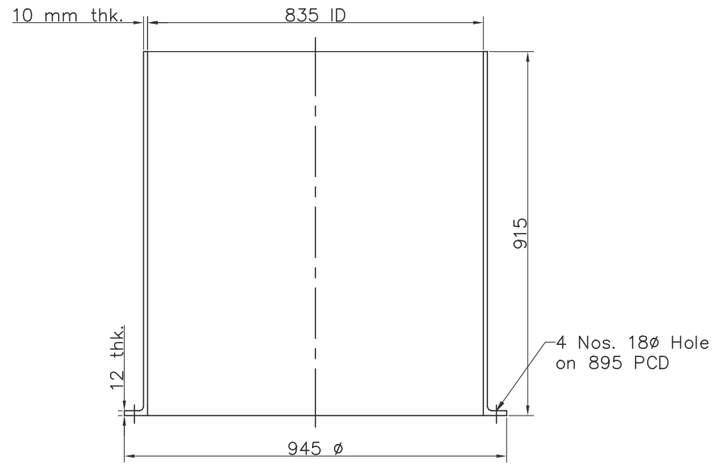


NOZZLE ORIENTATION PLAN



SKID MOUNTING DETAILS

TECHNICAL SPECIFICATION

VESSEL	FRP PRESSURE VESSEL
DESIGN CODE	BS 4994
DIMENSIONS	800 Ø
WORKING PRESSURE	4.5 BAR
DESIGN PRESSURE	5.0 BAR
TESTING PRESSURE	7.0 BAR
MOC	CSM + WR
FLANGE STADARD	TABLE - 10, BS4504

FIBRO PLAST INDUSTRIES
24-112/5, IDA, UPPAL, HYDERABAD-500039

CLIENT : M/s PENNAR ENVIRO LTD HYDERABAD

TITLE : FRP PRESSURE VESSEL

	NAME	DATE
DSN.	RK	29.04.19
DRN	PRB	29.04.19
CHD	JK	29.04.19
APD		

SCALE : 1:5 & NTS

Ref. Drg. No. : -

Drg. No. : FPL-PEL-18-19-242-1

Rev. No 0

SIZE A2

-

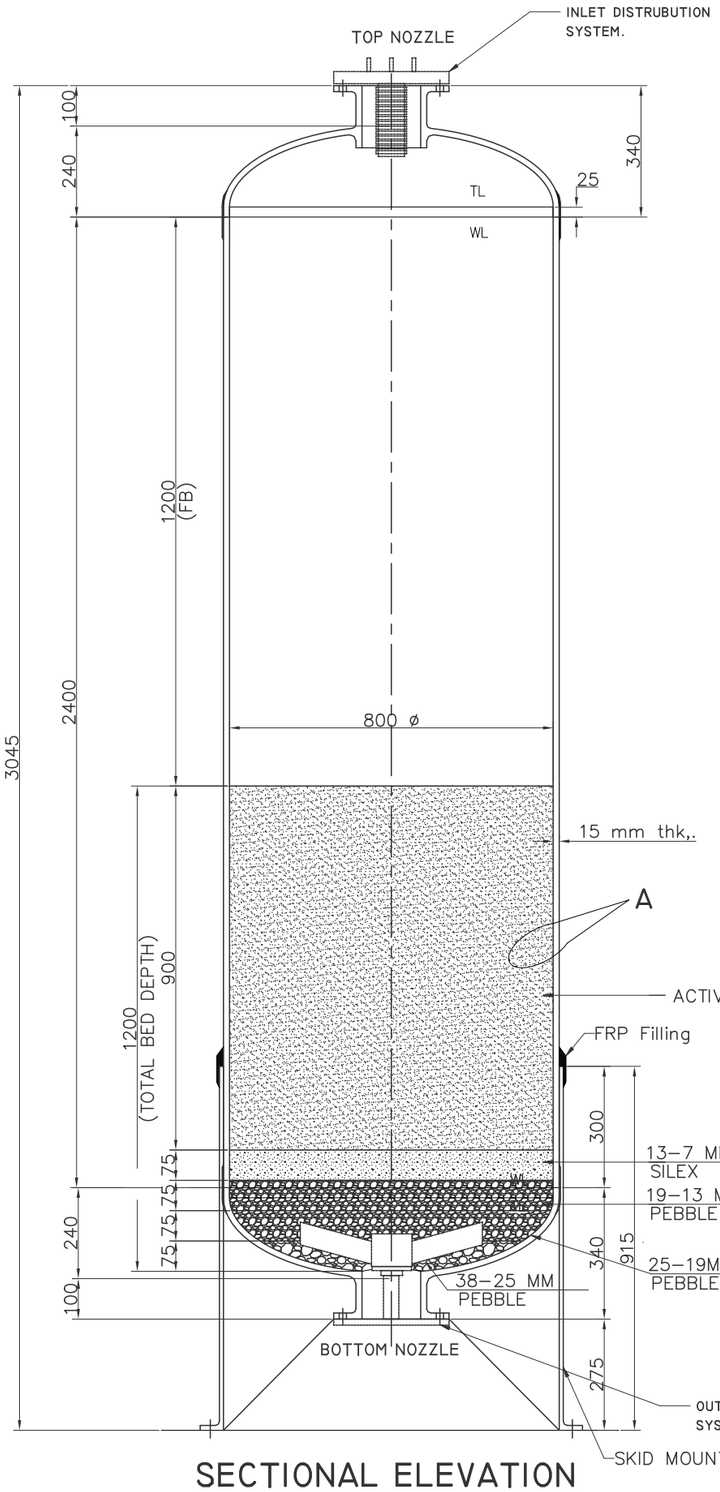
PENNAR INDUSTRIES LIMITED
ENVIRO BUSINESS UNIT

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**28/08/2018**
Customer :	**TAMILNADU GENERATION & DISTRIBUTION CORPORATION LIMITED**	**Rev No.:**	**1**
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-A043**	**PEL Doc. no:**	**A4-PEL-1037-DS-ACF001**

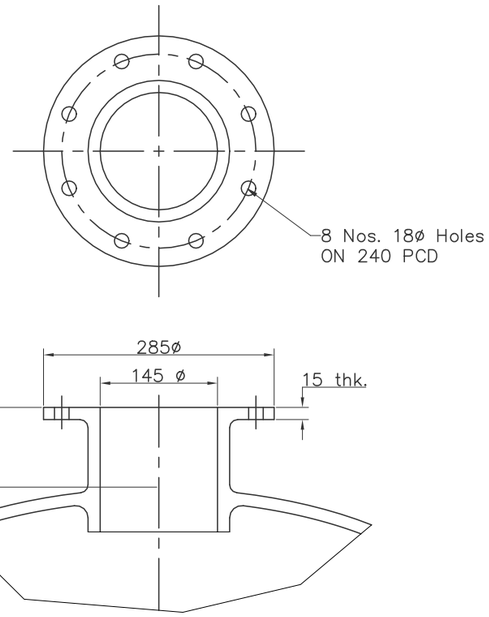
Datasheet for FRP Vessel_Activated Carbon Filter

A	**General Data**	
1	Item	Activated Carbon Filter
2	Tag No.	ACF
3	Qty.(No.)	1
4	Model	FPI-PV
5	Size	0.8 m (Dia) x 2.4 m (HOS)
B	**Operating Condition**	
1	Service	Sewage Water
2	Feed Flow Rate(m3/hr)	4
3	Backwash Flow Rate(m3/hr)	4
4	Viscosity at operating temp.(cp)	1
5	Operating Temperature(deg.C)	35
6	Operating Pressure(Kg/cm2)	4.5
7	Ph	7.0 to 8.0
C	**Design Condition**	
1	Design Code	ASME SEC X / BS 4994
2	Design Pressure(Kg/cm2)(g)	6
3	Hydrotest Pressure(Kg/cm2)(g)	9
4	Pressure drop across vessel (inlet to outlet nozzle)	0.5
D	**Materials of Construction**	
1	Filter / Vessel Shell & Dish	FRP (Isopthalic Resin)
2	Nozzle & othre Attachment	FRP (Isopthalic Resin)
3	Lifting Lug	Reinforced FRP
E	**Nozzle Schedule**	
1	Inlet Nozzle Size & End Connection	150 NB / ASME B 16.5,150#,FF
2	Outlet Nozzle Size & End Connection	150 NB / ASME B 16.5,150#,FF
F	**Weight/Dimension**	
1	Weight of filter	200 KGS. APPROX.
2	Weight of filter with media	PEL SCOPE
G	**Scop of Supply**	
1	Filter	Yes
2	Media	Yes (1200 mm Bed Depth)
6	Other Internal accessories	Yes
H	**Colour**	
1	Shade	Natural color

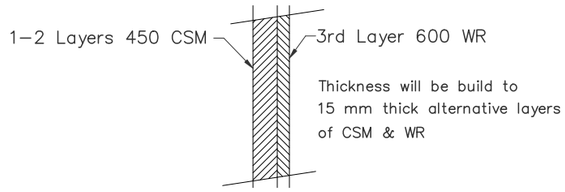
Rev	Date	Description	Made	Chkd	Appd
1	28-Aug-2019	For Approval	PSR	SSY	PAK



SECTIONAL ELEVATION



DETAILS OF TOP & BOTTOM NOZZLES



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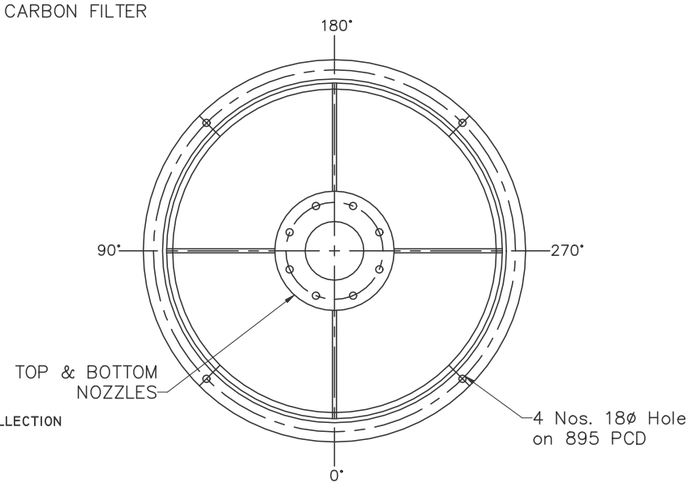
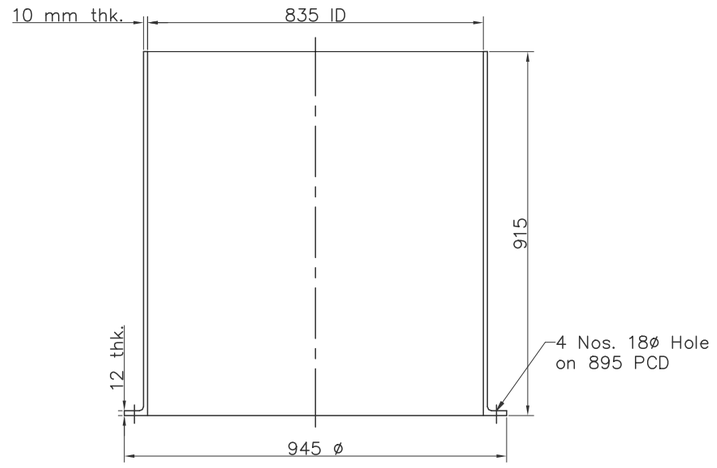


NOZZLE ORIENTATION PLAN



SKID MOUNTING DETAILS

TECHNICAL SPECIFICATION

VESSEL	FRP PRESSURE VESSEL
DESIGN CODE	BS 4994
DIMENSIONS	800 Ø
WORKING PRESSURE	4.5 BAR
DESIGN PRESSURE	5.0 BAR
TESTING PRESSURE	7.0 BAR
MOC	CSM + WR
FLANGE STADARD	TABLE - 10, BS4504

FIBRO PLAST INDUSTRIES
24-112/5, IDA, UPPAL, HYDERABAD-500039

CLIENT : M/s PENNAR ENVIRO LTD HYDERABAD

TITLE : FRP PRESSURE VESSEL

	NAME	DATE
DSN.	RK	29.04.19
DRN	PRB	29.04.19
CHD	JK	29.04.19
APD		

SCALE : 1:5 & NTS

Ref. Drg. No. : -

Drg. No. : FPL-PEL-18-19-242-1

Rev. No 0

SIZE A2

-

REV	DATE	ALTERED: AJP	REV	DATE	ALTERED: AAY
0–A	17.05.18	CHECKED: SSY	1	16.11.18	CHECKED: SSY

APPROVED

STATUS : CONTRACT

JOB NO.: 412

2X660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI

TAMILNADU GENERATION AND DISTRIBUTION CORP. LTD.(TANGEDCO)

CONSULTANT: DESEIN PVT LTD, NEW DELHI.

BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT,NOIDA

DEPT.	CODE		SCALE	WEIGHT(KG)	REF DRG.	ITEM
--	A		–	–	–	–

TECHNICAL DATA SHEET FOR PIPING MATERIAL

	NAME	SIGN	DATE
PREP	AJP		17.05.18
CHKD	SSY		17.05.18
APPD	PAK		17.05.18

DEPT.							CARD CODE	DRAWING NO.	REV
SIGN			N.A.				–446	PE–V0–412–673–A045	1
DATE								NO. OF SHEETS 6 EXCLUDING COVER PAGE	

PEL/D&D-F004

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Technical Datasheet for Piping Material

(DOC. NO. :- PE-V0-412-673-A045)

AAY	**SSY**	**PAK**
Prepared By	**Checked By**	**Approved By**

PEL/D&D-F004

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

CONTENTS

Sr. No.	Description	Pages
1	**Piping Material Specification**	
1.1	Base Material : Carbon Steel (GALVANIZED)	1
1.2	Base Material : UPVC	2
1.3	Base Material : CPVC	3

AAY	**SSY**	**PAK**
Prepared By	**Checked By**	**Approved By**

PEL/D&D-F004

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

FLUID SERVICE : Air		RATING :	150
OPERATING TEMPERATURE : 0°C-50 °C	OPERATING PRESSURE : 0 - 6 (Maximum)Kg/cm2(g)	LINE MOC:	GI

Operating Range	Description	Remarks
A. Pipe :		
15NB-40NB	Pipe,IS 1239 Part-1,Galvanized,Heavy Duty,ERW,Threded End(NPT-M)	
B. 90/45 Deg. Elbow :		
15NB-40NB	90 / 45 Deg.Elbow, 1.0 D, IS 1239 Part-2,Threaded NPT Female end,Galvanised	
C. Equal/Reducing Tee:		
15NB-40NB	Tee (Equal /Reducing), IS 1239 Part-2,Threaded NPT Female end,Galvanised	
D. Coupling(Half/Full/reducing) :		
15NB-40NB	Coupling (Half/Full/reducing), IS 1239 Part-2,Threaded NPT Female end ,Galvanised	
E. Flange :		
15NB-40NB	Threaded Flange, IS 2062 Gr B,Galvanized,Plate Type,ASME B 16.5,150#,Flat Face	
F. Blind Flange :		
15NB-40NB	Blind Flange, IS 2062 Gr B,Galvanized,Plate Type,ASME B 16.5,150#,Flat Face	
G. Gasket :		
15NB-40NB	Gasket ,Natural rubber, Full Face, ASME B16.21, 3 mm thk, To suit ASME B16.5 Flange,150#	
H. Bolts /Nuts :		
15NB-40NB	Hexagonal Bolt with 1 Nut and 2 Washers ,IS 1367 GR. 4.6/4,Galvanized	

Note-

1.Galvanisation of Pipe & fittings shall confirms to IS 4736

AAY	**SSY**	**PAK**
Prepared By	**Checked By**	**Approved By**

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

PEL/D&D-F004

FLUID SERVICE : Treated Sewage/ sewage water / service water		RATING :	150
OPERATING TEMPERATURE : 0°C-50 °C	OPERATING PRESSURE : 0- 5 (maximum)Kg/cm2(g)	LINE MOC:	UPVC

Operating Range	Description	Remarks
A. Pipe :		
15NB - 150NB	Pipe,UPVC/ASTM D 1785,SCH40, Plain Ends	
B. 90 Deg. Elbow :		
15NB - 150NB	90 Deg.Elbow, UPVC/ASTM D 2467,SCH80,Socket Ends	
C. 45 Deg. Elbow :		
15NB - 150NB	45 Deg.Elbow, UPVC/ASTM D 2467,SCH80,Socket Ends	
D. Tee :		
15NB - 150NB	TEE(Equal/Reducing), UPVC/ASTM D 2467,SCH80,Socket Ends	
E. Reducing Bush:		
15NB - 150NB	Reducing Bush,UPVC/ASTM D 2467,SCH80,Socket Ends	
F. Union :		
15NB - 150NB	Union,UPVC/ASTM D 2467,SCH80,Socket Ends	
G. Male Adopter :		
15NB - 150NB	Male Adopter,UPVC/ASTM D 2467,SCH80,Socket Ends x NPT-M	
H. Female Adopter :		
15NB - 150NB	Female Adopter,UPVC/ASTM D 2467,SCH80,Socket Ends x NPT-F	
I.Coupler		
15NB - 150NB	Coupler,UPVC/ASTM D 2467,SCH80,Socket Ends	
J.Nipple		
15NB - 150NB	Nipple, UPVC/ASTM D 1785,SCH 80,Plain Ends x NPT-M	
K. Flange :		
15NB - 150NB	Socket End Flange, UPVC/ASTM D 2467,ASME B16.5 ,150#,Flat Face	
L. Blind Flange :		
15NB - 150NB	Blind Flange, UPVC/ASTM D 2467, ASME B16.5 ,150#,Flat Face	
M. Gasket :		
15NB - 150NB	Gasket ,Natural rubber, Full face ,ASME B16.21, 3 mm thk, to suite ASME B16.5 Flange,150#	
N.Bolts /Nuts :		
15NB - 150NB	Hexagonal Bolt with 1 Nut and 2 Washers ,IS 1367 Cl 4.6/4 ,Galvanized	

NOTE :

1.Solvent Cement shall be confirm to ASTM D 2564 for All Socket End Fittings.

AAY	SSY	PAK
Prepared By	**Checked By**	**Approved By**

PEL/D&D-F004

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

FLUID SERVICE :Chemical (Sodium Hypo chloride)		RATING :	150
OPERATING TEMPERATURE : 0°C-50 °C	OPERATING PRESSURE : 0-5 (maximum)Kg/cm2(g)	LINE MOC:	CPVC

Operating Range	Description	Remarks
A. Pipe :		
15NB-150NB	Pipe,CPVC/ASTM F 441 Cl 23447,SCH80, Plain Ends	
B. 90 Deg. Elbow :		
15NB-150NB	90 Deg.Elbow, CPVC/ASTM F 439,SCH80,Socket Ends	
C. Tee :		
15NB-150NB	TEE(Equal/Reducing), CPVC/ASTM F 439,SCH80,Socket Ends	
D. Reducing Bush:		
15NB-150NB	Reducing Bush,CPVC/ASTM F 439,SCH80,Socket Ends	
E. Union :		
15NB-150NB	Union,CPVC/ASTM F 439,SCH80,Socket Ends	
F. Male Adopter :		
15NB-150NB	Male Adopter,CPVC/ASTM D 2466,SCH80,Socket End x NPT-M	
G. Female Adopter :		
15NB-150NB	Female Adopter,CPVC/ASTM F 439,SCH80,Socket End x NPT-F	
H. Coupler		
15NB-150NB	Coupler,CPVC/ASTM F 439,SCH80,Socket Ends	
I. Nipple		
15NB-40NB	Nipple,CPVC/ASTM F 441 Cl 23447,SCH 80,Plain Ends x NPT-M	
J. Flange :		
15NB-150NB	Socket End Flange, CPVC/ASTM F 439,ASME B16.5 ,150#,Flat Face	
L. Blind Flange :		
15NB-150NB	Blind Flange, CPVC/ASTM F 439, ASME B16.5 ,150#,Flat Face	
M. Gasket :		
15NB-150NB	Gasket,Natural rubber ,Full Face,ASME B16.21, 3 mm thk, to suite ASME B16.5 Flange,150#	
N.Bolts /Nuts :		
15NB-150NB	Hexagonal Bolt with 1 Nut and 2 Washers ,IS 1367 Cl 4.6/4 ,Galvanized	

NOTE :

1.Solvent Cement shall be confirm to ASTM F 493 for all Socket End Fittings.

AAY	SSY	PAK
Prepared By	**Checked By**	**Approved By**

APPROVED

REV.	DATE	DESCRIPTION	PREP.	CHK.	APPR.
0	02.05.2019	ISSUED FOR APPROVAL	PSR	SSY	PAK

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

DEPT.	CODE		SCALE	WEIGHT (KG)	REF DRG.	ITEM
--	A		--	–	–	–

TITLE

Technical Datasheet Of Bio-Digester & Reed bed

	NAME	SIGN	DATE
PREP	PSR		02.05.2019
CHKD	SSY		02.05.2019
APPD	PAK		02.05.2019

DEPT.							CARD CODE	BHEL DOC NO.	REV
SIGN				N.A.			–	PE-V0-412-673-A047	
DATE								PEL DOC NO. A4-PEL-1037-DS-DBD01	0
								NO. OF SHEETS – 6 (EXCLUDING COVER SHEET)	

PENNAR ENVIRO
Re-engineering Water, Environment & Energy

Project :	**2 x 6600 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS,CHENNAI**	**Date :**	**02-05-19**
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-A047**	**PEL Doc. no:**	**A4-PEL-1037-DS-DBD01**

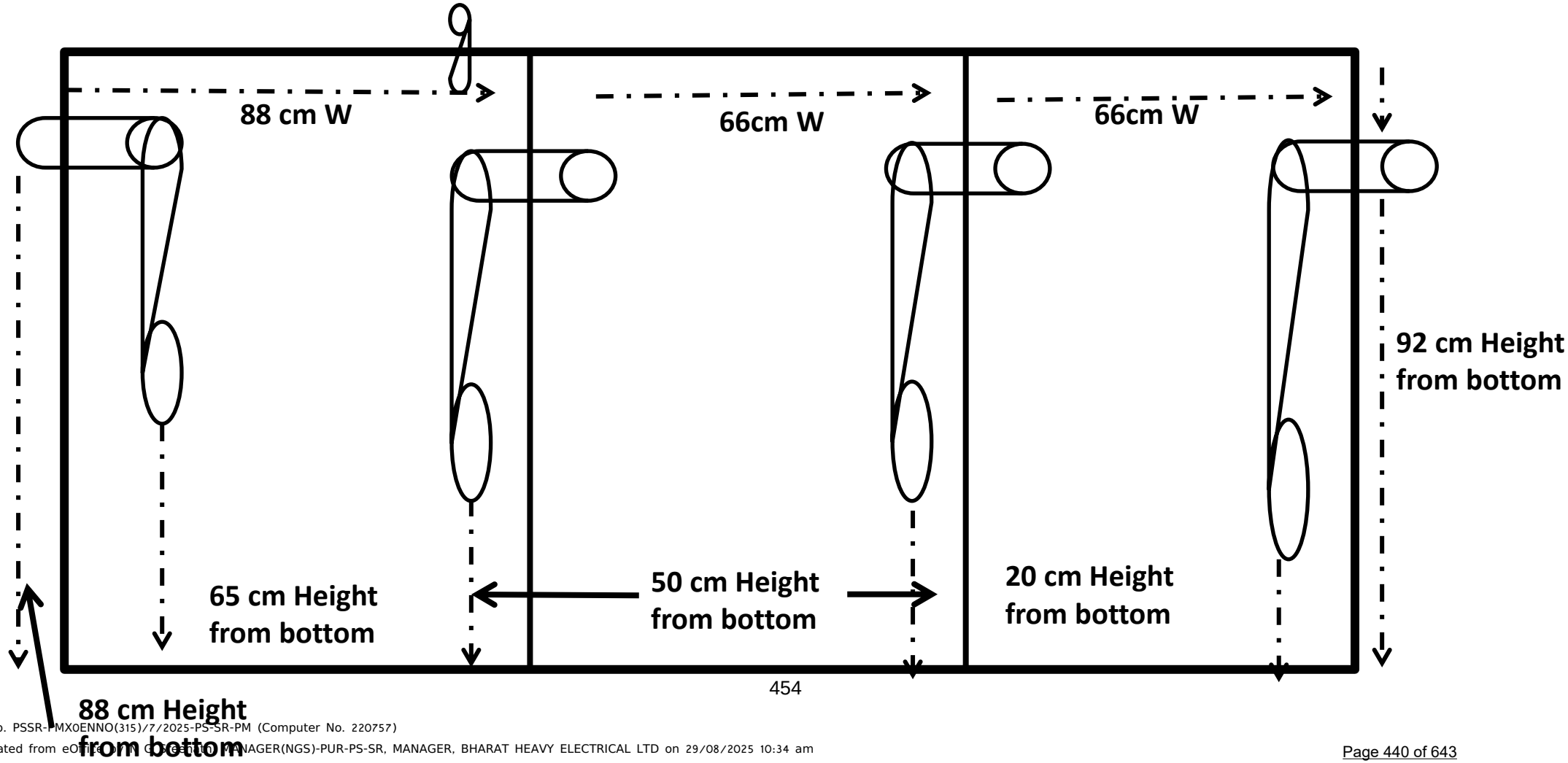
Datasheet for Bio digester & Reed Bed

General Data	
Manufacturer	KK NAG (DRDO Aprpoved)
Service	Sewage
Process and MOC details of Bio-Digester	
Effective Capacity	4.5m3
MOC	FRP
Thickness	10mm
Size	2.2m x 2.0m x 1.20m
Qty	1 No
inlet Pipe	110mm
Outlet Pipe	110mm
Process and MOC details of Reed Bed	
Effective Capacity	2.25m3
MOC	FRP
Thickness	10mm
Size	3.5m x 1.0m x 0.7m
Qty	1 No
inlet Pipe	110mm
Outlet Pipe	90 mm

Rev	Date	Description	Made	Chkd	Appd
0	02.05.2019	For Approval	GRK	SSY	PAK

5000 Litres FRP Bio Tank.

Dimensions: 220 x 200 x 120 cm.
Wall Thickness: 10 mm
Inlet Pipe: 110 mm; **Outlet pipe size**: 110 mm

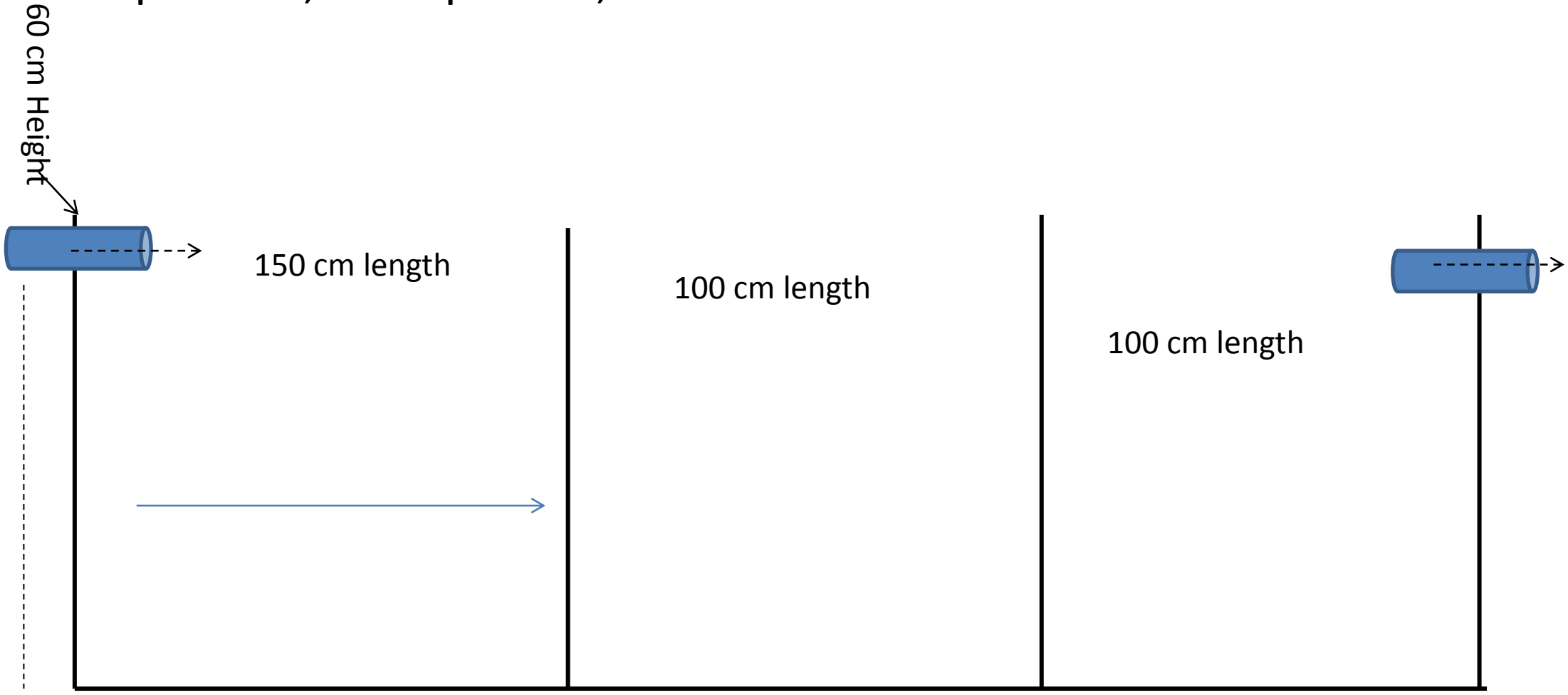


3500 Litres FRP Reedbed Tank.

Dimensions: 350 L x 100 W x 70 H cm.

Wall Thickness: 10 mm

Inlet Pipe: 110 mm; Outlet Pipe: 90 mm;



REEDBED SPECIFICATIONS

Sr. No.	Description	Quantity	Unit	Remarks
1	40 - 80 mm coarse gravels	5	$_{m}3$	Washed aggregates passing through 80 mm IS sieve and retained on 40 mm IS sieve.
2	5 - 20 mm fine gravels	10	$_{m}3$	Washed aggregates passing through 20 mm IS sieve and retained on 5 mm sieve.
3	4.75 mm coarse sand	2	$_{m}3$	Washed aggregates passing through 10 mm IS sieve and retained on 4.75 mm IS sieve.
4	Phragmites/Typha	50	piece	
5	Canna indica	50	piece	

K. K. NAG PVT. LTD
15 Sangam Project, Phase II,
Sangam Bridge,
46 Dr. Ambedkar Road,
Pune 411 001

Haematological and clinical analysis of blood samples from all the animals were performed at the end of the treatment period. i.e., after 24 hours of the last exposure (overnight fasted rat).

There were no treatment related mortalities in any of the rats. None of the animals showed any clinical signs of toxicity such as gain in body weight feed and water intake. Further, Biochemical Pathological and histopathological analysis did not show any significant difference between the treated groups compared to the control groups. Based on the above observation/ finding, it is reasonable to state that the test material, i.e., the effluent collected from the railway Biodigester and anaerobic microbial inoculum at given dose, i.e., undiluted concentration is non toxic in Wister rats. Based on experiment in the given conditions, it is concluded that no observation adverse effects level (NOAEL) of the effluent and inoculum for the 90-days period is >15gkg^{-1} of body weight in albino Wister rats. In other words ad libitum consumption of the effluent and the inoculum for 90 days has not induced any noticeable adverse effect in albino Wister rats

4.7 MATERIAL SAFETY DATA SHEET FOR AMI

1	**IDENTIFICATION OF ANAEROBIC MICROBIAL INOCULUM AND UNDERTAKING**		
1.1	Product name	:	Anaerobic Microbial Inoculum
1.2	Identified uses	:	Seed material in Biodigester used for degradation of organic waste.
1.3	Details of the supplier of data sheet	:	Director, Defence Research & Development Establishment, Jhansi Road, Gwalior – 474 002
1.4	Telephone	:	0751 – 2346640, 2233880, 2232940, 2341848.
1.5	Fax	:	0751 – 2341148
2	**HAZARDS IDENTIFICATION**		
2.1	Classification of the substance or mixture	:	Not a hazardous substance or mixture
2.2	Other hazards	:	None
3	**COMPOSITION OR INFORMATION ON INGREDIENTS**		
3.1	Substances	:	Contains mixtures of different groups of bacteria (Hydrolytic, Acidogenic, Acetogenic, methanogenic) in fermenting cow dung medium
3.2	Category	:	GRAS (Generally Recommended as Safe) bacteria
4	**FIRST AID MEASURES**		
4.1	**DESCRIPTION OF FIRST AID MEASURES**		
	If inhaled	:	If breathed, the gases formed by Anaerobic Microbial Inoculum move the person into fresh air or give oxygen respiration and refer to physician.
	In case of skin contact	:	Wash off with soap and plenty of water and consult medical practioner.
	In case of eye contact	:	Rinse eyes with water and refer ophthalmologist
	If swallowed	:	Rinse mouth with plenty of water then with mouth rinse solution and consult medical practioner.
5	**EXPOSURE CONTROLS / PERSONAL PROTECTION**		
5.1	Skin/Body protection	:	Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact. Dispose off contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wear apron for personal protection.
5.2	Eye / face protection	:	Wear goggles and wear cushioned standard cup mask

K. K. NAG PVT. LTD
15 Sangam Project, Phase II,
Sangam Bhavan,
49 Dr. Ambedkar Road,
Pune 411 001

Dr. G. J. Kulkarni's Copy Confidential

6	**SPECIAL HAZARD ARISING FROM SUBSTANCE OR MIXTURE**		
6.1	Special Hazard	:	Anaerobic Microbial Inoculum capable of producing biogas (40 – 70 % methane, 30 – 40 % CO_2 and traces of H_2S)
	Precaution	:	Keep the cap of container loosely fit to permit gas exchange.
7	**ACCIDENTAL RELEASE MEASURES**		
7.1	Personal precaution	:	Refer section 5
7.2	Environmental precautions	:	Let the product to enter drains after washing. For Disposal see section 13
8	**HANDLING AND STORAGE**		
8.1	Precautions for safe handling	:	Provide appropriate exhaust ventilation at places where aeration is less. Normal measures for preventive personal protection.
8.2	Conditions for safe storage including any incompatibilities	:	Store in loosely capped containers in a cool, dry and well ventilated place. Containers should be clean and devoid of any chemical. Keep 10-15 % of head space to accommodate thermal expansion and gas formed during shipment.
9	**PHYSICAL AND CHEMICAL PROPERTIES**		
9.1	Appearance	:	Liquid with settled undigested solid particles.
9.2	Odour	:	Odourless
9.3	pH	:	6.5 – 7.5
9.4	Colour	:	Brownish black
10	**Stability**		
	Stability	:	Stable at ambient temperature.
	Incompatibility	:	Strong oxidizing agents, antiseptic chemicals, antibiotics, strong acids or strong alkali.
11	**TOXICOLOGICAL INFORMATION**		
11.1	Acute toxicity		None
11.2	Skin corrosion/Irritation	:	Non corrosive
11.3	Eye damage/irritation	:	None
11.4	Respiratory or skin sensitization		None
11.5	Potential health hazards	:	None
12	**ECOLOGICAL INFORMATION**		
	Toxicity		Fish - Safe Rat - Safe
13	**DISPOSAL CONSIDERATIONS**		
	Disposal	:	Spilled product can be scrapped and applied to the agricultural field or let the product to enter drain.
14	**OTHER INFORMATION**		
The above information is believed to be correct but does not purport to be all inclusive and shall be used as a guide. The information in this document is based on present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. DRDE shall not be held liable for any damage resulting from handling or from contact with the above product.			

DRDE

□□EL□r□□□□ □□ C□□□□□ □rC□□□□□□□□□□□□ □ □□□□ □□ C□□r□□□□□□□ □ □□r □□□ □□□□ □r□□□□ □□□P□□□□□D□□ N□□PE-□0-41□-673-A04□□

□N□□	C□□ □ □□□□	□□EL□□ □ □□□□ d□d □□11□1□	C□□ □ □□□□	□□EL□□ □ □□□□ d□d 0□01□1□	C□□ □ □□□□	□□EL□□ □ □□□□ d□d □□01□1□
1□	Drive List and Operation & control Philosophy for STP are not received yet, hence control schemes cannot be reviewed at this stage, please furnish the sub vendor documents for approval.	Drive List and Operation & control Philosophy (Sub vendor document) for STP have already submitted to Customer for approval.	Noted.	Point Closed	--	--
□□	Control scheme shall be updated as per comments on P&I Diagram for Sewage Treatment Plant□ □ PE-V0-412-673-A001, R01.	Logic is revised as per latest PID.	Noted.	Point Closed	--	--
3□	STP's different drives are accommodated in the different DDCMIS, please note that I/O list and Drive list pertaining to respective DDCMIS shall also be updated accordingly.	Noted. The same shall be taken care during DDCMIS implementation as per the IO & drive list of STP.	BHEL is required to update the respective document and resubmit the same for approval.	All the IOs and drives related to Sewage treatment plant are covered in this document for the completeness point of view. Further the indication of same IO and drives in respective DDCMIS may result in repetition of same signals. Hence to avoid the same, the STP's IOs and drives are indicated in package specific document only. DDCMIS implementation part shall be taken care by EDN according to IO and drive list of STP.	List of DDCMIS are not as per contract. i. Separate CHP DDCMIS is not provided by BHEL EDN, as the same system is in BHEL ISG scope. Please check. ii. Separate CWPH DDCMIS is not provided by BHEL (EDN), same is part of respective unit DDCMIS. Please check. iii. Respective Unit DDCMIS is provided by BHEL (EDN), which unit DDCMIS shall be used for	Only Sewage transfer pumps installed in sewage lifting sumps (S1, S2, S3 & S4) other than STP area are controlled from respective DDCMIS. 1. IOs for Sewage transfer pump-1A/1B shall be implemented in CHP DDCMIS panels placed in control room near CHP MCC-1 near crusher house as indicated in electrical equipment layout of CHP MCC-1 (dwg no. IS-1-EE-688-120-E459) 2. IOs for Sewage transfer pump-2A/2B shall be implemented in CWPH DDCMIS panels placed in CW P/H control room as indicated electrical equipment layout of CW PH area (Dwg no. PE-DG-412-100-E024) 3. IOs for Sewage transfer pump-3A/3B shall be implemented in RODM DDCMIS panels as indicated in electrical equipment layout of RODM plant (Dwg no. 2-WT-330-00269) 4. IOs for Sewage transfer pump-4A/4B shall be implemented in Main plant DDCMIS Further the control of complete STP (except the system indicated above in point 1 to 4) shall be implemented

APPROVED

□N□□	C□□ □ □□□□	□□EL□□ □ □□□□ d□d □□11□1□	C□□ □ □□□□	□□EL□□ □ □□□□ d□d 0□01□1□	C□□ □ □□□□	□□EL□□ □ □□□□ d□d □□01□1□
					implementation of STP logics. Please note that above requirements is also not included in the controller functional grouping for respective DDCMIS. Please clarify.	in DDCMIS panels placed in STP control room as indicated in equipment layout of STP (Dwg No. PE-V0-412-673-A002) EDN will consider the IOs in the respective DDCMIS panels. The same is also indicated in control scheme on sheet no. 4
4□	BHEL to note that each & every signal shall be included in line with approved Drive control philosophy and Technical specification. BHEL to check & reconcile the details.	Noted. Further during logic implementation in DDCMIS, all the signals shall be considered by BHEL-EDN as per Drive control philosophy only. Drive control philosophy is also indicated under 'reference drawing' head in revised scheme.	Noted.	Point Closed	--	Point Closed
□□	BHEL to note that first unit's tag nos. shall have prefix 10 and second unit's tag nos. shall have prefix 20 and common system, tag nos. shall have prefix 90. BHEL to follow the prefix philosophy as per NIT, Vol. V, Cl. No. 2.01.25.	A note regarding tag no. is indicated on sht 3 in revised logic. Further please note that STP is a common system hence all the tags are prefixed with '90'.	STP's different drives are accommodated in the different DDCMIS, please note that prefix for drives and instruments shall be updated accordingly.	STP is a common system hence all the tags are prefixed with '90'.	Refer Sr. no. 3 above.	Please refer reply against point no. 3
6□	Notes shall be included in the document in line with MOM dtd 25-27.04.17.	All the related notes are indicated in revised logic.	Complete notes are not included. Please check and clarify.	All the notes are indicated in revised logic except the note regarding UCP and critical signal exchange as the same are not applicable for STP. Further a note regarding Backup control desk is indicated under notes heading on sheet 3.	Note regarding signal exchange is applicable for each logic implemented in respective DDCMIS as per specification.	Note regarding signal exchange is indicated in revised logic. However note regarding Backup control desk is deleted in revised logic as per the MOM dtd 24/25-01-19
7□	Please note that		i. Noted. ii. Follow the comment.	i. Point closed ii. The current logic	ii. Noted.	Point Closed

□□N□□	C□□ □ □□□□	□□EL□□ □□□□ d□d □□11□1□	C□□ □ □□□□	□□EL□□ □□□□ d□d 0□01□1□	C□□ □ □□□□	□□EL□□ □□□□ d□d □□01□1□
	i. opening & closing of discharge MOV/SOV shall be interlocked with pump status (start or stop) and as well as with pump individual discharge pressure as per approved P&IDs. ii. Auto start of standby pump or blower shall also be interlocked with discharge pressure low in addition to tripping of main pump. iii. Standby Pump shall not start if the running pump trips because of low-low level. iv. Discharge pressure low shall also be included for Tripping of pump.	i. Discharge valve shall be opened before starting of the pump as per the Control Philosophy. Accordingly, open & close command is coming from sequence as indicated on sht 65. ii. As per the current logic, at low discharge pressure, the running pump will get tripped and on tripping of the running pump, the standby selected pump will get start automatically. iii. Noted. As at very low level, the pump start permissive will not get satisfied therefore the standby pump will not start. iv. Noted. Discharge pressure low is already included for protection tripping of pump.	iii. Noted. iv. Noted.	is as per the comment. iii. Point closed iv. Point closed		
□□			BHEL being an EPC contractor shall be responsible for correctness, completeness & final successful implementation of functional diagrams/ OLCS/CLCS in every aspect for complete control, operation & commissioning of plant as per final approved P & IDs & control write-ups.	Noted and indicated under notes heading on sheet 3	Noted.	Point Closed

2 X 660 MW ENNORE SEZ STPP

CONTROL SCHEME FOR SEWAGE TREATMENT PLANT

REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD	REV.	DATE	ALTD	CHD	APPD
03	29.01.19	AR	VKV	SCS	02	05.01.19	AR –SD–	VKV –SD–	SCS –SD–	01	22.11.18	AR –SD–	VKV –SD–	SCS –SD–
1.	REVISED AS PER CUSTOMER'S COMMENTS DTD 23.01.19 & BHEL'S REPLY DTD 29.01.19				1.	REVISED AS PER CUSTOMER'S COMMENTS DTD 05.12.18 & BHEL'S REPLY DTD 05.01.19				1.	REVISED AS PER CUSTOMER'S COMMENTS DTD 16.11.18 & BHEL'S REPLY DTD 22.11.18			

JOB NO. 412
STATUS CONTRACT
DISTRIBUTION
TO
No. of

PROJECT–	2 X 660 MW ENNORE SEZ SUPERCRITICAL THERMAL POWER PROJECT AT ASH DYKE OF NCTPS, CHENNAI	
OWNER	TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LIMITED	
OWNER'S CONSULTANT	DESEIN PRIVATE LIMITED DESEIN HOUSE, NEW DELHI	
EPC CONTRACTOR	BHARAT HEAVY ELECTRICALS LTD POWER SECTOR PROJECT ENGINEERING MANAGEMENT NOIDA	DEPT CODE: I

	NAME	SIGN	DATE
DSGN	AR	–SD–	02.11.18
CHD	VKV	–SD–	02.11.18
APPD	SCS	–SD–	02.11.18

TITLE: CONTROL SCHEME FOR SEWAGE TREATMENT PLANT

DEPT. SIGN DATE | SCALE | DRAWING NO. PE–V0–412–673–A049 | SHEET 1 OF 95 | REV 03

462

INDEX

SHT. NO.	DESCRIPTION	REV.NO.				
		00	01	02	03	04
1	TITLE SHEET	x	x	x	x	
2&2a	INDEX	x	x	x	x	
3	REFERENCE DRAWINGS & NOTES	x	x	x	x	
4	LIST OF DRIVES	x				
5	SEWAGE TRANSFER PUMP–1A/1B STANDBY SELECTION LOGIC	x				
6	SEWAGE TRANSFER PUMP–1A DRIVE INTERFACE	x				
7	SEWAGE TRANSFER PUMP–1B DRIVE INTERFACE	x				
8	MISCELLANEOUS LOGICS	x				
9	SEWAGE TRANSFER PUMP–2A/2B STANDBY SELECTION LOGIC	x				
10	SEWAGE TRANSFER PUMP–2A DRIVE INTERFACE	x				
11	SEWAGE TRANSFER PUMP–2B DRIVE INTERFACE	x				
12	MISCELLANEOUS LOGICS	x				
13	SEWAGE TRANSFER PUMP–3A/3B STANDBY SELECTION LOGIC	x				
14	SEWAGE TRANSFER PUMP–3A DRIVE INTERFACE	x				
15	SEWAGE TRANSFER PUMP–3B DRIVE INTERFACE	x				
16	MISCELLANEOUS LOGICS	x				
17	SEWAGE TRANSFER PUMP–4A/4B STANDBY SELECTION LOGIC	x				
18	SEWAGE TRANSFER PUMP–4A DRIVE INTERFACE	x				
19	SEWAGE TRANSFER PUMP–4B DRIVE INTERFACE	x				
20	MISCELLANEOUS LOGICS	x				
21	COMMON COLLECTION SUMP PUMP–A/B STANDBY SELECTION LOGIC	x				
22	COMMON COLLECTION SUMP PUMP–A DRIVE INTERFACE	x				
23	COMMON COLLECTION SUMP PUMP–B DRIVE INTERFACE	x				
24	MISCELLANEOUS LOGICS	x				
25	MBBR FEED PUMP–A/B STANDBY SELECTION LOGIC	x			x	
26	MBBR FEED PUMP–A DRIVE INTERFACE	x			x	

SHT. NO.	DESCRIPTION	REV.NO.				
		00	01	02	03	04
27	MBBR FEED PUMP–B DRIVE INTERFACE	x			x	
28	MISCELLANEOUS LOGICS	x				
29	FILTER FEED PUMP–A/B STANDBY SELECTION LOGIC	x			x	
30	FILTER FEED PUMP–A DRIVE INTERFACE	x			x	
31	FILTER FEED PUMP–B DRIVE INTERFACE	x			x	
32,32a	MISCELLANEOUS LOGICS	x				
33	TREATED WATER DISPOSAL PUMP–A/B STANDBY SELECTION LOGIC	x			x	
34	TREATED WATER DISPOSAL PUMP–A DRIVE INTERFACE	x			x	
35	TREATED WATER DISPOSAL PUMP–B DRIVE INTERFACE	x			x	
36	MISCELLANEOUS LOGICS	x				
37	SLUDGE TRANSFER PUMP–A/B STANDBY SELECTION LOGIC	x			x	
38	SLUDGE TRANSFER PUMP–A DRIVE INTERFACE	x			x	
39	SLUDGE TRANSFER PUMP–B DRIVE INTERFACE	x			x	
40	MISCELLANEOUS LOGICS	x				
41	AIR BLWR–1A/1B STANDBY SELECTION LOGIC	x			x	
42	AIR BLWR–1A FOR CCS ,EQT & SHT DRIVE INTERFACE	x			x	
43	AIR BLWR–1B FOR CCS ,EQT & SHT DRIVE INTERFACE	x			x	
44	MISCELLANEOUS LOGICS	x				
45	AIR BLWR–2A/2B STANDBY SELECTION LOGIC	x			x	
46	AIR BLWR–2A FOR MBBR DRIVE INTERFACE	x			x	
47	AIR BLWR–2B FOR MBBR DRIVE INTERFACE	x			x	
48	NaOCL DOSING PUMP–1 DRIVE INTERFACE	x				
49	MISCELLANEOUS LOGICS	x				
50	NaOCL DOSING PUMP–2 DRIVE INTERFACE	x				
51	MISCELLANEOUS LOGICS	x				
52	MISCELLANEOUS LOGICS	x				

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
463
INDEX

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	2 OF 95		

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Sh.No.	DESCRIPTION	REVISION No				
		0	1	2	3	4
53.	DMF SERVICE SEQUENCE MASTER	X				
54.	DMF SERVICE SEQUENCE	X				
55.	DMF SERVICE SEQUENCE	X				
56.	DMF BACKWASH SEQUENCE MASTER	X				
57.	DMF BACKWASH SEQUENCE	X				
58.	DMF BACKWASH SEQUENCE	X				
59.	ACF SERVICE SEQUENCE MASTER	X				
60.	ACF SERVICE SEQUENCE	X				
61.	ACF SERVICE SEQUENCE	X				
62.	ACF BACKWASH SEQUENCE MASTER	X				
63.	ACF BACKWASH SEQUENCE	X				
64.	ACF BACKWASH SEQUENCE	X				
65.	FILTER FEED PUMP P-07A/B OUTLET VLV	X				
66.	DMF FEED INLET VLV	X				
67.	DMF BACKWASH INLET VALVE	X				
68.	DMF BACKWASH OUTLET VALVE	X				
69.	DMF DRAIN/RINSE OUTLET VLV	X				
70.	DMF FEED OUTLET VLV	X				
71.	DMF VENT VLV	X				
72.	DMF OUTLET VLV	X				

Sh.No.	DESCRIPTION	REVISION No				
		0	1	2	3	4
73.	ACF FEED INLET VLV DRIVE INTERFACE	X				
74.	ACF BACKWASH INLET VALVE DRIVE INTERFACE	X				
75.	ACF BACKWASH OUTLET VALVE DRIVE INTERFACE	X				
76.	ACF DRAIN/RINSE OUTLET VLV DRIVE INTERFACE	X				
77.	ACF FEED OUTLET VLV DRIVE INTERFACE	X				
78.	ACF VENT VLV DRIVE INTERFACE	X				
79.	MISCELLANEOUS LOGIC	X				
80.	CENTRIFUGE MOTOR DRIVE INTERFACE	X				
81.	FLUSHING VALVE DRIVE INTERFACE	X				
82.	NaOCL DOSING TANK DT-01 AGITATOR DRIVE INTERFACE	X				
83.	NaOCL DOSING TANK DT-02 AGITATOR DRIVE INTERFACE	X				
84.	POLYELECTROLYTE DOSING PUMP DRIVE INTERFACE	X				
85.	MISCELLANEOUS LOGIC	X	X			
86.	POLYELECTROLYTE DOS TANK AGITATOR DRIVE INTERFACE	X				
87.	CENTRIFUGE SEQUENCE MASTER	X				
88.	CENTRIFUGE START SEQUENCE	X				
89.	CENTRIFUGE START SEQUENCE	X				
90.	CENTRIFUGE STOP SEQUENCE	X				
91.	CENTRIFUGE STOP SEQUENCE	X				
92-95.	LEGEND	X				
95a,95b.	STEP TIMER BLOCK	X				

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
BHEL	TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 464 INDEX	REV. NO.	03 DATE: 29.01.2019
		SHT	2a OF 95

REFERENCE DRAWINGS:–

1. P & I D OF SEWAGE TREATMENT PLANT.	DRG. NO. : PE–V0–412–673–A001
2. OPERATION & CONTROL PHILOSOPHY – SEWAGE TREATMENT PLANT	DRG. NO. : PE–V0–412–673–A020
3. DRIVE CONTROL PHILOSOPHY (STN C&I)	DRG. NO. : PE–DM–412–145–I002

NOTES :–

1. THIS DOCUMENT COVERS THE DRIVE OF SEWAGE TREATMENT PLANT AS LISTED IN DRIVE LIST, DOC NO PE–V0–412–673–A038. THESE DRIVES SHALL BE CONTROLLED FROM STP STANDALONE DDCMIS EXCEPT THE FEW ONE WHICH IS INDICATED IN LIST OF DRIVES.

2. ALL TIMER VALUES ARE SUGGESTIVE ONLY AND TO BE SET AT SITE DURING COMMISSIONING.

3. VARIOUS SET POINTS, ENVISAGED IN LOGIC, SHALL BE SET DURING COMMISSIONING.

4. FIRST UNIT KKS TAGS TO BE READ WITH PREFIX '10' AND SECOND UNIT TAG NOS. TO BE READ WITH PREFIX '20'. KKS TAG FOR SYSTEMS COMMON TO BOTH UNITS TO BE READ WITH PREFIX '90'.

△1 5. LEGEND SHEETS AND DRIVE CONTROL MODULES INDICATED IN THE SCHEME ARE GENERIC AND SAME SHALL BE TAKEN CARE BY BHEL (EDN)–DDCMIS APPLICATION ENGINEER, WHILE IMPLEMENTING THE CONTROL SCHEMES IN METSO DNA (Valmet DNA) CONTROL SYSTEM.

6. BHEL WILL REVISE THE DRAWINGS AFTER FINALIZATION OF ALL RELATED SCHEMES, WRITE–UP AND P&ID'S EVEN AFTER APPROVAL OF THE DOCUMENT.

△2 7. BHEL BEING AN EPC CONTRACTOR SHALL BE RESPONSIBLE FOR CORRECTNESS, COMPLETENESS & FINAL SUCCESSFUL IMPLEMENTATION OF FUNCTIONAL DIAGRAMS/ OLCS/CLCS IN EVERY ASPECT FOR COMPLETE CONTROL, OPERATION & COMMISSIONING OF PLANT AS PER FINAL APPROVED P & IDS & CONTROL WRITE–UPS.

△3 8. THE BINARY AND ANALOG OUTPUTS FROM ONE SUBSYSTEM(SG/TG/BOP/OTHER SUBSYSTEMS) OF THE CONTROL SYSTEM TO OTHER WHICH ARE REQUIRED IN THESE SYSTEMS FOR PROTECTION PURPOSES AND SIGNALS DIRECTLY AFFECTING THE PERFORMANCE OF CLOSED LOOP CONTROLS (CRITICAL LOOPS OF BOP), SHALL BE MADE AVAILABLE FROM TRIPLE OR DUAL REDUNDANT BINARY AND ANALOG OUTPUT MODULES DEPENDING ON THE SYSTEM AND PROCESS REQUIREMENT. IN ADDITION, OTHER CRITICAL SIGNALS EXCHANGE BETWEEN SUBSYSTEMS (SG/TG/BOP/OTHER SUBSYSTEMS) SHALL ALSO BE HARDWIRED BASED ON SYSTEM AND PROCESS REQUIREMENT. FAILURE OF ANY SINGLE MODULE SHALL NOT AFFECT OPERATION OF MORE THAN ONE SINGLE DRIVE OF SAME SERVICE.

BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049	
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 465 REFERENCE DRAWINGS & NOTES	REV. NO.	03	DATE: 29.01.2019
		SHT	3 OF 95	

□AM□L NAD□ □ENE□A□□ON D□□□□□□□ON CO□P□L□D
□□660M□ E□□□r□ □E□ □□PP
CON□□OL □C□EME □O□ □E□ A□E □□EA□MEN□ PLAN□
L□□□ O□ D□□□E□

□O□ N□□41□

D□□ N□□: PE-□0-41□-673-A04□□ □E□□03
□□□ N□□: 4 O□ □□

□□NO	□□□	□A□	DE□C□P□ON	□□PE O□ D□□□E	OPE□A□□ON	LO□ □C □□EE□ NO	□EMA□□□
1	90GRS01AP001	P-01A	SEWAGE TRANSFER PUMP-1A	LTUD	ON/OFF	6	TO BE IMPLEMENTED IN CHP DDCMIS
2	90GRS01AP002	P-01B	SEWAGE TRANSFER PUMP-1B	LTUD	ON/OFF	7	TO BE IMPLEMENTED IN CHP DDCMIS
3	90GRS02AP001	P-02A	SEWAGE TRANSFER PUMP-2A	LTUD	ON/OFF	10	TO BE IMPLEMENTED IN CWPH DDCMIS
4	90GRS02AP002	P-02B	SEWAGE TRANSFER PUMP-2B	LTUD	ON/OFF	11	TO BE IMPLEMENTED IN CWPH DDCMIS
5	90GRS03AP001	P-03A	SEWAGE TRANSFER PUMP-3A	LTUD	ON/OFF	14	TO BE IMPLEMENTED IN RODM DDCMIS
6	90GRS03AP002	P-03B	SEWAGE TRANSFER PUMP-3B	LTUD	ON/OFF	15	TO BE IMPLEMENTED IN RODM DDCMIS
7	90GRS04AP001	P-04A	SEWAGE TRANSFER PUMP-4A	LTUD	ON/OFF	18	TO BE IMPLEMENTED IN MAIN PLANT DDCMIS
8	90GRS04AP002	P-04B	SEWAGE TRANSFER PUMP-4B	LTUD	ON/OFF	19	TO BE IMPLEMENTED IN MAIN PLANT DDCMIS
9	90GRS05AP001	P-05A	COMMON COLLECTION SUMP PUMP-A	LTUD	ON/OFF	22	
10	90GRS05AP002	P-05B	COMMON COLLECTION SUMP PUMP-B	LTUD	ON/OFF	23	
11	90GRS06AP001	P-06A	MBBR FEED PUMP-A	LTUD	ON/OFF	26	
12	90GRS06AP002	P-06B	MBBR FEED PUMP-B	LTUD	ON/OFF	27	
13	90GRS08AP001	P-07A	FILTER FEED PUMP-A	LTUD	ON/OFF	30	
14	90GRS09AP001	P-07A	FILTER FEED PUMP-B	LTUD	ON/OFF	31	
15	90GRS12AP001	P-08A	TREATED WATER DISPOSAL PUMP-A	LTUD	ON/OFF	34	
16	90GRS13AP001	P-08B	TREATED WATER DISPOSAL PUMP-B	LTUD	ON/OFF	35	
17	90GRS15AP001	P-09A	SLUDGE TRANSFER PUMP-A	LTUD	ON/OFF	38	
18	90GRS15AP002	P-09B	SLUDGE TRANSFER PUMP-B	LTUD	ON/OFF	39	
19	90GRC01AN001	B-01A	AIR BLWR-1A FOR CCS ,EQT & SHT	LTUD	ON/OFF	42	
20	90GRC01AN002	B-01B	AIR BLWR-1B FOR CCS ,EQT & SHT	LTUD	ON/OFF	43	
21	90GRC02AN001	B-02A	AIR BLWR-2A FOR MBBR	LTUD	ON/OFF	46	
22	90GRC02AN002	B-02B	AIR BLWR-2B FOR MBBR	LTUD	ON/OFF	47	
23	90GRN01AP001	DP-01	NaOCL DOSING PUMP-1	466 LTUD	ON/OFF	48	

□AM□L NAD□ □ENE□A□□ON D□□□□□□□ON CO□P□L□D

□□660M□ E□□□r□ □E□ □□PP

CON□□OL □C□EME □O□ □E□ A□E □□EA□MEN□ PLAN□

L□□□ O□ D□□□E□

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D□□ N□□: PE-□0-41□-673-A04□□ □E□□03

□□□ N□□: 4 a O□ □□

□□NO	□□□	□A□	DE□C□P□ON	□□PE O□ D□□□E	OPE□A□□ON	LO□ □C □□EE□ NO	□EMA□□□
24	90GRN02AP001	DP-02	NaOCL DOSING PUMP-2	LTUD	ON/OFF	50	
25	90GRS10AA201	V-165	FILTER FEED PUMP P-07A/B OUTLET VLV	SOL-S	OPEN/CLOSE	65	COIL VOLTAGE 24VDC
26	90GRB01AA201	V-166	DMF FEED INLET VLV	SOL-S	OPEN/CLOSE	66	COIL VOLTAGE 24VDC
27	90GRB01AA202	V-167	DMF BACKWASH INLET VALVE	SOL-S	OPEN/CLOSE	67	COIL VOLTAGE 24VDC
28	90GRB01AA203	V-168	DMF BACKWASH OUTLET VALVE	SOL-S	OPEN/CLOSE	68	COIL VOLTAGE 24VDC
29	90GRB01AA204	V-169	DMF DRAIN / RINSE OUTLET VLV	SOL-S	OPEN/CLOSE	69	COIL VOLTAGE 24VDC
30	90GRB01AA205	V-170	DMF FEED OUTLET VLV	SOL-S	OPEN/CLOSE	70	COIL VOLTAGE 24VDC
31	90GRB01AA206	V-171	DMF VENT VLV	SOL-S	OPEN/CLOSE	71	COIL VOLTAGE 24VDC
32	90GRS10AA202	V-176	DMF OUTLET VLV	SOL-S	OPEN/CLOSE	72	COIL VOLTAGE 24VDC
33	90GRB02AA201	V-177	ACF FEED INLET VLV	SOL-S	OPEN/CLOSE	73	COIL VOLTAGE 24VDC
34	90GRB02AA202	V-178	ACF BACKWASH INLET VALVE	SOL-S	OPEN/CLOSE	74	COIL VOLTAGE 24VDC
35	90GRB02AA203	V-179	ACF BACKWASH OUTLET VALVE	SOL-S	OPEN/CLOSE	75	COIL VOLTAGE 24VDC
36	90GRB02AA204	V-180	ACF DRAIN / RINSE OUTLET VLV	SOL-S	OPEN/CLOSE	76	COIL VOLTAGE 24VDC
37	90GRB02AA205	V-181	ACF FEED OUTLET VLV	SOL-S	OPEN/CLOSE	77	COIL VOLTAGE 24VDC
38	90GRB02AA206	V-182	ACF VENT VLV	SOL-S	OPEN/CLOSE	78	COIL VOLTAGE 24VDC
39	90GRS16AP001		CENTRIFUGE MOTOR	LTUD	ON/OFF	80	
40	90GRS15AA202	V-234	FLUSHING VALVE	SOL-S	OPEN/CLOSE	81	COIL VOLTAGE 24VDC
41	90GRN01AM001	AG-01	NaOCL DOSING TANK DT-01 AGITATOR	LTUD	ON/OFF	82	
42	90GRN01AM001	AG-02	NaOCL DOSING TANK DT-02 AGITATOR	LTUD	ON/OFF	83	
43	90GRN03AP001	DP-03	POLYELECTROLYTE DOSING PUMP	LTUD	ON/OFF	84	
44	90GRN03AM001	AG-03	POLYELECTROLYTE DOSING TANK AGITATOR	LTUD	ON/OFF	86	

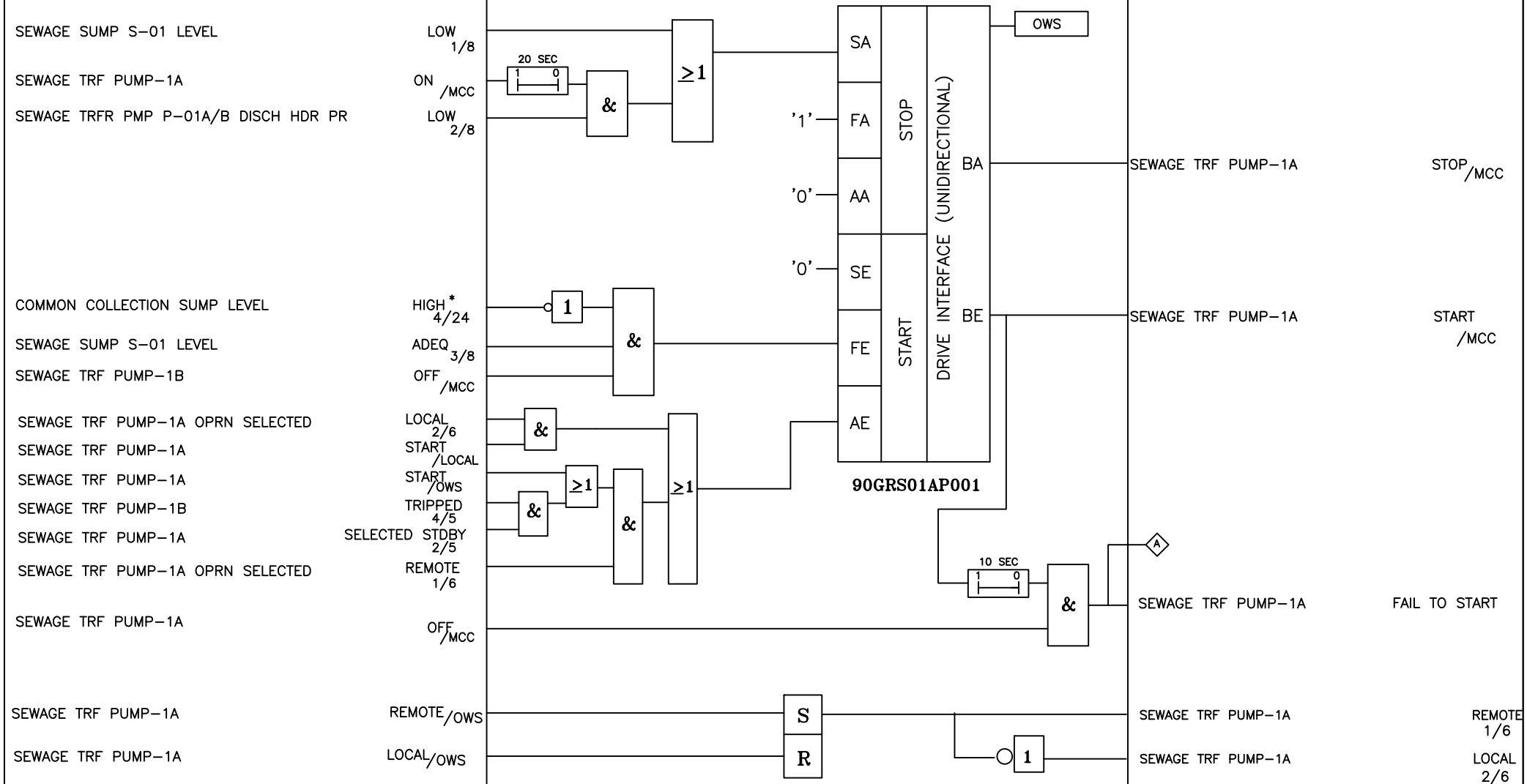
CONTROL OF SEWAGE SUMP-01 TRANSFER PUMPS
(TO BE IMPLEMENTED IN CHP DDCMIS NEAR COAL STOCK PILE AREA)

	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
		TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 468	REV. NO.	03 DATE: 29.01.2019
			SHT	5a OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE TRANSFER PMP–1A 90GRS01AP001	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–1B 90GRS01AP002	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–1B 90GRS01AP002	ON /MCC			
		S, R, ≥1	SEWAGE TRANSFER PMP–1A	SELECTED MAIN
			SEWAGE TRANSFER PMP–1B	STAND BY 1/7
SEWAGE TRANSFER PMP–1B 90GRS01AP002	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–1A 90GRS01AP001	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–1A 90GRS01AP001	ON /MCC			
		S, R, ≥1	SEWAGE TRANSFER PMP–1B	SELECTED MAIN
			SEWAGE TRANSFER PMP–1A	STAND BY 2/6
SEWAGE TRANSFER PMP–1A 90GRS01AP001	ON /MCC			
SEWAGE TRANSFER PMP–1A 90GRS01AP001	STOP /OWS			
SEWAGE TRANSFER PMP–1A 90GRS01AP001	OFF /MCC			
		S, R, &	SEWAGE TRANSFER PMP–1A	TRIPPED 3/7
SEWAGE TRANSFER PMP–1B 90GRS01AP002	ON /MCC			
SEWAGE TRANSFER PMP–1B 90GRS01AP002	STOP /OWS			
SEWAGE TRANSFER PMP–1B 90GRS01AP002	OFF /MCC			
		S, R, &	SEWAGE TRANSFER PMP–1B	TRIPPED 4/6

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT SEWAGE TRF PUMP–1A/B STANDBY SELECTION LOGIC	REV. NO.	03 DATE: 29.01.2019
		SHT	5 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE SUMP S-01 LEVEL	LOW 1/8			
SEWAGE TRF PUMP-1A	ON /MCC			
SEWAGE TRFR PMP P-01A/B DISCH HDR PR	LOW 2/8			
			SEWAGE TRF PUMP-1A	STOP /MCC
COMMON COLLECTION SUMP LEVEL	HIGH * 4/24			
SEWAGE SUMP S-01 LEVEL	ADEQ 3/8		SEWAGE TRF PUMP-1A	START /MCC
SEWAGE TRF PUMP-1B	OFF /MCC			
SEWAGE TRF PUMP-1A OPRN SELECTED	LOCAL 2/6			
SEWAGE TRF PUMP-1A	START /LOCAL			
SEWAGE TRF PUMP-1A	START /OWS			
SEWAGE TRF PUMP-1B	TRIPPED 4/5			
SEWAGE TRF PUMP-1A	SELECTED STDBY 2/5			
SEWAGE TRF PUMP-1A OPRN SELECTED	REMOTE 1/6			
SEWAGE TRF PUMP-1A	OFF /MCC		SEWAGE TRF PUMP-1A	FAIL TO START
SEWAGE TRF PUMP-1A	REMOTE /OWS		SEWAGE TRF PUMP-1A	REMOTE 1/6
SEWAGE TRF PUMP-1A	LOCAL /OWS		SEWAGE TRF PUMP-1A	LOCAL 2/6



* FROM STP DDCMIS

FOR STARTING OF SEWAGE TRANSFER PUMP-1A, OPERATOR TO ENSURE THAT MANUAL VALVES V-102 & V-106 ARE OPEN

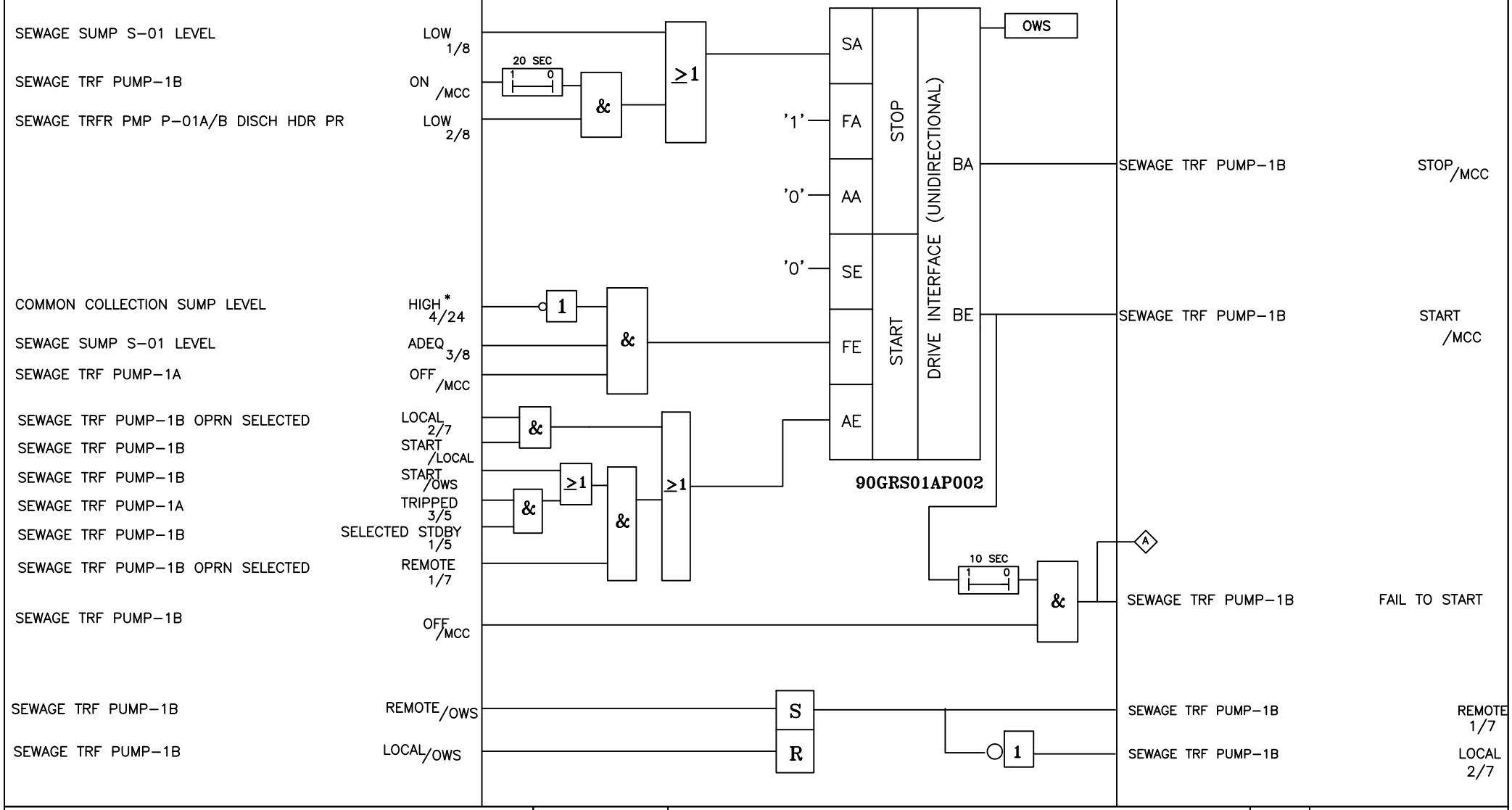
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
470 SEWAGE TRANSFER PUMP-1A

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	6 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE SUMP S-01 LEVEL	LOW 1/8			
SEWAGE TRF PUMP-1B	ON /MCC			
SEWAGE TRFR PMP P-01A/B DISCH HDR PR	LOW 2/8			
			SEWAGE TRF PUMP-1B	STOP /MCC
COMMON COLLECTION SUMP LEVEL	HIGH * 4/24			
SEWAGE SUMP S-01 LEVEL	ADEQ 3/8		SEWAGE TRF PUMP-1B	START /MCC
SEWAGE TRF PUMP-1A	OFF /MCC			
SEWAGE TRF PUMP-1B OPRN SELECTED	LOCAL 2/7			
SEWAGE TRF PUMP-1B	START /LOCAL			
SEWAGE TRF PUMP-1B	START /OWS			
SEWAGE TRF PUMP-1A	TRIPPED 3/5			
SEWAGE TRF PUMP-1B	SELECTED STDBY 1/5			
SEWAGE TRF PUMP-1B OPRN SELECTED	REMOTE 1/7			
SEWAGE TRF PUMP-1B	OFF /MCC		SEWAGE TRF PUMP-1B	FAIL TO START
SEWAGE TRF PUMP-1B	REMOTE /OWS		SEWAGE TRF PUMP-1B	REMOTE 1/7
SEWAGE TRF PUMP-1B	LOCAL /OWS		SEWAGE TRF PUMP-1B	LOCAL 2/7



* FROM STP DDCMIS

FOR STARTING OF SEWAGE TRANSFER PUMP-1A, OPERATOR TO ENSURE THAT MANUAL VALVES V-104 & V-106 ARE OPEN

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
471
SEWAGE TRANSFER PUMP-1B

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	7 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE SUMP-01 LEVEL 90GRS01CL001	/FIELD	HIGH LVM, HIGH LVM → ≥1 → 5 Sec	SEWAGE SUMP-01 LEVEL	HIGH
SEWAGE SUMP-01 LEVEL 90GRS01CL002	/FIELD			
		LOW LVM, LOW LVM → ≥1 → 5 Sec	SEWAGE SUMP-01 LEVEL	LOW 1/6,7
		5 Sec → 1	SEWAGE SUMP-01 LEVEL	ADEQ 3/6,7
SEWAGE TRFR PMP P-01A/B DISCH HDR PR 90GRS01CP001	/FIELD	LOW LVM, LOW LVM → ≥1 → 5 Sec	SEWAGE TRFR PMP P-01A/B DISCH HDR PR	LOW 2/6,7
SEWAGE TRFR PMP P-01A/B DISCH HDR PR 90GRS01CP002	/FIELD			
		HIGH LVM, HIGH LVM → ≥1 → 5 Sec	SEWAGE TRFR PMP P-01A/B DISCH HDR PR	HIGH

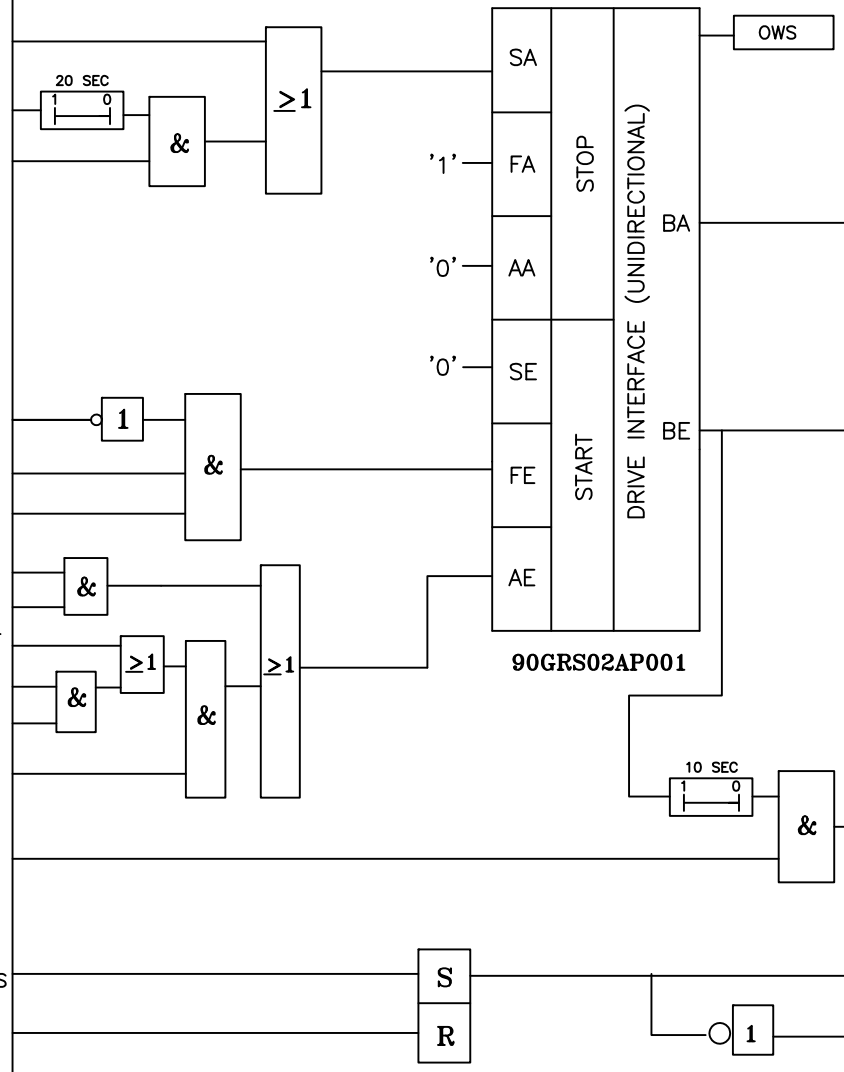
2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049	
TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT MISCELLANEOUS LOGICS 472	REV. NO.	03	DATE: 29.01.2019
	SHT	8 OF 95	

CONTROL OF SEWAGE SUMP-02 TRANSFER PUMPS
(TO BE IMPLEMENTED IN CWPH DDCMIS)

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049	
TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 473		REV. NO.	03	DATE: 29.01.2019
		SHT	9a OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE TRANSFER PMP–2A 90GRS02AP001	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–2B 90GRS02AP002	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–2B 90GRS02AP002	ON /MCC			
		S R ≥1	SEWAGE TRANSFER PMP–2A	SELECTED MAIN
			SEWAGE TRANSFER PMP–2B	STAND BY 1/11
SEWAGE TRANSFER PMP–2B 90GRS02AP002	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–2A 90GRS02AP001	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–2A 90GRS02AP001	ON /MCC			
		S R ≥1	SEWAGE TRANSFER PMP–2B	SELECTED MAIN
			SEWAGE TRANSFER PMP–2A	STAND BY 2/10
SEWAGE TRANSFER PMP–2A 90GRS02AP001	ON /MCC			
SEWAGE TRANSFER PMP–2A 90GRS02AP001	STOP /OWS			
SEWAGE TRANSFER PMP–2A 90GRS02AP001	OFF /MCC			
		S R &	SEWAGE TRANSFER PMP–2A	TRIPPED 3/11
SEWAGE TRANSFER PMP–2B 90GRS02AP002	ON /MCC			
SEWAGE TRANSFER PMP–2B 90GRS02AP002	STOP /OWS			
SEWAGE TRANSFER PMP–2B 90GRS02AP002	OFF /MCC			
		S R &	SEWAGE TRANSFER PMP–2B	TRIPPED 4/10

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
	TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT SEWAGE TRF PUMP-2A/B STANDBY SELECTION LOGIC	REV. NO.	03 DATE: 29.01.2019
		SHT	9 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
SEWAGE SUMP S–02 LEVEL	LOW 1/12		SEWAGE TRF PUMP–2A	STOP /MCC
SEWAGE TRF PUMP–2A	ON /MCC		SEWAGE TRF PUMP–2A	START /MCC
SEWAGE TRFR PMP P–02A/B DISCH HDR PR	LOW 2/12		SEWAGE TRF PUMP–2A	FAIL TO START
COMMON COLLECTION SUMP LEVEL	HIGH * 4/24		SEWAGE TRF PUMP–2A	REMOTE 1/10
SEWAGE SUMP S–02 LEVEL	ADEQ 3/12		SEWAGE TRF PUMP–2A	LOCAL 2/10
SEWAGE TRF PUMP–2B	OFF /MCC			
SEWAGE TRF PUMP–2A OPRN SELECTED	LOCAL 2/10			
SEWAGE TRF PUMP–2A	START /LOCAL			
SEWAGE TRF PUMP–2A	START /OWS			
SEWAGE TRF PUMP–2B	TRIPPED 4/9			
SEWAGE TRF PUMP–2A	SELECTED STDBY 2/9			
SEWAGE TRF PUMP–2A OPRN SELECTED	REMOTE 1/10			
SEWAGE TRF PUMP–2A	OFF /MCC			
SEWAGE TRF PUMP–2A	REMOTE /OWS			
SEWAGE TRF PUMP–2A	LOCAL /OWS			

* FROM STP DDCMIS

FOR STARTING OF SEWAGE TRANSFER PUMP–2A, OPERATOR TO ENSURE THAT MANUAL VALVES V–108 & V–112 ARE OPEN

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
475 SEWAGE TRANSFER PUMP–2A

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	10 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE SUMP S-02 LEVEL	LOW 1/12			
SEWAGE TRF PUMP-2B	ON /MCC			
SEWAGE TRFR PMP P-02A/B DISCH HDR PR	LOW 2/12			
			SEWAGE TRF PUMP-2B	STOP /MCC
COMMON COLLECTION SUMP LEVEL	HIGH * 4/24			
SEWAGE SUMP S-02 LEVEL	ADEQ 3/12		SEWAGE TRF PUMP-2B	START /MCC
SEWAGE TRF PUMP-2A	OFF /MCC			
SEWAGE TRF PUMP-2B OPRN SELECTED	LOCAL 2/11			
SEWAGE TRF PUMP-2B	START /LOCAL			
SEWAGE TRF PUMP-2B	START /OWS			
SEWAGE TRF PUMP-2A	TRIPPED 3/9			
SEWAGE TRF PUMP-2B	SELECTED STDBY 1/9			
SEWAGE TRF PUMP-2B OPRN SELECTED	REMOTE 1/11			
SEWAGE TRF PUMP-2B	OFF /MCC		SEWAGE TRF PUMP-2B	FAIL TO START
SEWAGE TRF PUMP-2B	REMOTE /OWS		SEWAGE TRF PUMP-2B	REMOTE 1/11
SEWAGE TRF PUMP-2B	LOCAL /OWS		SEWAGE TRF PUMP-2B	LOCAL 2/11

20 SEC

10 SEC

SA, FA, AA, SE, FE, AE — STOP, START — DRIVE INTERFACE (UNIDIRECTIONAL) — BA, BE

'1' '0' '0'

OWS

90GRS02AP002

* FROM STP DDCMIS

FOR STARTING OF SEWAGE TRANSFER PUMP-2B, OPERATOR TO ENSURE THAT MANUAL VALVES V-110 & V-112 ARE OPEN

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
476
SEWAGE TRANSFER PUMP-2B

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	11 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE SUMP–02 LEVEL 90GRS02CL001	/FIELD	HIGH LVM, HIGH LVM → ≥1 → 5 Sec	SEWAGE SUMP–02 LEVEL	HIGH
SEWAGE SUMP–02 LEVEL 90GRS02CL002	/FIELD			
		LOW LVM, LOW LVM → ≥1 → 5 Sec	SEWAGE SUMP–02 LEVEL	LOW 1/10,11
		5 Sec → 1	SEWAGE SUMP–02 LEVEL	ADEQ 3/10,11
SEWAGE TRFR PMP P–02A/B DISCH HDR PR 90GRS02CP001	/FIELD	LOW LVM, LOW LVM → ≥1 → 5 Sec	SEWAGE TRFR PMP P–02A/B DISCH HDR PR	LOW 2/10,11
SEWAGE TRFR PMP P–02A/B DISCH HDR PR 90GRS02CP002	/FIELD			
		HIGH LVM, HIGH LVM → ≥1 → 5 Sec	SEWAGE TRFR PMP P–02A/B DISCH HDR PR	HIGH

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049	
TITLE :– 477	CONTROL SCHEME FOR SEWAGE TREATMENT PLANT MISCELLANEOUS LOGICS	REV. NO.	03	DATE: 29.01.2019
		SHT	12 OF 95	

CONTROL OF SEWAGE SUMP-03 TRANSFER PUMPS
(TO BE IMPLEMENTED IN RODM DDCMIS)

	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
		TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 478	REV. NO.	03 DATE: 29.01.2019
			SHT	13a OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
SEWAGE TRANSFER PMP–3A 90GRS03AP001	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–3B 90GRS03AP002	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–3B 90GRS03AP002	ON /MCC			
		S R, ≥1	SEWAGE TRANSFER PMP–3A	SELECTED MAIN
			SEWAGE TRANSFER PMP–3B	STAND BY 1/15
SEWAGE TRANSFER PMP–3B 90GRS03AP002	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–3A 90GRS03AP001	SELECT MAIN /OWS			
SEWAGE TRANSFER PMP–3A 90GRS03AP001	ON /MCC			
		S R, ≥1	SEWAGE TRANSFER PMP–3B	SELECTED MAIN
			SEWAGE TRANSFER PMP–3A	STAND BY 2/14
SEWAGE TRANSFER PMP–3A 90GRS03AP001	ON /MCC			
SEWAGE TRANSFER PMP–3A 90GRS03AP001	STOP /OWS			
SEWAGE TRANSFER PMP–3A 90GRS03AP001	OFF /MCC	S R, &	SEWAGE TRANSFER PMP–3A	TRIPPED 3/15
SEWAGE TRANSFER PMP–3B 90GRS03AP002	ON /MCC			
SEWAGE TRANSFER PMP–3B 90GRS03AP002	STOP /OWS			
SEWAGE TRANSFER PMP–3B 90GRS03AP002	OFF /MCC	S R, &	SEWAGE TRANSFER PMP–3B	TRIPPED 4/14

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT SEWAGE TRF PUMP–2A/B STANDBY SELECTION LOGIC	REV. NO. 03	DATE: 29.01.2019
		SHT 13 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE SUMP S-03 LEVEL	LOW 1/16			
SEWAGE TRF PUMP-3A	ON /MCC			
SEWAGE TRFR PMP P-03A/B DISCH HDR PR	LOW 2/16			
			SEWAGE TRF PUMP-3A	STOP /MCC
COMMON COLLECTION SUMP LEVEL	HIGH * 4/24			
SEWAGE SUMP S-03 LEVEL	ADEQ 3/16		SEWAGE TRF PUMP-3A	START /MCC
SEWAGE TRF PUMP-3B	OFF /MCC			
SEWAGE TRF PUMP-3A OPRN SELECTED	LOCAL 2/14			
SEWAGE TRF PUMP-3A	START /LOCAL			
SEWAGE TRF PUMP-3A	START /OWS			
SEWAGE TRF PUMP-3B	TRIPPED 4/13			
SEWAGE TRF PUMP-3A	SELECTED STDBY 2/13			
SEWAGE TRF PUMP-3A OPRN SELECTED	REMOTE 1/14			
SEWAGE TRF PUMP-3A	OFF /MCC		SEWAGE TRF PUMP-3A	FAIL TO START
SEWAGE TRF PUMP-3A	REMOTE /OWS		SEWAGE TRF PUMP-3A	REMOTE 1/14
SEWAGE TRF PUMP-3A	LOCAL /OWS		SEWAGE TRF PUMP-3A	LOCAL 2/14

20 SEC

10 SEC

SA, FA, AA, SE, FE, AE — STOP, START — DRIVE INTERFACE (UNIDIRECTIONAL) — BA, BE

'1' '0' '0'

OWS

90GRS03AP001

FROM STP DDCMIS

FOR STARTING OF SEWAGE TRANSFER PUMP-3A, OPERATOR TO ENSURE THAT MANUAL VALVES V-114 & V-118 ARE OPEN

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
480 SEWAGE TRANSFER PUMP-3A

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	14 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE SUMP S-03 LEVEL	LOW 1/16			
SEWAGE TRF PUMP-3B	ON /MCC			
SEWAGE TRFR PMP P-03A/B DISCH HDR PR	LOW 2/16			
			SEWAGE TRF PUMP-3B	STOP /MCC
COMMON COLLECTION SUMP LEVEL	HIGH * 4/24			
SEWAGE SUMP S-03 LEVEL	ADEQ 3/16		SEWAGE TRF PUMP-3B	START /MCC
SEWAGE TRF PUMP-3A	OFF /MCC			
SEWAGE TRF PUMP-3B OPRN SELECTED	LOCAL 2/15			
SEWAGE TRF PUMP-3B	START /LOCAL			
SEWAGE TRF PUMP-3B	START /OWS			
SEWAGE TRF PUMP-3A	TRIPPED 3/13			
SEWAGE TRF PUMP-3B	SELECTED STDBY 1/13			
SEWAGE TRF PUMP-3B OPRN SELECTED	REMOTE 1/15			
SEWAGE TRF PUMP-3B	OFF /MCC		SEWAGE TRF PUMP-3B	FAIL TO START
SEWAGE TRF PUMP-3B	REMOTE /OWS		SEWAGE TRF PUMP-3B	REMOTE 1/15
SEWAGE TRF PUMP-3B	LOCAL /OWS		SEWAGE TRF PUMP-3B	LOCAL 2/15

20 SEC

10 SEC

SA, FA, AA, SE, FE, AE — STOP / START — DRIVE INTERFACE (UNIDIRECTIONAL) — BA, BE — OWS

'1' '0' '0'

90GRS03AP002

FROM STP DDCMIS

FOR STARTING OF SEWAGE TRANSFER PUMP-3B, OPERATOR TO ENSURE THAT MANUAL VALVES V-116 & V-118 ARE OPEN

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
481
SEWAGE TRANSFER PUMP-3B

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	15 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE SUMP–03 LEVEL 90GRS03CL001	/FIELD	HIGH LVM, HIGH LVM → ≥1 → 5 Sec	SEWAGE SUMP–03 LEVEL	HIGH
SEWAGE SUMP–03 LEVEL 90GRS03CL002	/FIELD			
		LOW LVM, LOW LVM → ≥1 → 5 Sec	SEWAGE SUMP–03 LEVEL	LOW 1/14,15
		5 Sec → 1	SEWAGE SUMP–03 LEVEL	ADEQ 3/14,15
SEWAGE TRFR PMP P–03A/B DISCH HDR PR 90GRS03CP001	/FIELD	LOW LVM, LOW LVM → ≥1 → 5 Sec	SEWAGE TRFR PMP P–03A/B DISCH HDR PR	LOW 2/14,15
SEWAGE TRFR PMP P–03A/B DISCH HDR PR 90GRS03CP002	/FIELD			
		HIGH LVM, HIGH LVM → ≥1 → 5 Sec	SEWAGE TRFR PMP P–03A/B DISCH HDR PR	HIGH

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
482 MISCELLANEOUS LOGICS

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	16 OF 95		

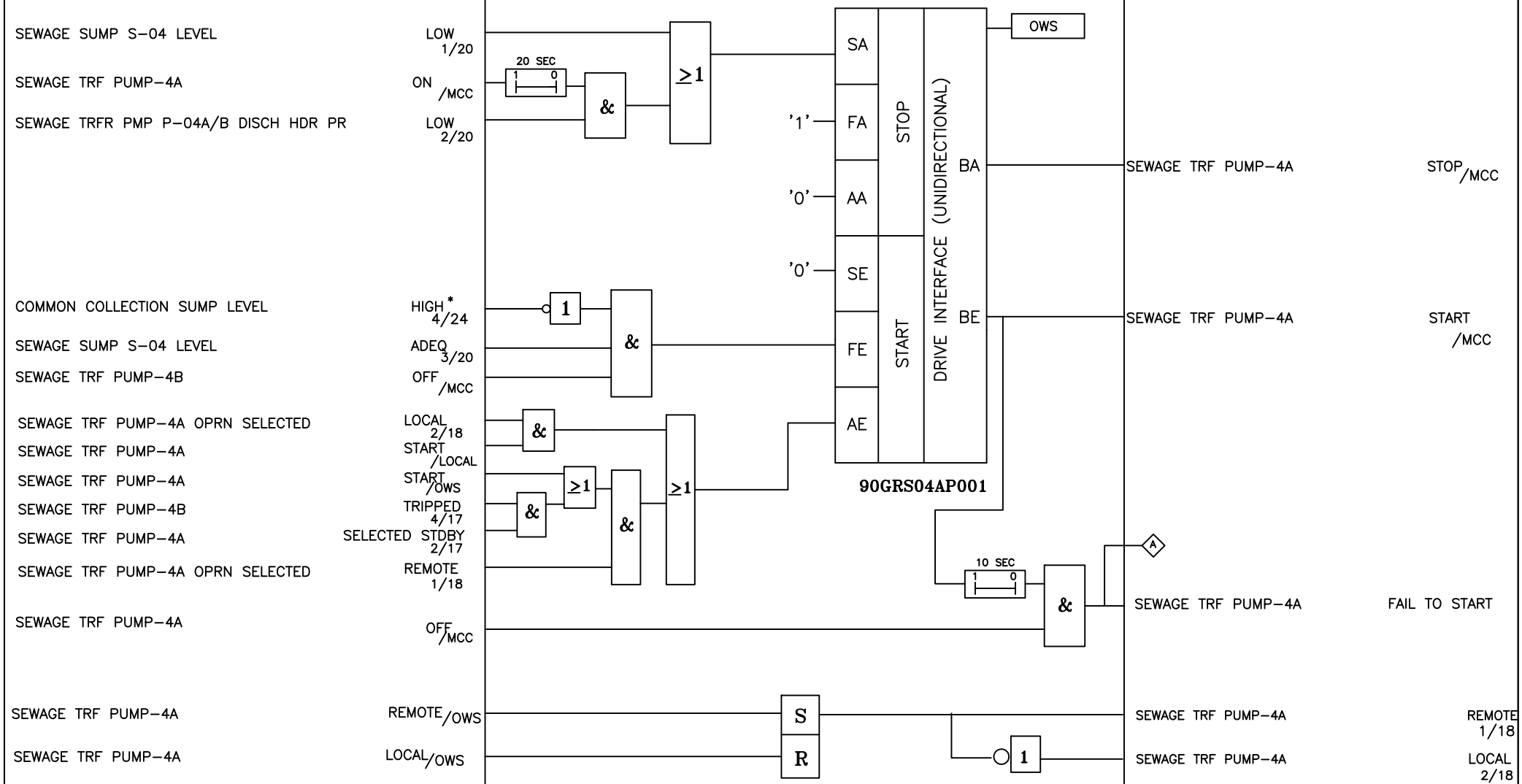
CONTROL OF SEWAGE SUMP-04 TRANSFER PUMPS (TO BE IMPLEMENTED IN MAIN PLANT DDCMIS)

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049	
	TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 483	REV. NO.	03	DATE: 29.01.2019
		SHT	17a OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE TRANSFER PMP–4A 90GRS04AP001	SELECT MAIN /OWS	S R	SEWAGE TRANSFER PMP–4A	SELECTED MAIN
SEWAGE TRANSFER PMP–4B 90GRS04AP002	SELECT MAIN /OWS	≥1	SEWAGE TRANSFER PMP–4B	STAND BY 1/19
SEWAGE TRANSFER PMP–4B 90GRS04AP002	ON /MCC			
SEWAGE TRANSFER PMP–4B 90GRS04AP002	SELECT MAIN /OWS	S R	SEWAGE TRANSFER PMP–4B	SELECTED MAIN
SEWAGE TRANSFER PMP–4A 90GRS04AP001	SELECT MAIN /OWS	≥1	SEWAGE TRANSFER PMP–4A	STAND BY 2/18
SEWAGE TRANSFER PMP–4A 90GRS04AP001	ON /MCC			
SEWAGE TRANSFER PMP–4A 90GRS04AP001	ON /MCC	S R	SEWAGE TRANSFER PMP–4A	TRIPPED 3/19
SEWAGE TRANSFER PMP–4A 90GRS04AP001	STOP /OWS	&		
SEWAGE TRANSFER PMP–4A 90GRS04AP001	OFF /MCC			
SEWAGE TRANSFER PMP–4B 90GRS04AP002	ON /MCC	S R	SEWAGE TRANSFER PMP–4B	TRIPPED 4/18
SEWAGE TRANSFER PMP–4B 90GRS04AP002	STOP /OWS	&		
SEWAGE TRANSFER PMP–4B 90GRS04AP002	OFF /MCC			

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049	
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT SEWAGE TRF PUMP–4A/B STANDBY SELECTION LOGIC	REV. NO.	03	DATE: 29.01.2019
		SHT	17 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE SUMP S-04 LEVEL	LOW 1/20			
SEWAGE TRF PUMP-4A	ON /MCC			
SEWAGE TRFR PMP P-04A/B DISCH HDR PR	LOW 2/20			
			SEWAGE TRF PUMP-4A	STOP /MCC
COMMON COLLECTION SUMP LEVEL	HIGH * 4/24			
SEWAGE SUMP S-04 LEVEL	ADEQ 3/20		SEWAGE TRF PUMP-4A	START /MCC
SEWAGE TRF PUMP-4B	OFF /MCC			
SEWAGE TRF PUMP-4A OPRN SELECTED	LOCAL 2/18			
SEWAGE TRF PUMP-4A	START /LOCAL			
SEWAGE TRF PUMP-4A	START /OWS			
SEWAGE TRF PUMP-4B	TRIPPED 4/17			
SEWAGE TRF PUMP-4A	SELECTED STDBY 2/17			
SEWAGE TRF PUMP-4A OPRN SELECTED	REMOTE 1/18			
			SEWAGE TRF PUMP-4A	FAIL TO START
SEWAGE TRF PUMP-4A	OFF /MCC			
SEWAGE TRF PUMP-4A	REMOTE /OWS		SEWAGE TRF PUMP-4A	REMOTE 1/18
SEWAGE TRF PUMP-4A	LOCAL /OWS		SEWAGE TRF PUMP-4A	LOCAL 2/18



* FROM STP DDCMIS

FOR STARTING OF SEWAGE TRANSFER PUMP-4A, OPERATOR TO ENSURE THAT MANUAL VALVES V-120 & V-124 ARE OPEN

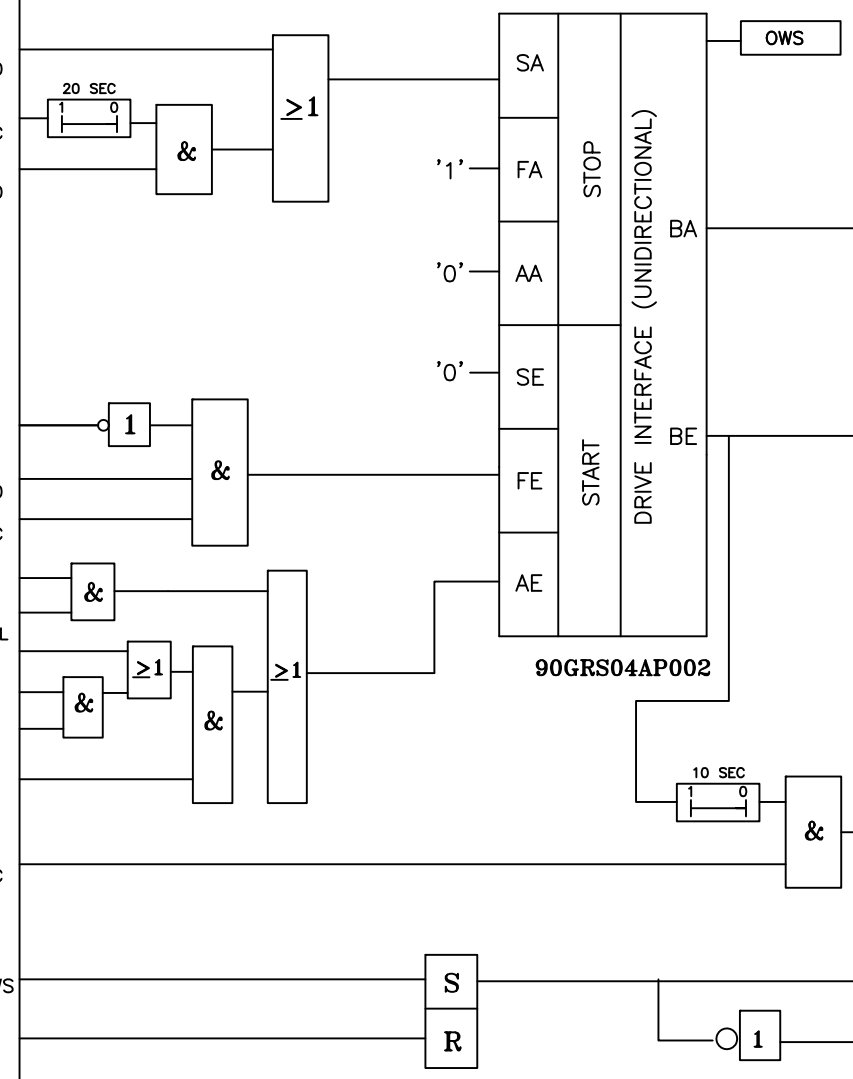
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
485 SEWAGE TRANSFER PUMP-4A

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	18 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE SUMP S-04 LEVEL	LOW 1/20			
SEWAGE TRF PUMP-4B	ON /MCC			
SEWAGE TRFR PMP P-04A/B DISCH HDR PR	LOW 2/20			
			SEWAGE TRF PUMP-4B	STOP /MCC
COMMON COLLECTION SUMP LEVEL	HIGH * 4/24			
SEWAGE SUMP S-04 LEVEL	ADEQ 3/20		SEWAGE TRF PUMP-4B	START /MCC
SEWAGE TRF PUMP-4A	OFF /MCC			
SEWAGE TRF PUMP-4B OPRN SELECTED	LOCAL 2/19			
SEWAGE TRF PUMP-4B	START /LOCAL			
SEWAGE TRF PUMP-4B	START /OWS			
SEWAGE TRF PUMP-4A	TRIPPED 3/17			
SEWAGE TRF PUMP-4B	SELECTED STDBY 1/17			
SEWAGE TRF PUMP-4B OPRN SELECTED	REMOTE 1/19			
SEWAGE TRF PUMP-4B	OFF /MCC		SEWAGE TRF PUMP-4B	FAIL TO START
SEWAGE TRF PUMP-4B	REMOTE /OWS		SEWAGE TRF PUMP-4B	REMOTE 1/19
SEWAGE TRF PUMP-4B	LOCAL /OWS		SEWAGE TRF PUMP-4B	LOCAL 2/19



* FROM STP DDCMIS

FOR STARTING OF SEWAGE TRANSFER PUMP-4B, OPERATOR TO ENSURE THAT MANUAL VALVES V-122 & V-124 ARE OPEN

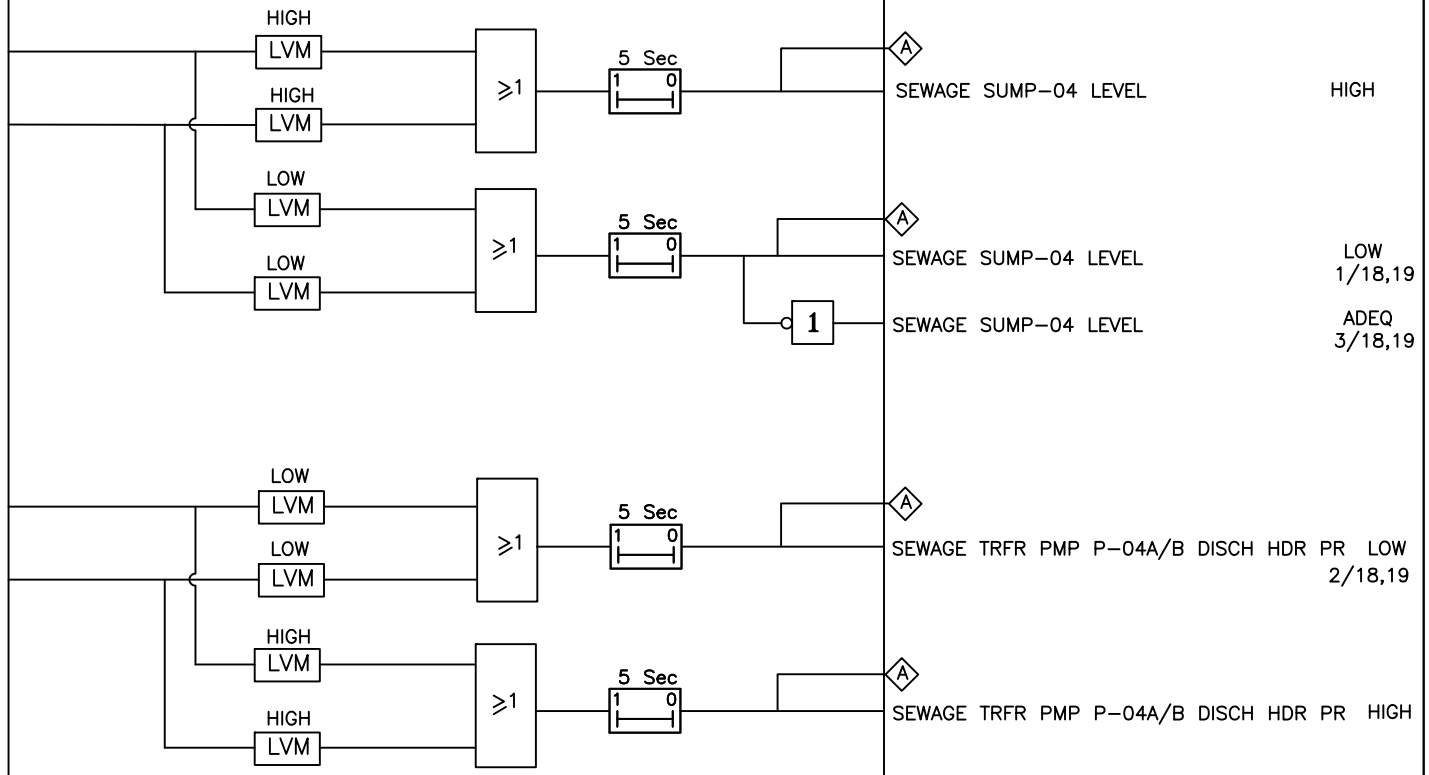
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
486
SEWAGE TRANSFER PUMP-4B

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	19 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SEWAGE SUMP–04 LEVEL 90GRS04CL001	/FIELD			
SEWAGE SUMP–04 LEVEL 90GRS04CL002	/FIELD			
SEWAGE TRFR PMP P–04A/B DISCH HDR PR 90GRS04CP001	/FIELD			
SEWAGE TRFR PMP P–04A/B DISCH HDR PR 90GRS04CP002	/FIELD			



	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
		TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT MISCELLANEOUS LOGICS 487	REV. NO. 03	DATE: 29.01.2019
			SHT 20	OF 95

CONTROL OF SEWAGE TREATMENT PLANT
(TO BE IMPLEMENTED IN STP DDCMIS)

	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
		TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 488	REV. NO.	03 DATE: 29.01.2019
			SHT	21a OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
COMMON COLLECTION SUMP PMP–A 90GRS05AP001	SELECT MAIN /OWS			
COMMON COLLECTION SUMP PMP–B 90GRS05AP002	SELECT MAIN /OWS			
COMMON COLLECTION SUMP PMP–B 90GRS05AP002	ON /MCC	≥1 → S/R	COMMON COLLECTION SUMP PMP–A	SELECTED MAIN
			COMMON COLLECTION SUMP PMP–B	STAND BY 1/23
COMMON COLLECTION SUMP PMP–B 90GRS05AP002	SELECT MAIN /OWS			
COMMON COLLECTION SUMP PMP–A 90GRS05AP001	SELECT MAIN /OWS			
COMMON COLLECTION SUMP PMP–A 90GRS05AP001	ON /MCC	≥1 → S/R	COMMON COLLECTION SUMP PMP–B	SELECTED MAIN
			COMMON COLLECTION SUMP PMP–A	STAND BY 2/22
COMMON COLLECTION SUMP PMP–A 90GRS05AP001	ON /MCC			
COMMON COLLECTION SUMP PMP–A 90GRS05AP001	STOP /OWS	S/R → &	COMMON COLLECTION SUMP PMP–A	TRIPPED 3/23
COMMON COLLECTION SUMP PMP–A 90GRS05AP001	OFF /MCC			
COMMON COLLECTION SUMP PMP–B 90GRS05AP002	ON /MCC			
COMMON COLLECTION SUMP PMP–B 90GRS05AP002	STOP /OWS	S/R → &	COMMON COLLECTION SUMP PMP–B	TRIPPED 4/22
COMMON COLLECTION SUMP PMP–B 90GRS05AP002	OFF /MCC			

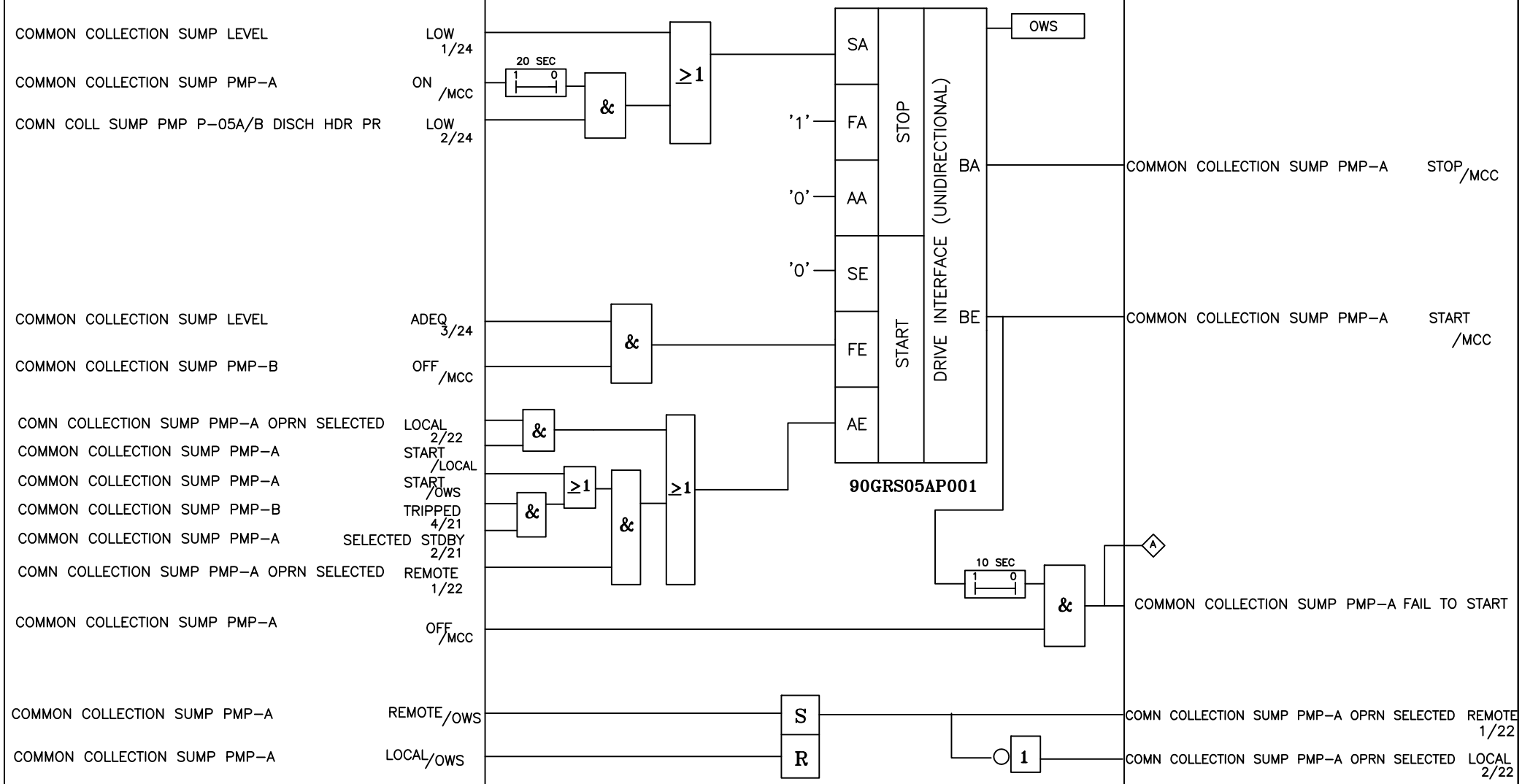
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
COMMON COLLECTION SUMP PMP STANDBY SELECTION LOGIC

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	21 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
COMMON COLLECTION SUMP LEVEL	LOW 1/24			
COMMON COLLECTION SUMP PMP–A	ON /MCC			
COMN COLL SUMP PMP P–05A/B DISCH HDR PR	LOW 2/24			
			COMMON COLLECTION SUMP PMP–A	STOP /MCC
COMMON COLLECTION SUMP LEVEL	ADEQ 3/24			
COMMON COLLECTION SUMP PMP–B	OFF /MCC			
			COMMON COLLECTION SUMP PMP–A	START /MCC
COMN COLLECTION SUMP PMP–A OPRN SELECTED	LOCAL 2/22			
COMMON COLLECTION SUMP PMP–A	START /LOCAL			
COMMON COLLECTION SUMP PMP–A	START /OWS			
COMMON COLLECTION SUMP PMP–B	TRIPPED 4/21			
COMMON COLLECTION SUMP PMP–A	SELECTED STDBY 2/21			
COMN COLLECTION SUMP PMP–A OPRN SELECTED	REMOTE 1/22			
COMMON COLLECTION SUMP PMP–A	OFF /MCC		COMMON COLLECTION SUMP PMP–A FAIL TO START	
COMMON COLLECTION SUMP PMP–A	REMOTE /OWS		COMN COLLECTION SUMP PMP–A OPRN SELECTED	REMOTE 1/22
COMMON COLLECTION SUMP PMP–A	LOCAL /OWS		COMN COLLECTION SUMP PMP–A OPRN SELECTED	LOCAL 2/22



FOR STARTING OF CCS PUMP–A, OPERATOR TO ENSURE THAT MANUAL VALVES V–126 & V–130 ARE OPEN

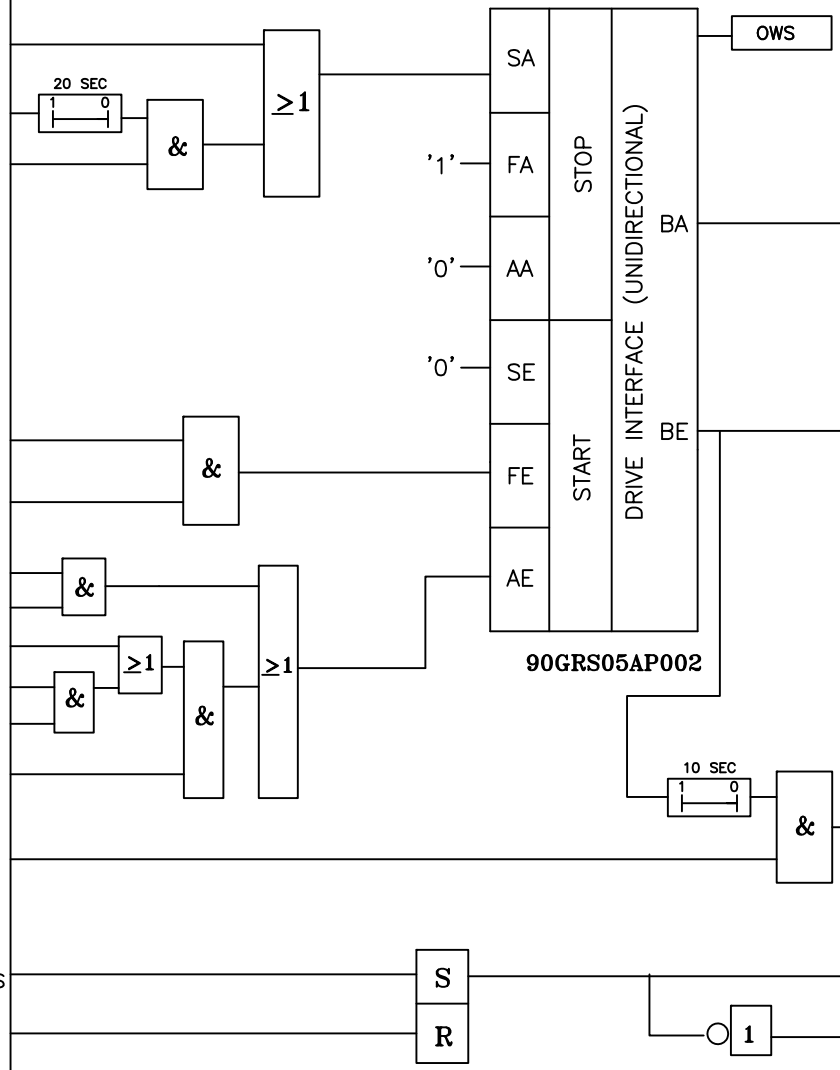
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
490 COMMON COLLECTION SUMP PMP–A

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	22 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
COMMON COLLECTION SUMP LEVEL	LOW 1/24		COMMON COLLECTION SUMP PMP–B	STOP /MCC
COMMON COLLECTION SUMP PMP–B	ON /MCC		COMMON COLLECTION SUMP PMP–B	START /MCC
COMN COLL SUMP PMP P–05A/B DISCH HDR PR	LOW 2/24		COMMON COLLECTION SUMP PMP–B FAIL TO START	
COMMON COLLECTION SUMP LEVEL	ADEQ 3/24		COMN COLLECTION SUMP PMP–B OPRN SELECTED	REMOTE 1/23
COMMON COLLECTION SUMP PMP–A	OFF /MCC		COMN COLLECTION SUMP PMP–B OPRN SELECTED	LOCAL 2/23
COMN COLLECTION SUMP PMP–B OPRN SELECTED	LOCAL 2/23			
COMMON COLLECTION SUMP PMP–B	START /LOCAL			
COMMON COLLECTION SUMP PMP–B	START /OWS			
COMMON COLLECTION SUMP PMP–A	TRIPPED 3/21			
COMMON COLLECTION SUMP PMP–B	SELECTED STDBY 1/21			
COMN COLLECTION SUMP PMP–B OPRN SELECTED	REMOTE 1/23			
COMMON COLLECTION SUMP PMP–B	OFF /MCC			
COMMON COLLECTION SUMP PMP–B	REMOTE /OWS			
COMMON COLLECTION SUMP PMP–B	LOCAL /OWS			



FOR STARTING OF CCS PUMP–B, OPERATOR TO ENSURE THAT MANUAL VALVES V–128 & V–130 ARE OPEN

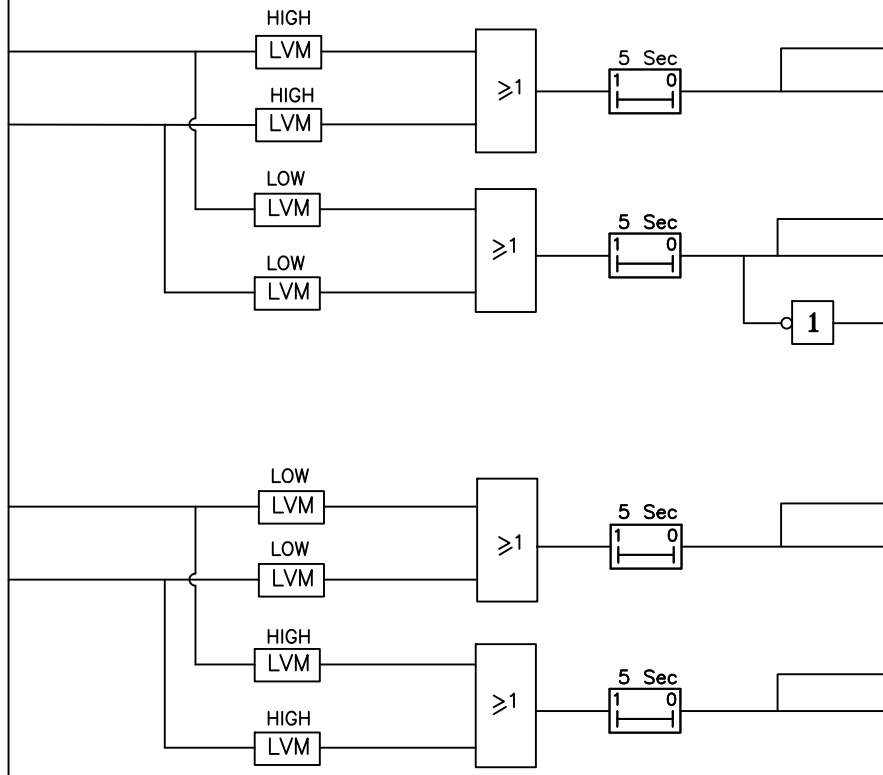
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
491 COMMON COLLECTION SUMP PMP–B

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	23 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
COMMON COLLECTION SUMP LEVEL 90GRS05CL001	/FIELD			
COMMON COLLECTION SUMP LEVEL 90GRS05CL002	/FIELD			
COMN COLL SUMP PMP P-05A/B DISCH HDR PR 90GRS01CP001	/FIELD			
COMN COLL SUMP PMP P-05A/B DISCH HDR PR 90GRS01CP002	/FIELD			

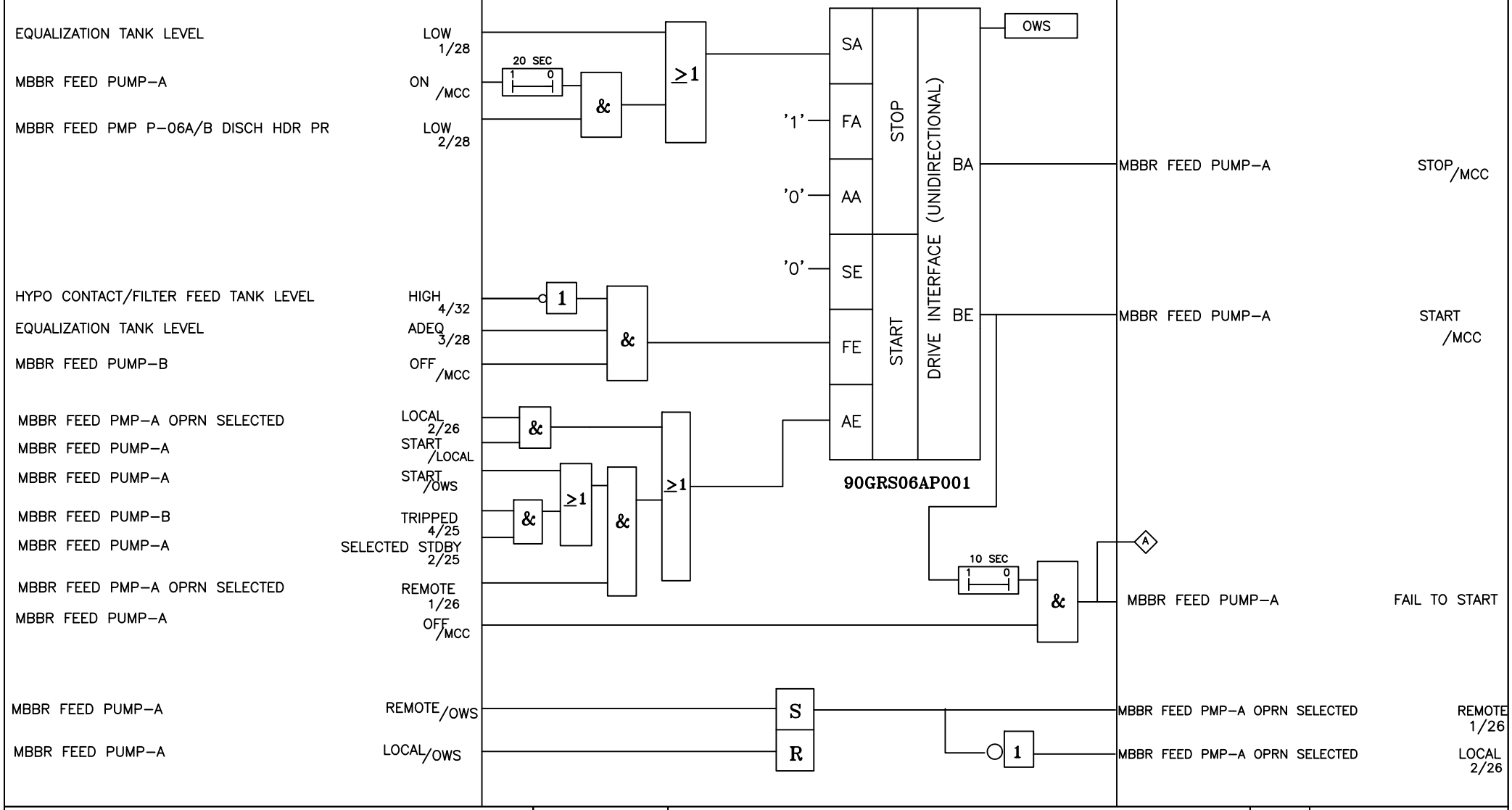


	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
		TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 492 MISCELLANEOUS LOGICS	REV. NO. 03	DATE: 29.01.2019
			SHT 24	OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
MBBR FEED PUMP–A 90GRS06AP001	SELECT MAIN /OWS			
MBBR FEED PUMP–B 90GRS06AP002	SELECT MAIN /OWS			
MBBR FEED PUMP–B 90GRS06AP002	ON /MCC			
		S R, ≥1	MBBR FEED PUMP–A	SELECTED MAIN
			MBBR FEED PUMP–B	STAND BY 1/27
MBBR FEED PUMP–B 90GRS06AP002	SELECT MAIN /OWS			
MBBR FEED PUMP–A 90GRS06AP001	SELECT MAIN /OWS			
MBBR FEED PUMP–A 90GRS06AP001	ON /MCC			
		S R, ≥1	MBBR FEED PUMP–B	SELECTED MAIN
			MBBR FEED PUMP–A	STAND BY 2/26
MBBR FEED PUMP–A 90GRS06AP001	ON /MCC			
MBBR FEED PUMP–A 90GRS06AP001	STOP /OWS			
MBBR FEED PUMP–A 90GRS06AP001	OFF /MCC			
		S R, &	MBBR FEED PUMP–A	TRIPPED 3/27
MBBR FEED PUMP–B 90GRS06AP002	ON /MCC			
MBBR FEED PUMP–B 90GRS06AP002	STOP /OWS			
MBBR FEED PUMP–B 90GRS06AP002	OFF /MCC			
		S R, &	MBBR FEED PUMP–B	TRIPPED 4/26

BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 493 MBBR FEED PUMP STANDBY SELECTION LOGIC	REV. NO.	03 DATE: 29.01.2019
		SHT	25 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
EQUALIZATION TANK LEVEL	LOW 1/28			
MBBR FEED PUMP–A	ON /MCC			
MBBR FEED PMP P–06A/B DISCH HDR PR	LOW 2/28			
			MBBR FEED PUMP–A	STOP /MCC
HYPO CONTACT/FILTER FEED TANK LEVEL	HIGH 4/32			
EQUALIZATION TANK LEVEL	ADEQ 3/28			
MBBR FEED PUMP–B	OFF /MCC			
			MBBR FEED PUMP–A	START /MCC
MBBR FEED PMP–A OPRN SELECTED	LOCAL 2/26			
MBBR FEED PUMP–A	START /LOCAL			
MBBR FEED PUMP–A	START /OWS			
MBBR FEED PUMP–B	TRIPPED 4/25			
MBBR FEED PUMP–A	SELECTED STDBY 2/25			
MBBR FEED PMP–A OPRN SELECTED	REMOTE 1/26			
MBBR FEED PUMP–A	OFF /MCC			
			MBBR FEED PUMP–A	FAIL TO START
MBBR FEED PUMP–A	REMOTE /OWS		MBBR FEED PMP–A OPRN SELECTED	REMOTE 1/26
MBBR FEED PUMP–A	LOCAL /OWS		MBBR FEED PMP–A OPRN SELECTED	LOCAL 2/26



FOR STARTING OF MBBR FEED PUMP–A, OPERATOR TO ENSURE THAT MANUAL VALVES V–132 & V–136 ARE OPEN

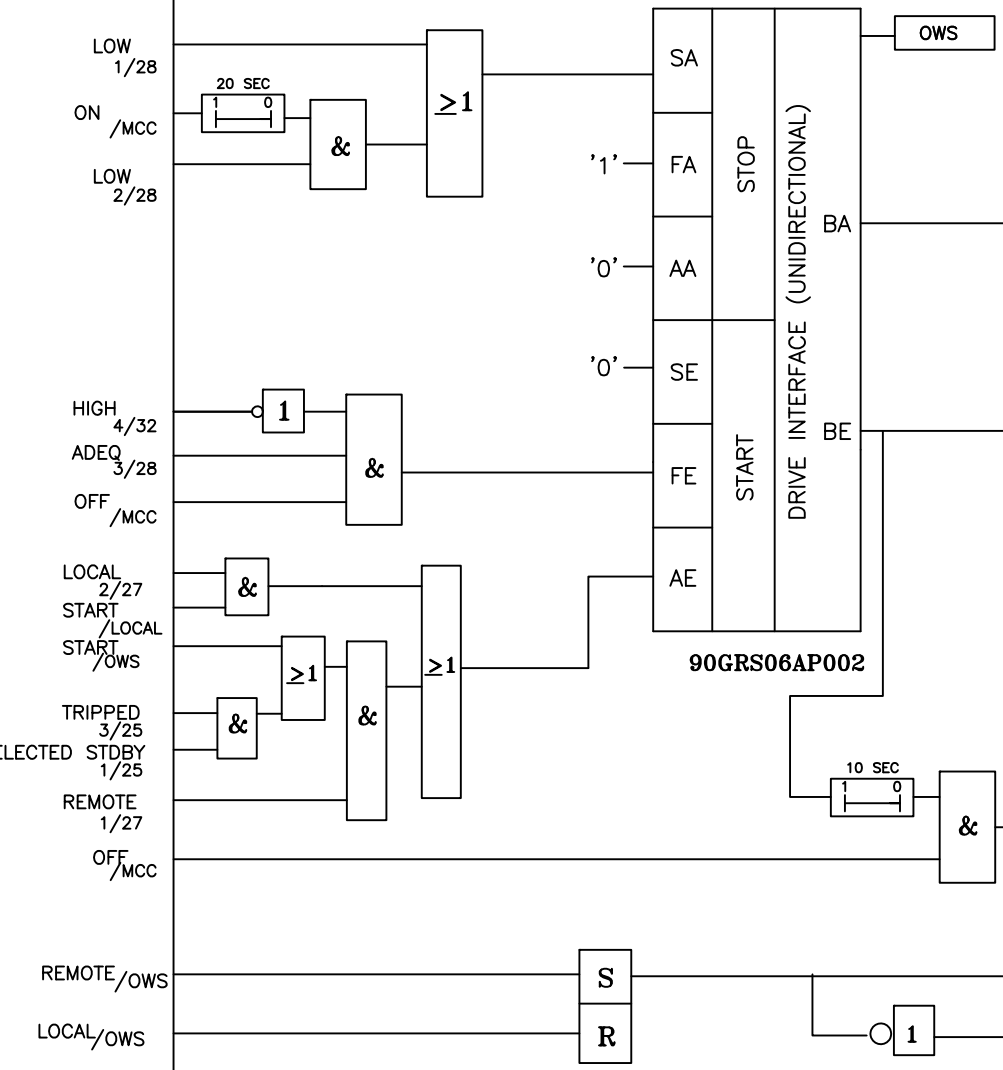
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
494 MBBR FEED PUMP–A

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	26 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
EQUALIZATION TANK LEVEL	LOW 1/28			
MBBR FEED PUMP–B	ON /MCC			
MBBR FEED PMP P–06A/B DISCH HDR PR	LOW 2/28			
			MBBR FEED PUMP–B	STOP /MCC
HYPO CONTACT/FILTER FEED TANK LEVEL	HIGH 4/32			
EQUALIZATION TANK LEVEL	ADEQ 3/28			
MBBR FEED PUMP–A	OFF /MCC			
			MBBR FEED PUMP–B	START /MCC
MBBR FEED PMP–B OPRN SELECTED	LOCAL 2/27			
MBBR FEED PUMP–B	START /LOCAL			
MBBR FEED PUMP–B	START /OWS			
MBBR FEED PUMP–A	TRIPPED 3/25			
MBBR FEED PUMP–B	SELECTED STDBY 1/25			
MBBR FEED PMP–B OPRN SELECTED	REMOTE 1/27			
MBBR FEED PUMP–B	OFF /MCC			
			MBBR FEED PUMP–B	FAIL TO START
MBBR FEED PUMP–B	REMOTE /OWS			
MBBR FEED PUMP–B	LOCAL /OWS			
			MBBR FEED PMP–B OPRN SELECTED	REMOTE 1/27
			MBBR FEED PMP–B OPRN SELECTED	LOCAL 2/27



FOR STARTING OF MBBR FEED PUMP–B, OPERATOR TO ENSURE THAT MANUAL VALVES V–134 & V–136 ARE OPEN

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
495 MBBR FEED PUMP–B

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	27 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
EQUALIZATION TANK LEVEL 90GRS06CL001	/FIELD	HIGH LVM, HIGH LVM → ≥1 → 5 Sec	EQUALIZATION TANK LEVEL	HIGH
EQUALIZATION TANK LEVEL 90GRS06CL002	/FIELD			
		LOW LVM, LOW LVM → ≥1 → 5 Sec	EQUALIZATION TANK LEVEL	LOW 1/26,27
		→ 1	EQUALIZATION TANK LEVEL	ADEQ 3/26,27,42
MBBR FEED PMP P-06A/B DISCH HDR PR 90GRS06CP001	/FIELD	LOW LVM, LOW LVM → ≥1 → 5 Sec	MBBR FEED PMP P-06A/B DISCH HDR PR	LOW 2/26,27
MBBR FEED PMP P-06A/B DISCH HDR PR 90GRS06CP002	/FIELD			
		HIGH LVM, HIGH LVM → ≥1 → 5 Sec	MBBR FEED PMP P-06A/B DISCH HDR PR	HIGH

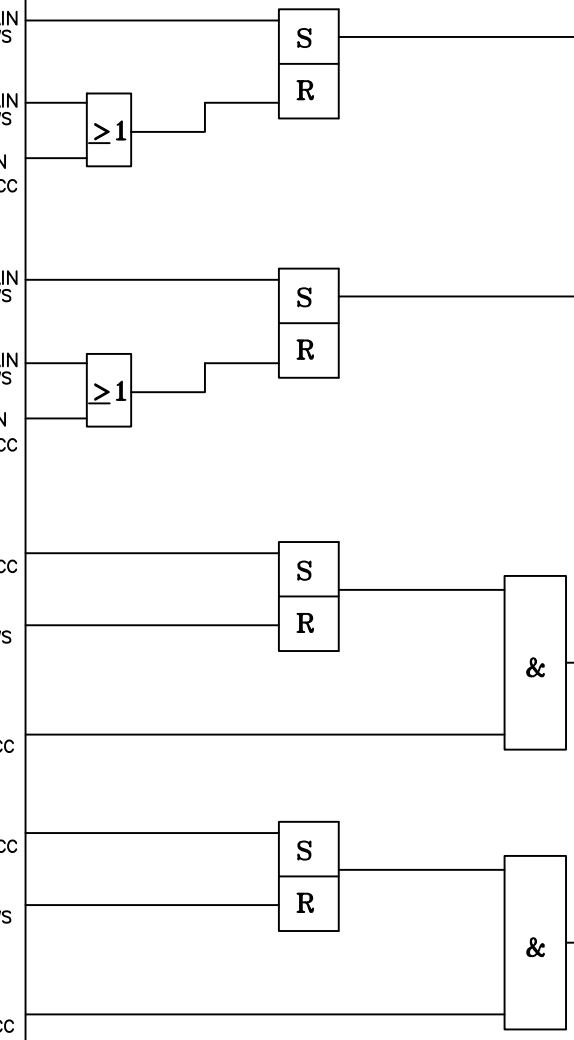
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
496 MISCELLANEOUS LOGICS

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	28 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
FILTER FEED PUMP–A 90GRS08AP001	SELECT MAIN /OWS			
FILTER FEED PUMP–B 90GRS09AP001	SELECT MAIN /OWS			
FILTER FEED PUMP–B 90GRS09AP001	ON /MCC			
FILTER FEED PUMP–B 90GRS09AP001	SELECT MAIN /OWS			
FILTER FEED PUMP–A 90GRS08AP001	SELECT MAIN /OWS			
FILTER FEED PUMP–A 90GRS08AP001	ON /MCC			
FILTER FEED PUMP–A 90GRS08AP001	ON /MCC			
FILTER FEED PUMP–A 90GRS08AP001	STOP /OWS			
FILTER FEED PUMP–A 90GRS08AP001	OFF /MCC			
FILTER FEED PUMP–B 90GRS09AP001	ON /MCC			
FILTER FEED PUMP–B 90GRS09AP001	STOP /OWS			
FILTER FEED PUMP–B 90GRS09AP001	OFF /MCC			



FILTER FEED PUMP–A	SELECTED MAIN
FILTER FEED PUMP–B	STAND BY 1/31
FILTER FEED PUMP–B	SELECTED MAIN
FILTER FEED PUMP–A	STAND BY 2/30
FILTER FEED PUMP–A	TRIPPED 3/31
FILTER FEED PUMP–B	TRIPPED 4/30

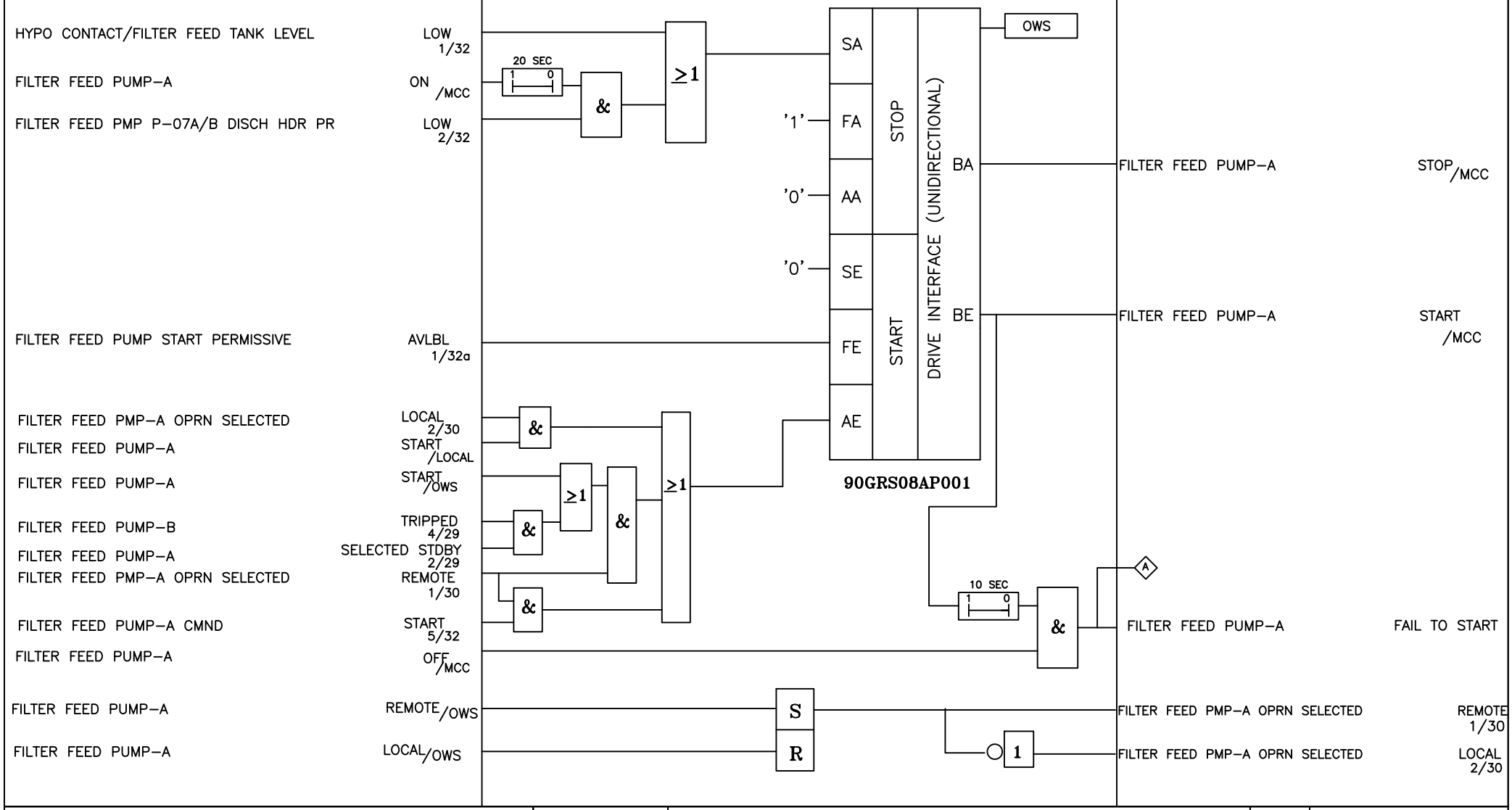
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
497 MBBR FEED PUMP STANDBY SELECTION LOGIC

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	29 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
HYPO CONTACT/FILTER FEED TANK LEVEL	LOW 1/32			
FILTER FEED PUMP–A	ON /MCC			
FILTER FEED PMP P–07A/B DISCH HDR PR	LOW 2/32			
			FILTER FEED PUMP–A	STOP /MCC
FILTER FEED PUMP START PERMISSIVE	AVLBL 1/32a		FILTER FEED PUMP–A	START /MCC
FILTER FEED PMP–A OPRN SELECTED	LOCAL 2/30			
FILTER FEED PUMP–A	START /LOCAL			
FILTER FEED PUMP–A	START /OWS			
FILTER FEED PUMP–B	TRIPPED 4/29			
FILTER FEED PUMP–A	SELECTED STDBY 2/29			
FILTER FEED PMP–A OPRN SELECTED	REMOTE 1/30			
FILTER FEED PUMP–A CMND	START 5/32		FILTER FEED PUMP–A	FAIL TO START
FILTER FEED PUMP–A	OFF /MCC			
FILTER FEED PUMP–A	REMOTE /OWS		FILTER FEED PMP–A OPRN SELECTED	REMOTE 1/30
FILTER FEED PUMP–A	LOCAL /OWS		FILTER FEED PMP–A OPRN SELECTED	LOCAL 2/30



FOR STARTING OF FILTER FEED PUMP–A, OPERATOR TO ENSURE THAT MANUAL VALVES V–157 & V–162 ARE OPEN

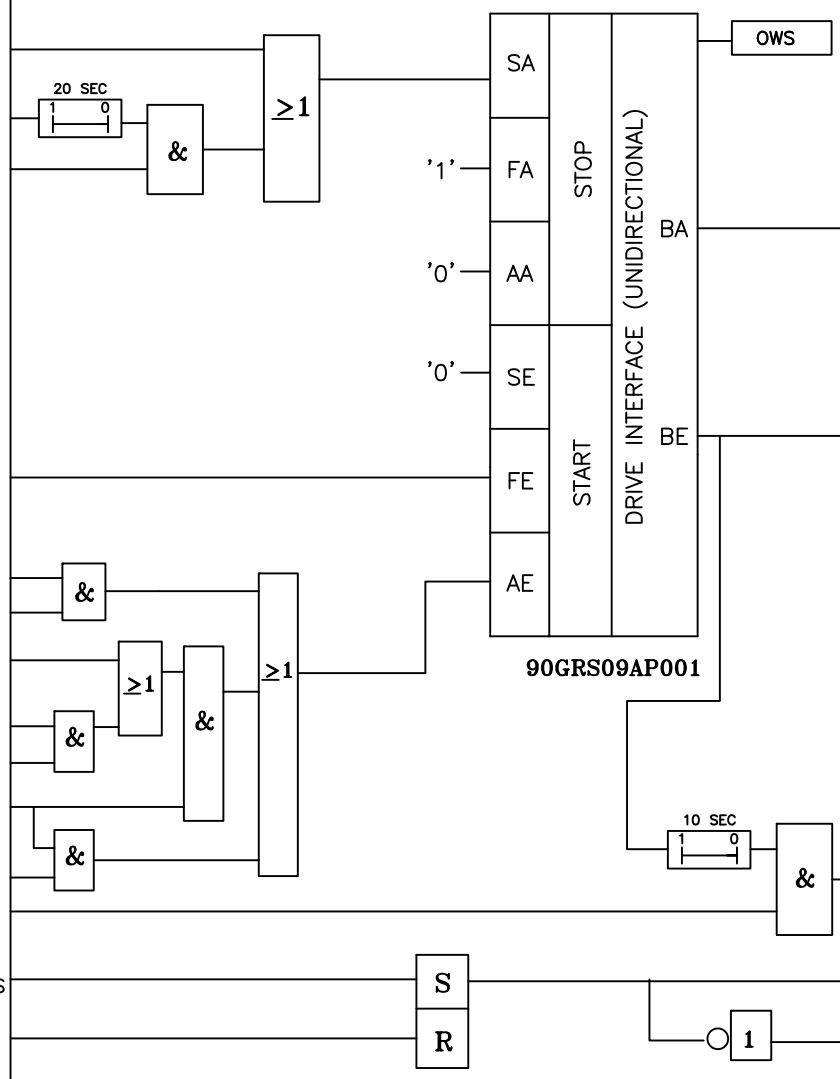
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
498
FILTER FEED PUMP–A

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	30 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
HYPO CONTACT/FILTER FEED TANK LEVEL	LOW 1/32			
FILTER FEED PUMP–B	ON /MCC			
FILTER FEED PMP P–07A/B DISCH HDR PR	LOW 2/32			
			FILTER FEED PUMP–B	STOP /MCC
FILTER FEED PUMP START PERMISSIVE	AVLBL 1/32a		FILTER FEED PUMP–B	START /MCC
FILTER FEED PMP–B OPRN SELECTED	LOCAL 2/31			
FILTER FEED PUMP–B	START /LOCAL			
FILTER FEED PUMP–B	START /OWS			
FILTER FEED PUMP–A	TRIPPED 3/29			
FILTER FEED PUMP–B	SELECTED STDBY 1/29			
FILTER FEED PMP–B OPRN SELECTED	REMOTE 1/31			
FILTER FEED PUMP–B CMND	START 6/32		FILTER FEED PUMP–B	FAIL TO START
FILTER FEED PUMP–B	OFF /MCC			
FILTER FEED PUMP–B	REMOTE /OWS		FILTER FEED PMP–B OPRN SELECTED	REMOTE 1/31
FILTER FEED PUMP–B	LOCAL /OWS		FILTER FEED PMP–B OPRN SELECTED	LOCAL 2/31



FOR STARTING OF FILTER FEED PUMP–A, OPERATOR TO ENSURE THAT MANUAL VALVES V–159 & V–164 ARE OPEN

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
499 FILTER FEED PUMP–B

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	31 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
HYPO CONTACT/FILTER FEED TANK LEVEL 90GRS07CL001	/FIELD	HIGH LVM, HIGH LVM → ≥1 → 5 Sec (1 0) → A	HYPO CONTACT/FILTER FEED TANK LEVEL	HIGH 4/26,27
HYPO CONTACT/FILTER FEED TANK LEVEL 90GRS07CL002	/FIELD			
		LOW LVM, LOW LVM → ≥1 → 5 Sec (1 0) → A	HYPO CONTACT/FILTER FEED TANK LEVEL	LOW 1/30,31
		→ 1	HYPO CONTACT/FILTER FEED TANK LEVEL	ADEQ 3/32a,48
FILTER FEED PMP P-07A/B DISCH HDR PR 90GRS08CP001	/FIELD	LOW LVM, LOW LVM → ≥1 → 5 Sec (1 0) → A	FILTER FEED PMP P-07A/B DISCH HDR PR	LOW 2/30,31
FILTER FEED PMP P-07A/B DISCH HDR PR 90GRS08CP002	/FIELD			
		HIGH LVM, HIGH LVM → ≥1 → 5 Sec (1 0) → A	MBBR FEED PMP P-06A/B DISCH HDR PR	HIGH
FILTER FEED PUMP-A CMND	START 4/54	≥1	FILTER FEED PUMP-A CMND	START 5/30
FILTER FEED PUMP-A CMND	START 6/57			
FILTER FEED PUMP-A CMND	START 4/60			
FILTER FEED PUMP-A CMND	START 6/63			
FILTER FEED PUMP-B CMND	START 5/54	≥1	FILTER FEED PUMP-B CMND	START 6/31
FILTER FEED PUMP-B CMND	START 7/57			
FILTER FEED PUMP-B CMND	START 5/60			
FILTER FEED PUMP-B CMND	START 7/63			

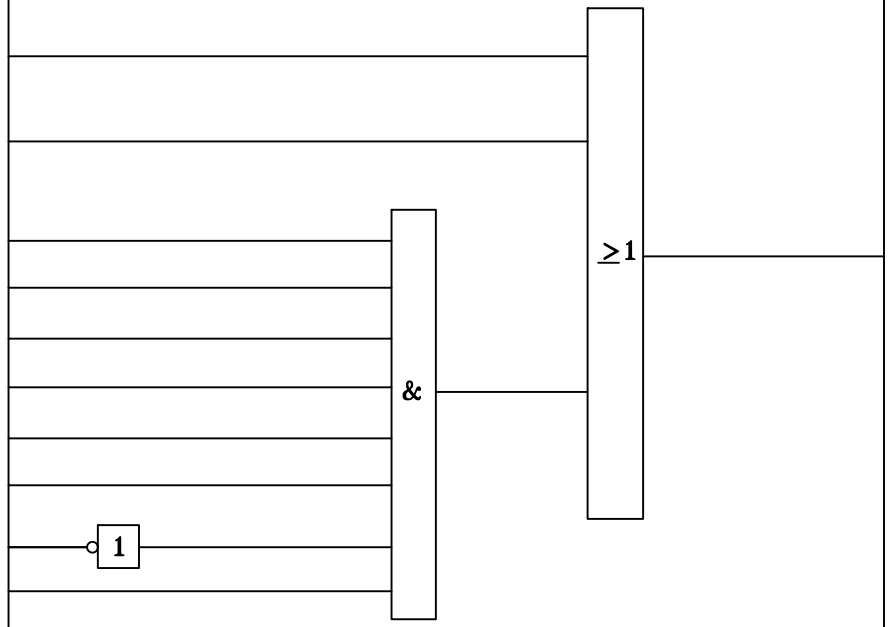
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 500
MISCELLANEOUS LOGICS

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	32 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
ACF BACKWASH SEQ ORDER	ON 1/62		FILTER FEED PUMP START PERMISSIVE	AVLBL 1/30,31
DMF BACKWASH SEQ ORDER	ON 1/56			
FILTER FEED PUMP OUTLET VLV, V-165 90GRS10AA201	OPENED /FIELD			
DMF FEED I/L VLV, V-166 90GRB01AA201	OPENED /FIELD			
DMF FEED O/L VLV, V-170 90GRB01AA205	OPENED /FIELD			
DMF OUTLET VLV, V-176 90GRS10AA202	OPENED /FIELD			
ACF FEED I/L VLV, V-177 90GRB02AA201	OPENED /FIELD			
ACF FEED O/L VLV, V-181 90GRB02AA205	OPENED /FIELD			
TREATED WATER TANK LEVEL	HIGH 4/36			
HYPO CONTACT/FILTER FEED TANK LEVEL	ADEQ 3/32			



	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
		TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 501 MISCELLANEOUS LOGICS	REV. NO.	03 DATE: 29.01.2019
			SHT	32a OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
TREATED WATER DISPOSAL PUMP–A 90GRS12AP001	SELECT MAIN /OWS	S R, ≥1	TREATED WATER DISPOSAL PUMP–A	SELECTED MAIN
TREATED WATER DISPOSAL PUMP–B 90GRS13AP001	SELECT MAIN /OWS		TREATED WATER DISPOSAL PUMP–B	STAND BY 1/35
TREATED WATER DISPOSAL PUMP–B 90GRS13AP001	ON /MCC			
TREATED WATER DISPOSAL PUMP–B 90GRS13AP001	SELECT MAIN /OWS	S R, ≥1	TREATED WATER DISPOSAL PUMP–B	SELECTED MAIN
TREATED WATER DISPOSAL PUMP–A 90GRS12AP001	SELECT MAIN /OWS		TREATED WATER DISPOSAL PUMP–A	STAND BY 2/34
TREATED WATER DISPOSAL PUMP–A 90GRS12AP001	ON /MCC			
TREATED WATER DISPOSAL PUMP–A 90GRS12AP001	ON /MCC	S R, &	TREATED WATER DISPOSAL PUMP–A	TRIPPED 3/35
TREATED WATER DISPOSAL PUMP–A 90GRS12AP001	STOP /OWS			
TREATED WATER DISPOSAL PUMP–A 90GRS12AP001	OFF /MCC			
TREATED WATER DISPOSAL PUMP–B 90GRS13AP001	ON /MCC	S R, &	TREATED WATER DISPOSAL PUMP–B	TRIPPED 4/34
TREATED WATER DISPOSAL PUMP–B 90GRS13AP001	STOP /OWS			
TREATED WATER DISPOSAL PUMP–B 90GRS13AP001	OFF /MCC			

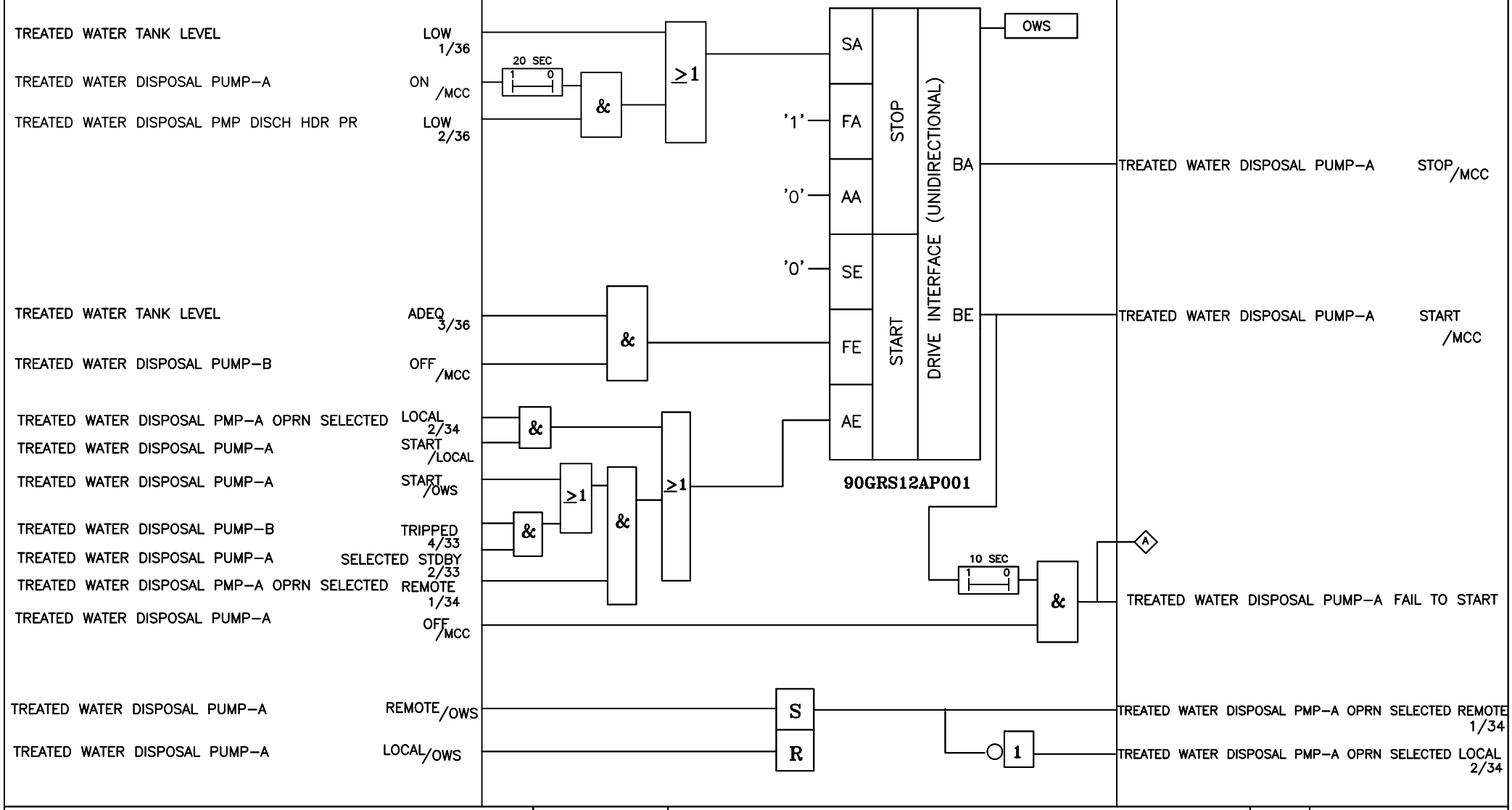
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
TREATED WATER DISPOSAL PUMP STANDBY SELECTION LOGIC

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	33 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
TREATED WATER TANK LEVEL	LOW 1/36			
TREATED WATER DISPOSAL PUMP-A	ON /MCC			
TREATED WATER DISPOSAL PMP DISCH HDR PR	LOW 2/36			
			TREATED WATER DISPOSAL PUMP-A	STOP /MCC
TREATED WATER TANK LEVEL	ADEQ 3/36			
TREATED WATER DISPOSAL PUMP-B	OFF /MCC		TREATED WATER DISPOSAL PUMP-A	START /MCC
TREATED WATER DISPOSAL PMP-A OPRN SELECTED	LOCAL 2/34			
TREATED WATER DISPOSAL PUMP-A	START /LOCAL			
TREATED WATER DISPOSAL PUMP-A	START /OWS			
TREATED WATER DISPOSAL PUMP-B	TRIPPED 4/33			
TREATED WATER DISPOSAL PUMP-A	SELECTED STDBY 2/33			
TREATED WATER DISPOSAL PMP-A OPRN SELECTED	REMOTE 1/34			
TREATED WATER DISPOSAL PUMP-A	OFF /MCC		TREATED WATER DISPOSAL PUMP-A	FAIL TO START
TREATED WATER DISPOSAL PUMP-A	REMOTE /OWS		TREATED WATER DISPOSAL PMP-A OPRN SELECTED	REMOTE 1/34
TREATED WATER DISPOSAL PUMP-A	LOCAL /OWS		TREATED WATER DISPOSAL PMP-A OPRN SELECTED	LOCAL 2/34



FOR STARTING OF TW DISPOSAL PUMP-A, OPERATOR TO ENSURE THAT MANUAL VALVES V-203 & V-208 ARE OPEN

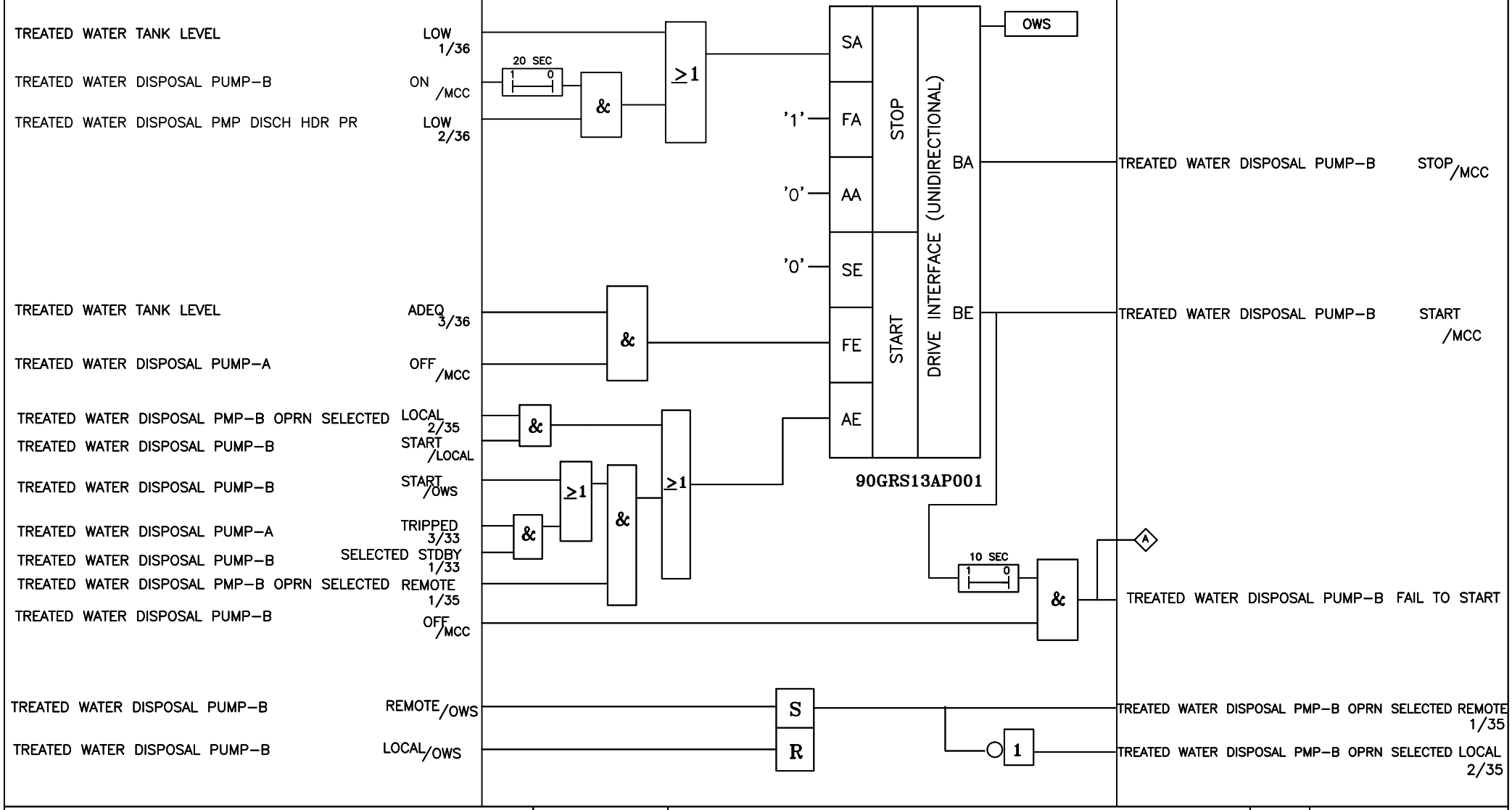
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
503
TREATED WATER DISPOSAL PUMP-A

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	34 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
TREATED WATER TANK LEVEL	LOW 1/36			
TREATED WATER DISPOSAL PUMP–B	ON /MCC			
TREATED WATER DISPOSAL PMP DISCH HDR PR	LOW 2/36			
			TREATED WATER DISPOSAL PUMP–B	STOP /MCC
TREATED WATER TANK LEVEL	ADEQ 3/36			
TREATED WATER DISPOSAL PUMP–A	OFF /MCC		TREATED WATER DISPOSAL PUMP–B	START /MCC
TREATED WATER DISPOSAL PMP–B OPRN SELECTED	LOCAL 2/35			
TREATED WATER DISPOSAL PUMP–B	START /LOCAL			
TREATED WATER DISPOSAL PUMP–B	START /OWS			
TREATED WATER DISPOSAL PUMP–A	TRIPPED 3/33			
TREATED WATER DISPOSAL PUMP–B	SELECTED STDBY 1/33			
TREATED WATER DISPOSAL PMP–B OPRN SELECTED	REMOTE 1/35			
TREATED WATER DISPOSAL PUMP–B	OFF /MCC		TREATED WATER DISPOSAL PUMP–B	FAIL TO START
TREATED WATER DISPOSAL PUMP–B	REMOTE /OWS		TREATED WATER DISPOSAL PMP–B OPRN SELECTED REMOTE	1/35
TREATED WATER DISPOSAL PUMP–B	LOCAL /OWS		TREATED WATER DISPOSAL PMP–B OPRN SELECTED LOCAL	2/35



FOR STARTING OF TW DISPOSAL PUMP–B, OPERATOR TO ENSURE THAT MANUAL VALVES V–205 & V–210 ARE OPEN

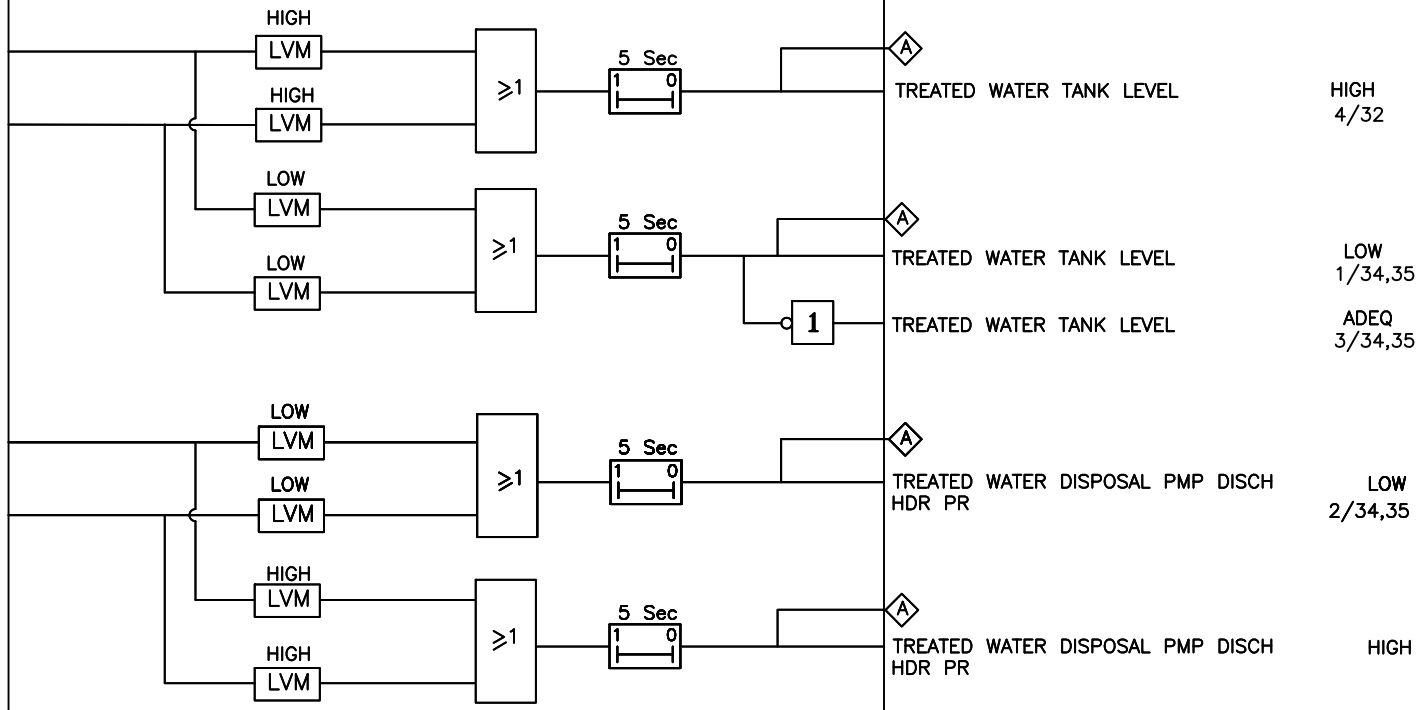
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
504
TREATED WATER DISPOSAL PUMP–B

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	35 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
TREATED WATER TANK LEVEL 90GRS11CL001	/FIELD			
TREATED WATER TANK LEVEL 90GRS11CL002	/FIELD			
TREATED WATER DISP PMP P-08A/B DISCH HDR PR 90GRS14CP001	/FIELD			
TREATED WATER DISP PMP P-08A/B DISCH HDR PR 90GRS14CP002	/FIELD			



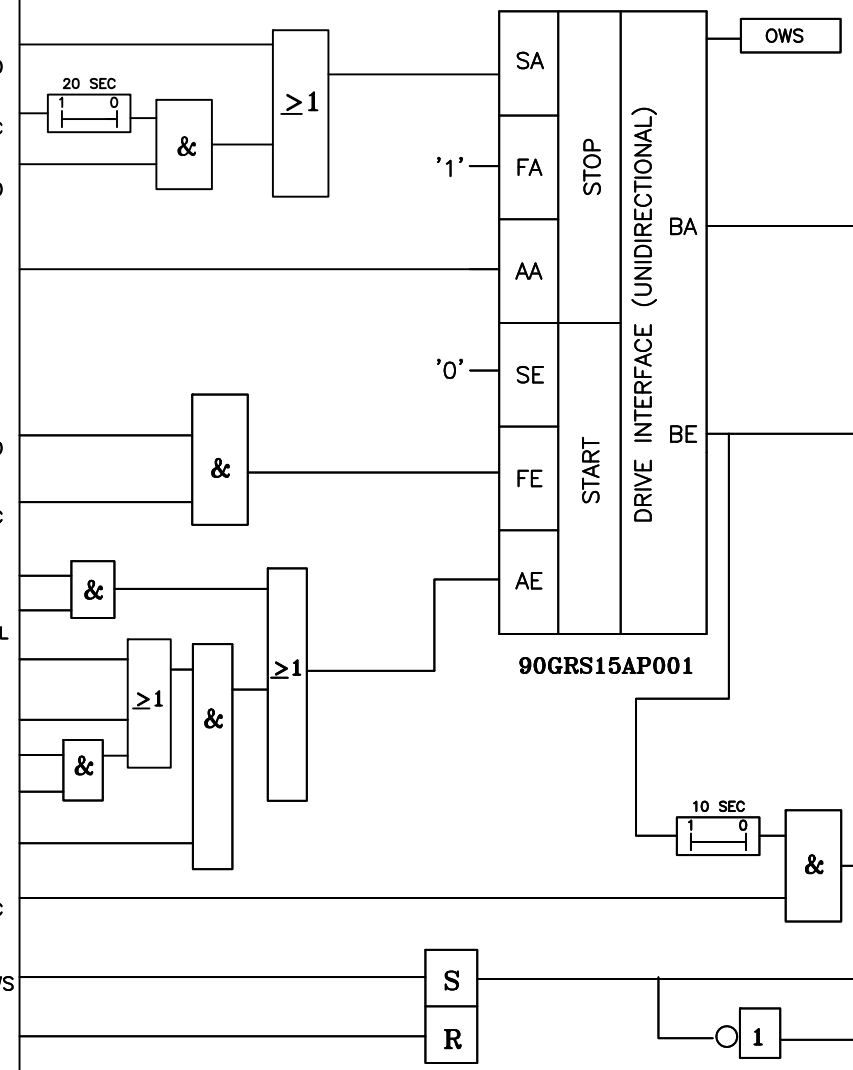
	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
		TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 505 MISCELLANEOUS LOGICS	REV. NO. 03	DATE: 29.01.2019
			SHT 36 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SLUDGE TRANSFER PUMP–A 90GRS15AP001	SELECT MAIN /OWS			
SLUDGE TRANSFER PUMP–B 90GRS15AP002	SELECT MAIN /OWS			
SLUDGE TRANSFER PUMP–B 90GRS15AP002	ON /MCC			
		S R ≥1	SLUDGE TRANSFER PUMP–A	SELECTED MAIN
			SLUDGE TRANSFER PUMP–B	STAND BY 1/39
SLUDGE TRANSFER PUMP–B 90GRS15AP002	SELECT MAIN /OWS			
SLUDGE TRANSFER PUMP–A 90GRS15AP001	SELECT MAIN /OWS			
SLUDGE TRANSFER PUMP–A 90GRS15AP001	ON /MCC			
		S R ≥1	SLUDGE TRANSFER PUMP–B	SELECTED MAIN
			SLUDGE TRANSFER PUMP–A	STAND BY 2/38
SLUDGE TRANSFER PUMP–A 90GRS15AP001	ON /MCC			
SLUDGE TRANSFER PUMP–A 90GRS15AP001	STOP /OWS			
SLUDGE TRANSFER PUMP–A 90GRS15AP001	OFF /MCC			
		S R &	SLUDGE TRANSFER PUMP–A	TRIPPED 3/39
SLUDGE TRANSFER PUMP–B 90GRS15AP002	ON /MCC			
SLUDGE TRANSFER PUMP–B 90GRS15AP002	STOP /OWS			
SLUDGE TRANSFER PUMP–B 90GRS15AP002	OFF /MCC			
		S R &	SLUDGE TRANSFER PUMP–B	TRIPPED 4/38

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
TITLE :–	CONTROL SCHEME FOR SEWAGE TREATMENT PLANT SLUDGE TRANSFER PUMP STANDBY SELECTION LOGIC	REV. NO. 03	DATE: 29.01.2019
		SHT 37 OF 95	

506

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SLUDGE HOLDING TANK LEVEL	LOW 1/40			
SLUDGE TRANSFER PUMP–A	ON /MCC			
SLUDGE TRANSFER PMP DISCH HDR PR	LOW 2/40			
SLUDGE TRANSFER PUMP–A	STOP 1/90			
SLUDGE HOLDING TANK LEVEL	ADEQ 3/40			
SLUDGE TRANSFER PUMP–B	OFF /MCC			
SLUDGE TRANSFER PMP–A OPRN SELECTED	LOCAL 2/38			
SLUDGE TRANSFER PUMP–A	START /LOCAL			
SLUDGE TRANSFER PUMP–A	START /OWS			
SLUDGE TRANSFER PUMP–A	START 3/89			
SLUDGE TRANSFER PUMP–B	TRIPPED 4/37			
SLUDGE TRANSFER PUMP–A	SELECTED STDBY 2/37			
SLUDGE TRANSFER PMP–A OPRN SELECTED	REMOTE 1/38			
SLUDGE TRANSFER PUMP–A	OFF /MCC			
SLUDGE TRANSFER PUMP–A	REMOTE /OWS		SLUDGE TRANSFER PMP–A OPRN SELECTED	REMOTE 1/38
SLUDGE TRANSFER PUMP–A	LOCAL /OWS		SLUDGE TRANSFER PMP–A OPRN SELECTED	LOCAL 2/38
			SLUDGE TRANSFER PUMP–A	STOP /MCC
			SLUDGE TRANSFER PUMP–A	START /MCC
			SLUDGE TRANSFER PUMP–A	FAIL TO START



FOR STARTING OF SLUDGE TRNSFR PUMP–A, OPERATOR TO ENSURE THAT MANUAL VALVES V–187 & V–192 ARE OPEN

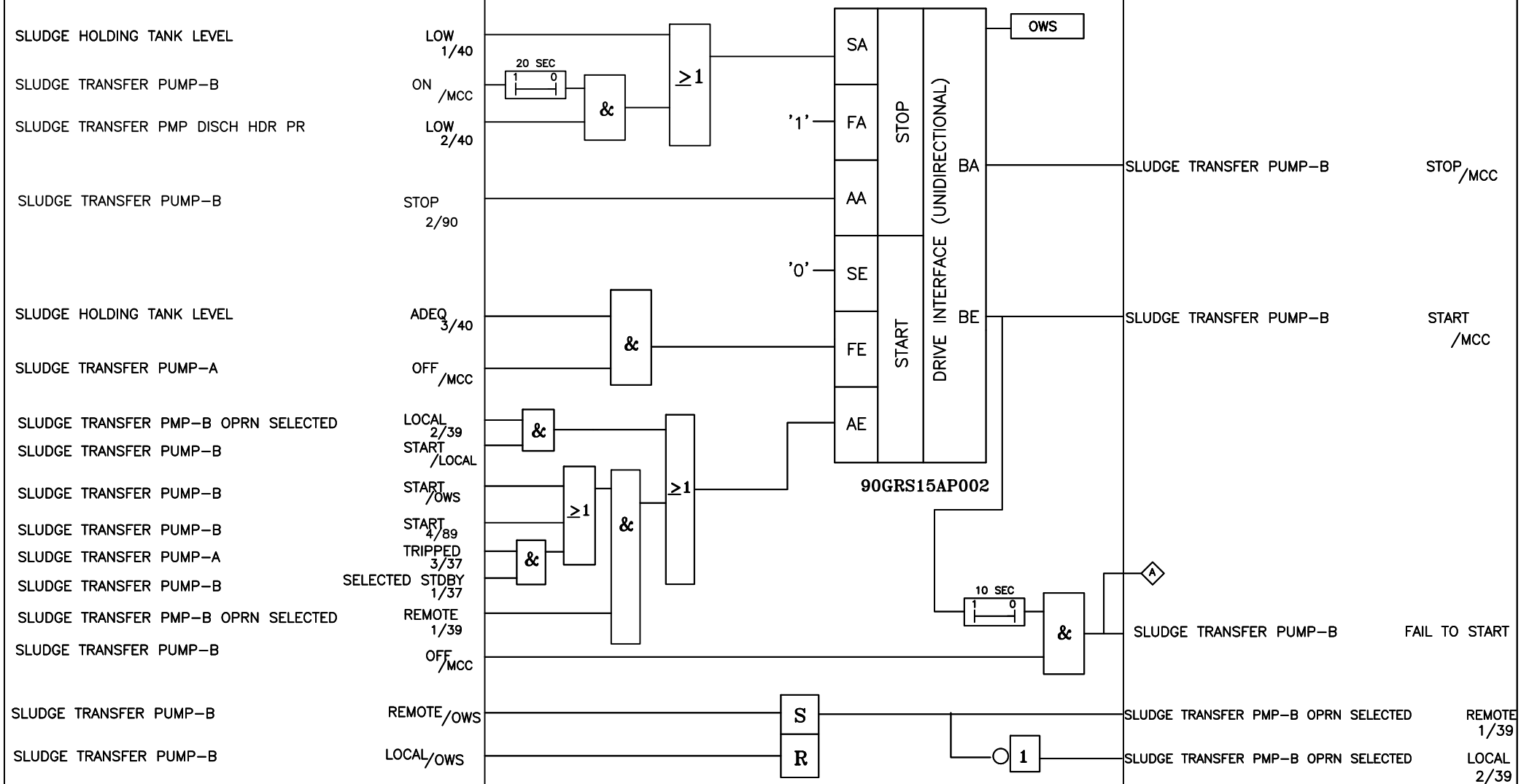
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
507
SLUDGE TRANSFER PUMP–A

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	38 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SLUDGE HOLDING TANK LEVEL	LOW 1/40			
SLUDGE TRANSFER PUMP–B	ON /MCC			
SLUDGE TRANSFER PMP DISCH HDR PR	LOW 2/40			
SLUDGE TRANSFER PUMP–B	STOP 2/90			
SLUDGE HOLDING TANK LEVEL	ADEQ 3/40			
SLUDGE TRANSFER PUMP–A	OFF /MCC			
SLUDGE TRANSFER PMP–B OPRN SELECTED	LOCAL 2/39			
SLUDGE TRANSFER PUMP–B	START /LOCAL			
SLUDGE TRANSFER PUMP–B	START /OWS			
SLUDGE TRANSFER PUMP–B	START 4/89			
SLUDGE TRANSFER PUMP–A	TRIPPED 3/37			
SLUDGE TRANSFER PUMP–B	SELECTED STDBY 1/37			
SLUDGE TRANSFER PMP–B OPRN SELECTED	REMOTE 1/39			
SLUDGE TRANSFER PUMP–B	OFF /MCC			
SLUDGE TRANSFER PUMP–B	REMOTE /OWS			
SLUDGE TRANSFER PUMP–B	LOCAL /OWS			



FOR STARTING OF SLUDGE TRNSFR PUMP–A, OPERATOR TO ENSURE THAT MANUAL VALVES V–189 & V–192 ARE OPEN

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
508
SLUDGE TRANSFER PUMP–B

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	39 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
SLUDGE HOLDING TANK LEVEL 90GRS15CL001	/FIELD			
SLUDGE HOLDING TANK LEVEL 90GRS15CL002	/FIELD			
		HIGH LVM, HIGH LVM → ≥1 → 5 Sec	SLUDGE HOLDING TANK LEVEL	HIGH 4/32
		LOW LVM, LOW LVM → ≥1 → 5 Sec	SLUDGE HOLDING TANK LEVEL	LOW 1/38,39
		5 Sec → 1	SLUDGE HOLDING TANK LEVEL	ADEQ 3/38,39,42
SLUDGE TRANSFER PMP P-09A/B DISCH HDR PR 90GRS15CP001	/FIELD			
SLUDGE TRANSFER PMP P-09A/B DISCH HDR PR 90GRS15CP002	/FIELD			
		LOW LVM, LOW LVM → ≥1 → 5 Sec	SLUDGE TRANSFER PMP DISCH HDR PR	LOW 2/38,39
		HIGH LVM, HIGH LVM → ≥1 → 5 Sec	SLUDGE TRANSFER PMP DISCH HDR PR	HIGH

BHEL

2 X 660 MW ENNORE SEZ STPP

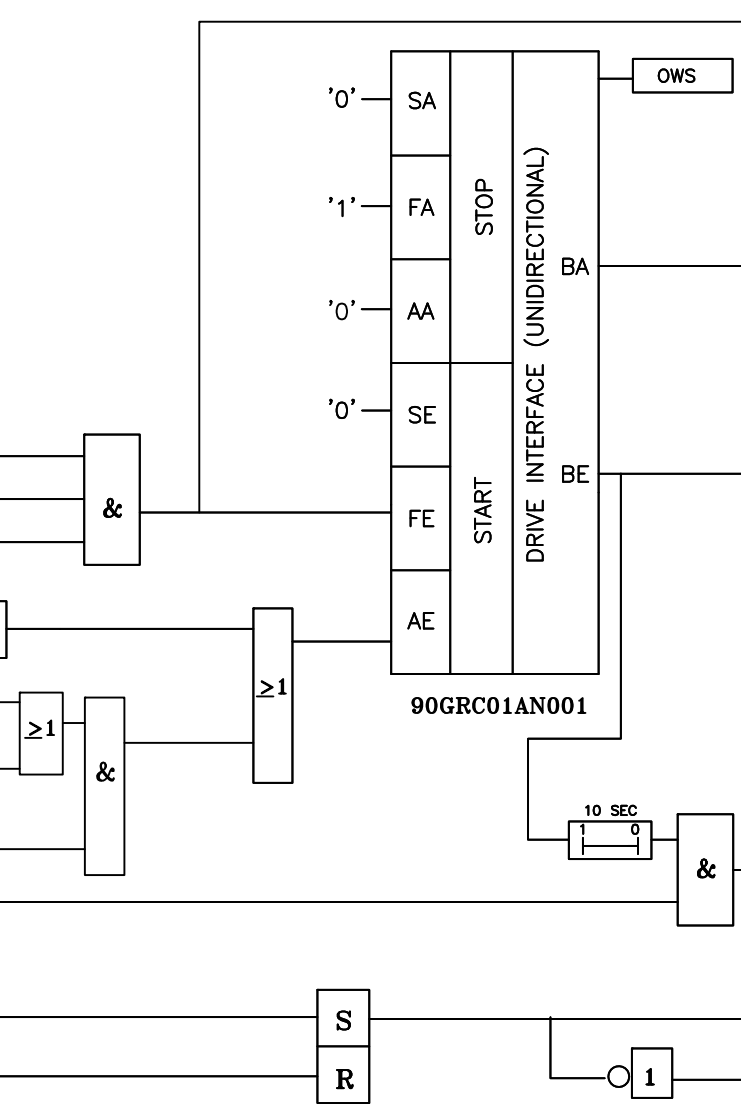
TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
509 MISCELLANEOUS LOGICS

DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	40 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
AIR BLOWER-1A 90GRC01AN001	SELECT MAIN /OWS			
AIR BLOWER-1B 90GRC01AN002	SELECT MAIN /OWS			
AIR BLOWER-1B 90GRC01AN002	ON /MCC			
		S R	AIR BLOWER-1A	SELECTED MAIN
			AIR BLOWER-1B	STAND BY 2/43
AIR BLOWER-1B 90GRC01AN002	SELECT MAIN /OWS			
AIR BLOWER-1A 90GRC01AN001	SELECT MAIN /OWS			
AIR BLOWER-1A 90GRC01AN001	ON /MCC			
		S R	AIR BLOWER-1B	SELECTED MAIN
			AIR BLOWER-1A	STAND BY 1/42
AIR BLOWER-1A 90GRC01AN001	ON /MCC			
AIR BLOWER-1A 90GRC01AN001	STOP /OWS			
AIR BLOWER-1A 90GRC01AN001	OFF /MCC			
		S R, &	AIR BLOWER-1A	TRIPPED 3/43
AIR BLOWER-1B 90GRC01AN002	ON /MCC			
AIR BLOWER-1B 90GRC01AN002	STOP /OWS			
AIR BLOWER-1B 90GRC01AN002	OFF /MCC			
		S R, &	AIR BLOWER-1B	TRIPPED 4/42

BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
	TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT AIR BLOWER-1A/1B STANDBY SELECTION LOGIC	REV. NO.	03 DATE: 29.01.2019
		SHT	41 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
			EQT, CCS & SHT TANK LEVEL	ADEQ 3/43
SLUDGE HOLDING TANK LEVEL	ADEQ 3/40			
EQUALIZATION TANK LEVEL	ADEQ 3/28			
COMMON COLLECTION SUMP LEVEL	ADEQ 3/24			
AIR BLOWER–1A OPRN SELECTED	LOCAL 2/42			
AIR BLOWER–1A	START /LOCAL			
AIR BLOWER–1A	START /OWS			
AIR BLOWER–1B	TRIPPED 4/41			
AIR BLOWER–1A	SELECTED STDBY 1/41			
AIR BLOWER–1A OPRN SELECTED	REMOTE 1/42			
AIR BLOWER–1A	OFF /MCC			
			AIR BLOWER–1A	STOP /MCC
			AIR BLOWER–1A	START /MCC
			AIR BLOWER–1A	FAIL TO START
AIR BLOWER–1A	REMOTE /OWS		AIR BLOWER–1A OPRN SELECTED	REMOTE 1/42
AIR BLOWER–1A	LOCAL /OWS		AIR BLOWER–1A OPRN SELECTED	LOCAL 2/42



FOR STARTING OF AIR BLOWER–1A, OPERATOR TO ENSURE THAT MANUAL VALVES V–139 & V–143 ARE OPEN

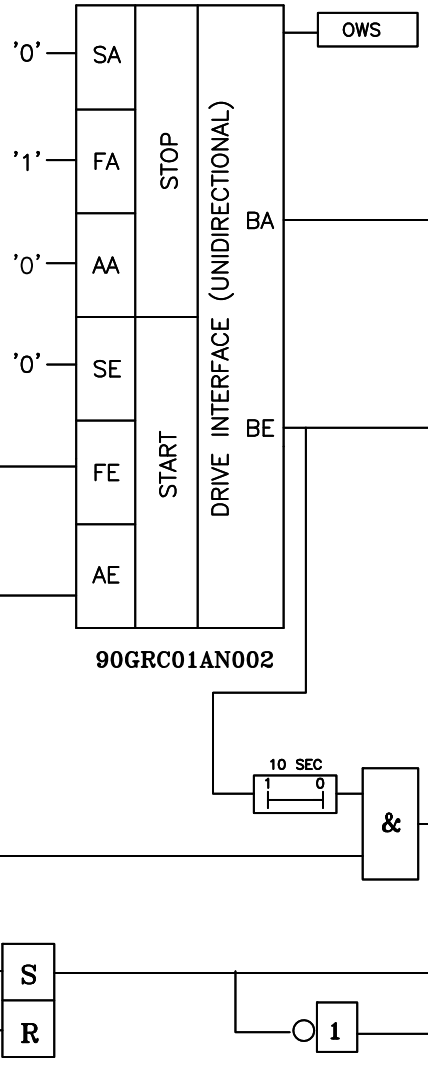
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
511
AIR BLOWER–1A

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	42 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
EQT, CCS & SHT TANK LEVEL	ADEQ 3/42			
AIR BLOWER–1B OPRN SELECTED	LOCAL 2/42			
AIR BLOWER–1B	START /LOCAL			
AIR BLOWER–1B	START /OWS			
AIR BLOWER–1A	TRIPPED 3/41			
AIR BLOWER–1B	SELECTED STDBY 2/41			
AIR BLOWER–1B OPRN SELECTED	REMOTE 1/42			
AIR BLOWER–1B	OFF /MCC			
			AIR BLOWER–1B	STOP /MCC
			AIR BLOWER–1B	START /MCC
			AIR BLOWER–1B	FAIL TO START
AIR BLOWER–1B	REMOTE /OWS		AIR BLOWER–1B OPRN SELECTED	REMOTE 1/43
AIR BLOWER–1B	LOCAL /OWS		AIR BLOWER–1B OPRN SELECTED	LOCAL 2/43



FOR STARTING OF AIR BLOWER–1B, OPERATOR TO ENSURE THAT MANUAL VALVES V–142 & V–143 ARE OPEN

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
512
AIR BLOWER–1B

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	43 OF 95		

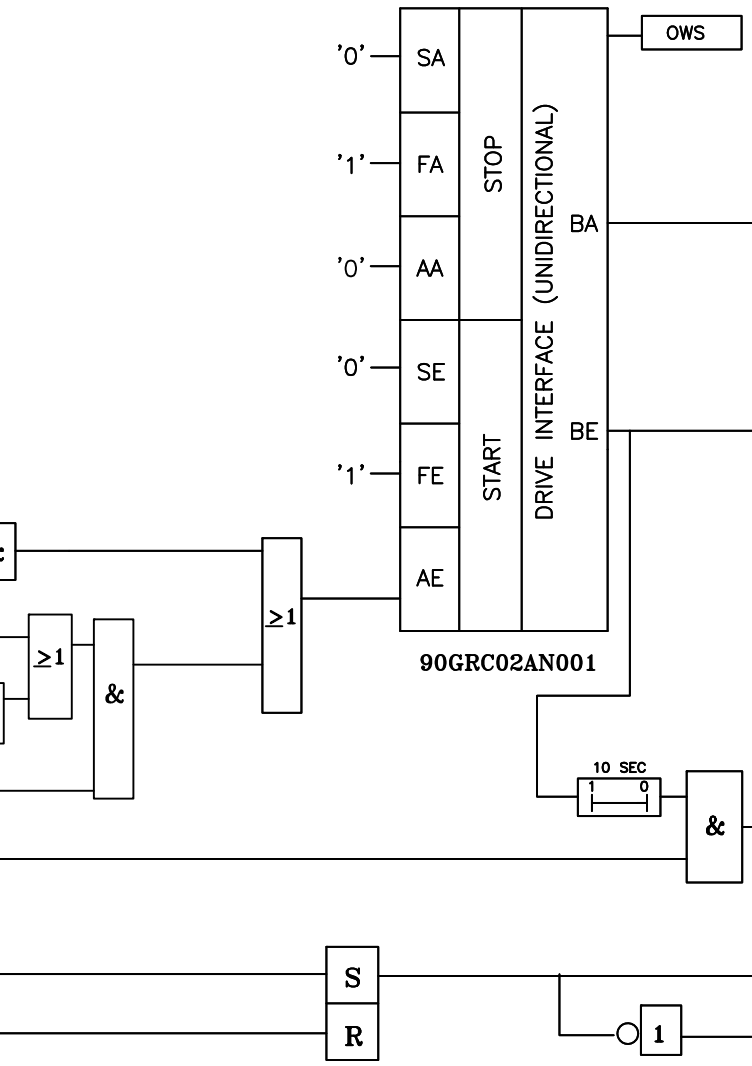
INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
AIR BLOWER B–01A/B DISCH HDR PR 90GRC01CP001	/FIELD			
AIR BLOWER B–01A/B DISCH HDR PR 90GRC01CP002	/FIELD			
		LOW LVM, LOW LVM → ≥1 → 5 Sec (1 0) → A	AIR BLOWER B–01A/B DISCH HDR PR	LOW
		HIGH LVM, HIGH LVM → ≥1 → 5 Sec (1 0) → A	AIR BLOWER B–01A/B DISCH HDR PR	HIGH
AIR BLOWER B–02A/B DISCH HDR PR 90GRC02CP001	/FIELD			
AIR BLOWER B–02A/B DISCH HDR PR 90GRC02CP002	/FIELD			
		LOW LVM, LOW LVM → ≥1 → 5 Sec (1 0) → A	AIR BLOWER B–02A/B DISCH HDR PR	LOW
		HIGH LVM, HIGH LVM → ≥1 → 5 Sec (1 0) → A	AIR BLOWER B–02A/B DISCH HDR PR	HIGH

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049	
TITLE :– 513	CONTROL SCHEME FOR SEWAGE TREATMENT PLANT MISCELLANEOUS LOGICS	REV. NO.	03	DATE: 29.01.2019
		SHT	44 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
AIR BLOWER-2A 90GRC02AN001	SELECT MAIN /OWS			
AIR BLOWER-2B 90GRC02AN002	SELECT MAIN /OWS			
AIR BLOWER-2B 90GRC02AN002	ON /MCC			
			AIR BLOWER-2A	SELECTED MAIN
			AIR BLOWER-2B	STAND BY 2/47
AIR BLOWER-2B 90GRC02AN002	SELECT MAIN /OWS			
AIR BLOWER-2A 90GRC02AN001	SELECT MAIN /OWS			
AIR BLOWER-2A 90GRC02AN001	ON /MCC			
			AIR BLOWER-2B	SELECTED MAIN
			AIR BLOWER-2A	STAND BY 1/46
AIR BLOWER-2A 90GRC02AN001	ON /MCC			
AIR BLOWER-2A 90GRC02AN001	STOP /OWS			
AIR BLOWER-2A 90GRC02AN001	OFF /MCC			
			AIR BLOWER-2A	TRIPPED 3/47
AIR BLOWER-2B 90GRC02AN002	ON /MCC			
AIR BLOWER-2B 90GRC02AN002	STOP /OWS			
AIR BLOWER-2B 90GRC02AN002	OFF /MCC			
			AIR BLOWER-2B	TRIPPED 4/46

BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
	TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT AIR BLOWER-2A/2B STANDBY SELECTION LOGIC	REV. NO.	03 DATE: 29.01.2019
		SHT	45 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
AIR BLOWER–2A OPRN SELECTED	LOCAL 2/46		AIR BLOWER–2A	STOP /MCC
AIR BLOWER–2A	START /LOCAL		AIR BLOWER–2A	START /MCC
AIR BLOWER–2A	START /OWS		AIR BLOWER–2A	FAIL TO START
AIR BLOWER–2B	TRIPPED 4/45		AIR BLOWER–2A OPRN SELECTED	REMOTE 1/46
AIR BLOWER–2A	SELECTED STDBY 1/45		AIR BLOWER–2A OPRN SELECTED	LOCAL 2/46
AIR BLOWER–2A OPRN SELECTED	REMOTE 1/46			
AIR BLOWER–2A	OFF /MCC			
AIR BLOWER–2A	REMOTE /OWS			
AIR BLOWER–2A	LOCAL /OWS			



FOR STARTING OF AIR BLOWER–2A, OPERATOR TO ENSURE THAT MANUAL VALVES V–150 & V–154 ARE OPEN

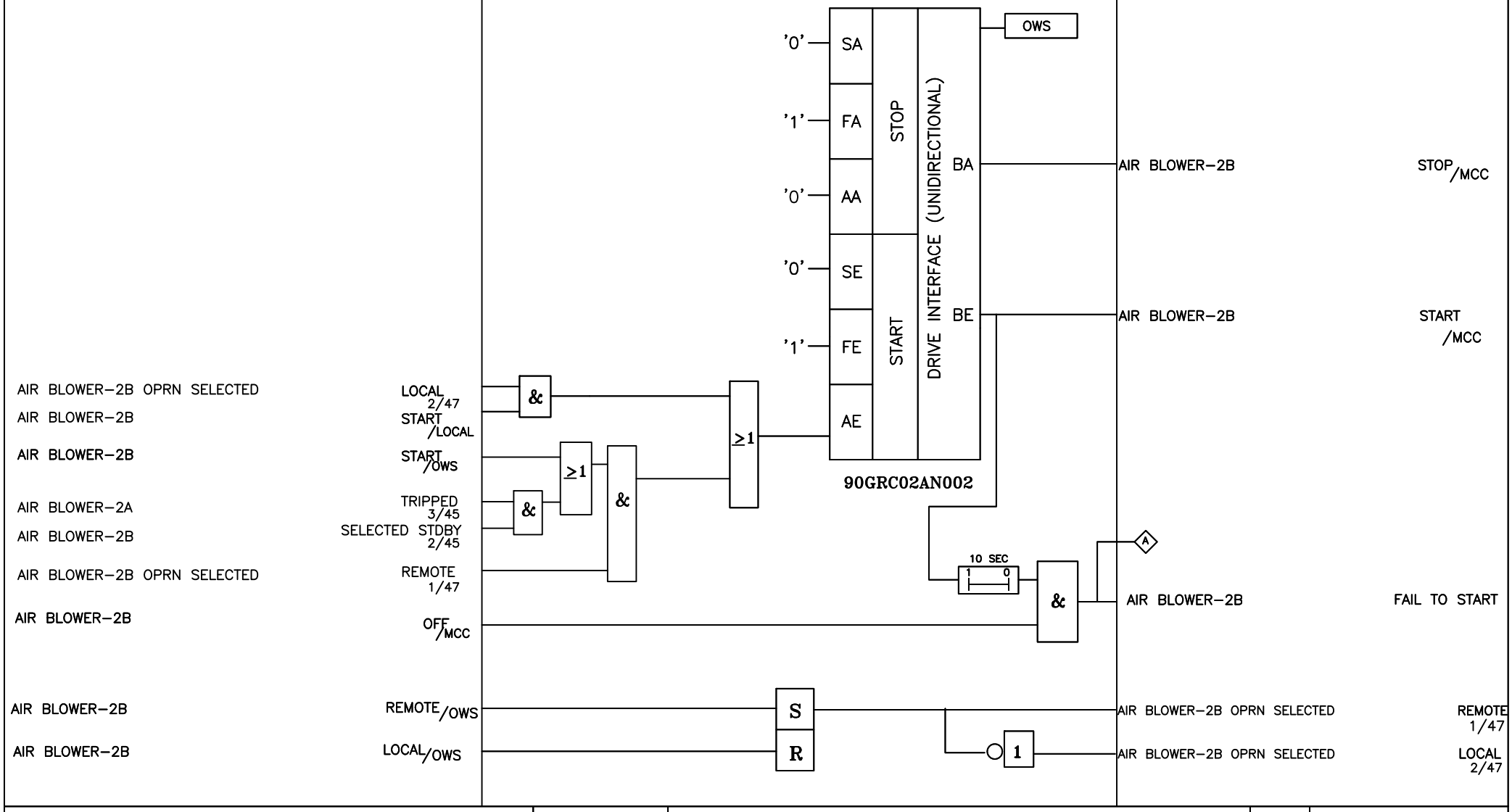
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
515
AIR BLOWER–2A

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	46 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
AIR BLOWER–2B OPRN SELECTED	LOCAL 2/47		AIR BLOWER–2B	STOP /MCC
AIR BLOWER–2B	START /LOCAL		AIR BLOWER–2B	START /MCC
AIR BLOWER–2B	START /OWS		AIR BLOWER–2B	FAIL TO START
AIR BLOWER–2A	TRIPPED 3/45		AIR BLOWER–2B OPRN SELECTED	REMOTE 1/47
AIR BLOWER–2B	SELECTED STDBY 2/45		AIR BLOWER–2B OPRN SELECTED	LOCAL 2/47
AIR BLOWER–2B OPRN SELECTED	REMOTE 1/47			
AIR BLOWER–2B	OFF /MCC			
AIR BLOWER–2B	REMOTE /OWS			
AIR BLOWER–2B	LOCAL /OWS			



FOR STARTING OF AIR BLOWER–2B, OPERATOR TO ENSURE THAT MANUAL VALVES V–153 & V–154 ARE OPEN

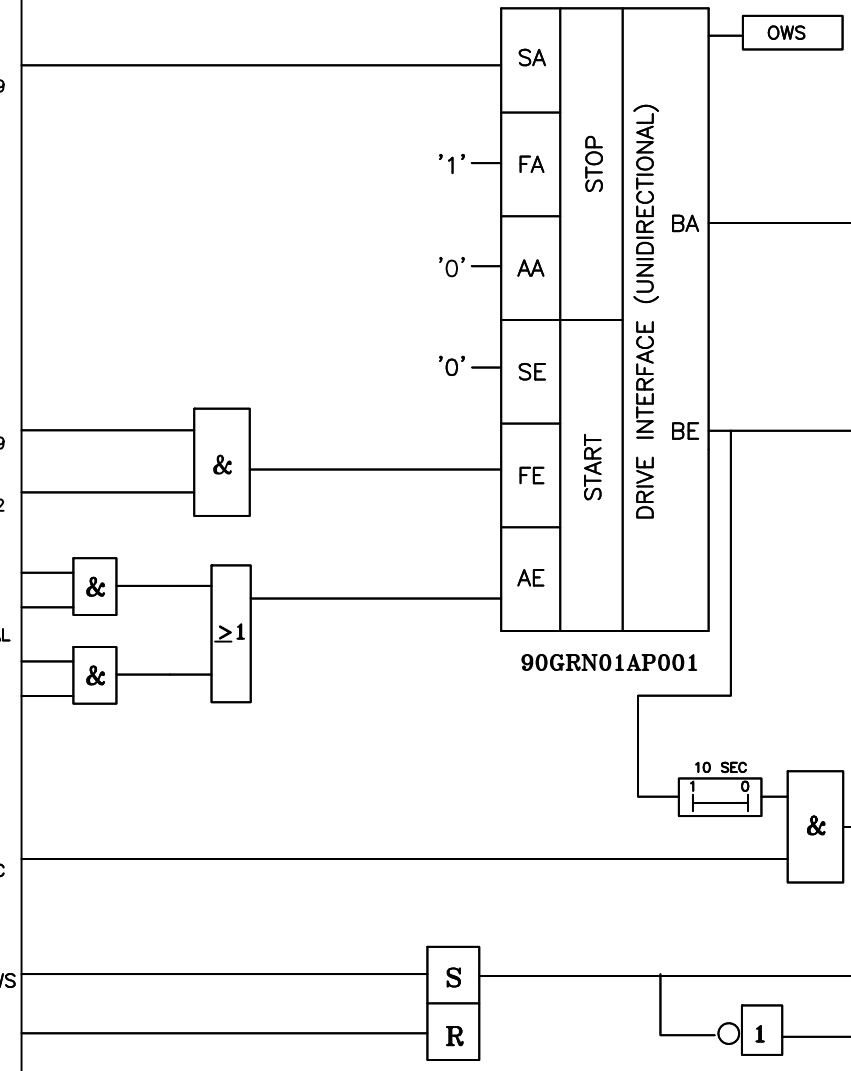
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
516
AIR BLOWER–2B

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	47 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
NaOCL DOSING TANK DT-01 LEVEL	LOW 1/49			
NaOCL DOSING TANK DT-01 LEVEL	ADEQ 3/49			
HYPO CONTACT/FILTER FEED TANK LEVEL	ADEQ 3/32			
NaOCL DOSING PUMP-1 OPRN SELECTED	LOCAL 2/48			
NaOCL DOSING PUMP-1	START /LOCAL			
NaOCL DOSING PUMP-1	START /OWS			
NaOCL DOSING PUMP-1 OPRN SELECTED	REMOTE 1/48			
NaOCL DOSING PUMP-1	OFF /MCC			
NaOCL DOSING PUMP-1	REMOTE /OWS			
NaOCL DOSING PUMP-1	LOCAL /OWS			
			NaOCL DOSING PUMP-1	STOP /MCC
			NaOCL DOSING PUMP-1	START /MCC
			NaOCL DOSING PUMP-1	FAIL TO START
			NaOCL DOSING PUMP-1 OPRN SELECTED	REMOTE 1/48
			NaOCL DOSING PUMP-1 OPRN SELECTED	LOCAL 2/48

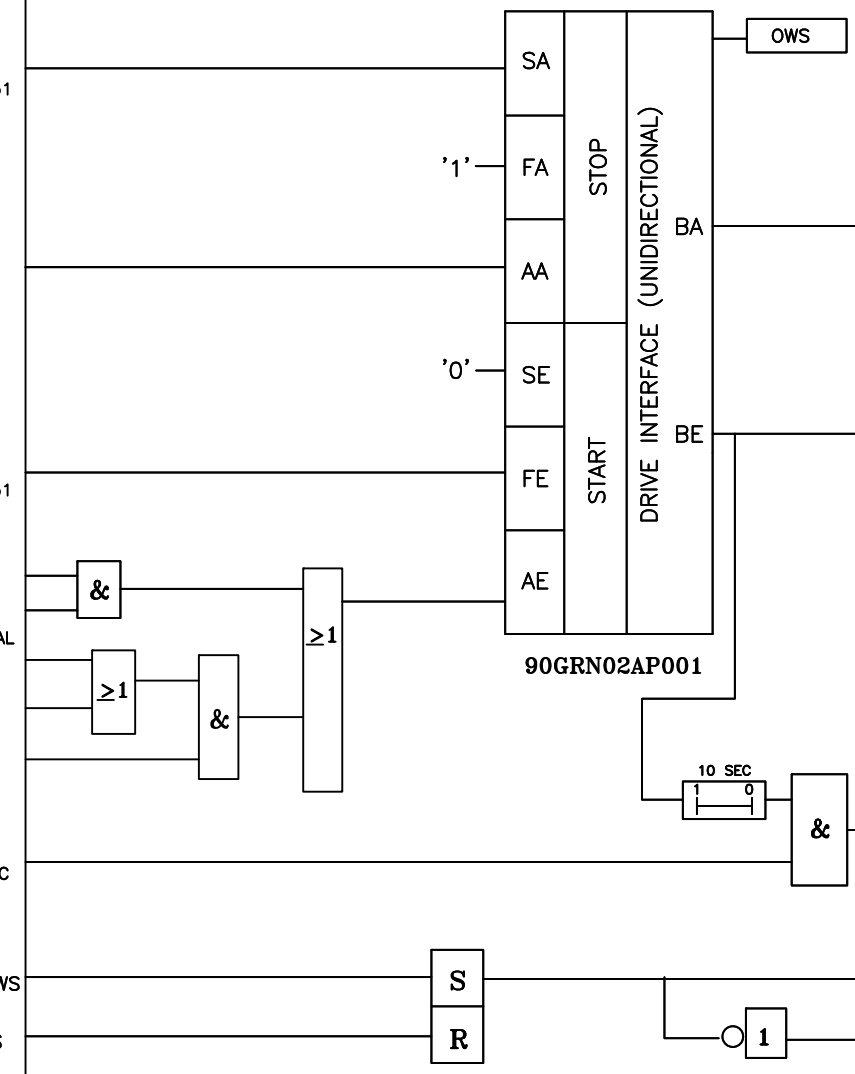


	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
		TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 517 NaOCL DOSING PUMP-1	REV. NO.	03 DATE: 29.01.2019
			SHT	48 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
NaOCL DOSING TANK DT-01 LEVEL 90GRN01CL001	/FIELD	HIGH LVM, HIGH LVM → ≥1 → 5 Sec	NaOCL DOSING TANK DT-01 LEVEL	HIGH
NaOCL DOSING TANK DT-01 LEVEL 90GRN01CL001	/FIELD			
		LOW LVM, LOW LVM → ≥1 → 5 Sec	NaOCL DOSING TANK DT-01 LEVEL	LOW 1/48
		5 Sec → 1	NaOCL DOSING TANK DT-01 LEVEL	ADEQ 3/48
NaOCL DOSING PUMP DP-01 DISCH PR 90GRN01CP001	/FIELD	LOW LVM, LOW LVM → ≥1 → 5 Sec	NaOCL DOSING PUMP-1 DISCH PR	LOW
NaOCL DOSING PUMP DP-01 DISCH PR 90GRN01CP002	/FIELD			
		HIGH LVM, HIGH LVM → ≥1 → 5 Sec	NaOCL DOSING PUMP-1 DISCH PR	HIGH
NaOCL DOSING PUMP-1 90GRN01AP001	ON /MCC	S	NaOCL DOSING PUMP-1	TRIPPED
NaOCL DOSING PUMP-1 90GRN01AP001	STOP /OWS	R		
NaOCL DOSING PUMP-1 90GRN01AP001	OFF /MCC	&		

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049	
	TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 51 NaOCL DOSING PUMP-1 MISCELLANEOUS LOGIC	REV. NO.	03	DATE: 29.01.2019
		SHT	49 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
NaOCL DOSING TANK DT–02 LEVEL	LOW 1/51			
NaOCL DOSING PUMP–2	STOP 3/90			
NaOCL DOSING TANK DT–02 LEVEL	ADEQ 3/51			
NaOCL DOSING PUMP–2 OPRN SELECTED	LOCAL 2/50			
NaOCL DOSING PUMP–2	START /LOCAL			
NaOCL DOSING PUMP–2	START /OWS			
NaOCL DOSING PUMP–2	START 1/89			
NaOCL DOSING PUMP–2 OPRN SELECTED	REMOTE 1/50			
NaOCL DOSING PUMP–2	OFF /MCC			
NaOCL DOSING PUMP–2	REMOTE /OWS			
NaOCL DOSING PUMP–2	LOCAL /OWS			
			NaOCL DOSING PUMP–2	STOP /MCC
			NaOCL DOSING PUMP–2	START /MCC
			NaOCL DOSING PUMP–2	FAIL TO START
			NaOCL DOSING PUMP–2 OPRN SELECTED	REMOTE 1/50
			NaOCL DOSING PUMP–2 OPRN SELECTED	LOCAL 2/50



	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049	
TITLE :–	CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 519 NaOCL DOSING PUMP–2	REV. NO.	03	DATE: 29.01.2019
		SHT	50 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
NaOCL DOSING TANK DT–02 LEVEL 90GRN02CL001	/FIELD	HIGH LVM, HIGH LVM → ≥1 → 5 Sec	NaOCL DOSING TANK DT–02 LEVEL	HIGH
NaOCL DOSING TANK DT–02 LEVEL 90GRN02CL001	/FIELD			
		LOW LVM, LOW LVM → ≥1 → 5 Sec	NaOCL DOSING TANK DT–02 LEVEL	LOW 1/50
		5 Sec → 1	NaOCL DOSING TANK DT–02 LEVEL	ADEQ 3/50
NaOCL DOSING PUMP DP–02 DISCH PR 90GRN02CP001	/FIELD	LOW LVM, LOW LVM → ≥1 → 5 Sec	NaOCL DOSING PUMP–2 DISCH PR	LOW
NaOCL DOSING PUMP DP–02 DISCH PR 90GRN02CP002	/FIELD			
		HIGH LVM, HIGH LVM → ≥1 → 5 Sec	NaOCL DOSING PUMP–2 DISCH PR	HIGH
NaOCL DOSING PUMP–2 90GRN02AP001	ON /MCC	S	NaOCL DOSING PUMP–2	TRIPPED
NaOCL DOSING PUMP–2 90GRN02AP001	STOP /OWS	R		
NaOCL DOSING PUMP–2 90GRN02AP001	OFF /MCC	&		

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049	
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 52. NaOCL DOSING PUMP–2 MISCELLANEOUS LOGIC	REV. NO.	03	DATE: 29.01.2019
		SHT	51 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
FILTER FEED PUMP–B	ON /MCC		ANY ONE FILTER FEED PUMP ON	1/54,55,60,61
FILTER FEED PUMP–A	ON /MCC			
FILTER FEED PUMP–B	ON /MCC		BOTH FILTER FEED PUMP ON	2/57,58,63,64
FILTER FEED PUMP–A	ON /MCC			
FLOW AT DMF INLET 90GRS10CF001	/FIELD	LOW LVM, 5 Sec	FLOW AT DMF INLET	LOW
		HIGH LVM, 5 Sec	FLOW AT DMF INLET	HIGH
FLOW AT ACF INLET 90GRS10CF002	/FIELD	LOW LVM, 5 Sec	FLOW AT ACF INLET	LOW
		HIGH LVM, 5 Sec	FLOW AT ACF INLET	HIGH

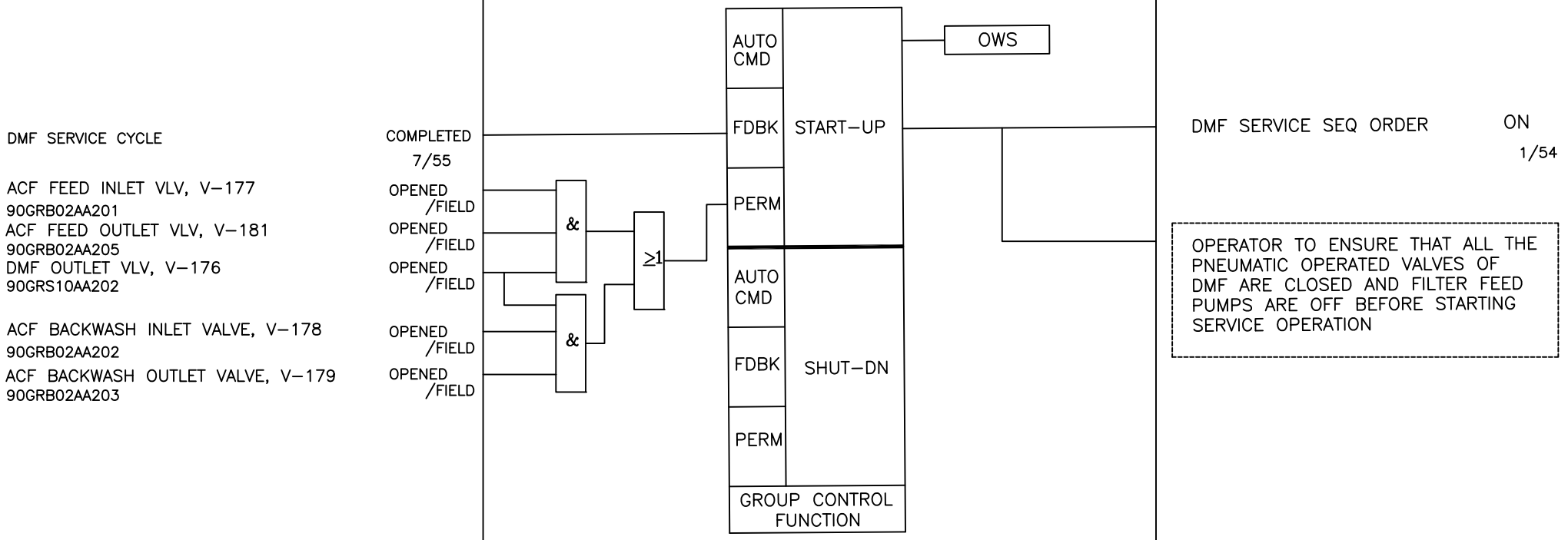
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 5 MISCELLANEOUS LOGIC

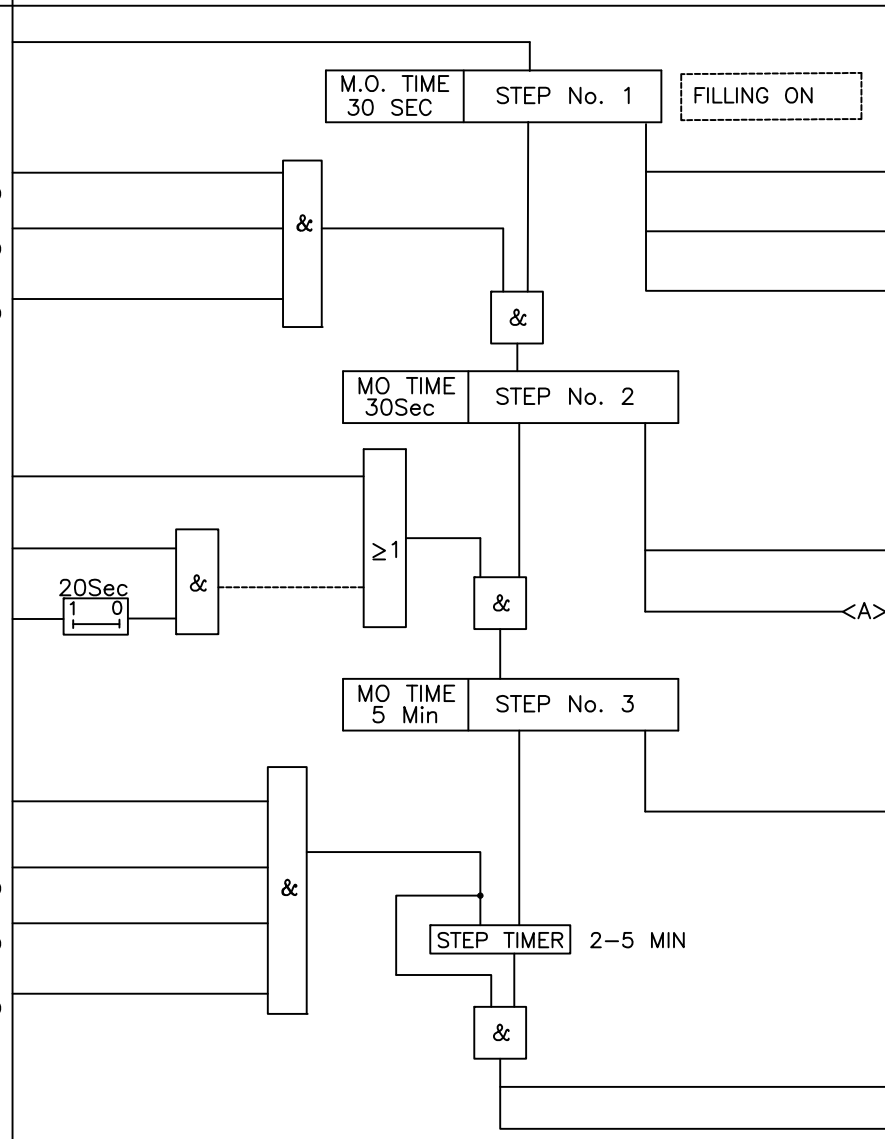
DRG. NO.	PE-V0-412-673-A049		
REV. NO.	03	DATE:	29.01.2019
SHT	52 OF 95		

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.



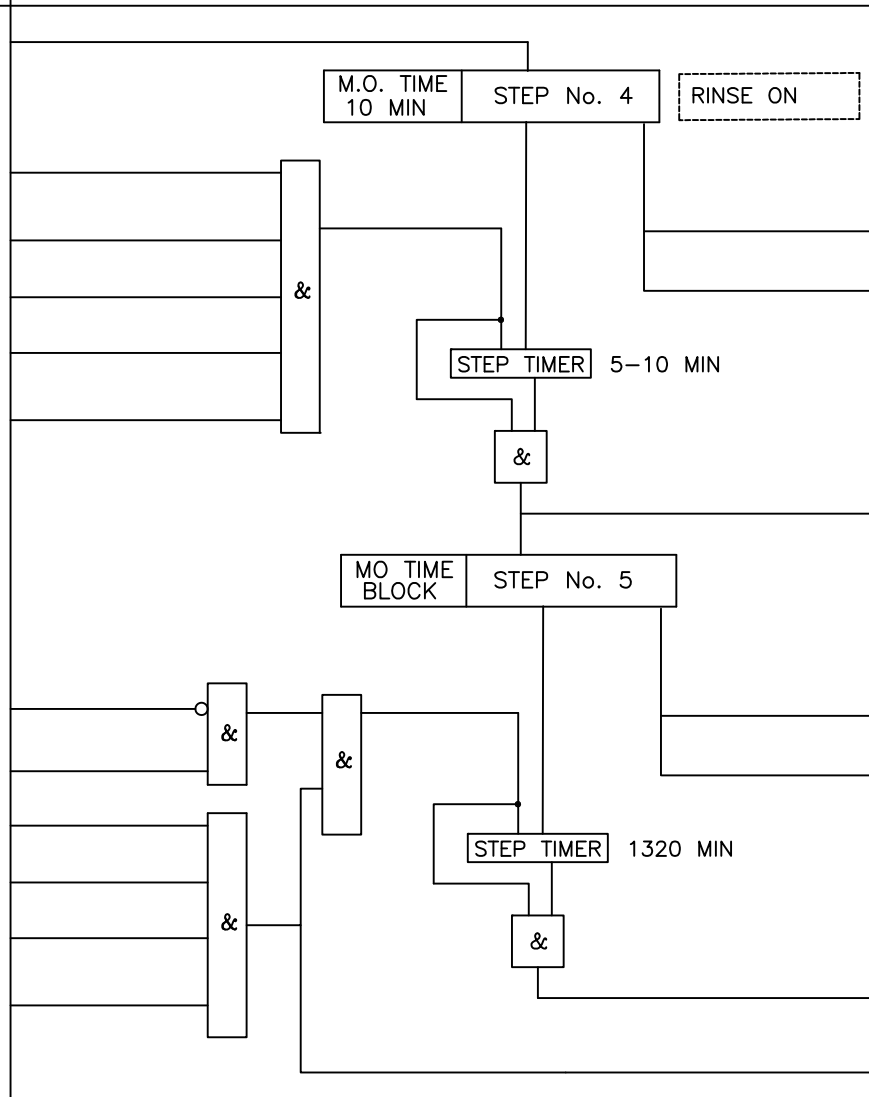
	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
		TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 522 DMF SERVICE SEQUENCE MASTER	REV. NO. 03	DATE: 29.01.2019
			SHT 53 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DMF SERVICE SEQ ORDER	ON 1/53			
FILTER FEED PUMP OUTLET VLV, V–165 90GRS10AA201	OPENED /FIELD		FILTER FEED PUMP OUTLET VLV	OPEN 1/65
DMF FEED INLET VLV, V–166 90GRB01AA201	OPENED /FIELD		DMF FEED INLET VLV, V–166	OPEN 2/66
DMF VENT VLV, V–171 90GRB01AA206	OPENED /FIELD		DMF VENT VLV, V–171	OPEN 3/71
FILTER FEED PUMP–A	ON /MCC		FILTER FEED PUMP–A START	4/32
FILTER FEED PUMP–A	OFF /SWGR			
FILTER FEED PUMP–A START CMND	<A>		<A>	
ANY ONE FILTER FEED PUMP	ON 1/52		FILTER FEED PUMP–B START	5/32
FILTER FEED PUMP OUTLET VLV, V–165 90GRS10AA201	OPENED /FIELD			
DMF FEED INLET VLV, V–166 90GRB01AA201	OPENED /FIELD			
DMF VENT VLV, V–171 90GRB01AA206	OPENED /FIELD			
			DMF INITIAL FILLING STEP COMPLETED	
			STEP NO. 4 ORDER ON	6/55



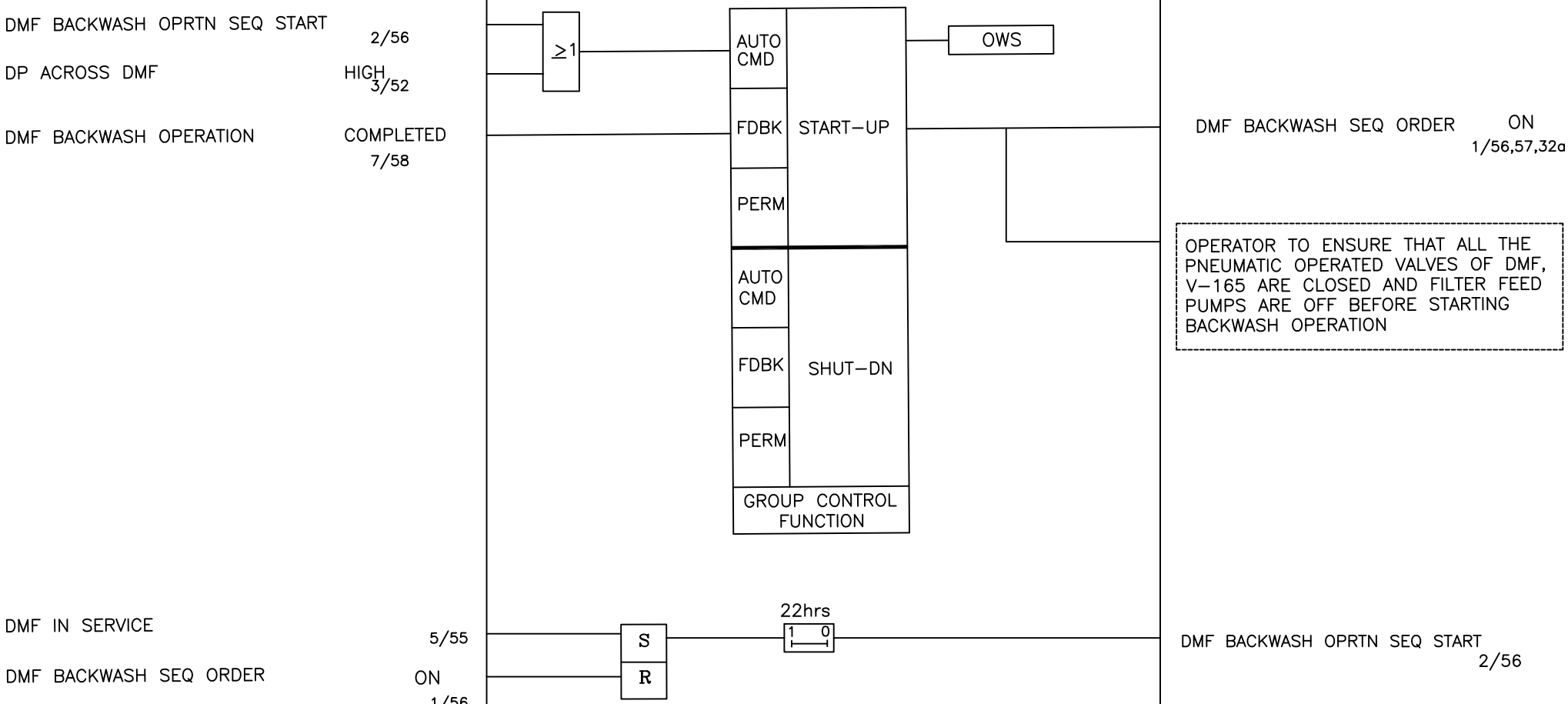
	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 523 DMF SERVICE SEQUENCE	REV. NO. 03	DATE: 29.01.2019
		SHT 54	OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DMF SERVICE SEQ STEP 4 ORDER	ON 6/54			
DMF DRAIN/RINSE OUTLET VLV, V–169 90GRB01AA204	OPENED /FIELD			
DMF VENT VLV, V–171 90GRB01AA206	CLOSED /FIELD			
FILTER FEED PUMP OUTLET VLV, V–165 90GRS10AA201	OPENED /FIELD			
DMF FEED INLET VLV, V–166 90GRB01AA201	OPENED /FIELD			
ANY ONE FILTER FEED PUMP	ON 1/52			
			DMF DRAIN/RINSE OUTLET VLV	OPEN 1/69
			DMF VENT VLV, V–171	CLOSE 2/71
			DMF INITIAL RINSE STEP COMPLETED	
DP ACROSS DMF	HIGH 1/79			
DMF DRAIN/RINSE OUTLET VLV, V–169 90GRB01AA204	CLOSED /FIELD			
DMF FEED OUTLET VLV, V–170 90GRB01AA206	OPENED /FIELD			
FILTER FEED PUMP OUTLET VLV, V–165 90GRS10AA201	OPENED /FIELD			
DMF FEED INLET VLV, V–166 90GRB01AA201	OPENED /FIELD			
ANY ONE FILTER FEED PUMP	ON 1/52			
			DMF DRAIN/RINSE OUTLET VLV	CLOSE 3/69
			DMF FEED OUTLET VLV, V–170	OPEN 4/70
			DMF SERVICE CYCLE COMPLETED	
			DMF IN SERVICE	5/56



	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 524 DMF SERVICE SEQUENCE	REV. NO. 03	DATE: 29.01.2019
		SHT 55	OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.



	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
		TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 525 DMF BACKWASH SEQUENCE MASTER	REV. NO. 03	DATE: 29.01.2019
			SHT 56 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DMF BACKWASH SEQ ORDER	ON 2/56	M.O. TIME 5 MIN | STEP No. 1 | AIR RELEASE & DRAIN		
DMF BACKWASH OUTLET VALVE, V–168 90GRS10AA201	OPENED /FIELD	&	DMF BACKWASH OUTLET VALVE	OPEN 1/68
DMF VENT VLV, V–171 90GRB01AA206	OPENED /FIELD		DMF VENT VLV, V–171	OPEN 2/71
		STEP TIMER 2–5 MIN		
		&		
			DMF AIR RELEASE & DRAIN	COMPLETED
		M.O. TIME 30 SEC | STEP No. 2 | BACKWASH ON		
FILTER FEED PUMP OUTLET VLV, V–165 90GRS10AA201	OPENED /FIELD	&	FILTER FEED PUMP OUTLET VLV	OPEN 3/65
DMF BACKWASH INLET VALVE, V–167 90GRB01AA202	OPENED /FIELD		DMF BACKWASH INLET VALVE,V–167	OPEN 4/67
DMF VENT VLV, V–171 90GRB01AA206	CLOSED /FIELD	&	DMF VENT VLV, V–171	CLOSE 5/71
		MO TIME 30 MIN | STEP No. 3		
BOTH FILTER FEED PUMP	ON 2/52		FILTER FEED PUMP–A	START 6/32
FILTER FEED PUMP OUTLET VLV, V–165 90GRS10AA201	OPENED /FIELD	&	FILTER FEED PUMP–B	START 7/32
DMF BACKWASH INLET VALVE, V–167 90GRB01AA202	OPENED /FIELD			
DMF BACKWASH OUTLET VALVE, V–168 90GRB01AA203	OPENED /FIELD	STEP TIMER 10–30 MIN		
		&		
			DMF BACKWASH	COMPLETED
			STEP NO. 4 ORDER ON	8/58

BHEL

2 X 660 MW ENNORE SEZ STPP

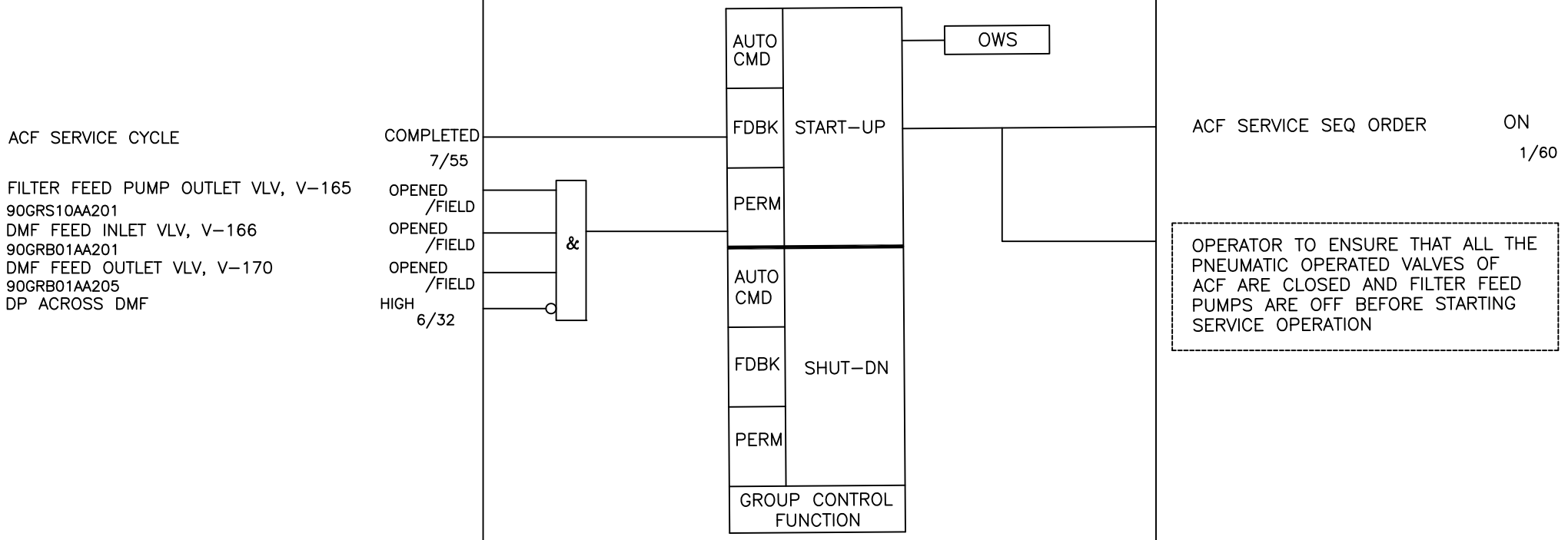
TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
526
DMF BACKWASH SEQUENCE

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	57	OF	95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DMF BACKWASH SEQ STEP 4 ORDER	ON 8/57	M.O. TIME 5 MIN — STEP No. 4 — REFILLING		
DMF FEED INLET VLV, V–166 90GRB01AA201	OPENED /FIELD		DMF FEED INLET VLV, V–166	OPEN 1/66
DMF VENT VLV, V–171 90GRB01AA206	OPENED /FIELD		DMF VENT VLV, V–171	OPEN 2/71
FILTER FEED PUMP OUTLET VLV, V–165 90GRS10AA201	OPENED /FIELD		DMF BACKWASH INLET VALVE,V–167	CLOSE 3/67
DMF BACKWASH INLET VALVE, V–167 90GRB01AA202	CLOSED /FIELD		DMF BACKWASH OUTLET VALVE,V–168	CLOSE 4/68
DMF BACKWASH OUTLET VALVE, V–168 90GRB01AA203	CLOSED /FIELD			
BOTH FILTER FEED PUMP	ON 2/52			
		STEP TIMER 2–5 MIN		
			DMF REFILLING STEP COMPLETED	
		MO TIME 10 MIN — STEP No. 5 — FINAL RINSE		
DMF DRAIN/RINSE OUTLET VLV, V–169 90GRB01AA204	OPENED /FIELD			
DMF VENT VLV, V–171 90GRB01AA206	CLOSED /FIELD		DMF VENT VLV, V–171	CLOSE 5/71
FILTER FEED PUMP OUTLET VLV, V–165 90GRS10AA201	OPENED /FIELD		DMF DRAIN/RINSE OUTLET VLV	OPEN 6/69
DMF FEED INLET VLV, V–166 90GRB01AA201	OPENED /FIELD			
BOTH FILTER FEED PUMP	ON 2/52			
		STEP TIMER 5–10 MIN		
			DMF BACKWASH OPERATION COMPLETED	7/56

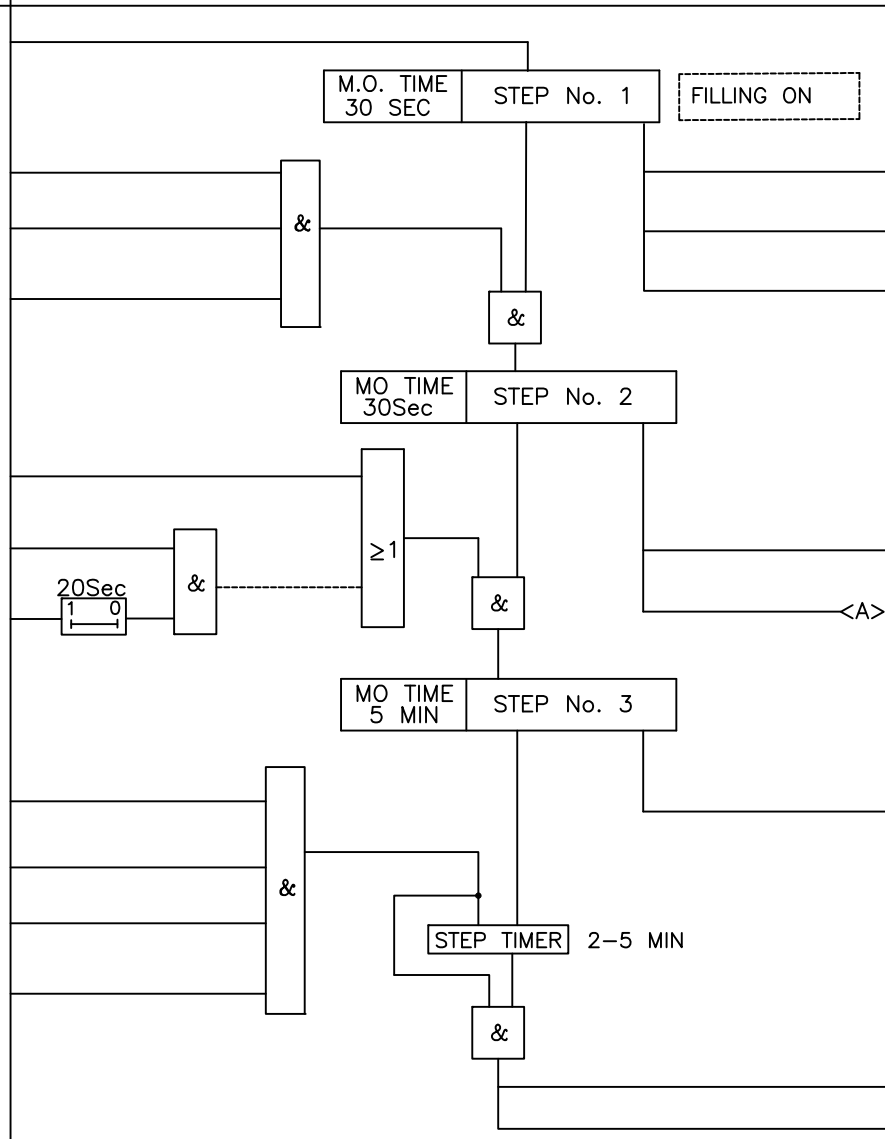
BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 527 DMF BACKWASH SEQUENCE	REV. NO.	03 DATE: 29.01.2019
		SHT	58 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.



	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
		TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 528 ACF SERVICE SEQUENCE MASTER	REV. NO. 03	DATE: 29.01.2019
			SHT 59 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
ACF SERVICE SEQ ORDER	ON 1/59			
DMF OUTLET VLV, V–176 90GRS10AA202	OPENED /FIELD		DMF OUTLET VLV, V–176	OPEN 1/72
ACF FEED INLET VLV, V–177 90GRB02AA201	OPENED /FIELD		ACF FEED INLET VLV, V–177	OPEN 2/73
ACF VENT VLV, V–182 90GRB02AA206	OPENED /FIELD		ACF VENT VLV, V–182	OPEN 3/78
FILTER FEED PUMP–A	ON /MCC			
FILTER FEED PUMP–A	OFF /SWGR		FILTER FEED PUMP–A START	4/32
FILTER FEED PUMP–A START CMND	<A>		<A>	
ANY ONE FILTER FEED PUMP	ON 1/52		FILTER FEED PUMP–B START	5/32
FILTER FEED PUMP OUTLET VLV, V–165 90GRS10AA201	OPENED /FIELD			
DMF FEED INLET VLV, V–166 90GRB01AA201	OPENED /FIELD			
DMF VENT VLV, V–171 90GRB01AA206	OPENED /FIELD			
			ACF INITIAL FILLING STEP COMPLETED	
			STEP NO. 4 ORDER ON	6/61



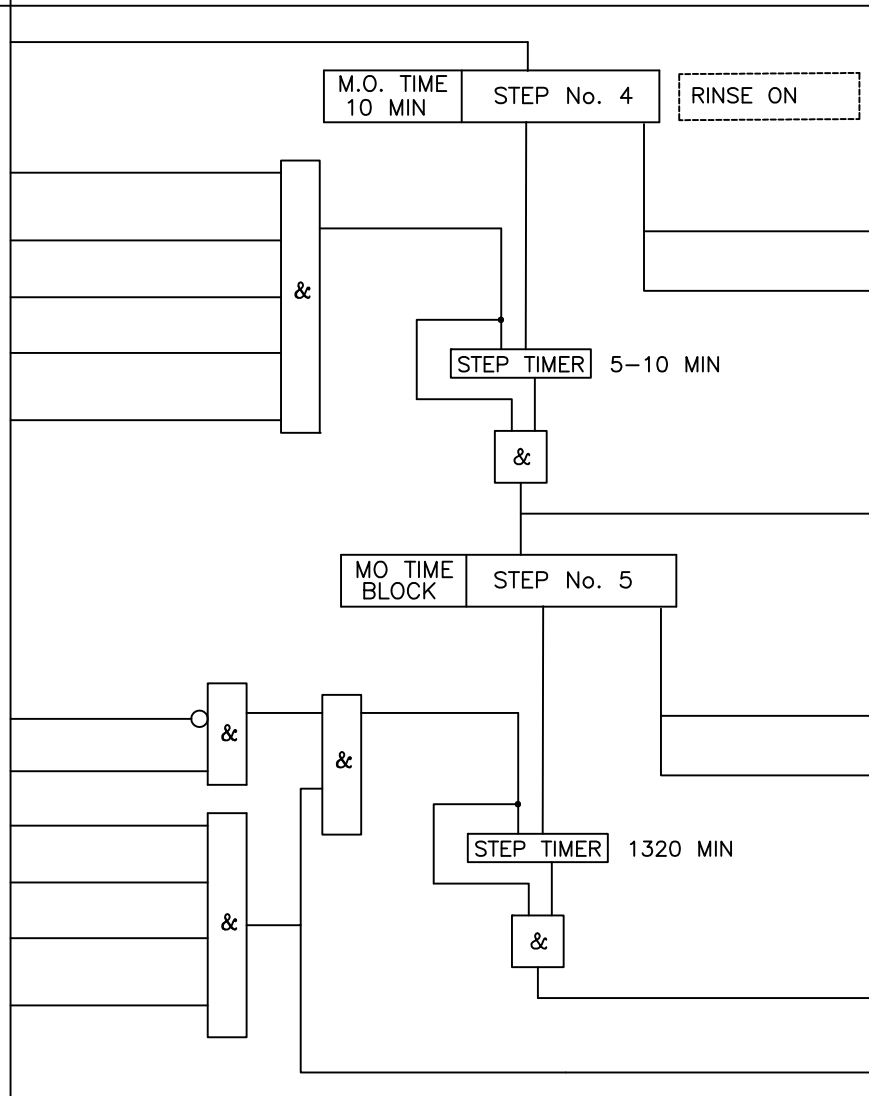
BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
529
ACF SERVICE SEQUENCE

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	60	OF	95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DMF SERVICE SEQ STEP 4 ORDER	ON 6/54			
ACF DRAIN/RINSE OUTLET VLV, V–180 90GRB02AA204	OPENED /FIELD			
ACF VENT VLV, V–182 90GRB02AA206	CLOSED /FIELD			
DMF OUTLET VLV, V–176 90GRS10AA202	OPENED /FIELD			
ACF FEED INLET VLV, V–177 90GRB02AA201	OPENED /FIELD			
ANY ONE FILTER FEED PUMP	ON 1/52			
			ACF DRAIN/RINSE OUTLET VLV	OPEN 1/76
			ACF VENT VLV, V–182	CLOSE 2/78
			ACF INITIAL RINSE STEP COMPLETED	
DP ACROSS ACF	HIGH 2/79			
ACF DRAIN/RINSE OUTLET VLV, V–180 90GRB02AA204	CLOSED /FIELD			
ACF FEED OUTLET VLV, V–181 90GRB02AA206	OPENED /FIELD			
DMF OUTLET VLV, V–176 90GRS10AA202	OPENED /FIELD			
ACF FEED INLET VLV, V–177 90GRB02AA201	OPENED /FIELD			
ANY ONE FILTER FEED PUMP	ON 1/52			
			ACF DRAIN/RINSE OUTLET VLV	CLOSE 3/79
			ACF FEED OUTLET VLV, V–181	OPEN 4/77
			ACF SERVICE CYCLE COMPLETED	
			ACF IN SERVICE	5/62



	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 530 DMF SERVICE SEQUENCE	REV. NO. 03	DATE: 29.01.2019
		SHT 61	OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.

ACF BACKWASH OPRTN SEQ START 2/62

DP ACROSS ACF HIGH 3/52

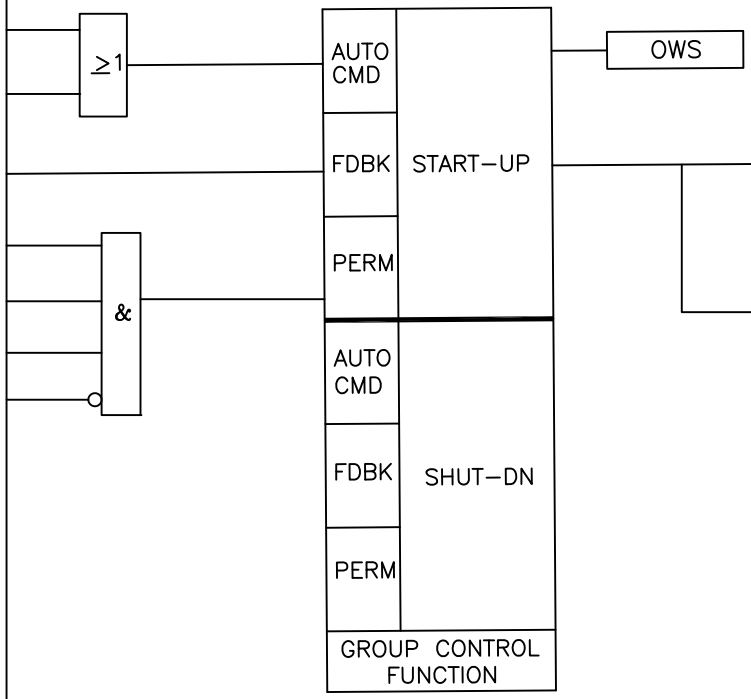
ACF BACKWASH OPERATION COMPLETED 6/55

FILTER FEED PUMP OUTLET VLV, V–165 90GRS10AA201 OPENED /FIELD

DMF FEED INLET VLV, V–166 90GRB01AA201 OPENED /FIELD

DMF FEED OUTLET VLV, V–170 90GRB01AA205 OPENED /FIELD

DP ACROSS DMF HIGH 6/32

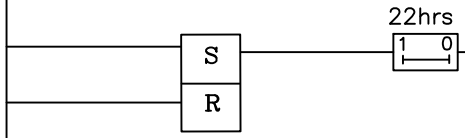


ACF BACKWASH SEQ ORDER ON 1/32a,62,63

OPERATOR TO ENSURE THAT ALL THE PNEUMATIC OPERATED VALVES OF ACF, V–176 ARE CLOSED AND FILTER FEED PUMPS ARE OFF BEFORE STARTING BACKWASH OPERATION

ACF IN SERVICE 5/61

ACF BACKWASH SEQ ORDER ON 1/62



ACF BACKWASH OPRTN SEQ START 2/62

	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
		TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 531 ACF BACKWASH SEQUENCE MASTER	REV. NO. 03	DATE: 29.01.2019
			SHT 62 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DMF BACKWASH SEQ ORDER	ON 1/62	M.O. TIME 5 MIN | STEP No. 1 | AIR RELEASE & DRAIN		
ACF BACKWASH OUTLET VALVE, V–179 90GRB02AA203	OPENED /FIELD	&	ACF BACKWASH OUTLET VALVE	OPEN 1/75
ACF VENT VLV, V–182 90GRB02AA206	OPENED /FIELD		ACF VENT VLV, V–182	OPEN 2/78
		STEP TIMER 2–5 MIN		
		&		
			ACF AIR RELEASE & DRAIN	COMPLETED
		M.O. TIME 30 SEC | STEP No. 2 | BACKWASH ON		
ACF BACKWASH INLET VALVE, V–178 90GRB02AA202	OPENED /FIELD	&	ACF BACKWASH INLET VALVE,V–178	OPEN 3/74
ACF VENT VLV, V–182 90GRB02AA206	OPENED /FIELD		ACF VENT VLV, V–182	CLOSE 4/78
DMF OUTLET VLV, V–176 90GRS10AA202	OPENED /FIELD	&	DMF OUTLET VLV, V–176	OPEN 5/72
		MO TIME 30 MIN | STEP No. 3		
BOTH FILTER FEED PUMP	ON 2/52	&	FILTER FEED PUMP–A	START 6/32
ACF BACKWASH INLET VALVE, V–178 90GRB02AA202	OPENED /FIELD		FILTER FEED PUMP–B	START 7/32
ACF BACKWASH OUTLET VALVE, V–179 90GRB02AA203	OPENED /FIELD	STEP TIMER 10–30 MIN		
DMF OUTLET VLV, V–176 90GRS10AA202	OPENED /FIELD	&		
			ACF BACKWASH CYCLE	COMPLETED
			STEP NO. 4 ORDER ON	8/64

BHEL

2 X 660 MW ENNORE SEZ STPP

TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT
532
ACF BACKWASH SEQUENCE

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	63	OF	95

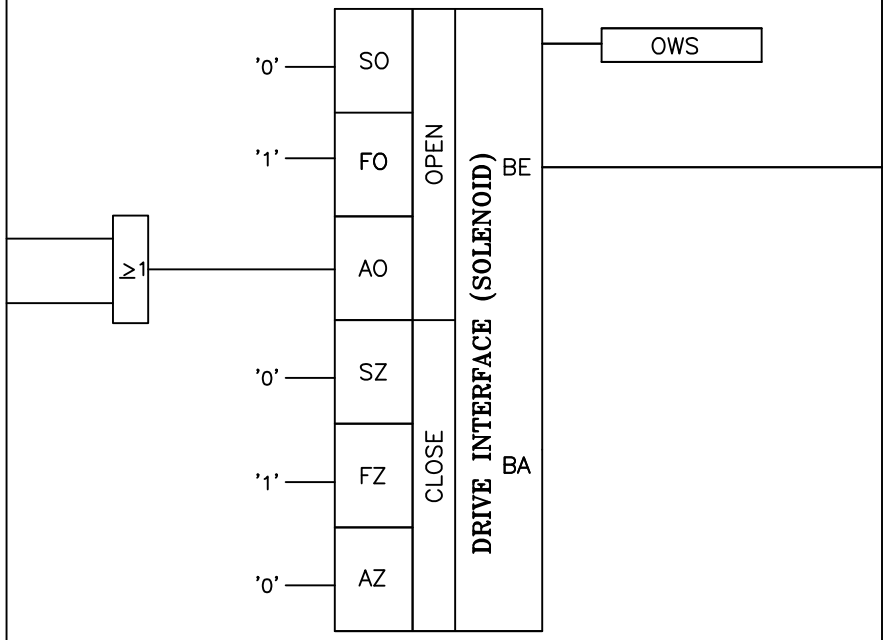
INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
ACF BACKWASH SEQ STEP 4 ORDER	ON 8/63	M.O. TIME 5 MIN | STEP No. 4 | REFILLING		
ACF FEED INLET VLV, V–177 90GRB10AA201	OPENED /FIELD	&	ACF FEED INLET VLV, V–177	OPEN 1/73
ACF VENT VLV, V–182 90GRB01AA206	OPENED /FIELD		ACF VENT VLV, V–182	OPEN 2/78
DMF OUTLET VLV, V–176 90GRS10AA202	OPENED /FIELD		ACF BACKWASH INLET VALVE,V–178	CLOSE 3/74
ACF BACKWASH INLET VALVE,V–178 90GRB01AA202	CLOSED /FIELD		ACF BACKWASH OUTLET VALVE,V–179	CLOSE 4/75
ACF BACKWASH OUTLET VALVE,V–179 90GRB01AA203	CLOSED /FIELD	STEP TIMER 2–5 MIN		
BOTH FILTER FEED PUMP	ON 2/52	&		
			ACF REFILLING STEP COMPLETED	
		MO TIME 10 MIN | STEP No. 5 | FINAL RINSE		
ACF DRAIN/RINSE OUTLET VLV, V–180 90GRB10AA204	OPENED /FIELD	&		
ACF VENT VLV, V–182 90GRB01AA206	CLOSED /FIELD		ACF VENT VLV, V–182	CLOSE 5/78
DMF OUTLET VLV, V–176 90GRS10AA202	OPENED /FIELD		ACF DRAIN/RINSE OUTLET VLV	OPEN 6/76
ACF FEED INLET VLV, V–177 90GRB02AA201	OPENED /FIELD	STEP TIMER 5–10 MIN		
BOTH FILTER FEED PUMP	ON 2/52	&		
			ACF BACKWASH CYCLE COMPLETED	

BHEL

2 X 660 MW ENNORE SEZ STPP

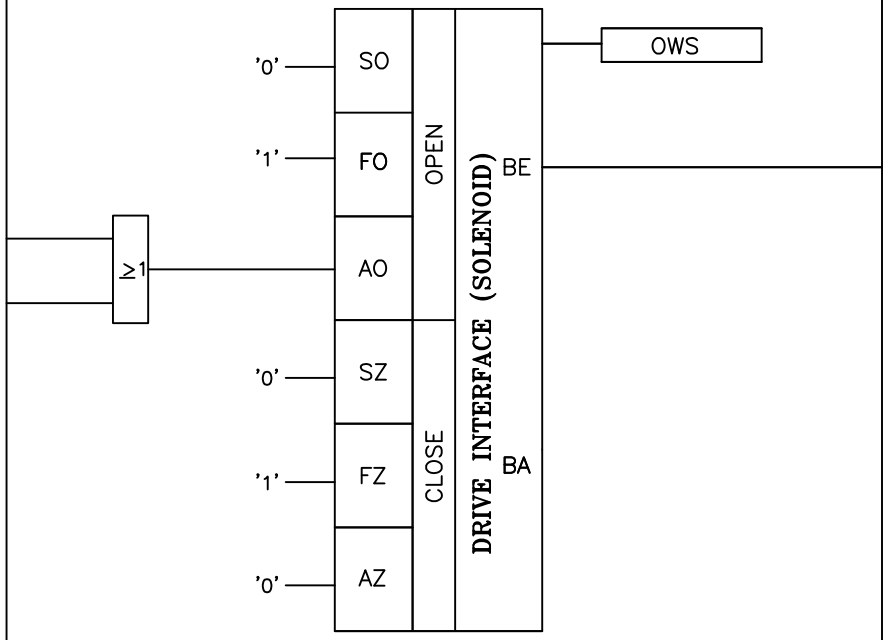
TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 533
ACF BACKWASH SEQUENCE

DRG. NO.	PE–V0–412–673–A049		
REV. NO.	03	DATE:	29.01.2019
SHT	64	OF	95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
FILTER FEED PUMP OUTLET VLV, V–165	OPEN 1/54		COMMAND	OPEN /IPR
FILTER FEED PUMP OUTLET VLV, V–165	OPEN 3/57			

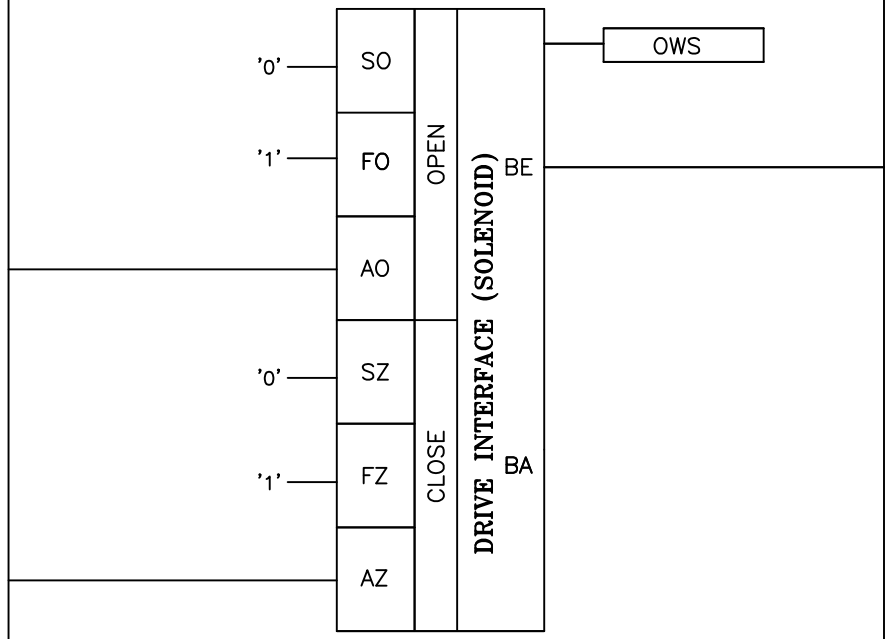
SINGLE COIL SOLENOID OPERATED VALVE

	2 X 660 MW ENNORE SEZ STPP		DRG. NO.	PE-V0-412-673-A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT FILTER FEED PUMP P–07A/B OUTLET VLV, V–165 90GRS10AA201		REV. NO.	03 DATE: 29.01.2019
			SHT	65 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DMF FEED INLET VLV, V-166	OPEN 2/54		COMMAND	OPEN /IPR
DMF FEED INLET VLV, V-166	OPEN 1/58			

SINGLE COIL SOLENOID OPERATED VALVE

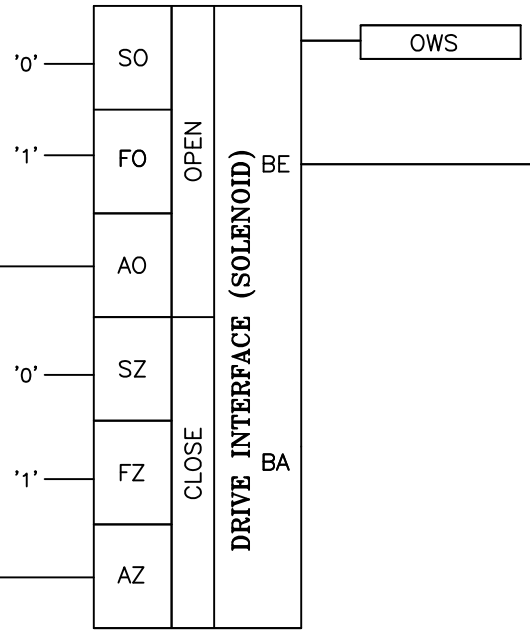
	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
	TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 535 DMF FEED INLET VLV, V-166 90GRB01AA201	REV. NO.	03 DATE: 29.01.2019
		SHT	66 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DMF BACKWASH INLET VALVE, V–167	OPEN 4/57		COMMAND	OPEN /IPR
DMF BACKWASH INLET VALVE, V–167	CLOSE 3/58			

SINGLE COIL SOLENOID OPERATED VALVE

	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
		TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 536 DMF BACKWASH INLET VALVE, V–167 90GRB01AA202	REV. NO. 03	DATE: 29.01.2019
			SHT 67	OF 95

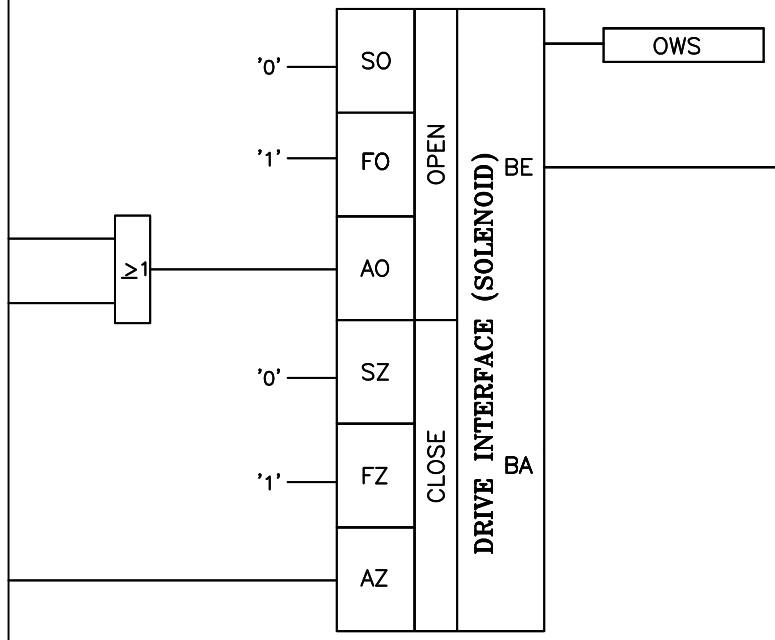
INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DMF BACKWASH OUTLET VALVE, V–168	OPEN 1/57		COMMAND	OPEN /IPR
DMF BACKWASH OUTLET VALVE, V–168	CLOSE 4/58			



SINGLE COIL SOLENOID OPERATED VALVE

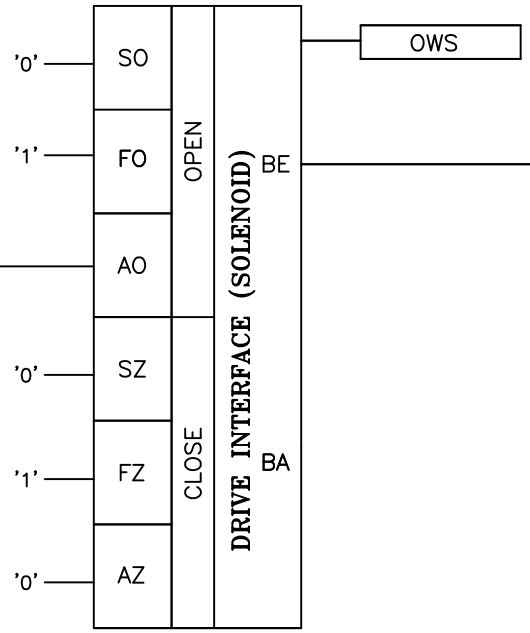
	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 537 DMF BACKWASH OUTLET VALVE, V–168 90GRB01AA203	REV. NO.	03 DATE: 29.01.2019
		SHT	68 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
DMF DRAIN/RINSE OUTLET VLV, V–169	OPEN 1/55		COMMAND	OPEN /IPR
DMF DRAIN/RINSE OUTLET VLV, V–169	OPEN 6/58			
DMF DRAIN/RINSE OUTLET VLV, V–169	CLOSE 4/58			



SINGLE COIL SOLENOID OPERATED VALVE

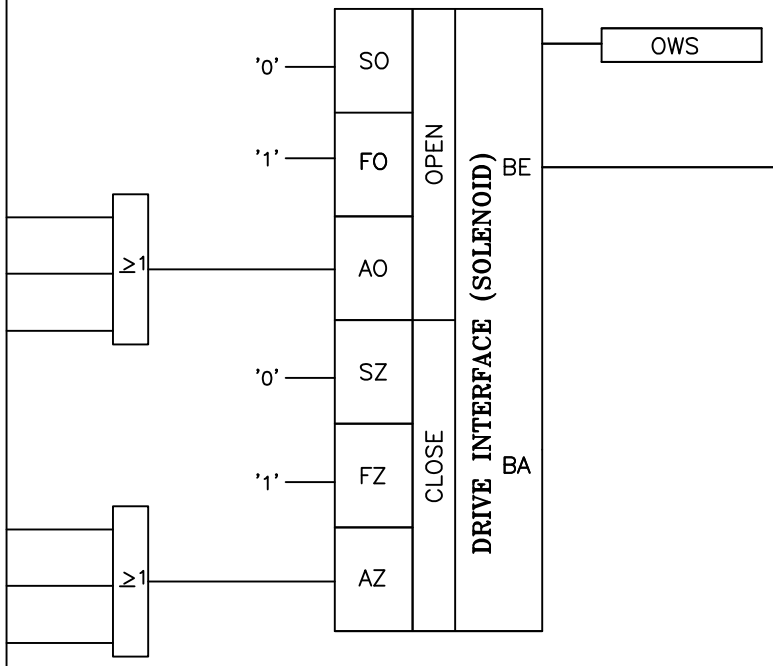
	2 X 660 MW ENNORE SEZ STPP		DRG. NO.	PE–V0–412–673–A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 538 DMF DRAIN/RINSE OUTLET VLV, V–169 90GRB01AA204		REV. NO.	03 DATE: 29.01.2019
			SHT	69 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	STATUS FROM SIG/SHT NO.		DESCRIPTION	STATUS TO SIG/SHT NO.
DMF FEED OUTLET VLV, V–170	OPEN 4/55		COMMAND	OPEN /IPR

SINGLE COIL SOLENOID OPERATED VALVE

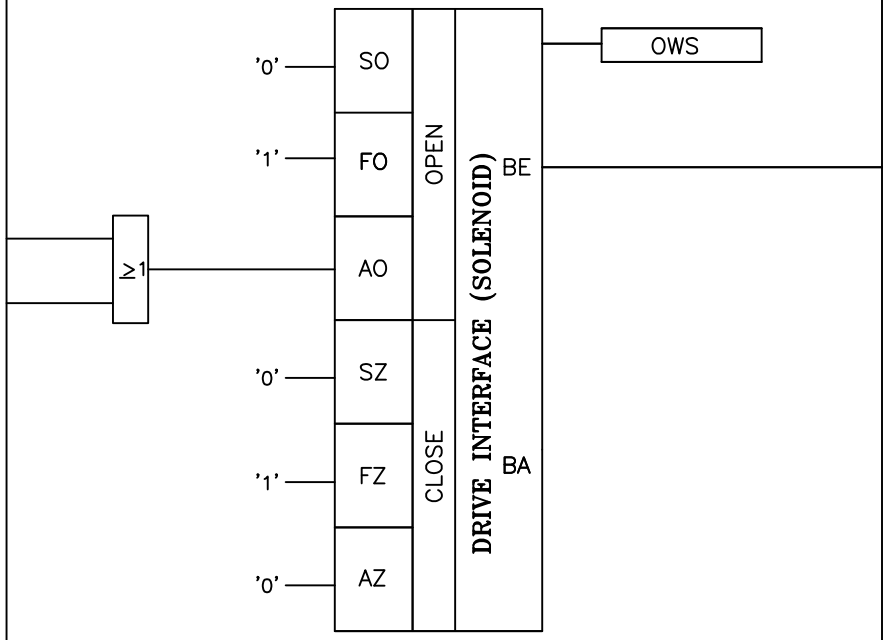
	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049	
		TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 539 DMF FEED OUTLET VLV, V–170 90GRB01AA205	REV. NO.	03	DATE: 29.01.2019
			SHT	70 OF 95	

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DMF VENT VLV, V-171	OPEN 3/54		COMMAND	OPEN /IPR
DMF VENT VLV, V-171	OPEN 2/57			
DMF VENT VLV, V-171	OPEN 2/58			
DMF VENT VLV, V-171	CLOSE 2/55			
DMF VENT VLV, V-171	CLOSE 5/57			
DMF VENT VLV, V-171	CLOSE 5/58			



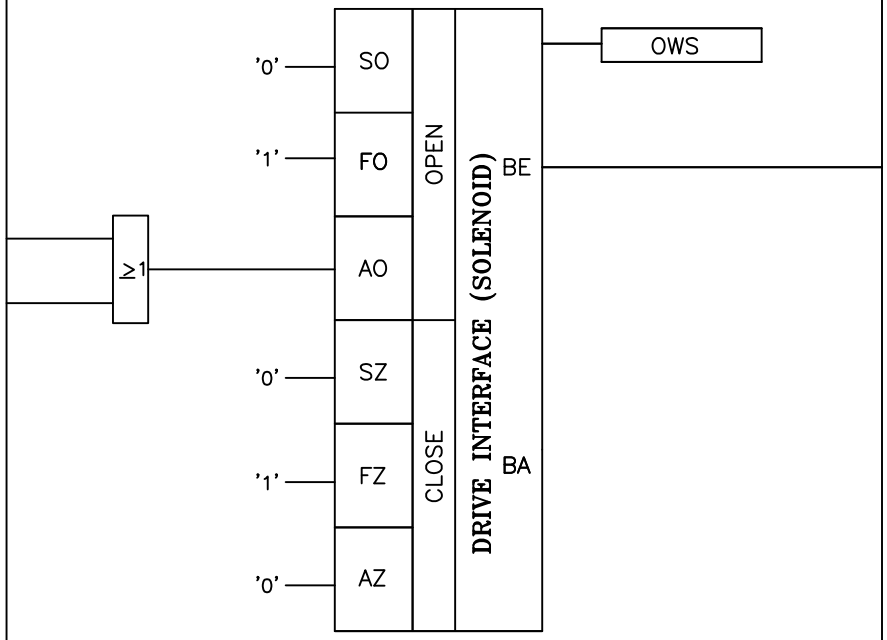
SINGLE COIL SOLENOID OPERATED VALVE

	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
		TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 540 DMF VENT VLV, V-171 90GRB01AA206	REV. NO. 03	DATE: 29.01.2019
			SHT 71	OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DMF OUTLET VLV, V–176	OPEN 1/60		COMMAND	OPEN /IPR
DMF OUTLET VLV, V–176	OPEN 5/63			

SINGLE COIL SOLENOID OPERATED VALVE

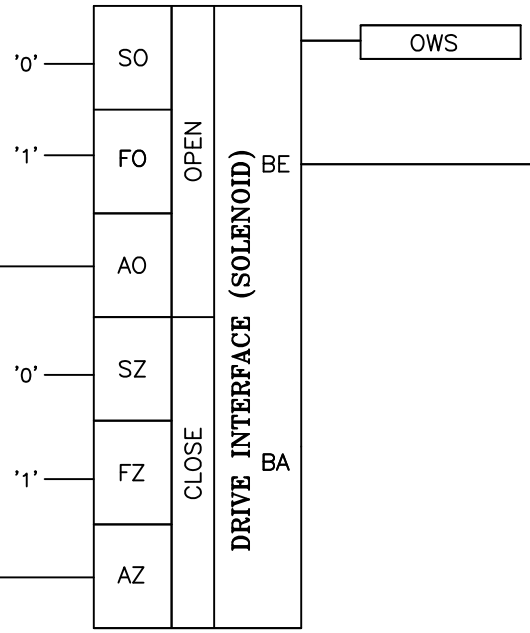
2 X 660 MW ENNORE SEZ STPP		DRG. NO.	PE–V0–412–673–A049
TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 541 DMF OUTLET VLV, V–176 90GRS10AA202		REV. NO.	03 DATE: 29.01.2019
		SHT	72 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
ACF FEED INLET VLV, V–177	OPEN 2/60		COMMAND	OPEN /IPR
ACF FEED INLET VLV, V–177	OPEN 1/64			

SINGLE COIL SOLENOID OPERATED VALVE

	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
		TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 542 ACF FEED INLET VLV, V–177 90GRB02AA201	REV. NO.	03 DATE: 29.01.2019
			SHT	73 OF 95

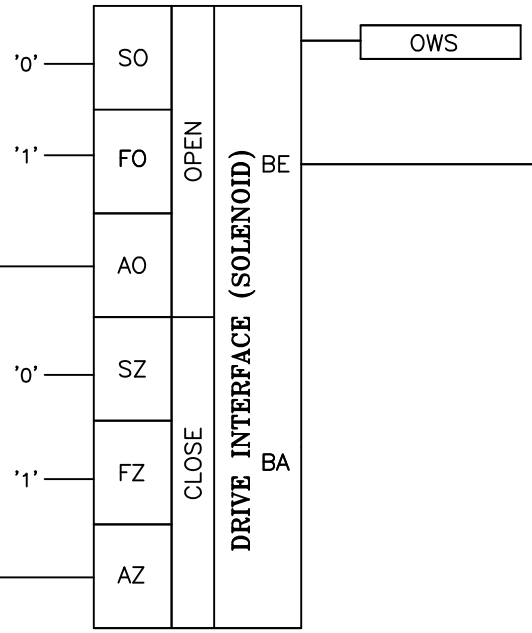
INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
ACF BACKWASH INLET VALVE, V–178	OPEN 3/63		COMMAND	OPEN /IPR
ACF BACKWASH INLET VALVE, V–178	CLOSE 3/64			



SINGLE COIL SOLENOID OPERATED VALVE

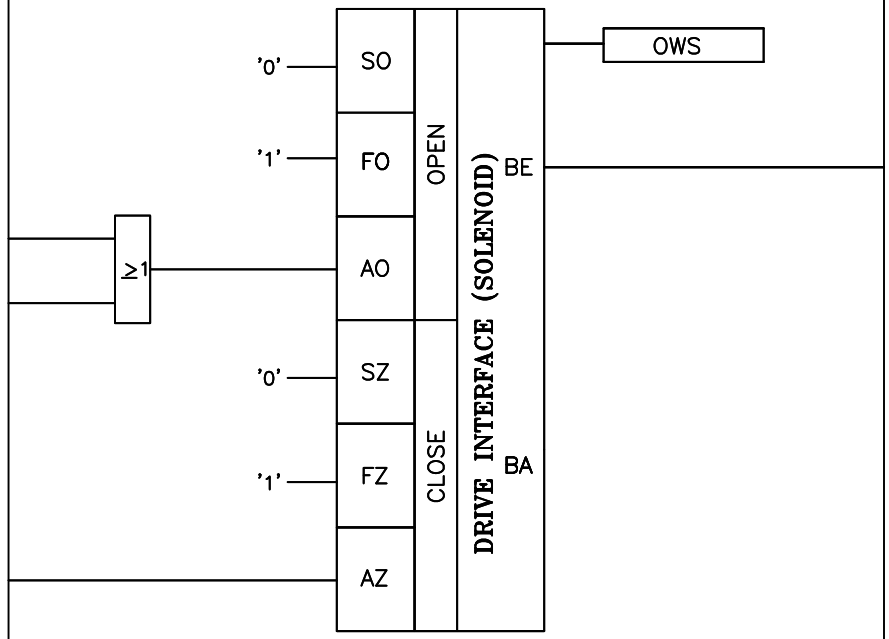
	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 543 ACF BACKWASH INLET VALVE, V–178 90GRB02AA202	REV. NO.	03 DATE: 29.01.2019
		SHT	74 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
ACF BACKWASH OUTLET VALVE, V–179	OPEN 1/63		COMMAND	OPEN /IPR
ACF BACKWASH OUTLET VALVE, V–179	CLOSE 4/64			



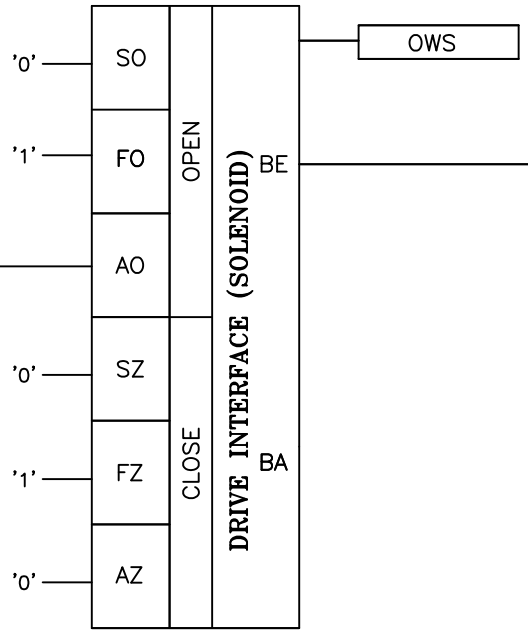
SINGLE COIL SOLENOID OPERATED VALVE

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE–V0–412–673–A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 544 ACF BACKWASH OUTLET VALVE, V–179 90GRB02AA203	REV. NO.	03 DATE: 29.01.2019
		SHT	75 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
ACF DRAIN/RINSE OUTLET VLV, V-180	OPEN 1/61		COMMAND	OPEN /IPR
ACF DRAIN/RINSE OUTLET VLV, V-180	OPEN 6/64			
ACF DRAIN/RINSE OUTLET VLV, V-180	CLOSE 3/61			

SINGLE COIL SOLENOID OPERATED VALVE

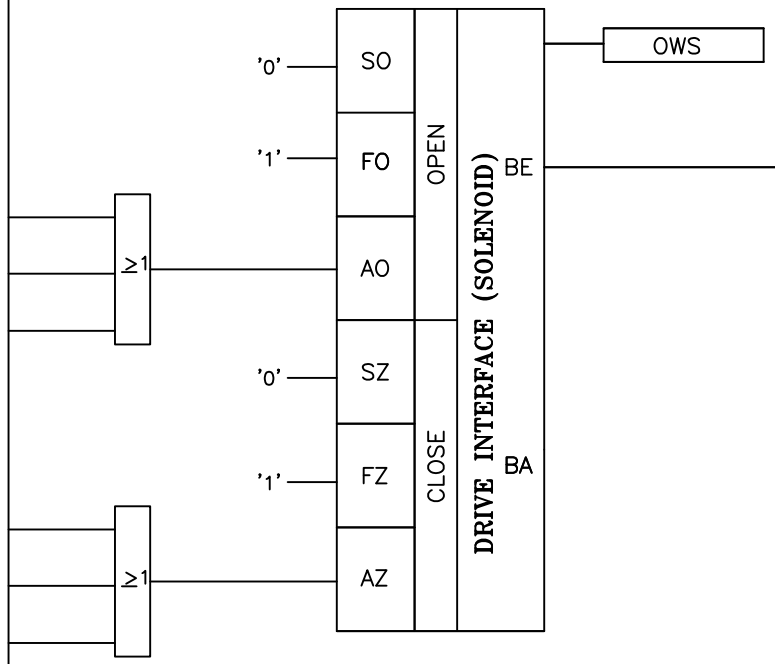
	2 X 660 MW ENNORE SEZ STPP		DRG. NO.	PE-V0-412-673-A049
	TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 545 ACF DRAIN/RINSE OUTLET VLV, V-180 90GRB02AA204		REV. NO.	03 DATE: 29.01.2019
			SHT	76 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
ACF FEED OUTLET VLV, V–181	OPEN 4/61		COMMAND	OPEN /IPR

SINGLE COIL SOLENOID OPERATED VALVE

	2 X 660 MW ENNORE SEZ STPP		DRG. NO.	PE–V0–412–673–A049
	TITLE :– CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 546 ACF FEED OUTLET VLV, V–181 90GRB02AA205		REV. NO.	03 DATE: 29.01.2019
			SHT	77 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
ACF VENT VLV, V-182	OPEN 3/60		COMMAND	OPEN /IPR
ACF VENT VLV, V-182	OPEN 2/63			
ACF VENT VLV, V-182	OPEN 2/64			
ACF VENT VLV, V-182	CLOSE 2/61			
ACF VENT VLV, V-182	CLOSE 4/63			
ACF VENT VLV, V-182	CLOSE 5/64			



SINGLE COIL SOLENOID OPERATED VALVE

	BHEL	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
		TITLE :- CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 547 ACF VENT VLV, V-182 90GRB02AA206	REV. NO.	03 DATE: 29.01.2019
			SHT	78 OF 95

INPUTS		LOGIC	OUTPUTS	
DESCRIPTION	**STATUS** FROM SIG/SHT NO.		**DESCRIPTION**	**STATUS** TO SIG/SHT NO.
DP ACROSS DMF 90GRB01CP001	/FIELD	HIGH LVM, HIGH LVM → ≥1 → 5 Sec → A	DP ACROSS DMF	HIGH 1/55
DP ACROSS DMF 90GRB01CP002	/FIELD			
DP ACROSS ACF 90GRB02CP001	/FIELD	HIGH LVM, HIGH LVM → ≥1 → 5 Sec → A	DP ACROSS ACF	HIGH 2/61
DP ACROSS ACF 90GRB02CP002	/FIELD			
CENTRIFUGE MOTOR 90GRS16AP001	ON /MCC	S, R; ≥1 (STOP /OWS, STOP /BUP); & (OFF /MCC) → A	CENTRIFUGE MOTOR	TRIPPED 4/34
CENTRIFUGE MOTOR 90GRS16AP001	STOP /OWS			
CENTRIFUGE MOTOR 90GRS16AP001	STOP /BUP			
CENTRIFUGE MOTOR 90GRS16AP001	OFF /MCC			

	2 X 660 MW ENNORE SEZ STPP	DRG. NO.	PE-V0-412-673-A049
TITLE :-	CONTROL SCHEME FOR SEWAGE TREATMENT PLANT 548 MISCELLANEOUS LOGIC	REV. NO.	03 DATE: 29.01.2019
		SHT	79 OF 95