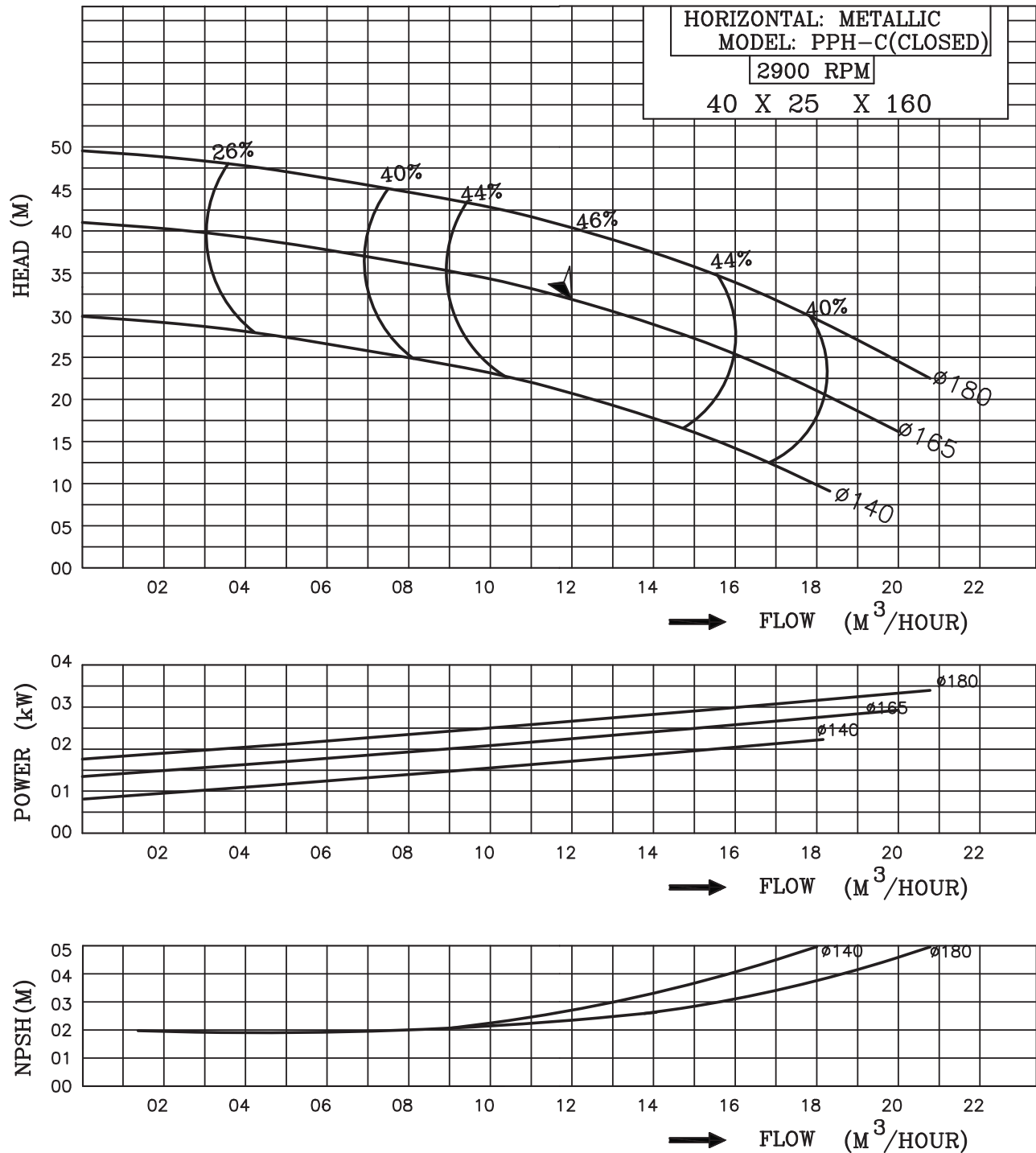


CHARACTERISTIC CURVE



DRAWN	MANJU	30.09.2015
CHECKED	SHARATH	30.09.2015
APPROVED	DHEERESH	30.09.2015
DWG.NO.:N05-CC-M-PPH-C-2900		



PROCESS PUMPS (I) Pvt. Ltd.,
 PLOT No. 86 , PEENYA INDUSTRIAL AREA,
 BANGALORE - 560 058.

Customer Name : M/s.De Nora india ltd

Capacity : 12 cmph

BKW :2.33 kw

Offer No. : PHO/CQ/MH/619C/17 Dated :02.08.2017

Head : 32 mlc

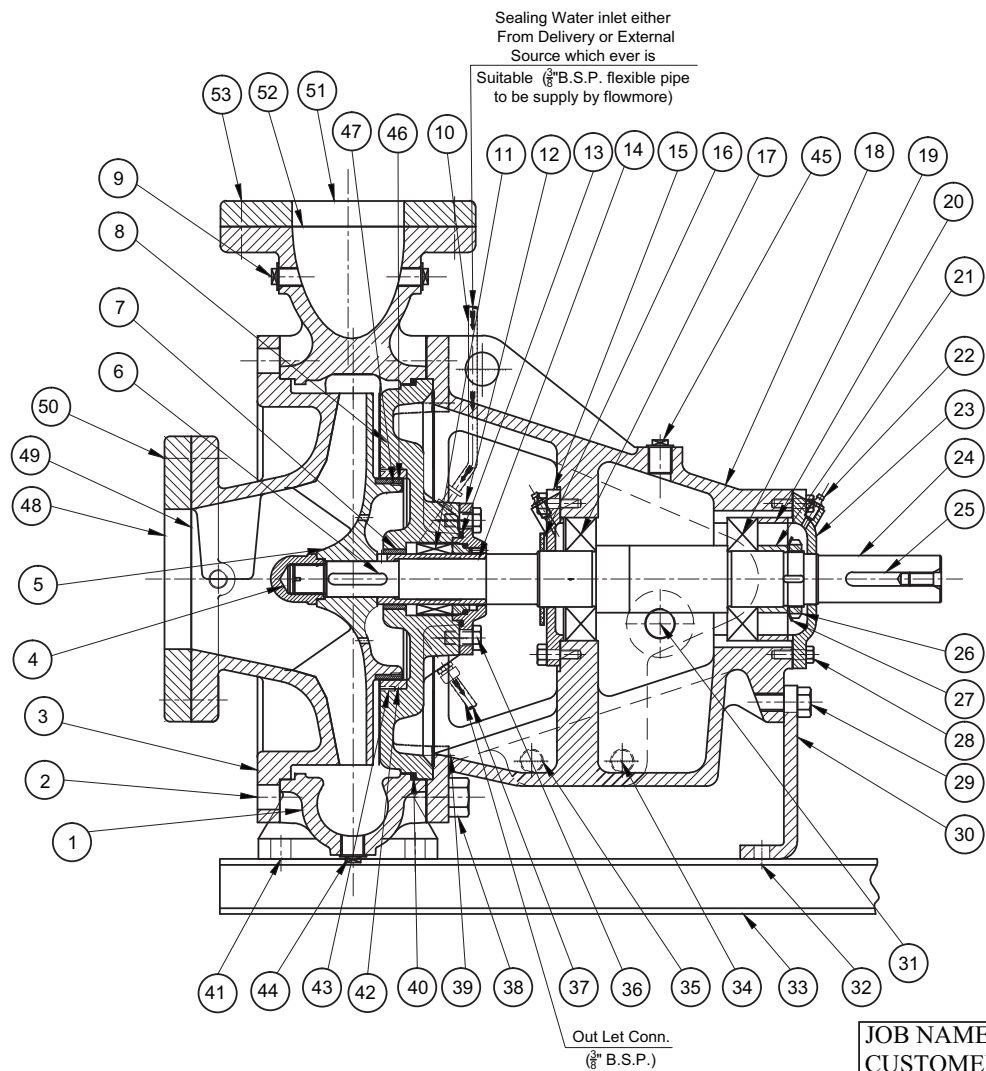
Pump Tag No. : 90PBM81AP001/90PBM82AP001

Efficiency : 46%

Imp Type : Closed

Pump Qty : 02 Nos

PROJECT:	2x660MW ENNORE SEZ COAL BASED STPP			ELECTRO CHLORINATION PACKAGE		REV
CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED			TECHNICAL DATASHEET OF VERTICAL/ HORIZONTAL PUMPS		
BIDDER/ VENDOR:	DE NORA INDIA LIMITED					
DATASHEET FOR:	SEA WATER BOOSTER PUMP			BHEL DOC. NO. :	PE-V11-412-174-A110	
GENERAL	1	TAG NO(S)		90PBM21AP001 / 90PBM22AP001		
	2	SERVICE		SEA WATER BOOSTING		
	3	QUANTITY	No.	2		
	4	RATING		100%		
	5	MANUFACTURER		FLOWMORE LIMITED		
	6	MODEL		5625 A - 125 X 100		
OPERATING CONDITIONS	7	DUTY		CONTINUOUS		
	8	FLUID HANDLED		SEA WATER		
	9	SPECIFIC GRAVITY		1.025		
	10	TEMPERATURE	Deg C	25 - 37		
	11	NPSH AVAILABLE	m	5 - 15		
	12	DISCHARGE PRESSURE (OPERATING)	m	25		
	13	CAPACITY (OPERATING)	m³/h	133.3		
PERFORMANCE	14	LOCATION		INDOOR		
	15	CAPACITY (DESIGN)	m³/h	150		
	16	TOTAL DIFFERENTIAL HEAD (DESIGN)	m	25.0		
	17	DESIGN CODE		IS 5120 / IS 9137 / HIS		
	18	ROTATION		CCW		
	19	NPSH REQUIRED	m	1.4		
	20	SHUT OFF PRESSURE	m	28.5		
	21	RPM	rpm	1470		
CONSTRUCTION	22	SHAFT ABSORBED POWER	kW	14.34		
	23	TYPE		END SUCTION W/ OPEN IMPELLER		
	24	COUPLING		FLEXIBLE COUPLING		
	25	NUMBER OF IMPELLER	No.	1		
	26	NUMBER OF STAGE		SINGLE		
	27	SUCTION NOZZLE SIZE/TYPE		125 NB / FLANGE ANSI #150 FF		
	28	DISCHARGE NOZZLE SIZE/TYPE		100 NB/ FLANGE ANSI #150 FF		
	29	SEAL TYPE		MECHANICAL SEAL		
MATERIAL	30	WEIGHT (PUMP + MOTOR +BASE FRAME)	KG	490 (APPROX.)		
	31	CASING		DUPLEX SS (ASTM A 890 Gr. 4A)		2
	32	IMPELLER		DUPLEX SS (ASTM A 890 Gr. 4A)		
	33	WEARING RING		DUPLEX S.S.(ASTM A995 Gr-4A)		
	34	SHAFT		Duplex SS 2205 UNS S31803		
	35	SHAFT SLEEVE		Duplex SS 2205 UNS S31803		
	36	BASE FRAME		M.S.(Fab.) (IS-2062) With Epoxy Coated		
	37	MECHANICAL SEAL COMPONENTS		BODY - DUPLEX SS , FACE COMBINATION - CARBON-SILICON		
MOTOR	38	FASTENER		SS316L		1
	39	TYPE		SQUIRREL CAGE , TEFC, IE2 < 10 KW & IE3 >10 KW		
	40	TEMP CLASS		B		
	41	INSULATION CLASS		F		
	42	POWER	kW	22		
	43	VOLTAGE		415V/ 50Hz/ 3Ph		
	44	HAZARDOUS CLASS		SAFE AREA, INDOOR		
	45	MANUFACTURER		CG / BHARAT BIJLEE/ ABB		
NOTES :	46	DEGREE OF PROTECTION		IP54		
	Sr. No 31-33 For Duplex SS Casing Grade is (ASTM A 890 Gr. 4A) and for Duplex SS ROD it UNS S31803. Both the Materials are Duplex SS.					



NOTE:-
DIRECTION OF PUMP ROTATION:- **COUNTER CLOCK WISE**, WHEN LOOKING FROM DRIVING END.

PUMP PARTICULARS (QTY:-02 Nos.)

FIG. -- 5625 A (SEMI OPEN)
SIZE -- 125x100 (5"x4")
STAGE -- SINGLE
LUB -- GREASE

53	HEX. HD. BOLT WITH NUT	08	S.S.-316 L
52	GASKET	01	RUBBER
51	COMPANION FLANGE For Disch. Side	01	DUPLEX S.S.
50	HEX. HD. BOLT WITH NUT	08	S.S.-316 L
49	GASKET	01	RUBBER
48	COMPANION FLANGE For Suction Side	01	DUPLEX S.S.
47	DOWEL PIN (Wearing Ring Impeller)	02	DUPLEX S.S.-32750/3260
46	WEARING Ring Impeller (Back Side)	01	DUPLEX S.S. (ASTM 890 Gr-4A)
45	PIPE PLUG	01	DUPLEX S.S.-32750/3260
44	PIPE PLUG	01	DUPLEX S.S.-32750/3260
43	DOWEL PIN	02	DUPLEX S.S.-32750/3260
42	WEARING RING CASING (Back Side)	01	DUPLEX S.S.(ASTM A995 Gr-4A)
41	HEX. HD. BOLT WITH NUT & WASHER	04	S.S.-316 L
40	'O' RING	01	NITRILE RUBBER
39	STUD BOLT WITH NUT	02	S.S.-316 L
38	HEX. HD. CAP SCREW	12	S.S.-316 L
37	SEALING LINE (Outlet)	01	S.S.-316 L FLEXIBLE BRIDED PIPE
36	HEX. HD. CAP SCREW WITH WASHER	04	S.S.-316 L
35	PIPE NIPPLE	01	DUPLEX S.S.-32750/3260
34	PIPE PLUG	01	DUPLEX S.S.-32750/3260
33	SKID BASE (BASE PLATE)	01	M.S.(Fab.) (IS-2062) With Epoxy Coated
32	HEX. HD. BOLT WITH NUT & WASHER	02	S.S.-316 L
31	PIPE PLUG	01	DUPLEX S.S.-32750/3260
30	SUPPORT FOOT	01	M.S (Plate)
29	HEX. HD. CAP SCREW WITH WASHER	02	S.S.-316 L
28	HEX. HD. CAP SCREW	08	S.S.-316 L
27	BRG. LOCK WASHER	01	STEEL (C-10/C-20)
26	BRG. LOCK NUT	01	STEEL (C-10/C-20)
25	KEY FOR COUPLING	01	S.S.-316 L
24	PUMP SHAFT	01	UNS S.31803 (DUPLEX S.S.)
23	BEARING COVER (D.E.)	01	C.I. (IS-210, FG 260)
22	GREASE RELEASE FITTING	02	STEEL
21	BEARING SPACER (Inner)	01	STEEL
20	BEARING SPACER (Outer)	01	STEEL
19	ANTI FRICTION BEARING (D.E.) (6310 Z-C3)	01	BRG. STEEL (SKF/FAG)
18	FRAME/BEARING HOUSING	01	C.I. (IS-210, FG 260)
17	ANTI FRICTION BEARING (N.D.E.) (6310 Z-C3)	01	BRG. STEEL (SKF/FAG)
16	WATER SLINGER	01	RUBBER
15	BEARING COVER (N.D.E.)	01	C.I. (IS-210, FG 260)
14	SHAFT SLEEVE	01	UNS S.31803 (DUPLEX S.S.)
13	'O' RING	01	NITRILE RUBBER
12	SEAL COVER/HOUSING	01	DUPLEX (ASTM A 890 Gr-4A)
11	MECH. SEAL ASSY.	01	Faces Carbon v/s Si. C.
10	SEALING LINE (Inlet)	01	S.S.-316 L FLEXIBLE BRIDED PIPE
09	PIPE PLUG	02	DUPLEX S.S.-32750/3260
08	BACK HEAD / BACK COVER	01	DUPLEX S.S.(ASTM A 890 Gr-4A)
07	STUFFING BOX BUSHING	01	DUPLEX S.S.-32750
06	KEY FOR IMPELLER	01	S.S.-316 L
05	IMPELLER (SEMI OPEN)	01	DUPLEX S.S. (ASTM A 890 Gr-4A)
04	IMPELLER NUT	01	S.S.-316 L
03	SUCTION HEAD (SEMI OPEN)	01	DUPLEX S.S (ASTM A 890 Gr-4A)
02	HEX. HD. CAP SCREW	12	S.S.-316 L
01	CASING (VOLUTE) (SEMI OPEN)	01	DUPLEX S.S.(ASTM A 890 Gr-4A)
S. NO.	DESCRIPTION	QTY.	MATERIAL

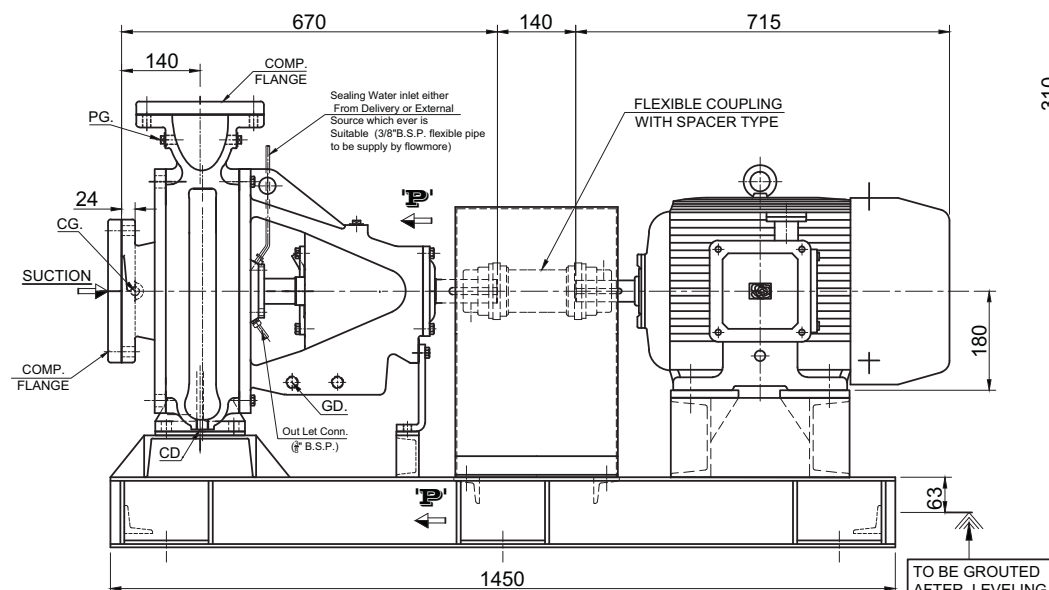
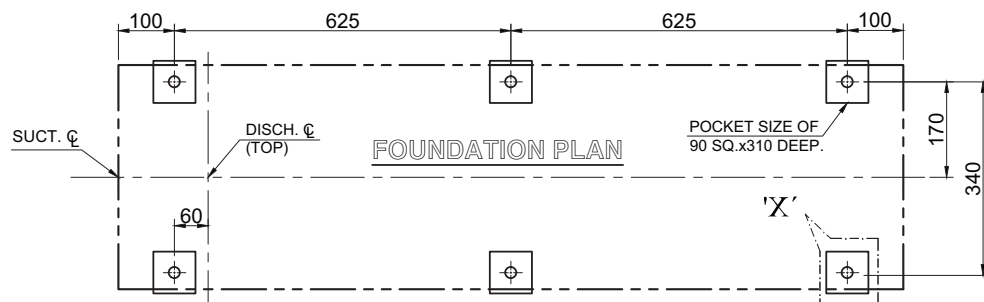
JOB NAME :- BOOSTER PUMP.,
CUSTOMER :- M/s. DE NORA INDIA LTD.,
PROJECT :- A/c. TANGEDCO- ENNORE STPP.,
ORDER NO. :- 4500088292., Dt.:- 03.02.2018

**CROSS SECTIONAL DRAWING
FOR
HORIZONTAL END SUCTION PUMP**

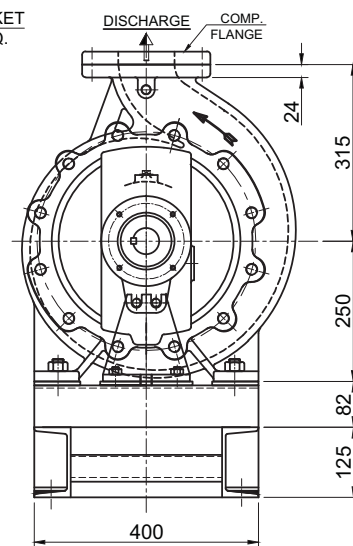
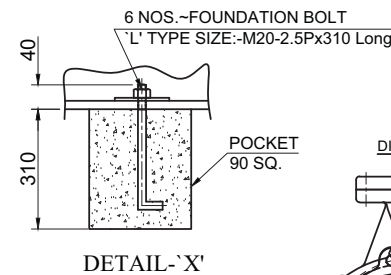
FLOWMORE LIMITED
NEW DELHI

NAME	DATE
DRN. HEM	19.02.2018
CHD. P.H.P.	19.02.2018
APPD. P.H.P.	19.02.2018
DRAWING NO.	REV.
CSD-SALE18023354_10	0

Page 24 of 26



FLANGE DETAIL AS PER ANSI B16.5, 150 LBS,			
SUCTION:-----	125 N.B.	DISCHARGE:----	100 N.B.
FLANGE O.D.:---	254	FLANGE O.D.:---	228.6
P.C.D.:-----	215.9	P.C.D.:-----	190.5
NO. OF. HOLES:-	8	NO. OF. HOLES:-	8
DIA OF BOLTS:-	M20	DIA OF BOLTS:-	M16
PG		PRESSURE GAUGE	3/8" B.S.P
CG		COMPOUND GAUGE	3/8" B.S.P
CD		CASING DRAIN	1/2" B.S.P
GD		GLAND DRAIN	1/2" B.S.P



NOTE:-

1. DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. DIRECTION OF ROTATION:-**COUNTER CLOCKWISE** WHEN LOOKING FROM DRIVING END.
3. STATIC LOAD (Pump Set With Motor) = 490 Kgs. (Approx.),
4. DYNMIC LOAD (Pump Set With Motor) = 650 Kgs. (Approx.),

MOTOR PARTICULARS		PUMP PARTICULARS (QTY:- 02 Nos.)	
MAKE	-- CGL	FIG.	-- 5625 A (S.O.)
FRAME	-- ND 180 L	SIZE	-- 125x100 (5"x4")
POWER	-- 22 K.W.	STAGE	-- SINGLE
SPEED	-- 1470 R.P.M.	SPEED	-- 1470 R.P.M.
VOLTS	-- 415±10%	CAPACITY	-- 150 Cu. M/hr.
PHASES	-- THREE	HEAD	-- 25 Mtrs.
FREQUENCY	-- 50 Hz.	PUMP INPUT	-- 14.34 K.W.
TYPE OF CONS.	-- H.S.S.	(Sp. Gr. 1.025)	
		EFFICIENCY	-- 73%

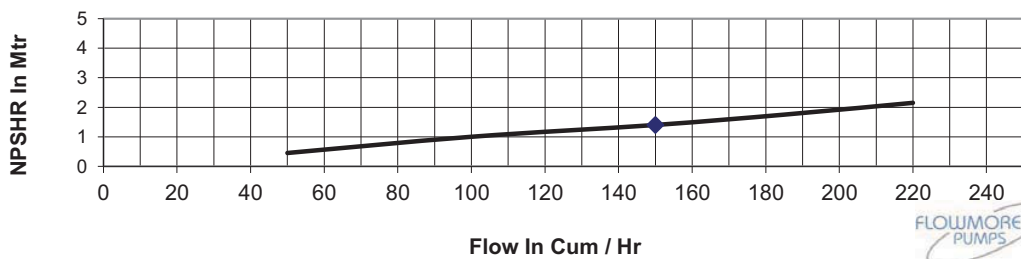
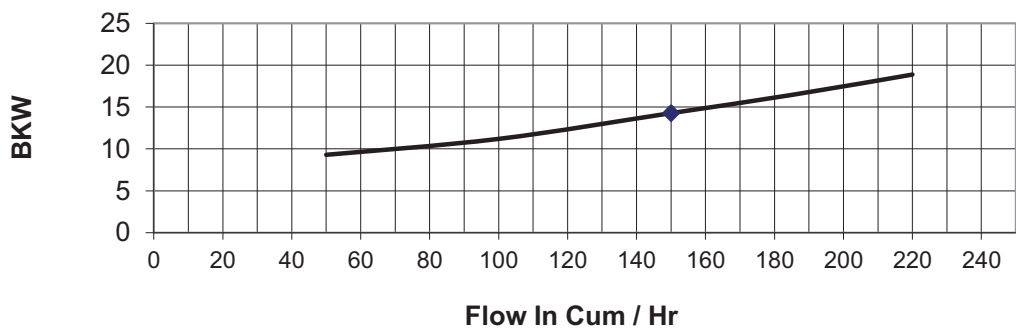
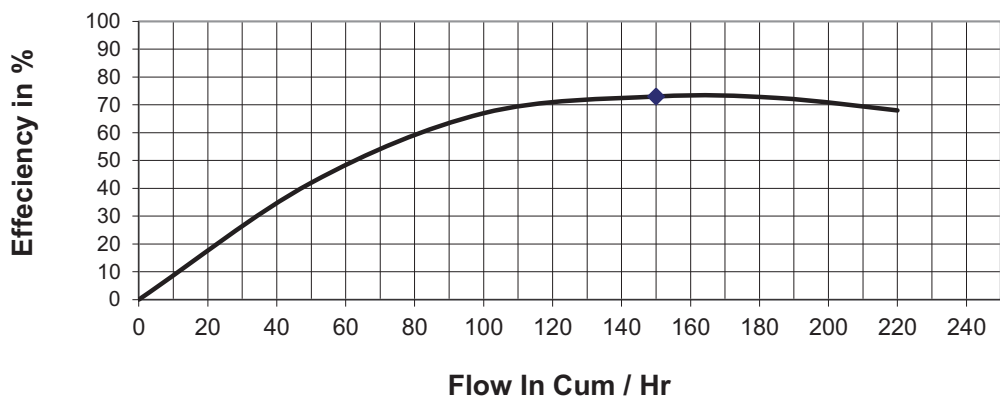
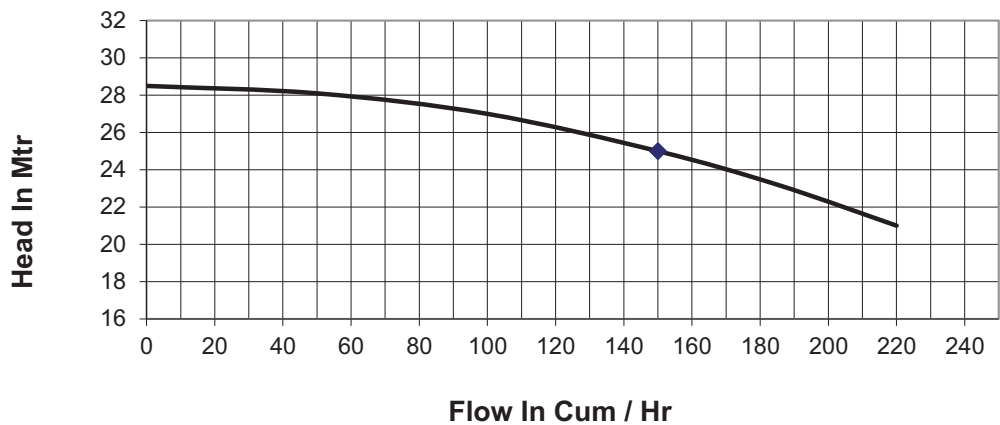
JOB NAME :- BOOSTER PUMP.,
 CUSTOMER :- M/s. DE NORA INDIA LTD.,
 PROJECT :- A/c. TANGEDCO- ENNORE STPP.,
 ORDER NO. :- 4500088292., Dt.:- 03.02.2018

GENERAL ARRANGEMENT DRAWING
 FOR
 HORIZONTAL END SUCTION PUMP

FLOWMORE LIMITED
 NEW DELHI

SCALE N.T.S.	DRAWING NO.	NAME		DATE
		DRN.	HEM	
		CHD.	D.H.P.	19.02.2018
		APPD.	P.H.P.	19.02.2018
		REV.		
		GA-SALE18023354_10		0

Page 25 of 26



Duty Point
150 Cum / Hr
25 Mtr H
73 % Eff
Sp Gr 1.025

Customer	M/S..DE NORA INDIA LIMITED - GOA - A/C.BHEL				
Suction	125 MM	Delivery	100 MM	Speed	1500 RPM
FLOWMORE LIMITED., MUMBAI				PUMP MODEL	
				5625 A - 125 X 100	
Dept : Mktg	Prepared By SAW		Dt.10.08.17		ES(N) -5A -004 /4

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED	
		CHECKED:			CHECKED	
APPROVED						
						STATUS : CONTRACT
						JOB NO.: 412

Approval vide Lr.No.:SE/E/Th&HyP/EE-7/M/AEE/M/F.En SEZ STPP/D.704/18 dt.12.11.2018.

2018.01.
08
16:40:29
+05'30'

BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT.	
This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from the contractual obligation.	
APPROVAL CATEGORY AWARDED = I	
CAT I - Approved	
CAT II - Approved With Comments as Noted	
CAT III - Not Approved	
CAT IV - Reference Drawing	
DEPARTMENT	MECHANICAL AUXILIARY
NAME:	FALGUNI SAHA

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DWG NO. PE - V11 - 412 - 174 - A111



DE NORA

SUB CONTRACTOR: DE NORA INDIA LIMITED KUNDAIM - GOA

ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES, SINGAPORE BRANCH

LOA NO:PW/PE/PG/EN1/P-24/17 DATED:22 APR 2017

DEPT.	CODE		SCALE	WEIGHT(KG)	REF DRG.	ITEM		
--	A		-	-	-	-		
TECHNICAL DATA SHEET OF BLOWERS					NAME	SIGN	DATE	
					PREP	SN		
					CHKD	PG		
					APPD	RF		
DEPT.					CARD CODE	BHEL DOC. NO.		REV
SIGN						PE - V11 - 412 - 174 - A111		1
DATE						NO. OF SHEETS 3 EXCLUDING COVER PAGE		

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED it must not be used directly or indirectly in any way detrimental to the interest of the company

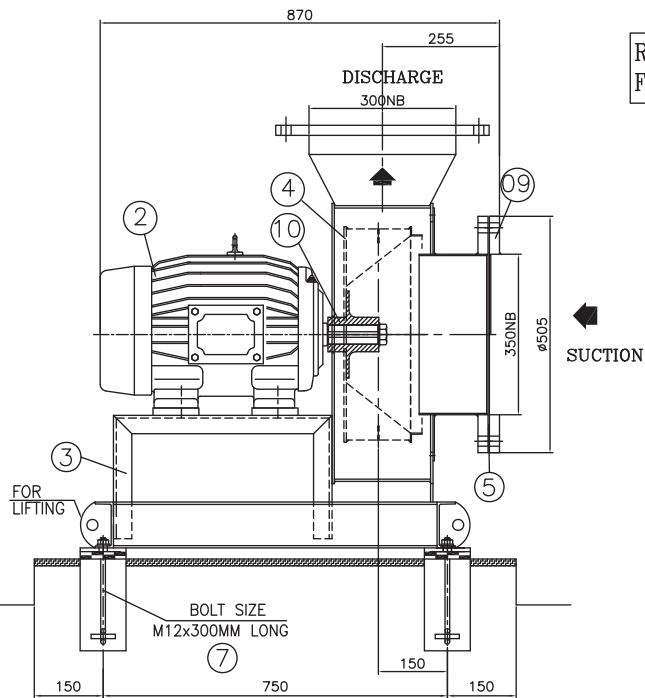
PROJECT:	2x660MW ENNORE SEZ COAL BASED STPP			ELECTRO CHLORINATION PACKAGE		REV
CONTRACTOR:	BHARAT HEAVY ELECTRICALS LIMITED			DATASHEET FOR DILUTION AIR BLOWER		
BIDDER/ VENDOR:	DE NORA INDIA LIMITED					
DATASHEET FOR:	DILUTION AIR BLOWER			BHEL DOC. NO. :	PE-V11-412-174-A111	1
GENERAL	1	TAG NO(S)		90PBM47AN001 / 90PBM48AN001 / 90PBM49AN001		
	2			90PBM50AN001		
	3	SERVICE		DILUTION AIR BLOWER		
	4	QUANTITY	No.	4 (2 SETS FOR EACH TANK)		
	5	RATING	%	100		
	6	LOCATION		OUTDOOR		
	7	MANUFACTURER		SWAM PNEUMATICS PVT.LTD.		
	8	MODEL		SWF-400AM		
OPERATING CONDITIONS	9	DUTY		CONTINUOUS		
	10	FLUID HANDLED		AIR		
	11	SPECIFIC GRAVITY	Kg/m ³	1.2		
	12	TEMPERATURE	Deg C	AMBIENT		
	13	CAPACITY REQUIRED	Nm ³ /h	7700		
PERFORMANCE	14	DESIGN CAPACITY	Nm ³ /h	7700		
	15	STATIC PRESSURE (DESIGN)	mmWC	250		
	16	ROTATION		CW FROM SUCTION		
	17	STANDARD		AS PER IS 4894		
	18	EFFICIENCY	%	70		
	19	FAN SPEED	rpm	2900		
	20	SHAFT POWER	BKW	10		
	21	SOUND LEVEL (1m distance)	dBA	90 - 92		
	22	IMPELLER DIAMETER	mm	470		
	CONSTRUCTION	23	TYPE		HORIZONTAL CENTRIFUGAL	
24		SUCTION NOZZLE SIZE		350 NB		
25		DISCHARGE NOZZLE SIZE		300 NB		
26		DRIVE METHOD		IMPELLER MOUNTED ON MOTOR SHAFT		
27		BEARING TYPE		ANTIFRICTION TYPE		
28		CASING (BODY)		SS316		
29		FAN WHEEL (IMPELLER)		SS316		
30		SHAFT		SS316		
MOTOR	31	BASE FRAME		MS-IS-2062		
	32	TYPE		SQUIRREL CAGE		
	33	TEMP CLASS		B		
	34	INSULATION		F		
	35	POWER	KW	15		
	36	SPEED	RPM	2900		
	37	VOLTAGE	V	415V/ 50Hz/ 3Ph		
	38	HAZARDOUS CLASS		Safe Area		
	39	PROTECTION		IP55		
	40	MANUFACTURER		APPROVED MAKE		
MISCELLANEOUS	41	ACCESSORIES		COMMON BASE FRAME FOR BLOWER AND MOTOR		
	42			SUCTION STRAINER		
	43			SET OF ANTIVIBRATION PADS		
	44			NON RETURN DAMPER		
	45			SET OF FOUNDATION BOLTS		
NOTES :						



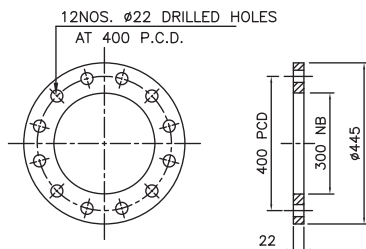
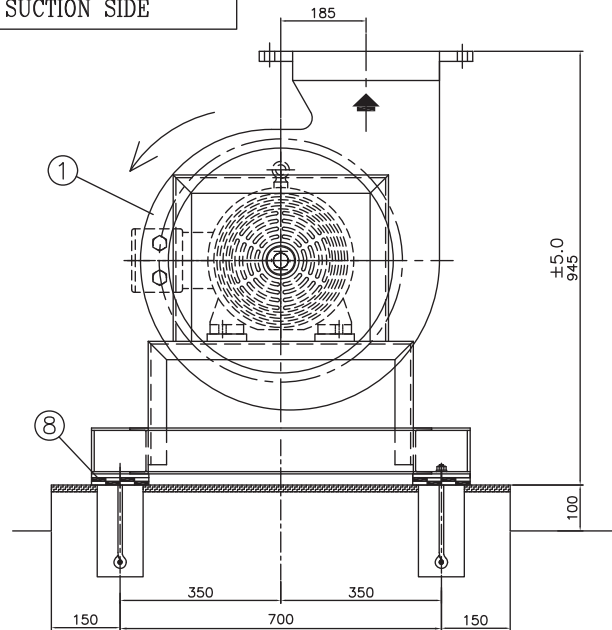
TECHNICAL DATA

APPLICATION	:	AIR DILUTION BLOWER
CAPACITY (NM ³ /Hr.)	:	7700
DISCHARGE PRESSURE (mmWC)	:	250
BLOWER SPEED (RPM) (approx)	:	2900
SHAFT POWER (BKW)	:	10
RECOMMENDED MOTOR (KW/RPM)	:	15/2900
TOTAL WEIGHT OF BLOWER & MOTOR (Kgs)	:	285 (APPROX.)
DYNAMIC LOAD (Kgs)	:	30 (APPROX.)
GD ² VALUE (KGM ²)	:	1.34
QUANTITY	:	04NOS.

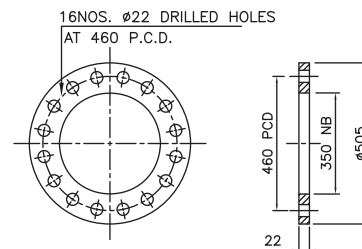
ROTATION ANTI CLOCK WISE
FROM SUCTION SIDE



SUCTION



DISCHARGE FLANGE DETAIL
DRILLED AS PER IS-6418 TABLE 6



SUCTION FLANGE DETAIL
DRILLED AS PER IS-6418 TABLE 6

10.	IMPELLER HUB	SS-316	SWAM	01NO.
09.	COMPANION FLANGE AT SUCTION	M.S. IS-2062	SWAM	01NO.
08.	ANTI VIBRATION PADS	RUBBER	SWAM	04NOS.
07.	FOUNDATION BOLTS	STD.	SWAM	04NOS.
05.	SUCTION STRAINER	S.S. WIRE MESH	SWAM	01NO.
04.	IMPELLER	SS-316	SWAM	01NO.
03.	COMMON BASE FRAME FOR BLOWER & MOTOR	M.S. IS-2062	SWAM	01NO.
02.	ELECTRIC MOTOR	STD.	AQUATECH	01NO.
01.	CENTRIFUGAL BLOWER BODY	SS-316	SWAM	01NO.
S.NO.	DESCRIPTION	MATERIAL	SCOPE	QTY.

ENQ. NO. :- Email DTD.-11.12.2017

CLIENT :- M/S DE NORA INDIA LTD.

swam **SWAM PNEUMATICS PVT. LTD.**
C-2 , SECTOR-3 , NOIDA U.P. 201 301

TITLE : **G.A. AND FOUNDATION PLAN OF
CENTRIFUGAL BLOWER MODEL SWF-400 AM**

ACT.	NAME	SIGN.	DATE	ANGLE	PROJECTION	REV.
DGN.	RAKESH		01.01.18			
DRN.	RAKESH		01.01.18			
CHK.				SCALE		
APP.				DWG. SIZE		

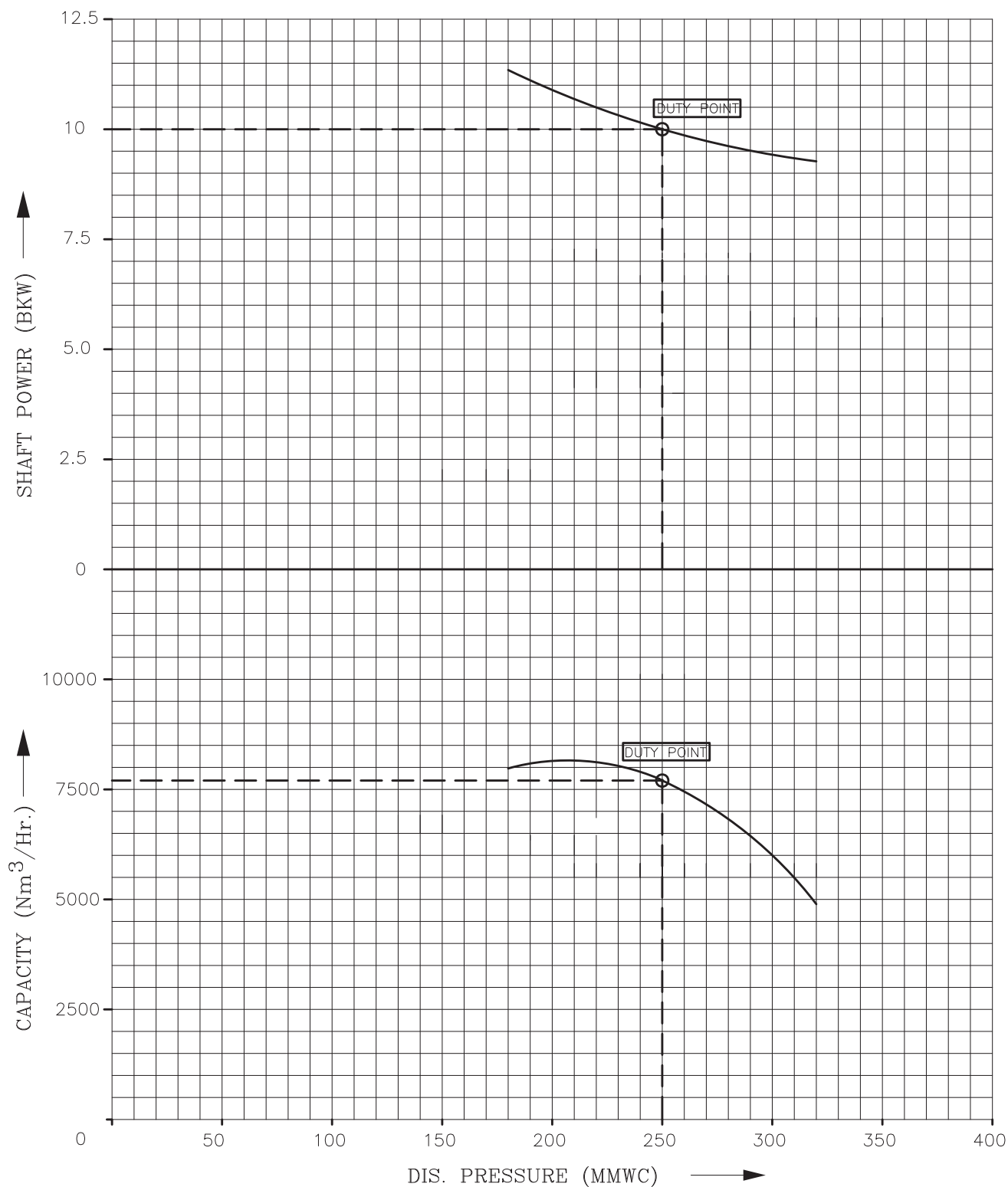
DRAWING NO. 180101/1

REV. NO.	PARTICULARS OF REVISION	DATE	NAME	APP.	THIS DRAWING IS THE PROPERTY OF M/s SWAM PNEUMATICS PVT. LTD. IT MUST NOT BE COPIED, IN WHOLE OR PART OR LENT OUT WITHOUT THEIR WRITTEN PERMISSION.

PERFORMANCE CHARACTERISTICS CURVE FOR CENTRIFUGAL BLOWER MODEL- SWF-400 AM

CLIENT : M/s. DE NORA INDIA LTD.

CAPACITY (Nm³/Hr.) : 7700
 DISCHARGE PRESSURE (MMWC) : 250
 BLOWER SPEED (APPROX. RPM) : 2900
 SHAFT POWER (BKW) : 10
 RECOMMENDED MOTOR (KW/RPM) : 15/2900



FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
			APPROVED		
STATUS : CONTRACT					
JOB NO.: 412					

Doc approved vide. Lr.No.:SE/E/
Th&HyP/EE-7/M/AEE/M/F.En SEZ STPP/
D.80/19 dt.11.07.2019

2019.06.
14
15:04:12
+05'30'

BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT.	
This approved status shall be interpreted as laid down in the contract and it shall not relieve the contractor from the contractual obligation.	
APPROVAL CATEGORY AWARDED = I	
QRT I - Approved	
CAT II - Approved With Comments as Noted	
CAT III - Not Approved	
CAT IV - Reference Drawing	
NAME	MECHANICAL AUXILIARY
FALGUINI SAHA	ZIR

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DWG NO. PE - V11 - 412 - 174 - A113



DE NORA

SUB CONTRACTOR: DE NORA INDIA LIMITED KUNDAIM - GOA

ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES, SINGAPORE BRANCH

LOA NO:PW/PE/PG/EN1/P-24/17 DATED: 22 APR 2017

DEPT.	CODE			SCALE	WEIGHT(KG)	REF DRG.	ITEM		
--	A			-	-	-	-		
QAP FOR VERTICAL/ HORIZONTAL PUMPS WITH MOTOR						NAME	SIGN	DATE	
						PREP	SN		
						CHKD	PG		
						APPD	RF		
DEPT.						CARD CODE	BHEL DOC. NO.	REV	
SIGN			N.A.				PE - V11 - 412 - 174 - A113	3	
DATE							NO. OF SHEETS 12 EXCLUDING COVER PAGE		

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED
it must not be used directly or indirectly in any way detrimental to the interest of the company

		BHARAT HEAVY ELECTRICALS LIMITED										
		FLOWMORE LIMITED (UNIT-I) 9th Mile Stone, G.T. Road Mohan Nagar, Ghaziabad (U.P.) FLOWMORE LIMITED (UNIT – II) 28 A, Site IV, Sahibabad Industrial Area, Ghaziabad (U.P.)		Quality Assurance Plan				Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD				
				Item: SEA WATER BOOSTER PUMPS								
				BHEL Doc No.: PE-V11-412-174-A113								
				Rev. No.: 3		Date: 13-06-2019						
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record	Responsibility			Remarks	
			M/C	B				P	W	V		
1	2	3	4		5	6	7	8			9	
1.	RAW MATERIAL											
1.1.	CASING, IMPELLER, SHAFT & SHAFT SLEEVE	CHEMICAL & PHYSICAL PROPERTIES: CHEMICAL ANALYSIS & MECHANICAL HARDNESS	EACH HEAT	EACH HEAT	APPROVED C.S. DRAWINGS & RELEVANT IS	APPROVED C.S. DRAWINGS & RELEVANT IS	INTERNAL TEST REPORT	√	M		C, B, O	
2.	IN PROCESS INSPECTION											
2.1.	CASING, IMPELLER, SHAFT & SHAFT SLEEVE	SURFACE DEFECTS: DPT ON MACHINED SURFACE	100%	100%	ASTME-165	NO LINER INDICATIONS	INTERNAL TEST REPORT	√	M		C, B, O	
2.2.	IMPELLER	BALANCING: DYNAMIC BALANCING	100%	100%	ISO 1940 Gr. 6.3	ISO 1940 Gr. 6.3	INTERNAL TEST REPORT	√	M		C, B, O	
2.3.	CASING	SOUNDNESS OF PARTS: HYDROTEST	100%	100%	RELEVANT IS/ HIS	NO LEAKAGE	INTERNAL TEST REPORT	√	M		C, B, O	TEST PRESSURE SHALL BE 1.5 TIMES THE SHUT OFF HEAD OR TWICE THE DUTY POINT HEAD WHICHEVER IS HIGHER

DE NORA INDIA LIMITED		Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A113		
Manufacturer / Sub-Supplier			Rev. No.: 3		Sheet No. 1
Signatures					
			Reviewed by	Approved by	Approval Category

		BHARAT HEAVY ELECTRICALS LIMITED									
		FLOWMORE LIMITED (UNIT-I) 9th Mile Stone, G.T. Road Mohan Nagar, Ghaziabad (U.P.) FLOWMORE LIMITED (UNIT – II) 28 A, Site IV, Sahibabad Industrial Area, Ghaziabad (U.P.)		Quality Assurance Plan				Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
				Item: SEA WATER BOOSTER PUMPS							
				BHEL Doc No.: PE-V11-412-174-A113							
				Rev. No.: 3		Date: 13-06-2019					
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record	Responsibility			Remarks
			M/C	B				P	W	V	
1	2	3	4		5	6	7	8			9
3.	FINAL INSPECTION										
3.1.	PUMP PARTS	DIMENSIONAL CHECK: MEASURE	100%	1 PER/TYPE	APPROVED GA DRAWINGS	APPROVED GA DRAWINGS	INSPECTION REPORT	√	M	C, B, O	
3.2.	PERFORMANCE TEST OF PUMP WITH SHOP MOTOR AT APPROPRIATE SPEED	DISCHARGE V/S HEAD DISCHARGE V/S EFF. DISCHARGE V/S POWER	100%	1 PER/TYPE	APPROVED GA DRAWINGS & RELEVANT IS/ HIS	APPROVED GA DRAWINGS & RELEVANT IS/ HIS	INSPECTION REPORT	√	M	C, B, O	
3.3.	PAINTING AND PACKING	VISUAL	100%		Mfg. Std.	Mfg. Std.			M		

		DE NORA INDIA LIMITED	Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A113		
Manufacturer / Sub-Supplier		Main-Supplier		Rev. No.: 3		Sheet No. 2
Signatures						
				Reviewed by	Approved by	Approval Category

		BHARAT HEAVY ELECTRICALS LIMITED										
PROCESS PUMPS (I) PVT LTD		Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD				
		Item: METALLIC HYPOCHLORITE DOSING PUMPS										
		BHEL Doc No.: PE-V11-412-174-A113										
		Rev. No.: 3			Date: 13-06-2019							
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record	Responsibility			Remarks	
			M/C	B				P	W	V		
1	2	3	4		5	6	7	8			9	
1.	RAW MATERIAL											
1.1.	CASING, COVER AND IMPELLER	MECHANICAL AND CHEMICAL ANALYSIS	1 PER BATCH	1 PER BATCH	APPROVED DATASHEET & VENDOR TECHNICAL ANNEXURE	APPROVED DATASHEET & VENDOR TECHNICAL ANNEXURE	LAB TEST REPORT	√	M		C, B, O	
1.2.	BAR SHAFT MATERIAL	100 % ULTRASONIC TEST (IF DIA >50MM): PHYSICAL & VISUAL	1 PER BATCH	1 PER BATCH	APPROVED DATASHEET & VENDOR TECHNICAL ANNEXURE	APPROVED DATASHEET & VENDOR TECHNICAL ANNEXURE	LAB TEST REPORT	√	M		C, B, O	
2.	IN PROCESS INSPECTION											
2.1.	MACHINES SURFACE ON CASING AND IMPELLER	VISUAL & LPI TEST CRITICAL AREA - LIQUID PENETRATE INSPECTION	100%		ASME Sec V Article 6 & 24 & Approved Test Procedure	ASME Sec V Article 6 & 24 & Approved Test Procedure	LPI TEST CERTIFICATE	√	M		C, B, O	
2.2.	CASING	PRESSURE TIGHTNESS: HYDROTEST	100%		APPROVED DATASHEET	APPROVED DATASHEET	FINAL INSPECTION CERTIFICATE	√	M		C, B, O	

DE NORA INDIA LIMITED		Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A113		
Manufacturer / Sub-Supplier			Rev. No.: 3		Sheet No. 3
Signatures					
			Reviewed by	Approved by	Approval Category

		BHARAT HEAVY ELECTRICALS LIMITED										
PROCESS PUMPS (I) PVT LTD		Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project.				
		Item: METALLIC HYPOCHLORITE DOSING PUMPS						PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED				
		BHEL Doc No.: PE-V11-412-174-A113						BIDDER / VENDOR : DE NORA INDIA LTD				
		Rev. No.: 3			Date:13-06-2019							
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks
			M/C	B					P	W	V	
1	2	3	4		5	6	7		8			9
2.3.	IMPELLER	BALANCING - DYNAMIC BALANCING	100%		As per ISO 1940	As per ISO 1940	TEST CERTIFICATE	√	M		C, B, O	
3.	FINAL INSPECTION											
3.1.	PUMP ASSEMBLY ALONG WITH ALL ACCESSORIES	DIMENSIONS: MEASUREMENT & VISUAL INSPECTION	100%		APPROVED DATASHEET & GA	APPROVED DATASHEET & GA	INSPECTION REPORT	√	M	C, B, O		
		ACCESSORIES: VISUAL VERIFICATION	100%		APPROVED DATASHEET & GA	APPROVED DATASHEET & GA	INSPECTION REPORT	√	M	C, B, O		
3.2.	PERFORMANCE TEST	Q VS HEAD: VISUAL	1/ LOT/ TYPE		APPROVED DATASHEET/ IS 5120	APPROVED DATASHEET/ IS 5120	INSPECTION TEST REPORT	√	M	C, B, O		
		Q VS POWER: VISUAL	1/ LOT/ TYPE		APPROVED DATASHEET/ IS 5120	APPROVED DATASHEET/ IS 5120	INSPECTION TEST REPORT	√	M	C, B, O		
		Q VS EFFICIENCY: VISUAL	1/ LOT/ TYPE		APPROVED DATASHEET/ IS 5120	APPROVED DATASHEET/ IS 5120	INSPECTION TEST REPORT	√	M	C, B, O		

	DE NORA INDIA LIMITED	Legend: * Records, Identified With “Tick” (✓) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. ‘B’ / ‘O’ is indicated in Column ‘W’ indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A113		
Manufacturer / Sub-Supplier	Main-Supplier		Rev. No.: 3		Sheet No. 4
Signatures					
			Reviewed by	Approved by	Approval Category



	DE NORA INDIA LIMITED	Legend: * Records, Identified With “Tick” (✓) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. ‘B’ / ‘O’ is indicated in Column ‘W’ indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A113		
Manufacturer / Sub-Supplier	Main-Supplier		Rev. No.: 3		Sheet No. 5
Signatures					
			Reviewed by	Approved by	Approval Category

		BHARAT HEAVY ELECTRICALS LIMITED										
		ANTICORROSIVE EQUIPMENT PRIVATE LIMITED		Quality Assurance Plan				Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD				
				Item: NON METALLIC PUMPS - DEWATERING PUMP; ACID CLEANING PUMP; ACID TRANSFER PUMP								
				BHEL Doc No.: PE-V11-412-174-A113								
				Rev. No.: 3		Date: 13-06-2019						
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks
			M/C	B					P	W	V	
1	2	3	4		5	6	7		8			9
2.2.	VOLUTE CASING	HYDRO TEST	100% REVIEW WITNESS 1 PER TAG		APPROVED DATASHEET	APPROVED DATASHEET	MANUFACTURER COMPLIANCE REPORT	√	M		C, B, O	1.5 TIMES SHUT OFF HEAD KG/CM2 FOR 30 MINS. AS PER IS 5120
2.3.	PUMP	SPARK TEST: HIGH VOLATAGE SPARK TEST	100%	100%	APPROVED DATASHEET	APPROVED DATASHEET	MANUFACTURER COMPLIANCE REPORT	√	M		C, B, O	SPARK TEST IS NOT APPLICABLE FOR PVDF COMPONENTS
2.4.	IMPELLER	DYNAMIC BALANCING	100%		As per ISO 1940 Gr. 6.3	As per ISO 1940 Gr. 6.3	TEST CERTIFICATE	√	M		C, B, O	ANTICO WILL PROVIDE ONLY IMPELLER BALANCING COMPLIANCE CERTIFICATE FOR REVIEW
3.	FINAL INSPECTION											
3.1.	DIMENSION OF PUMP SET	OVERALL DIMENSIONS: MEASUREMENT & VISUAL INSPECTION	1 SAMPLE	1 SAMPLE	APPROVED GA	APPROVED GA	INSPECTION REPORT	√	M		C, B, O	

	DE NORA INDIA LIMITED	Legend: * Records, Identified With “Tick” (✓) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. ‘B’ / ‘O’ is indicated in Column ‘W’ indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A113		
Manufacturer / Sub-Supplier	Main-Supplier		Rev. No.: 3		Sheet No. 6
Signatures					
			Reviewed by	Approved by	Approval Category

		BHARAT HEAVY ELECTRICALS LIMITED										
ANTICORROSIVE EQUIPMENT PRIVATE LIMITED		Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD				
		Item: NON METALLIC PUMPS - DEWATERING PUMP; ACID CLEANING PUMP; ACID TRANSFER PUMP										
		BHEL Doc No.: PE-V11-412-174-A113										
		Rev. No.: 3			Date: 13-06-2019							
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks
			M/C	B					P	W	V	
1	2	3	4		5	6	7		8			9
3.2.	PERFORMANCE TEST	Q VS HEAD: VISUAL	1/ LOT/ TYPE		APPROVED DATASHEET/ IS 5120	APPROVED DATASHEET/ IS 5120	TC AND PERFORMANCE CURVE	√	M	C, B, O		
		Q VS POWER: VISUAL	1/ LOT/ TYPE		APPROVED DATASHEET/ IS 5120	APPROVED DATASHEET/ IS 5120	TC AND PERFORMANCE CURVE	√	M	C, B, O		
		Q VS EFFICIENCY: VISUAL	1/ LOT/ TYPE		APPROVED DATASHEET/ IS 5120	APPROVED DATASHEET/ IS 5120	TC AND PERFORMANCE CURVE	√	M	C, B, O		

DE NORA INDIA LIMITED		Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A113		
Manufacturer / Sub-Supplier			Rev. No.: 3		Sheet No. 7
Signatures					
			Reviewed by	Approved by	Approval Category

		BHARAT HEAVY ELECTRICALS LIMITED											
		Quality Assurance Plan Item: AC ELECT. MOTORS FOR PUMPS BHEL Doc No.: PE-V11-412-174-A113 Rev. No.: 3					Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD						
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks	
			M/C	B					P	W	V		
1	2	3	4		5	6	7		8			9	
1.	RAW MATERIAL												
1.1.	ENAMELED COPPER CONDUCTOR	SURFACE FINISH & DIMENSION	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O		
		HEAT SHOCK	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O		
		RESISTIVITY	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O		
		BDV AT ROOM TEMP.	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O		
		TENSILE STRENGTH	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O		
		% ELONGATION	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O		
		FLEXIBILITY	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O		
		CURE TEST	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O		
1.2.	ROTOR SHAFT	DIMENSION	100%		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O		

		De Nora India Limited	Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A113		
Manufacturer / Sub-Supplier		Main-Supplier		Rev. No.: 3		Sheet No. 8
Signatures						
				Reviewed by	Approved by	Approval Category



BHARAT HEAVY ELECTRICALS LIMITED

				Quality Assurance Plan Item: AC ELECT. MOTORS FOR PUMPS BHEL Doc No.: PE-V11-412-174-A113 Rev. No.: 3				Date: 13-06-2019				Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks			
			M/C	B					P	W	V				
1	2	3	4		5	6	7		8			9			
		CHEMICAL COMPOSITION	SAMPLE		IS 2004	IS 2004	MTC	√	M		C, B, O				
		TENSILE, HARDNESS & ELONGATION	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O				
		UT TEST (FOR DIA > 50 MM)	100%		Relevant Std.	Relevant Std.	MTC	√	M		C, B, O				
2.	IN PROCESS														
2.1.	STATOR COIL	DIMENSION (ACROSS SECTION)	100%		Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O				
		COIL FORMING	3 COILS RANDOM		Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O				
		INTER TURN TEST	100%		Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O				
2.2.	ROTOR SHAFT MACHINING	DIMENSION	1 MOTOR / TYPE		Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O				
		RUN OUT OF BRG & COUPLING DIA	1 MOTOR / TYPE		Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O				
2.3.	ROTOR DYNAMIC BALANCING	VERIFICATION			Mfg. Drwg.	Mfg. Drwg.	CERTIFICATE OF CONFORMANCE	√	M		C, B, O				
		De Nora India Limited	Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections					BHEL Doc No.: PE-V11-412-174-A113							
Manufacturer / Sub-Supplier		Main-Supplier						Rev. No.: 3		Sheet No. 9					
Signatures															
								Reviewed by	Approved by	Approval Category					



BHARAT HEAVY ELECTRICALS LIMITED

		Quality Assurance Plan		Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD
		Item: AC ELECT. MOTORS FOR PUMPS		
		BHEL Doc No.: PE-V11-412-174-A113		
		Rev. No.: 3	Date:13-06-2019	

S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks
			M/C	B					P	W	V	
1	2	3	4		5	6	7		8			9
3.	ASSEMBLY											
3.1.	WORKMANSHIP	VISUAL	100%	100%	Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O	
3.2.	BEARING FITMENT	VISUAL	100%		APPROVED DRAWINGS	APPROVED DRAWINGS	SHOP RECORD	√	M		C, B, O	
3.3.	SHAFT RUN OUT	VISUAL & MEASURE	1 MOTOR / TYPE		IS 2223	IS 2223	SHOP RECORD	√	M		C, B, O	
3.4.	CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	VISUAL	100%	100%	Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O	
4.	ROUTINE TEST											
4.1.	NAME PLATE DETAILS	VISUAL	100%	100%	IS-325 & APPROVED DRAWINGS/ DATASHEET	IS-325 & APPROVED DRAWINGS/ DATASHEET	INSPECTION REPORT	√	M		C, B, O	
4.2.	PAINT SHADE & THICKNESS	VISUAL & MEASURE	1 MOTOR / TYPE	1 MOTOR / TYPE	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	INSPECTION REPORT	√	M		C, B, O	

	De Nora India Limited	<u>Legend:</u> * Records, Identified With “Tick” (✓) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. ‘B’ / ‘O’ is indicated in Column ‘W’ indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A113		
Manufacturer / Sub-Supplier	Main-Supplier		Rev. No.: 3		Sheet No. 1
Signatures					
			Reviewed by	Approved by	Approval Category



BHARAT HEAVY ELECTRICALS LIMITED

		Quality Assurance Plan		Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD
		Item: AC ELECT. MOTORS FOR PUMPS		
		BHEL Doc No.: PE-V11-412-174-A113		
		Rev. No.: 3	Date:13-06-2019	

S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks
			M/C	B					P	W	V	
1	2	3	4		5	6	7		8			9
4.3.	LOCATION OF TERMINAL BOX	VISUAL	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	INSPECTION REPORT	√	M		C, B, O	
4.4.	MOUNTING & OVERALL DIMENSION	VISUAL & MEASURE	1 MOTOR / TYPE	1 MOTOR / TYPE	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	INSPECTION REPORT	√	M		C, B, O	
4.5.	WINDING RESISTANCE	MEASURE	100%	100%	IS 325/ APPROVED DATASHEET/ IEC 60034	IS 325/ APPROVED DATASHEET/ IEC 60034	TEST REPORT	√	M		C, B, O	
4.6.	IR TEST BEFORE & AFTER HV ON WINDING	MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O	
4.7.	HV TEST	MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O	
4.8.	NO LOAD TEST	MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O	

	De Nora India Limited	Legend: * Records, Identified With “Tick” (✓) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. ‘B’ / ‘O’ is indicated in Column ‘W’ indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A113		
Manufacturer / Sub-Supplier	Main-Supplier		Rev. No.: 3		Sheet No. 11
Signatures					
			Reviewed by	Approved by	Approval Category



BHARAT HEAVY ELECTRICALS LIMITED

				Quality Assurance Plan				Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD				
				Item: AC ELECT. MOTORS FOR PUMPS								
				BHEL Doc No.: PE-V11-412-174-A113								
				Rev. No.: 3		Date: 13-06-2019						
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks
			M/C	B					P	W	V	
1	2	3	4		5	6	7		8			9
4.9.	DIRECTION OF ROTATION/ PHASE SEQUENCE	VISUAL & MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O	
4.10.	REDUCED VOLTAGE RUN	VISUAL & MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O	
4.11.	VIBRATION TEST	VISUAL & MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O	
4.12.	NOISE LEVEL TEST	MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O	
4.13.	LOCKED ROTOR TEST AT REDUCED VOLTAGE	MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O	
5.	FINAL DOCUMENTATION											
5.1.	FINAL DOCUMENTATION	REVIEW	100%		AS PER APPROVED QAP	AS PER APPROVED QAP	REPORT	√	M		C, B, O	

		De Nora India Limited	Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A113		
Manufacturer / Sub-Supplier		Main-Supplier		Rev. No.: 3		
				Sheet No. 12		
Signatures				Reviewed by	Approved by	Approval Category

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
			APPROVED		
					STATUS : CONTRACT
					JOB NO.: 412

Doc approved vide. Lr.No.:SE/E/
Th&HyP/EE-7/M/AEE/M/F.En SEZ STPP/
D.80/19 dt.11.07.2019

2019.06.
14
15:03:10
+05'30'

BHARAT HEAVY ELECTRICALS LTD	
PROJECT ENGINEERING MANAGEMENT.	
This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from the contractual obligation.	
APPROVAL CATEGORY AWARDED = I	
CAT I - Approved	
CAT II - Approved With Comments as Noted	
CAT III - Not Approved	
CAT IV - Reference Drawing	
DEPARTMENT	MECHANICAL AUXILIARY
NAME:	FALGUNI SAHA

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DWG NO. PE - V11 - 412 - 174 - A114



DE NORA

SUB CONTRACTOR: DE NORA INDIA LIMITED KUNDAIM - GOA

ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES, SINGAPORE BRANCH

LOA NO:PW/PE/PG/EN1/P-24/17 DATED: 22 APR 2017

DEPT.	CODE			SCALE	WEIGHT(KG)	REF DRG.	ITEM		
--	A			-	-	-	-		
QAP FOR BLOWERS WITH MOTOR						NAME	SIGN	DATE	
						PREP	SN		
						CHKD	PG		
						APPD	RF		
DEPT.						CARD CODE	BHEL DOC. NO.	REV	
SIGN			N.A.				PE - V11 - 412 - 174 - A114	4	
DATE							NO. OF SHEETS	6 EXCLUDING COVER PAGE	

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED
it must not be used directly or indirectly in any way detrimental to the interest of the company

		BHARAT HEAVY ELECTRICALS LIMITED										
		SWAM PNEUMATICS PVT.LTD.		Quality Assurance Plan				Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD				
				Item: AIR BLOWER WITH MOTOR								
				BHEL Doc No.: PE-V11-412-174-A114								
				Rev. No.: 4		Date: 13-06-19						
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks
			M/C	B					P	W	V	
1	2	3	4		5	6	7		8			9
1.	VISUAL EXAMINATION	VISUAL	100%	100%	DATASHEET & GA DRAWINGS	DATASHEET & GA DRAWINGS	INSPECTION REPORT/ MANUFACTURER REPORT	√	M	C, B, O		
2.	DIMENSIONS	MEASURE	100%	100%	DATASHEET & GA DRAWINGS	DATASHEET & GA DRAWINGS	INSPECTION REPORT/ MANUFACTURER REPORT	√	M	C, B, O		
3.	MATERIAL TEST CERTIFICATE (IMPELLER & CASING)	REVIEW OF DOCUMENTS	100%	100%	PHYSICAL & CHEMICAL PROPERTIES	PHYSICAL & CHEMICAL PROPERTIES	MANUFACTURER TEST REPORT	√	M		C, B, O	
4.	BALANCING	VISUAL & MEASURE	100%	100%	APPROVED DATASHEET	APPROVED DATASHEET	INSPECTION REPORT/ MANUFACTURER REPORT	√	M		C, B, O	
5.	PERFORMANCE & FULL LOAD TEST	VISUAL & MEASURE	100%	100%	DATASHEET & GA DRAWINGS	DATASHEET & GA DRAWINGS	TEST REPORT	√	M	C, B, O		

	De Nora India Limited	Legend: * Records, Identified With “Tick” (✓) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. ‘B’ / ‘O’ is indicated in Column ‘W’ indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A114		
Manufacturer / Sub-Supplier	Main-Supplier		Rev. No.: 4		Sheet No. 1
Signatures					
			Reviewed by	Approved by	Approval Category

		BHARAT HEAVY ELECTRICALS LIMITED										
SWAM PNEUMATICS PVT.LTD.		Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD				
		Item: AC ELECT. MOTORS BELOW 55KW (LV)										
		BHEL Doc No.: PE-V11-412-174-A114										
		Rev. No.: 4			Date: 13-06-19							
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks
			M/C	B					P	W	V	
1	2	3	4		5	6	7		8			9
1.	RAW MATERIAL											
1.1.	ENAMELED COPPER CONDUCTOR	SURFACE FINISH & DIMENSION	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O	
		HEAT SHOCK	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O	
		RESISTIVITY	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O	
		BDV AT ROOM TEMP.	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O	
		TENSILE STRENGTH	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O	
		% ELONGATION	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O	
		FLEXIBILITY	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O	
		CURE TEST	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O	
1.2.	ROTOR SHAFT	DIMENSION	100%		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O	

		De Nora India Limited	Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A114		
Manufacturer / Sub-Supplier		Main-Supplier		Rev. No.: 4		Sheet No. 2
Signatures						
				Reviewed by	Approved by	Approval Category



BHARAT HEAVY ELECTRICALS LIMITED

SWAM PNEUMATICS PVT.LTD.		Quality Assurance Plan				Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD						
		Item: AC ELECT. MOTORS BELOW 55KW (LV)										
		BHEL Doc No.: PE-V11-412-174-A114										
		Rev. No.: 4		Date: 13-06-19								
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks
			M/C	B					P	W	V	
1	2	3	4		5	6	7		8			9
		CHEMICAL COMPOSITION	SAMPLE		IS 2004	IS 2004	MTC	√	M		C, B, O	
		TENSILE, HARDNESS & ELONGATION	SAMPLE		Mfg. Std.	Mfg. Std.	MTC	√	M		C, B, O	
		UT TEST (FOR DIA > 50 MM)	100%		Relevant Std.	Relevant Std.	MTC	√	M		C, B, O	
2.	IN PROCESS											
2.1.	STATOR COIL	DIMENSION (ACROSS SECTION)	100%		Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O	
		COIL FORMING	3 COILS RANDOM		Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O	
		INTER TURN TEST	100%		Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O	
2.2.	ROTOR SHAFT MACHINING	DIMENSION	1 MOTOR / TYPE		Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O	
		RUN OUT OF BRG & COUPLING DIA	1 MOTOR / TYPE		Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O	
2.3.	ROTOR DYNAMIC BALANCING	VERIFICATION			Mfg. Drwg.	Mfg. Drwg.	CERTIFICATE OF CONFORMANCE	√	M		C, B, O	
		De Nora India Limited	Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections				BHEL Doc No.: PE-V11-412-174-A114					
		Manufacturer / Sub-Supplier					Rev. No.: 4			Sheet No. 3		
		Main-Supplier										
		Signatures										
						Reviewed by			Approved by			Approval Category



BHARAT HEAVY ELECTRICALS LIMITED

SWAM PNEUMATICS PVT.LTD.		Quality Assurance Plan				Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD							
		Item: AC ELECT. MOTORS BELOW 55KW (LV)											
		BHEL Doc No.: PE-V11-412-174-A114											
		Rev. No.: 4		Date: 13-06-19									
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks	
			M/C	B					P	W	V		
1	2	3	4		5	6	7		8			9	
3.	ASSEMBLY												
3.1.	WORKMANSHIP	VISUAL	100%	100%	Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O		
3.2.	BEARING FITMENT	VISUAL	100%		APPROVED DRAWINGS	APPROVED DRAWINGS	SHOP RECORD	√	M		C, B, O		
3.3.	SHAFT RUN OUT	VISUAL & MEASURE	1 MOTOR / TYPE		IS 2223	IS 2223	SHOP RECORD	√	M		C, B, O		
3.4.	CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	VISUAL	100%	100%	Mfg. Drwg.	Mfg. Drwg.	SHOP RECORD	√	M		C, B, O		
4.	ROUTINE TEST												
4.1.	NAME PLATE DETAILS	VISUAL	100%	100%	IS-325 & APPROVED DRAWINGS/ DATASHEET	IS-325 & APPROVED DRAWINGS/ DATASHEET	INSPECTION REPORT	√	M		C, B, O		
4.2.	PAINT SHADE & THICKNESS	VISUAL & MEASURE	1 MOTOR / TYPE	1 MOTOR / TYPE	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	INSPECTION REPORT	√	M		C, B, O		
		De Nora India Limited	Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections				BHEL Doc No.: PE-V11-412-174-A114						
Manufacturer / Sub-Supplier		Main-Supplier					Rev. No.: 4			Sheet No. 4			
Signatures							Reviewed by			Approved by			Approval Category

		BHARAT HEAVY ELECTRICALS LIMITED										
SWAM PNEUMATICS PVT.LTD.		Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD				
		Item: AC ELECT. MOTORS BELOW 55KW (LV)										
		BHEL Doc No.: PE-V11-412-174-A114										
		Rev. No.: 4			Date: 13-06-19							
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks
			M/C	B					P	W	V	
1	2	3	4		5	6	7		8			9
4.3.	LOCATION OF TERMINAL BOX	VISUAL	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	INSPECTION REPORT	√	M		C, B, O	
4.4.	MOUNTING & OVERALL DIMENSION	VISUAL & MEASURE	1 MOTOR / TYPE	1 MOTOR / TYPE	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	INSPECTION REPORT	√	M		C, B, O	
4.5.	WINDING RESISTANCE	MEASURE	100%	100%	IS 325/ APPROVED DATASHEET/ IEC 60034	IS 325/ APPROVED DATASHEET/ IEC 60034	TEST REPORT	√	M		C, B, O	
4.6.	IR TEST BEFORE & AFTER HV ON WINDING	MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O	
4.7.	HV TEST	MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O	
4.8.	NO LOAD TEST	MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O	

		De Nora India Limited	Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A114		
Manufacturer / Sub-Supplier		Main-Supplier		Rev. No.: 4		Sheet No. 5
Signatures						
		Reviewed by		Approved by	Approval Category	

		BHARAT HEAVY ELECTRICALS LIMITED											
		SWAM PNEUMATICS PVT.LTD.			Quality Assurance Plan				Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD				
					Item: AC ELECT. MOTORS BELOW 55KW (LV)								
					BHEL Doc No.: PE-V11-412-174-A114								
					Rev. No.: 4		Date:13-06-19						
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record		Responsibility			Remarks	
			M/C	B					P	W	V		
1	2	3	4		5	6	7		8			9	
4.9.	DIRECTION OF ROTATION/ PHASE SEQUENCE	VISUAL & MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O		
4.10.	REDUCED VOLTAGE RUN	VISUAL & MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O		
4.11.	VIBRATION TEST	VISUAL & MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O		
4.12.	NOISE LEVEL TEST	MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O		
4.13.	LOCKED ROTOR TEST AT REDUCED VOLTAGE	MEASURE	100%	100%	APPROVED DRAWINGS/ DATASHEET	APPROVED DRAWINGS/ DATASHEET	TEST REPORT	√	M		C, B, O		
5.	FINAL DOCUMENTATION												
5.1.	FINAL DOCUMENTATION	REVIEW	100%		AS PER APPROVED QAP	AS PER APPROVED QAP	REPORT	√	M		C, B, O		

		De Nora India Limited	Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections	BHEL Doc No.: PE-V11-412-174-A114		
Manufacturer / Sub-Supplier		Main-Supplier		Rev. No.: 4		
				Sheet No. 6		
Signatures				Reviewed by	Approved by	Approval Category

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
			APPROVED		
					STATUS : CONTRACT
					JOB NO.: 412

Approval vide Lr.No.:SE/E/Th&HyP/EE/M/AEE/M/F.En SEZ STPP/
D.621 /18 dt.01.08.2018.

2018.07.
20
09:12:17
+05'30'

BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT.	
This approval status shall be interpreted as last down in the contract and it shall not relieve the contractor from the contractual obligation.	
APPROVAL CATEGORY AWARDED *1	
CAT I - Approved	
CAT II - Approved With Comments as Noted	
CAT III - Not Approved	
CAT IV - Reference Drawing	
DEPARTMENT	MECHANICAL AUXILIARY
NAME	FALGUNI SAHA

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DWG NO. PE - V11 - 412 - 174 - A116



DE NORA

SUB CONTRACTOR: DE NORA INDIA LIMITED KUNDAIM - GOA

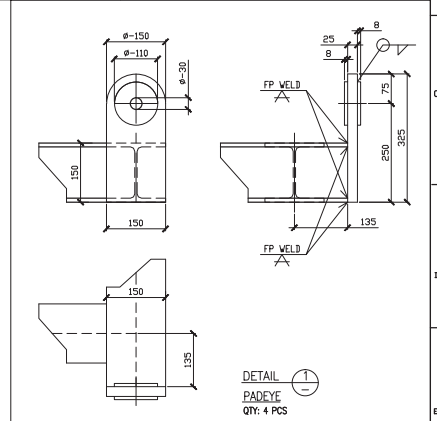
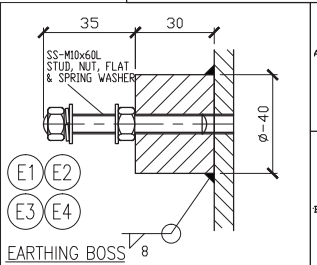
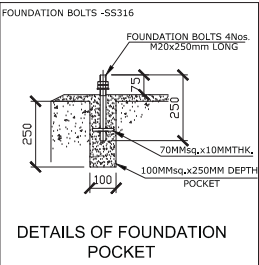
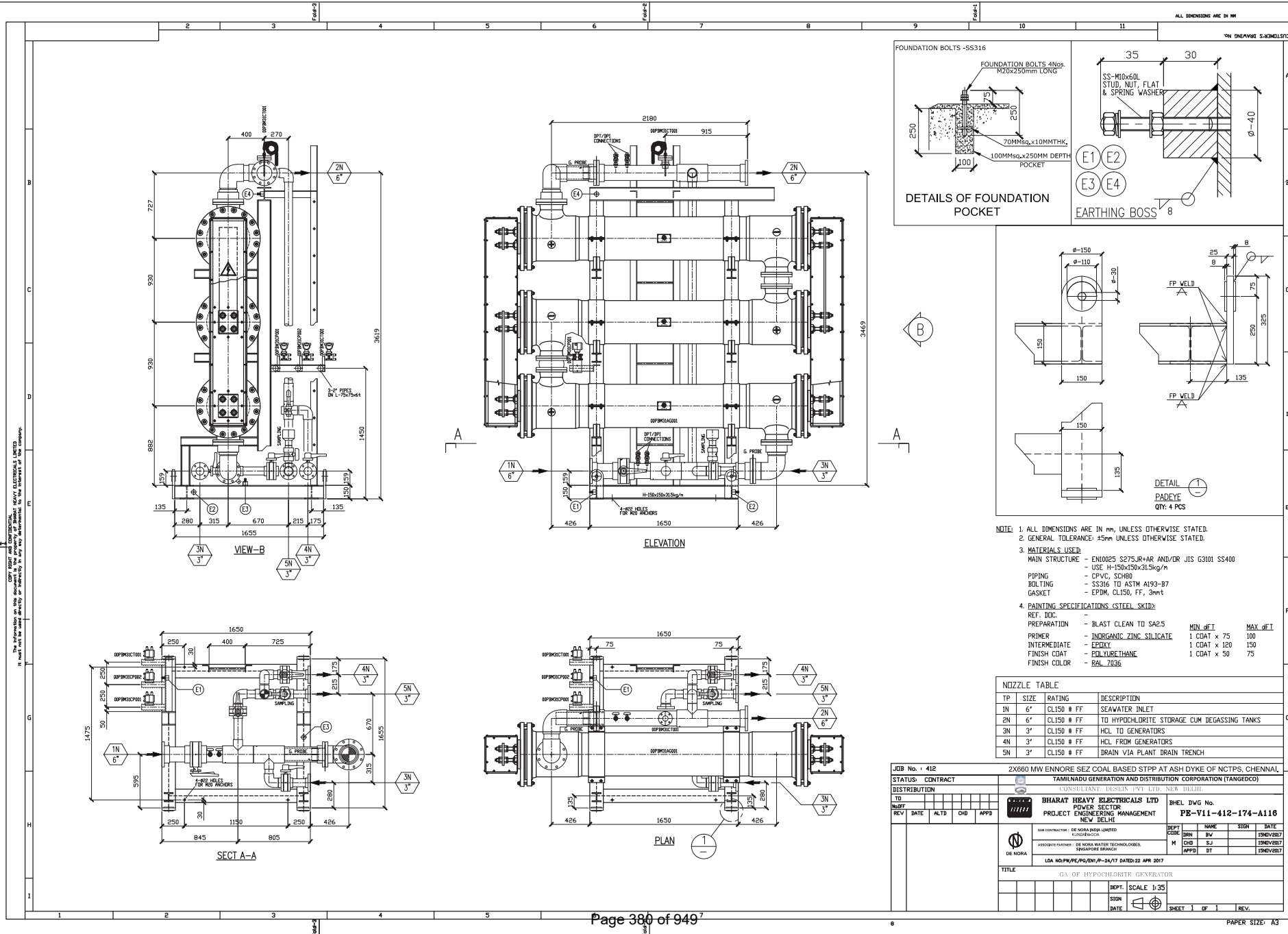
ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES, SINGAPORE BRANCH

LOA NO:PW/PE/PG/EN1/P-24/17 DATED:22 APR 2017

DEPT.	CODE			SCALE	WEIGHT(KG)	REF DRG.	ITEM		
--	A			-	-	-	-		
DATASHEET & GA OF HYPOCHLORITE GENERATOR (ELECTROLYZER)							NAME	SIGN	DATE
						PREP	SN		
						CHKD	PG		
						APPD	RF		
DEPT.					CARD CODE	BHEL DOC. NO.			REV
SIGN			N.A.			PE - V11 - 412 - 174 - A116			0
DATE						NO. OF SHEETS 2 EXCLUDING COVER PAGE			

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED
it must not be used directly or indirectly in any way detrimental to the interest of the company

PROJECT :		2 x 660MW ENNORE SEZ COAL BASED STPP		ELECTRO CHLORINATION SYSTEM			
PRINCIPAL CONTRACTOR :		BHARAT HEAVY ELECTRICALS LIMITED		Datasheet of Hypochlorite generator (Electrolyzer)			
BIDDER / VENDOR		DE NORA INDIA LIMITED		BHEL DOC. No. : PE-V11-412-174-A116			
1	Plant	Electro Chlorination Plant		Tag	90PBM31AG001 / 90PBM32AG001		
2							
3	Supplier	De Nora Water Technologies		Name	SEACLOR®		
4	Quantity	2		Model	3HX375		
5	Type	HORIZONTAL		Installation	SAFE AREA		
6	OPERATING CONDITION		REV.	PERFORMANCE		REV.	
7	Service	SODIUM HYPOCHLORITE					
8				Capacity per Unit	200	kg/h av Cl	
9	Fluid	SEAWATER		Hypochlorite Strength as Cl eq	2000	ppm	
10	Density	1025	kg/m³	Rated Current	6000	A DC	
11				Voltage across each Unit	140	V DC	
12	Seawater flow rate	150	m³/h				
13				Seawater TDS content at 100% rated output :			
14	Temperature	(minimum)	25 °C	(min)	39,600	ppm	
15		(maximum)	32 °C	(max)	39,740	ppm	
16	Pressure	(operating)	3 - 4 Bar g				
17		(design)	5 Bar g	Range Of Production Control	10-100	%	
20				(of rated capacity)			
21							
22	CONSTRUCTION DATA			MATERIALS OF CONSTRUCTION			
23	Model	3HX375		Body	FRP WITH PVC LINER		
24							
25	No. of cells	10		Flanges	FRP WITH PVC LINER		
26	Cell Type	Plate (Bioplar)					
27							
28	Temp	(design)	50 °C	Anode	Titanium ASTM B 265 Gr. 1		
29	Pressure	(design)	5 Bar g	Cathode	Titanium ASTM B 265 Gr. 1		
30	Test	(type)	HYDROSTATIC	Anode coating	DSA® (MMO)		
31		(pressure)	7.5 Bar g	Spacers	PVDF		
32				Studs/nuts/washers	Ti ASTM B 348 Gr.1		
33	Inlet nozzle	(size)	DN150/ Flange ANSI 150 #				
34	Outlet nozzle	(size)	DN150/ Flange ANSI 150 #	Connectors	COPPER 99.9%		
35							
36	Color	RAL 1016 Traffic Yellow		Gaskets	EPDM		
37	Code & Standard	BS4994		External bolts	Stainless Steel 316 ASTM- A 193 -B7		
39							
40							
41	ACCESSORIES			MISCELLANEOUS			
42							
43	GROUNDING TARGETS	DSA® COATED		Weight (empty)	711	kg/per cell	
44				(operating)	865	kg/per cell	
45							
47							
48	Note: Life of Electrode : 5 years.						
49							
50							
54							



- NOTE: 1. ALL DIMENSIONS ARE IN mm, UNLESS OTHERWISE STATED.
2. GENERAL TOLERANCE: 45mm UNLESS OTHERWISE STATED.
3. MATERIALS USED:
MAIN STRUCTURE - EN10025 S275JR+AR AND/OR JIS G3101 S3400
- USE H-150x150x31.5kg/m
PIPING - CPVC, SCH80
BOLTING - SS316 TO ASTM A193-B7
GASKET - EPDM, CL150, FF, 3mm
4. PAINTING SPECIFICATIONS (STEEL SKID):
REF. DOC. -
PREPARATION - BLAST CLEAN TO SA2.5
PRIMER - INORGANIC ZINC SILICATE
INTERMEDIATE - EPDM
FINISH COAT - POLYURETHANE
FINISH COLOR - RAL 7036
- | | MIN. dFT | MAX. dFT |
|--------------|----------|----------|
| 1 COAT x 75 | 100 | |
| 1 COAT x 120 | 150 | |
| 1 COAT x 50 | 75 | |

NOZZLE TABLE		
TP	SIZE	RATING
1N	6"	CL150 # FF
2N	6"	CL150 # FF
3N	3"	CL150 # FF
4N	3"	CL150 # FF
5N	3"	CL150 # FF

DESCRIPTION		
SEAWATER INLET		
TO HYPOCHLORITE STORAGE CUM DEGASSING TANKS		
HCL TO GENERATORS		
HCL FROM GENERATORS		
DRAIN VIA PLANT DRAIN TRENCH		

JOB No. 412		2X660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI	
STATUS CONTRACT		TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)	
CONSULTANT DESIGN PVT LTD, NEW DELHI			
DISTRIBUTION		BHARAT HEAVY ELECTRICALS LTD	
TO		POWER SECTION	
REV		PROJECT ENGINEERING MANAGEMENT	
DATE		NEW DELHI	
ALD			
CHD			
APPD			
		BHCL DWG No. PE-V11-412-174-A116	
		DEPT CODE	
		M CHD BV	
		H CHD SJ	
		APPD DT	
		SIGN DATE	
		SCALE 1:35	
		SHEET 1 OF 1	
		REV.	

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED	
		CHECKED:			CHECKED	
APPROVED						
						STATUS : CONTRACT
						JOB NO.: 412

Approval vide Lr.No.:SE/E/Th&HyP/EE/M/AEE/M/F.En SEZ STPP/
D.621 /18 dt.01.08.2018.

2018.06.
04
11:55:21
+05'30'

BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT.	
This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from the contractual obligation.	
APPROVAL CATEGORY AWARDED = I	
CAT I - Approved	
CAT II - Approved With Comments as Noted	
CAT III - Not Approved	
CAT IV - Reference Drawing	
DEPARTMENT	MECHANICAL AUXILIARY
NAME:	FALGUNI SAHA

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DWG NO. PE - V11 - 412 - 174 - A117



DE NORA

SUB CONTRACTOR: DE NORA INDIA LIMITED KUNDAIM - GOA

ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES, SINGAPORE BRANCH

LOA NO:PW/PE/PG/EN1/P-24/17 DATED: 22 APR 2017

DEPT.	CODE		SCALE	WEIGHT(KG)	REF DRG.	ITEM	
--	A		-	-	-	-	
QAP FOR HYPOCHLORITE GENERATOR					NAME	SIGN	DATE
					PREP	SN	
					CHKD	PG	
					APPD	RF	
DEPT.				CARD CODE	BHEL DOC. NO.		REV
SIGN					PE - V11 - 412 - 174 - A117		2
DATE					NO. OF SHEETS 2 EXCLUDING COVER PAGE		

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED
it must not be used directly or indirectly in any way detrimental to the interest of the company

		BHARAT HEAVY ELECTRICALS LIMITED										
		DE NORA INDIA LIMITED, KUNDAIM, GOA		Quality Assurance Plan				Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD				
				Item: HYPOCHLORITE GENERATOR								
				BHEL Doc No.: PE-V11-412-174-A117								
				Rev. No.: 2		Date: 16-11-2017						
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record	Responsibility			Remarks	
			M/C	B				P	W	V		
1	2	3	4		5	6	7	8			9	
1.	RAW MATERIAL	CHEMICAL COMPOSITION	100%		ASTM B-265 Gr. 1	ASTM B-265 Gr. 1	MANUFACTURER TEST CERTIFICATE & DNI QC REPORT	√	M		C, B, O	
2.	DIMENSIONAL TEST	MEASUREMENT	100%	100%	APPROVED DATASHEET & GA DRAWINGS	APPROVED DATASHEET & GA DRAWINGS	INSPECTION REPORT	√	C	B,O		
3.	CHECK FOR ASSEMBLY OF PIPING SPOOLS WITH VALVES, GASKETS, HARDWARE'S ETC	VISUAL	100%	100%	APPROVED DATASHEET & GA DRAWINGS	APPROVED DATASHEET & GA DRAWINGS	INSPECTION REPORT	√	C	B, O		
4.	HYDRAULIC TEST	VISUAL – 1.5 TIMES OPERATING PRESSURE	100%	100%	APPROVED DATASHEET & GA DRAWINGS	NO LEAKAGE/ NO PRESSURE DROP (DURATION 15 MINS)	TEST REPORT	√	C	B,O		
DE NORA WATER TECHNOLOGIES SINGAPORE		DE NORA INDIA LIMITED,		Legend: * Records, Identified With "Tick" (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point. Note: The Representative of Project Owner may also be associated for inspections				Sheet No. 1				
Manufacturer / Sub-Supplier		Main-Supplier										
				Reviewed by				Approved by		Approval Category		

		BHARAT HEAVY ELECTRICALS LIMITED										
		DE NORA INDIA LIMITED, KUNDAIM, GOA				Quality Assurance Plan Item: HYPOCHLORITE GENERATOR BHEL Doc No.: PE-V11-412-174-A117 Rev. No.: 2 Date: 16-11-2017			Project: 2 x 660MW ENNORE SEZ COAL BASED Supercritical Thermal Power Project. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
S.N.	Component / Operations	Characteristic / Check / Test	Quantum of Check		Reference Document	Acceptance Criteria	Format of Record	Responsibility			Remarks	
			M/C	B				P	W	V		
1	2	3	4		5	6	7	8			9	
5.	PERFORMANCE & FULL LOAD TEST	EFFICIENCY	100%	100%	APPROVED DATASHEET & GA DRAWINGS	APPROVED DATASHEET & GA DRAWINGS	DNWT/ DNI – FINAL INSPECTION FORM	√	C	B, O		PERFORMANCE AND FULL LOAD TEST WILL BE CARRIED OUT AT SITE

DE NORA WATER TECHNOLOGIES SINGAPORE	DE NORA INDIA LIMITED,	Legend: * Records, Identified With “Tick” (√) Shall be Essentially Included by Supplier in QA Documentation. ** M: Manufacturer/Sub-Supplier; C: Main Supplier; B: BHEL; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. ‘B’ / ‘O’ is indicated in Column ‘W’ indicate witness point. Note: The Representative of Project Owner may also be associated for inspections			
Manufacturer / Sub-Supplier	Main-Supplier		Sheet No. 2		
			Reviewed by	Approved by	Approval Category

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
			APPROVED		
STATUS : CONTRACT					
JOB NO.: 412					

REVISED TO CHANGE THE MAKE
FROM M/S RPG TO M/S GE TEK.

BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT.	
This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from the contractual obligation.	
APPROVAL CATEGORY AWARDED = I	
CAT I - Approved	
CAT II - Approved With Comments as Noted	
CAT III - Not Approved	
CAT IV - Reference Drawing	
DEPARTMENT	MECHANICAL AUXILIARY
NAME:	FALGUNI SAHA

FALGUNI
SAHA
2019.12.3
0 14:41:40
+05'30'

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DOC. NO. : PE - V11 - 412 - 174 - A121



SUB CONTRACTOR :DE NORA INDIA LIMITED
KUNDAIM - GOA

ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES,
SINGAPORE BRANCH

LOA NO:PW/PE/PG/EN1/P-24/17 DATED:22 APR 2017

DEPT. --	CODE A		SCALE -	WEIGHT(KG) -	REF DRG. -	ITEM -	
DATA SHEET FOR TRANSFORMER RECTIFIER.					NAME	SIGN	DATE
					PREP	AC	21/12/2019
					CHKD	AC	21/12/2019
					APPD	RF	21/12/2019
DEPT.					CARD CODE	REV	
SIGN		N.A.				2	
DATE							
NO. OF SHEETS 7 EXCLUDING COVER PAGE							

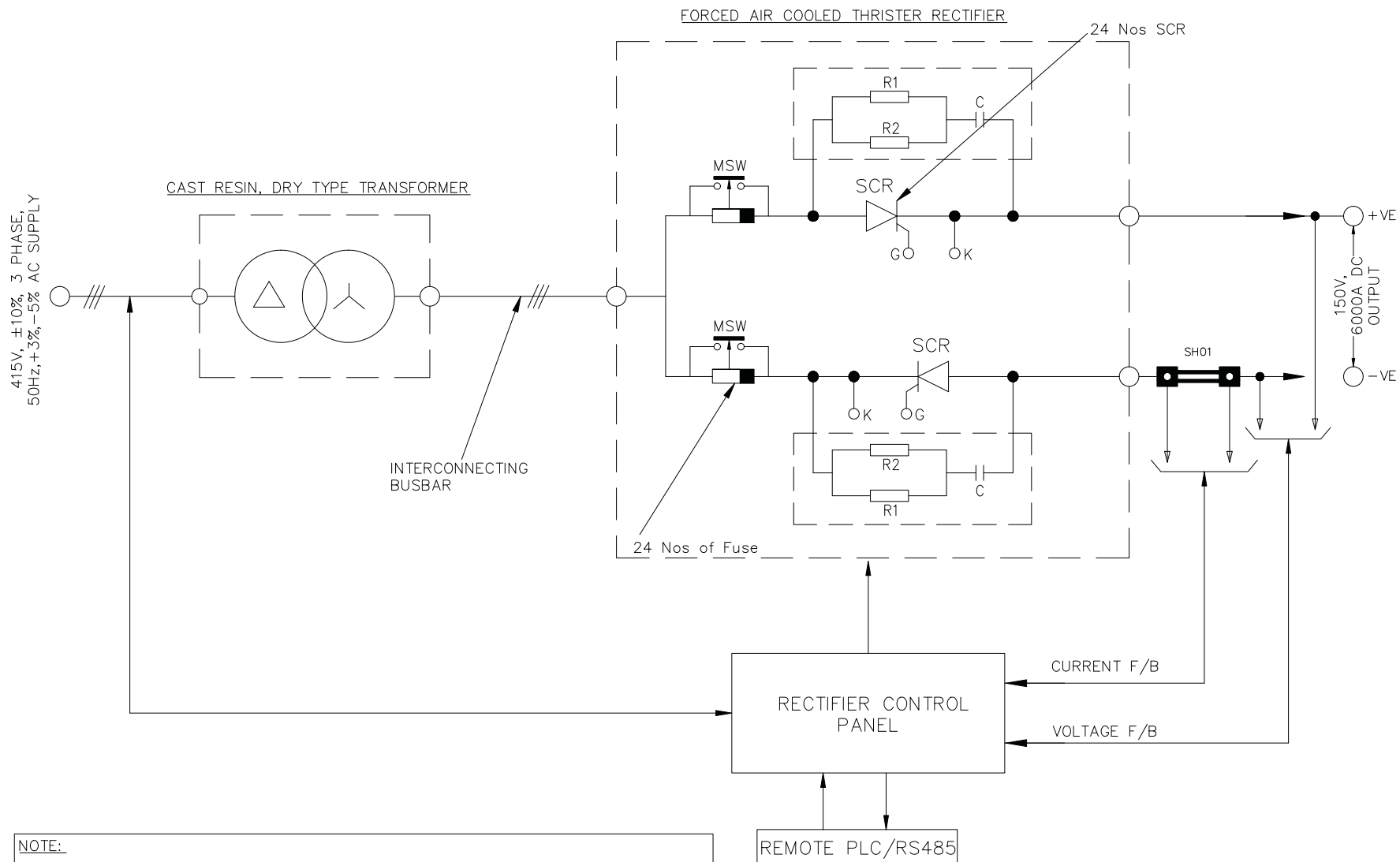
COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED it must not be used directly or indirectly in any way detrimental to the interest of the company

PROJECT :	2 x 660MW ENNORE SEZ COAL BASED STPP	ELECTRO CHLORINATION SYSTEM	
PRINCIPAL CONTRACTOR :	BHARAT HEAVY ELECTRICALS LIMITED	GA AND DATASHEET OF RECTIFIER TRANSFORMER	
BIDDER / VENDOR	DENORA INDIA LTD	BHEL DOC. No. : PE-V11-412-174-A121	Rev 6
GENERAL	1 TAG NO(S)	90PBM31GT001, 90PBM32GT001	
	2 QUANTITY	2	
	3 DUTY CYCLE	2X100%	
	4 LOCATION	SAFE AREA, INDOOR	
	5 MANUFACTURER	GE TEK ELECTRONICS PRIVATE LIMITED, CHENNAI	
	6 APPLICATION	CONVERT AC TO DC POWER	
	7 AMBIENT TEMPERATURE	°C 50°C MAXIMUM	
	8 DIMENSION RECTIFIER TRANSFORMER	mm 2375±10%mm width, 2200±10%mm depth, 3165±25mm height	△
	9 DIMENSION THYRISTOR CONTROLLED RECTIFIER CUBICLE	mm 1450mm width, 1250mm depth, 3040±25mm height	△
	10 DIMENSION CONTROL PANEL	mm 750mm width, 550mm depth, 1700mm height	
AC INPUT / DC OUTPUT	11 AC INPUT VOLTAGE	415V ± 10% , 3 ph , 3 Wire	
	12 FREQUENCY	50Hz, +3% to -5%	
	13 DC OUTPUT VOLTAGE RATING	V DC 150	
	14 DC OUTPUT CURRENT RATING	A DC 6000	
	15 RATED OUTPUT	kW 900	
	16 RATING OF TRANSFORMER	kVA 1141.31	△
	17 OVERALL EFFICIENCY	93% subject to IS tolerance	
	18 HEATER	YES, PROVIDED	
TRANSFORMER RECTIFIER	19 TYPE	CAST RESIN, DRY TYPE (INDOOR)	
	20 TRANSFORMER WINDINGS	COPPER WOUND	
	21 INSULATION CLASS	CLASS 'F'	
	22 COOLING	FORCED AIR COOLED	
	23 PRIMARY VOLTAGE	VAC 415 V (Nominal)	
	24 RATED PRIMARY KVA (Approx)	KVA 1141.31	△
	25 PRIMARY CURRENT	AMPS 1587.8	△
	26 ENCLOSURE PROTECTION	IP22	△
	27 TYPE OF PRIMARY CONNECTION	DELTA	
	28 TYPE OF SECONDARY CONNECTION	STAR	
	29 TEMP. RISE	95 degree C	
THYRISTOR CUBICLE	30 TYPE OF CONNECTION	Bridge	
	31 COOLING	FORCED AIR COOLED	
	32 RECTIFIER TYPE	SILICON CONTROLLED RECTIFIER (SCR)	
	33 NO. OF PULSE	6 PULSES	
	34 ENCLOSURE PROTECTION	IP21	
	35 No. OF SCRs. / ARM	Nos. 4	
	36 TOTAL Nos. OF SCR	Nos. 24	
	37 ANALOG METERS	a) DC VOLTMETER	
CONTROL CUBICLE	38	b) DC AMMETER	
	39 ENCLOSURE PROTECTION	IP41	
	40 INDICATIONS	a) MAINS 'ON'	
	41	b) RECTIFIER 'ON', RECTIFIER OFF, READY TO START	
	42 PUSH BUTTONS & CONTROLS	a) BLOWER ON	△
	43	b) BLOWER OFF	△
	44	c) FAULT ACCEPT / RESET (Through keyboard)	△
	45		
	46	d) E-STOP	
	47	e) RECTIFIER ON-OFF THROUGH KEYBOARD	
	48 DC OUTPUT CURRENT ADJUSTMENT	10 % to 100% (600A to 6000ADC) BY KEYBOARD	

CONTROL SECTION	49	FAULT ANNUNCIATION (LCD display)	a) PHASE FAIL	
	50		b) DC OVER VOLTAGE	
	51		c) DC OVER CURRENT	
	52		d) FAN FAIL	
	53		e) SCR FUSE FAIL	
	54		f) SCR OVER TEMPERATURE	
	55		g) TRANSFORMER WINDING TEMPERATURE HIGH	
	56		h) EMERGENCY STOP	
	57	INTERFACE SIGNAL WITH LOCAL CONTROL PANEL	A) DC VOLTAGE MONITORING (4-20mA TO PLC)	
	58		B) DC CURRENT MONITORING (4-20mA TO PLC)	
	59		C) DC CURRENT SETPOINT (4-20mA FROM PLC)	
	60		D) RECTIFIER START/STOP	
	61		E) LOCAL REMOTE SELECTOR SWITCH / KEYBOARD	
	62		F) RECTIFIER TRIP	
	63		G) RECTIFIER ALARM	
	64		H) RECTIFIER RUNNING	
	65		I) READY TO START	
	66	CIRCUIT PROTECTION	a. OVER VOLTAGE PROTECTION	
INTERNAL CABLING	67		b. OVER CURRENT PROTECTION	
	68		c. SHORT CIRCUIT PROTECTION	
	69	POSITIVE	BUSBAR – 100*10 – 4 IN PARRALE (UP TO REC. OUTPUT)	△
	70	NEGATIVE	BUSBAR – 100*10 – 4 IN PARRALE (UP TO REC. OUTPUT)	△
	71	POWER CABLE	1.5 or 2.5MM ²	
ENCLOSURE DETAILS	72	CABLE CONNECTING CONTROLLER AND PCB TERMINALS	0.5 SQ.MM	
	73	OTHER CONTROL CIRCUIT TERMINALS	1 SQ.MM	
	74	ENCLOSURE MATERIAL	MILD STEEL SHEET	
	75	THICKNESS mm	2	
	76	PAINT PRIMER	TWO COATS OF ZINC RICH PRIMER	
	77	PAINT FINISH	TWO COATS OF EPOXY FINISHING PAINT	
	78	PAINT SHADE INTERIER	GLOSSY WHITE	
	79	PAINT SHADE	RAL 7032	
NOTES :	1)	RECOMMENDED SIZE OF INPUT POWER CABLES TO TRANSFORMER 3 - 1C - 630mm ² AL. / Ph & 2 - 1C - 400mm ² AL. - N		
	2)	INPUT AC POWER SUPPLY CABLE, GLANDS AND LUGS TO BE SUPPLIED BY VENDOR - M/S DE NORA		

IF IN DOUBT ASK

(All information contained in the document is confidential and should not be used without prior consent of GE TEK Electronics Pvt. Ltd.)



NOTE:

1. AC input power cable to Rectifier Transformer = 3.5C*630 Sq.mm*2 Copper cables
2. Interconnecting Cu bus between Transformer to Rectifier 3runs of 2*10x150 in mm

Revision	Date	Name	Date	Name
01				
02	30.01.2018	SRK		
03	30.01.2018	EGS		
04	30.01.2018	EGS		

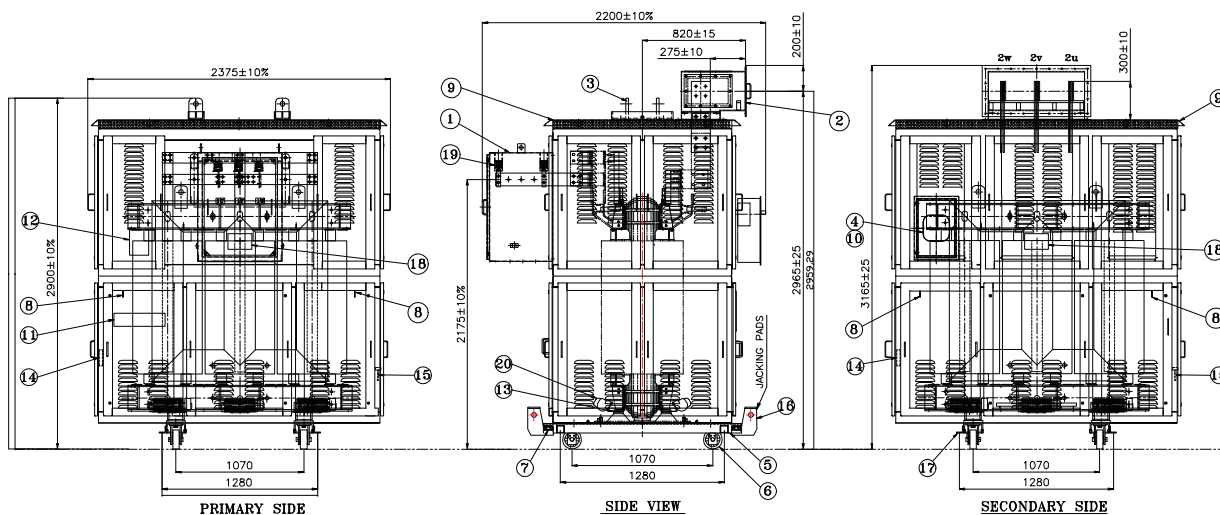
GE TEK Electronics Pvt. Ltd,
No.13, Ground floor, Evalappan Street,
Tambaram Sanatorium, Chennai - 600 047



SINGEL LINE DIAGRAM OF RECTIFIER SYSTEM

PROJECT	M/S DENORA INDIA LIMITED, GOA
RATING	VOLTAGE 150V CURRENT 6000A
DRA. NO	3SL-00103
PAGE NO	01 OF 01
REVISION	01

(All information contained in the document is confidential and should not be used without prior consent of GE TEK Electronics Pvt. Ltd.)



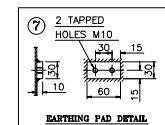
SPECIFICATION FOR TRANSFORMER-CRT		IT.	QTY	DESCRIPTION
RATED POWER	1141.31 kVA	1	1	PRI. CABLE BOX WITH DETACHABLE UNDRILLED A.L. GLAND MTS. PLATE TO SUIT FOR 3R*1x630 sq.mm XLPE A.L. CABLE/PHASE CONNECTED BACK TO BACK. (BOTTOM ENTRY)
VOLTAGE RATIO (V)	PRI: 415 / SEC: 134.59	2	1	LV BUS-DUCT (FRONT ENTRY)
INSULATION LEVEL (BIL)	LI - AC 3 / AC 3	3	4	LIFTING LUGS FOR CORE COIL ASSY & TRANSFORMER
VECTOR GROUP	Dy11	4	1	SCANNER BOX
FREQUENCY	50 Hz	5	1	UNDER CARRIAGE WITH HAULAGE HOLES
COOLING	AN	6	1	FLAT BI-DIRECTIONAL ROLLERS (#200)WITH LOCKING ARRANGEMENT
IP CLASS	IP : 23 (INDOOR)	7	2	EARTHING PAD (SUITABLE FOR M10 BOLT & 60x30x10 THK MS PLAT).
MAX. TEMP. RISE OF WINDING	90°C ABOVE AMBIENT	8	4	DOOR LIMIT SWITCHES FOR ENCLOSURE HINGE DOORS
MAX. AMBIENT TEMPERATURE	50°C	9	-	PERFORATED SHEET FOR AIR INLET AND OUTLET ON UPPER SIDE OF ENCLOSURE
POWDER COATING	RAL 7032	10	1	WINDING TEMPERATURE SCANNER WITH THREE PT-100 SENSOR (EMBEDDED IN EACH PRI COIL) PECON - TRE 7570
REFERENCE STANDARD	IS:11171/ IS:2026	11	1	MONOGRAM PLATE
INSULATION CLASS	F	12	1	RATING AND DIAGRAM PLATE
TOTAL WEIGHT	4200 kg.	13	4+2	ANTI-VIBRATION PAD
		14	2	SPACE HEATER
		15	2	THERMOSTAT
		16	4	JACKING PADS
		17	4	ANTI-EARTH QUAKE CLAMPS
		18	1+1	PRI. & SEC. SIDE DANGER PLATES
		19	-	EPOXY INSULATOR SUPPORTS FOR PRI. TERMINAL
		20	6	INLET FANS FOR COOLING (PRI. & SEC. SIDE)

LOUVERS & FITTINGS ARE SHOWN TENTATIVE ACTUAL
VE SLIGHT VARIATIONS.

CABLES, GLANDS & LUGS NOT IN RAYCHEM RPG SCOPE.
BODY SHALL BE 3 MM THK & COVERS 1.6 MM.
DOORS SHALL BE WITH PAD LOCKING PROVISION.
CONTINUITY SHALL BE MAINTAINED AT ALL GASKETED JOINTS

NOTES :

- 1) LOCATION OF LOUVERS & FITTINGS ARE SHOWN TENTATIVE ACTUAL JOB MAY HAVE SLIGHT VARIATIONS.
- 2) PRI. & SEC. CABLES, GLANDS & LUGS NOT IN RAYCHEM RPG SCOPE.
- 3) ENCLOSURE BODY SHALL BE 3 MM THK & COVERS 1.6 MM.
- 4) ALL HINGED DOORS SHALL BE WITH PAD LOCKING PROVISION.
- 5) EARTHING CONTINUITY SHALL BE MAINTAINED AT ALL GASKETED JOINTS

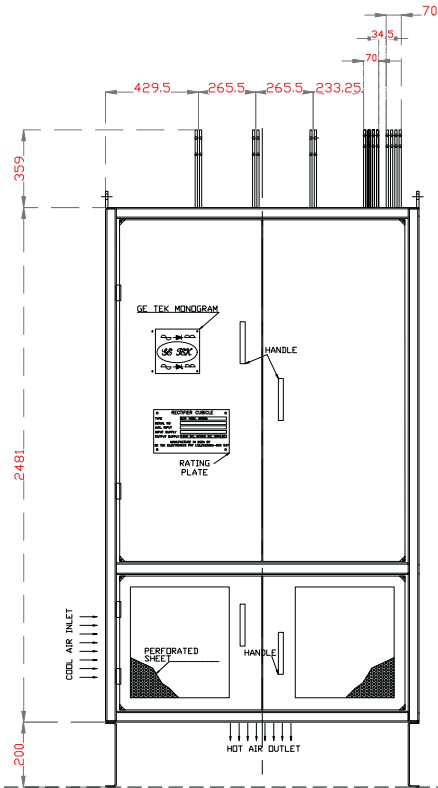


00	Revision	Date	Name	Date	Name		GENERAL ARRANGEMENTS OF TRANSFORMER	PROJECT	M/S DENORA INDIA LIMITED, GOA				
01				DR	30.01.2018			SRK	RATING	VOLTAGE	150V	CURRENT	6000A
02				CH	30.01.2018			EGS	DRA. NO	3GA-00103	REVISION	03	9
03				AP	30.01.2018			EGS	PAGE NO	01 OF 01			
04													

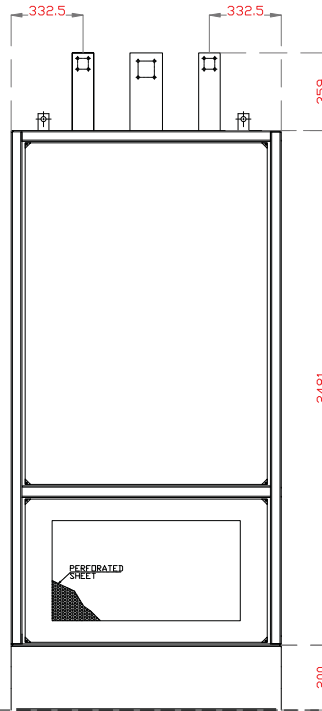
GE TEK Electronics Pvt. Ltd, No.13, Ground floor,Evalappan Street, Tambaram Sanatorium, Chennai – 600 047					
---	--	--	--	--	--

IF IN DOUBT ASK

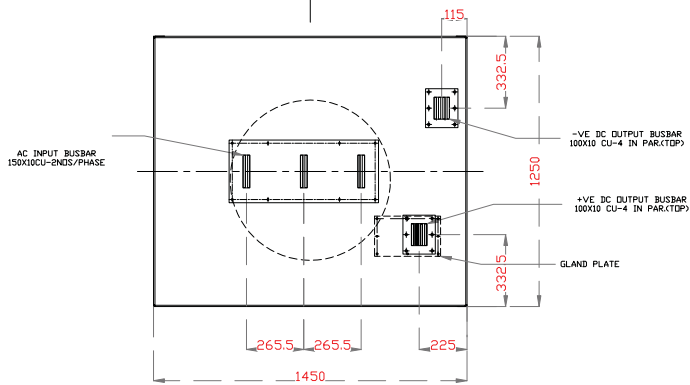
(All information contained in the document is confidential and should not be used without prior consent of GE TEK Electronics Pvt. Ltd.)



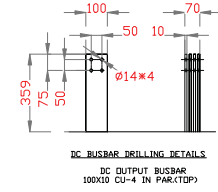
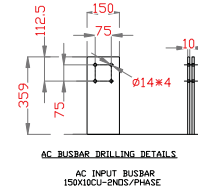
FRONT VIEW



RIGHT SIDE VIEW



PLAN VIEW



NOTE:

1. +VE & -VE DC OUTPUT TAKEN FROM TOP & COPPER BUSBAR SIZE - 100*10mm - 4 NOS
2. AC INPUT FROM TOP ENTRY & COPPER BUSBAR SIZE - 150*10mm - 2/PHASE - 3 SET
3. SHADE - SIEMENS GRAY 7032
4. CONTROL CABLE ENTRY AND AUX CABEL ENTRY FROM BOTTOM

00	Revision	Date	Name	Date	Name
01			DR	30.01.2018	SRK
02			CH	30.01.2018	EGS
03			AP	30.01.2018	EGS
04					

GE TEK Electronics Pvt. Ltd,
No.13, Ground floor,Evalappan Street,
Tambaram Sanatorium, Chennai - 600 047



RECTIFIER PANEL GENERAL
ARRANGEMENT

PROJECT	M/S DENORA INDIA LIMITED, GOA			
RATING	VOLTAGE	150V	CURRENT	6000A
DRA. NO	3GA—00104		REVISION	02
PAGE NO	01 OF 01			

(All information contained in the document is confidential and should not be used without prior consent of GE TEK Electronics Pvt. Ltd.)



1. Control cables are bottom entry
2. Shade – Siemens Gray (RAL7032)

15	Gland Plate	GP01
14	Door lock	
13	Control Panel Lifting Hog	
12	Emergency Stop Push Button	PB05
11	Accept and Reset Push Button	PB03,PB04
10	Blower ON-OFF Push Buttons	PB01,02
9	DC Ammeter	DCAM
8	DC Voltmeter	DCVM
7	GE TEK Multifuction Keyboard cum Display	GE02V2
6	Fault Indication Buzzer	BZA
5	Rectifier ON Indication Lamp	LP07
4	Local Mode Selection Indication Lamp	LP06
3	Transformer Fan ON Indication Lamp	LP05
2	Rectifier Fan ON Indication Lamp	LP04
1	Mains ON Indication Lamps	LP01-03
S.NO	DESCRIPTION	CKT CODE

00	Revision	Date	Name		Date	Name
01				DR	30.01.2018	SRK
02				CH	30.01.2018	EGS
03						
04				AP	30.01.2018	EGS

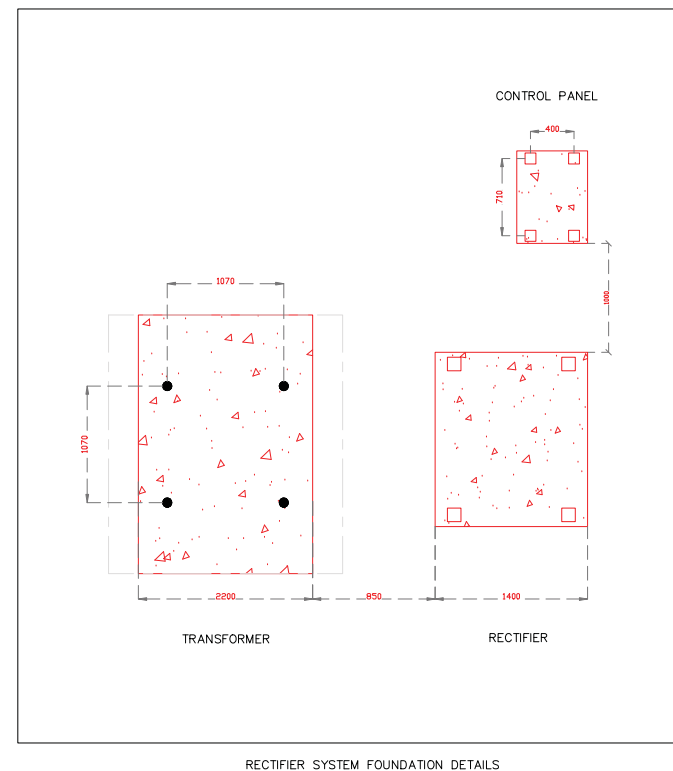
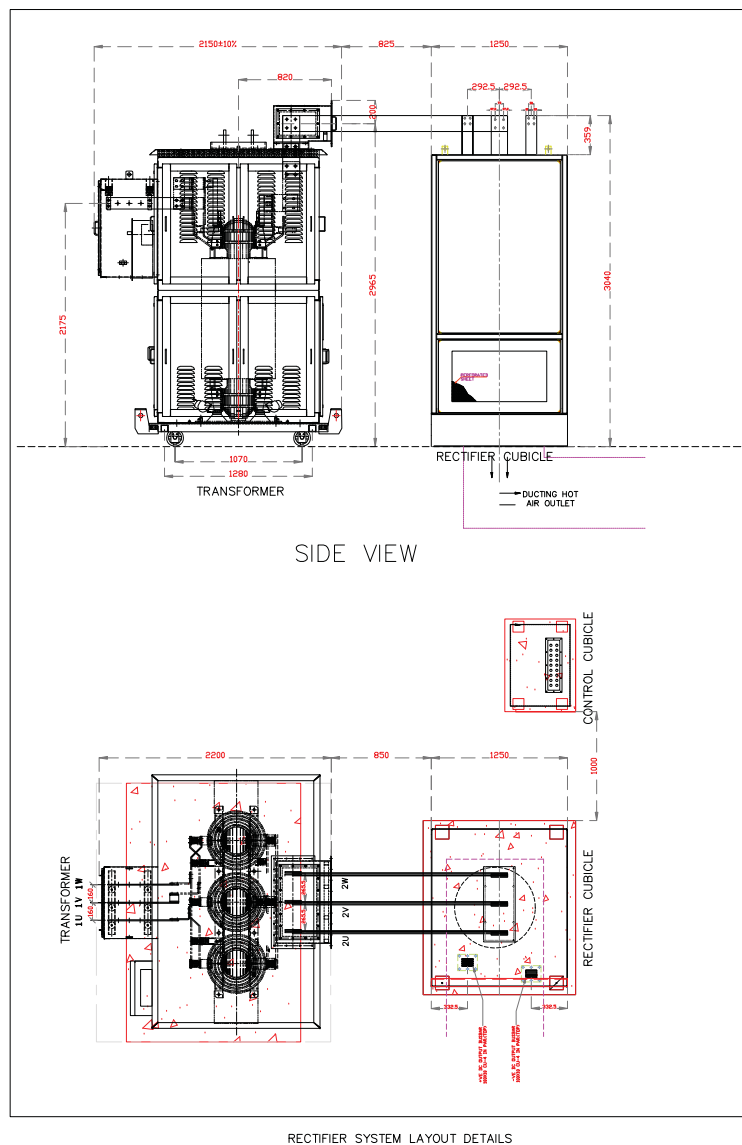
GE TEK Electronics Pvt. Ltd,
No.13, Ground floor, Evalappan Street,
Tambaram Sanatorium, Chennai – 600 047



RECTIFIER CONTROL PANEL GENERAL ARRANGEMENT

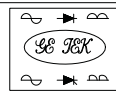
PROJECT	M/S DENORA INDIA LIMITED, GOA			
RATING	VOLTAGE	150V	CURRENT	6000A
DRA. NO	3GA—00105		REVISION	02
PAGE NO	01 OF 01			

(All information contained in the document is confidential and should not be used without prior consent of GE TEK Electronics Pvt. Ltd.)



00	Revision	Date	Name		Date	Name
01				DR	30.01.2018	SRK
02				CH	30.01.2018	EGS
03						
04				AP	30.01.2018	EGS

GE TEK Electronics Pvt. Ltd,
No.13, Ground floor, Evalappan Street,
Tambaram Sanatorium, Chennai – 600 047



LAYOUT AND FOUNDATION DETAILS OF RECTIFIER SYSTEM

PROJECT	M/S DENORA INDIA LIMITED, GOA		
RATING	VOLTAGE	150V	CURRENT 6000A
DRA. NO	3LO—00103		REVISION 02
PAGE NO	01 OF 01		

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
			APPROVED		
					STATUS : CONTRACT
					JOB NO.: 412

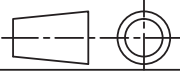
COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED it must not be used directly or indirectly in any way detrimental to the interest of the company

**FALGUNI
SAHA**
2019.04.2
6 22:45:25
+05'30'

 BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT.	
This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from the contractual obligation.	
APPROVAL CATEGORY AWARDED = I	
CAT I - Approved	
CAT II - Approved With Comments as Noted	
CAT III - Not Approved	
CAT IV - Reference Drawing	
DEPARTMENT	MECHANICAL AUXILIARY
NAME: FALGUNI SAHA	

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

	TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)
	CONSULTANT: DESEIN PVT LTD, NEW DELHI.
	BHARAT HEAVY ELECTRICALS LIMITED PROJECTS ENGINEERING MANAGEMENT, NOIDA.
	BHEL DOC. NO. : PE - V11 - 412 - 174 - A422
	SUB CONTRACTOR : DE NORA INDIA LIMITED KUNDAIM - GOA
DE NORA	ASSOCIATE PARTNER : DE NORA WATER TECHNOLOGIES, SINGAPORE BRANCH
	LOA NO: PW/PE/PG/EN1/P-24/17 DATED: 22 APR 2017

DEPT. --	CODE A		SCALE -	WEIGHT(KG) -	REF DRG. -	ITEM -	
QAP FOR TRANSFORMER RECTIFIER					NAME	SIGN	DATE
					PREP	SN	
					CHKD	PG	
					APPD	RF	
DEPT.					CARD CODE	REV	
SIGN		N.A.				2	
DATE							
					BHEL DOC. NO. PE - V11 - 412 - 174 -		
					NO. OF SHEETS 1 EXCLUDING COVER PAGE		

Bharat Heavy Electricals Limited

Sheet no : 1

		Quality Assurance Plan					Project: 2 x 660MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
		Item: Transformer Rectifier								
		BHEL Doc No.: PE-V11-412-174-A122								
		Rev. No.: 2			Date: 04.09.2017					
S.N.	Description	Type / Method of Check	Quantum of Check		Reference Document	Format of Record	Responsibility			Remarks
			M/C	B			P	W	V	
1	2	3	4		5	6	7			8
1.	Bought Out Items									
1.1.	Paper Covered Copper Conductor									
	1) Bare Size	Measurement	100%	100%	As per MR Note	I.Q.C Logsheets	M		C, B, O	MTC
	2) Increase in Size	Measurement	100%	100%	As per MR Note	I.Q.C Logsheets	M			
	3) Tensile Strength	T.C.R.			As per MR Note	I.Q.C Logsheets			M, C, B, O	
	4) Elongation/ Hardness	T.C.R.			As per MR Note	I.Q.C Logsheets			M, C, B, O	
	5) Resistivity	T.C.R.			As per MR Note	I.Q.C Logsheets			M, C, B, O	
1.2.	Lamination									
	1) Dimension	Measurement	Random check		As per MR Note	I.Q.C Logsheets	M			MTC
	2) Grade	T.C.R.			As per MR Note	I.Q.C Logsheets			M, C, B, O	
	3) Magnetic Properties	T.C.R.			As per MR Note	I.Q.C Logsheets			M, C, B, O	

Legend: M: Manufacturer/Sub-Supplier; C: Main Supplier, B: BHEL ; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point.		BHEL Doc No.: PE-V11-412-174-A122		
		Rev. No.: 00		
		Reviewed by	Approved by	Approval Category

Bharat Heavy Electricals Limited

Sheet no : 2

	Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
	Item: Transformer Rectifier									
	BHEL Doc No.: PE-V11-412-174-A122									
	Rev. No.: 2			Date: 04.09.2017						
S.N.	Description	Type / Method of Check	Quantum of Check		Reference Document	Format of Record	Responsibility			Remarks
			M/C	B			P	W	V	
1	2	3	4		5	6	7			8
	4) Surface Resistivity	T.C.R.			As per MR Note	I.Q.C Log sheet			M	
1.3.	Porcelain Bushing									
	1) Visual	Visual	100%		As per MR Note	MR Note	M		C, B, O	
	2) Dimension	Measurement	100%		As per MR Note	MR Note			M, C, B, O	
1.4.	Fabrication Sheet									
	1) Dimension	Measurement	One per Lot		IS 513	MR Note	M		C, B, O	
1.5.	Meters									
	1) Dimension Check/ Finish	Visual	100%		As per MR Note	I.Q.C Logsheets	M		C, B, O	MTC
	2) Calibration	Electrical	100%		As per MR Note	I.Q.C Logsheets	M		C, B, O	
	3) Pointer Movement	Electrical	100%		As per MR Note	I.Q.C Logsheets	M		C, B, O	
	4) Zero Adjustment	Electrical	100%		As per MR Note	I.Q.C Logsheets	M		C, B, O	

Legend: M: Manufacturer/Sub-Supplier; C: Main Supplier, B: BHEL ; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point.	BHEL Doc No.: PE-V11-412-174-A122		
	Rev. No.: 00		
	Reviewed by	Approved by	Approval Category

Bharat Heavy Electricals Limited

Sheet no : 3

	Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
	Item: Transformer Rectifier									
	BHEL Doc No.: PE-V11-412-174-A122									
	Rev. No.: 2			Date: 04.09.2017						
S.N.	Description	Type / Method of Check	Quantum of Check		Reference Document	Format of Record	Responsibility			Remarks
			M/C	B			P	W	V	
1	2	3	4		5	6	7			8
1.6.	Contactors									
	1) Visual	Visual	100%		As per MR Note	I.Q.C Logsheets	M		C, B, O	
	2) Functional Test	Electrical	100%		As per MR Note	I.Q.C Logsheets	M		C, B, O	
1.7.	Switch Fuse Unit									
	1) Type	Visual	100%		As per MR Note	I.Q.C Logsheets	M		C, B, O	
	2) Functional Test	Electrical	100%		As per MR Note	I.Q.C Logsheets	M		C, B, O	
1.8.	Auxiliary Transformer									
	1) Visual	Visual	100%		As per MR Note	I.Q.C Logsheets	M		C, B, O	ITC
	2) High Voltage Test	Electrical	100%		As per MR Note	I.Q.C Logsheets	M			
	3) Open Circuit Test	Electrical	100%		As per MR Note	I.Q.C Logsheets	M		C, B, O	
1.9.	Control & Power Cable (PVC Insulated)									

Legend: M: Manufacturer/Sub-Supplier; C: Main Supplier, B: BHEL ; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point.	BHEL Doc No.: PE-V11-412-174-A122		
	Rev. No.: 00		
	Reviewed by	Approved by	Approval Category

Bharat Heavy Electricals Limited

Sheet no : 4

	Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD				
	Item: Transformer Rectifier										
	BHEL Doc No.: PE-V11-412-174-A122										
	Rev. No.: 2			Date: 04.09.2017							
S.N.	Description	Type / Method of Check	Quantum of Check		Reference Document	Format of Record	Responsibility			Remarks	
			M/C	B			P	W	V		
1	2	3	4		5	6	7			8	
	1) Dimension	Measurement	One per Lot		As per MR Note	MR Note	M			ITC	
1.10.	Printed Circuit Boards										
	1) Dimension	Measurement	One per Lot		As per MR Note	MR Note	M				
	2) Copper Track Continuity	Measurement	One per Lot		As per MR Note	MR Note	M				
1.11.	Busbar Copper										
	1) Dimension	Measurement	One per Lot		As per MR Note	MR Note	M		C, B, O	MTC	
1.12.	Capsule Assembly										
	1) Type	Visual	One per Lot		As per MR Note	MR Note			M, C, B, O	MTC	
	2) Peak on State Voltage drop	T.C.R.				I.Q.C Logsheet			M, C, B, O		
Legend: M: Manufacturer/Sub-Supplier; C: Main Supplier, B: BHEL ; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point.							BHEL Doc No.: PE-V11-412-174-A122				
							Rev. No.: 00				
							Reviewed by		Approved by		Approval Category

Bharat Heavy Electricals Limited

Sheet no : 5

		Quality Assurance Plan					Project: 2 x 660MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
		Item: Transformer Rectifier								
		BHEL Doc No.: PE-V11-412-174-A122								
		Rev. No.: 2			Date: 04.09.2017					
S.N.	Description	Type / Method of Check	Quantum of Check		Reference Document	Format of Record	Responsibility			Remarks
			M/C	B			P	W	V	
1	2	3	4		5	6	7			8
	3) Average on state current	T.C.R.				I.Q.C Logsheet			M, C, B, O	
	4) Repetitive Peak forward off state reverse voltage	T.C.R.				I.Q.C Logsheet			M, C, B, O	
	5) Repetitive peak forward state reverse current	T.C.R.				I.Q.C Logsheet			M, C, B, O	
1.13.	Diode Device									
	1) Marking	Visual	One per Lot		As per MR Note	MR Note	M			
	2) P.I.V	Electrical	As per Table 2				M			
1.14.	Paint									

Legend: M: Manufacturer/Sub-Supplier; C: Main Supplier, B: BHEL ; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point.		BHEL Doc No.: PE-V11-412-174-A122		
		Rev. No.: 00		
		Reviewed by	Approved by	Approval Category

Bharat Heavy Electricals Limited

Sheet no : 6

	Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
	Item: Transformer Rectifier									
	BHEL Doc No.: PE-V11-412-174-A122									
	Rev. No.: 2			Date: 04.09.2017						
S.N.	Description	Type / Method of Check	Quantum of Check		Reference Document	Format of Record	Responsibility			Remarks
			M/C	B			P	W	V	
1	2	3	4		5	6	7			8
	1) Type	Visual	100%		As per MR Note	MR Note			M	
1.15.	H.R.C. Fuse									
	1) Type & Rating	Visual	100%		As per MR Note	MR Note			M, C, B, O	
	2) Continuity	Electrical	100%		As per MR Note	MR Note	M			
1.16.	Current Transformer									
	1) Type & Rating	Visual	100%		As per MR Note	MR Note	M			
	2) Ratio Test	Electrical	One per Lot		As per MR Note	MR Note	M			
1.17.	Hooter/ Buzzer									
	1) Type	Visual	100%		As per MR Note	MR Note	M		C, B, O	
	2) Functional	Electrical	100%		As per MR Note	MR Note	M		C, B, O	
1.18.	Plot Lamp/ Contact Element									

Legend: M: Manufacturer/Sub-Supplier; C: Main Supplier, B: BHEL ; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point.	BHEL Doc No.: PE-V11-412-174-A122		
	Rev. No.: 00		
	Reviewed by	Approved by	Approval Category

Bharat Heavy Electricals Limited

Sheet no : 7

	Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
	Item: Transformer Rectifier									
	BHEL Doc No.: PE-V11-412-174-A122									
	Rev. No.: 2			Date: 04.09.2017						
S.N.	Description	Type / Method of Check	Quantum of Check		Reference Document	Format of Record	Responsibility			Remarks
			M/C	B			P	W	V	
1	2	3	4		5	6	7			8
	1) Type	Visual	100%		As per MR Note	MR Note	M		C, B, O	
	2) Functional	Electrical	100%		As per MR Note	MR Note	M		C, B, O	
2.	Process									
2.1.	Winding									
	1) Dimensions	Measurement	100%		Transformer Datasheet	Tx. Dept. Check List	M			
	2) No. of Tappings	Visual	100%		Transformer Datasheet	Tx. Dept. Check List	M			
2.2.	Complete Core									
	1) Dimension	Measurement	100%		Transformer Datasheet	Tx. Dept. Check List	M			
2.3.	Transformer									
	1) Insulation Resistance	Electrical	100%		IS 2026	Tx. Dept. register	M		C, B, O	ITC
	2) Turns Ratio	Electrical	100%		Data Sheet	Tx. Dept. register	M		C, B, O	
2.4.	Fabrication of Control Cubicle									

Legend: M: Manufacturer/Sub-Supplier; C: Main Supplier, B: BHEL ; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point.	BHEL Doc No.: PE-V11-412-174-A122		
	Rev. No.: 00		
	Reviewed by	Approved by	Approval Category

Bharat Heavy Electricals Limited

Sheet no : 8

		Quality Assurance Plan					Project: 2 x 660MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
		Item: Transformer Rectifier								
		BHEL Doc No.: PE-V11-412-174-A122								
		Rev. No.: 2			Date: 04.09.2017					
S.N.	Description	Type / Method of Check	Quantum of Check		Reference Document	Format of Record	Responsibility			Remarks
			M/C	B			P	W	V	
1	2	3	4		5	6	7			8
	1) Dimensions	Measurement	100%		Fabrication Drawing	Mechanical Department Checklist	M			
	2) Cutting	Measurement	100%		Fabrication Drawing	Mechanical Department Checklist			M	
	3) Welding	Visual	100%		Fabrication Drawing	Mechanical Department Checklist			M	
	4) Drilling, cutout & Accessories	Measurement	100%		Fabrication Drawing	Mechanical Department Checklist				
	5) Door Alignment	Visual	100%		Fabrication Drawing	Mechanical Department Checklist			M, C, B, O	
2.5.	Pre-treatment & Painting of Control Cubicle									
	1) Surface Leveling	Visual	100%		Job Card	Paint shop Check List			M, C, B, O	
	2) Primer Coat	Visual	100%		Job Card	Paint shop Check List			M	
	3) Final Painting	Measurement	One per Lot		Job Card	Paint shop Check List	M		C, B, O	

Legend: M: Manufacturer/Sub-Supplier; C: Main Supplier, B: BHEL ; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point.		BHEL Doc No.: PE-V11-412-174-A122		
		Rev. No.: 00		
		Reviewed by	Approved by	Approval Category

Bharat Heavy Electricals Limited

Sheet no : 9

	Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
	Item: Transformer Rectifier									
	BHEL Doc No.: PE-V11-412-174-A122									
	Rev. No.: 2			Date: 04.09.2017						
S.N.	Description	Type / Method of Check	Quantum of Check		Reference Document	Format of Record	Responsibility			Remarks
			M/C	B			P	W	V	
1	2	3	4		5	6	7			8
	4) Check for Shade	Visual	100%		Job Card	Paint shop Check List			M, C, B, O	
2.6.	Control Panel Assembly									
	1) Component Mounting	Visual	100%		Approved Drawing	Assembly Dept.	M		C, B, O	
	2) Connection (Power)	Visual	100%		Approved Drawing	Assembly Dept.			M	
	3) Panel Door Fittings etc.	Visual	100%		Approved Drawing	Assembly Dept.			M, C, B, O	
	4) Wiring Check	Electrical	10%		Approved Drawing	Assembly Dept.	M			
3.	Final Inspection									
	1) Physical	Visual	100%		Approved Drawing		M	C, B, O		
	2) Dimensions	Measurement	100%		Approved Drawing	Test Certificate	M	C, B, O		
	3) Insulation Resistance	Electrical	100%		Approved Drawing	Test Certificate	M	C, B, O		
	4) H. V. Test	Electrical	100%		Approved Drawing	Test Certificate	M	C, B, O		
	5) Functional Check	Electrical	100%		Approved Drawing	Test Certificate	M	C, B, O		

Legend: M: Manufacturer/Sub-Supplier; C: Main Supplier, B: BHEL ; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point.	BHEL Doc No.: PE-V11-412-174-A122		
	Rev. No.: 00		
	Reviewed by	Approved by	Approval Category

Bharat Heavy Electricals Limited

Sheet no : 10

	Quality Assurance Plan						Project: 2 x 660MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI. PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED BIDDER / VENDOR : DE NORA INDIA LTD			
	Item: Transformer Rectifier									
	BHEL Doc No.: PE-V11-412-174-A122									
	Rev. No.: 2			Date: 04.09.2017						
S.N.	Description	Type / Method of Check	Quantum of Check		Reference Document	Format of Record	Responsibility			Remarks
			M/C	B			P	W	V	
1	2	3	4		5	6	7			8
	6) No Load Test (OC)	Electrical	100%		IS 4540	Test Certificate	M	C, B, O		
	7) Load Test (SC)	Electrical	100%		IS 4540	Test Certificate	M	C, B, O		
	8) Annunciation	Electrical	100%		Approved Drawing	Test Certificate	M	C, B, O		
	9) Temp. rise under SC	Electrical	One per Lot		IS 4540	Test Certificate	M	C, B, O		

Legend: M: Manufacturer/Sub-Supplier; C: Main Supplier, B: BHEL ; O: Owner P: Perform W: Witness and V: Review & Verification of the test records. 'B' / 'O' is indicated in Column 'W' indicate witness point.	BHEL Doc No.: PE-V11-412-174-A122		
	Rev. No.: 00		
	Reviewed by	Approved by	Approval Category

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED
it must not be used directly or indirectly in any way detrimental to the interest of the company

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
			APPROVED		
STATUS : CONTRACT					
JOB NO.: 412					

Approval vide Lr.No.:SE/E/Th&HyP/EE/M/AEE/M/F.En SEZ STPP/
D.621 /18 dt.01.08.2018.

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DWG NO. PE – V11 – 412 – 174 – A132

2018.08.



DE NORA

SUB CONTRACTOR: DE NORA INDIA LIMITED KUNDAIM – GOA



03

ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES, SINGAPORE BRANCH

09:27:44

+05'30'

LOA NO:PW/PE/PG/EN1/P-24/17 DATED: 22 APR 2017

DEPT. --	CODE A		SCALE -	WEIGHT(KG) -	REF DRG. -	ITEM -	
PERFORMANCE GUARANTEE TEST PROCEDURE					NAME	SIGN	DATE
					PREP	SN	
					CHKD	PG	
					APPD	RF	
DEPT.				CARD CODE	BHEL DOC. NO. PE - V11 - 412 - 174 - A132		REV 0
SIGN		N.A.					
DATE					NO. OF SHEETS 10 EXCLUDING COVER PAGE		

	2x660 MW ENNORE SEZ COAL BASED STPP PERFORMANCE GUARANTEE TEST PROCEDURE	Doc No. PE-V11-412-174-A132
---	---	-------------------------------------

TABLE OF CONTENTS

1.0	PERFORMANCE GUARANTEES
2.0	CORRECTION CURVE FOR SPECIFIC POWER CONSUMPTION
3.0	PERFORMANCE DEMONSTRATION TEST TIME AND DURATION
4.0	DEMONSTRATION TEST COMMITTEE
5.0	PERFORMANCE TEST REPORT
6.0	DATA ACQUISITION
7.0	PRODUCTION CAPACITY DEMONSTRATION
8.0	D.C. SPECIFIC POWER CONSUMPTION CALCULATION
ANNEX I	GUARANTEED PERFORMANCE TEST REPORT
ANNEX II	GUARANTEED PERFORMANCE TEST MEASUREMENTS
ANNEX III	DETERMINATION OF AVAILABLE CHLORINE IN SEA WATER
ANNEX IV	DETERMINATION OF TDS (180°C) IN SEA WATER

1.0 PERFORMANCE GUARANTEES

- Maximum equivalent chlorine production of each generator 3HX.375 200 kg/h Cl₂ av.
- Specific power consumption for electrolysis at system capacity of 200 kg/h Cl₂ av., with total one (1) generator at 100% current, at the D.C. terminals of the rectifier unit, at sea water temperature 25 to 32°C and TDS (180°C) 39600 – 39740mg/l 4.25 kWh/kg Cl₂ av.

2.0 CORRECTION CURVE FOR SPECIFIC POWER CONSUMPTION

Use the following correction formulas in respect of actual sea water temperature (T) and Total Dissolved Salts (180°C) (S), measured during performance test.

In fact, should the Total Dissolved Salts and/or the sea water temperature be different from what specified in the contract, the guaranteed specific electric consumption must be corrected according to:

$$W_{T,S} = 0.00042 * S * T - 0.03000 * S - 0.05708 * T + 6.36200$$

Where:

$W_{T,S}$ guaranteed specific power consumption according to the actual temperature (T) and actual TDS (S), during performance test.

T actual sea water temperature (°C)

S actual TDS at 180°C g/l

Please refer to attached form (ANNEX IV)

	2x660 MW ENNORE SEZ COAL BASED STPP PERFORMANCE GUARANTEE TEST PROCEDURE	Doc No. PE-V11-412-174-A132

3.0 PERFORMANCE DEMONSTRATION TEST TIME AND DURATION

The demonstration test must be made after that each generator has been thoroughly acid washed and it has been operated in steady conditions at rated capacity for at least one hour before starting the official readings. The demonstration test will be made at the demand of De Nora and in agreement with the Contractor and the Owner. The demonstration test will last 8 hours.

4.0 DEMONSTRATION TEST COMMITTEE

The plant demonstration will be made under the supervision of a “Demonstration Committee” composed by one representative of the Owner, one representative of Contractor and one representative of De Nora.

The results of the measurements and determination shall be reported in the “Performance Test Report” which will be signed by the committee’s members.

5.0 PERFORMANCE TEST REPORT

The “Performance Test Report” will be written in English. The final test results will be calculated as average among the results of each measure taken along the test period. Abnormal or clearly not realistic or wrong results will not be taken into consideration. Before starting the demonstration test, all the instruments and measuring devices will be calibrated under supervision of Demonstration Committee. Correction factors will be eventually checked or calculated and used for calculating the absolute values to be averaged for having final demonstration test data.

As soon as the demonstration test is completed, the committee will summarise the results in a common final report in which it will be stated whether the Plant has been satisfactory operated.

6.0 DATA ACQUISITION

Data acquisition has to be performed by using the enclosed log sheets (see attached).

7.0 PRODUCTION CAPACITY DEMONSTRATION

The flow-rate of the hypochlorite solution is practically equal to the flow-rate of the sea water fed to the generator, measured by the relevant flow indicator, keeping the flow-rate constant during the test run.

NOTE: if required, flow indicator can be calibrated by measuring the volume of sea water accumulated in the storage tank during a fixed period of time. Instrument calibration and validity certificate must be provided and made available to the Demonstration Test Committee.

Check and record the sea water flow-rate value every hour. Take every hour a sample of hypochlorite solution representative of the production during the test run and analyse immediately for its available chlorine content according to the analytical method:

“Determination of available chlorine in sea water” (ANNEX III)

Calculation:

$$\text{Flow rate (m}^3\text{/h)} \times \text{Concentration of Cl}_2 \text{ av. (kg/m}^3\text{)} = \text{kg/h of Cl}_2 \text{ av.}$$

8.0 D.C. SPECIFIC POWER CONSUMPTION CALCULATION

The D.C. specific power consumption must be calculated as follows:

Read and record every hour the total voltage of the generator at the D.C. terminals of the rectifier. Calculate the average value.

Read and record every hour the total current load of the system at the D.C. kAmmeter placed on the control panel of the rectifier. Calculate the average value.

Determine the hourly average production according to preceding paragraph.

Calculation:

$$W_{\text{D.C. act}} = \frac{\text{Volt} \times \text{kA}}{\text{kgCl}_2/\text{h}} = \text{kWh/kgCl}_2 \text{ av.}$$

A N N E X E S

	2x660 MW ENNORE SEZ COAL BASED STPP PERFORMANCE GUARANTEE TEST PROCEDURE	Doc No. PE-V11-412-174-A132

A N N E X I

ELECTROCHLORINATION UNIT	GUARANTEED PERFORMANCE TEST REPORT	SCOPE: GUARANTEE CERTIFICATE	DATE
-----------------------------	--	------------------------------------	------

Guaranteed parameter	Unit of measure	Actual value of generator	Guaranteed value
available Cl ₂ production of each generator	kg/h		200
specific electric power consumption at (*)°C and TDS (180°C) (*) g/l (*) as per contract	$\frac{\text{kWh}}{\text{kgCl}_{2\text{av.}}}$		4.25

This certifies that the performance test has been conducted following the required procedure and that performance parameters fulfil guaranteed values.

Signatures:

DE NORA

END USER



**2x660 MW ENNORE SEZ COAL BASED STPP
PERFORMANCE GUARANTEE TEST
PROCEDURE**

Doc No. PE-V11-412-174-A132

A N N E X I I

**ELECTROCHLORINATION PLANT
GUARANTEED PERFORMANCE TEST
MEASUREMENTS**

DATE:

GENERATOR ITEM:

SEA WATER TDS (180°C):

Time	D.C. current A	Tot. voltage V	Sea water flow m ³ /h	Sea water temperature °C	Cl ₂ av. concentration g/l	Remarks
Average value						

Signatures:

ANNEX III

DETERMINATION OF AVAILABLE CHLORINE IN SEA WATER

Method

Iodometric titration.

Reagents

- Glacial acetic acid
- KI crystals
- Na₂S₂O₃ 0.1 N standard solution
- Starch indicator solution

Add to 1.25 g of potato starch a little cold water to prepare a paste. Boil 250 ml of distilled water and add the past to the boiling water and continue to boil for about 10 minutes.

Cool and add about 0.3 g of salicylic acid.

Note: This solution deteriorates quickly. When the end point of titration is pinkish, a new solution has to be prepared.

Procedure

Take a 250 ml Erlenmeyer flask; add about 30 ml of distilled water and about 0.5 g of solid potassium iodide. Pipette 50 ml of sea water sample, put it in the flask and add 15 ml of glacial acetic acid. Titrate with sodium thiosulfate 0.1 N standard solution using few drops of starch solution as indicator.

End point from blue to colourless

Calculation

$$\text{Total available chlorine} = \frac{A * 0.1 * 35.5}{50} = A * 0.071 = g / l Cl_2$$

Where:

A = ml of Na₂S₂O₃ 0.1 N standard solution used in the titration.

A N N E X I V

DETERMINATION OF TOTAL DISSOLVED SALTS (TDS AT 180°C) IN SEAWATER USING EVAPORATION (COMMONLY USE IN LABORATORY)

Method

Gravimetric

Apparatuses

- Evaporating dishes: 150-200 ml capacity dishes made of the following materials: Platinum, Porcelain, Silica, Pyrex.
- Steam bath.
- Drying oven equipped with a thermostatic control capable of maintaining the temperature within a 2 °C range.
- Dessicator, provided with a dessicant containing a colour indicator of moisture concentration.
- Analytical balance, 200 g capacity, capable of weighting to 0.1 mg.
- Filter paper.

Procedure

Preparation of evaporating dish:

A dish to be used in the determination of total residue should receive a preliminary drying in an oven at the same temperature intended to be used for the residue, i.e. 180 °C.

Filter the seawater sample on filter paper.

Pour a measured portion of the well mixed filtered sample into a weighed evaporating dish placed on a steam bath. After complete evaporation of the water from the residue, transfer the dish to an oven maintained at 179° - 181°C.

Dry to constant weight. (Constant weight is considered attained when not more than a 0.5 mg weight change occurs between two successive series of operations consisting of heating, cooling in dessicator, and weighing).

Drying for a long period may eliminate the necessity for checking for constant weight but the analyst must either dry the dish overnight or determinate by trial the minimum time required to attain constant weight with a given type of sample when a number of samples of the same kind are involved.

Allow the dish to cool briefly in air before placing it, while still warm, in a dessicator to complete the cooling in a dry atmosphere. Do not overload the dessicator. Sufficient room must be available so that all dishes may remain flat on the dessicator shelf, and no part of a dish should touch another dish or the side of the dessicator. Weigh the dish as soon as it has completely cooled. The residue should not remain overly long in a dessicator because some residues are very hygroscopic and may remove water from a desiccator that is not thoroughly dry.

Report the increase in weight over the empty dish as "total residue on drying at 180°C" in terms of mg/l and to the nearest whole number.

Report only three significant figures.

APPROVED

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
					STATUS : CONTRACT
					JOB NO.: 412

Approval vide Lr.No.: 542, dt.31.05.2019.

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED
it must not be used directly or indirectly in any way detrimental to the interest of the company

FALGUNI
SAHA
2019.12.0
2
11:11:40
+05'30'

BHARAT HEAVY ELECTRICALS LTD. PROJECT ENGINEERING MANAGEMENT	
This approval shall be interpreted as not done in the contract and it shall not release the contractor from the contractual obligations.	
APPROVAL CATEGORY AWARDED = 1	
CAT 1 - Approved	
CAT 2 - Approved With Comments as Noted	
CAT 3 - Not Approved	
DEPARTMENT : MECHANICAL SUPERVISORY	
NAME :	FALGUNI SAHA

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DOC. NO. : PE - V11 - 412 - 174 - A134



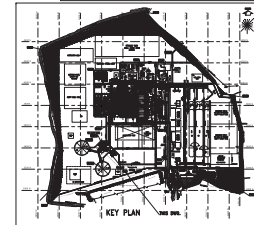
SUB CONTRACTOR : DE NORA INDIA LIMITED
KUNDAIM - GOA

ASSOCIATE PARTNER : DE NORA WATER TECHNOLOGIES, SINGAPORE BRANCH

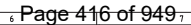
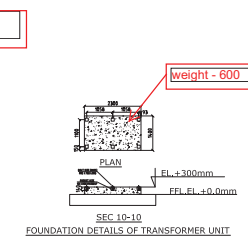
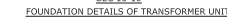
LOA NO: PW/PE/PG/EN1/P-24/17 DATED: 22 APR 2017

DEPT. --	CODE A		SCALE -	WEIGHT(KG) -	REF DRG. -	ITEM -	
DRIVE LIST					NAME	SIGN	DATE
					PREP	SN	
					CHKD	PG	
					APPD	RF	
DEPT.							
SIGN		N.A.					
DATE							
				CARD CODE -	BHEL DOC. NO. PE - V11 - 412 - 174 - A134		REV 1
NO. OF SHEETS 1 EXCLUDING COVER PAGE							

PROJECT : 2 X 660 MW ENNORE SEZ COAL BASED STPP AT ASH DYKE OF NCTPS, CHENNAI								DOCUMENT TITLE : DRIVE LIST					
CLIENT : TAMILNADU GENERATION AND DISTRIBUTION CORPORATION								DOC NO.: PE-V11-412-174-A134					
PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED								REV. NO.: 1					
SUB CONTRACTOR : DE NORA INDIA LIMITED								DATE: 22.05.2019					
UID	KKS_CODE	STATUS	TAG	DESCRIPTION	DRIVE TYPE	O/ C	AREA	PACKAGE	PLC NAME	SPECIAL REMARK	REF_DOC_NO	REV NUMBER	
DRIVE LIST FOR CW CHLORINATION SYSTEM (DRIVES CONTROLLED FROM PLC)													
1	90PBM21AP001		NA	SEA WATER BOOSTER PUMP (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM	M/S DENORA SUPPLIED PLC		PE-V11-412-174-A101	PAGE 2/6	3
2	90PBM22AP001		NA	SEA WATER BOOSTER PUMP (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
3	90PBM21AA603		NA	90PBM21AA603- MOTORIZED VALVE AT BYPASS OF SW BOOSTER PUMP	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
4	90PBM21AT001		NA	SELF CLEANING STRAINER (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
5	90PBM22AT001		NA	SELF CLEANING STRAINER (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
6	90PBM31GT001		NA	TRANSFORMER RECTIFIER (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
7	90PBM32GT001		NA	TRANSFORMER RECTIFIER (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
8	90PBM21AA601		NA	SELF CLEANING STRAINER drain valve	SOV/O (single coil)	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
9	90PBM22AA601		NA	SELF CLEANING STRAINER drain valve	SOV/O (single coil)	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
10	90PBM31AA601		NA	SODIUM HYPOCHLORITE GENERATOR INLET CONTROL VALVE	SOV/O (single coil)	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
11	90PBM32AA601		NA	SODIUM HYPOCHLORITE GENERATOR INLET CONTROL VALVE	SOV/O (single coil)	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
12	90PBM31AA602		NA	SODIUM HYPOCHLORITE GENERATOR OUTLET ON/OFF VALVE	SOV/O (single coil)	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
13	90PBM32AA602		NA	SODIUM HYPOCHLORITE GENERATOR OUTLET ON/OFF VALVE	SOV/O (single coil)	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 2/6	3
14	90PBM47AN001		NA	AIR DILUTION BLOWER (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
15	90PBM48AN001		NA	AIR DILUTION BLOWER (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
16	90PBM49AN001		NA	AIR DILUTION BLOWER (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
17	90PBM50AN001		NA	AIR DILUTION BLOWER (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
18	90PBM41AP001		NA	HYPOCHLORITE DOSING PUMP FOR CW FOREBAY (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
19	90PBM42AP001		NA	HYPOCHLORITE DOSING PUMP FOR CW FOREBAY (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
20	90PBM46AP001		NA	HYPOCHLORITE DOSING PUMP FOR PT PLANT STILLING CHAMBER (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
21	90PBM47AP001		NA	HYPOCHLORITE DOSING PUMP FOR PT PLANT STILLING CHAMBER (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
22	90PBM43AP001		NA	HYPOCHLORITE (SHOCK)DOSING PUMP FOR SEA WATER INTAKE (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
23	90PBM44AP001		NA	HYPOCHLORITE (SHOCK)DOSING PUMP FOR SEA WATER INTAKE (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
24	90PBM45AP001		NA	HYPOCHLORITE(SHOCK) DOSING PUMP FOR SEA WATER INTAKE (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
25	90PBM52AP001		NA	ACID CLEANING PUMP (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 4/6	3
26	90PBM53AP001		NA	ACID CLEANING PUMP (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 4/6	3
27	90PBM51AP001		NA	ACID TRANSFER PUMP (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 4/6	3
28	90PBM51AP002		NA	ACID TRANSFER PUMP (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 4/6	3
29	90PBM61AP001		NA	N-PIT DEWATERING PUMP (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 5/6	3
30	90PBM62AP001		NA	N-PIT DEWATERING PUMP (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 5/6	3
31	90PBM40AA601		NA	90PBM40BB001, HYPO TANK INLET MOTORIZED VALVE	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
32	90PBM40AA602		NA	90PBM40BB001, HYPO TANK OUTLET MOV	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
33	90PBM40AA603		NA	90PBM40BB002, HYPO TANK INLET MOV	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
34	90PBM40AA604		NA	90PBM40BB002, HYPO TANK OUTLET MOV-	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
35	90PBM41AA601		NA	90PBM41AP001, CONT. DOSING PUMP DISCHARGE MOV-	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
36	90PBM42AA601		NA	90PBM42AP001, CONTI. DOSING PUMP DISCHARGE MOV-	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
37	90PBM43AA601		NA	90PBM43AP001, SHOCK DOSING PUMP DISCHARGE MOV-	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
38	90PBM43AA602		NA	90PBM43AP001,44AP001,45AP001, SHOCK DOSING PUMP DIS. MOV-	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
39	90PBM44AA601		NA	90PBM44AP001, SHOCK DOSING PUMP DIS. MOV-	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
40	90PBM44AA602		NA	90PBM43AP001,44AP001,45AP001, SHOCK DOSING PUMP DIS. MOV-	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
41	90PBM45AA601		NA	90PBM45AP001, SHOCK DOSING PUMP DIS. MOV-	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
42	90PBM46AA601		NA	90PBM46AP001, DOSING PUMP TO PTP DIS. MOV-	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
43	90PBM47AA601		NA	90PBM47AP001, DOSING PUMP TO PTP DIS. MOV	MOV	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 3/6	3
DRIVE LIST FOR SEA WATER INTAKE AT 2X600MW PLANT-													
44	90PBM81AP001		NA	HYPOCHLORITE DOSING PUMP FOR SEA WATER INTAKE AT 2X600MW PLANT- (WORKING)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM	DCS FROM LNT		PE-V11-412-174-A101	PAGE 5/6	3
45	90PBM82AP001		NA	HYPOCHLORITE DOSING PUMP FOR SEA WATER INTAKE AT 2X600MW PLANT- (STANDBY)	LT	O	CHLORINATION BUILDING	ELECTRO CHLORINATION SYSTEM			PE-V11-412-174-A101	PAGE 5/6	3



 - Building walls



FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
			APPROVED		
STATUS : CONTRACT					
JOB NO.: 412					

2019.03.
14
16:07:01
+05'30'

BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT.	
This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from the contractual obligation.	
APPROVAL CATEGORY AWARDED = I	
CAT I - Approved	
CAT II - Approved With Comments as Noted	
CAT III - Not Approved	
CAT IV - Reference Drawing	
DEPARTMENT	MECHANICAL AUXILIARY
NAME:	FALGUNI SAHA

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DWG NO. **PE-V11-412-174-A112**



DE NORA

SUB CONTRACTOR: DE NORA INDIA LIMITED KUNDAIM – GOA

ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES, SINGAPORE BRANCH

LOA NO: PW/PE/PG/EN1/P-24/17 DATED: 22 APR 2017

DEPT.	CODE		SCALE	WEIGHT(KG)	REF DRG.	ITEM	
--	A		-	-	-	-	
GA & Datasheet for AC Motors For Electrochlorination Plant					NAME	SIGN	DATE
					PREP	SN	
					CHKD	PG	
					APPD	RF	

DEPT.					CARD CODE	BHEL DOC. NO. PE - V11 - 412 - 174 - A112	REV
SIGN			N.A.				0
DATE							
NO. OF SHEETS 89 EXCLUDING COVER PAGE							

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED
it must not be used directly or indirectly in any way detrimental to the interest of the company

	TITLE ACID CLEANING PUMP MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 1 OF 89

S. No.	Description		Data to be filled by successful bidder
A.	General		
1	Manufacturer & country of origin		CG Power And Industrial Solutions – INDIA
2	Motor type		3 phase AC Squirrel Cage induction Motor IE2
3	Type of starting		Direct Online
4	Name of the equipment driven by motor & Quantity		Acid Cleaning Pump Motor – 2 Nos
5	Maximum Power requirement of driven equipment		4.93 KW
6	Rated speed of Driven Equipment		2850
7	Design ambient temperature		50 °C
B.	Design and Performance Data		
1	Frame size & type designation		132S
2	Type of duty		S1
3	Rated Voltage		415 +/- 10% VAC
4	Permissible variation for		
5	a	Voltage	10%
6	b	Frequency	+3-5%
7	c	Combined voltage & frequency	10% (ABSOLUTE)
8	Rated output at design ambient temp (by resistance method)		7.5KW
9	Synchronous speed & Rated slip		2900 / Slip – 50
10	Minimum permissible starting voltage		85% Rated Voltage
11	Starting time in sec with mechanism coupled		
12	a) At rated voltage		0.055 sec
13	b) At min starting voltage		0.075 sec
14	Locked rotor current as percentage of FLC (including IS tolerance)		840% (FLC)
15	Torque		
	a) Starting		200
	b) Maximum		250
16	Permissible temp rise at rated output over ambient temp & method		70 (Resistance Method)
17	Noise level at 1.0 m (dB		As per IS 12065
18	Amplitude of vibration		As per IS 12075
19	Efficiency & P.F. at rated voltage & frequency		
	a) At 100% load		88.8

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE ACID CLEANING PUMP MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 2 OF 89

S. No.	Description	Data to be filled by successful bidder
	c) At 75% load	85.5
	c) At starting	84
C.	Constructional Features	
1	Method of connection of motor driven equipment	Direct Coupled
2	Applicable Standard	IS/IEC 60034 / IS 12615
3	DOP of Enclosure	IP55
4	Method of cooling	TEFC
5	Class of insulation	F (Temp. rise limited to Class B)
6	Main terminal box	
	a) Type	Non Phase Segregated
	b) Power Cable details (Conductor, size, armour/unarmour)	1*3C * 10sqmm Al
	c) Cable Gland & lugs details (Size, type & material)	Double compression metal gland – CBW02
	d) Permissible Fault level (kArms & duration in sec)	50 KA
7	Space heater details (Voltage & watts)	NA
8	Flame proof motor details (if applicable)	NA
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	6 Nos of terminals
10	Winding connection	DELTA
11	Kind of rotor winding	Squirrel Cage
12	Kind of bearings	SKF or Equivalent Sealed bearing ZZ
13	Direction of rotation when viewed from NDE	Bidirectional
14	Paint Shade & type	Shade No. 631 of IS : 5 - Epoxy paint
15	Net weight of motor	36Kg
16	Outline mounting drawing No (To be enclosed as annexure)	Enclosed
D.	Characteristic curves/ drawings (To be enclosed for motors of rating ≥ 55 KW)	
	a) Torque speed characteristic	Enclosed
	b) Thermal withstand characteristic	Enclosed
	c) Current vs time	Enclosed

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE ACID CLEANING PUMP MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 3 OF 89

S. No.	Description	Data to be filled by successful bidder
	d) Speed vs time	Enclosed

- Note : 1) Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside the terminal box showing the connection diagram for desired direction of rotation and reverse rotation
- 2) Two separate earthing terminals suitable for connecting GI strip grounding conductor shall be provided on opposite sides of the motor frame

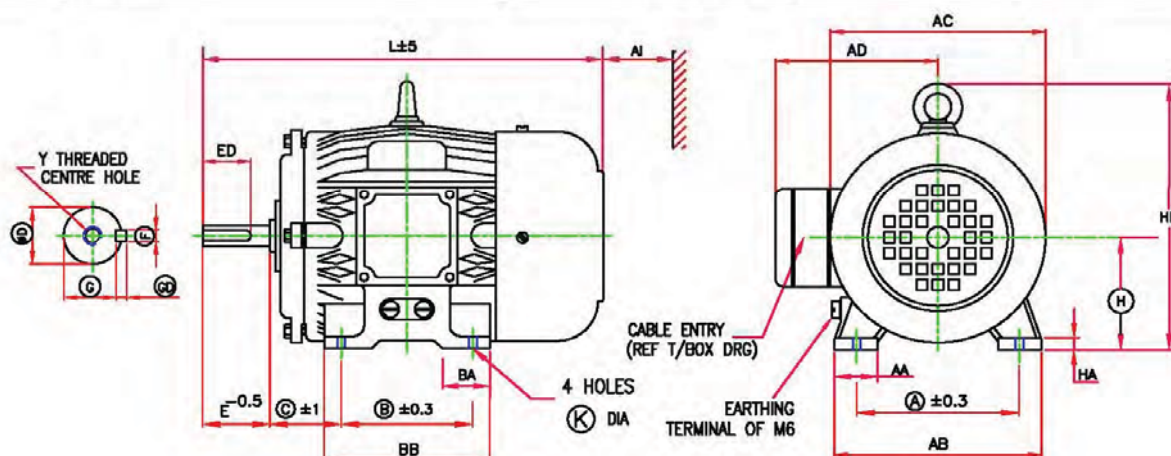
NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

DO NOT SCALE

PLEASE ASK, IF IN DOUBT

PROJECTION



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND132M	216	178		89	132.0/131.7	48	254	54	216	12.0 / 12.5	190	275	510	320	20	72.3	80

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
38.018 / 38.002	80	60	10.00 / 9.964	8.0 / 7.9	33.0 / 32.8	M12X28

NOTES

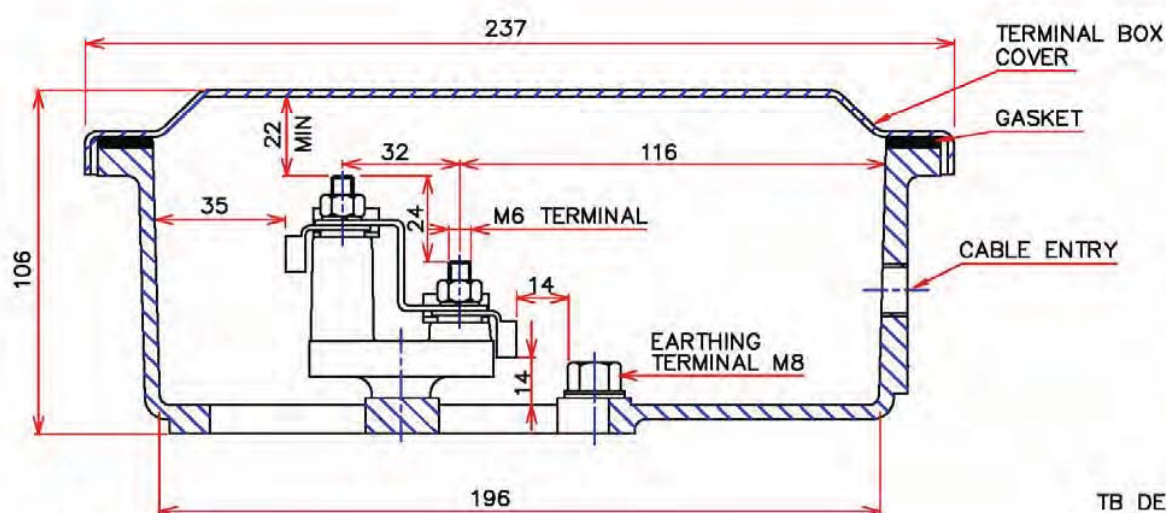
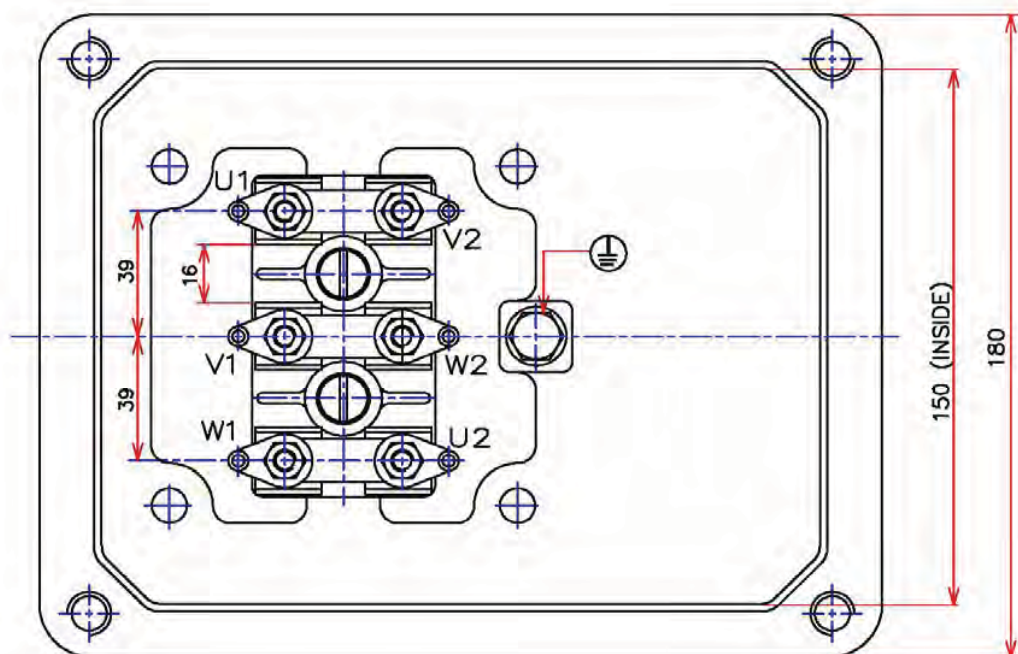
ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.
MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY
**MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

TERMINAL BOX SUITABLE FOR ROTATION THROUGH 360 DEGREES IN STEPS OF 90 DEGREES.

ALL DIMENSIONS ARE IN mm

RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CUSTOMER					RATED O/P kW	7.5		
P.O. NO.		enquiry			NO OF POLES	4		
IND. NO.		QMYD171617/600			FRAME	ND132M		
CLIENT					TAG NO.			
PROJECT								
	NAME	DATE	REMARKS		TITLE			
DRN	SBK	12-Dec-17			DIMENSIONAL DRAWING			
CHD	SBK	12-Dec-17						
APPROVED	SSN	12-Dec-17						
 CG Power and Industrial Solutions Limited LT Motors Division Ahmednagar					DRG NO	QMYD171617/600-4		
					REV 0			



CLEARANCE: 12
CREEPAGE 40

TB DESIGN
1.3C.35CI
1.3.5C.35CI
2.3C.25CI

ACCESSORIES	SPACE HEATER	THERMISTOR	RTD	
APPLICABLE	NA	NA	NA	
CABLE SIZE (ENTRY)	NA	NA	NA	
MAIN CABLE SIZE 1	3C x10 mm ² Al	CABLE ENTRY	M25X1.5P 1-No.	
CUSTOMER			RATED O/P kW	7.5
PO No	enquiry		NO OF POLES	4
INDENT / ENQ No	QMYD171617/600		FRAME	ND132M
CLIENT			Tag No.	
PROJECT				
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED	
DRAWN BY	AMR	05-02-2018	TITLE : TERMINAL BOX ARRANGEMENT	
CHECKED BY	SBK	05-02-2018		
APPROVED BY	SRB	05-02-2018		

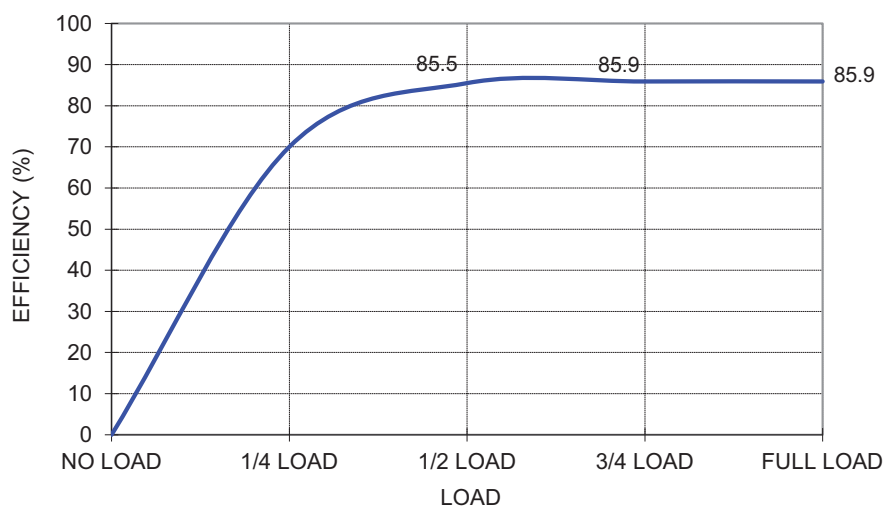


CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

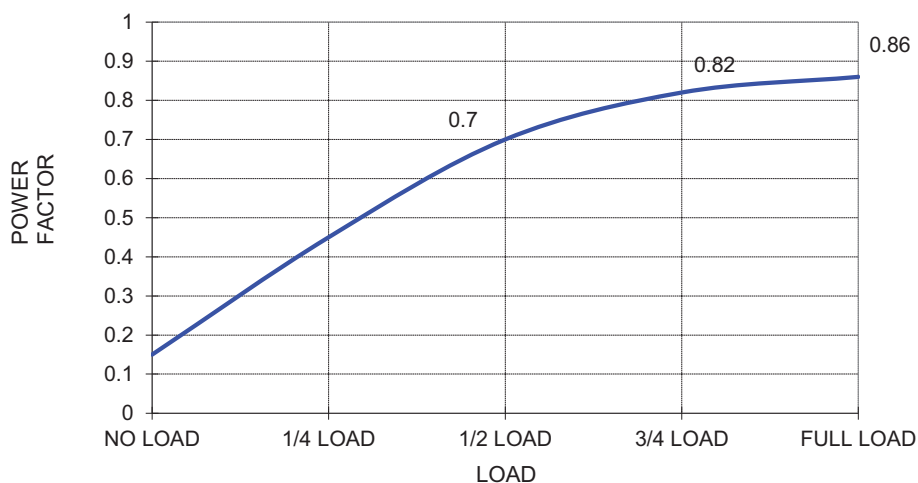
EA3218_1R2

DRG No :

LOAD Vs EFFICIENCY



LOAD Vs POWER-FACTOR

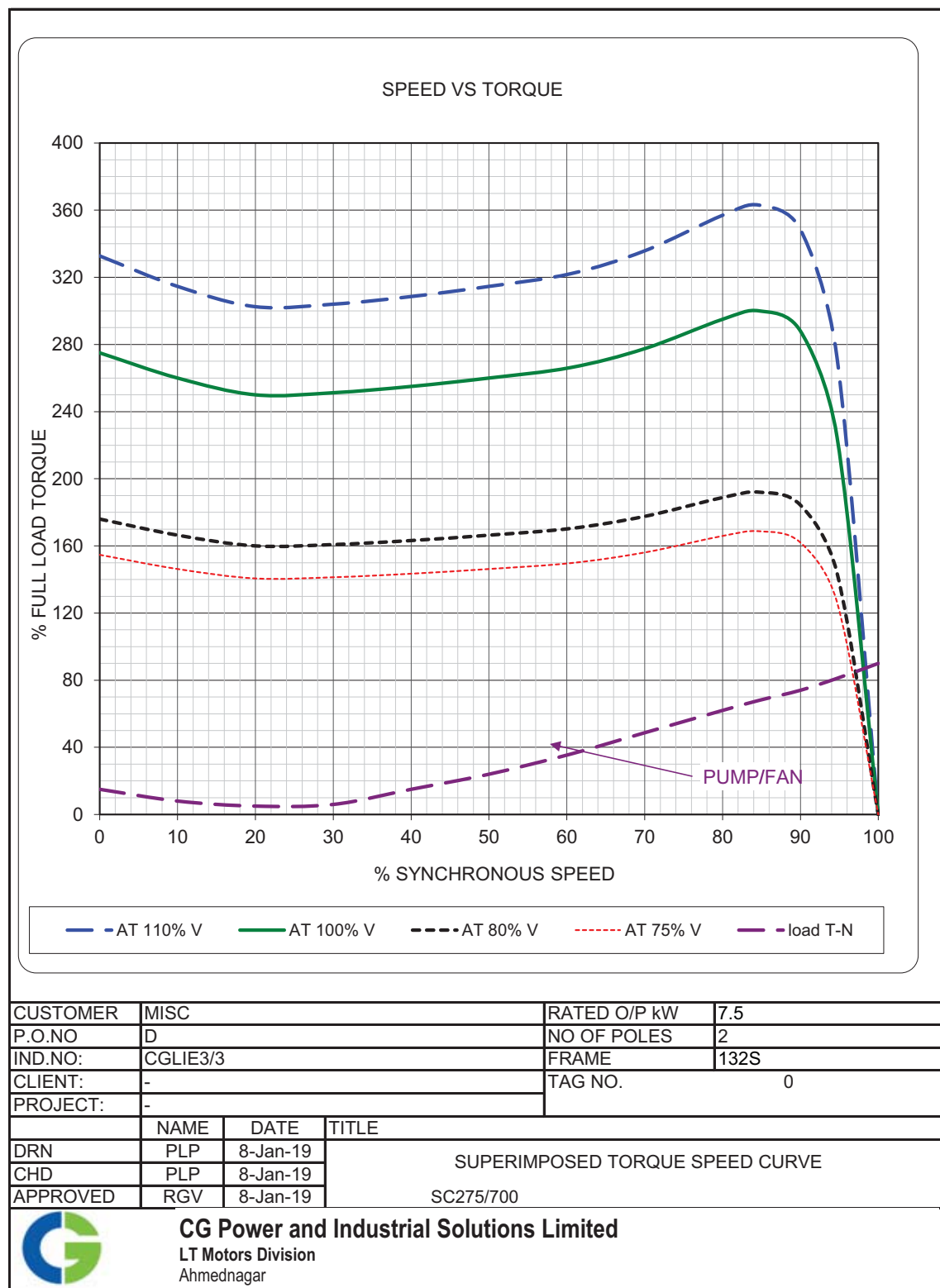


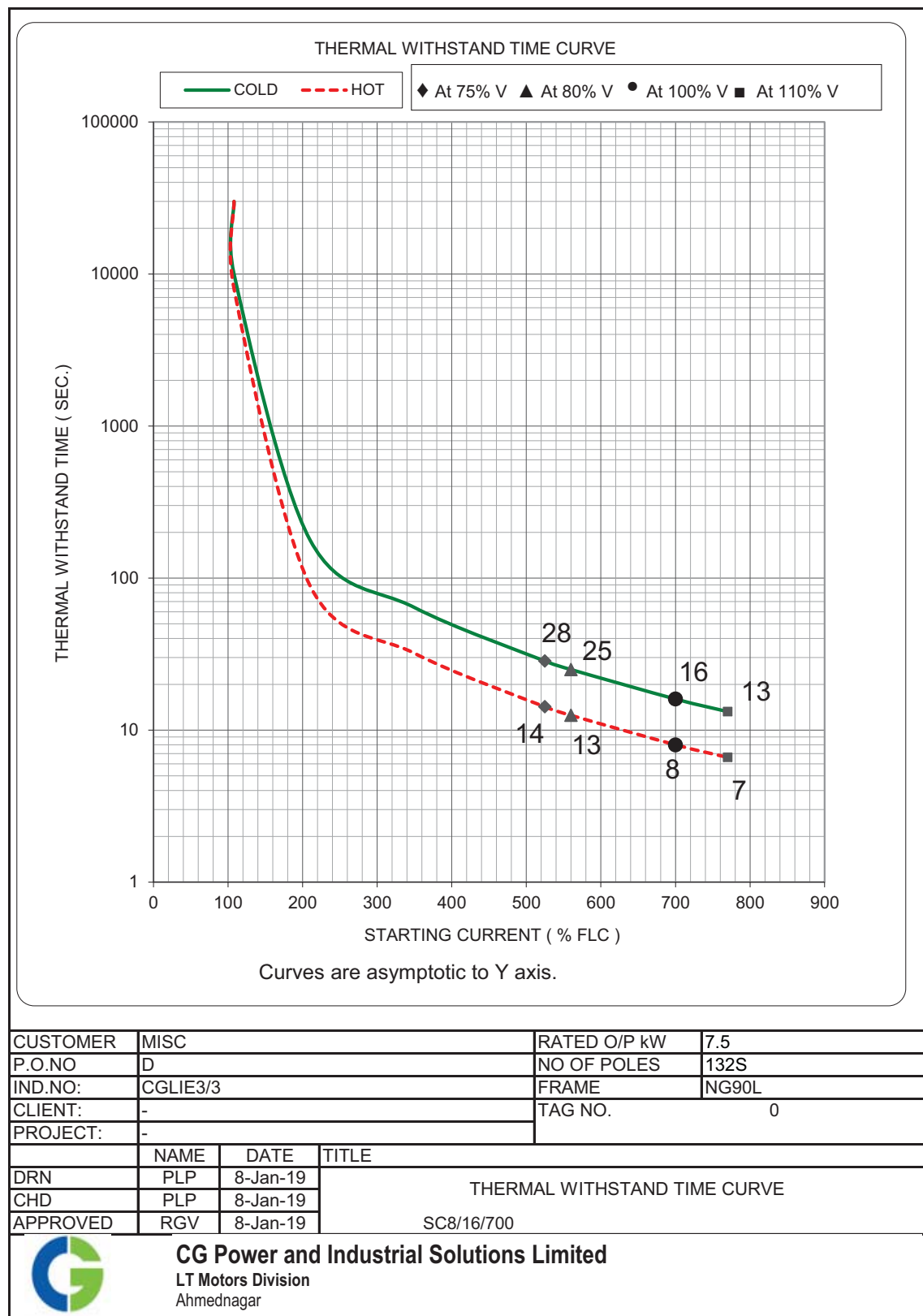
CUSTOMER	MISC	RATED O/P kW	7.5
P.O.NO	D	NO OF POLES	2
IND.NO:	CGLIE3/3	FRAME	132S
CLIENT:	-	TAG NO.	0
PROJECT:	-		
	NAME	DATE	TITLE
DRN	PLP	8-Jan-19	LOAD Vs EFFICIENCY & POWER FACTOR CURVE SC85.90/0.86
CHD	PLP	8-Jan-19	
APPROVED	RGV	8-Jan-19	

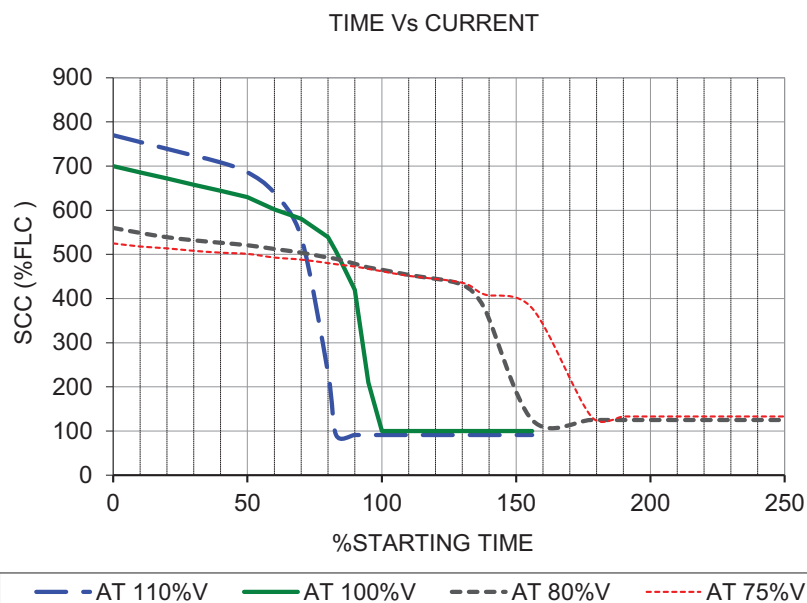
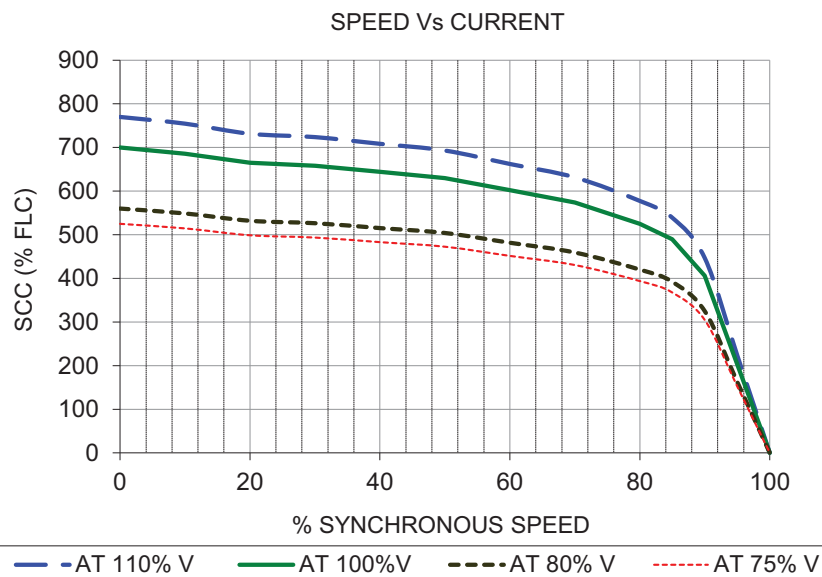


CG Power and Industrial Solutions Limited

LT Motors Division
Ahmednagar





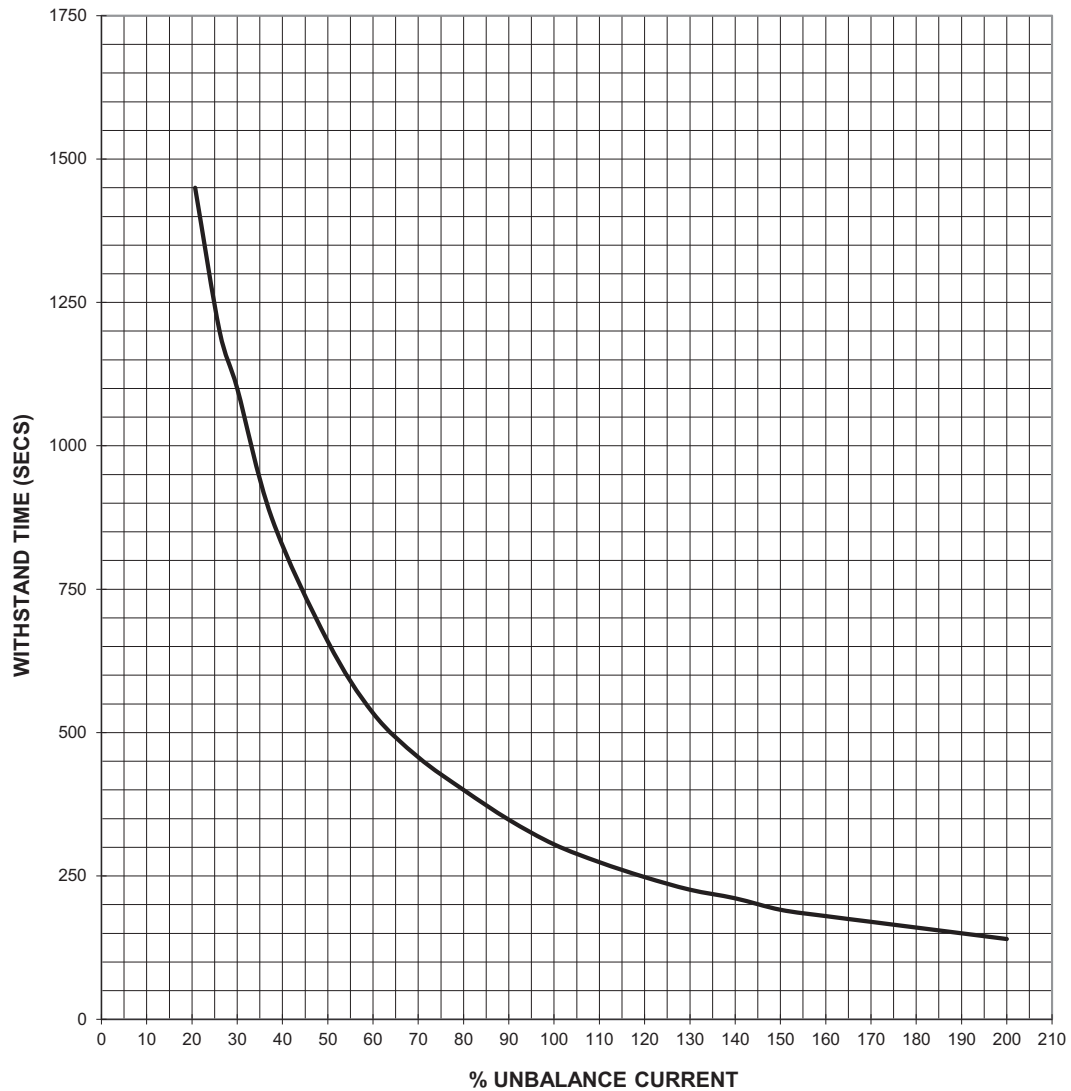


CUSTOMER	MISC	RATED O/P kW	7.5
P.O.NO	D	NO OF POLES	2
IND.NO:	CGLIE3/3	FRAME	132S
CLIENT:	-	TAG NO.	0
PROJECT:	-		
	NAME	DATE	TITLE
DRN	PLP	8-Jan-19	CURRENT SPEED & CURRENT TIME CURVE SC2850/100
CHD	PLP	8-Jan-19	
APPROVED	RGV	8-Jan-19	



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

NEGATIVE SEQUENCE CHARACTERISTICS



CUSTOMER	MISC	RATED O/P kW	7.5
P.O.NO	D	NO OF POLES	2
IND.NO:	CGLIE3/3	FRAME	132S
CLIENT:	-	TAG NO.	0
PROJECT:	-		
	NAME	DATE	TITLE
DRN	PLP	8-Jan-19	NEGATIVE SEQUENCE CHARACTERISTICS
CHD	PLP	8-Jan-19	
APPROVED	RGV	8-Jan-19	



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

	TITLE ACID TRANSFER PUMP MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 11 OF 89

S. No.	Description		Data to be filled by successful bidder
A.	General		
1	Manufacturer & country of origin		CG Power And Industrial Solutions – INDIA
2	Motor type		3 phase AC Squirrel Cage induction Motor IE2
3	Type of starting		Direct Online
4	Name of the equipment driven by motor & Quantity		Acid Transfer Pump Motor – 2 Nos
5	Maximum Power requirement of driven equipment		0.92 KW
6	Rated speed of Driven Equipment		1475
7	Design ambient temperature		50 °C
B.	Design and Performance Data		
1	Frame size & type designation		100L
2	Type of duty		S1
3	Rated Voltage		415 +/- 10% VAC
4	Permissible variation for		
5	a	Voltage	10%
6	b	Frequency	+3-5%
7	c	Combined voltage & frequency	10% (ABSOLUTE)
8	Rated output at design ambient temp (by resistance method)		2.2 KW
9	Synchronous speed & Rated slip		1500/ Slip –25
10	Minimum permissible starting voltage		85% Rated Voltage
11	Starting time in sec with mechanism coupled		
12	a) At rated voltage		0.055 sec
13	b) At min starting voltage		0.075 sec
14	Locked rotor current as percentage of FLC (including IS tolerance)		650% Subject to TOL , Inline with IS 12615
15	Torque		
	a) Starting		200
	b) Maximum		250
16	Permissible temp rise at rated output over ambient temp & method		70 (Resistance Method)
17	Noise level at 1.0 m (dB		As per IS 12065
18	Amplitude of vibration		As per IS 12705
19	Efficiency & P.F. at rated voltage & frequency		
	a) At 100% load		88.8

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE DEWATERING PUMP MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 12 OF 89

S. No.	Description	Data to be filled by successful bidder
	c) At 75% load	85.5
	c) At starting	84
C.	Constructional Features	
1	Method of connection of motor driven equipment	Direct Coupled
2	Applicable Standard	IS/IEC 60034 / IS 12615
3	DOP of Enclosure	IP55
4	Method of cooling	TEFC
5	Class of insulation	F (Temp. rise limited to Class B)
6	Main terminal box	
	a) Type	Non Phase Segregated
	b) Power Cable details (Conductor, size, armour/unarmour)	1*3C * 2.5sqmm
	c) Cable Gland & lugs details (Size, type & material)	Double compression metal gland – CBW01S
	d) Permissible Fault level (kArms & duration in sec)	50 KA
7	Space heater details (Voltage & watts)	NA
8	Flame proof motor details (if applicable)	NA
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	6 Nos of terminals
10	Winding connection	DELTA
11	Kind of rotor winding	Squirrel Cage
12	Kind of bearings	SKF or Equivalent Sealed bearing ZZ
13	Direction of rotation when viewed from NDE	Bidirectional
14	Paint Shade & type	Shade No. 631 of IS : 5 - Epoxy paint
15	Net weight of motor	36Kg
16	Outline mounting drawing No (To be enclosed as annexure)	Enclosed
D.	Characteristic curves/ drawings (To be enclosed for motors of rating ≥ 55 KW)	
	a) Torque speed characteristic	Enclosed
	b) Thermal withstand characteristic	Enclosed
	c) Current vs time	Enclosed

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE DEWATERING PUMP MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 13 OF 89

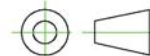
S. No.	Description	Data to be filled by successful bidder
	d) Speed vs time	Enclosed

- Note : 1) Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside the terminal box showing the connection diagram for desired direction of rotation and reverse rotation
- 2) Two separate earthing terminals suitable for connecting GI strip grounding conductor shall be provided on opposite sides of the motor frame

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

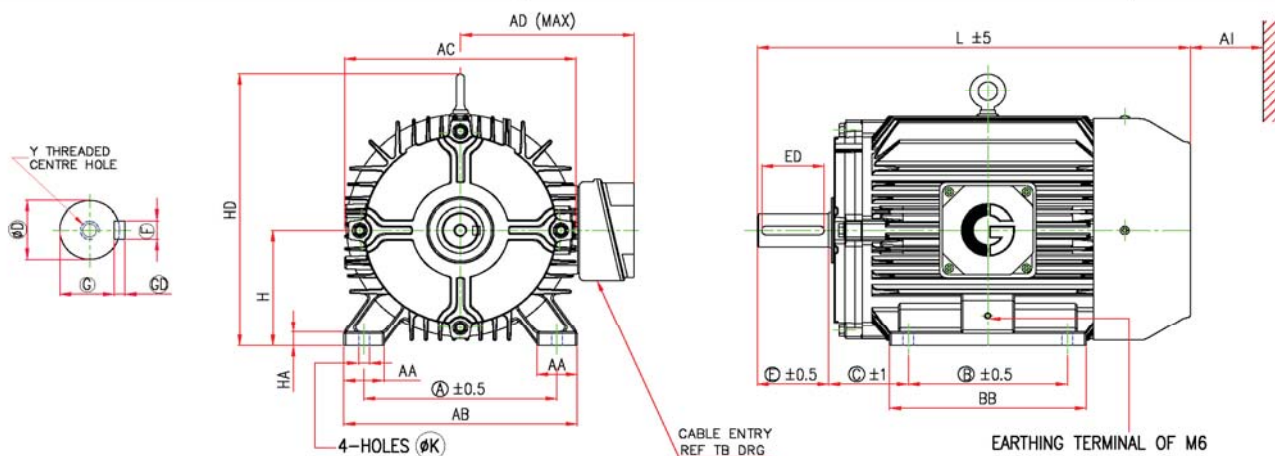
DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

PROJ.



DO NOT SCALE

PLEASE ASK, IF IN DOUBT



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
NG90L	140	125		56	90.0 / 89.7	38	175		195	10.0 / 10.5	170	190	365	232	12	24	50

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

NOTES

ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.

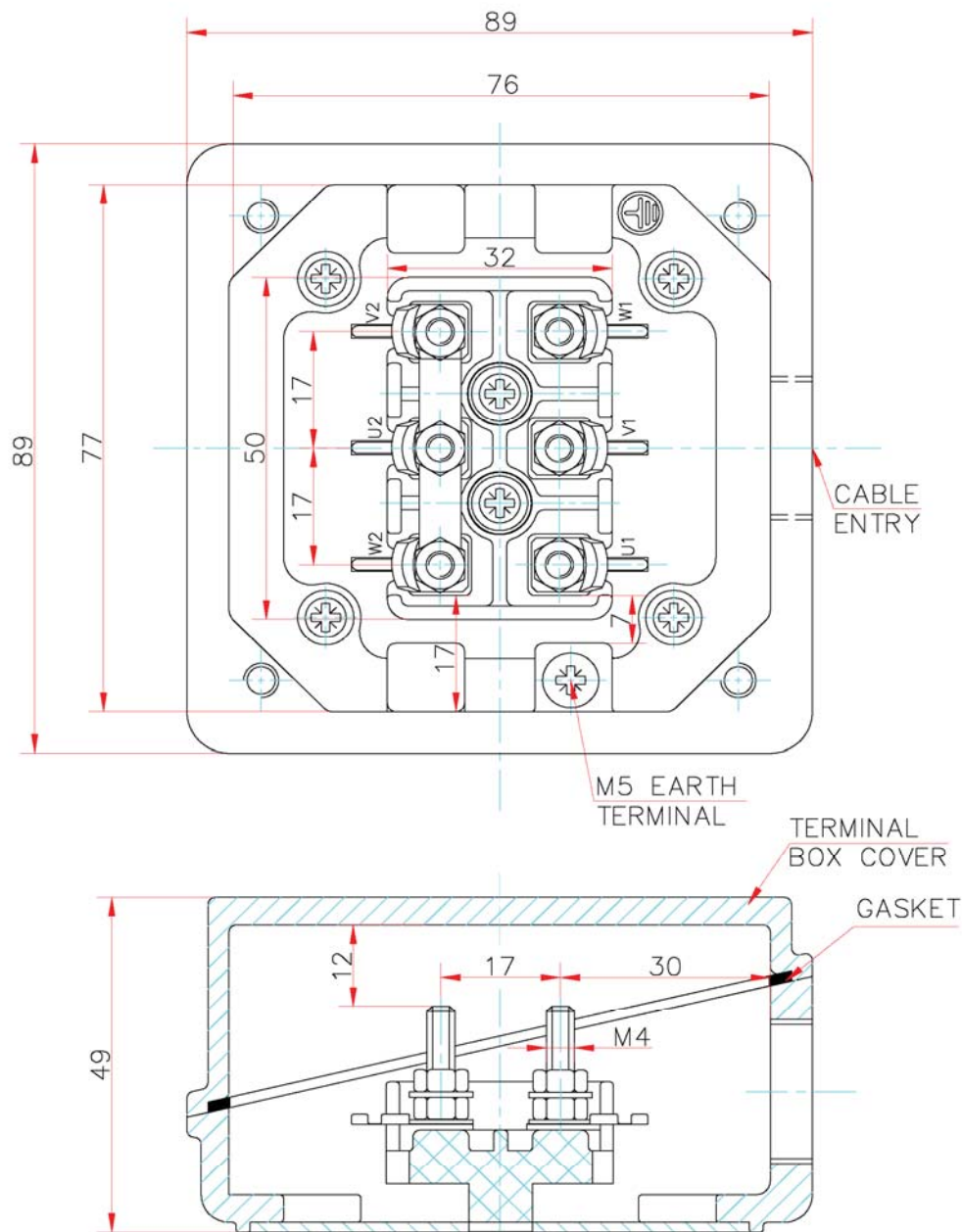
MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY

**MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

ALL DIMENSIONS ARE IN mm

RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CUSTOMER				RATED O/P kW	1.5	
P.O. NO.	D			NO OF POLES	4	
IND. NO.	CGLIE3/20			FRAME	NG90L	MOUNTING B3
CLIENT				TAG NO.		
PROJECT						
	NAME	DATE	REMARKS		TITLE DIMENSIONAL DRAWING	
DRN	SBK	25-Oct-18				
CHD	SBK	25-Oct-18				
APPROVED	SSN	25-Oct-18				
 CG Power and Industrial Solutions Limited LT Motors Division Ahmednagar					DRG NO	
					CGLIE3/20-4	
					REV 0	



CREEPAGE = 20

CLEARANCE = 9

MATERIAL OF T/BOX
CAST IRON

ACCESSORIES	SPACE HEATER		THERMISTOR	RTD	
APPLICABLE	NA		NA	NA	
CABLE SIZE (ENTRY)	NA		NA	NA	
MAIN CABLE SIZE	1 * 3C,2.5-MM² Cu		CABLE ENTRY	M20X1.5P 1-No.	
CUSTOMER	MISC			RATED O/P kW	1.5
PO No	D			NO OF POLES	4
INDENT / ENQ No	CGLIE3/20			FRAME	NG90L
CLIENT			Tag No.		
PROJECT					
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED		
DRAWN BY	AMR	08-01-2019	TITLE : TERMINAL BOX ARRANGEMENT		
CHECKED BY	SBK	08-01-2019			
APPROVED BY	SRB	08-01-2019			

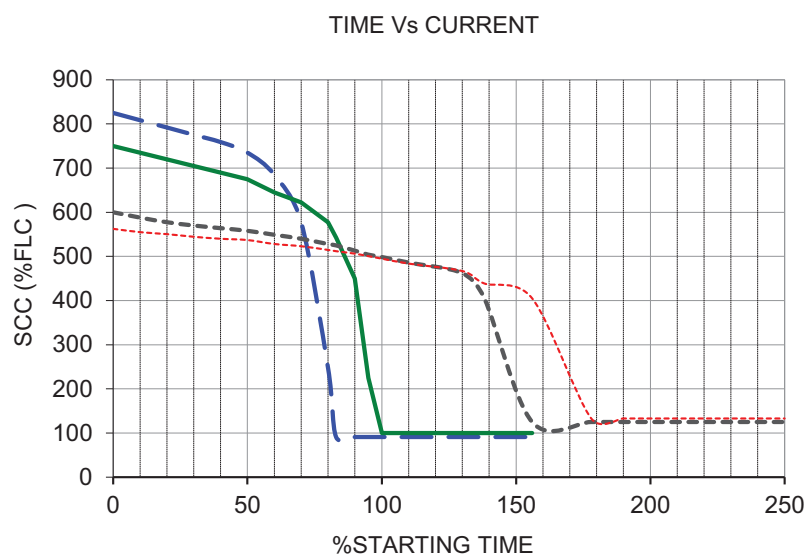
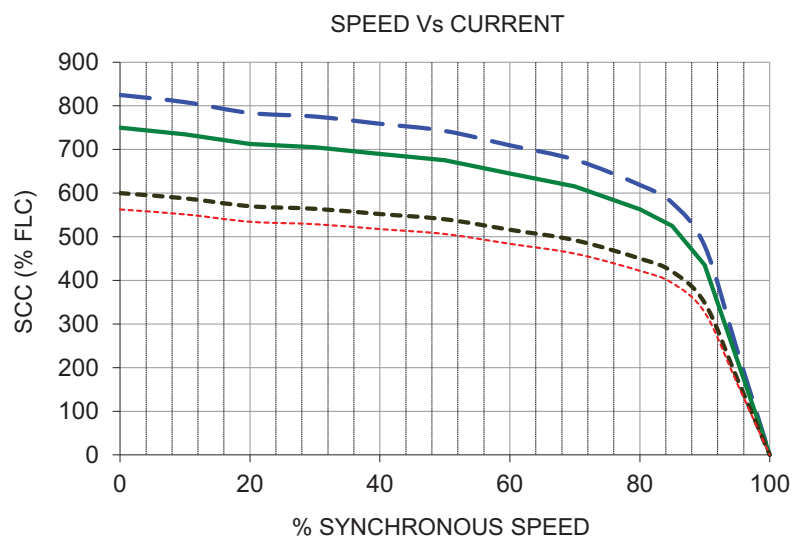


CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

EA9105R1

DRG No :

61901101

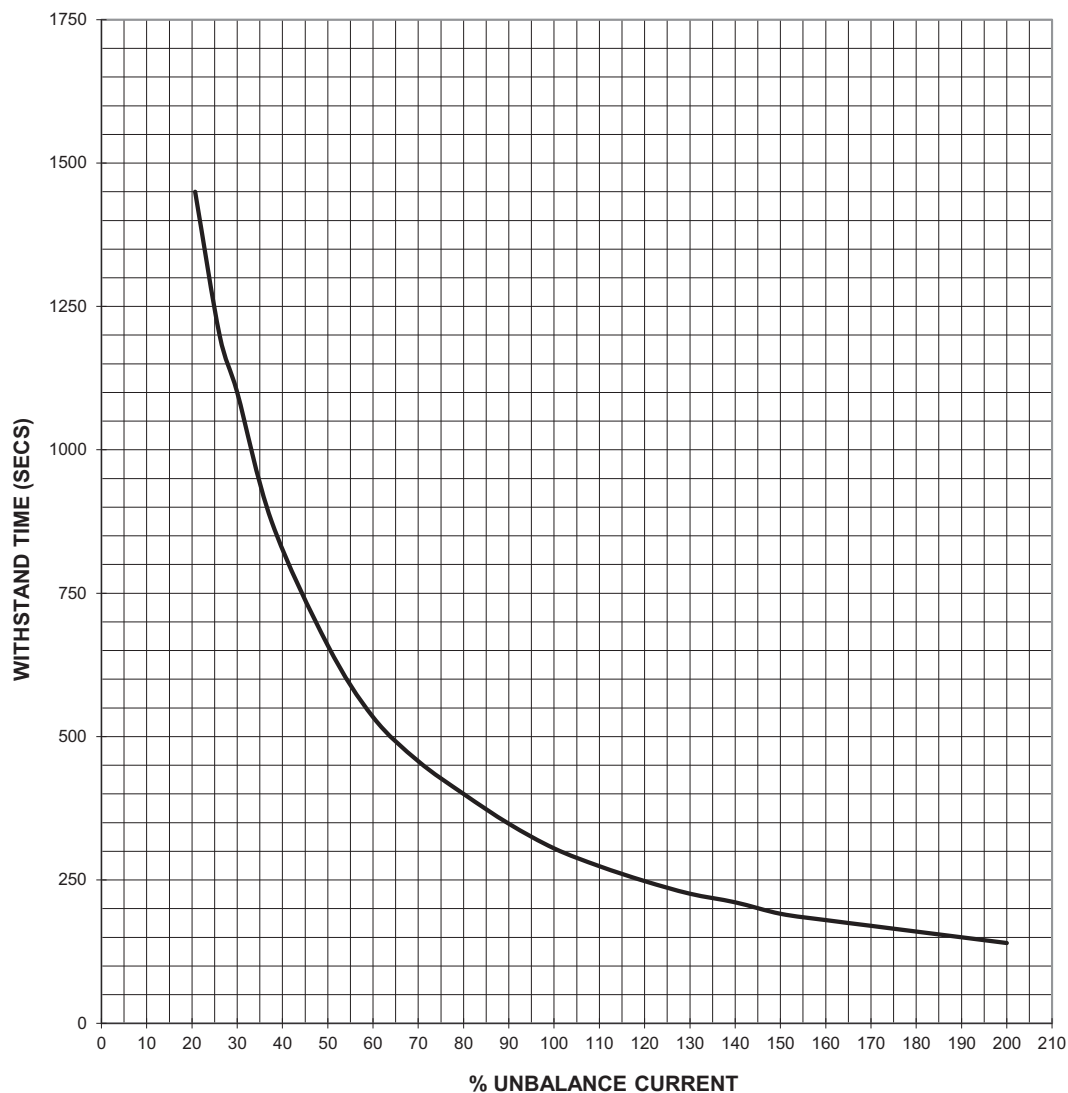


CUSTOMER	MISC	RATED O/P kW	1.5
P.O.NO	D	NO OF POLES	4
IND.NO:	CGLIE3/20	FRAME	NG90L
CLIENT:	-	TAG NO.	0
PROJECT:	-		
	NAME	DATE	TITLE
DRN	PLP	9-Jan-19	CURRENT SPEED & CURRENT TIME CURVE SC1430/100
CHD	PLP	9-Jan-19	
APPROVED	RGV	9-Jan-19	



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

NEGATIVE SEQUENCE CHARACTERISTICS

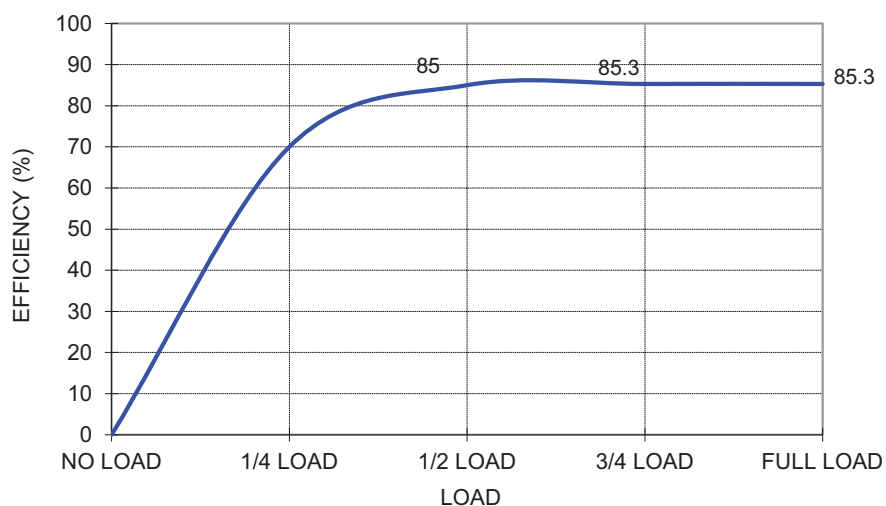


CUSTOMER	MISC	RATED O/P kW	1.5
P.O.NO	D	NO OF POLES	4
IND.NO:	CGLIE3/20	FRAME	NG90L
CLIENT:	-	TAG NO.	0
PROJECT:	-		
	NAME	DATE	TITLE
DRN	PLP	9-Jan-19	NEGATIVE SEQUENCE CHARACTERISTICS
CHD	PLP	9-Jan-19	
APPROVED	RGV	9-Jan-19	

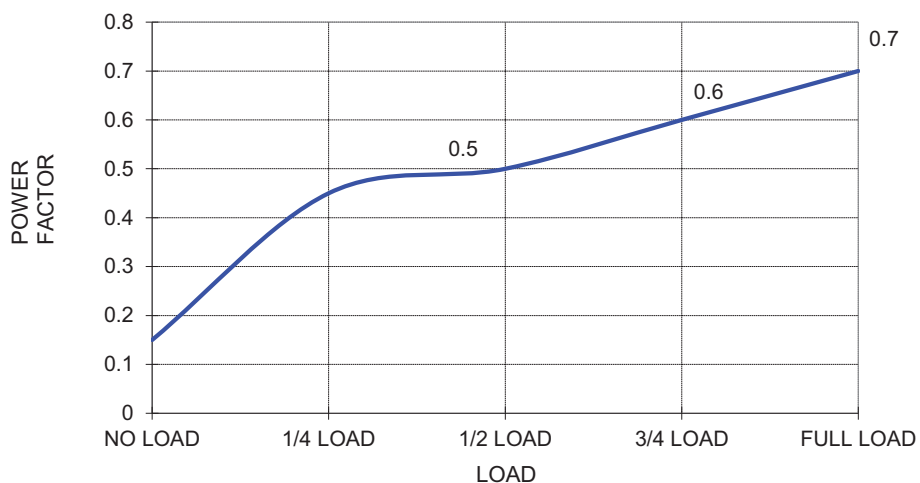


CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

LOAD Vs EFFICIENCY



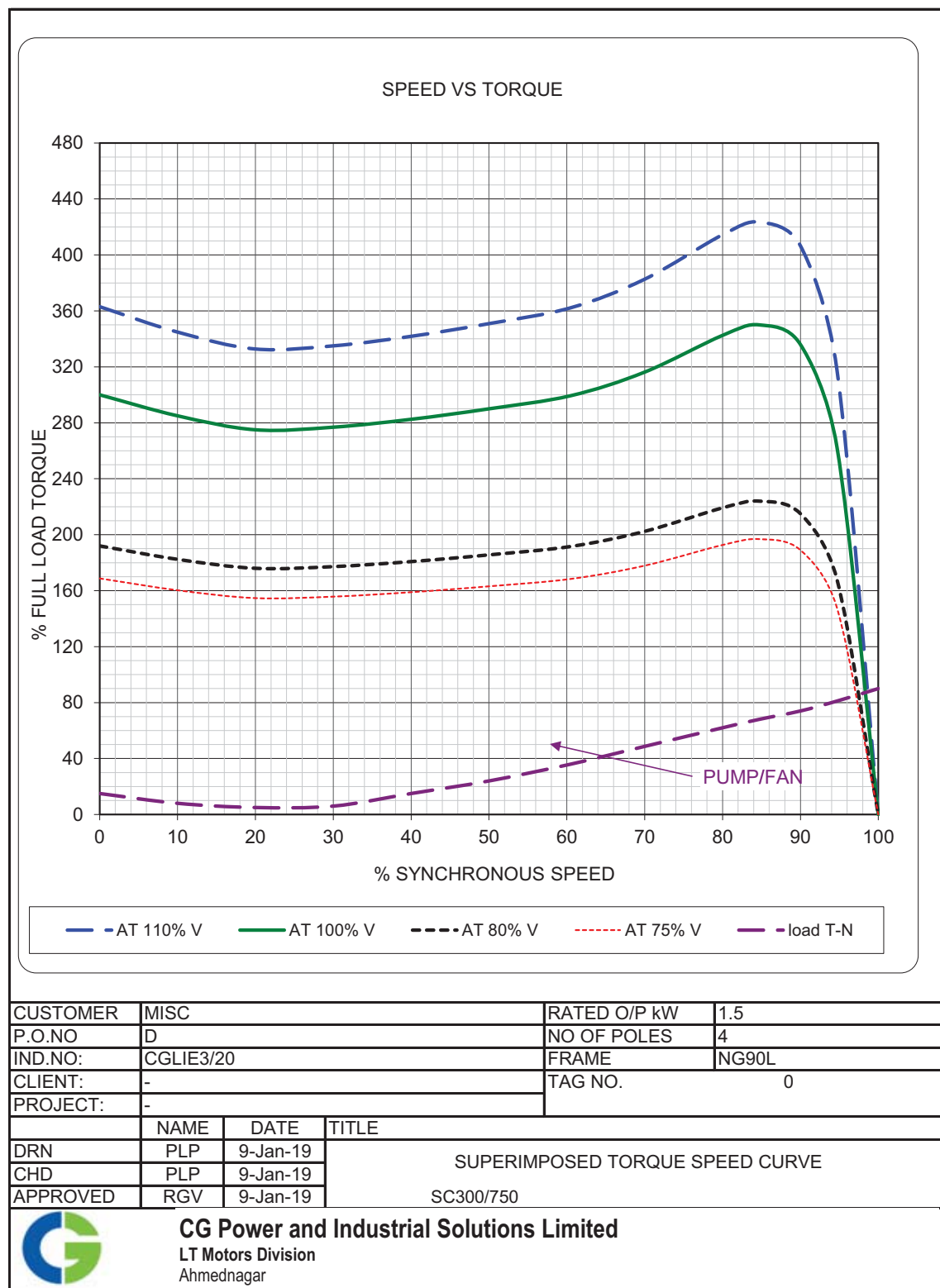
LOAD Vs POWER-FACTOR

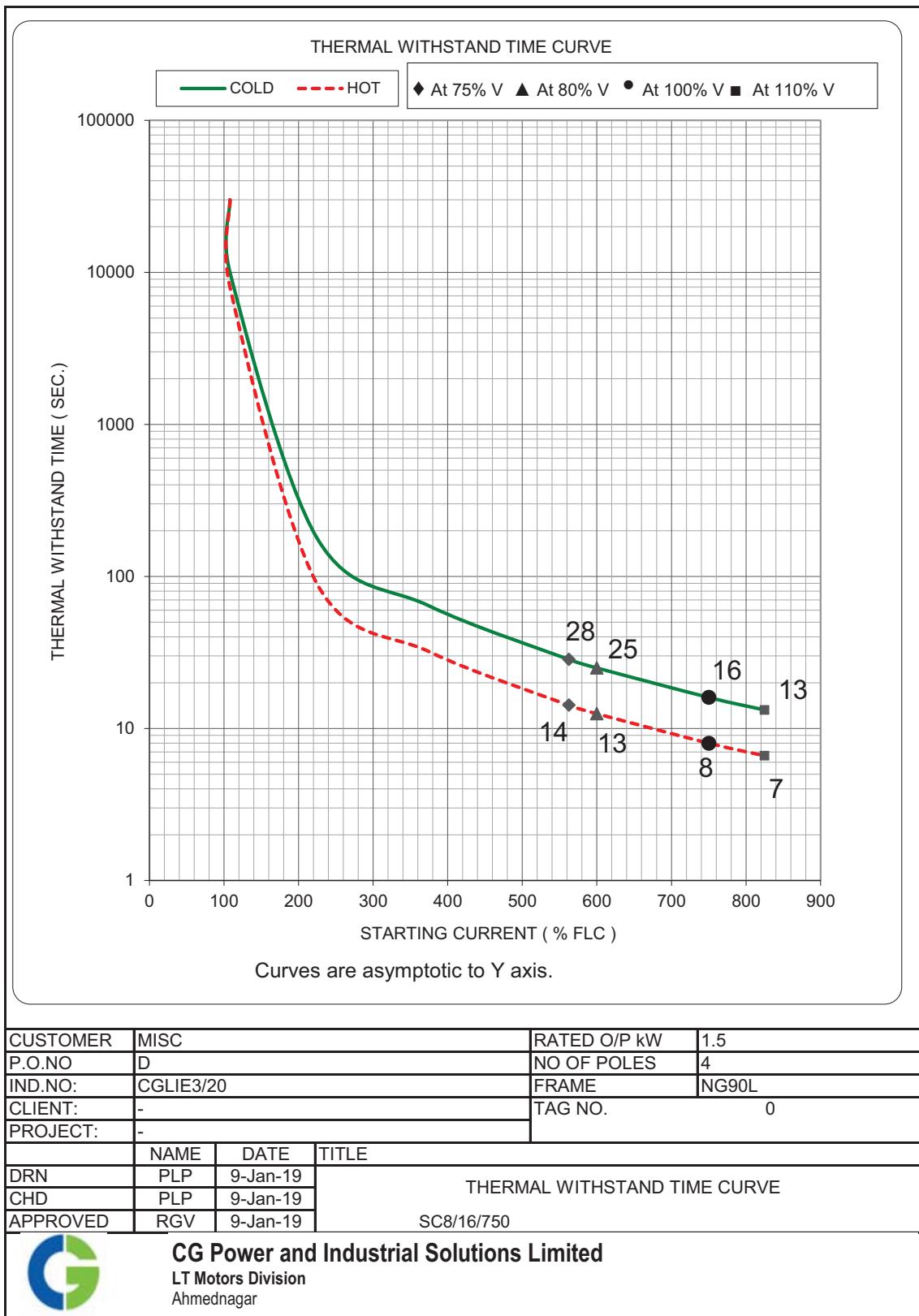


CUSTOMER	MISC	RATED O/P kW	1.5
P.O.NO	D	NO OF POLES	4
IND.NO:	CGLIE3/20	FRAME	NG90L
CLIENT:	-	TAG NO.	0
PROJECT:	-		
	NAME	DATE	TITLE
DRN	PLP	9-Jan-19	LOAD Vs EFFICIENCY & POWER FACTOR CURVE SC85.30/0.70
CHD	PLP	9-Jan-19	
APPROVED	RGV	9-Jan-19	



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar





	TITLE DEWATERING PUMP MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 21 OF 89

S. No.	Description		Data to be filled by successful bidder
A.	General		
1	Manufacturer & country of origin		CG Power And Industrial Solutions – INDIA
2	Motor type		3 phase AC Squirrel Cage induction Motor IE2
3	Type of starting		Direct Online
4	Name of the equipment driven by motor & Quantity		Acid Cleaning Pump Motor – 2 Nos
5	Maximum Power requirement of driven equipment		0.92 KW
6	Rated speed of Driven Equipment		2850
7	Design ambient temperature		50 °C
B.	Design and Performance Data		
1	Frame size & type designation		90L
2	Type of duty		S1
3	Rated Voltage		415 +/- 10% VAC
4	Permissible variation for		
5	a	Voltage	10%
6	b	Frequency	+3-5%
7	c	Combined voltage & frequency	10% (ABSOLUTE)
8	Rated output at design ambient temp (by resistance method)		2.2KW
9	Synchronous speed & Rated slip		1500 / Slip – 50
10	Minimum permissible starting voltage		85% Rated Voltage
11	Starting time in sec with mechanism coupled		
12	a) At rated voltage		0.055 sec
13	b) At min starting voltage		0.075 sec
14	Locked rotor current as percentage of FLC (including IS tolerance)		840% (FLC)
15	Torque		
	a) Starting		300
	b) Maximum		350
16	Permissible temp rise at rated output over ambient temp & method		70 (Resistance Method)
17	Noise level at 1.0 m (dB		As per IS 12065
18	Amplitude of vibration		As per IS 12075
19	Efficiency & P.F. at rated voltage & frequency		
	a) At 100% load		85.3

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE DEWATERING PUMP MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 22 OF 89

S. No.	Description	Data to be filled by successful bidder
	c) At 75% load	85.3
	c) At starting	85
C.	Constructional Features	
1	Method of connection of motor driven equipment	Direct Coupled
2	Applicable Standard	IS/IEC 60034 / IS 12615
3	DOP of Enclosure	IP55
4	Method of cooling	TEFC
5	Class of insulation	F (Temp. rise limited to Class B)
6	Main terminal box	
	a) Type	Non Phase Segregated
	b) Power Cable details (Conductor, size, armour/unarmour)	1*3C * 2.5 sqmm
	c) Cable Gland & lugs details (Size, type & material)	Double compression metal gland – CBW02
	d) Permissible Fault level (kArms & duration in sec)	50 KA
7	Space heater details (Voltage & watts)	NA
8	Flame proof motor details (if applicable)	NA
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	6 Nos of terminals
10	Winding connection	DELTA
11	Kind of rotor winding	Squirrel Cage
12	Kind of bearings	SKF or Equivalent Sealed ZZ bearing
13	Direction of rotation when viewed from NDE	Bidirectional
14	Paint Shade & type	Shade No. 632 of IS : 5 - Epoxy paint
15	Net weight of motor	24Kg
16	Outline mounting drawing No (To be enclosed as annexure)	Enclosed
D.	Characteristic curves/ drawings (To be enclosed for motors of rating ≥ 55 KW)	
	a) Torque speed characteristic	Enclosed
	b) Thermal withstand characteristic	Enclosed
	c) Current vs time	Enclosed

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE DEWATERING PUMP MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 23 OF 89

S. No.	Description	Data to be filled by successful bidder
	d) Speed vs time	Enclosed

Note : 1) Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside

the terminal box showing the connection diagram for desired direction of rotation and reverse rotation

2) Two separate earthing terminals suitable for connecting GI strip grounding conductor shall be provided on opposite sides of the motor frame

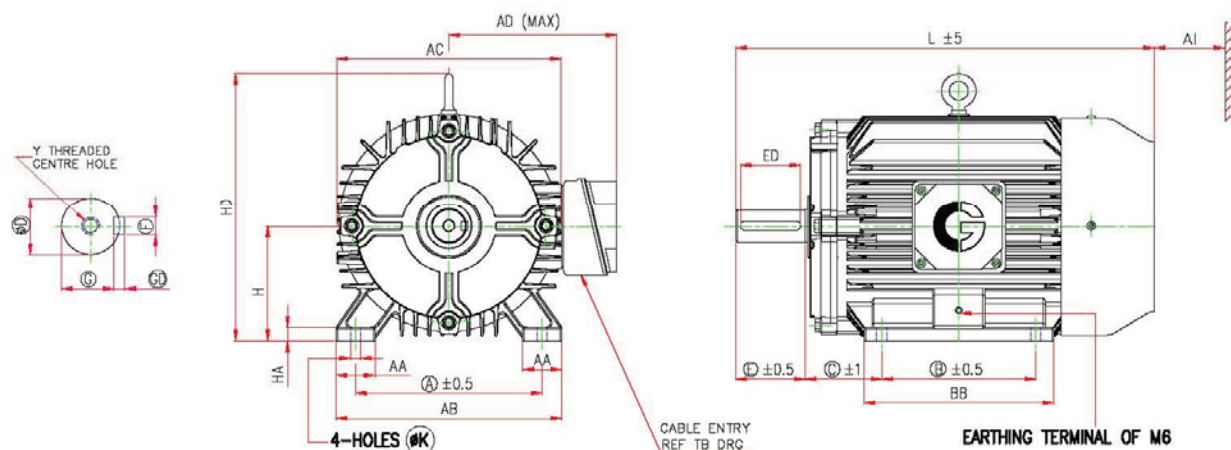
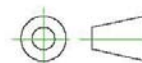
NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

DO NOT SCALE

PLEASE ASK, IF IN DOUBT

PROJ.



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
NG90L	140	125		56	90.0 / 89.7	38	175		195	10.0 / 10.5	170	190	365	232	12	24	50

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

NOTES

ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.

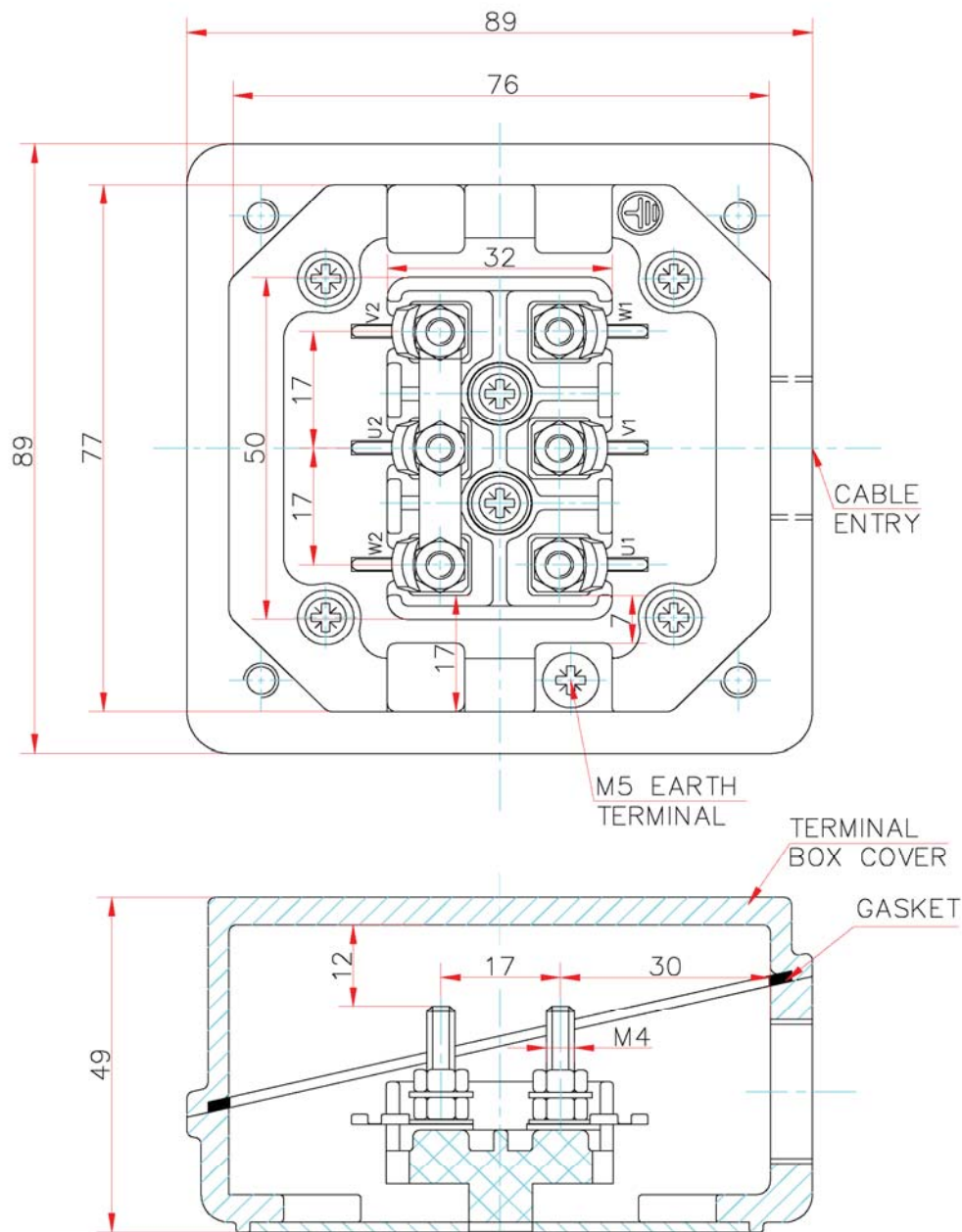
MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY

**MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

ALL DIMENSIONS ARE IN mm

RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CUSTOMER				RATED O/P kW	2.2
P.O. NO.	D			NO OF POLES	2
IND. NO.	CGLIE3/3			FRAME	NG90L
CLIENT				MOUNTING	B3
PROJECT				TAG NO.	
	NAME	DATE	REMARKS	TITLE DIMENSIONAL DRAWING	
DRN	SBK	5-Jul-18			
CHD	SBK	5-Jul-18			
APPROVED	SSN	5-Jul-18			
 CG Power and Industrial Solutions Limited LT Motors Division Ahmednagar				DRG NO	CGLIE3/3-2
					REV 0



CREEPAGE = 20

CLEARANCE = 9

MATERIAL OF T/BOX
CAST IRON

ACCESSORIES	SPACE HEATER		THERMISTOR	RTD	
APPLICABLE	NA		NA	NA	
CABLE SIZE (ENTRY)	NA		NA	NA	
MAIN CABLE SIZE	1 * 3C,2.5-MM²		CABLE ENTRY	M20X1.5P 1-No.	
CUSTOMER	MISC			RATED O/P kW	2.2
PO No	D			NO OF POLES	2
INDENT / ENQ No	CGLIE3/3			FRAME	NG90L
CLIENT			Tag No.		
PROJECT					
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED		
DRAWN BY	AMR	08-01-2019	TITLE : TERMINAL BOX ARRANGEMENT		
CHECKED BY	SBK	08-01-2019			
APPROVED BY	SRB	08-01-2019			

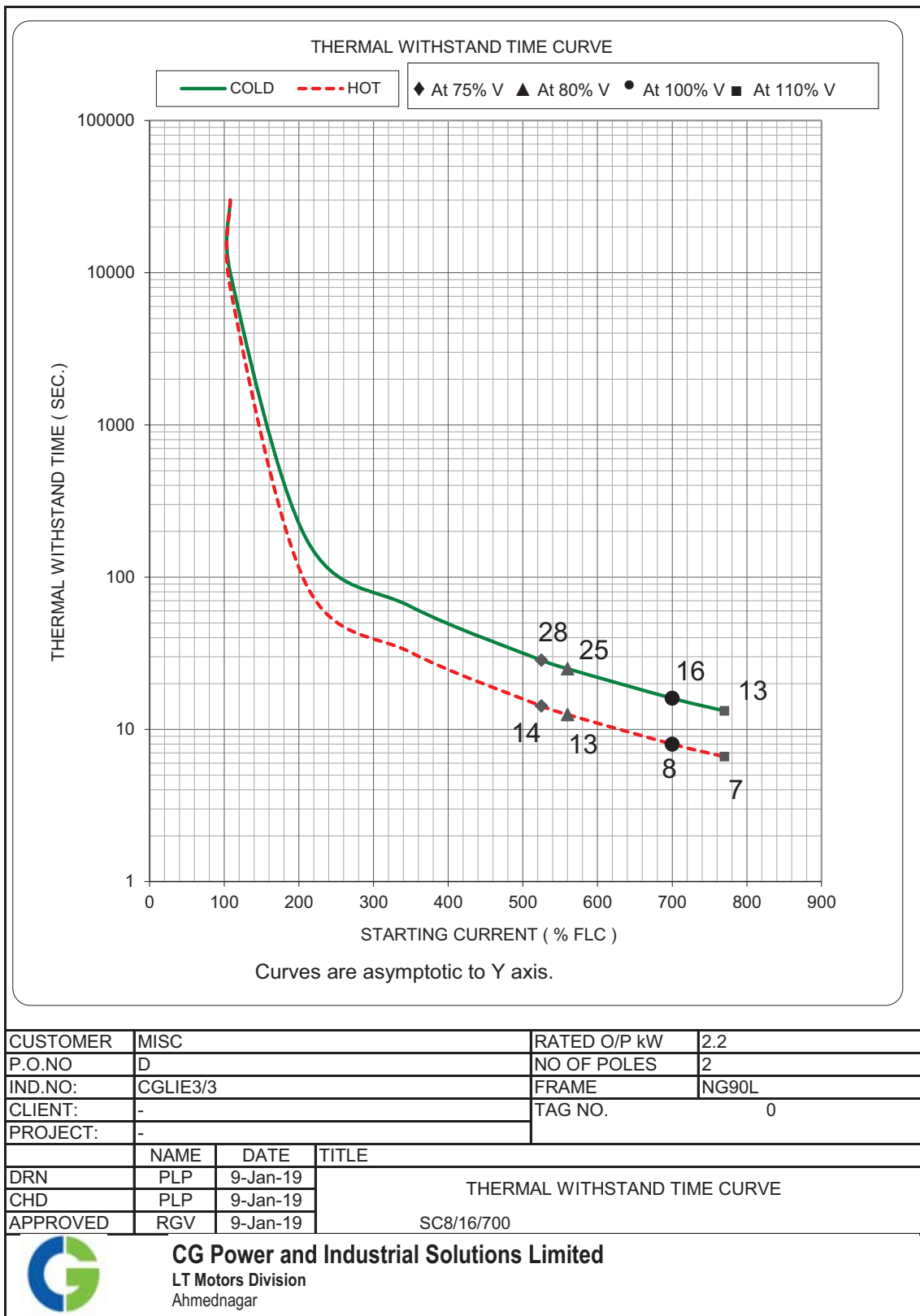


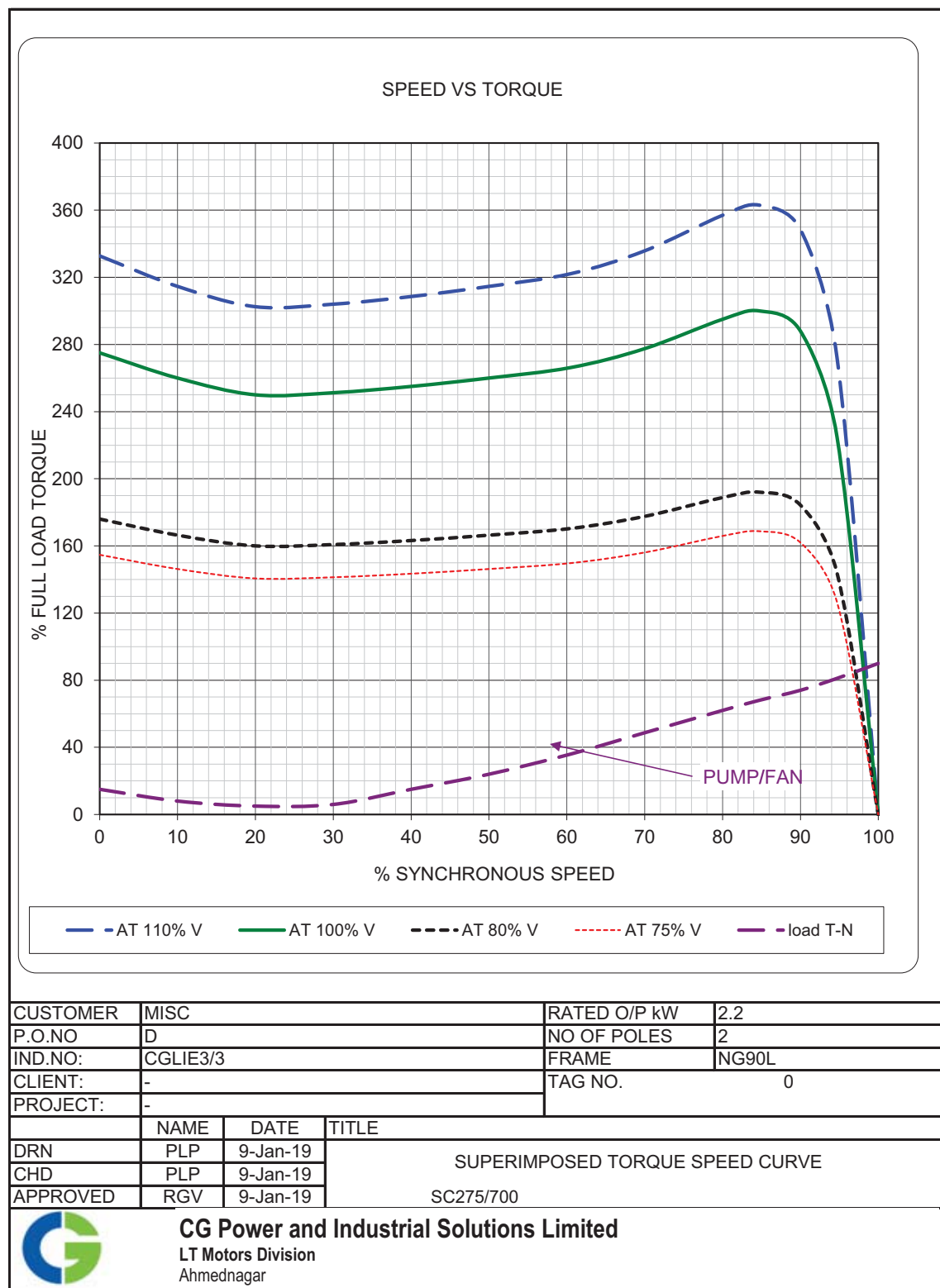
CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

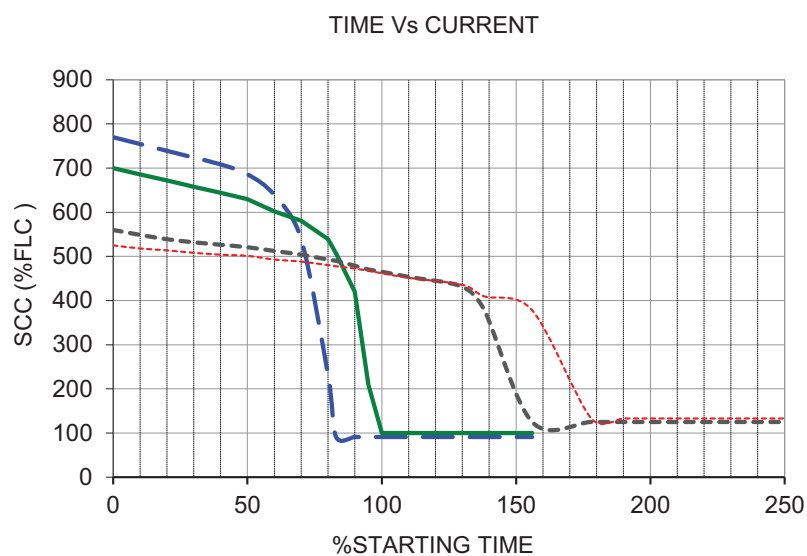
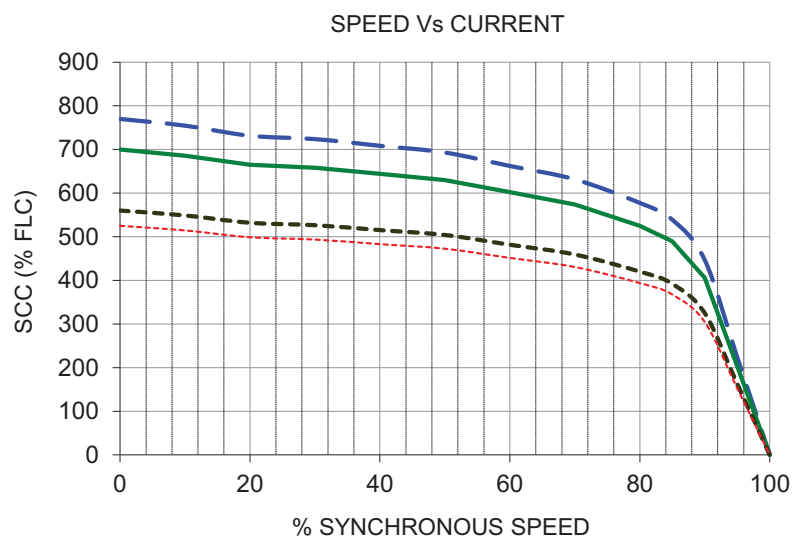
EA9105R1

DRG No :

61901101





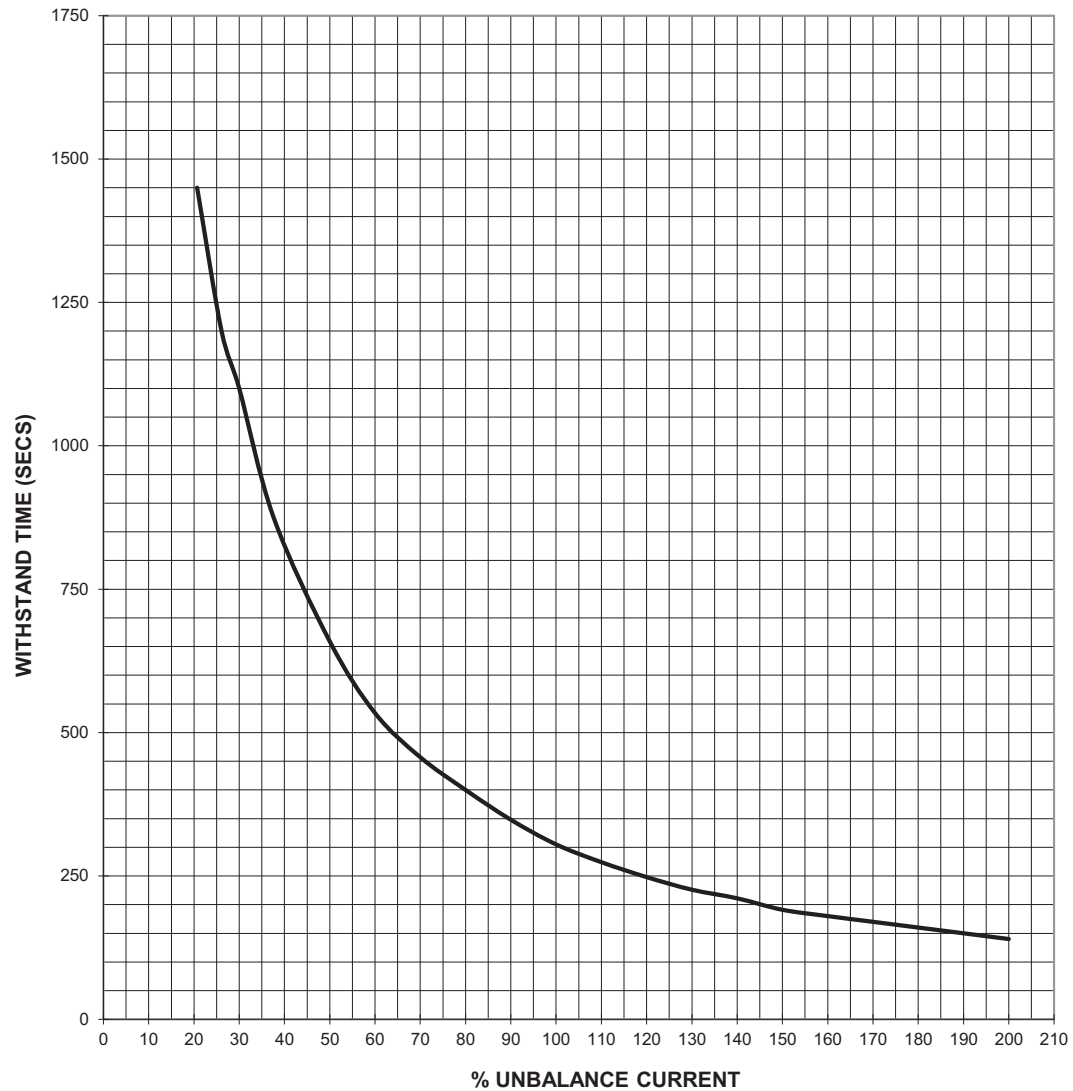


CUSTOMER	MISC	RATED O/P kW	2.2
P.O.NO	D	NO OF POLES	2
IND.NO:	CGLIE3/3	FRAME	NG90L
CLIENT:	-	TAG NO. 0	
PROJECT:	-		
	NAME	DATE	TITLE
DRN	PLP	9-Jan-19	CURRENT SPEED & CURRENT TIME CURVE SC2850/100
CHD	PLP	9-Jan-19	
APPROVED	RGV	9-Jan-19	



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

NEGATIVE SEQUENCE CHARACTERISTICS



CUSTOMER	MISC	RATED O/P kW	2.2
P.O.NO	D	NO OF POLES	2
IND.NO:	CGLIE3/3	FRAME	NG90L
CLIENT:	-	TAG NO.	0
PROJECT:	-		
	NAME	DATE	TITLE
DRN	PLP	9-Jan-19	NEGATIVE SEQUENCE CHARACTERISTICS
CHD	PLP	9-Jan-19	
APPROVED	RGV	9-Jan-19	



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

	TITLE BLOWER MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 30 OF 89

S. No.	Description		Data to be filled by successful bidder
A.	General		
1	Manufacturer & country of origin		CG / INDIA
2	Motor type		TEFC Induction Motor IE3
3	Type of starting		DOL
4	Name of the equipment driven by motor & Quantity		AIR DILLUTION BLOWER
5	Maximum Power requirement of driven equipment		10KW
6	Rated speed of Driven Equipment		2900
7	Design ambient temperature		50 Deg C
B.	Design and Performance Data		
1	Frame size & type designation		ND160 M
2	Type of duty		S1
3	Rated Voltage		415 VAC
4	Permissible variation for		
5	a	Voltage	+/- 10%
6	b	Frequency	+/- 5%
7	c)	Combined voltage & frequency	+/- 10%
8	Rated output at design ambient temp (by resistance method)		15KW
9	Synchronous speed & Rated slip		3000RPM / 2.66%SLIP
10	Minimum permissible starting voltage		85% Of Rated Voltage
11	Starting time in sec with mechanism coupled		
12	a) At rated voltage		0.5 SEC.
13	b) At min starting voltage		0.8SEC
14	Locked rotor current as percentage of FLC (including IS tolerance)		840%
15	Torque		
	a) Starting		200% of FLT
	b) Maximum		275 of FLT
16	Permissible temp rise at rated output over ambient temp & method		70 Deg. By Resistance method
17	Noise level at 1.0 m (dB)		AS PER IS 12065
18	Amplitude of vibration		AS PER IS12075
19	Efficiency & P.F. at rated voltage & frequency		
	a) At 100% load		91.9% and 0.89
	c) At 75% load		91.9% and 0.86

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE BLOWER MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 31 OF 89

S. No.	Description	Data to be filled by successful bidder
	c) At starting	NILL & 0.3 to 0.5
C.	Constructional Features	
1	Method of connection of motor driven equipment	Direct – impellar mounted on motor shaft
2	Applicable Standard	IS / IEC 60034 / IS 12615
3	DOP of Enclosure	IP 55
4	Method of cooling	IC 411
5	Class of insulation	F (Temperature Class limited to B)
6	Main terminal box	
	a) Type	Non Phase Seggregated
	b) Power Cable details (Conductor, size, armour/unarmour)	1 x 3C x 25 Sqmm Al.
	c) Cable Gland & lugs details (Size, type & material)	Double compression glands , Make : Comet or equivalent, CBW03
	d) Permissible Fault level (kArms & duration in sec)	50KA For 0.25 sec.
7	Space heater details (Voltage & watts)	NA
8	Flame proof motor details (if applicable)	NA
	a) Enclosure	NA
	b) suitability for hazardous area	NA
	i NA	NA
	ii NA	NA
9	No. of Stator winding	6 no. of Terminals
10	Winding connection	DELTA
11	Kind of rotor winding	Squirrel cage Rotor
12	Kind of bearings	6309zz / 6209zz
13	Direction of rotation when viewed from NDE	BIDIRECTIONAL
14	Paint Shade & type	Shade No. 632 of IS : 5 - Epoxy paint
15	Net weight of motor	108
16	Outline mounting drawing No (To be enclosed as annexure)	Enclosed Drawing
D.	Characteristic curves/ drawings (To be enclosed for motors of rating $\geq 55KW$)	NA
	a) Torque speed characteristic	Enclosed
	b) Thermal withstand characteristic	Enclosed
	c) Current vs time	Enclosed

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE BLOWER MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 32 OF 89

S. No.	Description	Data to be filled by successful bidder
	d) Speed vs time	Enclosed

Note : 1) Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside

the terminal box showing the connection diagram for desired direction of rotation and reverse rotation

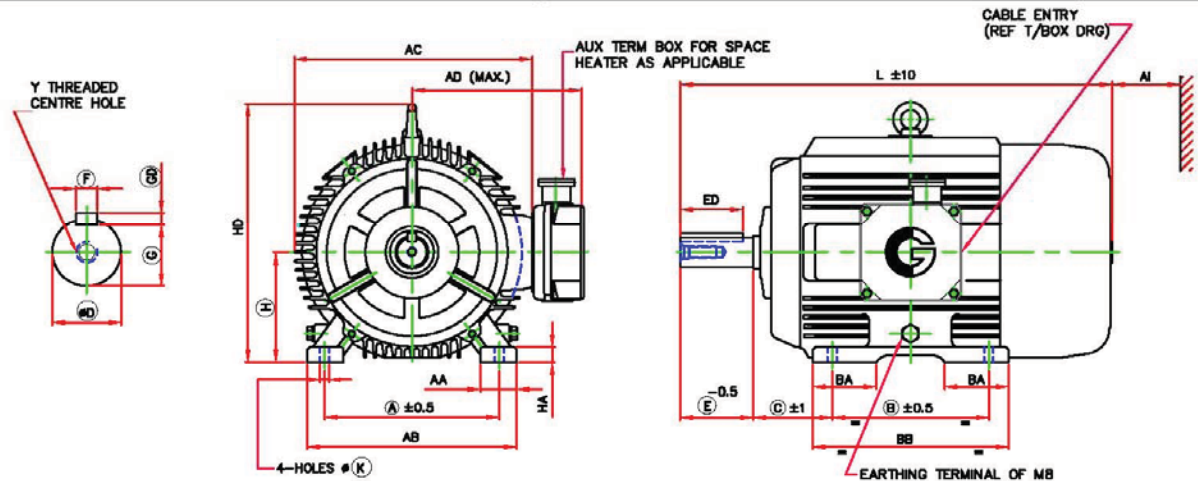
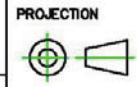
2) Two separate earthing terminals suitable for connecting GI strip grounding conductor shall be provided on opposite sides of the motor frame

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

DO NOT SCALE

PLEASE ASK, IF IN DOUBT



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND160M	254	210		108	160.0 / 159.5	73	308	77	254	15.0 / 15.5	250	318	605	376	22	108	90

D END SHAFT EXTENSION AND KEY							
D TOL	E	ED	F TOL	GD TOL	G	Y	
42.018 / 42.002	110	80	12.00 / 11.957	8.0 / 7.9	37.0 / 36.8	M16X32	

NOTES

ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.

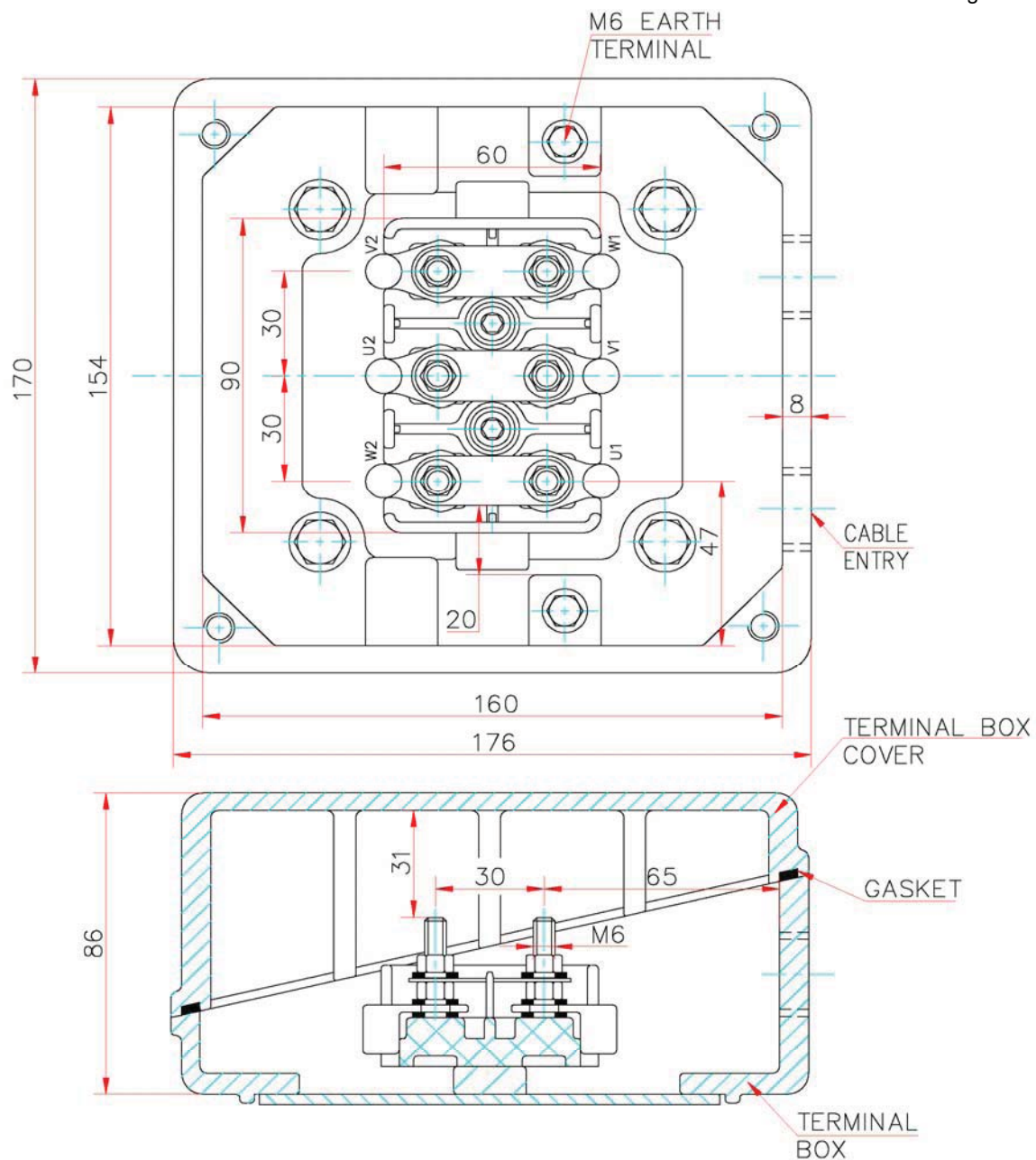
MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY

**MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

ALL DIMENSIONS ARE IN mm

RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CROPPED DIMENSIONS ARE AS PER IS: 1204/IEC 60072						
CUSTOMER	SWAM PNEUMATICS PVT LTD			RATED O/P kW	15	
P.O. NO.	SWAM/PUR/18/1848			NO OF POLES	2	
IND. NO.	NMPI174348/100			FRAME	ND160M	
CLIENT				TAG NO.		
PROJECT						
	NAME	DATE	REMARKS		TITLE DIMENSIONAL DRAWING	
DRN	SBK	5-Feb-18				
CHD	SBK	5-Feb-18				
APPROVED	SSN	5-Feb-18				
 CG Power and Industrial Solutions Limited LT Motors Division Ahmednagar					DRG NO	
					NMPI174348/100-2	
					REV 0	



CREEPAGE = 25
CLEARANCE = 12

MATERIAL OF T/BOX
CAST IRON

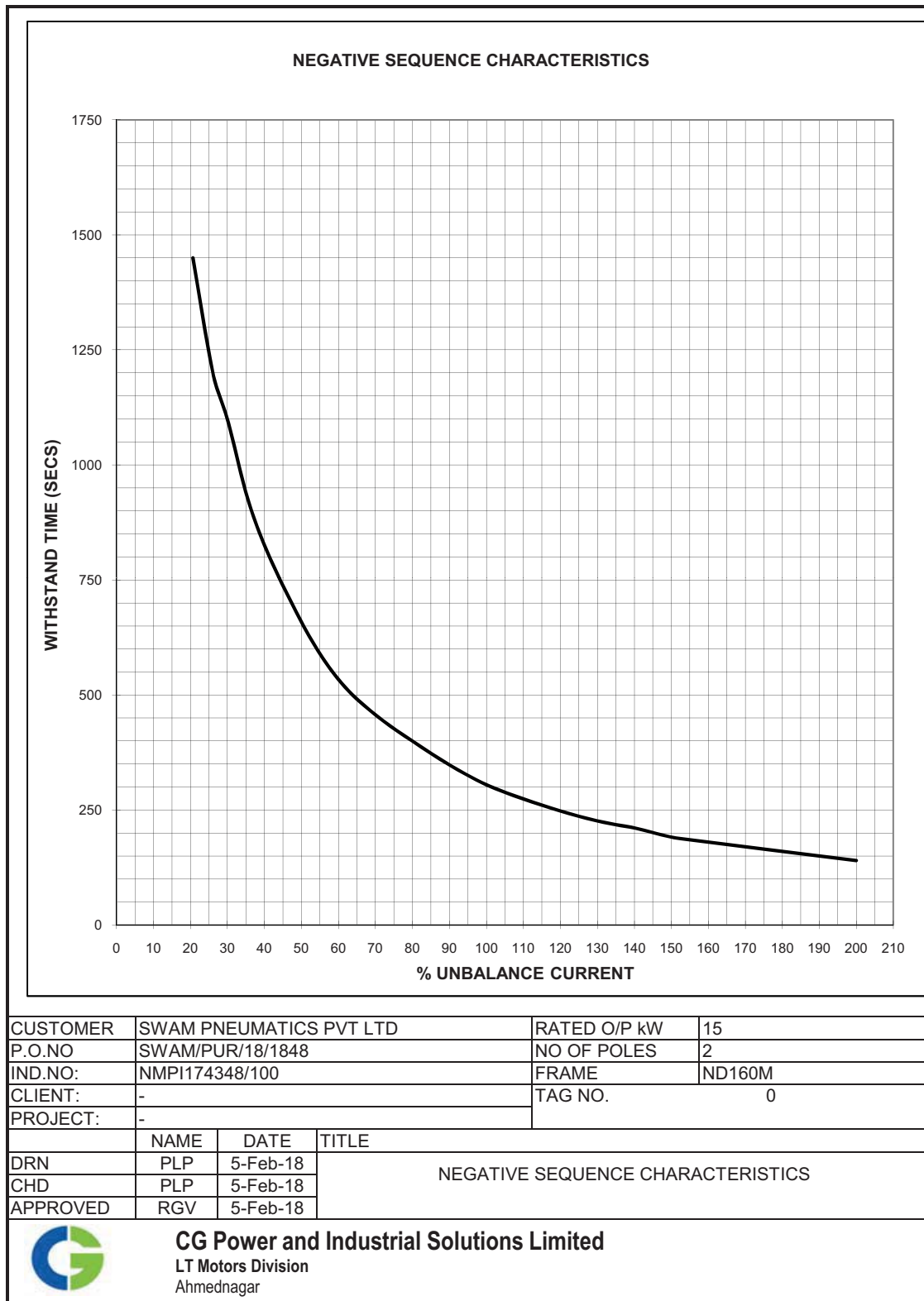
ACCESSORIES	SPACE HEATER	THERMISTOR	RTD
APPLICABLE	NA	NA	NA
CABLE SIZE (ENTRY)	NA	NA	NA
MAIN CABLE SIZE	1 * 3C,25-MM ² AL.	CABLE ENTRY	M25X1.5P 2-Nos.
CUSTOMER	SWAM PNEUMATICS PVT LTD		RATED O/P kW
PO No	SWAM/PUR/18/1848		NO OF POLES
INDENT / ENQ No	NMPI174348/100		FRAME
CLIENT	Tag No.		ND160M
PROJECT			
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED
DRAWN BY	AMR	2/5/2018	TITLE : TERMINAL BOX ARRANGEMENT
CHECKED BY	SBK	2/5/2018	
APPROVED BY	SRB	2/5/2018	

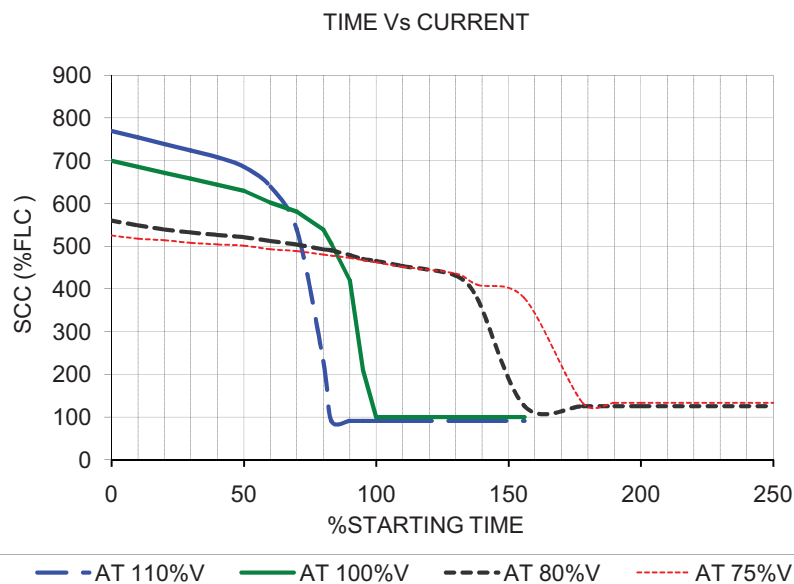
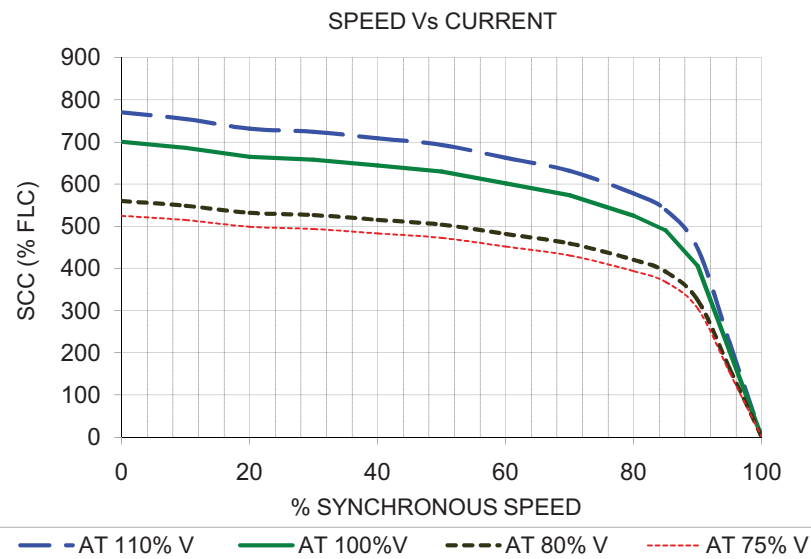


CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

EA9101R1

DRG No :

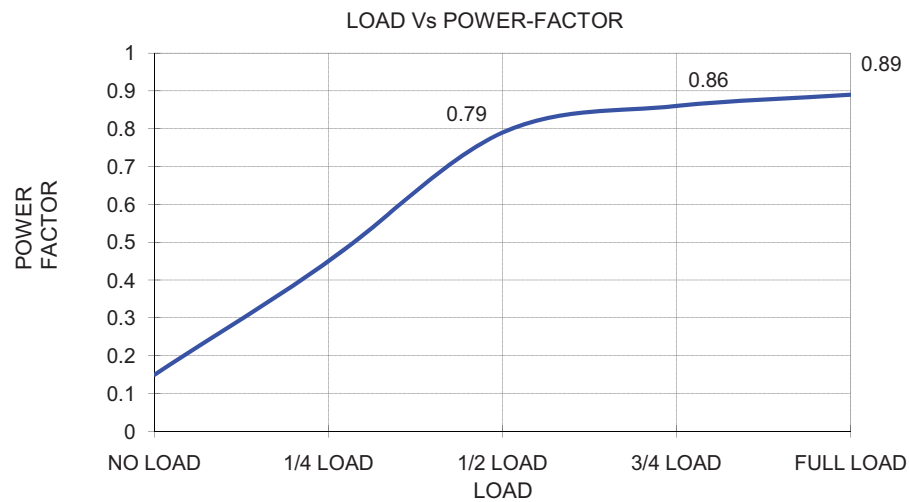
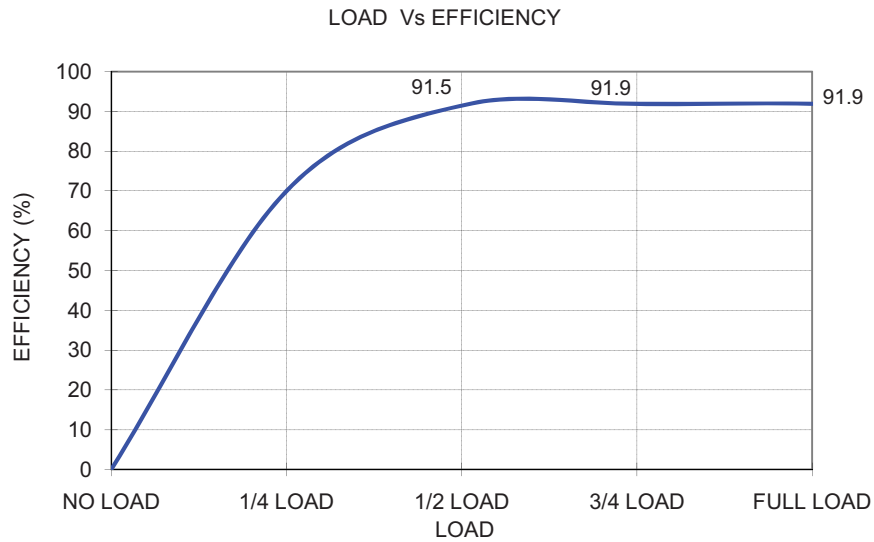




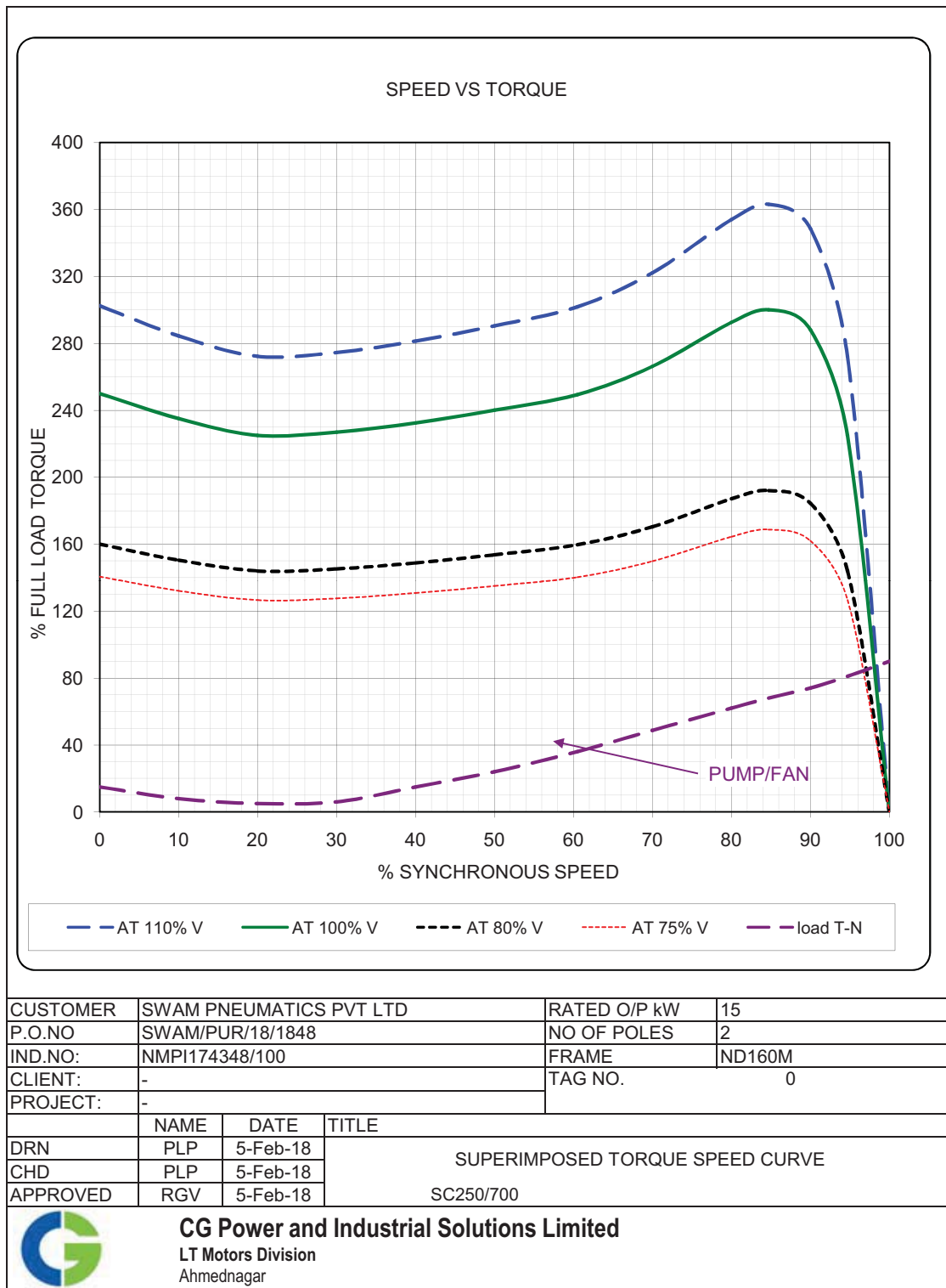
CUSTOMER	SWAM PNEUMATICS PVT LTD		RATED O/P kW	15
P.O.NO	SWAM/PUR/18/1848		NO OF POLES	2
IND.NO:	NMPI174348/100		FRAME	ND160M
CLIENT:	-		TAG NO.	0
PROJECT:	-			
	NAME	DATE	TITLE	
DRN	PLP	5-Feb-18	CURRENT SPEED & CURRENT TIME CURVE SC2920/100	
CHD	PLP	5-Feb-18		
APPROVED	RGV	5-Feb-18		

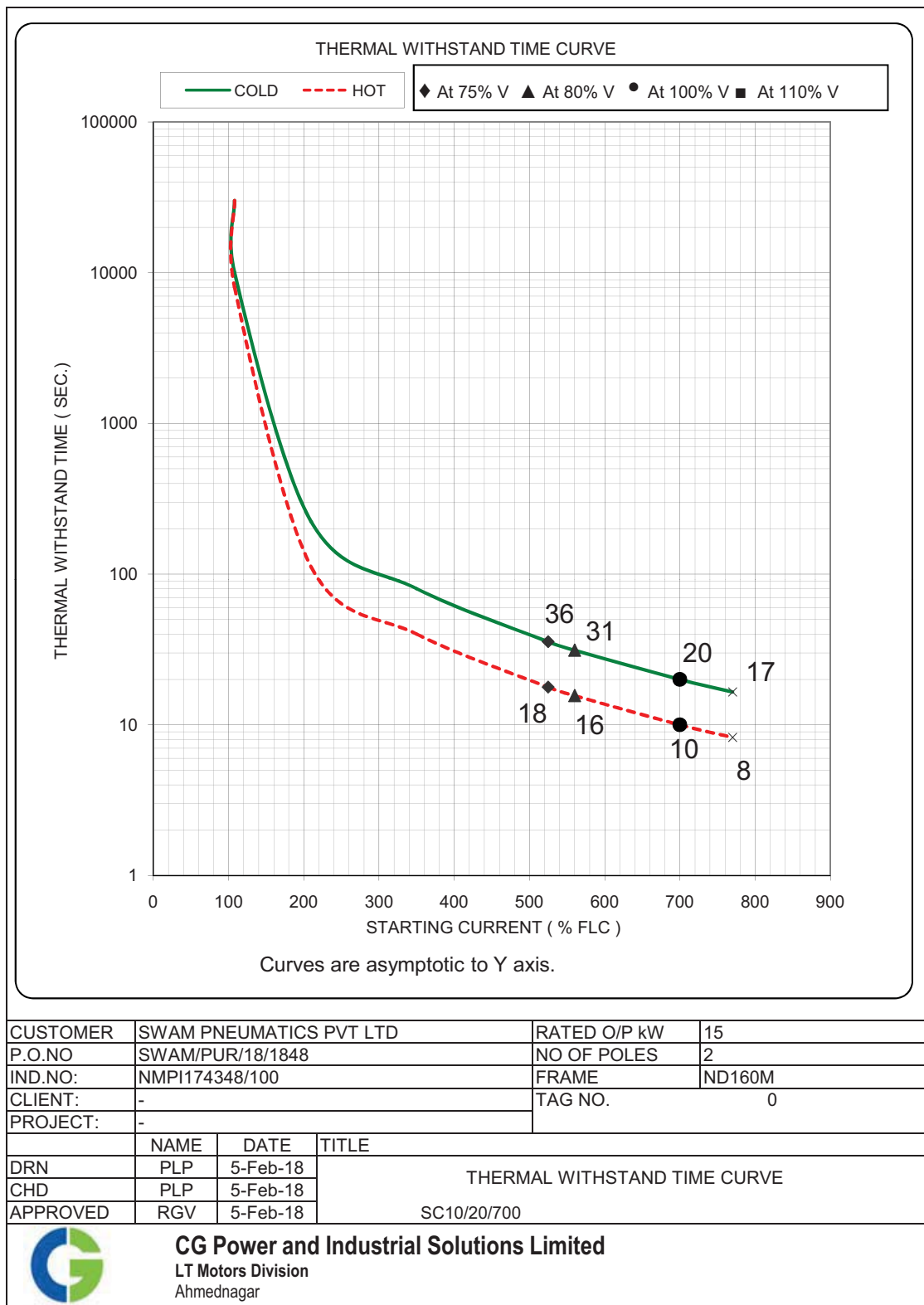


CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar



CUSTOMER	SWAM PNEUMATICS PVT LTD			RATED O/P kW	15
P.O.NO	SWAM/PUR/18/1848			NO OF POLES	2
IND.NO:	NMPI174348/100			FRAME	ND160M
CLIENT:	-			TAG NO.	0
PROJECT:	-				
	NAME	DATE	TITLE		
DRN	PLP	5-Feb-18	LOAD Vs EFFICIENCY & POWER FACTOR CURVE SC91.90/0.89		
CHD	PLP	5-Feb-18			
APPROVED	RGV	5-Feb-18			
 CG Power and Industrial Solutions Limited LT Motors Division Ahmednagar					





	TITLE CONTINUOUS DOSING PUMP MOTOR FOR CW FOREBAY DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 1 OF 10

S. No.	Description		Data to be filled by successful bidder
A.	General		
1	Manufacturer & country of origin		CG Power And Industrial Solutions – INDIA
2	Motor type		3 phase AC Squirrel Cage induction Motor IE3
3	Type of starting		Direct Online
4	Name of the equipment driven by motor & Quantity		Continuous Dosing pump for CW Forebay – 2 Nos
5	Maximum Power requirement of driven equipment		15.32 KW
6	Rated speed of Driven Equipment		2950
7	Design ambient temperature		50 °C
B.	Design and Performance Data		
1	Frame size & type designation		ND 160L
2	Type of duty		S1
3	Rated Voltage		415 +/- 10% VAC
4	Permissible variation for		
5	a	Voltage	10%
6	b	Frequency	+3-5%
7	c)	Combined voltage & frequency	10% (ABSOLUTE)
8	Rated output at design ambient temp (by resistance method)		18.5 KW
9	Synchronous speed & Rated slip		2900 / Slip – 50
10	Minimum permissible starting voltage		85% Rated Voltage
11	Starting time in sec with mechanism coupled		
12	a) At rated voltage		0.055 sec
13	b) At min starting voltage		0.075 sec
14	Locked rotor current as percentage of FLC (including IS tolerance)		840% (FLC)
15	Torque		
	a) Starting		225
	b) Maximum		275
16	Permissible temp rise at rated output over ambient temp & method		70 (Resistance Method)
17	Noise level at 1.0 m (dB)		As per IS 12065
18	Amplitude of vibration		As per IS 12075
19	Efficiency & P.F. at rated voltage & frequency		

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE CONTINUOUS DOSING PUMP MOTOR FOR CW FOREBAY DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 2 OF 10

S. No.	Description	Data to be filled by successful bidder
	a) At 100% load	92.4
	c) At 75% load	92.4
	c) At starting	92
C.	Constructional Features	
1	Method of connection of motor driven equipment	Direct Coupled
2	Applicable Standard	IS/IEC 60034 / IS 12615
3	DOP of Enclosure	IP55
4	Method of cooling	TEFC
5	Class of insulation	F (Temp. rise limited to Class B)
6	Main terminal box	
	a) Type	Non Phase Segregated
	b) Power Cable details (Conductor, size, armour/unarmour)	1*3C * 25 sqmm Al
	c) Cable Gland & lugs details (Size, type & material)	Double compression metal gland – CBW03
	d) Permissible Fault level (kArms & duration in sec)	50 KA
7	Space heater details (Voltage & watts)	NA
8	Flame proof motor details (if applicable)	NA
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	6 Nos of terminals
10	Winding connection	DELTA
11	Kind of rotor winding	Squirrel Cage
12	Kind of bearings	SKF or Equivalent Sealed bearing ZZ
13	Direction of rotation when viewed from NDE	Bidirectional
14	Paint Shade & type	Shade No. 631 of IS : 5 - Epoxy paint
15	Net weight of motor	36Kg
16	Outline mounting drawing No (To be enclosed as annexure)	Enclosed
D.	Characteristic curves/ drawings (To be enclosed for motors of rating $\geq 55\text{KW}$)	
	a) Torque speed characteristic	Enclosed
	b) Thermal withstand characteristic	Enclosed

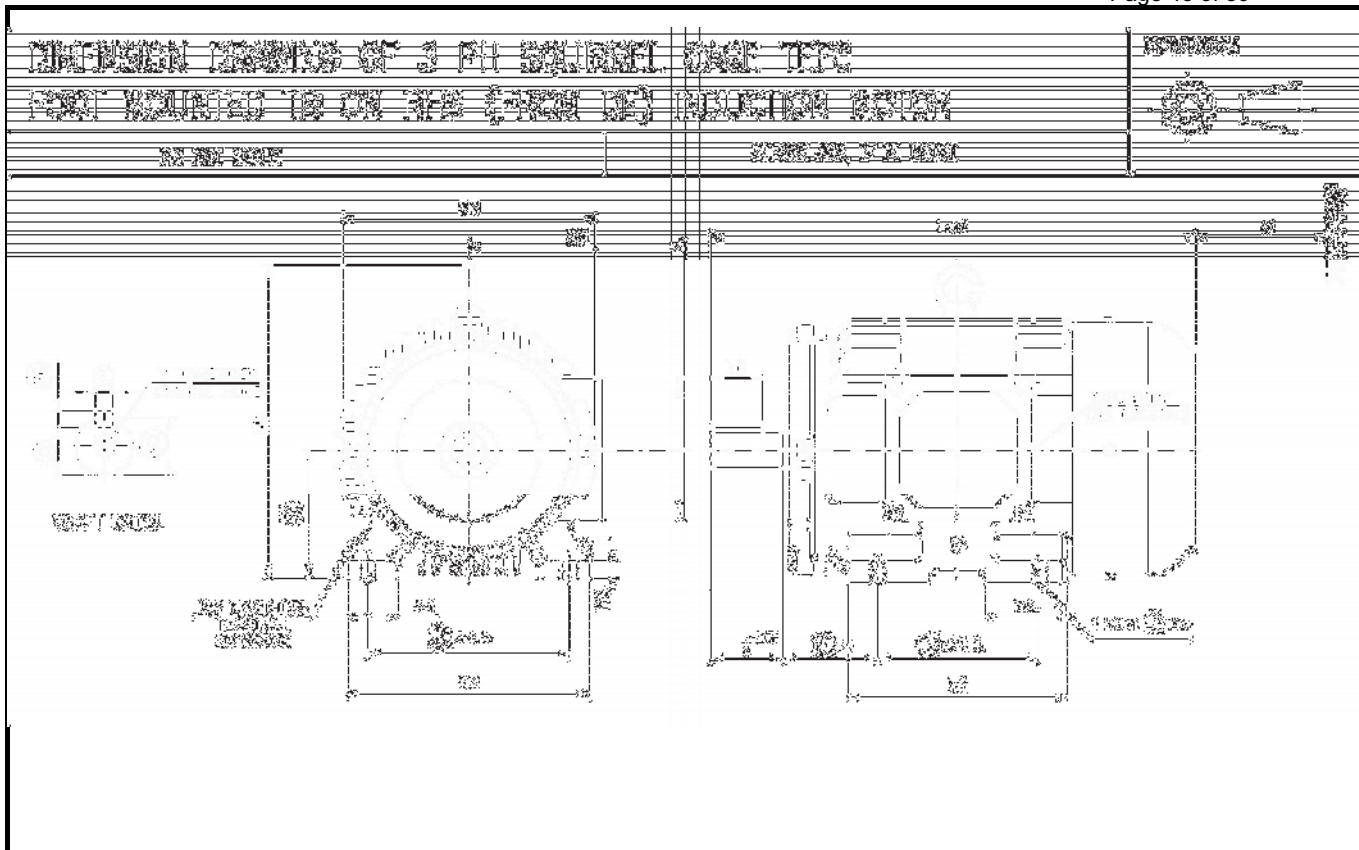
NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE	SPECIFICATION NO.
	CONTINUOUS DOSING PUMP MOTOR FOR CW FOREBAY DATA SHEET - C	VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 42 OF 89

S. No.	Description	Data to be filled by successful bidder
	c) Current vs time	Enclosed
	d) Speed vs time	Enclosed

Note : 1) Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside the terminal box showing the connection diagram for desired direction of rotation and reverse rotation
 2) Two separate earthing terminals suitable for connecting GI strip grounding conductor shall be provided on opposite sides of the motor frame

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			



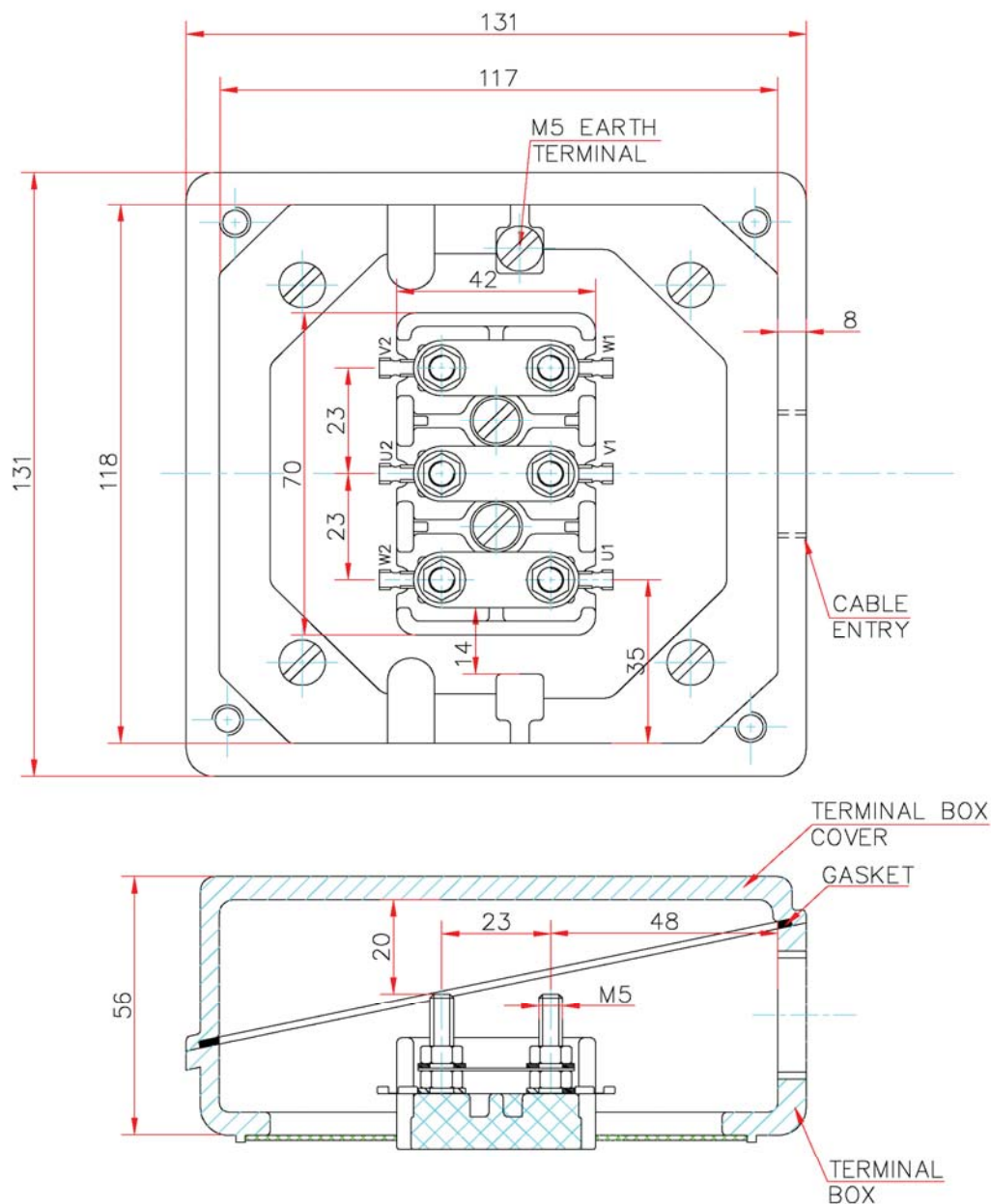
FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	A1**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND100L	160	140		63	100.0 / 99.7	36	192	51	170	12.0 / 12.5	160	215	380	250	16	36	60

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
28.009 / 27.996	60	44	8.00 / 7.96	7.0 / 6.9	24.0 / 23.8	M10X22

NOTES TERMINAL BOX CAN BE ROTATED IN 360 DEG @90 DEG.
 ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.
 MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY
 **MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

ALL DIMENSIONS ARE IN mm
 RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CUSTOMER					RATED O/P kW	3.7
P.O. NO.	enquiry				NO OF POLES	2
IND. NO.	QMYD171616/500				FRAME	ND100L
CLIENT					MOUNTING	B3
PROJECT					TAG NO.	
	NAME	DATE	REMARKS			TITLE
DRN	SBK	24-Dec-18				DIMENSIONAL DRAWING
CHD	SBK	24-Dec-18				
APPROVED	SSN	24-Dec-18				
 CG Power and Industrial Solutions Limited LT Motors Division Ahmednagar					DRG NO	QMYD171616/500-2



CREEPAGE = 25
CLEARANCE = 11

MATERIAL OF T/BOX
CAST IRON

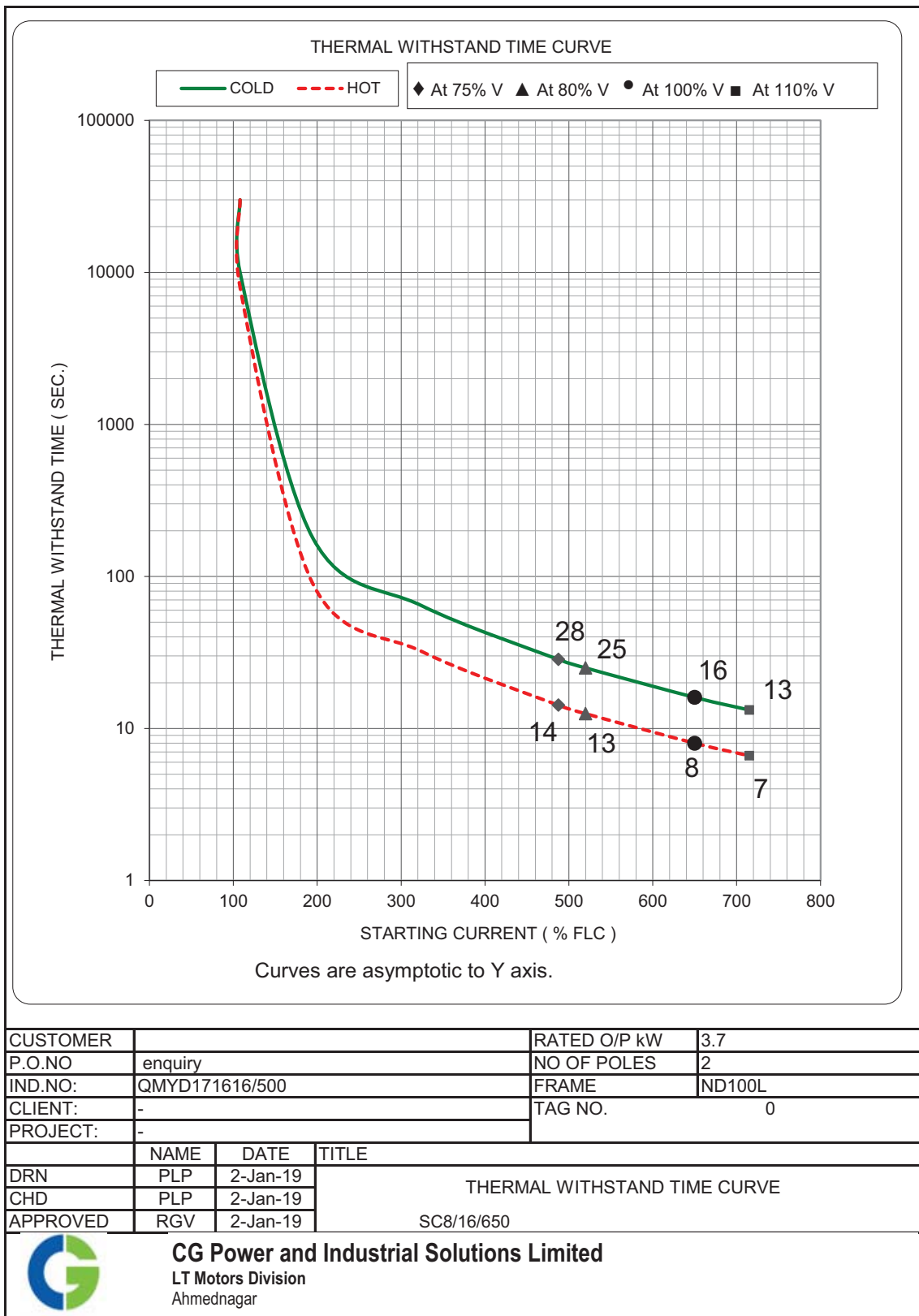
ACCESSORIES	SPACE HEATER		THERMISTOR	RTD	
APPLICABLE	NA		NA	NA	
CABLE SIZE (ENTRY)	NA		NA	NA	
MAIN CABLE SIZE	1 * 3C,25-MM² Al		CABLE ENTRY	M20X1.5P 1-No.	
CUSTOMER				RATED O/P kW	3.7
PO No	enquiry			NO OF POLES	2
INDENT / ENQ No	QMYD171616/500			FRAME	ND100L
CLIENT			Tag No.		
PROJECT					
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED		
DRAWN BY	AMR	24-12-2018	TITLE : TERMINAL BOX ARRANGEMENT		
CHECKED BY	SBK	24-12-2018			
APPROVED BY	SRB	24-12-2018			

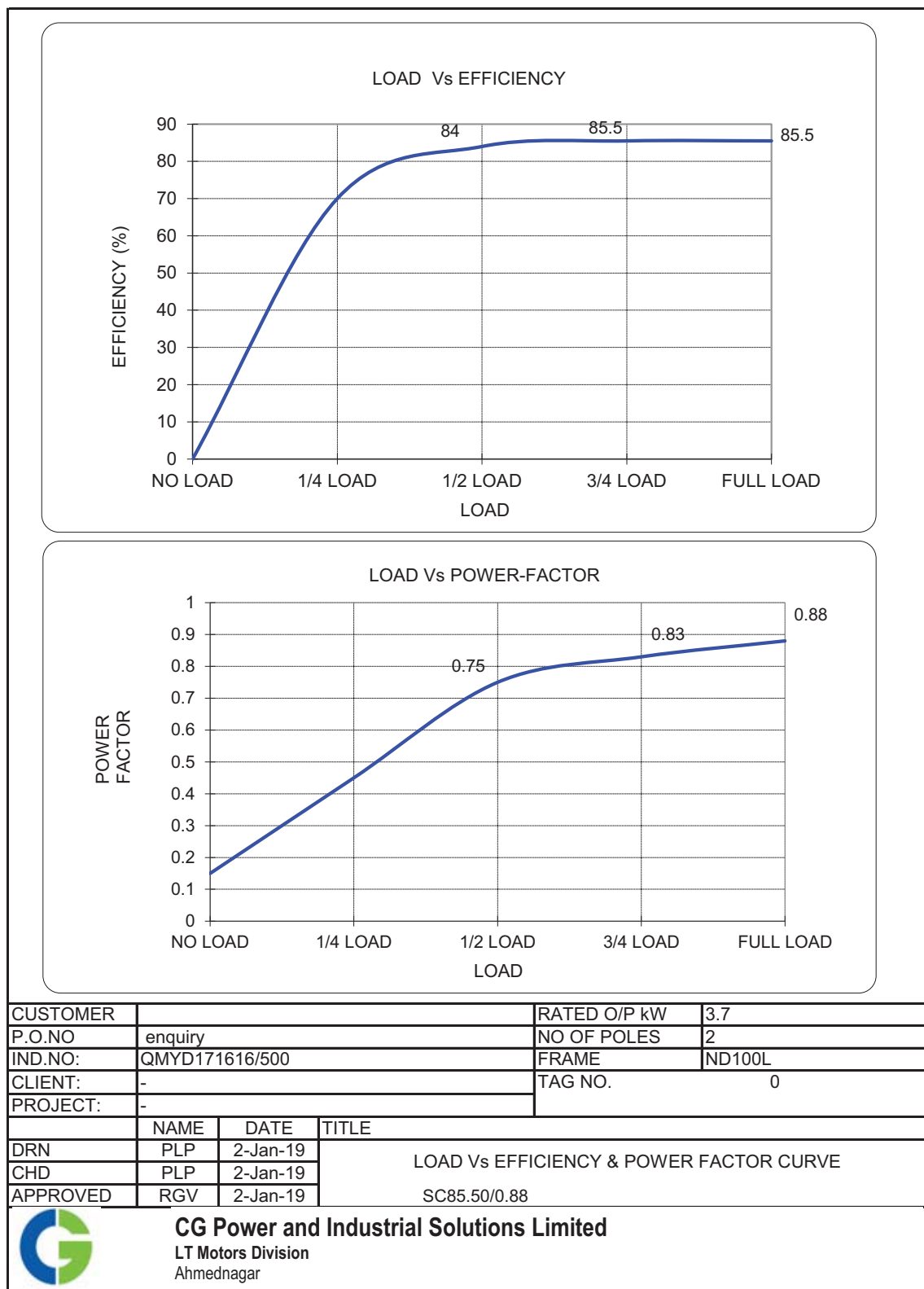


CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

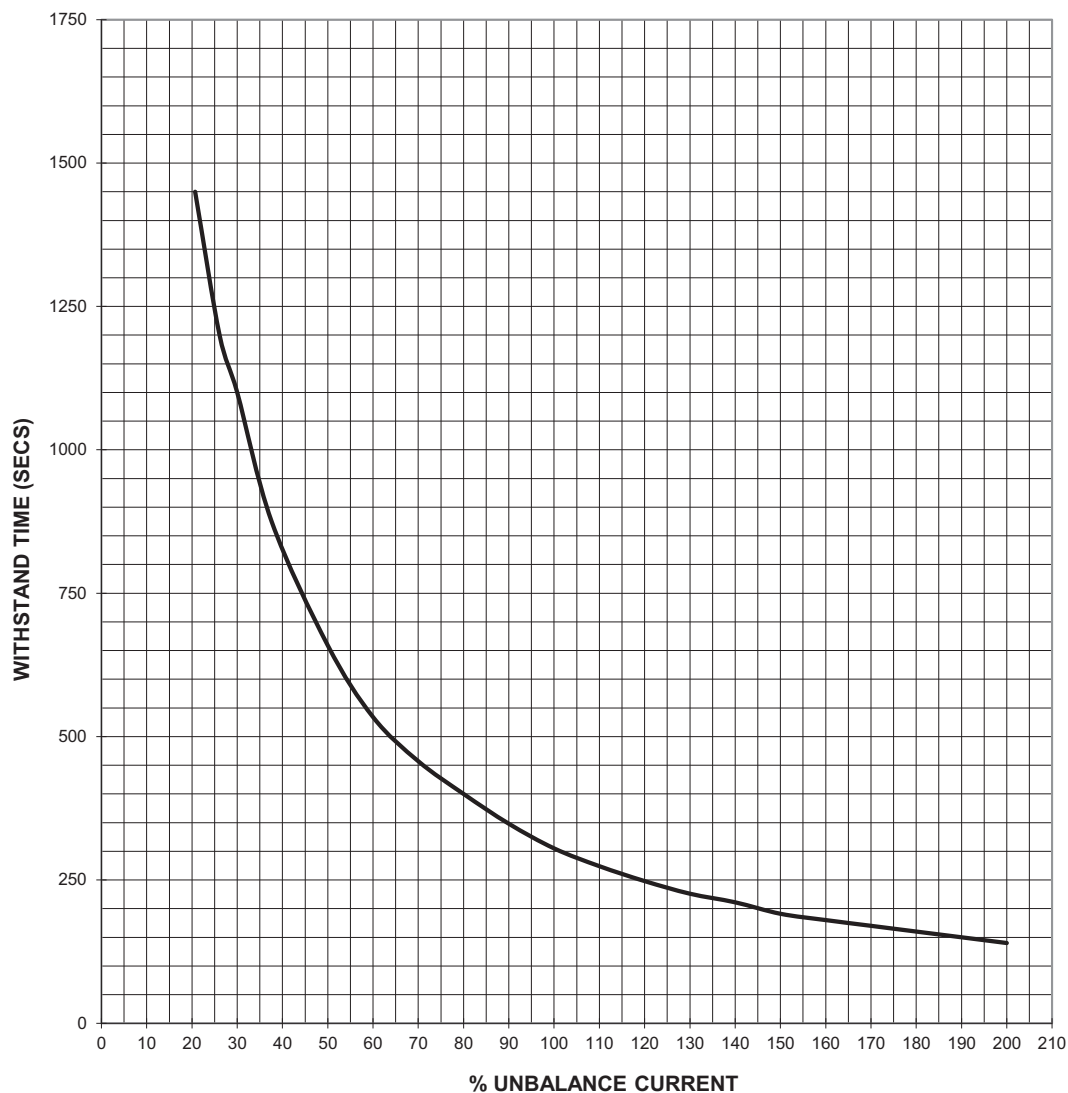
EA9103R1

DRG No :





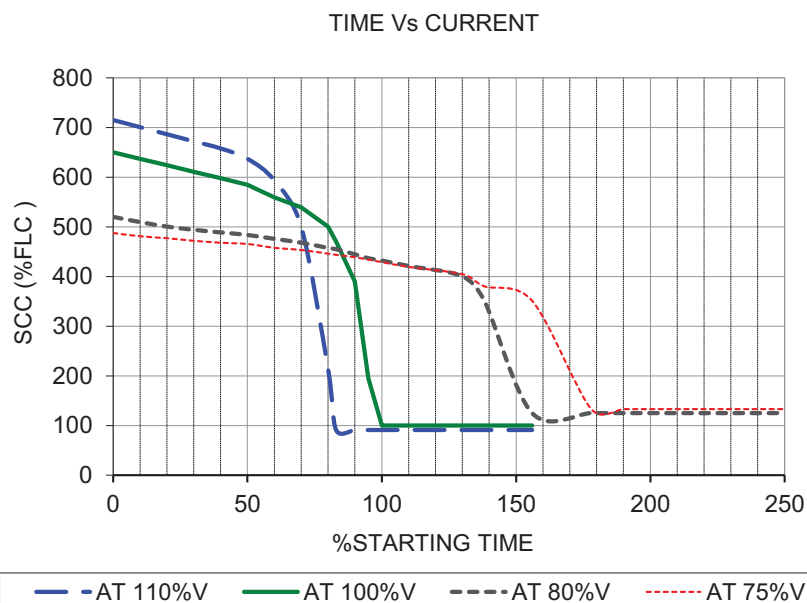
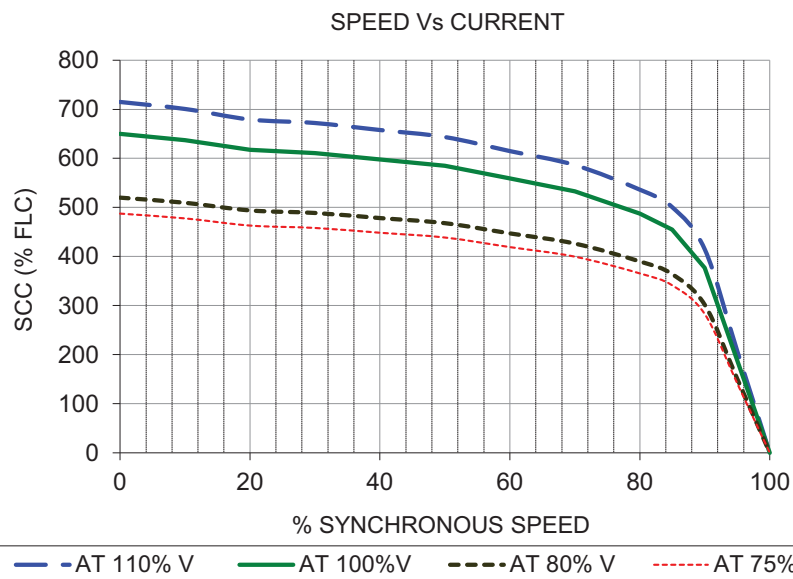
NEGATIVE SEQUENCE CHARACTERISTICS



CUSTOMER				RATED O/P kW	3.7
P.O.NO	enquiry			NO OF POLES	2
IND.NO:	QMYD171616/500			FRAME	ND100L
CLIENT:	-			TAG NO.	0
PROJECT:	-				
	NAME	DATE	TITLE		
DRN	PLP	2-Jan-19	NEGATIVE SEQUENCE CHARACTERISTICS		
CHD	PLP	2-Jan-19			
APPROVED	RGV	2-Jan-19			



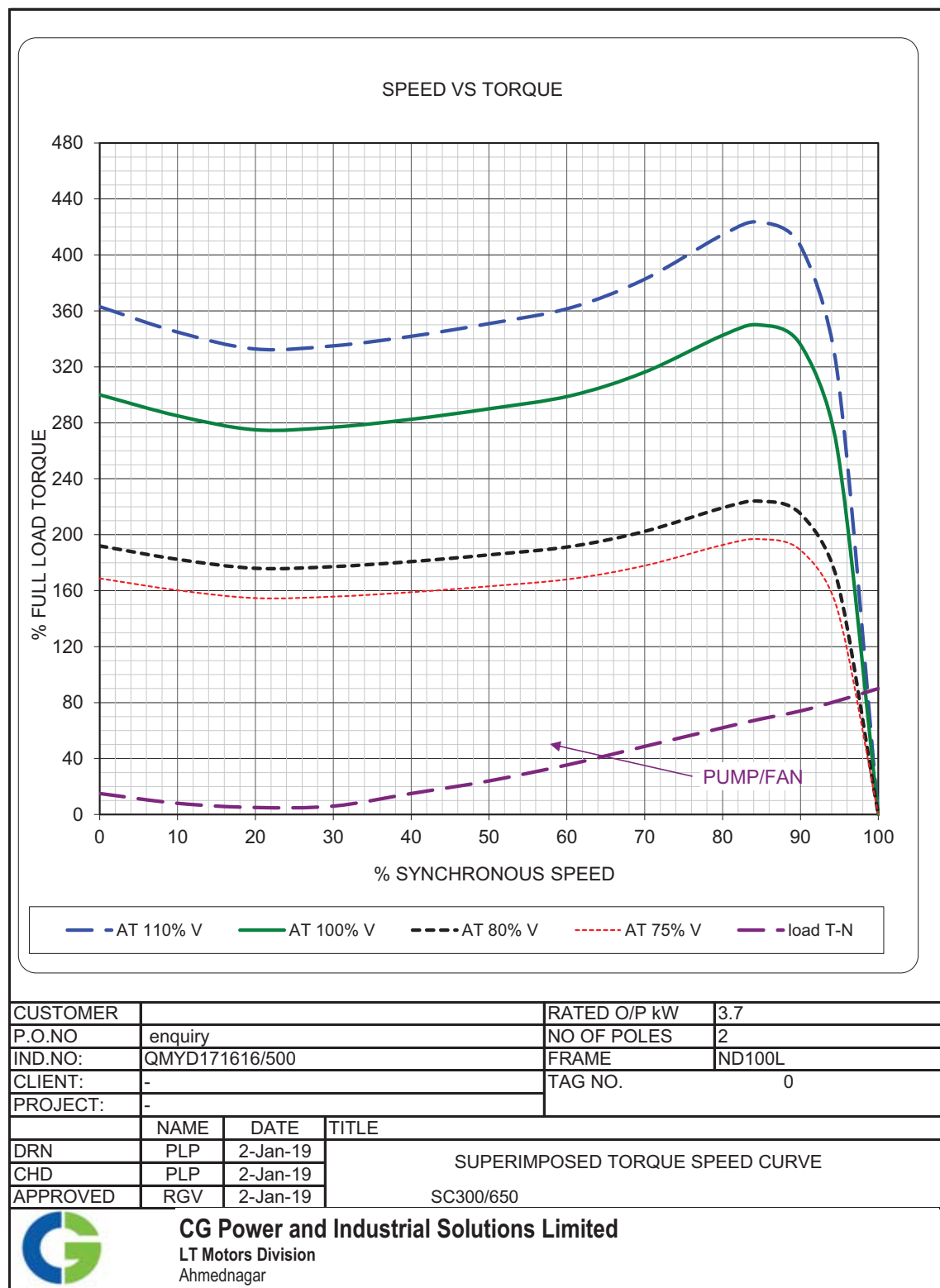
CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar



CUSTOMER		RATED O/P kW	3.7
P.O.NO	enquiry	NO OF POLES	2
IND.NO:	QMYD171616/500	FRAME	ND100L
CLIENT:	-	TAG NO.	0
PROJECT:	-		
	NAME	DATE	TITLE
DRN	PLP	2-Jan-19	CURRENT SPEED & CURRENT TIME CURVE SC2875/100
CHD	PLP	2-Jan-19	
APPROVED	RGV	2-Jan-19	



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar



	TITLE CONTINUOUS DOSING PUMP MOTOR FOR SEA WATER INTAKE DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 50 OF 89

S. No.	Description		Data to be filled by successful bidder
A.	General		
1	Manufacturer & country of origin		CG Power And Industrial Solutions – INDIA
2	Motor type		3 phase AC Squirrel Cage induction Motor IE2
3	Type of starting		Direct Online
4	Name of the equipment driven by motor & Quantity		Continuous Dosing pump for CW Forebay – 2 Nos
5	Maximum Power requirement of driven equipment		2.82 KW
6	Rated speed of Driven Equipment		2850
7	Design ambient temperature		50°C
B.	Design and Performance Data		
1	Frame size & type designation		ND 100L
2	Type of duty		S1
3	Rated Voltage		415 +/- 10% VAC
4	Permissible variation for		
5	a	Voltage	10%
6	b	Frequency	+3-5%
7	c)	Combined voltage & frequency	10% (ABSOLUTE)
8	Rated output at design ambient temp (by resistance method)		3.7KW
9	Synchronous speed & Rated slip		2900 / Slip – 50
10	Minimum permissible starting voltage		85% Rated Voltage
11	Starting time in sec with mechanism coupled		
12	a) At rated voltage		0.35 sec
13	b) At min starting voltage		0.55 sec
14	Locked rotor current as percentage of FLC (including IS tolerance)		840% (FLC)
15	Torque		
	a) Starting		225
	b) Maximum		275
16	Permissible temp rise at rated output over ambient temp & method		70 (Resistance Method)
17	Noise level at 1.0 m (dB)		As per IS 12065
18	Amplitude of vibration		As per IS 12075
19	Efficiency & P.F. at rated voltage & frequency		

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE CONTINUOUS DOSING PUMP MOTOR FOR SEA WATER INTAKE DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 51 OF 89

S. No.	Description	Data to be filled by successful bidder
	a) At 100% load	86.3
	c) At 75% load	86.3
	c) At starting	86
C.	Constructional Features	
1	Method of connection of motor driven equipment	Direct Coupled
2	Applicable Standard	IS/IEC 60034 / IS 12615
3	DOP of Enclosure	IP55
4	Method of cooling	TEFC
5	Class of insulation	F (Temp. rise limited to Class B)
6	Main terminal box	
	a) Type	Non Phase Segregated
	b) Power Cable details (Conductor, size, armour/unarmour)	1*3C * 2.5sqmm Cu
	c) Cable Gland & lugs details (Size, type & material)	Double compression metal gland – CBW01S
	d) Permissible Fault level (kArms & duration in sec)	50 KA
7	Space heater details (Voltage & watts)	NA
8	Flame proof motor details (if applicable)	NA
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	6 Nos of terminals
10	Winding connection	DELTA
11	Kind of rotor winding	Squirrel Cage
12	Kind of bearings	SKF or Equivalent Sealed Bearing ZZ
13	Direction of rotation when viewed from NDE	Bidirectional
14	Paint Shade & type	Shade No. 631 of IS : 5 - Epoxy paint
15	Net weight of motor	184Kg
16	Outline mounting drawing No (To be enclosed as annexure)	Enclosed
D.	Characteristic curves/ drawings (To be enclosed for motors of rating ≥ 55 KW)	
	a) Torque speed characteristic	Enclosed
	b) Thermal withstand characteristic	Enclosed

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE CONTINUOUS DOSING PUMP MOTOR FOR SEA WATER INTAKE DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 52 OF 89

S. No.	Description	Data to be filled by successful bidder
	c) Current vs time	Enclosed
	d) Speed vs time	Enclosed

Note : 1) Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside the terminal box showing the connection diagram for desired direction of rotation and reverse rotation

2) Two separate earthing terminals suitable for connecting GI strip grounding conductor shall be provided on opposite sides of the motor frame

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

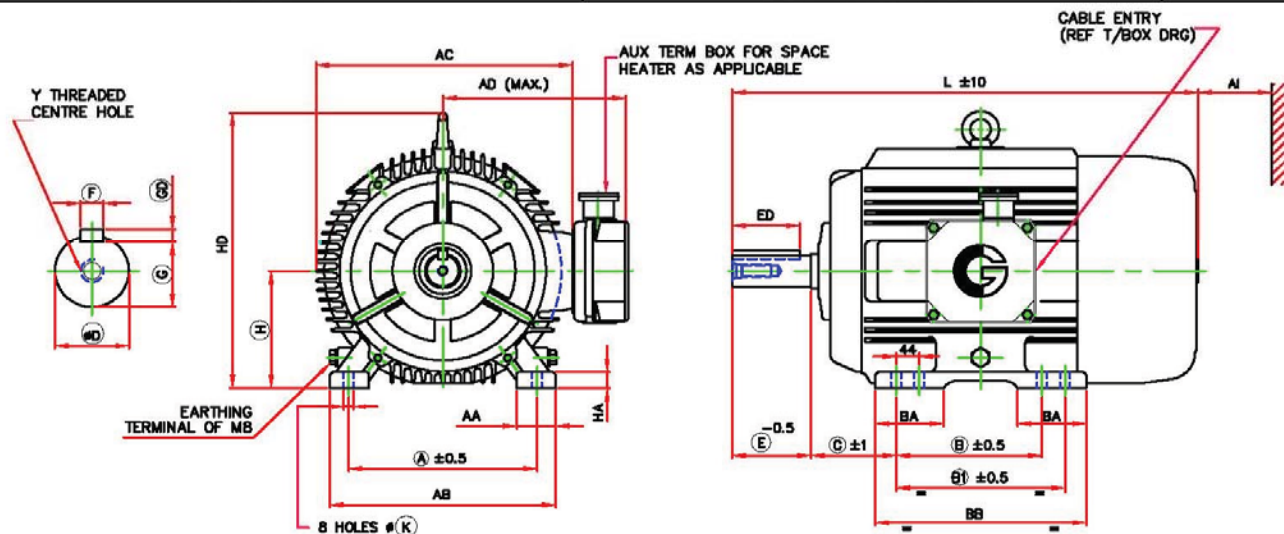
DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

PROJECTION



DO NOT SCALE

PLEASE ASK, IF IN DOUBT



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	A1**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND160L	254	210	254	108	160.0 / 159.5	73	308	100	298	15.0 / 15.5	250	325	650	376	22	129	90

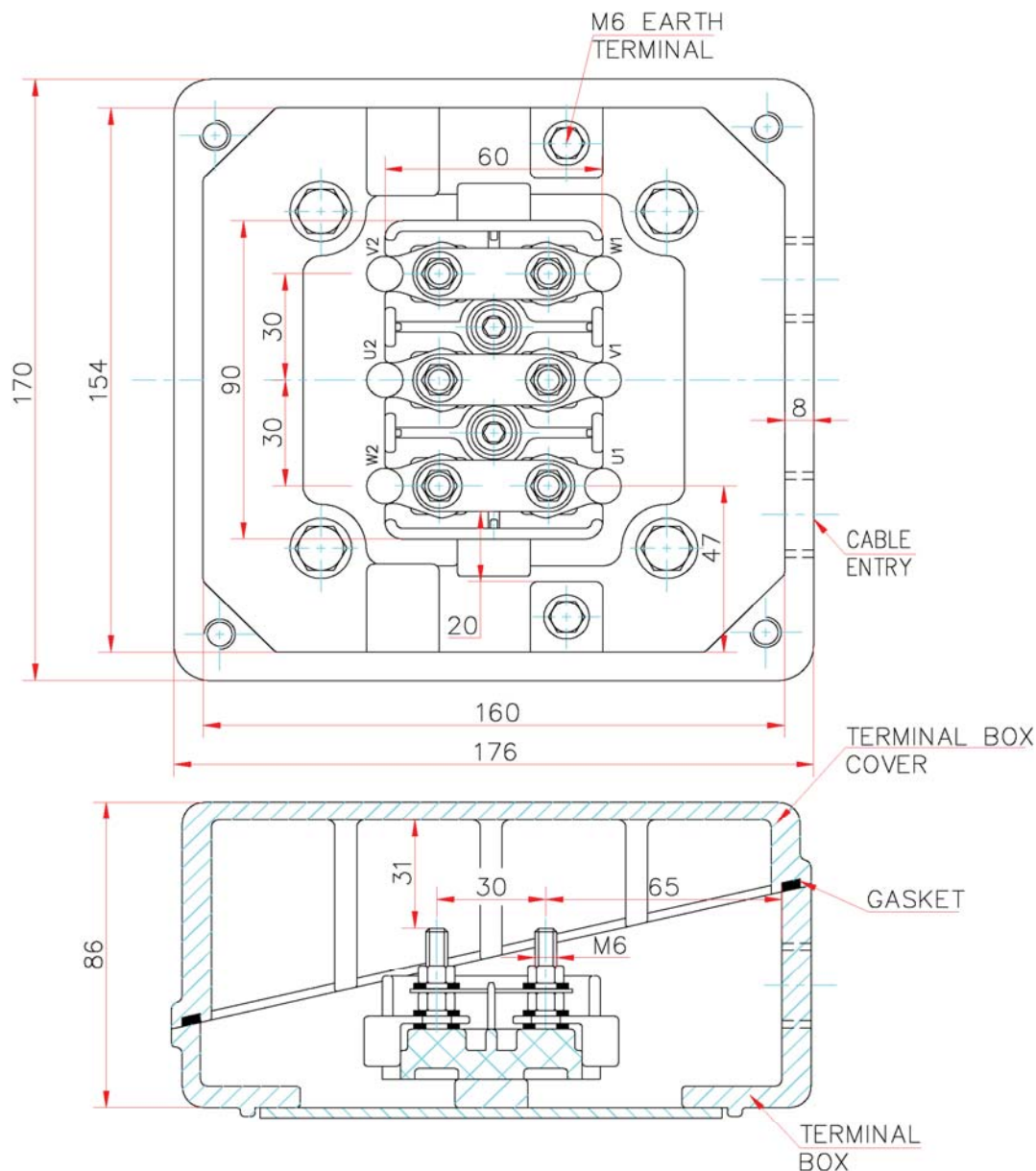
D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
42.018 / 42.002	110	80	12.00 / 11.957	8.0 / 7.9	37.0 / 36.8	M16X32

NOTES TERMINAL BOX CAN BE ROTATED IN 360 DEG @90 DEG.
 ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.
 MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY
 **MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

ALL DIMENSIONS ARE IN mm
 RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CUSTOMER					RATED O/P kW	18.5
P.O. NO.	D				NO OF POLES	2
IND. NO.	CGLIE3/9				FRAME	ND160L
CLIENT					MOUNTING	B3
PROJECT					TAG NO.	
	NAME	DATE	REMARKS			TITLE
DRN	SBK	24-Dec-18				DIMENSIONAL DRAWING
CHD	SBK	24-Dec-18				
APPROVED	SSN	24-Dec-18				
CG Power and Industrial Solutions Limited LT Motors Division Ahmednagar					DRG NO	CGLIE3/9-2

REV 0



CREEPAGE = 25
CLEARANCE = 12

MATERIAL OF T/BOX
CAST IRON

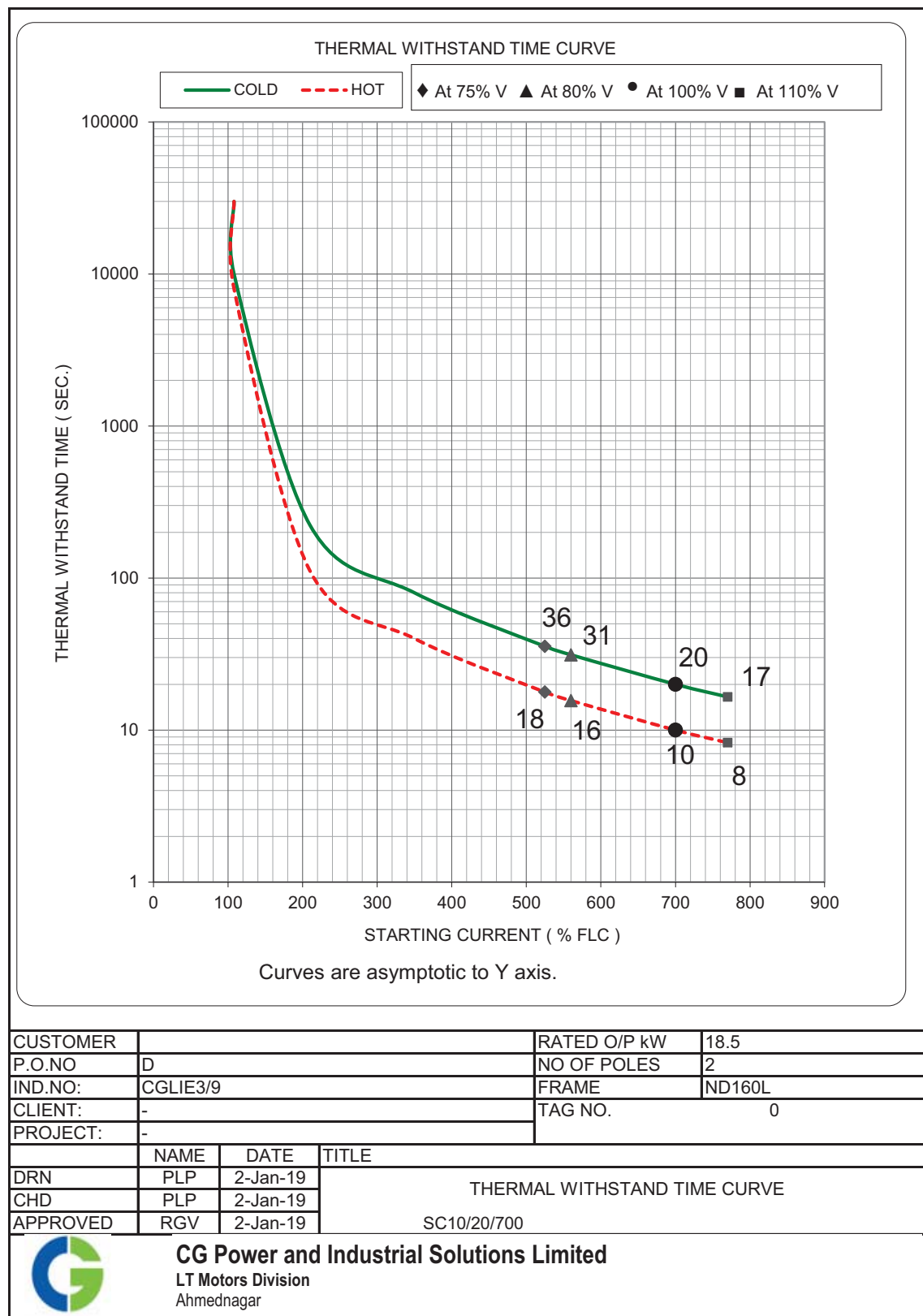
ACCESSORIES	SPACE HEATER	THERMISTOR	RTD	
APPLICABLE	NA	NA	NA	
CABLE SIZE (ENTRY)	NA	NA	NA	
MAIN CABLE SIZE	1 * 3C,2.5-MM ² Cu	CABLE ENTRY	M25X1.5P 2-Nos.	
CUSTOMER			RATED O/P kW	18.5
PO No	D		NO OF POLES	2
INDENT / ENQ No	CGLIE3/9		FRAME	ND160L
CLIENT			Tag No.	
PROJECT				
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED	
DRAWN BY	AMR	24-12-2018	TITLE : TERMINAL BOX ARRANGEMENT	
CHECKED BY	SBK	24-12-2018		
APPROVED BY	SRB	24-12-2018		

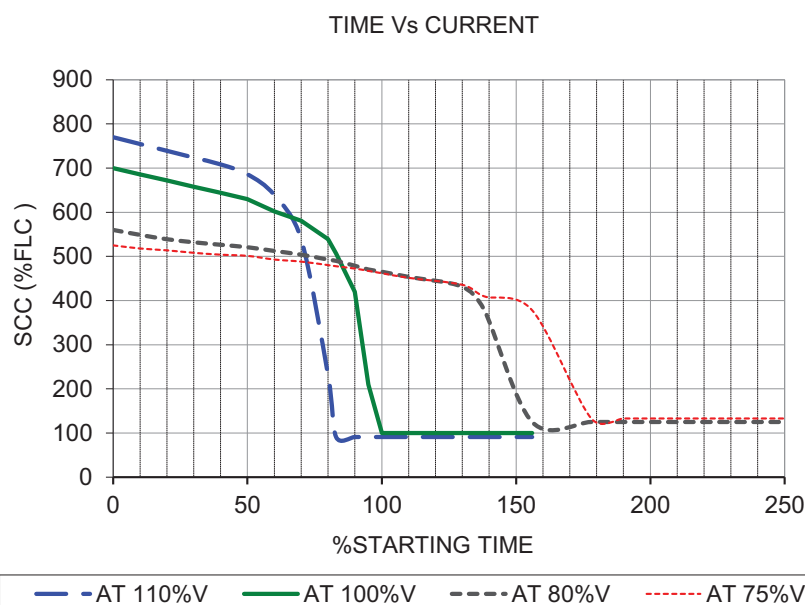
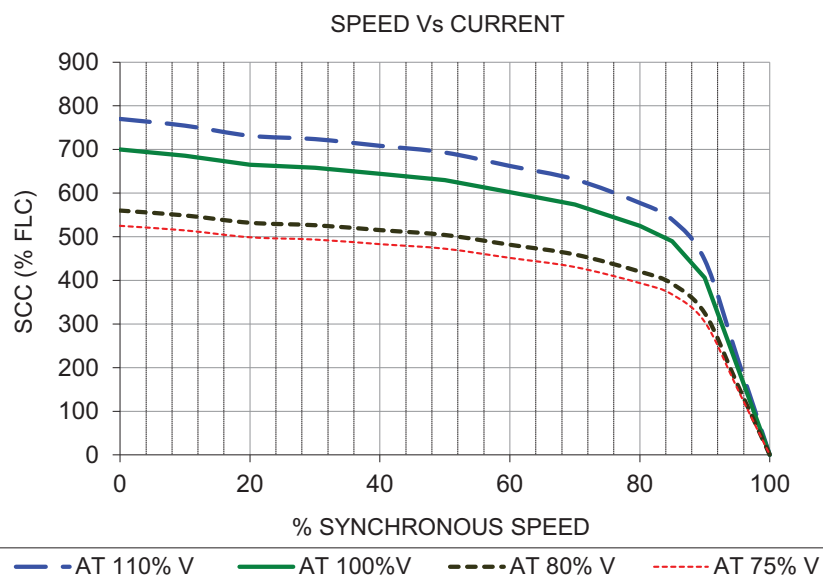


CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

EA9101R1

DRG No :

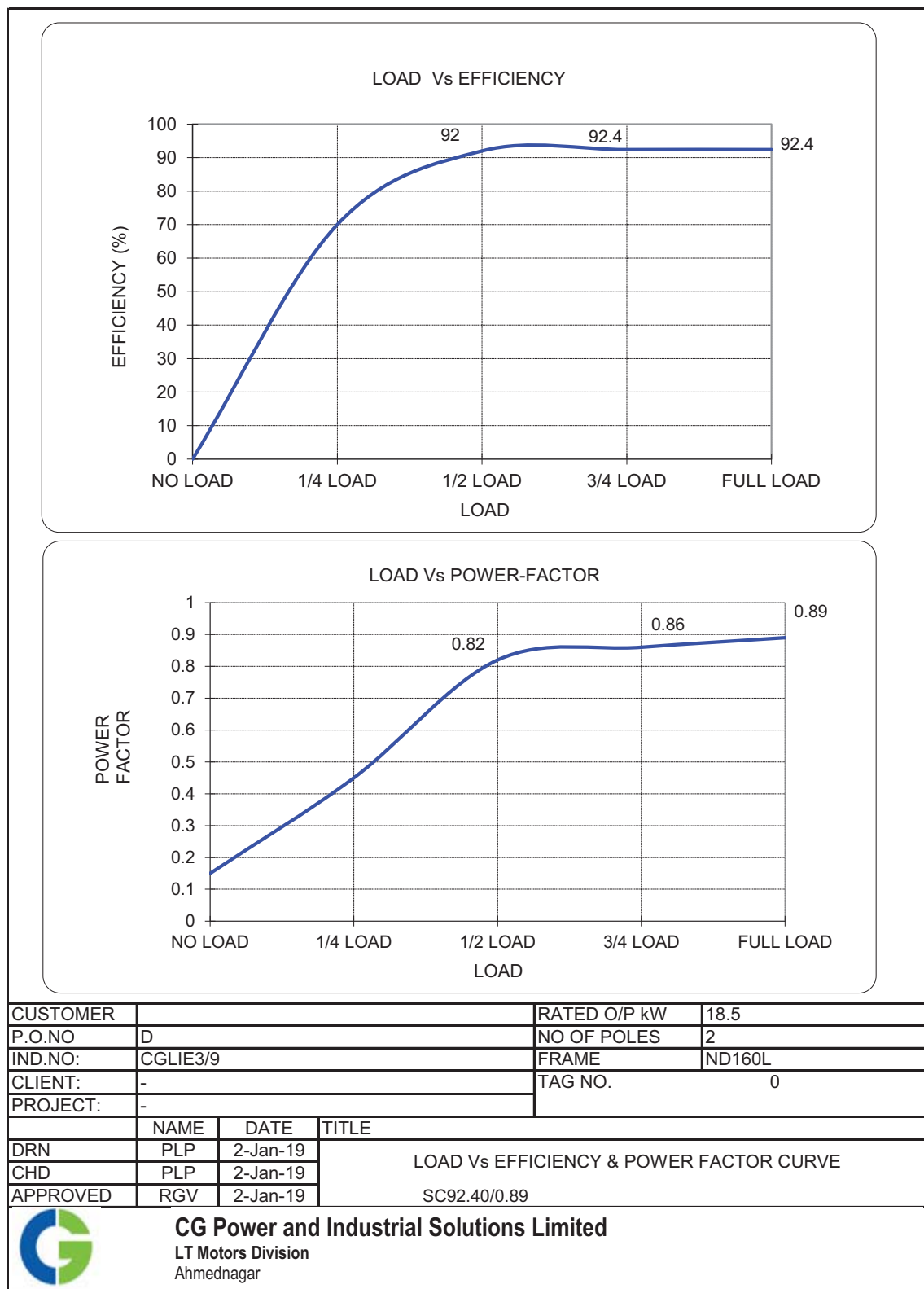




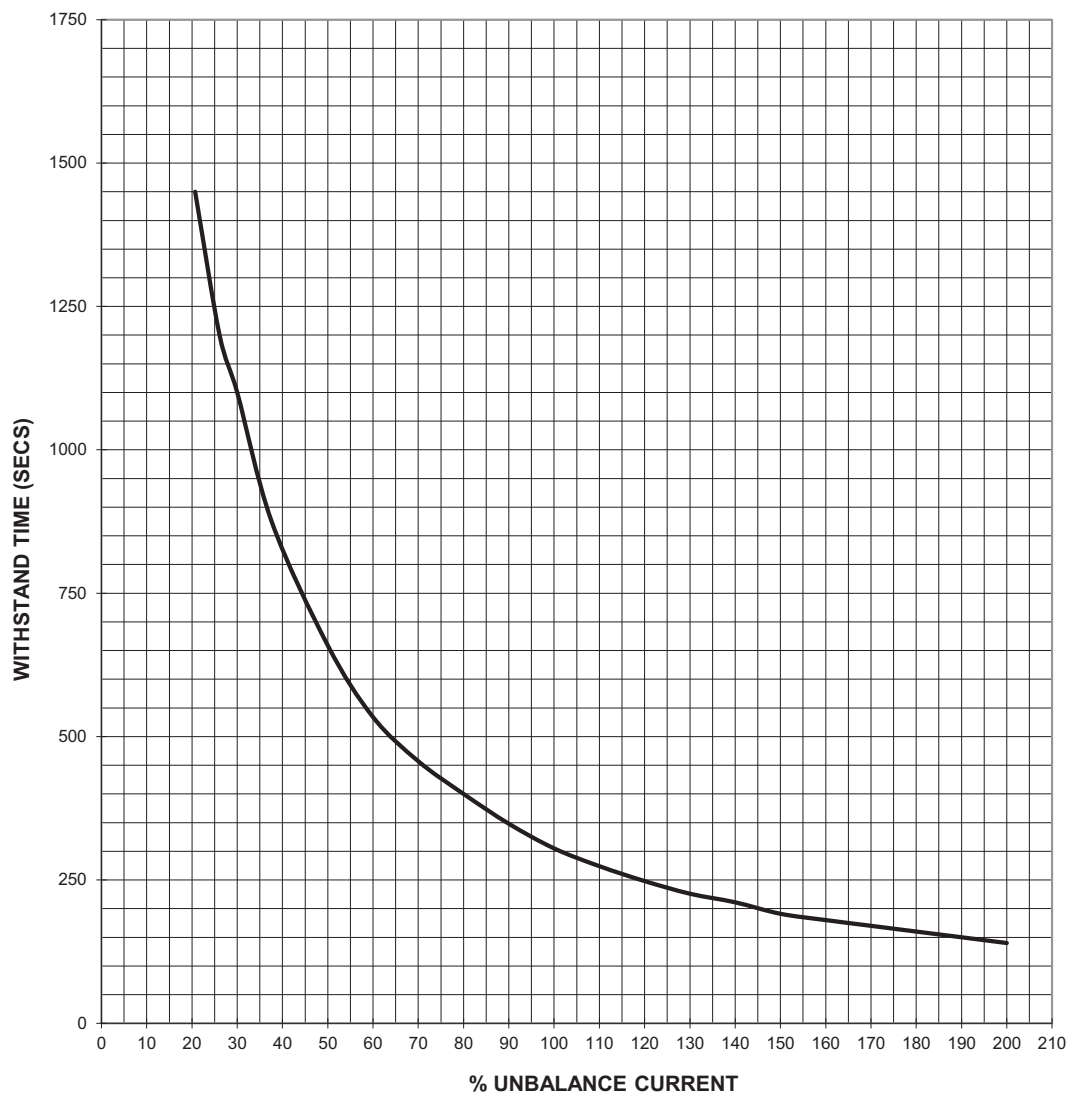
CUSTOMER		RATED O/P kW	18.5
P.O.NO	D	NO OF POLES	2
IND.NO:	CGLIE3/9	FRAME	ND160L
CLIENT:	-	TAG NO.	0
PROJECT:	-		
	NAME	DATE	TITLE
DRN	PLP	2-Jan-19	CURRENT SPEED & CURRENT TIME CURVE SC2920/100
CHD	PLP	2-Jan-19	
APPROVED	RGV	2-Jan-19	



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar



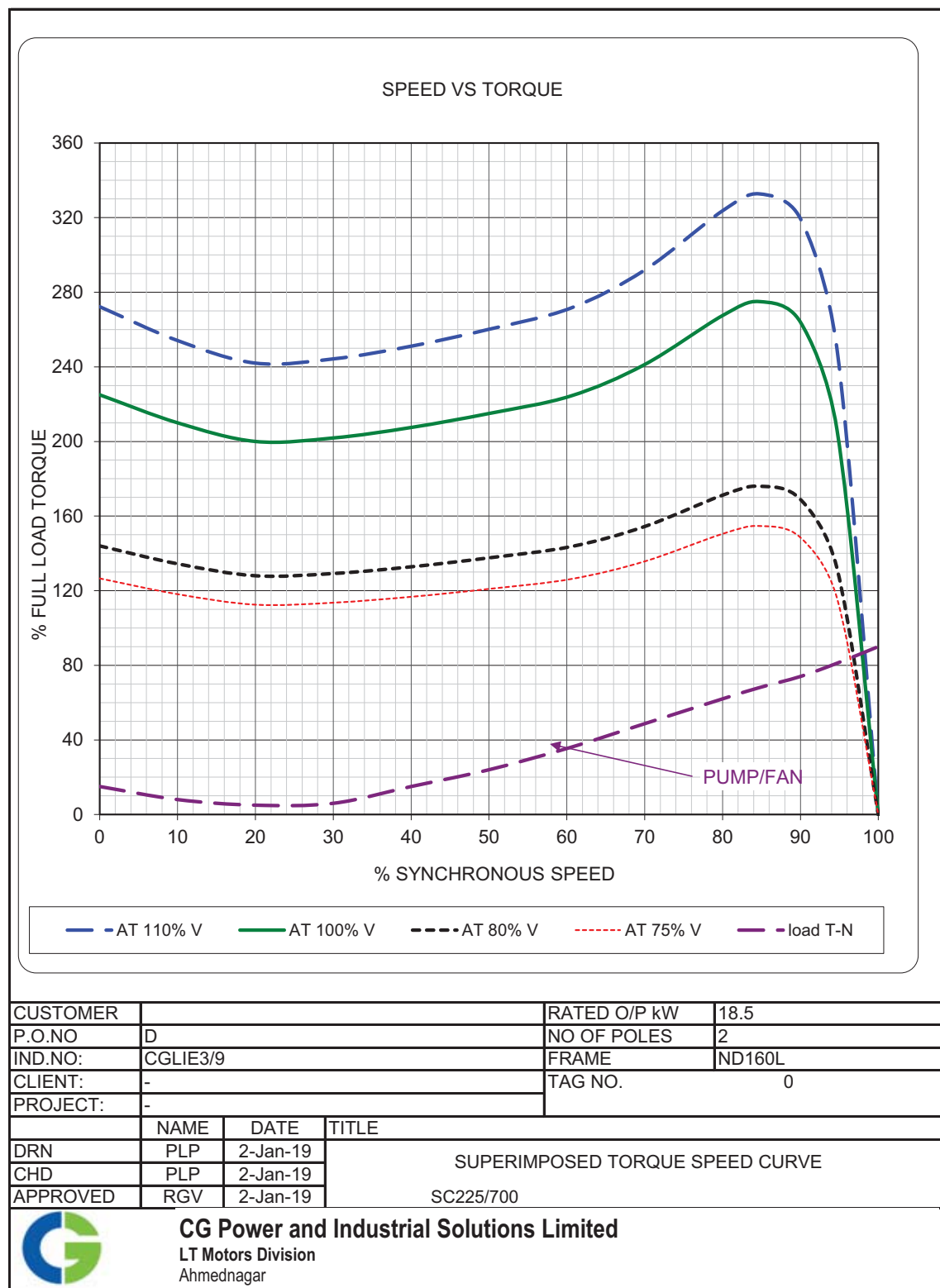
NEGATIVE SEQUENCE CHARACTERISTICS



CUSTOMER				RATED O/P kW	18.5
P.O.NO	D			NO OF POLES	2
IND.NO:	CGLIE3/9			FRAME	ND160L
CLIENT:	-			TAG NO.	0
PROJECT:	-				
	NAME	DATE	TITLE		
DRN	PLP	2-Jan-19	NEGATIVE SEQUENCE CHARACTERISTICS		
CHD	PLP	2-Jan-19			
APPROVED	RGV	2-Jan-19			



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar



	TITLE CONTINUOUS DOSING PUMP MOTOR FOR PTP STILLING CHAMBER DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 60 OF 89

S. No.	Description		Data to be filled by successful bidder
A.	General		
1	Manufacturer & country of origin		CG Power And Industrial Solutions – INDIA
2	Motor type		3 phase AC Squirrel Cage induction Motor IE2
3	Type of starting		Direct Online
4	Name of the equipment driven by motor & Quantity		Continuous Dosing pump for CW Forebay – 2 Nos
5	Maximum Power requirement of driven equipment		1.82 KW
6	Rated speed of Driven Equipment		2850
7	Design ambient temperature		50°C
B.	Design and Performance Data		
1	Frame size & type designation		ND 90L
2	Type of duty		S1
3	Rated Voltage		415 +/- 10% VAC
4	Permissible variation for		
5	a	Voltage	10%
6	b	Frequency	+3-5%
7	c)	Combined voltage & frequency	10% (ABSOLUTE)
8	Rated output at design ambient temp (by resistance method)		2.2KW
9	Synchronous speed & Rated slip		2900 / Slip – 50
10	Minimum permissible starting voltage		85% Rated Voltage
11	Starting time in sec with mechanism coupled		
12	a) At rated voltage		0.055 sec
13	b) At min starting voltage		0.075 sec
14	Locked rotor current as percentage of FLC (including IS tolerance)		840% (FLC)
15	Torque		
	a) Starting		225
	b) Maximum		275
16	Permissible temp rise at rated output over ambient temp & method		70 (Resistance Method)
17	Noise level at 1.0 m (dB)		As per IS 12065
18	Amplitude of vibration		As per IS 12075
19	Efficiency & P.F. at rated voltage & frequency		

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE	SPECIFICATION NO.
	CONTINUOUS DOSING PUMP MOTOR FOR PTP STILLING CHAMBER DATA SHEET - C	VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 61 OF 89

S. No.	Description	Data to be filled by successful bidder
	a) At 100% load	84.3
	c) At 75% load	84.3
	c) At starting	84
C.	Constructional Features	
1	Method of connection of motor driven equipment	Direct Coupled
2	Applicable Standard	IS/IEC 60034 / IS 12615
3	DOP of Enclosure	IP55
4	Method of cooling	TEFC
5	Class of insulation	F (Temp. rise limited to Class B)
6	Main terminal box	
	a) Type	Non Phase Segregated
	b) Power Cable details (Conductor, size, armour/unarmour)	1*3C * 2.5sqmm Cu
	c) Cable Gland & lugs details (Size, type & material)	Double compression metal gland – CBW01S
	d) Permissible Fault level (kArms & duration in sec)	50 KA
7	Space heater details (Voltage & watts)	NA
8	Flame proof motor details (if applicable)	NA
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	6 Nos of terminals
10	Winding connection	DELTA
11	Kind of rotor winding	Squirrel Cage
12	Kind of bearings	SKF or Equivalent Sealed Bearing ZZ
13	Direction of rotation when viewed from NDE	Bidirectional
14	Paint Shade & type	Shade No. 631 of IS : 5 - Epoxy paint
15	Net weight of motor	24Kg
16	Outline mounting drawing No (To be enclosed as annexure)	Enclosed
D.	Characteristic curves/ drawings (To be enclosed for motors of rating $\geq 55\text{KW}$)	
	a) Torque speed characteristic	Enclosed
	b) Thermal withstand characteristic	Enclosed

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE	SPECIFICATION NO.
	CONTINUOUS DOSING PUMP MOTOR FOR PTP STILLING CHAMBER DATA SHEET - C	VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 62 OF 89

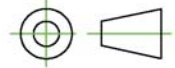
S. No.	Description	Data to be filled by successful bidder
	c) Current vs time	Enclosed
	d) Speed vs time	Enclosed

Note : 1) Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside the terminal box showing the connection diagram for desired direction of rotation and reverse rotation
 2) Two separate earthing terminals suitable for connecting GI strip grounding conductor shall be provided on opposite sides of the motor frame

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

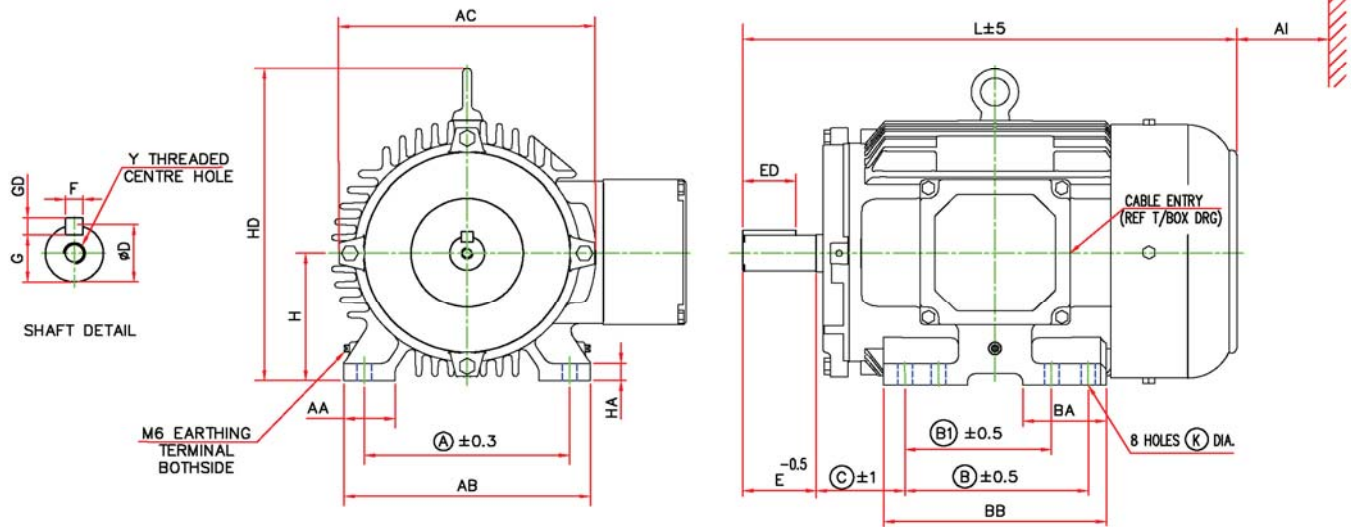
DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

PROJECTION



DO NOT SCALE

PLEASE ASK, IF IN DOUBT



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND90L	140	100	125	56	90.0 / 89.7	35	168	57	152	10.0 / 10.5	150	195	335	185	15	24	50

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
24.009 / 23.996	50	36	8.00 / 7.96	7.0 / 6.9	20.0 / 19.8	M8X19

NOTES TERMINAL BOX CAN BE ROTATED IN 360 DEG @90 DEG.
ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.
MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY
**MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

ALL DIMENSIONS ARE IN mm
RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

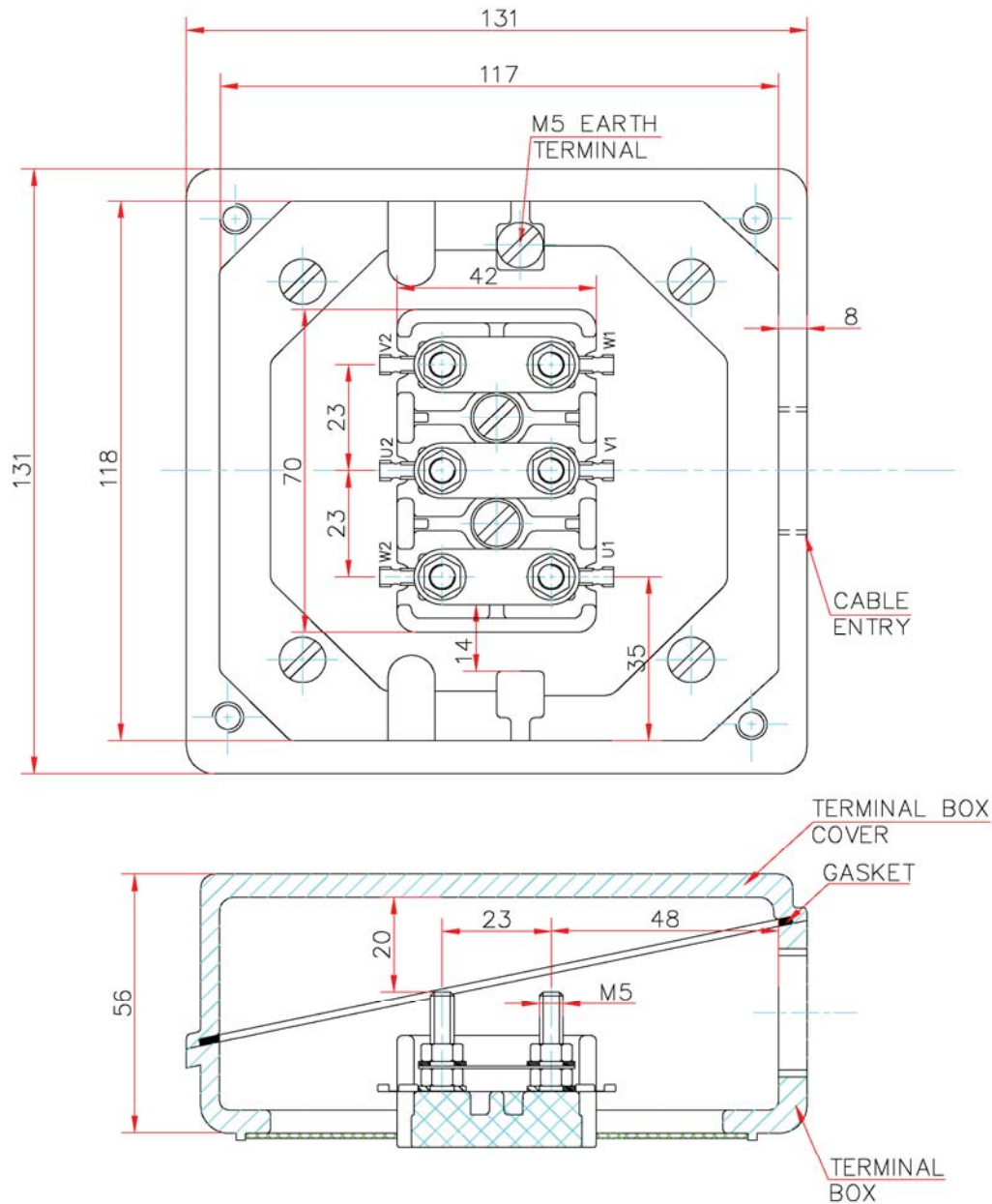
CUSTOMER			RATED O/P kW	2.2
P.O. NO.	enquiry		NO OF POLES	2
IND. NO.	QMYD171616/400		FRAME	ND90L
CLIENT			MOUNTING	B3
PROJECT			TAG NO.	
	NAME	DATE	REMARKS	TITLE
DRN	SBK	24-Dec-18		DIMENSIONAL DRAWING
CHD	SBK	24-Dec-18		
APPROVED	SSN	24-Dec-18		



CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

DRG NO

QMYD171616/400-2



CREEPAGE = 25
CLEARNCE = 11

MATERIAL OF T/BOX
CAST IRON

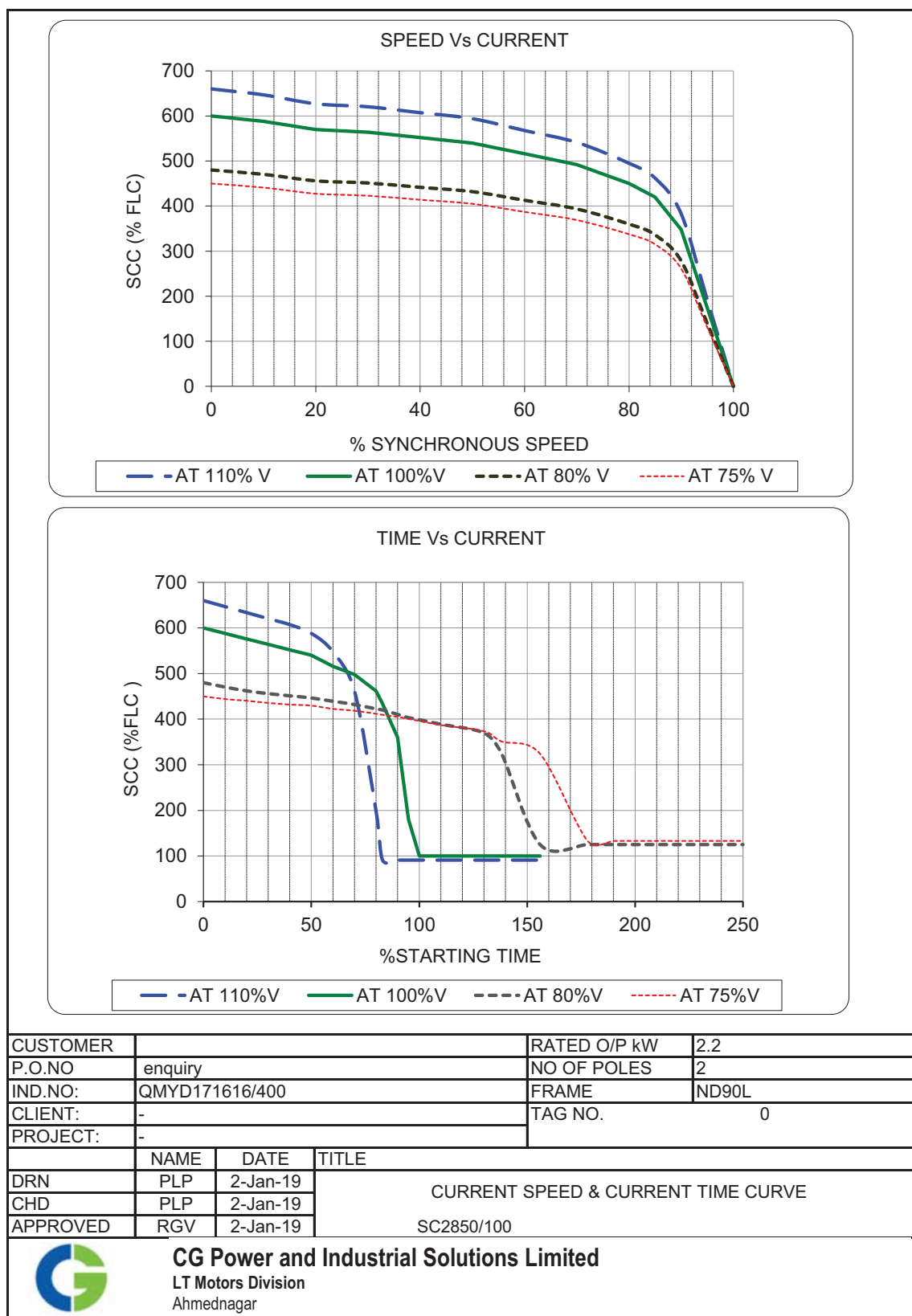
ACCESSORIES	SPACE HEATER	THERMISTOR	RTD	
APPLICABLE	NA	NA	NA	
CABLE SIZE (ENTRY)	NA	NA	NA	
MAIN CABLE SIZE	2 * 3C,6-MM²	CABLE ENTRY	M20X1.5P 2-Nos.	
CUSTOMER	1-3C-2.5 sq.mm [Cu]		RATED O/P kW	2.2
PO No	enquiry		NO OF POLES	2
INDENT / ENQ No	QMYD171616/400		FRAME	ND90L
CLIENT	Tag No.			
PROJECT				
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED	
DRAWN BY	AMR	24-12-2018	TITLE : TERMINAL BOX ARRANGEMENT	
CHECKED BY	SBK	24-12-2018		
APPROVED BY	SRB	24-12-2018		

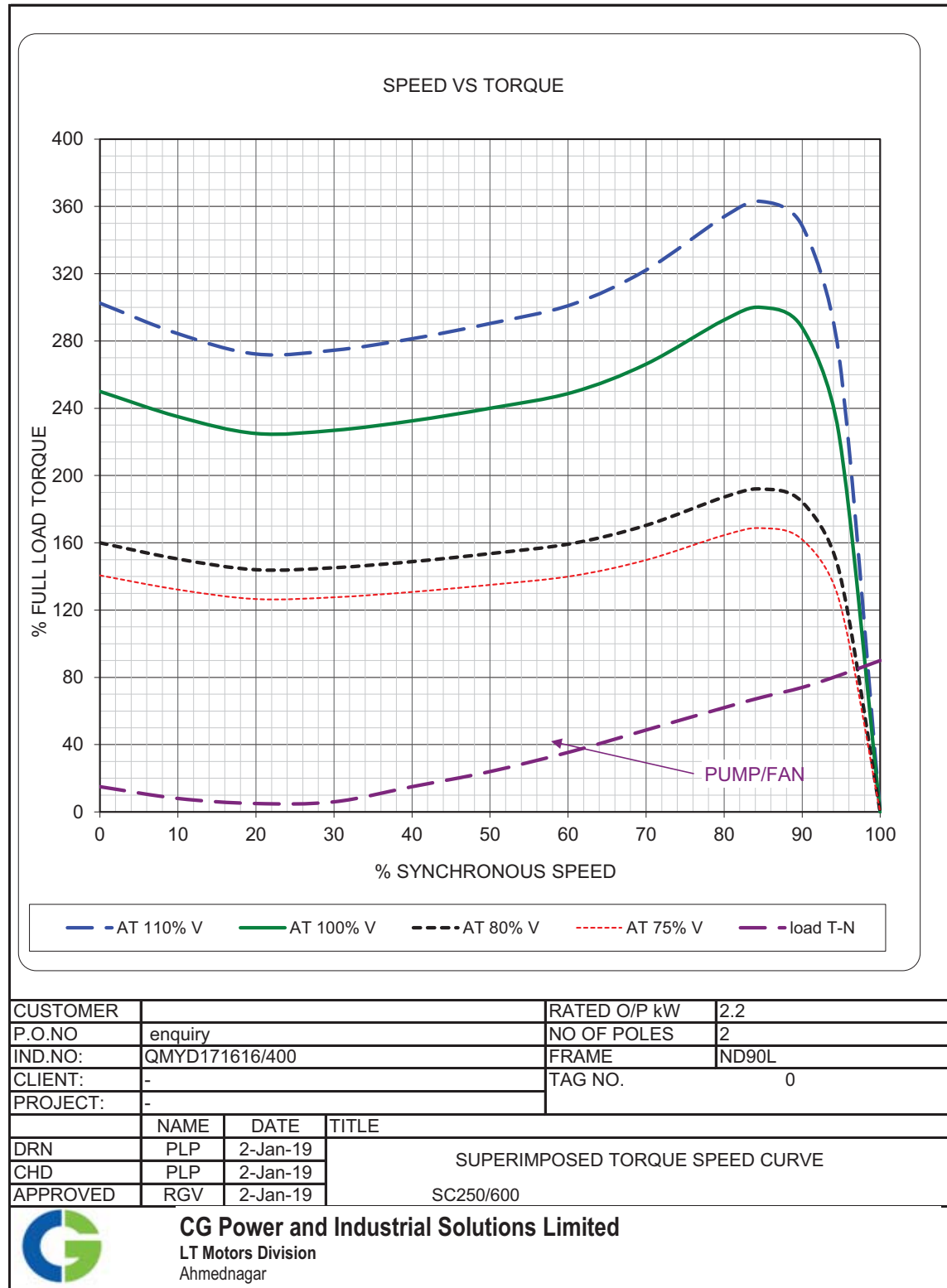


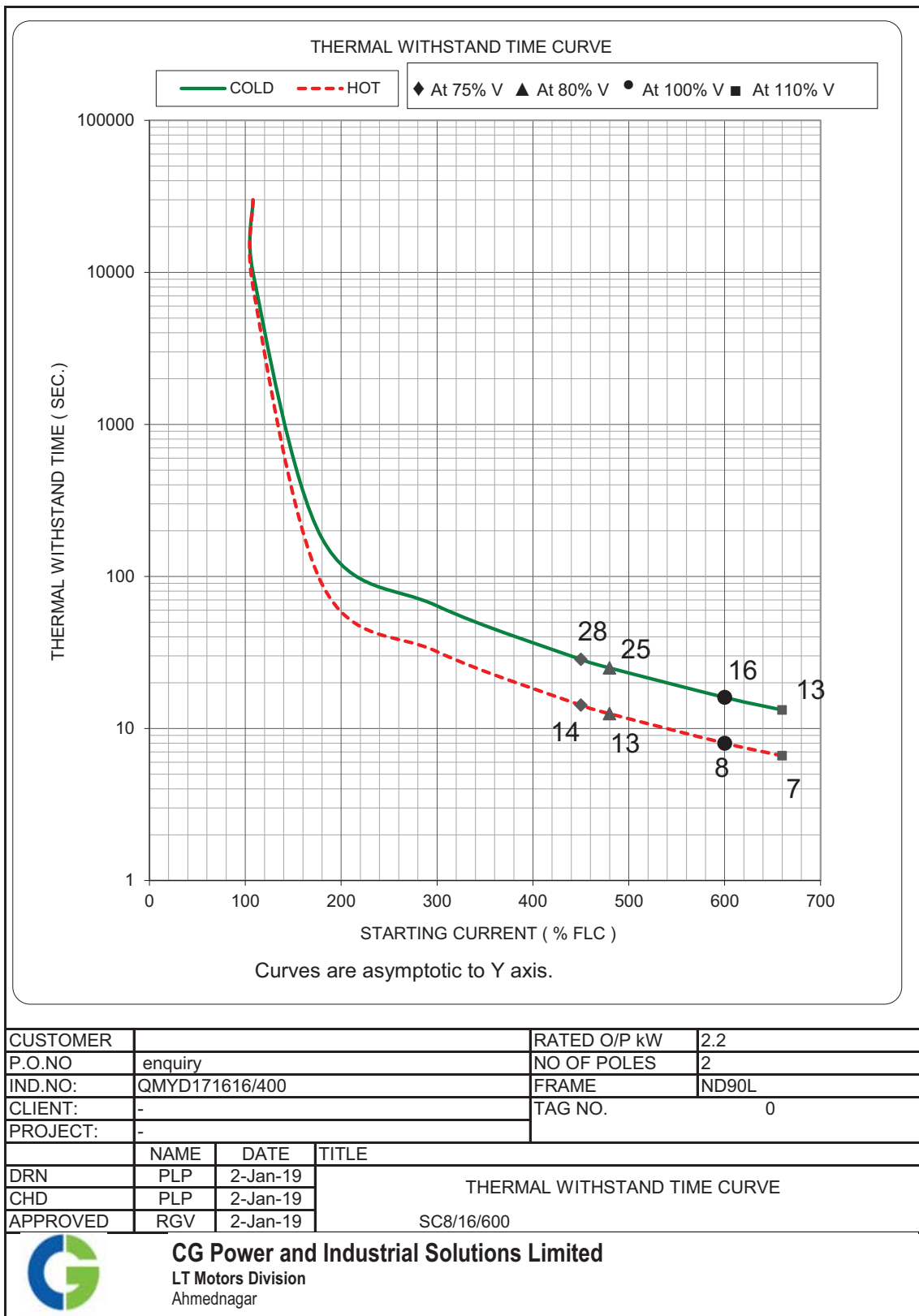
CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

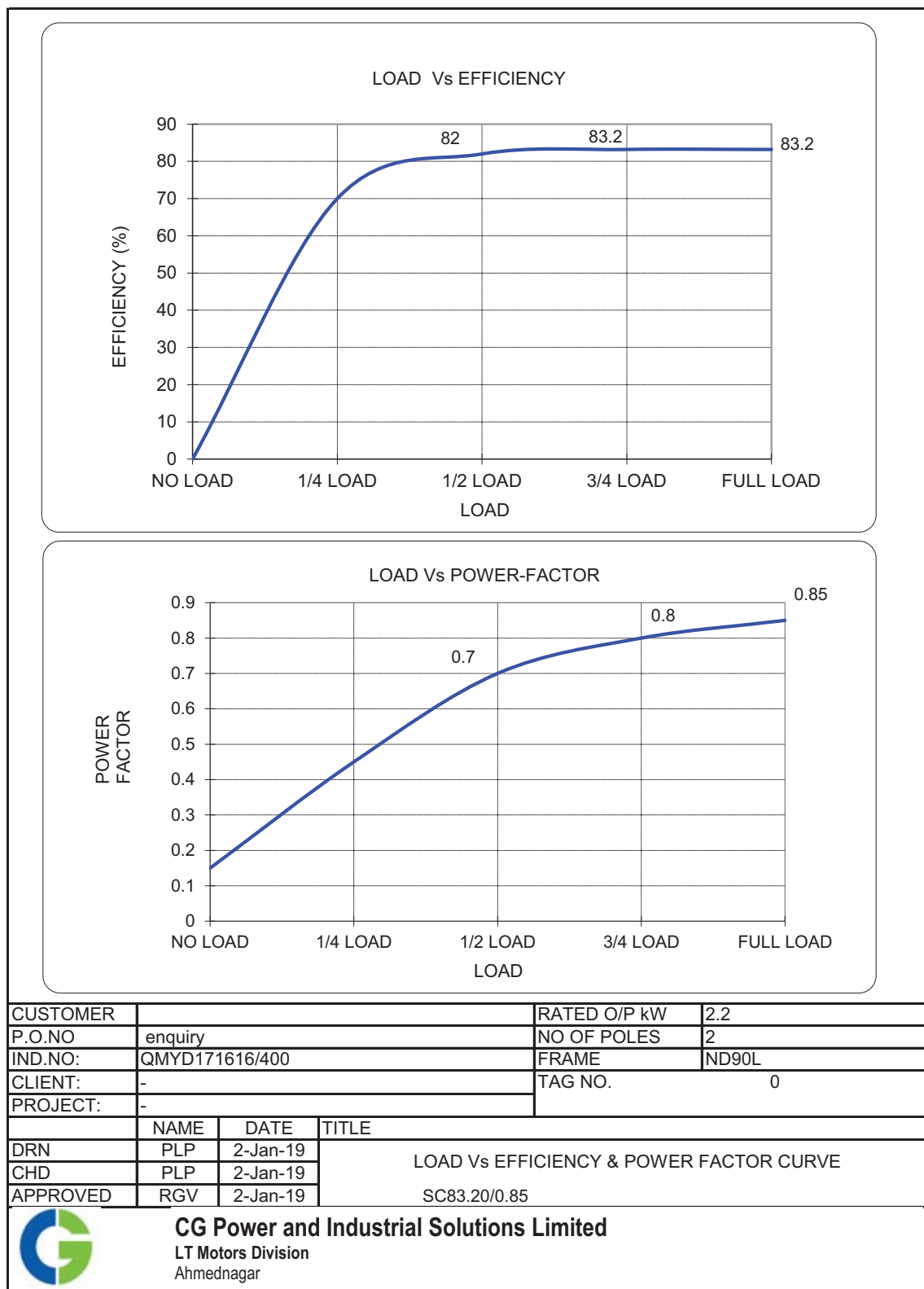
EA9103R1

DRG No :

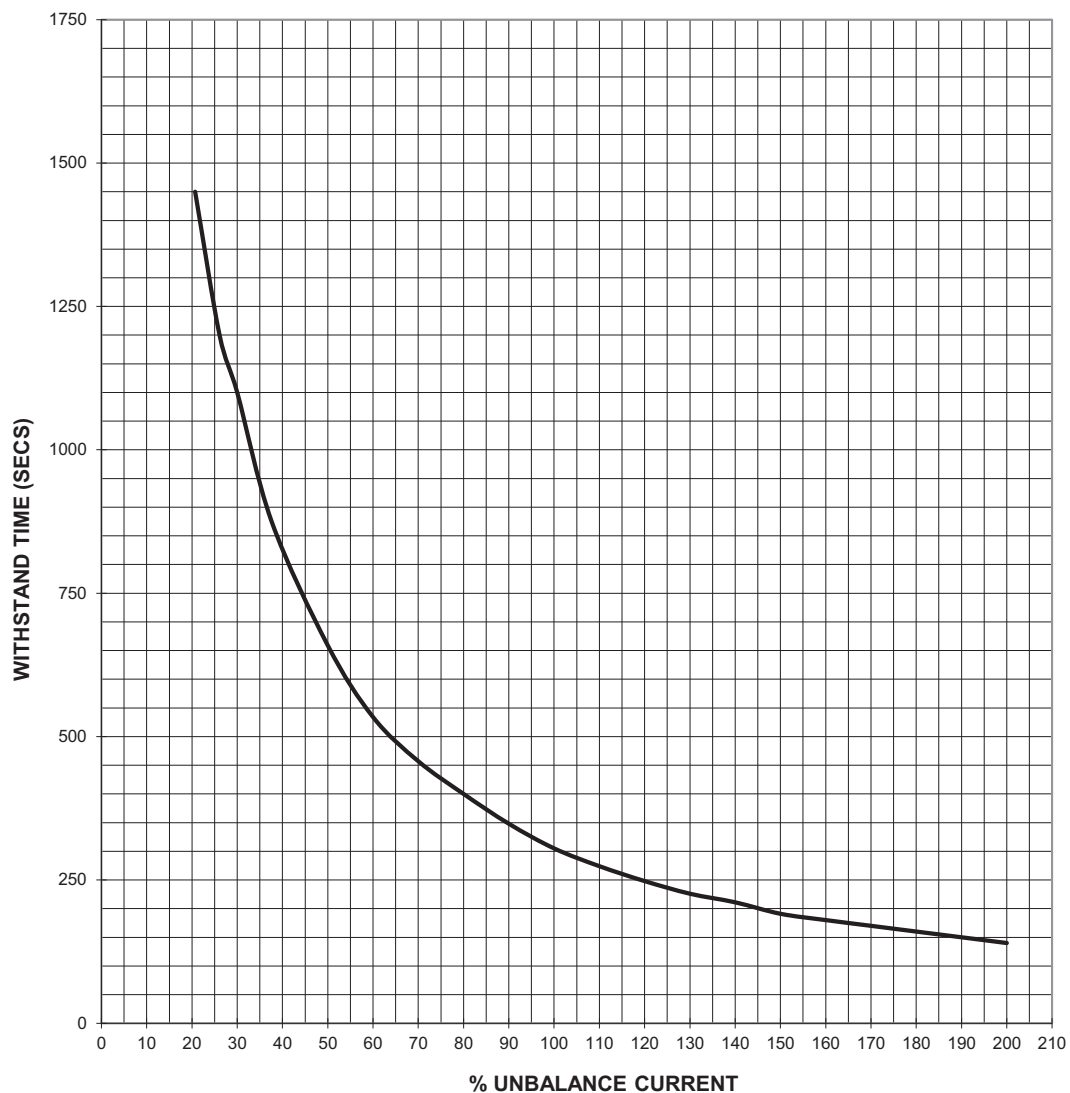








NEGATIVE SEQUENCE CHARACTERISTICS



CUSTOMER				RATED O/P kW	2.2
P.O.NO	enquiry			NO OF POLES	2
IND.NO:	QMYD171616/400			FRAME	ND90L
CLIENT:	-			TAG NO.	0
PROJECT:	-				
	NAME	DATE	TITLE		
DRN	PLP	2-Jan-19	NEGATIVE SEQUENCE CHARACTERISTICS		
CHD	PLP	2-Jan-19			
APPROVED	RGV	2-Jan-19			



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar

	TITLE SHOCK DOSING PUMP MOTOR FOR CW FOREBAY DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 70 OF 89

S. No.	Description		Data to be filled by successful bidder
A.	General		
1	Manufacturer & country of origin		CG Power And Industrial Solutions – INDIA
2	Motor type		3 phase AC Squirrel Cage induction Motor IE3
3	Type of starting		Direct Online
4	Name of the equipment driven by motor & Quantity		Continuous Dosing pump for CW Forebay – 2 Nos
5	Maximum Power requirement of driven equipment		15.32 KW
6	Rated speed of Driven Equipment		2850
7	Design ambient temperature		50 °C
B.	Design and Performance Data		
1	Frame size & type designation		ND 160L
2	Type of duty		S1
3	Rated Voltage		415 +/- 10% VAC
4	Permissible variation for		
5	a	Voltage	10%
6	b	Frequency	+3-5%
7	c	Combined voltage & frequency	10% (ABSOLUTE)
8	Rated output at design ambient temp (by resistance method)		18.5 KW
9	Synchronous speed & Rated slip		2900 / Slip – 50
10	Minimum permissible starting voltage		85% Rated Voltage
11	Starting time in sec with mechanism coupled		
12	a) At rated voltage		0.055 sec
13	b) At min starting voltage		0.075 sec
14	Locked rotor current as percentage of FLC (including IS tolerance)		840% (FLC)
15	Torque		
	a) Starting		225
	b) Maximum		275
16	Permissible temp rise at rated output over ambient temp & method		70 (Resistance Method)
17	Noise level at 1.0 m (dB)		As per IS 12065
18	Amplitude of vibration		As per IS 12075
19	Efficiency & P.F. at rated voltage & frequency		

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE	SPECIFICATION NO.
	SHOCK DOSING PUMP MOTOR FOR CW FORBAY DATA SHEET - C	VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 71 OF 89

S. No.	Description	Data to be filled by successful bidder
	a) At 100% load	92.4
	c) At 75% load	92.4
	c) At starting	92
C.	Constructional Features	
1	Method of connection of motor driven equipment	Direct Coupled
2	Applicable Standard	IS/IEC 60034 / IS 12615
3	DOP of Enclosure	IP55
4	Method of cooling	TEFC
5	Class of insulation	F (Temp. rise limited to Class B)
6	Main terminal box	
	a) Type	Non Phase Segregated
	b) Power Cable details (Conductor, size, armour/unarmour)	1 x 3 C x 25 Al.
	c) Cable Gland & lugs details (Size, type & material)	Double compression metal gland – CBW03
	d) Permissible Fault level (kArms & duration in sec)	50 KA
7	Space heater details (Voltage & watts)	NA
8	Flame proof motor details (if applicable)	NA
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	6 Nos of terminals
10	Winding connection	DELTA
11	Kind of rotor winding	Squirrel Cage
12	Kind of bearings	SKF or Equivalent
13	Direction of rotation when viewed from NDE	Bidirectional
14	Paint Shade & type	Shade No. 631 of IS : 5 - Epoxy paint
15	Net weight of motor	36Kg
16	Outline mounting drawing No (To be enclosed as annexure)	Enclosed
D.	Characteristic curves/ drawings (To be enclosed for motors of rating $\geq 55\text{KW}$)	
	a) Torque speed characteristic	Enclosed
	b) Thermal withstand characteristic	Enclosed

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE	SPECIFICATION NO.
	SHOCK DOSING PUMP MOTOR FOR CW FOREBAY DATA SHEET - C	VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 3 OF 3

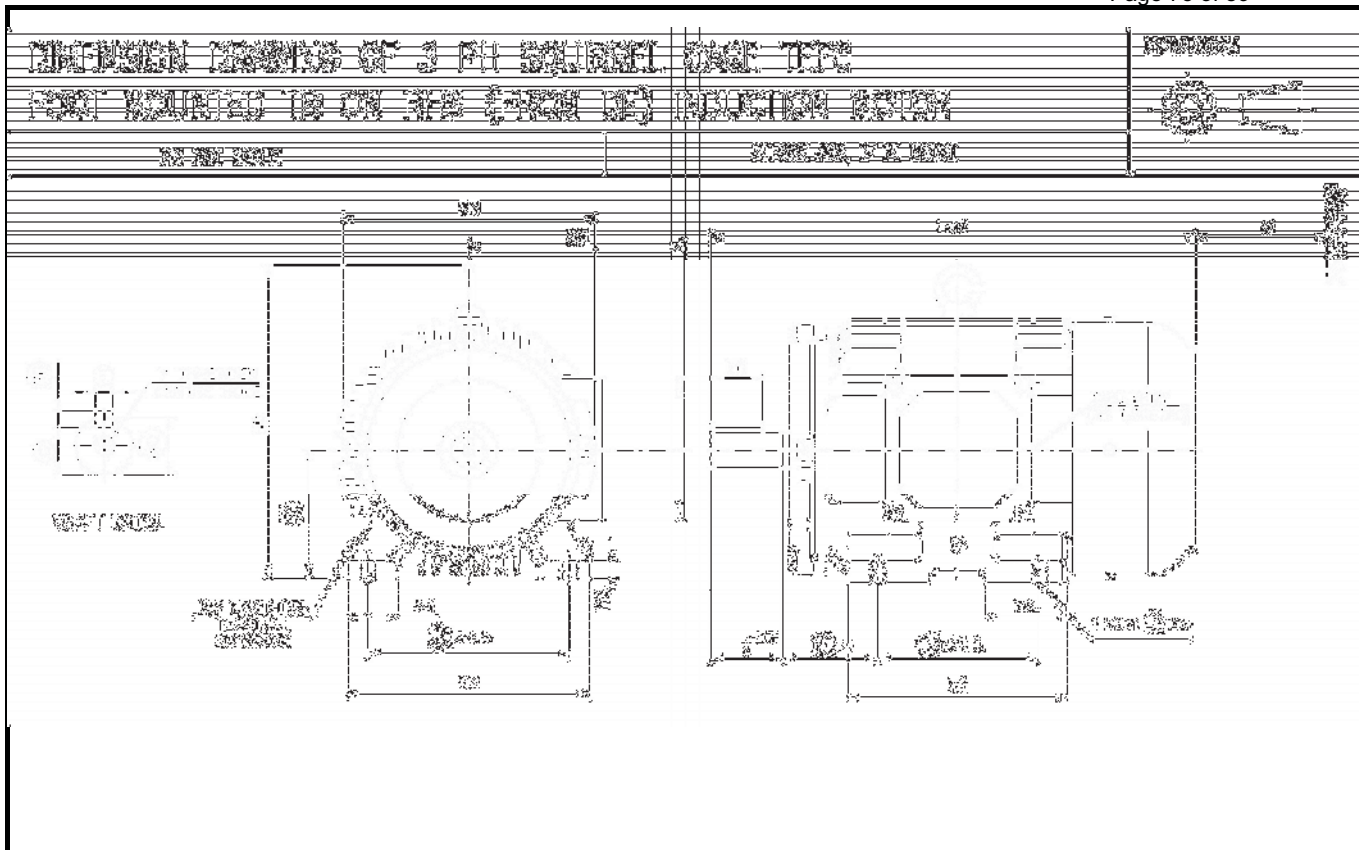
S. No.	Description	Data to be filled by successful bidder
	c) Current vs time	Enclosed
	d) Speed vs time	Enclosed

Note : 1) Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside

the terminal box showing the connection diagram for desired direction of rotation and reverse rotation

2) Two separate earthing terminals suitable for connecting GI strip grounding conductor shall be provided on opposite sides of the motor frame

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			



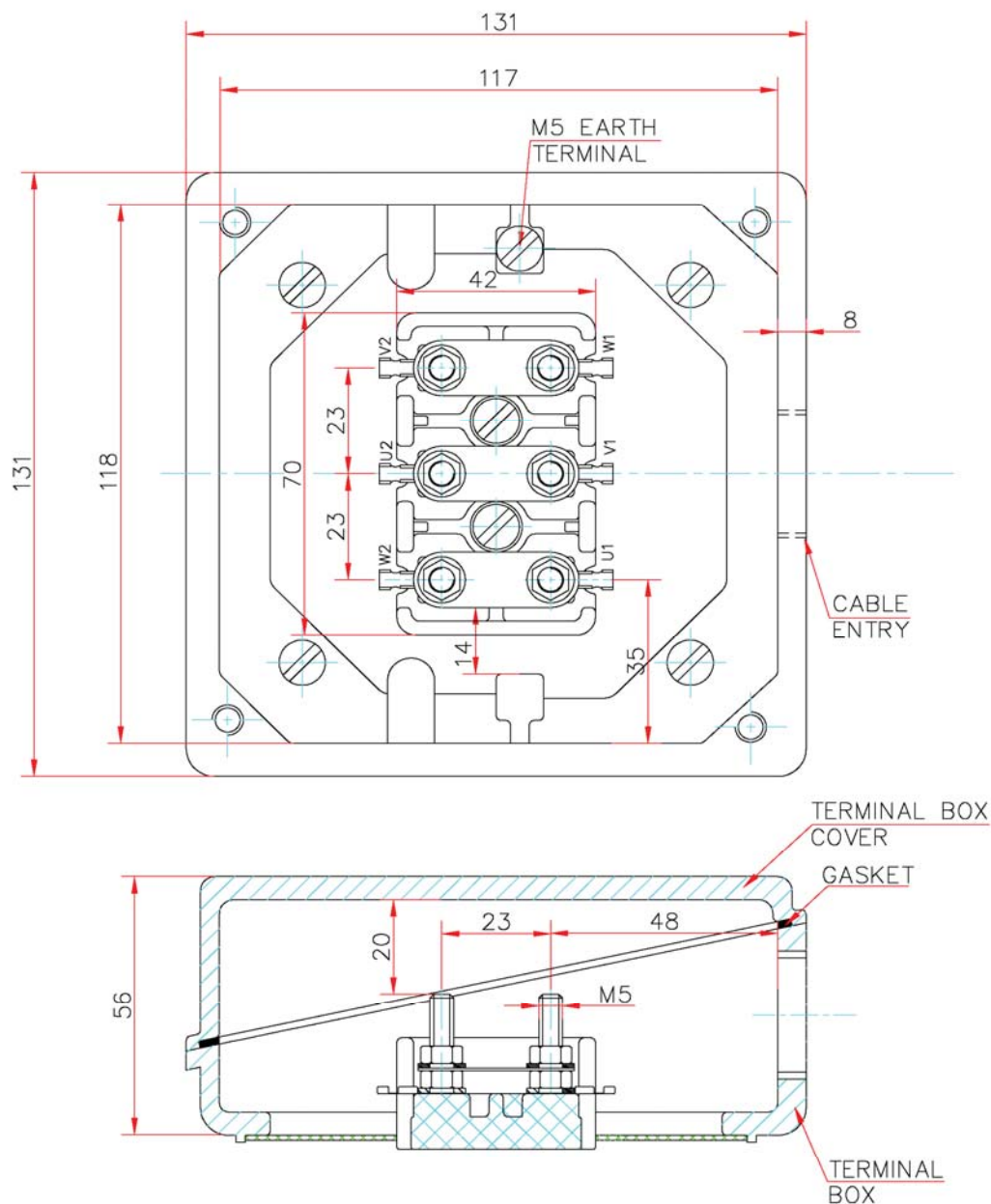
FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND100L	160	140		63	100.0 / 99.7	36	192	51	170	12.0 / 12.5	160	215	380	250	16	36	60

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
28.009 / 27.996	60	44	8.00 / 7.96	7.0 / 6.9	24.0 / 23.8	M10X22

NOTES TERMINAL BOX CAN BE ROTATED IN 360 DEG @90 DEG.
 ONE EARTHING TERMINAL IS PROVIDED INSIDE MAIN TERMINAL BOX.
 MOTOR MAY HAVE ADDITIONAL FOOT HOLES FOR CUSTOMER/SITE FLEXIBILITY
 **MINIMUM DISTANCE FOR EFFICIENT COOLING OF MOTOR TO BE MAINTAINED BY USER

ALL DIMENSIONS ARE IN mm
 RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

CUSTOMER				RATED O/P kW	3.7	
P.O. NO.	enquiry			NO OF POLES	2	
IND. NO.	QMYD171616/500			FRAME	ND100L	MOUNTING B3
CLIENT				TAG NO.		
PROJECT						
	NAME	DATE	REMARKS		TITLE DIMENSIONAL DRAWING	
DRN	SBK	24-Dec-18				
CHD	SBK	24-Dec-18				
APPROVED	SSN	24-Dec-18				
CG Power and Industrial Solutions Limited LT Motors Division Ahmednagar Page 490 of 949					DRG NO	
					QMYD171616/500-2	
					REV 0	



CREEPAGE = 25
CLEARANCE = 11

MATERIAL OF T/BOX
CAST IRON

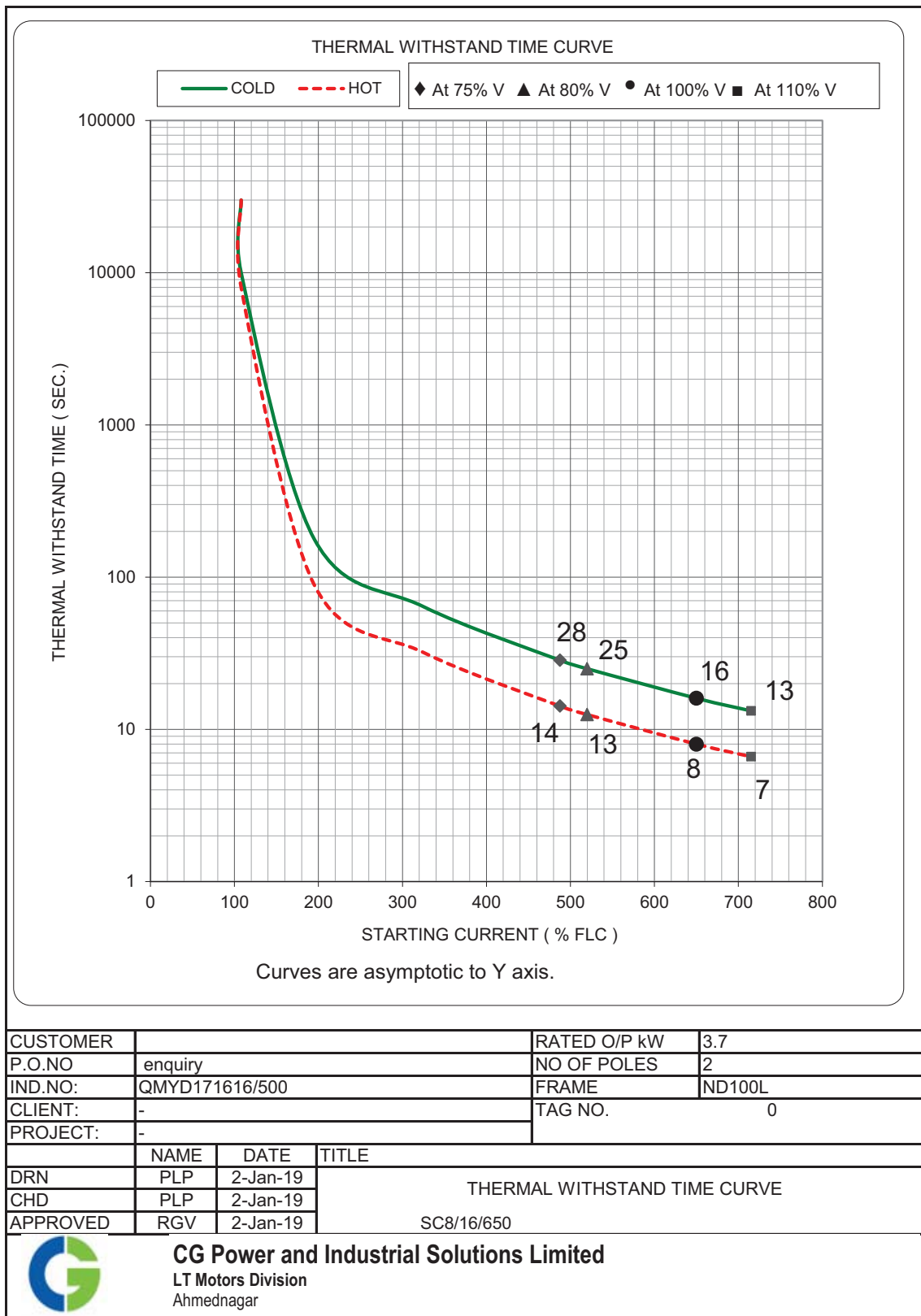
ACCESSORIES	SPACE HEATER		THERMISTOR	RTD	
APPLICABLE	NA		NA	NA	
CABLE SIZE (ENTRY)	NA		NA	NA	
MAIN CABLE SIZE	1 * 3C,25-MM² Al.		CABLE ENTRY	M20X1.5P 1-No.	
CUSTOMER				RATED O/P kW	3.7
PO No	enquiry			NO OF POLES	2
INDENT / ENQ No	QMYD171616/500			FRAME	ND100L
CLIENT			Tag No.		
PROJECT					
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED		
DRAWN BY	AMR	24-12-2018	TITLE : TERMINAL BOX ARRANGEMENT		
CHECKED BY	SBK	24-12-2018			
APPROVED BY	SRB	24-12-2018			

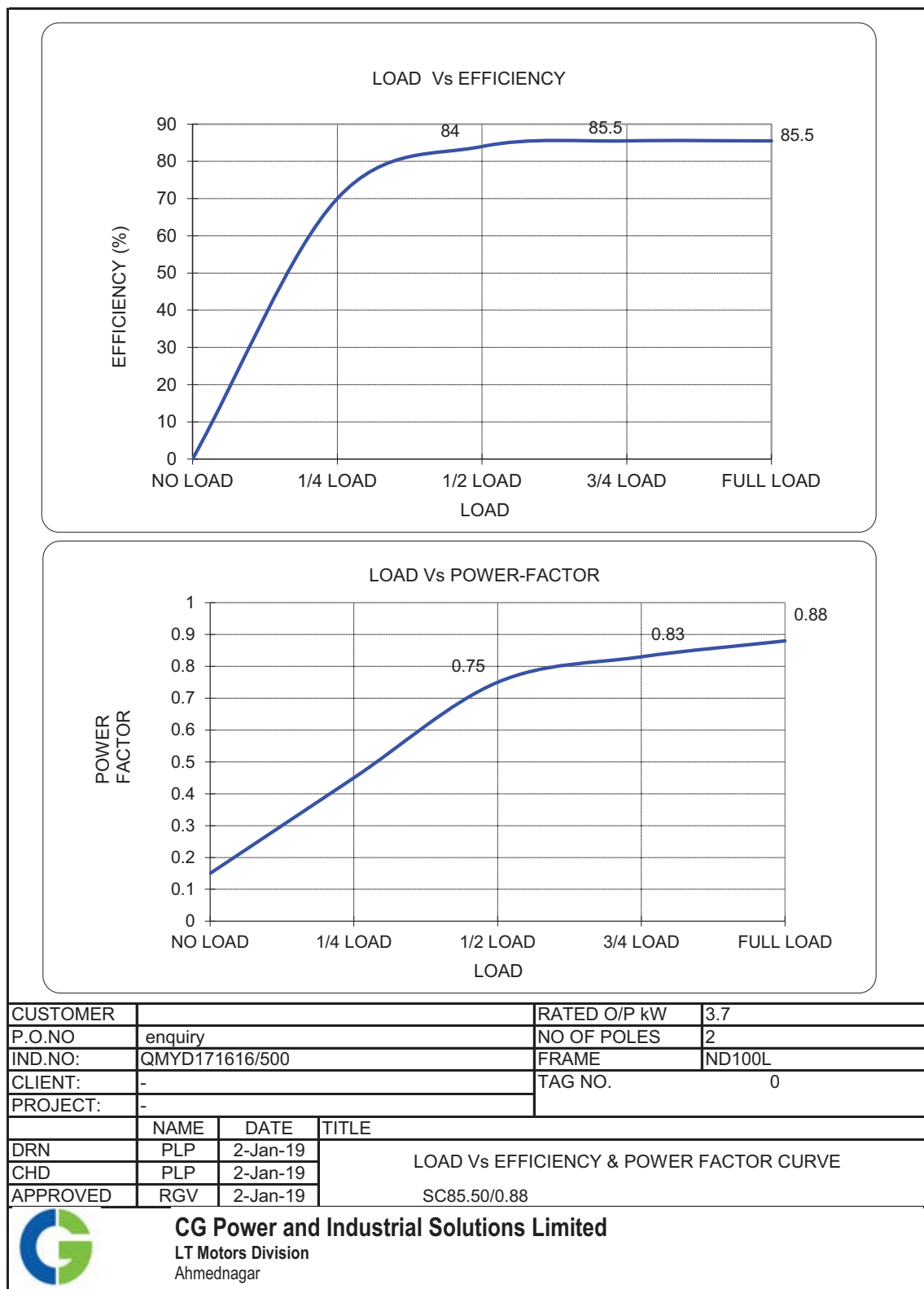


CG Power and Industrial Solutions Limited
LT Motors Division
Ahmednagar

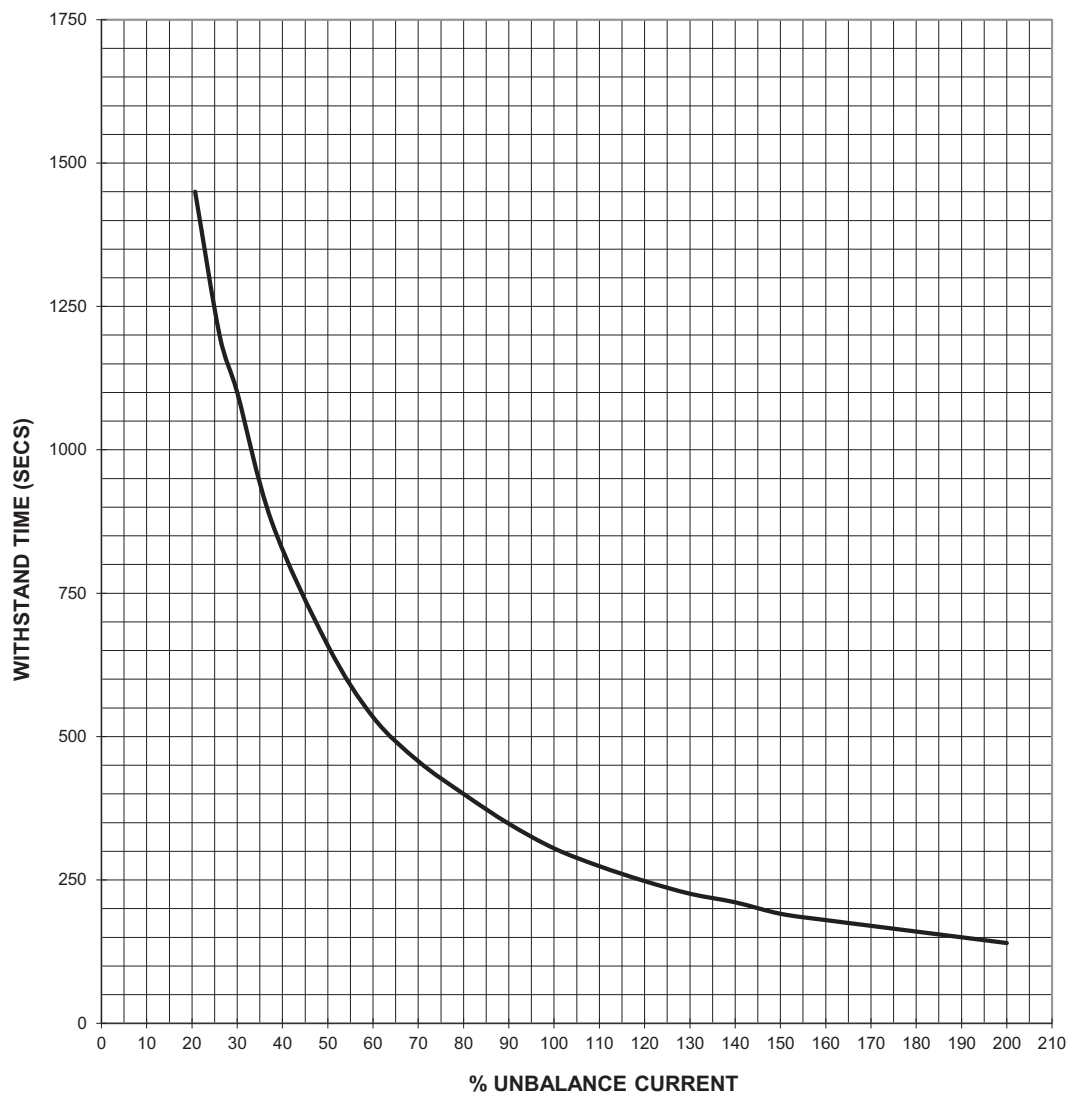
EA9103R1

DRG No :





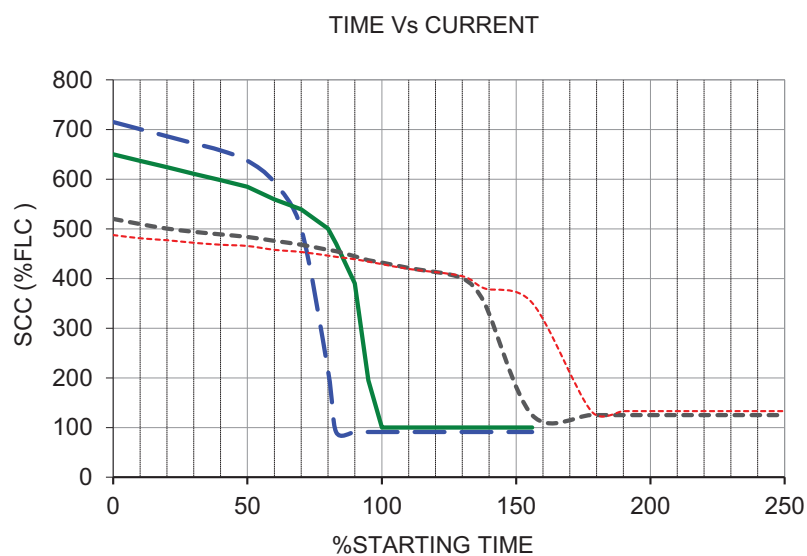
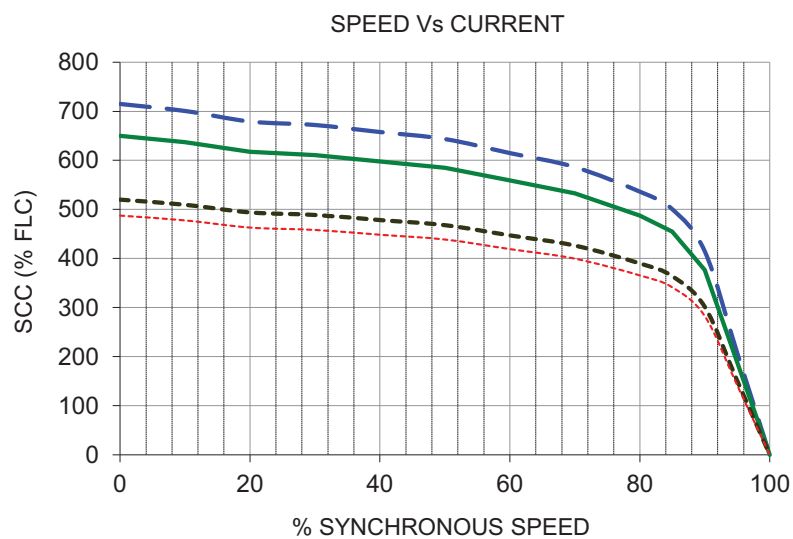
NEGATIVE SEQUENCE CHARACTERISTICS



CUSTOMER				RATED O/P kW	3.7
P.O.NO	enquiry			NO OF POLES	2
IND.NO:	QMYD171616/500			FRAME	ND100L
CLIENT:	-			TAG NO.	0
PROJECT:	-				
	NAME	DATE	TITLE		
DRN	PLP	2-Jan-19	NEGATIVE SEQUENCE CHARACTERISTICS		
CHD	PLP	2-Jan-19			
APPROVED	RGV	2-Jan-19			



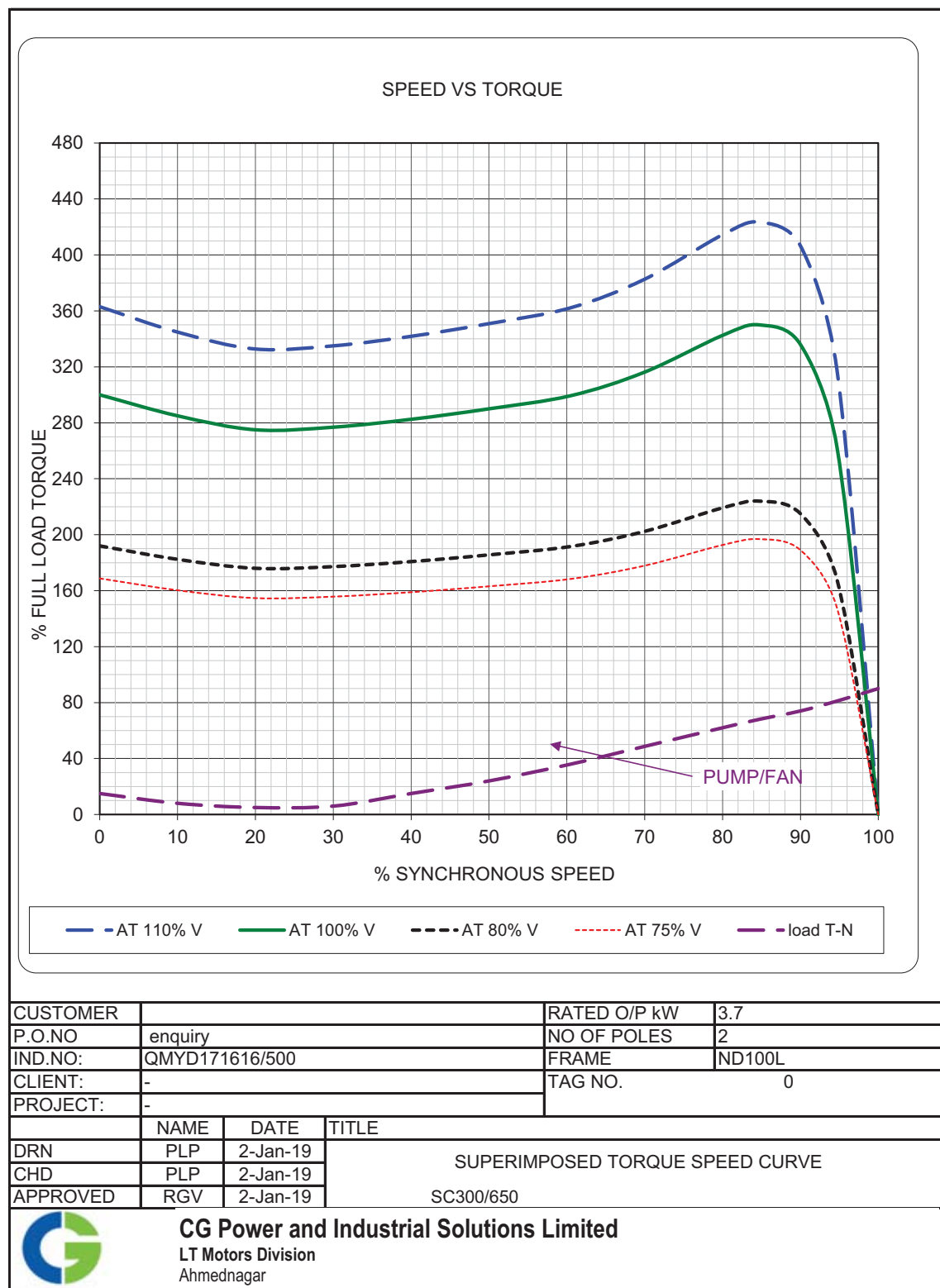
CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar



CUSTOMER		RATED O/P kW	3.7
P.O.NO	enquiry	NO OF POLES	2
IND.NO:	QMYD171616/500	FRAME	ND100L
CLIENT:	-	TAG NO.	0
PROJECT:	-		
	NAME	DATE	TITLE
DRN	PLP	2-Jan-19	CURRENT SPEED & CURRENT TIME CURVE SC2875/100
CHD	PLP	2-Jan-19	
APPROVED	RGV	2-Jan-19	



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar



	TITLE SEA WATER BOOSTER PUMP MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 80 OF 89

S. No.	Description		Data to be filled by successful bidder
A.	General		
1	Manufacturer & country of origin		CG Power And Industrial Solutions – INDIA
2	Motor type		3 phase AC Squirrel Cage induction Motor IE3
3	Type of starting		Direct Online
4	Name of the equipment driven by motor & Quantity		Sea Water Booster Pump – 2 Nos
5	Maximum Power requirement of driven equipment		14.34KW
6	Rated speed of Driven Equipment		1470
7	Design ambient temperature		50°C
B.	Design and Performance Data		
1	Frame size & type designation		ND 180L
2	Type of duty		S1
3	Rated Voltage		415 +/- 10% VAC
4	Permissible variation for		
5	a	Voltage	10%
6	b	Frequency	+3-5%
7	c	Combined voltage & frequency	10% (ABSOLUTE)
8	Rated output at design ambient temp (by resistance method)		22KW
9	Synchronous speed & Rated slip		1500 / Slip – 30
10	Minimum permissible starting voltage		85% Rated Voltage
11	Starting time in sec with mechanism coupled		
12	a) At rated voltage		0.35 sec
13	b) At min starting voltage		0.55 sec
14	Locked rotor current as percentage of FLC (including IS tolerance)		
15	Torque		
	a) Starting		175
	b) Maximum		225
16	Permissible temp rise at rated output over ambient temp & method		
17	Noise level at 1.0 m (dB		As per IS 12065
18	Amplitude of vibration		As per IS 12075
19	Efficiency & P.F. at rated voltage & frequency		
	a) At 100% load		93.0

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

	TITLE SEA WATER BOOSTER PUMP MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 81 OF 89

S. No.	Description	Data to be filled by successful bidder
	c) At 75% load	93.0
	c) At starting	92.0
C.	Constructional Features	
1	Method of connection of motor driven equipment	Direct Coupled
2	Applicable Standard	IS/IEC 60034
3	DOP of Enclosure	IP55
4	Method of cooling	TEFC
5	Class of insulation	F (Temp. rise limited to Class B)
6	Main terminal box	
	a) Type	Non Phase Segregated
	b) Power Cable details (Conductor, size, armour/unarmour)	3C * 25sqmm
	c) Cable Gland & lugs details (Size, type & material)	Double compression metal gland – CBW03
	d) Permissible Fault level (kArms & duration in sec)	50 KA
7	Space heater details (Voltage & watts)	NA
8	Flame proof motor details (if applicable)	NA
	a) Enclosure	
	b) suitability for hazardous area	
	i Zone	O / I / II
	ii Group	IIA / IIB / IIC
9	No. of Stator winding	6 Nos of terminals
10	Winding connection	DELTA
11	Kind of rotor winding	Squirrel Cage
12	Kind of bearings	SKF or Equivalent Sealed Bearings ZZ
13	Direction of rotation when viewed from NDE	Bidirectional
14	Paint Shade & type	Shade No. 631 of IS : 5 - Epoxy paint
15	Net weight of motor	184Kg
16	Outline mounting drawing No (To be enclosed as annexure)	Enclosed
D.	Characteristic curves/ drawings (To be enclosed for motors of rating ≥ 55 KW)	
	a) Torque speed characteristic	Enclosed
	b) Thermal withstand characteristic	Enclosed
	c) Current vs time	Enclosed
	d) Speed vs time	Enclosed

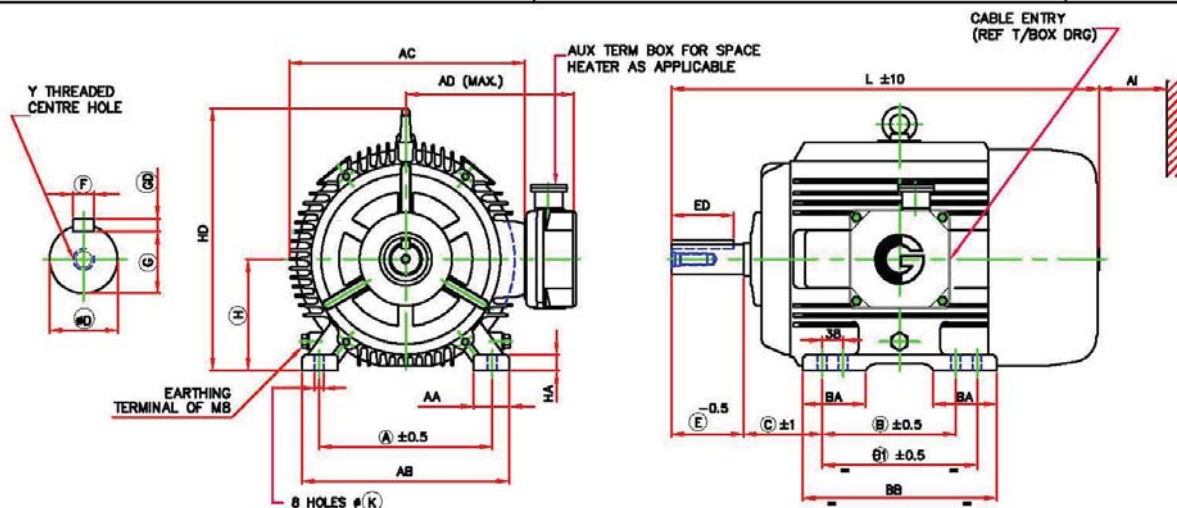
NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

DIMENSION DRAWING OF 3 PH SQUIRREL CAGE TEFC FOOT MOUNTED TB ON RHS (FROM DE) INDUCTION MOTOR

DO NOT SCALE

PLEASE ASK, IF IN DOUBT

PROJECTION



FRAME	FOOT FIXING										OVER ALL					MOTOR wt (kg)	AI**
	A	B	B1	C	H TOL	AA	AB	BA	BB	K TOL	AD	AC	L	HD	HA		
ND180L	279	241	279	121	180.0 / 179.5	84	348	114	323	15.0 / 15.5	270	352	715	418	22	184	100

D END SHAFT EXTENSION AND KEY						
D TOL	E	ED	F TOL	GD TOL	G	Y
48.018 / 48.002	110	80	14.00 / 13.957	9.0 / 8.9	42.5 / 42.3	M16X32

NOTES

Note : 1) Permanently attached diagram and instruction plate made preferably of stainless steel shall be mounted inside the terminal box showing the connection diagram for desired direction of rotation and reverse rotation

Motor may have additional foot holes for customer site flexibility **Minimum distance for efficient cooling of motor to be maintained by user

ALL DIMENSIONS ARE IN mm

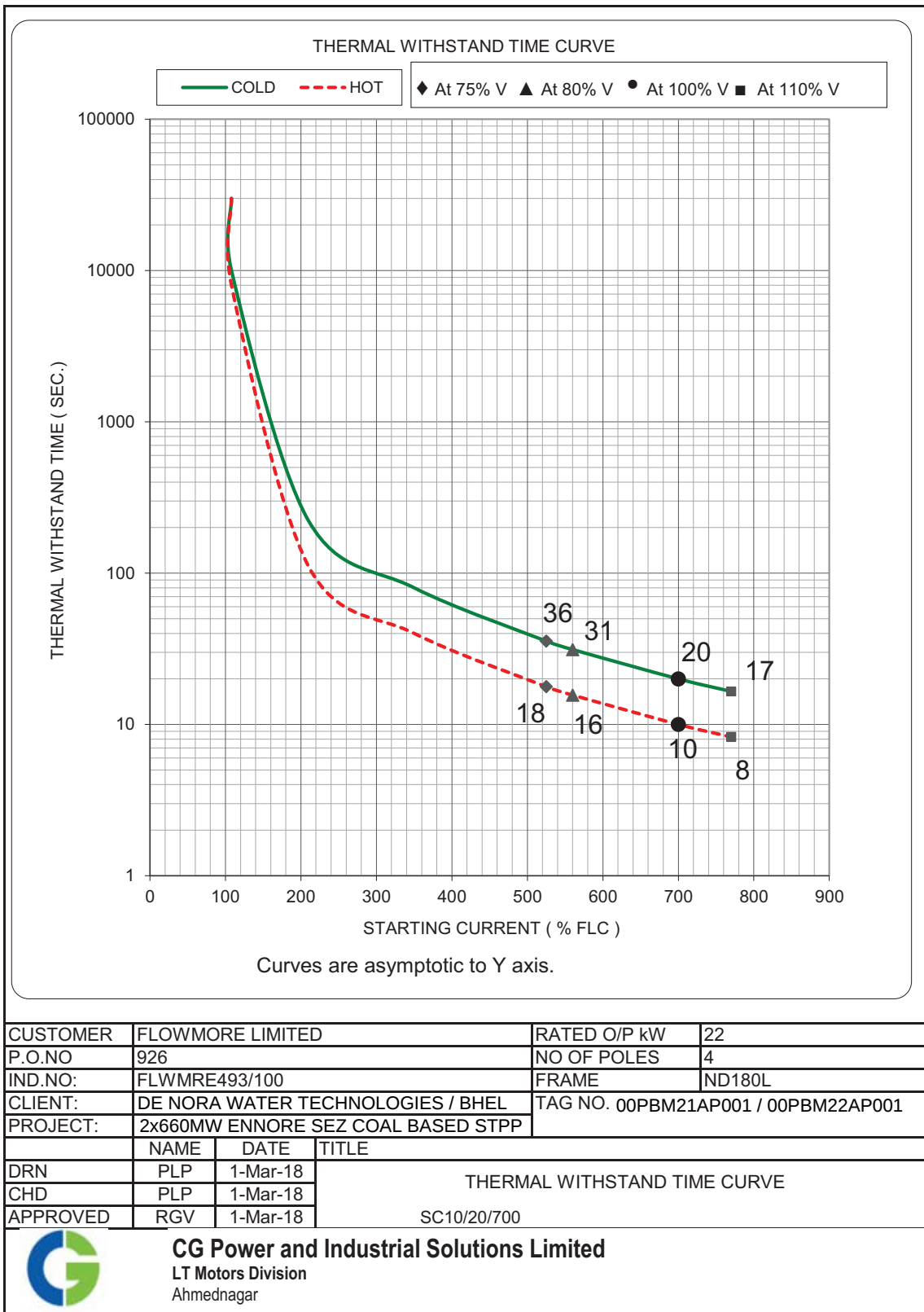
RINGED DIMENSIONS ARE AS PER IS:1231/IEC60072

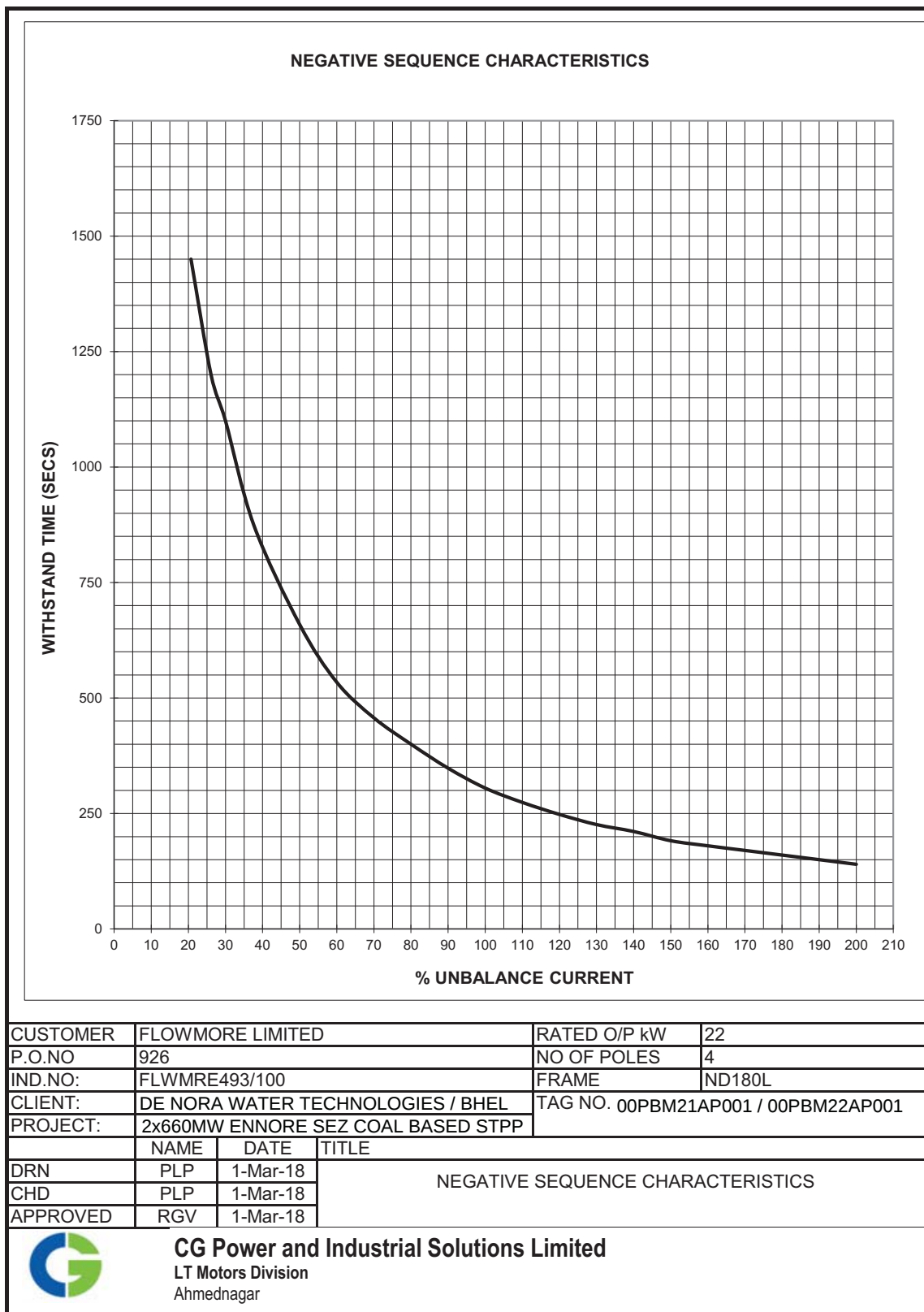
CUSTOMER	FLOWMORE LIMITED			RATED O/P kW	22	
P.O. NO.	926			NO OF POLES	4	
IND. NO.	FLWMRE493/100			FRAME	ND180L	MOUNTING B3
CLIENT	DE NORA WATER TECHNOLOGIES / BHEL			TAG NO.	00PBM21AP001 / 00PBM22AP001	
PROJECT	2x660MW ENNORE SEZ COAL BASED STPP					
	NAME	DATE	REMARKS		TITLE DIMENSIONAL DRAWING	
DRN	SBK	1-Mar-18				
CHD	SBK	1-Mar-18				
APPROVED	SSN	1-Mar-18				
 CG Power and Industrial Solutions Limited LT Motors Division Ahmednagar					DRG NO	
					FLWMRE493/100-4	
					REV 0	

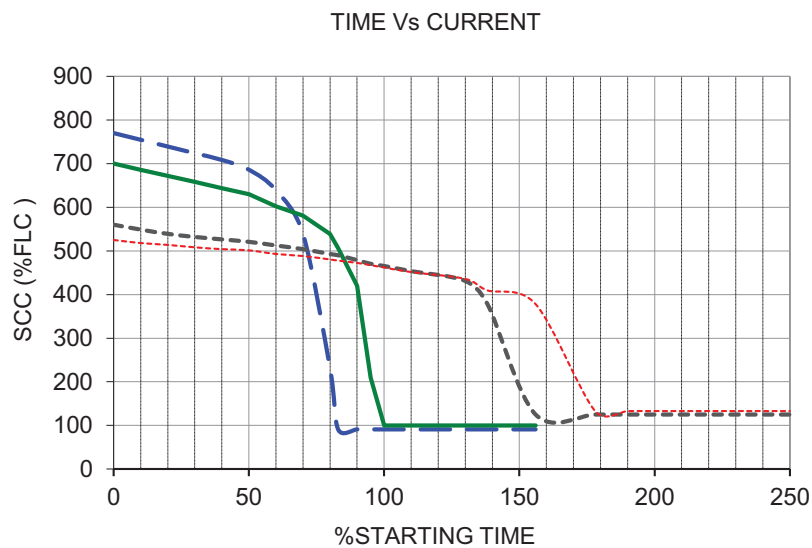
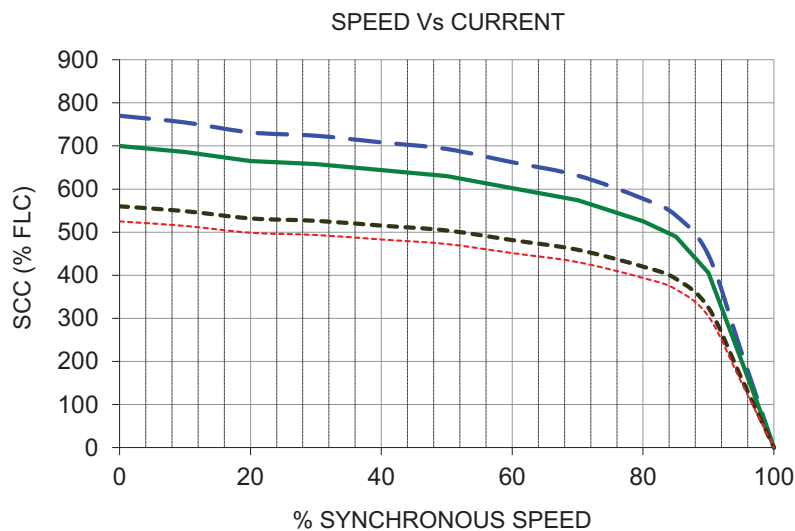
ACCESSORIES	SPACE HEATER		THERMISTOR	RTD	
APPLICABLE	NA		NA	NA	
CABLE SIZE (ENTRY)	NA		NA	NA	
MAIN CABLE SIZE	2 * 3C,25-MM² Al		CABLE ENTRY	M25X1.5P 2-Nos.	
CUSTOMER	FLOWMORE LIMITED			RATED O/P kW	22
PO No	000926			NO OF POLES	4
INDENT / ENQ No	FLWMRE493/100			FRAME	ND180L
CLIENT	DE NORA WATER TECHNOLOGIES / BHEL			Tag No. 00PBM21AP001 / 00PBM22AP001	
PROJECT	2x660MW ENNORE SEZ COAL BASED STPP				
	NAME	DATE	ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED		
DRAWN BY	AMR	01/03/2018	TITLE : TERMINAL BOX ARRANGEMENT		
CHECKED BY	SBK	01/03/2018			
APPROVED BY	SRB	01/03/2018			



DRG No :





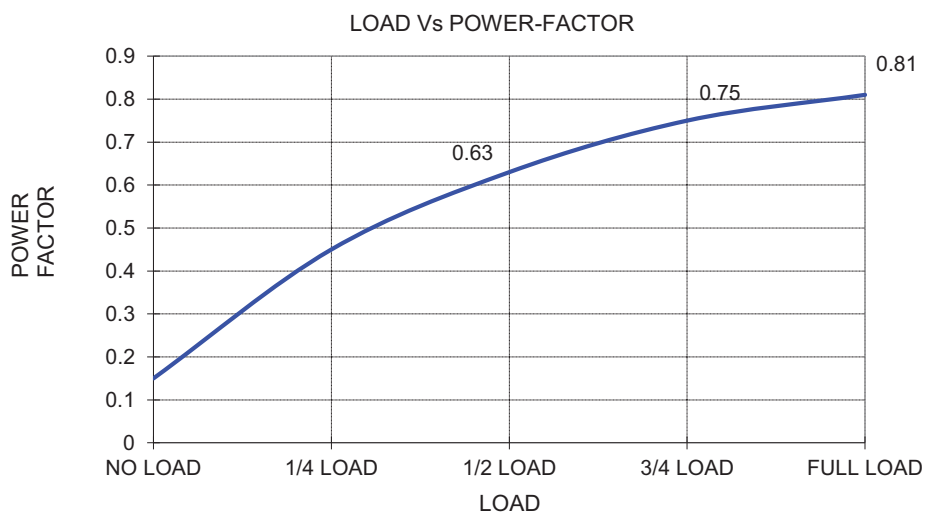
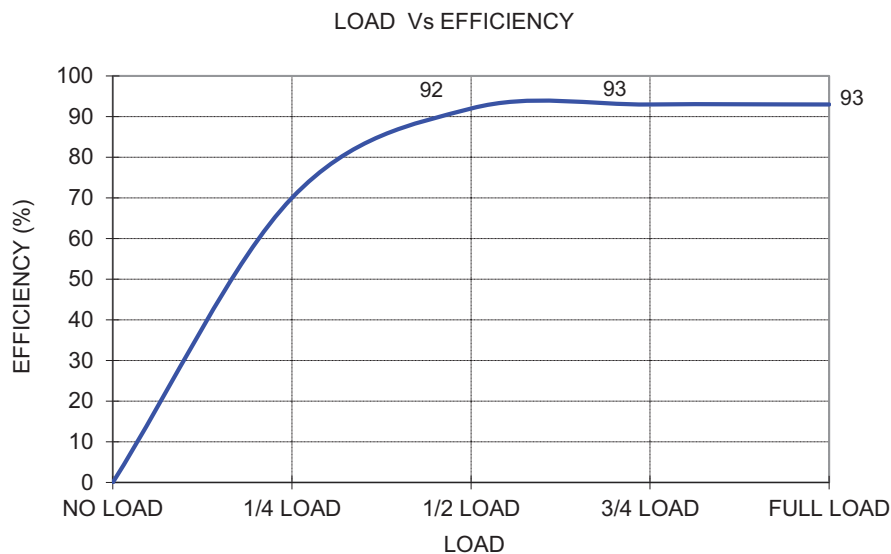


CUSTOMER	FLOWMORE LIMITED		RATED O/P kW	22
P.O.NO	926		NO OF POLES	4
IND.NO:	FLWMRE493/100		FRAME	ND180L
CLIENT:	DE NORA WATER TECHNOLOGIES / BHEL		TAG NO. 00PBM21AP001 / 00PBM22AP001	
PROJECT:	2x660MW ENNORE SEZ COAL BASED STPP			
	NAME	DATE	TITLE	
DRN	PLP	1-Mar-18	CURRENT SPEED & CURRENT TIME CURVE SC1470/100	
CHD	PLP	1-Mar-18		
APPROVED	RGV	1-Mar-18		



CG Power and Industrial Solutions Limited

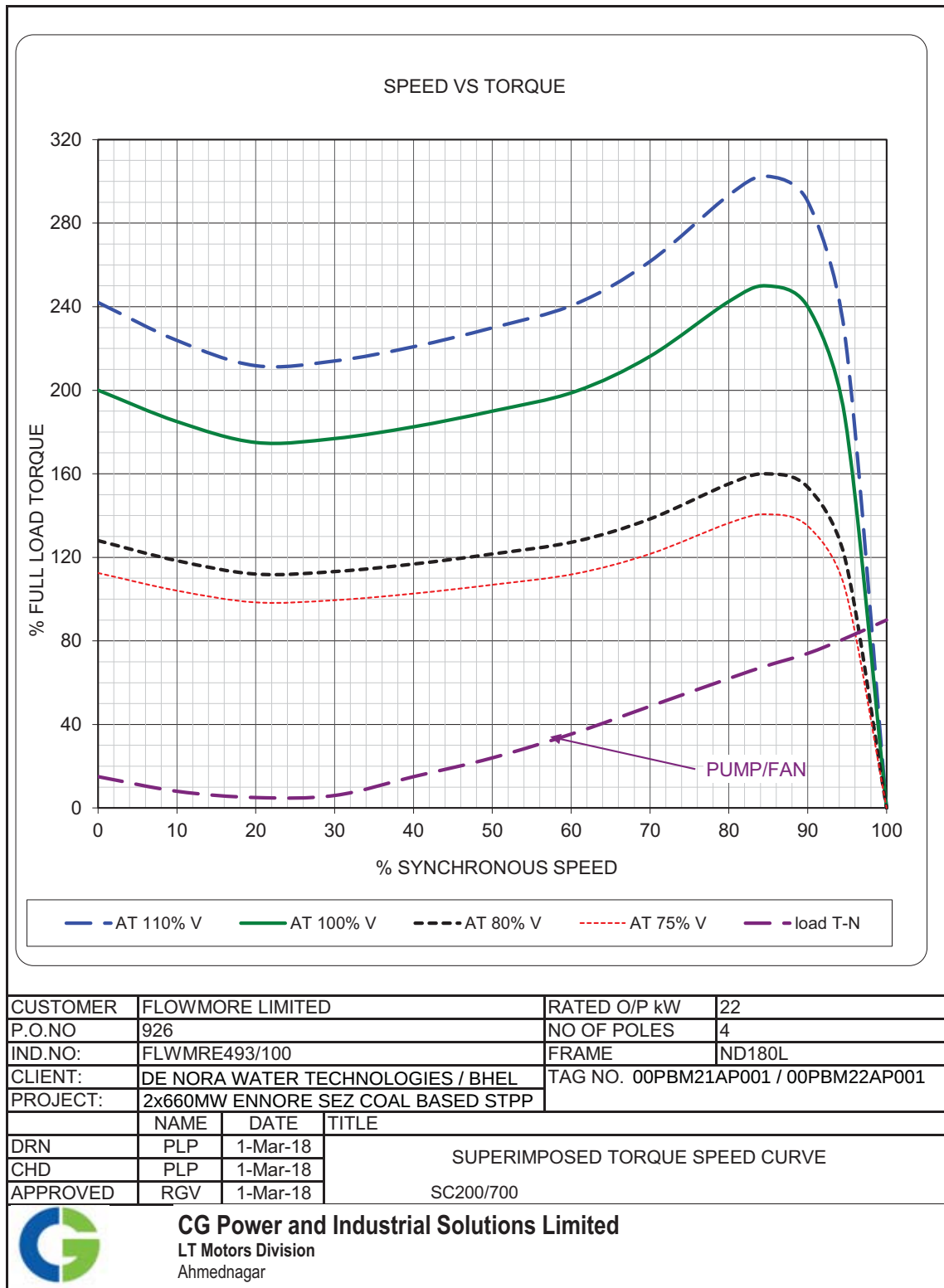
LT Motors Division
Ahmednagar



CUSTOMER	FLOWMORE LIMITED		RATED O/P kW	22
P.O.NO	926		NO OF POLES	4
IND.NO:	FLWMRE493/100		FRAME	ND180L
CLIENT:	DE NORA WATER TECHNOLOGIES / BHEL		TAG NO. 00PBM21AP001 / 00PBM22AP001	
PROJECT:	2x660MW ENNORE SEZ COAL BASED STPP			
	NAME	DATE	TITLE	
DRN	PLP	1-Mar-18	LOAD Vs EFFICIENCY & POWER FACTOR CURVE SC93.00/0.81	
CHD	PLP	1-Mar-18		
APPROVED	RGV	1-Mar-18		



CG Power and Industrial Solutions Limited
 LT Motors Division
 Ahmednagar



	TITLE MOTOR DATA SHEET - C	SPECIFICATION NO.
		VOLUME II B
		SECTION D
		REV NO. 00 DATE
		SHEET 3 OF 3

NAME OF VENDOR			SEAL	REV.	
NAME	SIGNATURE	DATE			

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
APPROVED					
STATUS : CONTRACT					
JOB NO.: 412					

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED it must not be used directly or indirectly in any way detrimental to the interest of the company

2018.12.
31
12:38:54
+05'30'

	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT.
This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from the contractual obligation.	
APPROVAL CATEGORY AWARDED = I	
CAT I - Approved	
CAT II - Approved With Comments as Noted	
CAT III - Not Approved	
CAT IV - Reference Drawing	
DEPARTMENT	MECHANICAL AUXILIARY
NAME:	FALGUNI SAHA

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DWG NO. PE - V11 - 412 - 174 - A118

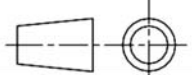


DE NORA

SUB CONTRACTOR: DE NORA INDIA LIMITED KUNDAIM - GOA

ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES, SINGAPORE BRANCH

LOA NO: PW/PE/PG/EN1/P-24/17 DATED: 22 APR 2017

DEPT.	CODE		SCALE	WEIGHT(KG)	REF DRG.	ITEM	
--	A		-	-	-	-	
GA FOR ATMOSPHERIC TANKS					NAME	SIGN	DATE
					PREP	SN	
					CHKD	PG	
					APPD	RF	
DEPT.				CARD CODE	BHEL DOC. NO.		REV
SIGN			N.A.		PE - V11 - 412 - 174 - A118		4
DATE					NO. OF SHEETS 10 EXCLUDING COVER PAGE		

DE NORA WATER TECHNOLOGIES				
DATASHEET FOR: ACID CLEANING TANK		DATASHEET NO: PE-V11-412-174-A118		REV
PROJECT: 2x660MW ENNORE SEZ COAL BASED STPP		PROJECT NO: BHEL		1
GENERAL	1	TAG NO(S)		90PBM508B001
	2	SERVICE		ACID CLEANING TANK
	2	SERVICE		INTERMITTENT
	3	QUANTITY	No.	1
	4	INSTALLATION		OUTDOOR
	5	MANUFACTURER		BPPL
OPERATING CHARACTERISTICS	6	COUNTRY OF MANUFACTURER		INDIA
	9	DUTY		INTERMITTENT
	10	FLUID HANDLED		5% W/W HYDROCHLORIC ACID
	11	NOMINAL/MAXIMUM PRESSURE	barg	ATMOSPHERIC
	12	NOMINAL/MAXIMUM TEMPERATURE	Deg C	25 - 32 /50
	13	DESIGN PRESSURE	barg	FULL LIQUID
	14	MAXIMUM SERVICE PRESSURE	barg	ATMOSPHERIC
	15	DESIGN TEMPERATURE	Deg C	50
	16	GROSS CAPACITY	m ³	7.2
CONSTRUCTION	17	NET CAPACITY	m ³	4.8
	18	TEST PRESSURE	barg	FULL LIQUID
	21	CONSTRUCTION STANDARD		BS 4994 - 1987 / ASTM RTP-1
	22	INSTALLATION POSITION (HORIZONTAL/VERTICAL)		VERTICAL CYLINDRICAL, FLAT BOTTOM WITH INTERNAL SLOPE (1% DIAMETER)
	23	NOZZLE CONNECTION		FLANGE WITH SS316L BOLTS & NUTS
	24	FLANGES STANDARD		ANSI B 16.5#150 EXCEPT MANHOLE
	26	PROTECTION:		
	27	EXTERNAL		VINYL ESTER GRADE RESIN
	28	INTERNAL		VINYL ESTER GRADE RESIN
	29	COLOUR		ALUMINIUM
	31	MATERIAL :		
	32	SHELL/BOTTOM		VINYL ESTER GRADE RESIN
	33	RAINHOOD		VINYL ESTER GRADE RESIN
	35	THICKNESS OF:		
	36	SHELL WALLS (OVERALL)	mm	9 mm FRP (Gradual wall thickness)
	37	SHELL BASE (OVERALL)	mm	10 mm FRP
	38	SHELL KNUCKLE (OVERALL)	mm	19 mm FRP
	39	TOP COVER (UNLINED)	mm	10 mm FRP
	40	LINING	mm	NA
WEIGHTS AND OVERALL DIMENSIONS	44	SHELL DIMENSION:		
	45	DIAMETER/THICKNESS	mm	2000
	46	LENGTH/HEIGHT	mm	2550
	48	WEIGHT OF THE SUPPLY:		
	49	EMPTY	kg	500
	50	FILLED WITH WATER	kg	5500
NOZZLE DATA	52	N1	DN100 ANSI 150# FF	DILUTE ACID TO PUMP'S SUCTION
	53	N2	DN80 ANSI 150# FF	DILUTE ACID RETURN
	54	N3	DN100 ANSI 150# FF	OVERFLOW
	55	N4	DN25 ANSI 150# FF	TITRATION SAMPLING
	56	N5	DN25 ANSI 150# FF	DRAIN
	57	N6	DN50 ANSI 150# FF	LEVEL TRANSMITTER CONN.
	58	N7	DN50 ANSI 150# FF	VENT
	59	N8	DN50 ANSI 150# FF	TOP LEVEL INDICATOR CONN
	60	N9	DN50 ANSI 150# FF	BOTTOM LEVEL INDICATOR CONN
	61	N10	DN25 ANSI 150# FF	SERVICE WATER INLET
	62	N11	DN50 ANSI 150# FF	CONC ACID INLET
	63	N12	DN25 ANSI 150# FF	MANUAL FILL POINT CONN
	64	N13	DN80 ANSI 150# FF	WATER INLET CONN
	65	HH	DN200 ANSI 150# FF	HANDHOLE
NOTES :				

NOZZLE SCHEDULE (All DIMENSION IN MM)										
MARK	DUTY/DESCRIPTION	PRESS. RATING	DRILLING	NB	OD	PCD	QTY	HOLE BOLTS DIA	FLANGE THK	PROJ
HH	HAND HOLE	150#	150#	200	343	298	8	22	28	150
N1	DILUTE ACID TO PUMP'S SUCTION	150#	150#	100	229	190	8	19	24	100
N2	DILUTE ACID RETURN	150#	150#	80	190	152	4	19	24	100
N3	OVERFLOW	150#	150#	100	229	190	8	19	24	100
N4	TITRATION SAMPLING	150#	150#	25	108	79	4	15	15	100
N5	DRAIN	150#	150#	25	108	79	4	15	15	100
N6	LEVEL TRANSMITTER CONN.	150#	150#	50	152	121	4	19	15	100
N7	VENT	150#	150#	50	152	121	4	19	15	100
N8	TOP LEVEL INDICATOR CONN.	150#	150#	50	152	121	4	19	15	100
N9	BOTTOM LEVEL INDICATOR CONN.	150#	150#	50	152	121	4	19	15	100
N10	SERVICE WATER INLET	150#	150#	25	108	79	4	15	15	100
N11	CONC ACID INLET	150#	150#	50	152	121	4	19	15	100
N12	MANUAL FILL POINT CONN	150#	150#	25	108	79	4	15	15	100
N13	WATER INLET CONN	150#	150#	80	190	152	4	19	24	100

DESIGN DATA

PROCESS MEDIA	:	5% W/W HYDROCHLORIC ACID
SPECIFIC GRAVITY	:	1050 kg/m ³
OPERATING TEMP	:	25 - 32 /50 deg C
DESIGN TEMP	:	50 deg C
OPERATING PRESSURE	:	ATMOSPHERIC
DESIGN PRESSURE	:	FULL OF LIQUID
TEST PRESSURE	:	FULL OF LIQUID
GROSS CAPACITY	:	7.2 m ³
NET CAPACITY	:	4.8 m ³
EMPTY WEIGHT	:	450 Kg
OPERATING WEIGHT	:	8035 Kg

GENERAL NOTES

- 1.ALL DIMENSIONS ARE IN MM UNLESS SPECIFIED.
- 2.ALL FLANGES AS PER ANSI B-16.5 CLASS 150# EXCEPT MANHOLE.
- 3.ALL NOZZLE BELOW 80MM WILL HAVE 6MM THICK GUSSET.
- 4.FOR NOZZLE ORIENTATION REFER PLAN VIEW ONLY.
- 5.MOC OF FASTENER IS GI & FOUNDATION BOLT IS SS316L .
- 6.MOC OF GASKET IS NEOPRENE.
- 7.METHOD OF CONSTRUCTION :- HAND LAY-UP.
- 8.NAME PLATE WILL BE EMBEDDED INTO SHELL & MOC IS SS316.
- 9.DESIGN CODE :- BS 4994:1987

RESIN AND LAMINATE SPECIFICATION

TOP COAT COLOR	ALUMINIUM
THICKNESS	TOP 10 LAYER FRP
	SHELL 9 LAYER FRP
	BOTTOM 10 LAYER FRP

FIBERGLASS	0.45 GSM CHOPPED STRAND MAT
	0.61 GSM WOVEN ROVING MAT
	0.03 GSM SURFACE MAT

NO.	REVISION	DATE	BY

QTY. 1	TAG. NO.-00PBM50BB001	MATL. FRVE	CLIENT-DENORA WATER TECHNOLOGIES
Drawn by	Checked by	Approved by - date	WO NUMBER
KS	30/12/17	SS 30/12/17	AB 30/12/17

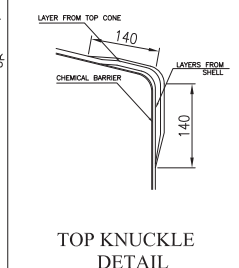
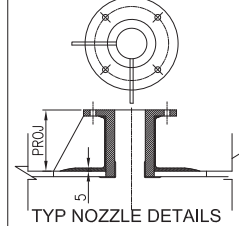
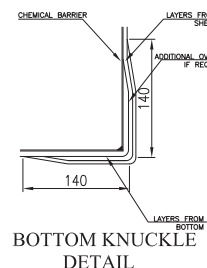
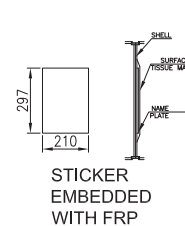
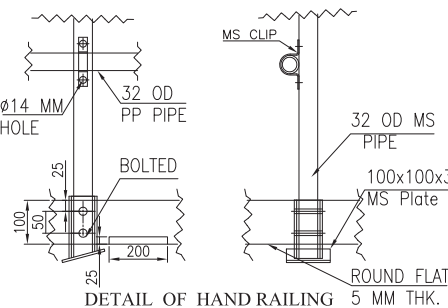
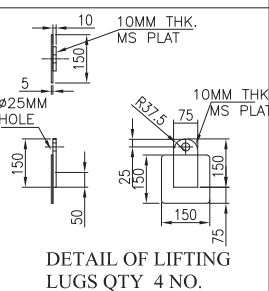
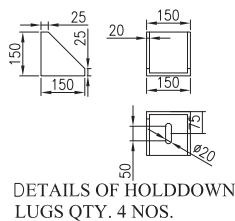
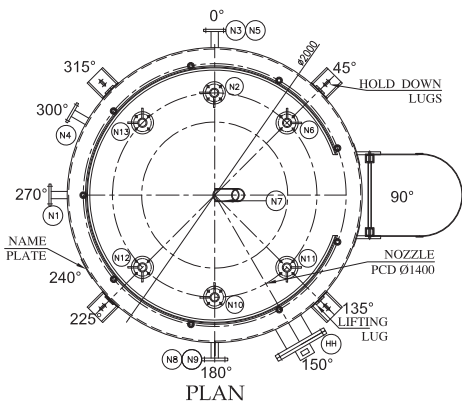
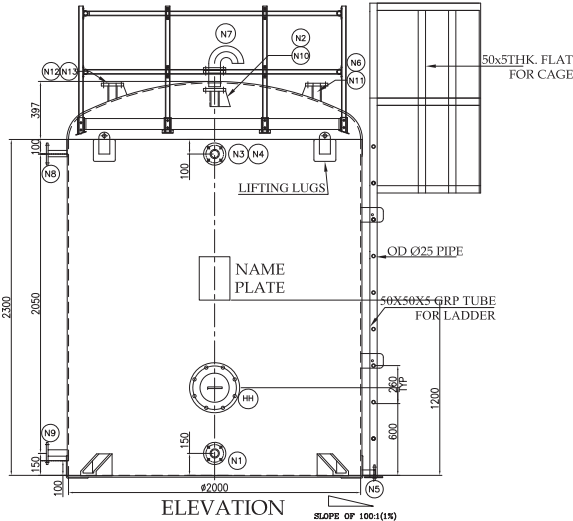


**BHAVI PLAST
PVT. LTD.**

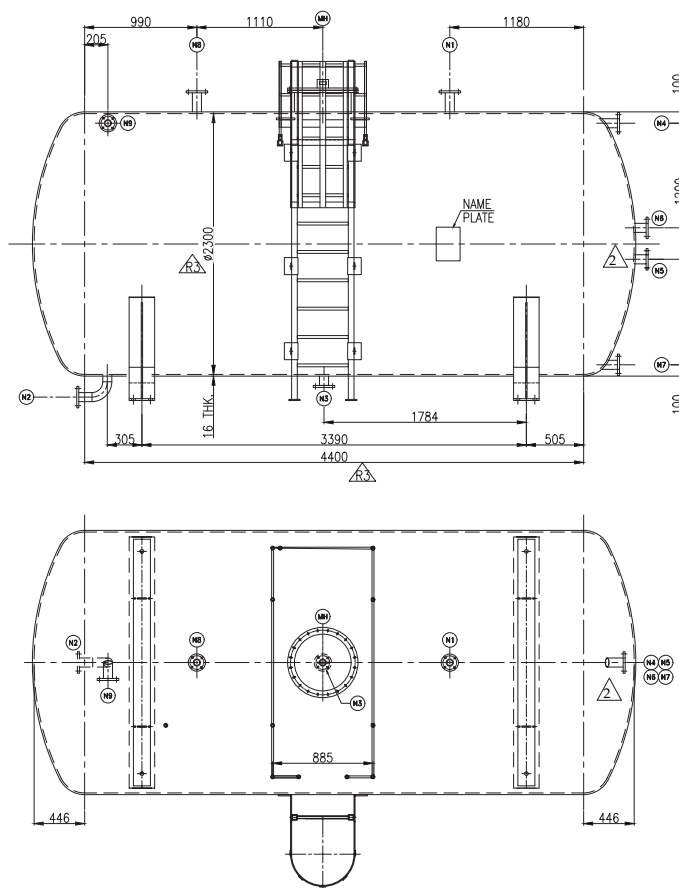
ACID CLEANING TANK

DWG.NO.-TD-01

Rev. 1 Sheet 1 OF 1



DE NORA WATER TECHNOLOGIES						
DATASHEET FOR: BULK ACID STORAGE TANK				DATASHEET NO: PE-V11-412-174-A118		REV
PROJECT: 2x660MW ENNORE SEZ COAL BASED STPP				PROJECT NO: BHEL		1
GENERAL	1	TAG NO(S)		90PBM51BB001		
	2	SERVICE		BULK ACID STORAGE		
	3	DUTY		INTERMITTENT		
	4	QUANTITY	No.	1		
	5	INSTALLATION		OUTDOOR		
	6	MANUFACTURER		BPPL		
	7	COUNTRY OF MANUFACTURER		INDIA		
OPERATING CHARACTERISTICS	8	DUTY		INTERMITTENT		
	9	FLUID HANDLED		35% W/W HYDROCHLORIC ACID		
	10	NOMINAL/MAXIMUM PRESSURE	barg	ATMOSPHERIC		
	11	NOMINAL/MAXIMUM TEMPERATURE	Deg C	25 - 32 /50		
	12	DESIGN PRESSURE	barg	FULL LIQUID		
	13	MAXIMUM SERVICE PRESSURE	barg	ATMOSPHERIC		
	14	DESIGN TEMPERATURE	Deg C	50		
	15	NET CAPACITY	m ³	20		
CONSTRUCTION	16	GROSS CAPACITY	m ³	22.3		
	17	TEST PRESSURE	barg	FULL LIQUID		
	18	CONSTRUCTION STANDARD		BS 4994 - 1987 / ASTM RTP-1		
	19	INSTALLATION POSITION (HORIZONTAL/VERTICAL)		HORIZONTAL CYLINDRICAL, WITH INTERNAL SLOPE (5° GRADIENT)		
	20	NOZZLE CONNECTION		FLANGE WITH SS316L BOLTS & NUTS		
	21	FLANGES STANDARD		ANSI# 150		
	22	PROTECTION:				
	23	EXTERNAL		VINYL ESTER GRADE RESIN		
	24	INTERNAL		VINYL ESTER GRADE RESIN		
	25	COLOUR		ALUMINIUM		
	26	MATERIAL :				
	27	SHELL		VINYL ESTER GRADE RESIN		
	28	RAINHOOD		VINYL ESTER GRADE RESIN		
WEIGHTS AND OVERALL DIMENSIONS	29	THICKNESS OF:				
	30	SHELL WALLS (OVERALL)	mm	16 mm FRP		
	31	SHELL BASE (OVERALL)	mm	NA		
	32	SHELL KNUCKLE (OVERALL)	mm	21 mm FRP		
	33	TOP COVER (UNLINED)		NA		
	34	SHELL DIMENSION:				
	35	DIAMETER	mm	2300		
NOZZLE DATA	36	LENGTH	mm	4400		
	37	WEIGHT OF THE SUPPLY:				
	38	EMPTY	kg	1300		
	39	FILLED WITH WATER	kg	16300		
	40	N1	DN50 ANSI 150# FF	ACID INLET		
	41	N2	DN50 ANSI 150# FF	ACID OUTLET		
	42	N3	DN25 ANSI 150# FF	DRAIN		
	43	N4	DN50 ANSI 150# FF	TOP LEVEL INDICATOR CONN		
	44	N5	DN50 ANSI 150# FF	BOTTOM LEVEL INDICATOR CONN		
	45	N6	DN50 ANSI 150# FF	TOP LEVEL INDICATOR CONN		
	46	N7	DN50 ANSI 150# FF	BOTTOM LEVEL INDICATOR CONN		
	47	N8	DN50 ANSI 150# FF	LEVEL TRANSMITTER CONN		
	48	N9	DN50 ANSI 150# FF	OVERFLOW		
	49	MH	DN500 MANU STD	MANHOLE		
NOTES :						



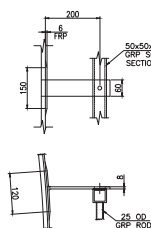
NOZZLE SCHEDULE (ALL DIMENSION IN MM)									
MAEK	DUTY/DESCRIPTION	PRESSURE RATING	NB	OD	PCD	QTY BOLTS	HOLE DIA	FLANGE THK.	PROJECTION
MH	MANHOLE	ANSI B16.5 150#	500	620	570	20	14	15	200
N1	ACID INLET	ANSI B16.5 150#	50	152	121	4	19	19	100
N2	ACID OUTLET	ANSI B16.5 150#	50	152	121	4	19	19	100
N3	DRAIN	ANSI B16.5 150#	25	107	79	4	15	15	100
N4	TOP LEVEL INDICATOR CONNECTION	ANSI B16.5 150#	50	152	121	4	19	19	100
N5	BOTTOM LEVEL INDICATOR CONN.	ANSI B16.5 150#	50	152	121	4	19	19	200
N6	TOP LEVEL INDICATOR CONNECTION	ANSI B16.5 150#	50	152	121	4	19	19	100
N7	BOTTOM LEVEL INDICATOR CONN.	ANSI B16.5 150#	50	152	121	4	19	19	100
N8	LEVEL TRANSMITTER CONNECTION	ANSI B16.5 150#	50	152	121	4	19	19	100
N9	OVERFLOW	ANSI B16.5 150#	50	152	121	4	19	19	100

DESIGN DATA

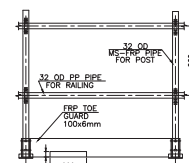
PROCESS MEDIA	:	35% HCL
SPECIFIC GRAVITY	:	1.15 kg/m ³
OPERATING TEMP.	:	25-32/50 deg C
DESIGN TEMP.	:	50° C
OPERATING PRESSURE	:	ATMOSPHERIC
DESIGN PRESSURE	:	FULL OF LIQUID
TEST PRESSURE	:	FULL OF LIQUID
MAXIMUM CAPACITY	:	20m ³
EMPTY WEIGHT	:	1800 kg
OPERATING WEIGHT	:	25585 kg

GENERAL NOTES

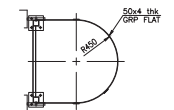
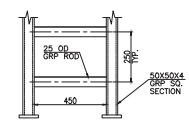
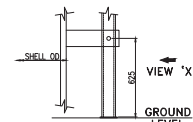
1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. ALL FLANGES ARE AS PER ANSI B16.5 CLASS 150# EXCEPT MANHOLE.
3. ALL NOZZLE BELOW 80MM WILL HAVE 6MM THICK GUSSET.
4. FOR NOZZLE ORIENTATION REFER PLAN VIEW ONLY.
5. MOC OF FASTENER IS GI & FOUNDATION BOLT IS SS316L.
6. MOC OF GASKET NEOPRENE.
7. METHOD OF CONSTRUCTION :- HAND LAY-UP.
8. NAME PLATE WILL BE EMBEDDED INTO SHELL.
9. DESIGN CODE :- BS 4994:1987.



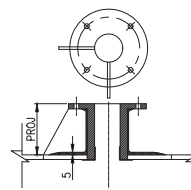
DETAIL OF CLIT



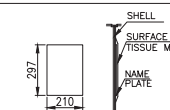
DETAIL OF HAND RAILING TOP OF TANK



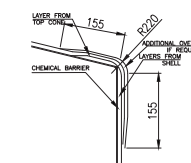
DETAIL OF LADDER



TYP NOZZLE DETAILS



STICKER EMBEDDED WITH FRP



KNUCKLE DETAIL

RESIN AND LAMINATE SPECIFICATION

RESIN	VINYL ESTER
TOP COAT COLOR	ALUMINIUM
THICKNESS	DISH 16 LAYERS FRP
	SHELL 16 LAYERS FRP

FIBERGLASS	0.45 GSM CHOPPED STRAND MAT
	0.61 GSM WOVEN ROVING MAT
	0.03 GSM SURFACE MAT

R3	DIA AND LENGTH CHANGED	07/02/18	SS
NO.	REVISION	DATE	BY

QTY. 1	TAG.NO:00PBM51BB001	MATL. FRVE	CLIENT- DENORA WATER TECHNOLOGIES
Drawn by	Checked by	Approved by - date	WO NUMBER
NS	12/01/18	AB 12/01/18	MB 12/01/18



**BHAVI PLAST
PVT. LTD.**

**GA DRAWING OF BULK ACID
STORAGE TANK 20 m3 TANK**

DWG.NO.-TD/02

Rev. 3

Sheet 1 OF 1

DE NORA WATER TECHNOLOGIES

DATASHEET FOR: HYPOCHLORITE STORAGE CUM DEGASSING TANK					DATASHEET NO: PE-V11-412-174-A118		REV
PROJECT: 2x660MW ENNORE SEZ COAL BASED STPP					CLIENT. : BHEL		1
GENERAL	1	TAG NO(S)			90PBM40BB001 / 90PBM40BB002		
	2	SERVICE			HYPOCHLORITE STORAGE CUM DEGASSING TANK		
	3	QUANTITY			No.	2	
	4	RATING			%	100	
	5	LOCATION			SAFE AREA, OUTDOOR		
	6	MANUFACTURER			BPPL		
	7						
OPERATING CONDITION	8	DUTY			CONTINUOUS		
	9	FLUID HANDLED			SEA WATER + 0.2 % NaOCL + H2		
	10	FLOWRATE:					
	11	- SEA WATER + HYPOCHLORITE SOLUTION		m³/h	150 m³/h		
	12	- HYDROGEN		Nm³/h	70		
	13	- AIR		Nm³/h	3,900		
	14	PRESSURE			ATMOSPHERIC		
	15	TEMPERATURE			deg C	25 - 37	
	16	NET VOLUME		m³	90.5		1
	17	RESIDENCE TIME for DEGASSING			mins	5	
18							
CONSTRUCTION	19	TYPE			VERTICAL, CYLINDRICAL SHELL, DISH CLOSED TOP		
	20				& FLAT BOTTOM WITH INTERNAL SLOPE (5° SLOPE)		
	21	GROSS CAPACITY		m³	94.5		1
	22	DIAMETER (INTERNAL)			mm	4000	
	23	TANK HEIGHT			mm	7500 from TANGENT TO TANGENT	
	24	HEIGHT (OVERALL)			mm	8275 including dish top	
	25	DESIGN/TEST PRESSURE			m	FULL LIQUID	
	26	DESIGN TEMPERATURE			deg C	50	
	27	CODE OF DESIGN/ FABRICATION			BS 4994 - 1987 / ASTM RTP-1		
	28	WEIGHT EMPTY/IN OPERATION			kg	2700/52700	
	29	COLOR			Aluminium		
	30	THICKNESS - SHELL		mm	5 Layers FRP + 10 mm MS		
	31	- BOTTOM		mm	5 Layers FRP + 12 mm MS		1
	32	- TOP		mm	5 Layers FRP + 10 mm MS		
MATERIALS	33	SHELL- INTERNAL			VINYL ESTER GRADE RESIN		
	34	ULTRAVIOLET PROTECTION			ULTRAVIOLET ABSORBER TO BE ADDED TO FRP/RESIN		
	35	FLANGE			VINYL ESTER GRADE RESIN		
	36	NOZZLES			FRP LAMINATION		
	37	BOLTINGS			SS316L		
	38	FLANGE STANDARD			DRILLED TO ANSI 150#		
	39						
NOZZLE DATA	40	N1	DN150	ANSI 150# FF	HYPOCHLORITE INLET		
	41	N2	DN500	ANSI 150# FF	VENT		
	42	N3	DN500	ANSI 150# FF	DILUTION AIR INLET		
	43	N4	DN300	ANSI 150# FF	HYPOCHLORITE TO PUMPS' SUCTION		
	44	N5	DN200	ANSI 150# FF	OVERFLOW		
	45	N6	DN50	ANSI 150# FF	HYPOCHLORITE INLET FROM DOSING PUMP		
	46	N7	DN50	ANSI 150# FF	LEVEL GAUGE CONNECTION		
	47	N8	DN50	ANSI 150# FF	ULTRASONIC LEVEL TRANSMITTER		
	48	N9	DN80	ANSI 150# FF	DRAIN		
	49	N10	DN50	ANSI 150# FF	ULTRASONIC LEVEL TRANSMITTER		
	50	N11	DN50	ANSI 150# FF	DP LEVEL TRANSMITTER		
	51	MH	DN500	MANU STD	MANHOLE		
MISCELLANEOUS	52	ACCESSORIES			CAGED LADDER AND PLATFORM AT TOP OF TANK		
	53						
	54	COUNTRY OF ORIGIN			INDIA		
	55						

NOTES :



 BHAVI PLAST PVT. LTD.	GA DRAWING OF 70 m3 TANK		
	DWG.NO. -TD/04	Rev. 3	Sheet 1 OF 1

DE NORA WATER TECHNOLOGIES									
DATASHEET FOR: HYPOCHLORITE STORAGE CUM DEGASSING TANK					DATASHEET NO. : PE-V11-412-174-A118			REV	
PROJECT: 2x660MW ENNORE SEZ COAL BASED STPP					CLIENT. : BHEL			4	
GENERAL	1	TAG NO(S)				90PBM70BB001			
	2	SERVICE				HYPOCHLORITE STORAGE CUM DEGASSING			
	3					TANK FOR SEA WATER INTAKE			
	4	QUANTITY		No.	1				
	5	RATING		%	100				
	6	LOCATION				SAFE AREA, OUTDOOR			
	7	MANUFACTURER				BPPL			
OPERATING CONDITION	8	DUTY				CONTINUOUS			
	9	FLUID HANDLED				SEA WATER + 0.2 % NaOCL + H2			
	10	FLOWRATE:							
	14	PRESSURE				ATMOSPHERIC			
	15	TEMPERATURE		deg C	25 - 37				
	16	NET CAPACITY		m ³	15				1
	17								
CONSTRUCTION	19	TYPE				VERTICAL, CYLINDRICAL SHELL, DISH CLOSED TOP			
	20					& FLAT BOTTOM WITH INTERNAL SLOPE (5° SLOPE)			
	21	GROSS CAPACITY		m ³	17				1
	22	DIAMETER (INTERNAL)		mm	2500				4
	23	TANK HEIGHT		mm	3500	from TANGENT TO TANGENT			4
	24	HEIGHT (OVERALL)		mm	3984	including dish top			4
	25	DESIGN/TEST PRESSURE		m	FULL LIQUID				
	26	DESIGN TEMPERATURE		deg C	50				
	27	CODE OF DESIGN/ FABRICATION			BS 4994 - 1987 / ASTM RTP-1				
	28	WEIGHT EMPTY/IN OPERATION		kg	2800/ 14800				
	29	COLOR			Aluminium				
	30	THICKNESS	- SHELL	mm	5 Layers FRP + 8mm MS				4
	31		- BOTTOM	mm	5 Layers FRP + 10mm MS				4
	32		- TOP	mm	5 Layers FRP + 8mm MS				4
MATERIALS	33	SHELL- INTERNAL				VINYL ESTER GRADE RESIN			
	34	ULTRAVIOLET PROTECTION				ULTRAVIOLET ABSORBER TO BE ADDED TO FRP/RESIN			
	35	FLANGE				VINYL ESTER GRADE RESIN			
	36	NOZZLES				FRP LAMINATION			
	37	BOLTINGS				SS316L			
	38	FLANGE STANDARD				DRILLED TO ANSI 150#			
	39	TANK				MS - FRP			
NOZZLE DATA	40	N1	DN80	ANSI 150# FF		-			
	41	N2	DN200	ANSI 150# FF		VENT			
	42	N3	DN100	ANSI 150# FF		-			
	43	N4	DN100	ANSI 150# FF		-			
	44	N5	DN80	ANSI 150# FF		OVERFLOW			
	45	N6	DN50	ANSI 150# FF		DRAIN			
	46	N7	DN50	ANSI 150# FF		LEVEL GAUGE CONN			
	47	N8	DN50	ANSI 150# FF		LEVEL TRANSMITTER CONN			
	48	N9	DN50	ANSI 150# FF		LEVEL TRANSMITTER CONN			
	49	MH		MANU STD		MANHOLE			
MISCELLANEOUS	50	ACCESSORIES				CAGED LADDER AND PLATFORM AT TOP OF TANK			
	51								
	52	COUNTRY OF ORIGIN				INDIA			
	53								
NOTES :									

PROJECT :	2 x 660MW ENNORE SEZ COAL BASED STPP at Ash Dyke of NCTPS			ELECTRO CHLORINATION SYSTEM	
PRINCIPAL CONTRACTOR :	BHARAT HEAVY ELECTRICALS LIMITED			TECHNICAL DATASHEET FOR NAOH TANK	
BIDDER / VENDOR	DE NORA INDIA LIMITED			BHEL DOC. No. : PE-V11-412-174-A118	
GENERAL	1	TAG NO(S)		90PBM60BB001	
	2	SERVICE		INTERMITTENT	
	3	QUANTITY	No.	1	
	4	INSTALLATION		OUTDOOR	
	5	MANUFACTURER		SINTEX	
	6	COUNTRY OF MANUFACTURER		INDIA	
OPERATING CONDITION	7	DUTY		INTERMITTENT	
	8	FLUID HANDLED		45% NAOH (SODIUM HYDROXIDE)	
	9	NOMINAL/MAXIMUM PRESSURE	barg	ATMOSPHERIC	
	10	NOMINAL/MAXIMUM TEMPERATURE	Deg C	25 - 32 / 40	
	11	DESIGN PRESSURE		FULL LIQUID	
	12	MAXIMUM SERVICE PRESSURE		ATMOSPHERIC	
CONSTRUCTION	13	DESIGN TEMPERATURE		Deg C	50
	14	OVERALL CAPACITY		m ³	0.5
	15	TEST PRESSURE		barg	FULL LIQUID
	16	INSTALLATION POSITION (HORIZONTAL/VERTICAL)		VERTICAL CYLINDRICAL, FLAT BOTTOM	
	17	NOZZLE CONNECTION		CPVC FLANGE WITH SS316L BOLTS & NUTS	
	18	FLANGES STANDARD		ANSI# 150	
	19	COLOUR		BLACK	
	20	MATERIAL OF SHELL/BOTTOM		HDPE	
NOZZLE DATA	21	DIAMETER		mm	1000
	22	HEIGHT		mm	735
	23	N1	DN25	ANSI 150# FF	DRAIN
	24	N2	DN25	ANSI 150# FF	TOP LEVEL INDICATOR CONN
	25	N3	DN25	ANSI 150# FF	BOTTOM LEVEL INDICATOR CONN
	26	N4	DN25	ANSI 150# FF	NAOH (SODIUM HYDROXIDE INLET)
	27	N5	DN25	ANSI 150# FF	OVERFLOW
	28	MH	385MM		MANHOLE WITH COVER

Sintex Double-layer Water Tanks



Features:

- Virgin plastic
- Double-layer body
- 100% UV stabilised
- FDA approved
- Protection against algae formation
- Lightweight and durable
- Hygienic
- Quality tested and approved by leading laboratories, industries and institutes
- Maintenance-free
- Rustproof

RANGE & SPECIFICATIONS				
Code No.	Capacity (litres)	Dia. (inches)	Height (inches)	Manhole Dia. (inches)
CCWS-50.01	500	40.5	29.1	15.7
CCWS-50.02	500	35.8	37.7	15.7
CCWS-70.01	700	40.5	42.5	15.7
CCWS-75.01	750	40.5	43.3	15.7
CCWS-100.01	1000	43.3	48.2	15.7
CCWS-150.01	1500	53.1	49.8	15.7
CCWS-175.01	1750	54.7	53.1	15.7
CCWS-200.01	2000	53.1	62.9	15.7
CCWS-200.02	2000	55.5	61.8	17.7
CCWS-250.01	2500	59.0	67.7	17.7
CCWS-300.01	3000	59.0	79.5	15.7
CCWS-500.01	5000	78.7	76.3	20.0
CCWS-500.02	5000	78.7	78.7	37.0
CCWS-750.01	7500	78.7	113.3	20.0
CCWS-1000.02	10000	100.3	97.6	20.0
CCWS-1000.03	10000	83.6	124.4	20.0
CCWS-1500.01	15000	100.3	139.8	20.0
CCWS-1500.02	15000	118.1	110.2	20.0
CCWS-2000.01	20000	100.3	181.1	20.0
CCWS-2000.02	20000	118.1	130.7	20.0
CCWS-2500.01	25000	118.1	159.4	20.0

Available from 550 litres to 20000 litres as per ISI specification.

Sintex Loft Water Tanks

Features:

- 100% virgin material
- FDA grade material
- Multipurpose usage
- Stylish design
- Suitable where space is a constraint
- Available in black and white colours



RANGE & SPECIFICATIONS					
Code No.	Capacity (litres)	Length (inches)	Width (inches)	Height (inches)	Manhole Dia. (inches)
IWS 10.01	100	23.4	23.4	15.1	12.2
IWS 15.01	150	28.5	28.5	14.7	12.2
IWS 20.01	200	37.7	28.5	13.7	11.8
IWS 22.01	225	40.7	28.3	15.1	12.0
IWS 27.01	270	43.5	28.7	17.1	12.0
IWS 27.02	275	48.8	35.0	12.4	12.0
IWS 30.01	300	48.0	32.8	13.5	12.0
IWS 37.01	375	49.6	37.7	13.9	11.8
IWS 40.02*	400	61.2	39.3	13.5	11.8
IWS 42.01	425	49.4	37.7	15.7	11.8
IWS 47.02*	475	62.4	45.2	12.9	11.8
IWS 50.01	500	55.5	39.5	17.3	12.0
IWS 50.02**	500	58.0	31.0	16.0	12.0
IWS 50.06**	500	51.57	36.02	19.29	11.81
IWS 62.01*	625	56.9	38.6	20.5	11.8
IWS 82.01*	825	78.5	39.3	20.1	11.2
IWS 100.01*	1000	78.3	39.1	24.4	11.2

Available in 200 litres ISI.

*Double-lid. White Loft Tank is meant only for indoor installation.

**Available from selected factories.

Reno Water Tanks

Features:

- 100% virgin material
- Stylish design
- FDA grade material
- Computerised, ribbed design for better strength
- Hygienic

RANGE & SPECIFICATIONS				
Code No.	Capacity (litres)	Dia. (inches)	Height (inches)	Manhole Dia. (inches)
WSCC 50-01	500	35.4	34.8	15.7
WSCC 70-01	700	35.4	46.4	15.7
WSCC 100-01	1000	43.7	46.4	15.7
WSCC 150-01	1500	53.15	46.2	15.7
WSCC 200-01	2000	53.3	59.4	15.7
WSCC 250-01	2500	53.5	74.0	15.7
WSCC 300-01	3000	59.0	72.8	15.7
WSCC 500-01	5000	71.26	86.22	20.0
WSCC 1000-01	10000	83.6	123.0	20.0



FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
APPROVED					
					STATUS : CONTRACT
					JOB NO.: 412

2017.12.
15
18:33:41
+05'30'

	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT.
This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from the contractual obligation.	
APPROVAL CATEGORY AWARDED = I	
CAT I - Approved	
CAT II - Approved With Comments as Noted	
CAT III - Not Approved	
CAT IV - Reference Drawing	
DEPARTMENT	MECHANICAL AUXILIARY
NAME: FALGUNI SAHA	

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

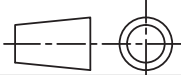
BHEL DOC. NO. : PE - V11 - 412 - 174 -

SUB CONTRACTOR : **DE NORA INDIA LIMITED**
KUNDAIM - GOA



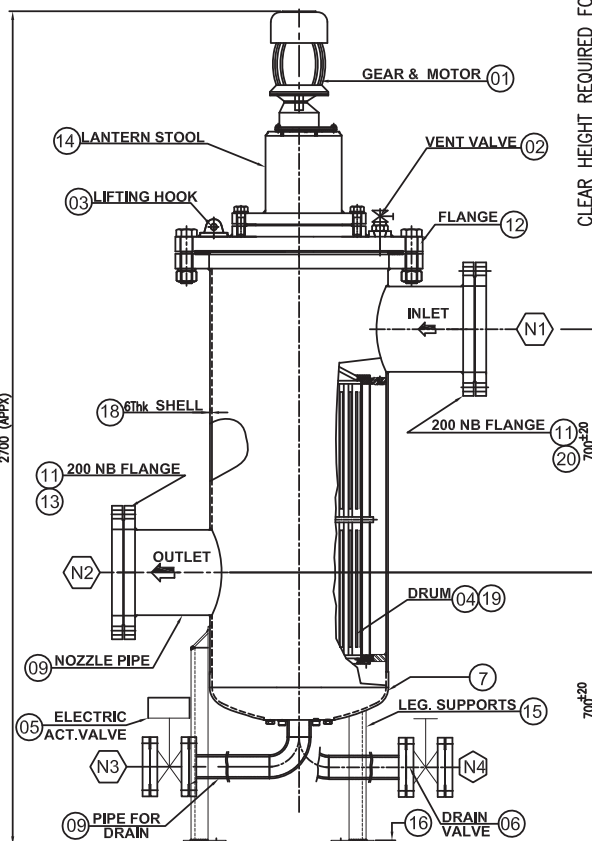
ASSOCIATE PARTNER: **DE NORA WATER TECHNOLOGIES,**
SINGAPORE BRANCH

LOA NO: PW/PE/PG/EN1/P-24/17 DATED: 22 APR 2017

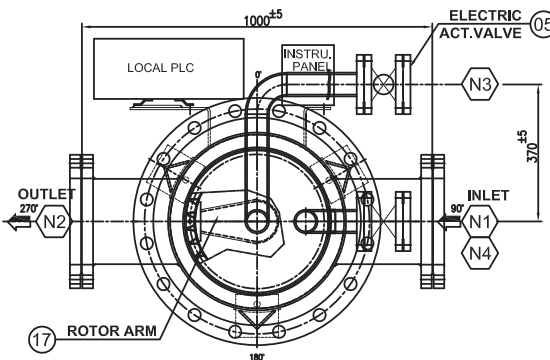
DEPT. --	CODE A		SCALE -	WEIGHT(KG) -	REF DRG. -	ITEM -	
Mechanical Datasheet & GA for Strainers & Valves					NAME	SIGN	DATE
					PREP	PG	
					CHKD	A	
					APPD	RF	
DEPT.					CARD CODE	REV	
SIGN		N.A.				0	
DATE							
					BHEL DOC. NO. PE - V11 - 412 - 174 -		
					NO. OF SHEETS 17 EXCLUDING COVER PAGE		

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED
it must not be used directly or indirectly in any way detrimental to the interest of the company

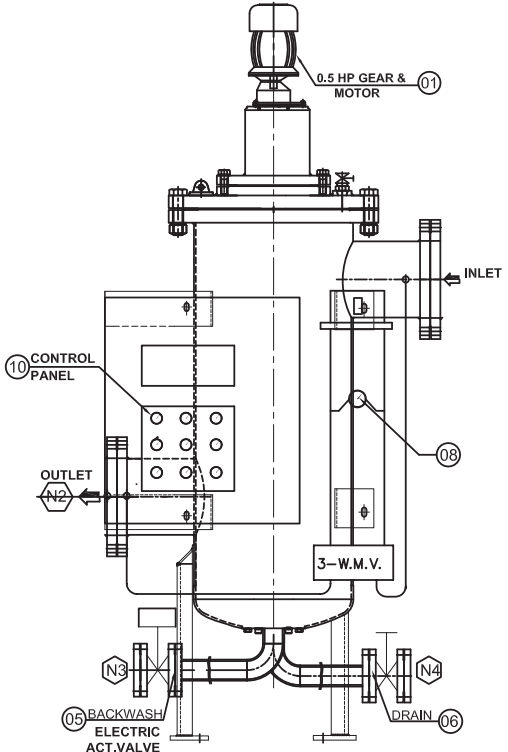
PROJECT :	2 x 660MW ENNORE SEZ COAL BASED STPP		ELECTRO CHLORINATION SYSTEM	
PRINCIPAL CONTRACTOR :	BHARAT HEAVY ELECTRICALS LIMITED		MECHANICAL DATASHEET & GA FOR STRAINER & VALVE	
BIDDER / VENDOR	DE NORA INDIA LIMITED		BHEL DOC. No. : PE-V11-412-174-A119	Rev
GENERAL	1	Tag No (S)	90PBM21AT001 / 90PBM22AT001	
	2	Quantity	Two (2) x 100%	
	3	Designation	Sea Water Strainer	
	4	Installation	Indoor	
	5	Type	Auto-backwash	
	7	Manufacturer	OTOKLIN	
OPERATING CHARACTERISTICS	8	Nature of fluid	Seawater	
	9	Specific Gravity	1.022	
	10	Temperature (Normal Operating)	°C 25 - 32	
	11	Flow rate	m ³ /hr 175	
	12	Filter inlet pressure	barg 1 - 2	
	13	Porosity	microns 500	VOID
	14	Clean filter head loss	barg 0.2	
	15	Fouled filter head loss	barg 0.5	
	16	Filtering surface	m ² ≥ 0.126	
	17	Passage surface	m ² > 0.126	
	18	Passage surface to nozzle surface ratio	≥ 4:1	
	19	Mesh size of strainer element	500-micron 100 MICRON	
	20	Filter test pressure	barg 4	
	21	Allowable max. differential pressure through Element	barg 0.5	
	22	Type of automatic control	DPT	
SHELL-COVER	23	Construction standard / test code	ASME Section VIII Div.1 w/o 'U' Stamp + OTOKLIN Standard	
	24	Inlet / outlet nominal diameter	mm 200	
	25	Inlet / outlet connection type	Flange ANSI 150#	
	26	Material	Duplex SS	
	27	Coating	N.A.	
	28	Vent nominal diameter	25 NB	
	29	Drain nominal diameter	50 NB	
	30	FILTERING ELEMENT QUANTITY	One set per strainer	
MATERIAL OF STRAINER	31	Element	Duplex SS	
	32	Shell	Duplex SS	
	33	Seals	Neoprene	
	34	Vent / drain valve	CPVC	
	35	Fouling indicator	N/A	
	36	Hydraulic seal	N/A	
	37	Support / fixation lugs	Yes (Lifting Lugs)	
WEIGHTS - OVERALL DIMENSIONS	38	Drawing No	ENQ/ GA/STR/17/001	
	39	Dry weight	kg 2500 Approx.	
	40	Flooded weight	kg 3000 Approx.	
MOTOR	41	Rated Power	0.18 KW	
	42	Rated Voltage/frequency	415 VAC / 3Ph / 50 Hz	



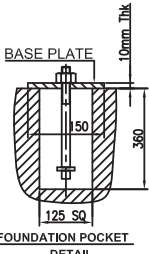
SECTIONAL ELEVATION



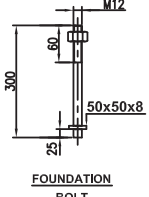
TOP VIEW



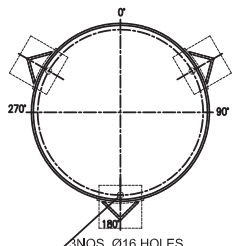
G.A. FOR INSTRUMENTATION & CONTROL PANEL



FOUNDATION POCKET DETAIL



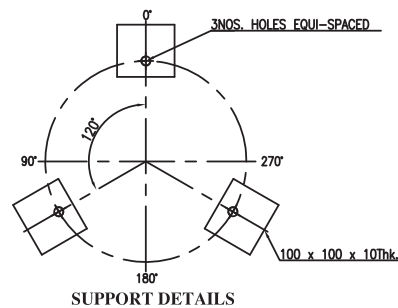
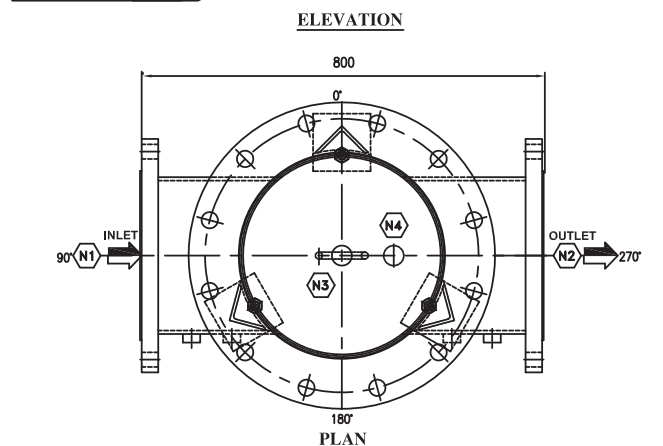
FOUNDATION BOLT



LEG SUPPORT

REV. NO.	DATE	ZONE	DESCRIPTION OF REVISION	MADE BY	AUTH. BY
DESIGN DATA					
TYPE	AUTOMATIC SELF CLEANING FILTER				
DESIGN CODE	OTOKLIN STD & ASME SEC VIII DIV1				
MAKE	OTOKLIN				
TAG NO	00PBM21AT001/ 00PBM22AT001				
MESH SIZE	500 MICRONS 100 MICRON				
FLOW RATE	175 m ³ /hr				
END CONNECTION	200 NB, 150#				
FLUID HANDLE	SEA WATER				
OPERATING PRESSURE	2.0 Kg/cm ²				
DESIGN PRESSURE	4.0 Kg/cm ²				
DESIGN TEMPERATURE	60°C				
MAX. PRESSURE DROP FOR STRAINING ELEMENT AT DESIGN FLOW CONDITION FLOW CONDITION CLEAN / 50% CLOGGED	0.2 / 0.5 Kg/cm ²				
BACKWASH CYCLE DURATION	3-5 min / SHIFT OR AS PER DIRT LOAD				
JOINT EFFICIENCY	0.7				
HYDRO TEST PRESSURE	6.0 Kg/cm ²				
QTY	02 Nos.				
PAINTING	N/A				
WEIGHT WITH FULL OF WATER	3000 kgs.				
N4	MANUAL DRAIN	50NB, ANSI B16.5, 150#			
N3	BACKWASH DRAIN	50NB, ANSI B16.5, 150#			
N2	OUTLET	200NB, 150#			
N1	INLET	200NB, 150#			
NO.	DESCRIPTION	SIZE			
NOZZLE SCHEDULE					
NOTE:- GA DRAWING FOR ENQUIRY PURPOSE ONLY. ACTUAL ITEM SHALL BE DIFFER FROM THIS.					
22	PR. TAPPING	04	1/2" NPT x 3000#		
21	DIFFERENTIAL PRESSURE SWITCH	01	STD.		
20	FASTNERS	--	SS 316L		-
19	WIRE MESH FOR DRUM	01	DUPLEX SS		500 MICRONS
18	BODY SHELL	01	DUPLEX SS		6 Thk
17	ROTOR ARM	01	STD.		-
16	BASE PLATE	03	M.S.		10 THK.
15	LEG SUPPORT	03	M.S.		STD.
14	LANTERN STOOL	01	M.S.		STD.
13	GASKET	1 SET	NEOPRENE		STD.
12	SHELL FLANGE	01	DUPLEX SS		WITH FASTNERS & GASKETS
11	NOZZLE FLANGES WITH COMPANION	04	DUPLEX SS		200NB
10	CONTROL PANEL	01	STD.		
09	NOZZLE INLET / OUTLET	02	DUPLEX SS		200NB x 6 Thk
08	DIFFERENTIAL PRESSURE INDICATOR	01	STD.		
07	DISH END	01	DUPLEX SS		8Thk
06	MANUAL DRAIN VALVE	01	WETTED PARTS 50NB x STD.		WAFER TYPE BUTTERFLY VALVE
05	ELECTRIC ACTUATED DRAIN VALVE	01	WETTED PARTS 50NB		150#, SORF
04	FILTER DRUM	01	OTOKLIN STD.	-	-
03	LIFTING HOOK	03	STD.	--	-
02	VENT BALL VALVE	01	STD.	1"NPT x 800#	-
01	MOTOR & GEAR BOX ASSEMBLY	01	STD.		-
REV. NO.	DESCRIPTION	NOS. OF	MATERIAL	SIZE	REMARKS ORG. NO.
BILL OF MATERIALS					
ALL DIMENSION ARE IN MM. UNLESS OTHERWISE SPECIFIED					
THIS DRG. IS THE SOLE PROPERTY OF OTOKLIN. IT SHOULD NOT BE COPIED OR COMMUNICATED TO ANY PERSON WITHOUT THE WRITTEN APPROVAL OF THE PROPRIETORS.			CLIENT:- M/s. DE NORA INDIA LIMITED. PROJECT:- 2 X 600 MW ENNORE SEZ COAL BASED STEPPED ENQUIRY NO:- 20870		
DRAWN			ZEEZHAN 04/09/17		
CHECKED			PREMA 04/09/17		
APPD.			COPY DISTRIBUTION		
OC- FILE			OC- FILE		
OUE- SELF			OUE- SELF		
MACHINING			MACHINING		
FACT- AMB			FACT- AMB		
QC + PRODN			QC + PRODN		
SUPERSEDED BY			REPLACES		
E-410, Crystal Plaza, New Link Road, Andheri (W), Mumbai-400 053			SCALE: 1: NTS		
E-410, Crystal Plaza, New Link Road, Andheri (W), Mumbai-400 053			SHEET: 1 OF 1		
E-410, Crystal Plaza, New Link Road, Andheri (W), Mumbai-400 053			REV: R1		

PROJECT :	2 x 660MW ENNORE SEZ COAL BASED STPP		ELECTRO CHLORINATION SYSTEM	
PRINCIPAL CONTRACTOR :	BHARAT HEAVY ELECTRICALS LIMITED		MECHANICAL DATASHEET & GA FOR STRAINER & VALVE	
BIDDER / VENDOR	DE NORA INDIA LIMITED		BHEL DOC. No. : PE-V11-412-174-A119	Rev
GENERAL	1	Tag No (S)	00PBM40AT001-00PBM40AT002 90PBM40AT001 / 90PBM40AT002	
	2	Quantity	Two (2) x 100%	
	3	Designation	Strainer for Dosing Pump for Sea Water Forbay and PT Plant	
	4	Installation	Indoor	
	5	Type	Simplex Basket Strainer	
	6	Manufacturer	OTOKLIN	
OPERATING CHARACTERISTICS	7	Nature of fluid	Seawater + sodium Hypochlorite	
	8	Specific Gravity	1.022	
	9	Temperature (Normal Operating)	°C 25 - 37	
	10	Flow rate	m ³ /hr 240 248	
	11	Line Size	DN DN 300	
	12	Filter inlet pressure	barg 0.05 - 0.4	
	13	Porosity	microns 4000	VOID
	14	Clean filter head loss	barg 0.1	
	15	Fouled filter head loss	barg 0.15	
	16	Filtering surface	m ² >0.19	
	17	Passage surface	m ² >0.19	
	18	Passage surface to nozzle surface ratio	4:1 (Minimum)	
	19	Mesh size of strainer element	microns 1000 500 MICRON	
	20	Filter test pressure	barg 6	
SHELL-COVER	21	Construction standard / test code	ASME Section VIII Div.1 w/o 'U' Stamp + OTOKLIN Standard	
	22	Inlet / outlet nominal diameter	300 NB	
	23	Inlet / outlet connection type	Flange ANSI 150# B16.5 SORF	
	24	Material	Duplex SS	
	25	Coating	N.A.	
	26	Vent nominal diameter	1/2 inch	
	27	Drain nominal diameter	1/2 inch	
	28	Painting For LEG SUPPORT	yes	
	29	Painting for Body	Duplex SS body does not required painting	
	30	FILTERING ELEMENT QUANTITY	One set per strainer	
MATERIAL OF STRAINER	31	Element	Duplex SS	
	32	Shell	Duplex SS	
	33	Seals	Neoprene	
	34	Vent / drain valve	CPVC	
	35	Fouling indicator	N/A	
	36	Hydraulic seal	N/A	
	37	Fastner	SS316L	
	38	Foundation Bolt	SS316L	
	39	Support / fixation lugs	Yes (Lifting Lugs)	



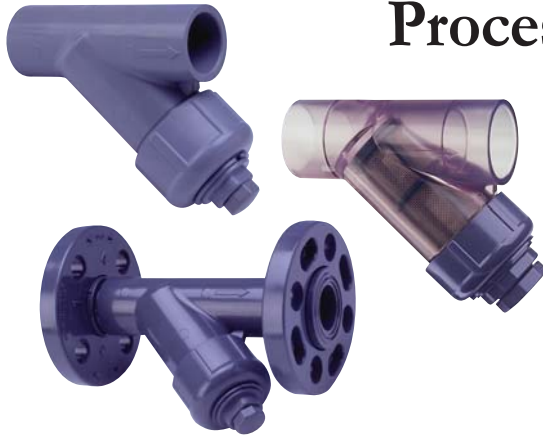
A horizontal number line with arrows at both ends. It is divided into three equal segments by two vertical tick marks. The segments are labeled with the numbers 3, 2, and 1 from left to right.

PROJECT :	2 x 660MW ENNORE SEZ COAL BASED STPP			ELECTRO CHLORINATION SYSTEM		
PRINCIPAL CONTRACTOR :	BHARAT HEAVY ELECTRICALS LIMITED			MECHANICAL DATASHEET & GA FOR STRAINER & VALVE		
BIDDER / VENDOR	DE NORA INDIA LIMITED			BHEL DOC. No. : PE-V11-412-174-A119		
GENERAL	1	Tag No (S)		90PBM52AT001 / 90PBM53AT001	90PBM81AT001 / 90PBM82AT001	90PBM90AT015
	2	Quantity		Two (2) x 100%	Two (2) x 100%	1 No.
	3	Service		at suction of Acid cleaning Pump	at Discharge of Dosing Pump at Sea Water intake	inlet of Chlorine analyser
	4	Installation		Indoor	Indoor	Indoor
	5	Type		Y- type strainer	Y- type strainer	Y- type strainer
	6	Manufacturer		Spears	Spears	Spears
OPERATING CHARACTERISTICS	7	Nature of fluid		6 % Hydrochloric Acid	Sea Water + 2% Sodium Hypochlorite Solution	Sea Water
	8	Specific Gravity		1.029	1.025	1.022
	9	Temperature (Normal Operating)	°C	25 - 32	25 - 37	25 - 32
	10	Flow rate		41 m3/hr	12 m3/hr	50 L/Hr
	11	Design Pressure	Kg/cm2	6	6	10
STRAINER	12	Body		CPVC	CPVC	CPVC
	13	Mesh Screen		CPVC	CPVC	CPVC
	14	End Connection Size	Inch	4"	3"	1/2"
	15	O - ring		EPDM	EPDM	EPDM
	16	Mesh Sieve No.	Number	20	20	20
	17	Mesh Opening size	Inch	0.033	0.033	0.033
	18	Weight	Kgs	7.3	4.5	0.38



PVC & CPVC Y-STRAINERS

In-Line Protection of Process Equipment



In-Line Horizontal or Vertical Installation

Line fluid flow is diverted through the interior of the strainer basket to fully entrap sediment, dirt and debris in either horizontal or vertical installation.

Rugged PVC or CPVC Construction

Computer engineered design places strength where it's needed most. PVC or higher heat handling CPVC materials provide exceptional chemical and corrosion resistance.

Special PVC Clear-Body Option

Allows visibility of internal flow and easy monitoring of sediment accumulation in the strainer. (socket style only)

Convenient Removable Strainer Basket

Strainer basket easily unscrews from Y-body for quick cleaning of strainer screen.

EPDM or Viton® O-ring Options

Choice of high grade EPDM or Viton® O-rings allows application specific selection for optimum chemical resistance.

Full Service Pressure Rating

Sizes 1/2" - 2" Pressure Rated to 150 psi @ 73°F

Sizes 3" - 4" to 90 psi @ 73°F

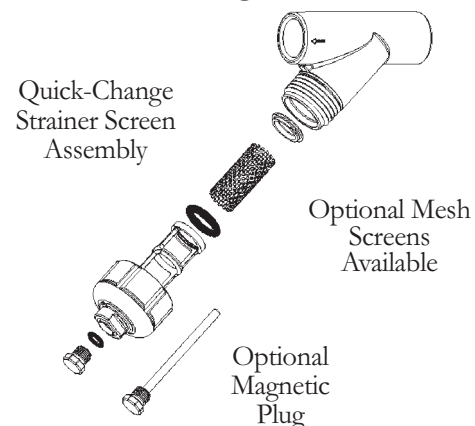
PVC, CPVC and Stainless Steel Strainer Screen Assortment Options

Standard Y-STRAINERS are assembled with 1/32" perforation (20 Mesh) PVC screens for PVC Strainers and CPVC Screens for CPVC Strainers. Optional perforation sizes and 316 Stainless Steel Mesh Screens are available.

Standard or Optional Magnetic Drain Plug for Quick Flushing

Standard plug easily removes for quick flushing of strainer or installation of a bleed-off valve. Optional magnetic plug traps ferrous metal particles inside strainer.

Spears Y-type sediment strainers are the perfect choice for in-line removal of suspended solids, sediment, dirt and debris. Convenient removable strainer basket allows quick cleaning with an assortment of screen mesh sizes to meet a variety of application needs. Spears Y-Strainers are produced from PVC Gray, PVC Clear for fluid visibility and CPVC Gray for higher temperatures. Available with socket or flanged end connectors in IPS sizes 1/2" through 4".



Sample Engineering Specification

All sediment strainers shall be Y-type constructed from PVC Type I, ASTM D 1784 Cell Classification 12454 or CPVC Type IV, or ASTM D 1784 Cell Classification 23447. All O-rings shall be EPDM or genuine Viton®. All Y-strainers shall have replaceable PVC, CPVC or Type 316 stainless steel screens and O-ring sealed drain plugs with magnetic drain plug option. All threaded Y-Strainers shall have Stainless Steel Reinforced (SR) threads. All Y-Strainers, sizes 1/2" - 2" shall be pressure rated to 150 psi, sizes 3" - 4" to 90 psi for water at 73°F, as manufactured by Spears Manufacturing Company.

Viton® is a registered trademark Dupont Dow Elastomers.



Quality Systems Certificate No. 293
Corporate Facilities, Sylmar, CA
Assessed to ISO 9001

PROGRESSIVE PRODUCTS FROM SPEARS INNOVATION & TECHNOLOGY

Visit our web site: www.spearsmfg.com

Page 524 of 949

Page 7 of 8

Strainer Screen Mesh Options

Stock Y-Strainers are assembled with standard 1/32" (20 mesh) perforated PVC or CPVC Screens, PVC, CPVC and 316 stainless steel screens are available in the following standard mesh size designations. PVC and CPVC screens are perforated; stainless steel screens are wire mesh. Additional stainless steel mesh screen sizes can be custom ordered, down to 400 mesh.

U.S. Standard Mesh Sieve No.	Sieve Opening Size (inch)	Perforation Designation (inch)
8	0.094	3/32
12	0.062	1/16
20	0.033	1/32
30	0.024	Use Mesh No.

Cv Values

Y-Strainers Cv				
Nominal Size	Plastic Strainer Mesh			
	8	12	20	30
1/2	5.5	5.4	5.3	5.2
3/4	8.2	7.8	7.5	7.2
1	14.3	13.9	13.6	13.3
1-1/4	33.6	32.9	29.4	25.4
1-1/2	43.8	41.6	33.0	32.1
2	50.6	50.0	49.6	48.8
3	75.2	74.6	74.0	73.4
4	169.5	169.0	168.8	168.0

Drain Plug Tap Size for Bleed-Off Valve

Y-Strainer Size	Tap Size (NPT)
1/2	1/4 - 18
3/4	1/4 - 18
1	3/8 - 18
1-1/4	1/2 - 14
1-1/2	1 - 11-1/2
2	1 - 11-1/2
3	1 - 11-1/2
4	1 - 11-1/2

Y-Strainer Threaded Dimensions

Nominal Size	Dimension Reference (inches, ±1/16)						Approx. Wt. (Lbs.)	
	A ¹	A	D	E	B	C	PVC	CPVC
1/2	4-7/8	3-1/16	2-1/2	1-5/8	3-5/8	5-1/16	.31	.33
3/4	5-15/16	3-11/16	3	2	4-3/8	5-13/16	.50	.53
1	7-1/16	4-7/16	3-5/8	2-1/4	5-3/16	7	.85	.90
1-1/4	8-3/8	5-5/16	4-1/4	2-13/16	6	7-15/16	1.21	1.28
1-1/2	9-3/8	6	4-7/8	3-3/16	6-15/16	8-13/16	1.66	1.76
2	12	7-5/8	6-3/16	3-1/2	8-1/8	10-1/8	2.96	3.10
3	15-5/16	9-11/16	7-5/8	5-1/8	11	14-1/4	5.34	5.64
4	19-13/16	12-1/2	9-7/8	6-9/16	14	14-3/8	9.97	10.45

Y-Strainer Socket Dimensions

Nominal Size	Dimension Reference (inches, ±1/16)						Approx. Wt. (Lbs.)	
	A ¹	A	D	E	B	C	PVC	CPVC
1/2	4-5/8	3-1/16	2-1/2	1-5/8	1-5/8	3-3/8	.31	.33
3/4	5-3/4	3-11/16	3	2	2	4	.50	.53
1	6-7/8	4-7/16	3-5/8	2-1/4	2-1/2	4-3/4	.85	.90
1-1/4	8-5/32	5-5/16	4-1/4	2-13/16	3-1/16	5-9/16	1.21	1.28
1-1/2	9-1/8	6	4-7/8	3-3/16	3-9/16	6-5/16	1.66	1.76
2	11-3/4	7-5/8	6-3/16	3-1/2	4-1/2	7-1/2	2.96	3.10
3	15	9-11/16	7-5/8	5-1/8	6-9/16	10-5/16	5.34	5.64
4	19-11/16	12-1/2	9-7/8	6-9/16	8-5/8	13-1/8	9.97	10.45

Y-Strainer Flanged Dimensions

Nominal Size	Dimension Reference (inches, ±1/16)						Approx. Wt. (Lbs.)	
	A ¹	A	D	E	B	C	PVC	CPVC
1/2	5-13/16	4-3/16	2-1/2	1-5/8	5-11/16	3-1/2	.82	.85
3/4	7-1/8	5	3-1/8	2	6-7/16	3-7/8	1.23	1.28
1	8-3/16	5-3/4	3-5/8	2-1/4	7-1/4	4-1/4	1.70	1.81
1-1/4	9-7/16	6-9/16	4-9/32	2-13/16	8-1/8	4-15/16	2.40	2.52
1-1/2	10-7/16	7-3/8	4-7/8	3-3/16	9-3/16	8-13/16	3.07	3.25
2	13-1/4	9-1/8	6-3/16	3-1/2	10-3/8	10-1/8	5.20	5.42
3	16-21/32	11-3/8	7-5/8	5-1/8	12-1/32	7-1/2	9.44	10.07
4	21-19/32	14-5/16	9-7/8	6-9/16	14-9/16	9-1/16	14.87	16.15

Note: 4" flanged Y-strainer uses split flange ring

NOT FOR USE WITH COMPRESSED AIR OR GASES



SPEARS® MANUFACTURING COMPANY

CORPORATE OFFICES

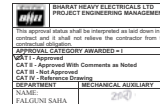
15853 Olden Street, Sylmar, CA 91342
P.O. Box 9203, Sylmar, CA 91392
(818) 364-1611 • <http://www.spearsmfg.com>



FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
APPROVED					
STATUS : CONTRACT					
JOB NO.: 412					

2017.11.
01
16:20:50
+05'30'



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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DOC. NO. : PE - V11 - 412 - 174 - A120



SUB CONTRACTOR :DE NORA INDIA LIMITED
KUNDAIM - GOA

ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES,
SINGAPORE BRANCH

LOA NO:PW/PE/PG/EN1/P-24/17 DATED:22 APR 2017

DEPT. --	CODE A		SCALE -	WEIGHT(KG) -	REF DRG. -	ITEM -	
DATA SHEET FOR SAFETY ITEMS					NAME	SIGN	DATE
					PREP	SN	
					CHKD	PG	
					APPD	RF	
DEPT.					CARD CODE	REV	
SIGN		N.A.				0	
DATE							

BHEL DOC. NO.
PE - V11 - 412 - 174 - A120

NO. OF SHEETS **7** EXCLUDING COVER PAGE

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED
it must not be used directly or indirectly in any way detrimental to the interest of the company

PROJECT :	2 x 660MW ENNORE SEZ COAL BASED STPP		ELECTRO CHLORINATION SYSTEM	
PRINCIPAL CONTRACTOR :	BHARAT HEAVY ELECTRICALS LIMITED		TECHNICAL DATASHEET OF SAFETY ITEMS	
BIDDER / VENDOR	DE NORA INDIA LIMITED		BHEL DOC. No. : PE-V11-412-174-A120 Rev No: A 0	
GENERAL	1	SERVICE	SAFETY SHOWER & EYE WASH	
	2	QUANTITY	No.	1
	3	RATING	1X100%	
	4	MANUFACTURER	UNICARE EMERGENCY EQUIPMENT PVT. LTD.	
	5	MODEL	LSES7	
CONSTRUCTION	6	DUTY	INTERMITTENT	
	7	FLUID HANDLED	PORTABLE WATER	
	8	DESIGN PRESSURE	Barg	5.8
	9	DESIGN TEMPERATURE	Deg C	65
	10	DESIGN STANDARD	ISI 10592	
	11	OPERATING PRESSURE REQUIRED	Barg	1.9
	12	OPERATING TEMPERATURE REQUIRED	Deg C	Ambient
	13	INLET/OUTLET CONNECTION STD	THREADED (BSPF)	THREADED (BSPF)
	14	CONNECTION SIZE	1.1/4"	1.1/4"
MATERIAL	15	TUBULAR	GI C Class	
	16	SHOWER SPRAY HEAD	ABS Plastic	
	17	EYEWASH SPRAY HEAD	ABS Plastic	
	18	EYEWASH WATER COLLECTION BOWL	ABS Plastic	
	19	SPRAY HEAD	ABS Plastic	
DIMENSIONS & WEIGHT	20	DIMENSIONS	AS PER DRAWING	
		WEIGHT	9kg	
NOTES				

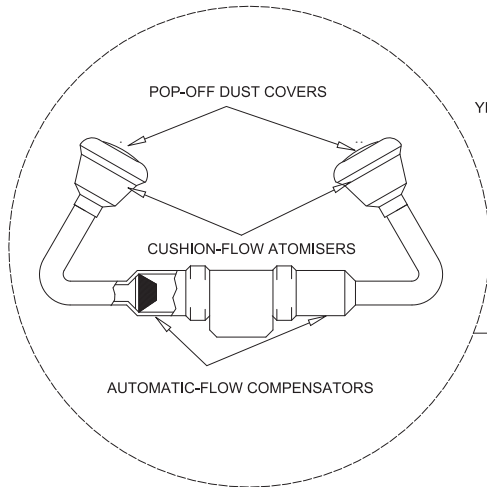
IS:10592



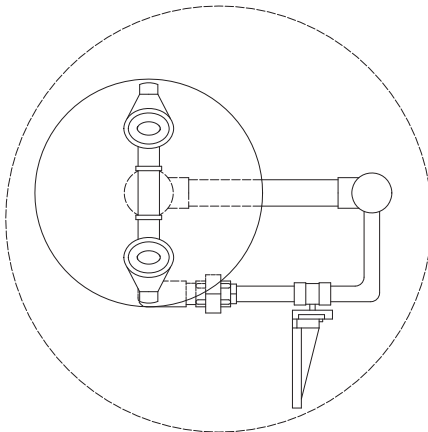
ISI APPROVAL

NO:CM/L-1598977

CHEMICAL/IMPACT RESISTANT YELLOW
CYCOLAC SHOWER HEAD

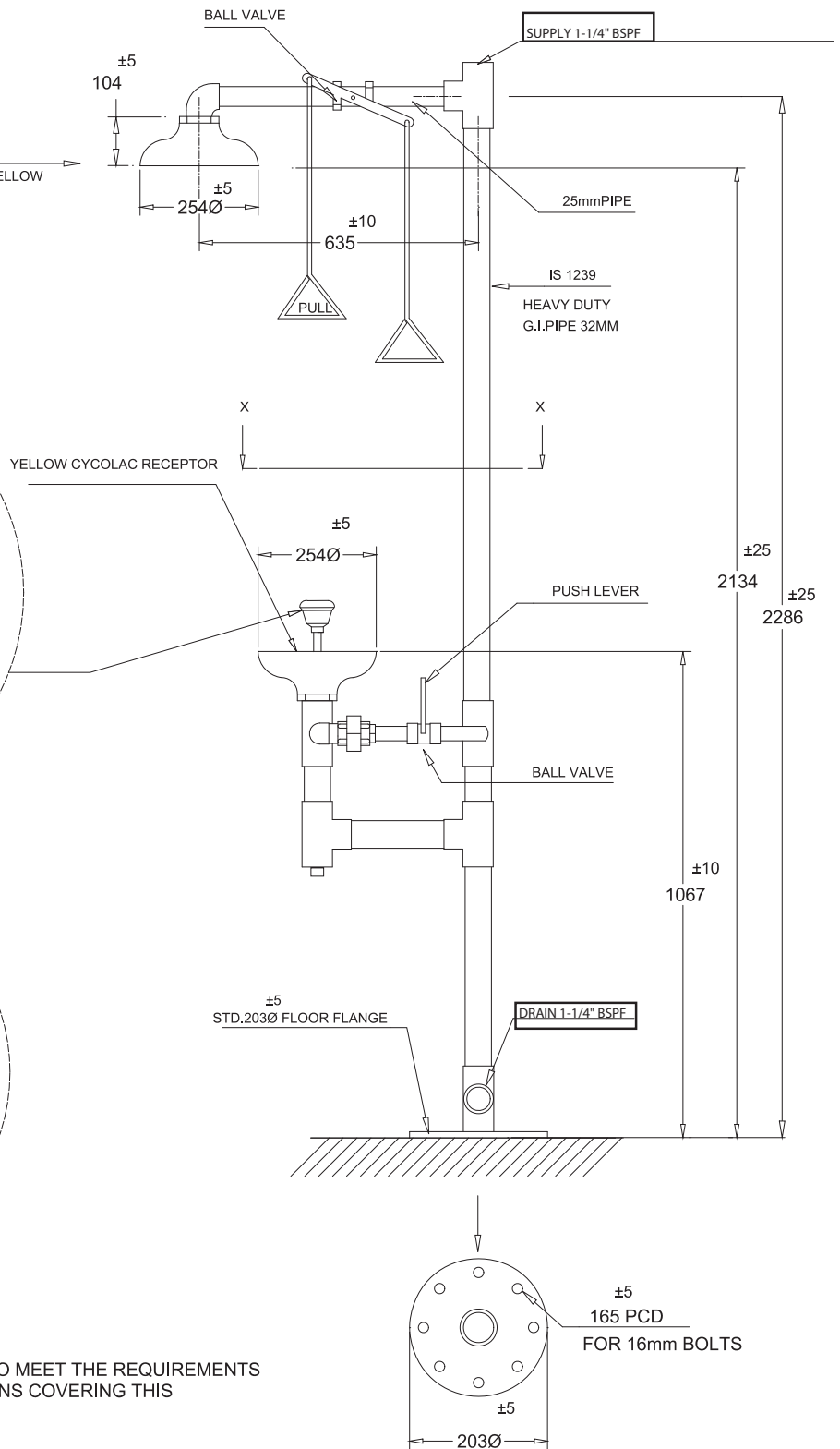


ATOMISER UNIT (ABS)



SECTIONAL TOP VIEW 'X' 'X'

NOTE :
THIS EQUIPMENT ENABLES YOU TO MEET THE REQUIREMENTS
IN THE ISI RULES AND REGULATIONS COVERING THIS
TYPE OF EQUIPMENT.



ALL DIMENSIONS ARE IN MM. UNLESS OTHERWISE SPECIFIED			UNICARE EMERGENCY EQUIPMENT PVT.LTD. Vora Ind.Complex,VASAI(E)		MATERIAL :	SPECIFICATION
DRAWING NO.: EWC005	SCALE: N.T.S.	REV.: 00			PIPES FITTINGS	IS 1239 HD GI IS 1879 GI
	NAME	DATE	TITLE: EYE/FACE WASH & SHOWER MODEL LSES7		VALVE	GUN METAL
DRN.BY:	SUNIL	26-4-05			RECCOMD WATER PRES FLOW	2 Bar (min)
CHED.BY:						
APPD.BY:						

PROJECT :	2 x 660MW ENNORE SEZ COAL BASED STPP		ELECTRO CHLORINATION SYSTEM
PRINCIPAL CONTRACTOR :	BHARAT HEAVY ELECTRICALS LIMITED		TECHNICAL DATASHEET OF SAFETY ITEMS
BIDDER / VENDOR	DE NORA INDIA LIMITED		BHEL DOC. No. : PE-V11-412-174-A120 Rev No: A 0
GENERAL	1	SERVICE	PVC PROTECTIVE SUIT
	2	QUANTITY	Set 2
	4	MANUFACTURER	UNICARE EMERGENCY EQUIPMENT PVT. LTD.
	5	HOOD	(YES/NO) YES
	6	RUBBER BOOT	(YES/NO) YES
	7	FACE VISOR	(YES/NO) YES
	8	PVC GAUNTLETS	(YES/NO) YES
NOTES			

PPROJECT: 2x660MW ENNORE SEZ COAL BASED STPP			ELECTRO CHLORINATION SYSTEM			
CONTRACTOR BHARAT HEAVY ELECTRICALS LIMITED			DATASHEET FOR SAFETY ITEMS			
DATASHEET FOR: HYDROGEN DETECTOR			BHEL DOC NO. : PE-V11-412-174-A120			
GENERAL	1	Tag No.		00PBM31CA001		
	2	Quantity		1		
	3	Service		HYDROGEN GAS DETECTION AT ELECTROCHLORINATION BUILDING		
	4	Type		Catalytic Combustion (Diffusion)		
PROCESS CONDITIONS	5	Duty		CONTINUOUS		
	6	Fluid		HYDROGEN		
	7	Design Temperature	Deg. C	50		
	8	Design Pressure	Kg/Cm2	5		
	9	Humidity	%	5 ~ 100		
	10	Make		Oldham		
	11	Model		OLCT 100C		
	12	Working Principle		Catalytic Combustion (Diffusion)		
	13	Range		0-100% LEL		
	14	Enclosure		Epoxy Painted Aluminium Alloy		
	15	Protection		Ex d IIC		
	16	Response Time		T90<15 Sec.		
	17	Linearity		<3%LEL		
	18	Operating Temp.		0-70 Centigrade (Typical)		
	19	Approvals		CCOE		
	20	Operating Humidity		0-95% RH Non Condensing		
	21	Calibration		Hydrogen		
	22	Display		4 digit seven segment LED		
	23	Supply Input		5 to 30 Volts from Monitor/Controller.		
	24	Output		4-20mA equivalent to 0-100% LEL. 3 wire		
	25	Controls		Non intrusive magnet		
	26	Cable inlet		2 x M20		
	27	IP rating		IP 66		
	28	Dimension		131mm X 138mm X 111mm		
	29	Weight		1.3 Kg		
	30	Power supply / Consumption		24 V DC (15V - 28V) / 180 mA		
	31	Accuracy		± 3 % FSD		
MISCELLANEOUS	32	Make		Oldham		
	33	Model		OLCT 100C		
INSTRUMENT INDEX	Measurement/ Test		Input Min Range	Input Max range	Output Min Range	Output Max range
	Input signal		0% LEL	100% LEL	4 mA	20 mA
ACCESSORIES	SS Tag Plate with Tag no. and service Engraved					

PPROJECT: 2x660MW ENNORE SEZ COAL BASED STPP				ELECTRO CHLORINATION SYSTEM			
CONTRACTOR BHARAT HEAVY ELECTRICALS LIMITED				DATASHEET FOR SAFETY ITEMS			
DATASHEET FOR: HYDROGEN DETECTOR				BHEL DOC NO. : PE-V11-412-174-A120			
GENERAL	1	Tag No.			00PBM40CA001		
	2	Quantity			± 2		
	3	Service			HYDROGEN GAS DETECTION NEAR HYPOCHLORITE STORAGE TANK		
	4	Type			Catalytic Combustion (Diffusion)		
PROCESS CONDITIONS	5	Duty			CONTINUOUS		
	6	Fluid			HYDROGEN GAS		
	7	Design Temperature		Deg. C	50		
	8	Design Pressure		Kg/Cm2	5		
	9	Humidity		%	5 ~ 100		
	10	Make			Oldham		
	11	Model			OLCT 100C		
	12	Working Principle			Catalytic Combustion (Diffusion)		
	13	Range			0-100% LEL		
	14	Enclosure			Epoxy Painted Aluminium Alloy		
	15	Protection			Ex d IIC		
	16	Response Time			T90<15 Sec.		
	17	Linearity			<3%LEL		
	18	Operating Temp.			0-70 Centigrade (Typical)		
	19	Approvals			CCOE		
	20	Operating Humidity			0-95% RH Non Condensing		
	21	Calibration			Hydrogen		
	22	Display			4 digit seven segment LED		
	23	Supply Input			5 to 30 Volts from Monitor/Controller.		
	24	Output			4-20mA equivalent to 0-100% LEL. 3 wire		
	25	Controls			Non intrusive magnet		
	26	Cable inlet			2 x M20		
	27	IP rating			IP 66		
	28	Dimension			131mm X 138mm X 111mm		
	29	Weight			1.3 Kg		
	30	Power supply / Consumption			24 V DC (15V - 28V) / 180 mA		
	31	Accuracy			± 3 % FSD		
MISCELLANEOUS	32	Make			Oldham		
	33	Model			OLCT 100C		
INSTRUMENT INDEX	Measurement/ Test		Input Min Range	Input Max range		Output Min Range	Output Max range
	Input signal		0% LEL	100% LEL		4 mA	20 mA
ACCESSORIES	SS Tag Plate with Tag no. and service Engraved						

OLCT 100 C

- Epoxy painted aluminum alloy
- Microprocessor based designed for fast, accurate response
- Poison resistant catalytic bead sensor
- High bright LED digits displaying gas concentration
- LEL over-range protection
- Modular design for easy maintenance
- Screw-in sensor for easy field service and replacement
- Non-intrusive calibration
- Standard 3 wired 4~20mA analog signal output for full scale
- On board relays (SPDT) for fault, warning ,alarm
- 3 LED indicators for Fault, Alarm 1, and Alarm 2



The Fixed Gas Detection People

Profiles

The OLCT 100 C is an explosion proof gas detector for continuous monitoring of combustible gases and vapors in ambient air. The transmitter uses microprocessor technology to convert the signal from a catalytic bead sensor to a 4 to 20 mA analog signal output.

The transmitter features a display and three programmable relays (SPDT) for controlling external equipment such as sirens, valves or switches. The transmitter provides an industry standard 3-wired, 4-20mA output for connection to a control system or PLC. Three relays can be easily set to latching/non-latching for safety control system.

The unit is designed for one-man calibration, neither measurement tool (Multi-meter) nor potentiometer adjustments are required. Maintenance, calibration, setup and instrument configuration are easily accomplished by using the non-intrusive magnetic wand. This allows a single user to undertake routine maintenance without needing to access internal components.

The transmitter is housed in a cast aluminum explosion-proof enclosure. The unit is typically powered with a 24 VDC (15-28 VDC) power supply and outputs a 0-24 mA signal. OLCT 100 C is suitable for use in Zone 1 or 2 hazardous areas.

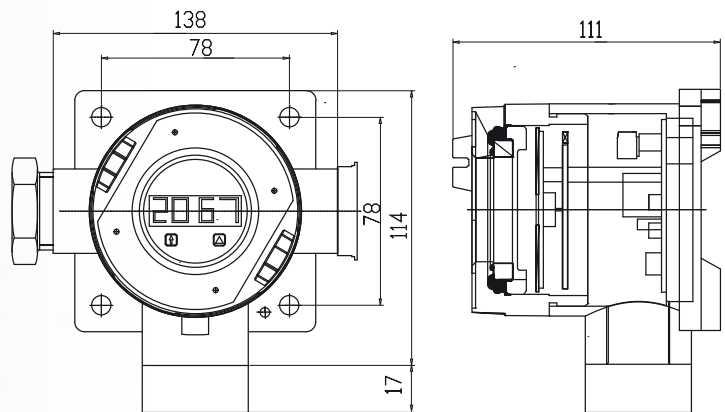


Features

MODEL	OLCT 100 C
Sensor	Anti-poison Catalytic 4F
Gas type	LEL
Range	0-100%LEL
Response Time	T90<15S
Sample type	Diffusion
Accuracy	±3% FS
Resolution	1%LEL
Low alarm setting	10%LEL adjustable
High alarm setting	20%LEL adjustable
Sensor life	48 month
Enclosure	Epoxy painted Aluminum alloy
Display	4 digit, 7-segment LED
Power Consumption	24V DC(15V-28V) 180 mA
Outputs	Standard 4~20mA 3-wired
Alarm Relays	SPDT, Fault/AL1/AL2 30VDC@5A
EX Class	Ex d IIC T6
IP rating	IP66
Temperature	-40°C ~ +70°C
Humidity	0-90% RH
Pressure	1atm±10%
Cable Inlet	2 x M20
Calibration	Non-intrusive.
Dimensions	131mmX138mm X 111mm
Weight	1.3Kg
EMC	EN50270-2006

Applications

- Refineries
- Oil production
- Chemical plants
- Industrial safety
- Shipyards and maritime
- Power plants
- Steel mills



Test and calibration gas

For your safety, test and calibrate your gas monitors regularly.



www.oldhamgas.com



AMERICAS

Phone: +1-412-788-4353
Fax: +1-412-788-8353
info@indsci.com

ASIA PACIFIC

Phone: +65-6561-7377
Fax: +65-6561-7787
info@ap.indsci.com

EUROPE

Phone: +33-3-21-60-80-80
Fax: +33-3-21-60-80-00
info@oldhamgas.com
Page 8 of 8

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
			INFORMATION ONLY		
					STATUS : CONTRACT
					JOB NO.: 412

NOTE: ANY OTHER INSTRUMENT NOT LISTED IN THIS LIST, BUT, REQUIRED TO MEET THE PROCESS/SYSTEM REQUIREMENT OR AS PER P&ID THE SAME SHALL BE SUPPLIED BY M/S DENORA WITHOUT ANY PRICE/DELIVERY IMPLICATION TO BHEL.

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.

BHEL DOC. NO. : PE - V11 - 412 - 174 - A123



SUB CONTRACTOR : DE NORA INDIA LIMITED
KUNDAIM - GOA

ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES,
SINGAPORE BRANCH

LOA NO: PW/PE/PG/EN1/P-24/17 DATED: 22 APR 2017

DEPT. --	CODE A		SCALE -	WEIGHT(KG) -	REF DRG. -	ITEM -	
INSTRUMENT SCHEDULE FOR ECP					NAME	SIGN	DATE
					PREP	SN	
					CHKD	PG	
					APPD	RF	

DEPT.					CARD CODE	BHEL DOC. NO. PE - V11 - 412 - 174 - A123	REV
SIGN			N.A.		-		0
DATE							

NO. OF SHEETS 02 EXCLUDING COVER PAGE

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED it must not be used directly or indirectly in any way detrimental to the interest of the company

2019.0

1.03

10:36:2

9

+05'30'

					PROJECT : 2 x 660 MW project Ennore SEZ coal based STPP at ash dyke of NCTPS, Chennai										DOCUMENT TITLE : INSTRUMENT SCHEDULE				
					CLIENT : Tamilnadu Generation and distribution Corporation										DOC NO.: PE-V11-412-174-A123				
					PRINCIPAL CONTRACTOR : BHARAT HEAVY ELECTRICALS LIMITED										REV. NO.: B				
					SUB CONTRACTOR : DE NORA INDIA LIMITED										DATE: 22.12.2018				
Unit Name	Tag Number	Instrument_Type	Instrument_Type_Desc	Process_Function_Type	Service	ID_Type_Name	Process_Medium	Design Temperature Deg. C	Operating Temperature Deg. C	Design Pressure	Operating Pressure	Unit	Instrument_End_Connection_Type	Pipe Inlet number	Mating Pipe/ Flange MOC	Units	Instrument Range	Power_Supply	P&ID Location_Dwg
ELECTRO CHLORINATION PLANT	90PM02CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF SEAWATER BOOSTER PUMP	NA	SEA WATER	50	25 - 32	5	2.5	Bar g	1/2" NPT (Male Threaded)	90PM021-88003	N/A	Bar g	0-4	NA	Page 2
ELECTRO CHLORINATION PLANT	90PM02CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF SEAWATER BOOSTER PUMP	NA	SEA WATER	50	25 - 32	5	2.5	Bar g	1/2" NPT (Male Threaded)	90PM022-88003	N/A	Bar g	0-4	NA	Page 2
ELECTRO CHLORINATION PLANT	90PM04CP001	BOURDON	PRESSURE GAUGE	PRESSURE	HYDROGEN DILUTION AIR BLOWER DISCHARGE	NA	AIR	50	28 - 35	5	250	mmWc	1/2" NPT (Male Threaded)	90PM041-88001	N/A	mmWc	0-400	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM04CP001	BOURDON	PRESSURE GAUGE	PRESSURE	HYDROGEN DILUTION AIR BLOWER DISCHARGE	NA	AIR	50	28 - 35	5	250	mmWc	1/2" NPT (Male Threaded)	90PM048-88001	N/A	mmWc	0-400	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM04CP001	BOURDON	PRESSURE GAUGE	PRESSURE	HYDROGEN DILUTION AIR BLOWER DISCHARGE	NA	AIR	50	28 - 35	5	250	mmWc	1/2" NPT (Male Threaded)	90PM049-88001	N/A	mmWc	0-400	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM05CP001	BOURDON	PRESSURE GAUGE	PRESSURE	HYDROGEN DILUTION AIR BLOWER DISCHARGE	NA	AIR	50	28 - 35	5	250	mmWc	1/2" NPT (Male Threaded)	90PM050-88001	N/A	mmWc	0-400	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	NEUTRALISED EFFLUENT TRANSFER PUMP DISCHARGE	NA	NEUTRALISED SOLUTION	50	28 - 35	5	1.7	Bar g	1/2" NPT (Male Threaded)	90PM061-88001	N/A	Bar g	0-4	NA	Page 5
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	NEUTRALISED EFFLUENT TRANSFER PUMP DISCHARGE	NA	NEUTRALISED SOLUTION	50	28 - 35	5	1.7	Bar g	1/2" NPT (Male Threaded)	90PM062-88001	N/A	Bar g	0-4	NA	Page 5
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF CONTINUOUS DOSING PUMP	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Male Threaded)	90PM063-88002	N/A	Bar g	0-6	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF CONTINUOUS DOSING PUMP	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Male Threaded)	90PM063-88002	N/A	Bar g	0-6	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF SHOCK DOSING PUMP	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Male Threaded)	90PM063-88002	N/A	Bar g	0-6	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF SHOCK DOSING PUMP	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Male Threaded)	90PM064-88002	N/A	Bar g	0-6	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF CONTINUOUS DOSING PUMP AT FTP	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Male Threaded)	90PM066-88002	N/A	Bar g	0-6	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF CONTINUOUS DOSING PUMP AT FTP	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Male Threaded)	90PM067-88002	N/A	Bar g	0-6	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM05CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF HCL UNLOADING PUMP	NA	33% HYDROCHLORIC ACID	50	25 - 32	5	1	Bar g	1/2" NPT (Male Threaded)	90PM051-88001	N/A	Bar g	0-2.5	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM05CP002	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF HCL UNLOADING PUMP	NA	33% HYDROCHLORIC ACID	50	25 - 32	5	1	Bar g	1/2" NPT (Male Threaded)	90PM051-88002	N/A	Bar g	0-2.5	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM05CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF ACID CLEANING PUMP	NA	5% HYDROCHLORIC ACID	50	25 - 32	5	2	Bar g	1/2" NPT (Male Threaded)	90PM052-88002	N/A	Bar g	0-4	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM05CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF ACID CLEANING PUMP	NA	5% HYDROCHLORIC ACID	50	25 - 32	5	2	Bar g	1/2" NPT (Male Threaded)	90PM053-88002	N/A	Bar g	0-4	NA	Page 3
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF DOSING PUMP AT SEA WATER INTAKE	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Male Threaded)	90PM061-88002	N/A	Bar g	0-6	NA	Page 5
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	DISCHARGE OF DOSING PUMP AT SEA WATER INTAKE	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Male Threaded)	90PM062-88002	N/A	Bar g	0-6	NA	Page 5
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	PRESSURE	INLET OF CHLORINE ANALYSER	NA	SEA WATER	50	25 - 32	5	3.2	Bar g	1/2" NPT (Male Threaded)	90PM061-88005	N/A	Bar g	0-6	NA	Page 6
ELECTRO CHLORINATION PLANT	90PM02CP001	DIAPHRAGM	PRESSURE GAUGE	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE AT AUTO STRAINER	NA	SEA WATER	50	25 - 32	5	<0.5	Bar g	1/2" NPT (Male Threaded)	90PM021-88001	N/A	Bar g	0-1	NA	Page 2
ELECTRO CHLORINATION PLANT	90PM02CP001	DIAPHRAGM	PRESSURE GAUGE	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE AT AUTO STRAINER	NA	SEA WATER	50	25 - 32	5	<0.5	Bar g	1/2" NPT (Male Threaded)	90PM022-88001	N/A	Bar g	0-1	NA	Page 2
ELECTRO CHLORINATION PLANT	90PM03CP001	DIAPHRAGM	PRESSURE GAUGE	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE ACROSS ELECTROLYSER	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	<1	Bar g	1/2" NPT (Male Threaded)	90PM031-88004	N/A	Bar g	0-2.5	NA	Page 2
ELECTRO CHLORINATION PLANT	90PM03CP001	DIAPHRAGM	PRESSURE GAUGE	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE ACROSS ELECTROLYSER	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	<1	Bar g	1/2" NPT (Male Threaded)	90PM032-88004	N/A	Bar g	0-2.5	NA	Page 2
ELECTRO CHLORINATION PLANT	90PM04CP001	DIAPHRAGM	PRESSURE GAUGE	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE AT HYPO STRAINER	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	<0.03	Bar g	1/2" NPT (Male Threaded)	90PM040-88009	N/A	Bar g	0-1	NA	Page 5
ELECTRO CHLORINATION PLANT	90PM04CP001	DIAPHRAGM	PRESSURE GAUGE	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE AT HYPO STRAINER	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	<0.03	Bar g	1/2" NPT (Male Threaded)	90PM040-88009	N/A	Bar g	0-1	NA	Page 5
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE AT SEA WATER INTAKE STRAINER	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	<0.03	Bar g	1/2" NPT (Male Threaded)	90PM061-88001	N/A	Bar g	0-1	NA	Page 5
ELECTRO CHLORINATION PLANT	90PM06CP001	DIAPHRAGM	PRESSURE GAUGE	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE AT SEA WATER INTAKE STRAINER	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	<0.03	Bar g	1/2" NPT (Male Threaded)	90PM062-88001	N/A	Bar g	0-1	NA	Page 5
ELECTRO CHLORINATION PLANT	90PM05CL001	CLEAR BOROSILICATE TUBE	LEVEL GAUGE	LEVEL	LEVEL OF ACID BULK STORAGE TANK	NA	33% HYDROCHLORIC ACID	50	25 - 32	5	Atmospheric	2" (Flanged)	N/A	FRP	mm	1200	NA	Page 4	
ELECTRO CHLORINATION PLANT	90PM05CL002	CLEAR BOROSILICATE TUBE	LEVEL GAUGE	LEVEL	LEVEL OF ACID BULK STORAGE TANK	NA	33% HYDROCHLORIC ACID	50	25 - 32	5	Atmospheric	2" (Flanged)	N/A	FRP	mm	1200	NA	Page 4	
ELECTRO CHLORINATION PLANT	90PM04CL005	Float and Board	LEVEL GAUGE	LEVEL	HYPO STORAGE TANK LEVEL INDICATOR	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	Atmospheric	2" (Flanged)	N/A	FRP	mm	7500	NA	Page 3	
ELECTRO CHLORINATION PLANT	90PM04CL006	Float and Board	LEVEL GAUGE	LEVEL	HYPO STORAGE TANK LEVEL INDICATOR	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	Atmospheric	2" (Flanged)	N/A	FRP	mm	7500	NA	Page 3	
ELECTRO CHLORINATION PLANT	90PM05CL001	MAGNETIC	LEVEL GAUGE	LEVEL	LEVEL OF 5% ACID STORAGE TANK	NA	5% HYDROCHLORIC ACID	50	25 - 32	5	Atmospheric	2" (Flanged)	N/A	FRP	mm	2250	NA	Page 4	
ELECTRO CHLORINATION PLANT	90PM07CL001	Float and Board	LEVEL GAUGE	LEVEL	LOOSE ITEM FOR STORAGE TANK (90PM708001)	NA	SODIUM HYPOCHLORITE	50	28 - 35	5	Atmospheric	2" (Flanged)	N/A	FRP	mm	2700	NA	Page 5	
ELECTRO CHLORINATION PLANT	90PM06CL001	CLEAR BOROSILICATE TUBE	LEVEL GAUGE	LEVEL	NACH DRUM LEVEL	NA	NACH	50	28 - 35	5	Atmospheric	1" (Flanged)	N/A	HDPE	mm	800	NA	Page 5	
ELECTRO CHLORINATION PLANT	90PM03CT001	RTD	TEMPERATURE TRANSMITTER	TEMPERATURE	TEMPERATURE AT OUTLET OF ELECTROLYSER	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	2-3	Bar g	N/A	90PM031-88004	N/A	Deg. C	0-100	24vDC/2wire	Page 2
ELECTRO CHLORINATION PLANT	90PM03CT001	RTD	TEMPERATURE TRANSMITTER	TEMPERATURE	TEMPERATURE AT OUTLET OF ELECTROLYSER	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	2-3	Bar g	N/A	90PM032-88004	N/A	Deg. C	0-100	24vDC/2wire	Page 2
ELECTRO CHLORINATION PLANT	90PM03CT001	RTD	TEMPERATURE TRANSMITTER	TEMPERATURE	SEAWATER BOOSTER PUMP DISCHARGE TEMPERATURE	AI	SEA WATER	50	25 - 32	5	2.5	Bar g	N/A	90PM021-88001	N/A	Deg. C	0-60	24vDC/2wire	Page 2
ELECTRO CHLORINATION PLANT	90PM04CL001	ULTRASONIC	LEVEL TRANSMITTER	LEVEL	LEVEL OF HYPOCHLORITE STORAGE TANK	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	Atmospheric	2" (Flanged)	N/A	FRP	mmH2O	0-8000	24vDC/2wire	Page 3	
ELECTRO CHLORINATION PLANT	90PM04CL002	ULTRASONIC	LEVEL TRANSMITTER	LEVEL	LEVEL OF HYPOCHLORITE STORAGE TANK	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	Atmospheric	2" (Flanged)	N/A	FRP	mmH2O	0-8000	24vDC/2wire	Page 3	
ELECTRO CHLORINATION PLANT	90PM04CL003	ULTRASONIC	LEVEL TRANSMITTER	LEVEL	LEVEL OF HYPOCHLORITE STORAGE TANK	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	Atmospheric	2" (Flanged)	N/A	FRP	mmH2O	0-8000	24vDC/2wire	Page 3	
ELECTRO CHLORINATION PLANT	90PM04CL004	ULTRASONIC	LEVEL TRANSMITTER	LEVEL	LEVEL OF HYPOCHLORITE STORAGE TANK	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	Atmospheric	2" (Flanged)	N/A	FRP	mmH2O	0-8000	24vDC/2wire	Page 3	
ELECTRO CHLORINATION PLANT	90PM04CL005	ULTRASONIC	LEVEL TRANSMITTER	LEVEL	LEVEL OF HYPOCHLORITE STORAGE TANK	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	Atmospheric	2" (Flanged)	N/A	FRP	mmH2O	0-8000	24vDC/2wire	Page 3	
ELECTRO CHLORINATION PLANT	90PM04CL006	ULTRASONIC	LEVEL TRANSMITTER	LEVEL	LEVEL OF HYPOCHLORITE STORAGE TANK	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	Atmospheric	2" (Flanged)	N/A	FRP	mmH2O	0-8000	24vDC/2wire	Page 3	
ELECTRO CHLORINATION PLANT	90PM06CL001	ULTRASONIC	LEVEL TRANSMITTER	LEVEL	LEVEL OF NEUTRALISATION PIT	AI	NEUTRALISED SOLUTION	50	25 - 32	5	Atmospheric	2" (Flanged)	N/A	CPVC	mmH2O	0-8000	24vDC/2wire	Page 5	
ELECTRO CHLORINATION PLANT	90PM05CL003	NON CONTACT RADAR	LEVEL TRANSMITTER	LEVEL	LEVEL OF ACID BULK STORAGE TANK	AI	33% HYDROCHLORIC ACID	50	25 - 32	5	Atmospheric	2" (Flanged)	N/A	FRP	mmH2O	0-70000	24vDC/2wire	Page 4	
ELECTRO CHLORINATION PLANT	90PM05CL001	NON CONTACT RADAR	LEVEL TRANSMITTER	LEVEL	LEVEL OF 5% ACID STORAGE TANK	AI	5% HYDROCHLORIC ACID	50	25 - 32	5	Atmospheric	2" (Flanged)	N/A	FRP	mmH2O	0-70000	24vDC/2wire	Page 4	
ELECTRO CHLORINATION PLANT	90PM07CL001	ULTRASONIC	LEVEL TRANSMITTER	LEVEL	LEVEL OF HYPOCHLORITE STORAGE TANK AT SEA WATER INTAKE	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	Atmospheric	2" (Flanged)	N/A	FRP	mmH2O	0-8000	24vDC/2wire	Page 5	
ELECTRO CHLORINATION PLANT	90PM07CL002	ULTRASONIC	LEVEL TRANSMITTER	LEVEL	LEVEL OF HYPOCHLORITE STORAGE TANK AT SEA WATER INTAKE	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	Atmospheric	2" (Flanged)	N/A	FRP	mmH2O	0-8000	24vDC/2wire	Page 5	
ELECTRO CHLORINATION PLANT	90PM04CT001	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	DISCHARGE OF CONTINUOUS DOSING PUMP	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Female Threaded)	90PM041-88002	N/A	Bar g	0-10	24vDC/2wire	Page 3
ELECTRO CHLORINATION PLANT	90PM04CT001	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	DISCHARGE OF CONTINUOUS DOSING PUMP	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Female Threaded)	90PM042-88002					

Unit_Name	Tag Number	Instrument_Type	Instrument_Type_Desc	Process_Function_Type	Service	ID_Type_Name	Process_Medium	Design Temperature Deg. C	Operating Temperature Deg. C	Design Pressure	Operating Pressure	Unit	Instrument_End_Connection_Type	Pipe In# number	Mating Pipe / Flange MOC	Units	Instrument Range	Power_Supply	P&ID Location_Dwg
ELECTRO CHLORINATION PLANT	90PBA6C0001	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	DISCHARGE OF CONTINUOUS DOSING PUMP AT FTP	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Female Threaded)	90PBA6-BR002	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA7C0001	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	DISCHARGE OF CONTINUOUS DOSING PUMP AT FTP	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Female Threaded)	90PBA7-BR002	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA2C0001	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	PRESSURE AT DISCHARGE OF NEUTRALIZATION PIT PUMP	AI	NEUTRALIZED SOLUTION	50	25 - 32	5	1.7	Bar g	1/2" NPT (Female Threaded)	-	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 5
ELECTRO CHLORINATION PLANT	90PBA5C0001	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	DISCHARGE OF HCL UNLOADING PUMP	AI	33% HYDROCHLORIC ACID	50	25 - 32	5	1	Bar g	1/2" NPT (Female Threaded)	90PBA5-BR003	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 4
ELECTRO CHLORINATION PLANT	90PBA2C0001	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	DISCHARGE OF ACID CLEANING PUMP	AI	5% HYDROCHLORIC ACID	50	25 - 32	5	2	Bar g	1/2" NPT (Female Threaded)	90PBA2-BR002	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 4
ELECTRO CHLORINATION PLANT	90PBA1C0004	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	SUCTION OF DOSING PUMP AT SEA WATER INTAKE	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	< 0.03	Bar g	1/2" NPT (Female Threaded)	90PBA1-BR001	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 5
ELECTRO CHLORINATION PLANT	90PBA1C0003	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	DISCHARGE OF DOSING PUMP AT SEA WATER INTAKE	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Female Threaded)	90PBA1-BR002	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 5
ELECTRO CHLORINATION PLANT	90PBA2C0004	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	SUCTION OF DOSING PUMP AT SEA WATER INTAKE	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	0.03	Bar g	1/2" NPT (Female Threaded)	90PBA2-BR001	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 5
ELECTRO CHLORINATION PLANT	90PBA3C0003	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	DISCHARGE OF DOSING PUMP AT SEA WATER INTAKE	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	1/2" NPT (Female Threaded)	90PBA3-BR002	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 5
ELECTRO CHLORINATION PLANT	90PBA21C0004	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	PRESSURE AT DISCHARGE OF STRAINER	AI	SEA WATER	50	25 - 32	5	1 - 2	Bar g	1/2" NPT (Female Threaded)	90PBA21-BR004	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 2
ELECTRO CHLORINATION PLANT	90PBA21C0004	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	PRESSURE AT DISCHARGE OF STRAINER	AI	SEA WATER	50	25 - 32	5	1 - 2	Bar g	1/2" NPT (Female Threaded)	90PBA21-BR004	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 2
ELECTRO CHLORINATION PLANT	90PBA21C0005	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	PRESSURE AT DISCHARGE OF STRAINER	AI	SEA WATER	50	25 - 32	5	1 - 2	Bar g	1/2" NPT (Female Threaded)	90PBA21-BR004	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 2
ELECTRO CHLORINATION PLANT	90PBA23C0001	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	PRESSURE AT DISCHARGE OF SEAWATER BOOSTER PUMP	AI	SEA WATER	50	25 - 32	5	2.5	Bar g	1/2" NPT (Female Threaded)	90PBA23-BR001	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 2
ELECTRO CHLORINATION PLANT	90PBA23C0002	DIAPHRAGM	PRESSURE TRANSMITTER	PRESSURE	PRESSURE AT DISCHARGE OF SEAWATER BOOSTER PUMP	AI	SEA WATER	50	25 - 32	5	2.5	Bar g	1/2" NPT (Female Threaded)	90PBA23-BR001	N/A	Bar g	0 ~ 10	24VDC/2watt	Page 2
ELECTRO CHLORINATION PLANT	90PBA1C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	SEAWATER INLET TO STRAINER	AI	SEA WATER	50	25 - 32	5	1 - 2	Bar g	6" (Flanged)	90PBA1-BR001	CPVC	M3/hr	---	24VDC/4 wire	Page 2
ELECTRO CHLORINATION PLANT	90PBA21C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	SEAWATER BOOSTER PUMP DISCHARGE FLOW	AI	SEA WATER	50	25 - 32	5	2.5	Bar g	6" (Flanged)	90PBA21-BR003	CPVC	M3/hr	---	24VDC/4 wire	Page 2
ELECTRO CHLORINATION PLANT	90PBA23C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	SEAWATER BOOSTER PUMP DISCHARGE FLOW	AI	SEA WATER	50	25 - 32	5	2.5	Bar g	6" (Flanged)	90PBA23-BR003	CPVC	M3/hr	---	24VDC/4 wire	Page 2
ELECTRO CHLORINATION PLANT	90PBA31C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	SEAWATER INLET TO ELECTROLYZER	AI	SEA WATER	50	25 - 32	5	2.5	Bar g	6" (Flanged)	90PBA31-BR001	CPVC	M3/hr	---	24VDC/4 wire	Page 2
ELECTRO CHLORINATION PLANT	90PBA31C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	SEAWATER INLET TO ELECTROLYZER	AI	SEA WATER	50	25 - 32	5	2.5	Bar g	6" (Flanged)	90PBA31-BR001	CPVC	M3/hr	---	24VDC/4 wire	Page 2
ELECTRO CHLORINATION PLANT	90PBA41C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	DISCHARGE OF CONTINUOUS DOSING PUMP	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	6" (Flanged)	90PBA41-BR002	CPVC	M3/hr	---	24VDC/4 wire	Page 3
ELECTRO CHLORINATION PLANT	90PBA42C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	DISCHARGE OF CONTINUOUS DOSING PUMP	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	6" (Flanged)	90PBA42-BR002	CPVC	M3/hr	---	24VDC/4 wire	Page 3
ELECTRO CHLORINATION PLANT	90PBA43C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	DISCHARGE OF SHOCK DOSING PUMP	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	6" (Flanged)	90PBA43-BR002	CPVC	M3/hr	---	24VDC/4 wire	Page 3
ELECTRO CHLORINATION PLANT	90PBA44C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	DISCHARGE OF SHOCK DOSING PUMP	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	6" (Flanged)	90PBA44-BR002	CPVC	M3/hr	---	24VDC/4 wire	Page 3
ELECTRO CHLORINATION PLANT	90PBA45C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	DISCHARGE OF SHOCK DOSING PUMP	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	6" (Flanged)	90PBA45-BR002	CPVC	M3/hr	---	24VDC/4 wire	Page 3
ELECTRO CHLORINATION PLANT	90PBA46C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	DISCHARGE OF CONTINUOUS DOSING PUMP AT FTP	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	2" (Flanged)	90PBA46-BR002	CPVC	M3/hr	---	24VDC/4 wire	Page 3
ELECTRO CHLORINATION PLANT	90PBA47C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	DISCHARGE OF CONTINUOUS DOSING PUMP AT FTP	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	2" (Flanged)	90PBA47-BR002	CPVC	M3/hr	---	24VDC/4 wire	Page 3
ELECTRO CHLORINATION PLANT	90PBA81C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	DISCHARGE OF DOSING PUMP AT SEA WATER INTAKE	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	2" (Flanged)	90PBA81-BR002	CPVC	M3/hr	---	24VDC/4 wire	Page 5
ELECTRO CHLORINATION PLANT	90PBA82C0001	MAGNETIC	FLOW TRANSMITTER	FLOW	DISCHARGE OF DOSING PUMP AT SEA WATER INTAKE	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	3.2	Bar g	2" (Flanged)	90PBA82-BR002	CPVC	M3/hr	---	24VDC/4 wire	Page 5
ELECTRO CHLORINATION PLANT	90PBA83C0001	DP TYPE	FLOW TRANSMITTER	FLOW	VENT OF HYPOCHLORITE STORAGE TANK	AI	AIR + HYDROGEN GAS	50	25 - 32	5	250	mmWC	1/2" (Flanged)	N/A	FEP	Nm3/hr	---	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA83C0002	DP TYPE	FLOW TRANSMITTER	FLOW	VENT OF HYPOCHLORITE STORAGE TANK	AI	AIR + HYDROGEN GAS	50	25 - 32	5	250	mmWC	1/2" (Flanged)	N/A	FEP	Nm3/hr	---	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA21C0002	DIAPHRAGM	DIFF. PRESSURE TRANSMITTER	DIFFERENTIAL PRESSURE	SEA WATER AUTO STRAINER DIFFERENTIAL PRESSURE	AI	SEA WATER	50	25 - 32	5	+0.5	Bar g	1/2" NPT (Female Threaded)	90PBA21-BR001	N/A	Bar g	0-2	24VDC/2watt	Page 2
ELECTRO CHLORINATION PLANT	90PBA22C0002	DIAPHRAGM	DIFF. PRESSURE TRANSMITTER	DIFFERENTIAL PRESSURE	SEA WATER AUTO STRAINER DIFFERENTIAL PRESSURE	AI	SEA WATER	50	25 - 32	5	+0.5	Bar g	1/2" NPT (Female Threaded)	90PBA22-BR001	N/A	Bar g	0-2	24VDC/2watt	Page 2
ELECTRO CHLORINATION PLANT	90PBA31C0002	DIAPHRAGM	DIFF. PRESSURE TRANSMITTER	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE ACROSS ELECTROLYZER	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	2.5	Bar g	1/2" NPT (Female Threaded)	90PBA31-BR004	N/A	Bar g	0-2	24VDC/2watt	Page 2
ELECTRO CHLORINATION PLANT	90PBA32C0002	DIAPHRAGM	DIFF. PRESSURE TRANSMITTER	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE ACROSS ELECTROLYZER	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	2.5	Bar g	1/2" NPT (Female Threaded)	90PBA32-BR004	N/A	Bar g	0-2	24VDC/2watt	Page 2
ELECTRO CHLORINATION PLANT	90PBA40C0002	DIAPHRAGM	DIFF. PRESSURE TRANSMITTER	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE AT HYPO STRAINER	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	0.03	Bar g	1/2" NPT (Female Threaded)	90PBA40-BR009	N/A	Bar g	0-2	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA40C0004	DIAPHRAGM	DIFF. PRESSURE TRANSMITTER	DIFFERENTIAL PRESSURE	DIFFERENTIAL PRESSURE AT HYPO STRAINER	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	0.03	Bar g	1/2" NPT (Female Threaded)	90PBA40-BR009	N/A	Bar g	0-2	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA1C0002	DIAPHRAGM	DIFF. PRESSURE TRANSMITTER	DIFFERENTIAL PRESSURE	STRAINER DIFFERENTIAL PRESSURE AT SEA WATER INTAKE	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	0.03	Bar g	1/2" NPT (Female Threaded)	90PBA1-BR003	N/A	Bar g	0-2	24VDC/2watt	Page 5
ELECTRO CHLORINATION PLANT	90PBA2C0002	DIAPHRAGM	DIFF. PRESSURE TRANSMITTER	DIFFERENTIAL PRESSURE	STRAINER DIFFERENTIAL PRESSURE AT SEA WATER INTAKE	AI	SODIUM HYPOCHLORITE	50	28 - 35	5	0.03	Bar g	1/2" NPT (Female Threaded)	90PBA2-BR001	N/A	Bar g	0-2	24VDC/2watt	Page 5
ELECTRO CHLORINATION PLANT	90PBA52C0001	DIAPHRAGM	FLOW SWITCH	FLOW	DISCHARGE OF HCL CLEANING PUMP	DI	5% HYDROCHLORIC ACID	50	25 - 32	5	2	Bar g	1/2" NPT (Male Threaded)	90PBA52-BR002	N/A	---	---	24VDC/2watt	Page 4
ELECTRO CHLORINATION PLANT	90PBA53C0001	DIAPHRAGM	FLOW SWITCH	FLOW	DISCHARGE OF HCL CLEANING PUMP	DI	5% HYDROCHLORIC ACID	50	25 - 32	5	2	Bar g	1/2" NPT (Male Threaded)	90PBA53-BR002	N/A	---	---	24VDC/2watt	Page 4
ELECTRO CHLORINATION PLANT	90PBA7C0001	DIAPHRAGM	FLOW SWITCH	FLOW	HYDROGEN DILUTION AIR BLOWERS FLOW	DI	AIR	50	25 - 32	5	250	mmWC	1/2" NPT (Male Threaded)	90PBA7-BR001	N/A	Nm3/hr	---	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA8C0001	DIAPHRAGM	FLOW SWITCH	FLOW	HYDROGEN DILUTION AIR BLOWERS FLOW	DI	AIR	50	25 - 32	5	250	mmWC	1/2" NPT (Male Threaded)	90PBA8-BR001	N/A	Nm3/hr	---	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA49C0001	DIAPHRAGM	FLOW SWITCH	FLOW	HYDROGEN DILUTION AIR BLOWERS FLOW	DI	AIR	50	25 - 32	5	250	mmWC	1/2" NPT (Male Threaded)	90PBA49-BR001	N/A	Nm3/hr	---	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA50C0001	DIAPHRAGM	FLOW SWITCH	FLOW	HYDROGEN DILUTION AIR BLOWERS FLOW	DI	AIR	50	25 - 32	5	250	mmWC	1/2" NPT (Male Threaded)	90PBA50-BR001	N/A	Nm3/hr	---	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA40C0001	Catalytic Combustion (Diffusion)	HYDROGEN DETECTOR	ANALYSER	HYDROGEN DETECTOR AT HYPOCHLORITE STORAGE TANK	AI	HYDROGEN GAS	50	25 - 32	5	Atmospheric	N/A	N/A	N/A	N/A	% LEL	0-100	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA40C0002	Catalytic Combustion (Diffusion)	HYDROGEN DETECTOR	ANALYSER	HYDROGEN DETECTOR AT HYPOCHLORITE STORAGE TANK	AI	HYDROGEN GAS	50	25 - 32	5	Atmospheric	N/A	N/A	N/A	N/A	% LEL	0-100	24VDC/2watt	Page 3
ELECTRO CHLORINATION PLANT	90PBA31C0001	Catalytic Combustion (Diffusion)	HYDROGEN DETECTOR	ANALYSER	HYDROGEN DETECTOR AT ELECTROCHLORINATION BUILDING	AI	HYDROGEN GAS	50	25 - 32	5	Atmospheric	N/A	N/A	N/A	N/A	% LEL	0-100	24VDC/2watt	Page 2
ELECTRO CHLORINATION PLANT	90PBA90C0001	Amperometric	CHLORINE ANALYSER	ANALYSER	CHLORINE ANALYSER AT HYPOCHLORITE STORAGE TANK	AI	SEA WATER	50	25 - 32	5	3.2	Bar g	N/A	N/A	N/A	PPM	0-10	340V AC / UPS	Page 6

REV	DATE	ALTERED:	REV	DATE	ALTERED
		CHECKED:			CHECKED
APPROVED					
STATUS : CONTRACT					
JOB NO.: 412					

Note: If any additional valves required to complete the system or as per process requirement the same shall be supplied by M/s Denora without any price/delivery implication.

2017.12.
29
17:52:39
+05'30'

	BHARAT HEAVY ELECTRICALS LTD PROJECT ENGINEERING MANAGEMENT.
This approval status shall be interpreted as laid down in the contract and it shall not relieve the contractor from the contractual obligation.	
APPROVAL CATEGORY AWARDED = I	
CAT I - Approved	
CAT II - Approved With Comments as Noted	
CAT III - Not Approved	
CAT IV - Reference Drawing	
DEPARTMENT	MECHANICAL AUXILIARY
NAME:	FALGUNI SAHA

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



TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TANGEDCO)



CONSULTANT: DESEIN PVT LTD, NEW DELHI.



**BHARAT HEAVY ELECTRICALS LIMITED
PROJECTS ENGINEERING MANAGEMENT, NOIDA.**

BHEL DWG NO. PE - V11 - 412 - 174 - A124

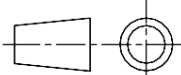


DE NORA

SUB CONTRACTOR: DE NORA INDIA LIMITED KUNDAIM - GOA

ASSOCIATE PARTNER: DE NORA WATER TECHNOLOGIES, SINGAPORE BRANCH

LOA NO: PW/PE/PG/EN1/P-24/17 DATED: 22 APR 2017

DEPT.	CODE		SCALE	WEIGHT(KG)	REF DRG.	ITEM	
--	A		-	-	-	-	
VALVE SCHEDULE					NAME	SIGN	DATE
					PREP	SN	
					CHKD	PG	
					APPD	RF	
DEPT.				CARD CODE	BHEL DOC. NO.		REV
SIGN		N.A.			PE - V11 - 412 - 174 - A124		0
DATE					NO. OF SHEETS 10 EXCLUDING COVER PAGE		

COPY RIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED it must not be used directly or indirectly in any way detrimental to the interest of the company

DE NORA WATER TECHNOLOGIES
PROJECT : 2X660MW ENNINORE SEZ COAL BASED STPP

VALVE LIST
DOCUMENT NO.: PE-V11-412-174-A124

CLIENT : BHEL

PLANT: ELECTRO CHLORINATION PLANT

NO	TAG No.	VALVE TYPE	TYPE	DESIGN DATA						SERVICE OF VALVE	MAKE	REFERENCE DRAWING		REMARKS	REV
				SIZE	CONN	MATERIAL	RATING	P [barg]	T [°C]						
1	90PBM 11 AA501	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	MAIN INLET VALVE	
2	90PBM 21 AA501	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEA WATER STRAINER 90PBM21AT001 INLET VALVE	
3	90PBM 21 AA502	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEA WATER STRAINER 90PBM21AT001 OUTLET VALVE	
4	90PBM 21 AA303	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	DP INDICATOR PDI 90PBM21CP001 INLET ROOT VALVE	
5	90PBM 21 AA304	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	DP INDICATOR PDI 90PBM21CP001 OUTLET ROOT VALVE	
6	90PBM 21 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	DP TRANSMITTER PDT 90PBM21CP002 INLET ROOT VALVE	
7	90PBM 21 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	DP TRANSMITTER PDT 90PBM21CP002 OUTLET ROOT VALVE	
8	90PBM 21 AA701	CHECK VALVE	WAFER DUAL PLATE	200	WAFER	CPVC	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEA WATER STRAINER 90PBM21AT001 OUTLET CHECK VALVE	
9	90PBM 21 AA601	BUTTERFLY	ELECTRIC ACTUATED	50	SORF	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEA WATER STRAINER 90PBM21AT001 FLUSHING VALVE (part of autostrainer vendor package)	
10	90PBM 21 AA602	BUTTERFLY	MANUAL LEVER OPERATED	50	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEA WATER STRAINER 90PBM21AT001 DRAIN VALVE (part of autostrainer vendor package)	
11	90PBM 22 AA501	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEA WATER STRAINER 90PBM22AT001 INLET VALVE	
12	90PBM 22 AA502	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEA WATER STRAINER 90PBM22AT001 OUTLET VALVE	
13	90PBM 22 AA303	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	DP INDICATOR PDI 90PBM22CP001 INLET ROOT VALVE	
14	90PBM 22 AA304	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	DP INDICATOR PDI 90PBM22CP001 OUTLET ROOT VALVE	
15	90PBM 22 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	DP TRANSMITTER PDT 90PBM22CP002 INLET ROOT VALVE	
16	90PBM 22 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	DP TRANSMITTER PDT 90PBM22CP002 OUTLET ROOT VALVE	
17	90PBM 22 AA701	CHECK VALVE	WAFER DUAL PLATE	200	WAFER	CPVC	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEA WATER STRAINER 90PBM22AT001 OUTLET CHECK VALVE	
18	90PBM 22 AA601	BUTTERFLY	ELECTRIC ACTUATED	50	SORF	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEA WATER STRAINER 90PBM22AT001 FLUSHING VALVE (typically part of autostrainer vendor package)	
19	90PBM 22 AA602	BUTTERFLY	MANUAL LEVER OPERATED	50	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEA WATER STRAINER 90PBM22AT001 DRAIN VALVE (typically part of autostrainer vendor package)	
20	90PBM 21 AA309	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	PRESSURE TRANSMITTER PT 90PBM21CP003 ROOT VALVE	
21	90PBM 21 AA310	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	PRESSURE TRANSMITTER PT 90PBM21CP004 ROOT VALVE	
22	90PBM 21 AA311	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	PRESSURE TRANSMITTER PT 90PBM21CP005 ROOT VALVE	
23	90PBM 21 AA503	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEAWATER BOOSTER PUMP 90PBM21AP001 INLET VALVE	
24	90PBM 21 AA702	CHECK VALVE	WAFER DUAL PLATE	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 2/6	SEAWATER BOOSTER PUMP 90PBM21AP001 OUTLET CHECK VALVE	

DE NORA WATER TECHNOLOGIES
PROJECT : 2X660MW ENNNORE SEZ COAL BASED STPP

VALVE LIST
DOCUMENT NO.: PE-V11-412-174-A124

CLIENT : BHEL

PLANT: ELECTRO CHLORINATION PLANT

NO	TAG No.	VALVE TYPE	TYPE	DESIGN DATA						SERVICE OF VALVE	MAKE	REFERENCE DRAWING	REMARKS	REV
				SIZE	CONN	MATERIAL	RATING	P [barg]	T [°C]					
25	90PBM 21 AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	SEAWATER BOOSTER PUMP 90PBM21AP001 INLET DRAIN VALVE	
26	90PBM 21 AA504	BUTTERFLY	MANUAL LEVER OPERATED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	SEAWATER BOOSTER PUMP 90PBM21AP001 OUTLET VALVE	
27	90PBM 21 AA311	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	PRESSURE INDICATOR 90PBM21CP501 ROOT VALVE	
28	90PBM 22 AA503	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	SEAWATER BOOSTER PUMP 90PBM22AP001 INLET VALVE	
29	90PBM 22 AA702	CHECK VALVE	WAFER DUAL PLATE	150	WAFER	CPVC	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	SEAWATER BOOSTER PUMP 90PBM22AP001 OUTLET CHECK VALVE	
30	90PBM 22 AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	SEAWATER BOOSTER PUMP 90PBM22AP001 INLET DRAIN VALVE	
31	90PBM 22 AA504	BUTTERFLY	MANUAL LEVER OPERATED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	SEAWATER BOOSTER PUMP 90PBM22AP001 OUTLET VALVE	
32	90PBM 22 AA311	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	PRESSURE INDICATOR 90PBM22CP501 ROOT VALVE	
33	90PBM 21 AA603	BUTTERFLY	MOTORIZED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	SEAWATER BOOSTER PUMP 90PBM21AP001 BYPASS VALVE	
34	90PBM 23 AA312	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	PRESSURE TRANSMITTER PT 90PBM23CP001 ROOT VALVE	
35	90PBM 23 AA313	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	PRESSURE TRANSMITTER PT 90PBM23CP002 ROOT VALVE	
36	90PBM 31 AA501	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER FLOW CONTROL VALVE 90PBM31AG001 INLET ISOL VALVE	
37	90PBM 31 AA502	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER FLOW CONTROL VALVE 90PBM31AG001 OUTLET ISOL VALVE	
38	90PBM 31 AA503	BUTTERFLY	MANUAL LEVER OPERATED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER FLOW CONTROL VALVE 90PBM31AG001 BYPASS VALVE	
39	90PBM 31 AA601	BUTTERFLY	MODULATING	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER FLOW CONTROL VALVE	
40	90PBM 31 AA504	BUTTERFLY	MANUAL LEVER OPERATED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM31AG001 INLET ISOL VALVE	
41	90PBM 31 AA602	BUTTERFLY	SOLENOID OPERATED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM31AG001 OUTLET VALVE	
42	90PBM 31 AA404	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM31AG001 INLET DRAIN VALVE	
43	90PBM 31 AA401	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM31AG001 OUTLET DRAIN VALVE	
44	90PBM 31 AA402	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM31AG001 SAMPLING VALVE	
45	90PBM 31 AA403	BALL VALVE	MANUAL LEVER OPERATED	50	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	TUNDISH OF 90QCG31AG101 SAMPLING ISOL VALVE	
46	90PBM 31 AA505	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	6% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM31AG001 ACID INLET VALVE	
47	90PBM 31 AA506	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	6% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM31AG001 ACID OUTLET VALVE	
48	90PBM 31 AA303	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	DP INDICATOR PDI 90PBM31CP001 INLET ROOT VALVE	

DE NORA WATER TECHNOLOGIES																
PROJECT :				2X660MW ENNNORE SEZ COAL BASED STPP							VALVE LIST					
CLIENT :				BH&L							DOCUMENT NO.: PE-V11-412-174-A124					
											PLANT: ELECTRO CHLORINATION PLANT					
NO	TAG No.	VALVE TYPE	TYPE	DESIGN DATA						SERVICE OF VALVE	MAKE	REFERENCE DRAWING	REMARKS	REV		
				SIZE	CONN	MATERIAL	RATING	P [bar(g)]	T [°C]							
49	90PBM 31 AA304	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	DP INDICATOR PDI 90PBM31CP001 OUTLET ROOT VALVE			
50	90PBM 31 AA301	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	DP TRANSMITTER PDT 90PBM31CP002 INLET ROOT VALVE			
51	90PBM 31 AA302	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	DP TRANSMITTER PDT 90PBM31CP002 OUTLET ROOT VALVE			
52	90PBM 32 AA501	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER FLOW CONTROL VALVE 90PBM32AG001 INLET ISOL VALVE			
53	90PBM 32 AA502	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER FLOW CONTROL VALVE 90PBM32AG001 OUTLET ISOL VALVE			
54	90PBM 32 AA503	BUTTERFLY	MANUAL LEVER OPERATED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER FLOW CONTROL VALVE 90PBM32AG001 BYPASS VALVE			
55	90PBM 32 AA601	BUTTERFLY	MODULATING	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER FLOW CONTROL VALVE			
56	90PBM 32 AA504	BUTTERFLY	MANUAL LEVER OPERATED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM32AG001 INLET ISOL VALVE			
57	90PBM 32 AA602	BUTTERFLY	SOLENOID OPERATED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM32AG001 OUTLET VALVE			
58	90PBM 32 AA404	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM32AG001 INLET DRAIN VALVE			
59	90PBM 32 AA401	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM32AG001 OUTLET DRAIN VALVE			
60	90PBM 32 AA402	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM32AG001 SAMPLING VALVE			
61	90PBM 32 AA403	BALL VALVE	MANUAL LEVER OPERATED	50	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	TUNDISH OF 00QCG32AG101 SAMPLING ISOL VALVE			
62	90PBM 32 AA505	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	6% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM32AG001 ACID INLET VALVE			
63	90PBM 32 AA506	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	6% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	ELECTROLYZER 90PBM32AG001 ACID OUTLET VALVE			
64	90PBM 32 AA303	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	DP INDICATOR PDI 90PBM32CP001 INLET ROOT VALVE			
65	90PBM 32 AA304	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	DP INDICATOR PDI 90PBM32CP001 OUTLET ROOT VALVE			
66	90PBM 32 AA301	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	DP TRANSMITTER PDT 90PBM32CP002 INLET ROOT VALVE			
67	90PBM 32 AA302	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 2/6	DP TRANSMITTER PDT 90PBM32CP002 OUTLET ROOT VALVE			
68	90PBM 40 AA601	BUTTERFLY	MOTORIZED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 3/6	HYPOCHLORITE TANK 90PBM40B8001 INLET ON-OFF VALVE			
69	90PBM 40 AA603	BUTTERFLY	MOTORIZED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 3/6	HYPOCHLORITE TANK 90PBM40B8002 INLET ON-OFF VALVE			
70	90PBM 40 AA602	BUTTERFLY	MOTORIZED	300	LUG	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 3/6	HYPOCHLORITE TANK 90PBM40B8001 OUTLET VALVE			
71	90PBM 40 AA604	BUTTERFLY	MOTORIZED	300	LUG	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 3/6	HYPOCHLORITE TANK 90PBM40B8002 OUTLET VALVE			
72	90PBM 40 AA401	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 3/6	HYPOCHLORITE TANK 90PBM40B8001 DRAIN VALVE			

DE NORA WATER TECHNOLOGIES
PROJECT : 2X660MW ENNORE SEZ COAL BASED STPP

VALVE LIST
DOCUMENT NO.: PE-V11-412-174-A124

CLIENT : BHEL

PLANT: ELECTRO CHLORINATION PLANT

NO	TAG No.			VALVE TYPE	TYPE	DESIGN DATA					SERVICE OF VALVE	MAKE	REFERENCE DRAWING			REMARKS	REV
						SIZE	CONN	MATERIAL	RATING	P [bar(g)]	T [°C]						
73	90PBM	40	AA402	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPOCHLORITE TANK 90PBM40B8002 DRAIN VALVE	
74	90PBM	47	AA701	NON RETURN DAMPER	-	500	WAFER	PVC	#150	6	60	Air	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DILUTION AIR BLOWER 90PBM47AN001 NON RETURN DAMPER	
75	90PBM	47	AA301	BALL VALVE	MANUAL LEVER OPERATED	25	FF: THREAD	CPVC/ EPDM	#150	6	60	Air	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE INDICATOR 90PBM47CP501 ROOT VALVE	
76	90PBM	48	AA701	NON RETURN DAMPER	-	500	WAFER	PVC	#150	6	60	Air	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DILUTION AIR BLOWER 90PBM48AN001 NON RETURN DAMPER	
77	90PBM	48	AA301	BALL VALVE	MANUAL LEVER OPERATED	25	FF: THREAD	CPVC/ EPDM	#150	6	60	Air	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE INDICATOR 90PBM48CP501 ROOT VALVE	
78	90PBM	49	AA701	NON RETURN DAMPER	-	500	WAFER	PVC	#150	6	60	Air	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DILUTION AIR BLOWER 90PBM49AN001 NON RETURN DAMPER	
79	90PBM	49	AA301	BALL VALVE	MANUAL LEVER OPERATED	25	FF: THREAD	CPVC/ EPDM	#150	6	60	Air	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE INDICATOR 90PBM49CP501 ROOT VALVE	
80	90PBM	50	AA701	NON RETURN DAMPER	-	500	WAFER	PVC	#150	6	60	Air	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DILUTION AIR BLOWER 90PBM50AN001 NON RETURN DAMPER	
81	90PBM	50	AA301	BALL VALVE	MANUAL LEVER OPERATED	25	FF: THREAD	CPVC/ EPDM	#150	6	60	Air	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE INDICATOR 90PBM50CP501 ROOT VALVE	
82	90PBM	40	AA502	BUTTERFLY	MANUAL LEVER OPERATED	300	LUG	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	STRAINER FOR DOSING PUMP 90PBM40AT001 INLET VALVE	
83	90PBM	40	AA503	BUTTERFLY	MANUAL LEVER OPERATED	300	LUG	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	STRAINER FOR DOSING PUMP 90PBM40AT001 OUTLET VALVE	
84	90PBM	40	AA307	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DP INDICATOR PDI 90PBM40CP001 INLET ROOT VALVE	
85	90PBM	40	AA308	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DP INDICATOR PDI 90PBM40CP001 OUTLET ROOT VALVE	
86	90PBM	40	AA305	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DP TRANSMITTER PDT 90PBM40CP002 INLET ROOT VALVE	
87	90PBM	40	AA306	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DP TRANSMITTER PDT 90PBM40CP002 OUTLET ROOT VALVE	
88	90PBM	40	AA504	BUTTERFLY	MANUAL LEVER OPERATED	300	LUG	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	STRAINER FOR DOSING PUMP 90PBM40AT002 INLET VALVE	
89	90PBM	40	AA505	BUTTERFLY	MANUAL LEVER OPERATED	300	LUG	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	STRAINER FOR DOSING PUMP 90PBM40AT002 OUTLET VALVE	
90	90PBM	40	AA307	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DP INDICATOR PDI 90PBM40CP003 INLET ROOT VALVE	
91	90PBM	40	AA308	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DP INDICATOR PDI 90PBM40CP003 OUTLET ROOT VALVE	
92	90PBM	40	AA305	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DP TRANSMITTER PDT 90PBM40CP004 INLET ROOT VALVE	
93	90PBM	40	AA306	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	DP TRANSMITTER PDT 90PBM40CP004 OUTLET ROOT VALVE	
94	90PBM	40	AA506	BUTTERFLY	MANUAL LEVER OPERATED	200	LUG	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	COMMON STRAINER PIPELINE FOR DOSING PUMP 90PBM40AT001 OUTLET VALVE	
95	90PBM	40	AA404	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	COMMON STRAINER PIPELINE FOR DOSING PUMP 90PBM40AT001 SAMPLING VALVE	
96	90PBM	41	AA501	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP (CW FOREBAY) 90PBM41AP001 INLET VALVE	
97	90PBM	41	AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP (CW FOREBAY) 90PBM41AP001 INLET DRAIN VALVE	
98	90PBM	41	AA701	CHECK VALVE	WAFER DUAL PLATE	150	WAFER	CPVC	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP (CW FOREBAY) 90PBM41AP001 OUTLET CHECK VALVE	
99	90PBM	41	AA601	BUTTERFLY	MOTORIZED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP (CW FOREBAY) 90PBM41AP001 OUTLET VALVE	
100	90PBM	41	AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE GAUGE 90PBM41CP501 ROOT VALVE	
101	90PBM	41	AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE TRANSMITTER 90PBM41CP001 ROOT VALVE	
102	90PBM	42	AA501	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP (CW FOREBAY) 90PBM42AP001 INLET VALVE	
103	90PBM	42	AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP (CW FOREBAY) 90PBM42AP001 INLET DRAIN VALVE	
104	90PBM	42	AA701	CHECK VALVE	WAFER DUAL PLATE	150	WAFER	CPVC	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP (CW FOREBAY) 90PBM42AP001 OUTLET CHECK VALVE	
105	90PBM	42	AA601	BUTTERFLY	MOTORIZED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP (CW FOREBAY) 90PBM42AP001 OUTLET VALVE	
106	90PBM	42	AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE GAUGE 90PBM42CP501 ROOT VALVE	

DE NORA WATER TECHNOLOGIES																
PROJECT :				2X660MW ENNORE SEZ COAL BASED STPP							VALVE LIST					
CLIENT :				BH&L							DOCUMENT NO.: PE-V11-412-174-A124					
											PLANT: ELECTRO CHLORINATION PLANT					
NO	TAG No.	VALVE TYPE	TYPE	DESIGN DATA						SERVICE OF VALVE	MAKE	REFERENCE DRAWING		REMARKS	REV	
				SIZE	CONN	MATERIAL	RATING	P [bar/g]	T [°C]							
107	90PBM 42 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE TRANSMITTER 90PBM42CP001 ROOT VALVE		
108	90PBM 42 AA502	BUTTERFLY	MANUAL LEVER OPERATED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	CONT DOSING TO COMMON CW FCV		
109	90PBM 41 AA402	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP (CW FOREBAY) 90PBM41AP001 OUTLET VENT VALVE		
110	90PBM 43 AA501	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM43AP001 INLET VALVE		
111	90PBM 43 AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM43AP001 INLET DRAIN VALVE		
112	90PBM 43 AA701	CHECK VALVE	WAFER DUAL PLATE	150	WAFER	CPVC	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM43AP001 OUTLET CHECK VALVE		
113	90PBM 43 AA601	BUTTERFLY	MOTORIZED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM43AP001 OUTLET VALVE		
114	90PBM 43 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE GAUGE 90PBM43CP501 ROOT VALVE		
115	90PBM 43 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE TRANSMITTER 90PBM43CP001 ROOT VALVE		
116	90PBM 43 AA402	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM43AP001 OUTLET VENT VALVE		
117	90PBM 44 AA501	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM44AP001 INLET VALVE		
118	90PBM 44 AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM44AP001 INLET DRAIN VALVE		
119	90PBM 44 AA701	CHECK VALVE	WAFER DUAL PLATE	150	WAFER	CPVC	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM44AP001 OUTLET CHECK VALVE		
120	90PBM 44 AA601	BUTTERFLY	MOTORIZED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM44AP001 OUTLET VALVE		
121	90PBM 44 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE GAUGE 90PBM44CP501 ROOT VALVE		
122	90PBM 44 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE TRANSMITTER 90PBM44CP001 ROOT VALVE		
123	90PBM 45 AA501	BUTTERFLY	MANUAL LEVER OPERATED	200	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM45AP001 INLET VALVE		
124	90PBM 45 AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM45AP001 INLET DRAIN VALVE		
125	90PBM 45 AA701	CHECK VALVE	WAFER DUAL PLATE	150	WAFER	CPVC	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM45AP001 OUTLET CHECK VALVE		
126	90PBM 45 AA601	BUTTERFLY	MOTORIZED	150	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO SHOCK DOSING PUMP (CW FOREBAY) 90PBM45AP001 OUTLET VALVE		
127	90PBM 45 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE GAUGE 90PBM45CP501 ROOT VALVE		
128	90PBM 45 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE TRANSMITTER 90PBM45CP001 ROOT VALVE		
129	90PBM 43 AA602	BUTTERFLY	MODULATING	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #1 FCV		
130	90PBM 43 AA303	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE TRANSMITTER 90PBM43CP002 ROOT VALVE		
131	90PBM 43 AA502	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #1 DIFFUSER 1 ISOL VALVE		
132	90PBM 43 AA503	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #1 DIFFUSER 2 ISOL VALVE		
133	90PBM 43 AA504	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #1 DIFFUSER 3 ISOL VALVE		
134	90PBM 43 AA505	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #1 DIFFUSER 4 ISOL VALVE		
135	90PBM 43 AA506	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #1 DIFFUSER 5 ISOL VALVE		

DE NORA WATER TECHNOLOGIES																
PROJECT :				2X660MW ENNNORE SEZ COAL BASED STPP							VALVE LIST					
CLIENT :				BH&L							DOCUMENT NO.: PE-V11-412-174-A124					
											PLANT: ELECTRO CHLORINATION PLANT					
NO	TAG No.	VALVE TYPE	TYPE	SIZE	CONN	MATERIAL	RATING	P [bar]	T [°C]	SERVICE OF VALVE	MAKE	REFERENCE DRAWING		REMARKS		REV
136	90PBM 44 AA602	BUTTERFLY	MODULATING	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #2 FCV		
137	90PBM 44 AA303	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE TRANSMITTER 90PBM44CP002 ROOT VALVE		
138	90PBM 44 AA502	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #2 DIFFUSER 1 ISOL VALVE		
139	90PBM 44 AA503	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #2 DIFFUSER 2 ISOL VALVE		
140	90PBM 44 AA504	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #2 DIFFUSER 3 ISOL VALVE		
141	90PBM 44 AA505	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #2 DIFFUSER 4 ISOL VALVE		
142	90PBM 44 AA506	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	SHOCK DOSING TO CW #2 DIFFUSER 5 ISOL VALVE		
143	90PBM 46 AA501	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP [PTP] 90PBM46AP001 INLET VALVE		
144	90PBM 46 AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP [PTP] 90PBM46AP001 INLET DRAIN VALVE		
145	90PBM 46 AA701	CHECK VALVE	WAFER DUAL PLATE	80	WAFER	CPVC	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP [PTP] 90PBM46AP001 OUTLET CHECK VALVE		
146	90PBM 46 AA601	BALL VALVE	MOTORIZED	80	WAFER	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP [PTP] 90PBM46AP001 OUTLET VALVE		
147	90PBM 46 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE GAUGE 90PBM46CP501 ROOT VALVE		
148	90PBM 46 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE TRANSMITTER 90PBM46CP001 ROOT VALVE		
149	90PBM 47 AA501	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP [PTP] 90PBM47AP001 INLET VALVE		
150	90PBM 47 AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP [PTP] 90PBM47AP001 INLET DRAIN VALVE		
151	90PBM 47 AA701	CHECK VALVE	WAFER DUAL PLATE	80	WAFER	CPVC	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP [PTP] 90PBM47AP001 OUTLET CHECK VALVE		
152	90PBM 47 AA601	BALL VALVE	MOTORIZED	80	SOCKET UNION	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP [PTP] 90PBM47AP001 OUTLET VALVE		
153	90PBM 47 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE GAUGE 90PBM47CP501 ROOT VALVE		
154	90PBM 47 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	PRESSURE TRANSMITTER 90PBM47CP001 ROOT VALVE		
155	90PBM 46 AA402	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	CONT DOSING TO PT VENT ISOL VALVE		
156	90PBM 46 AA502	BALL VALVE	MANUAL LEVER OPERATED	80	SOCKET UNION	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	CONT DOSING TO PT DIFFUSER ISOL VALVE		
157	90PBM 46 AA303	BALL VALVE	MANUAL LEVER OPERATED	40	SOCKET UNION	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP [PTP] 90PBM46AP001 TO HYPO STORAGE TANK ISOL VALVE		
158	90PBM 47 AA303	BALL VALVE	MANUAL LEVER OPERATED	40	SOCKET UNION	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT DOSING PUMP [PTP] 90PBM47AP001 TO HYPO STORAGE TANK ISOL VALVE		
159	90PBM 40 AA403	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 3/6	HYPO CONT TANKS OUTLET COMMON DRAIN		
160	90PBM 10 AA501	BALL VALVE	MANUAL LEVER OPERATED	25	RF	S3316	# 150	10	60	POTABLE WATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	POTABLE WATER LINE INLET VALVE		
161	90PBM 10 AA701	CHECK VALVE	PISTON DISC CHECK	25	WAFER	S3316	# 150	10	60	POTABLE WATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	POTABLE LINE INLET CHECK VALVE		
162	90PBM 10 AA502	BALL VALVE	MANUAL LEVER OPERATED	25	RF	S3316	# 150	10	60	POTABLE WATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	SAFETY SHOWER INLET VALVE		
163	90PBM 10 AA702	CHECK VALVE	PISTON DISC CHECK	25	WAFER	S3316	# 150	10	60	POTABLE WATER	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	SAFETY SHOWER INLET CHECK VALVE		
164	90PBM 50 AA501	BALL VALVE	MANUAL LEVER OPERATED	25	FF: THREAD	CPVC/ EPDM	# 150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID CLEANING TANK 90PBM50B8001 ACID SAMPLING VALVE		
165	90PBM 50 AA502	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	# 150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	FUNNEL OF 90PBM50B8001 SAMPLING ISOL VALVE		
166	90PBM 50 AA401	BALL VALVE	MANUAL LEVER OPERATED	25	FF: SOCKET UNION	CPVC/ EPDM	# 150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID CLEANING TANK 90PBM50B8001 DRAIN VALVE		

 Make shall be as per approved sub vendor list.

DE NORA WATER TECHNOLOGIES																
PROJECT :			2X660MW ENNORE SEZ COAL BASED STPP								DOCUMENT NO.: PE-V11-412-174-A124					
CLIENT :			BH&L								PLANT: ELECTRO CHLORINATION PLANT					
NO	TAG No.		VALVE TYPE	TYPE	DESIGN DATA						SERVICE OF VALVE	MAKE	REFERENCE DRAWING		REMARKS	REV
					SIZE	CONN	MATERIAL	RATING	P [bar(g)]	T [°C]						
167	90PBM	50 AA503	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	# 150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID CLEANING TANK 90PBM50BB001 OUTLET VALVE	
168	90PBM	50 AA402	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	# 150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	LEVEL GAUGE 90PBM50CL501 DRAIN VALVE	
169	90PBM	50 AA451	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	# 150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	LEVEL GAUGE 90PBM50CL501 VENT VALVE	
170	90PBM	50 AA301	BALL VALVE	MANUAL LEVER OPERATED	50	FF; THREAD	CPVC/ EPDM	# 150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	LEVEL GAUGE 90PBM50CL501 TOP ROOT VALVE	
171	90PBM	50 AA302	BALL VALVE	MANUAL LEVER OPERATED	50	FF; THREAD	CPVC/ EPDM	# 150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	LEVEL GAUGE 90PBM50CL501 BOTTOM ROOT VALVE	
172	90PBM	51 AA501	BALL VALVE	MANUAL LEVER OPERATED	65	SOCKET UNION	CPVC/ EPDM	#150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	CONC ACID INLET VALVE 1	
173	90PBM	51 AA502	BALL VALVE	MANUAL LEVER OPERATED	65	SOCKET UNION	CPVC/ EPDM	#150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	CONC ACID INLET VALVE 2	
174	90PBM	51 AA503	BALL VALVE	MANUAL LEVER OPERATED	65	SOCKET UNION	CPVC/ EPDM	#150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID TRANSFER PUMP 90PBM51AP001 INLET VALVE	
175	90PBM	51 AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID TRANSFER PUMP 90PBM51AP001 INLET DRAIN VALVE	
176	90PBM	51 AA402	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID TRANSFER PUMP 90PBM51AP001 OUTLET DRAIN VALVE	
177	90PBM	51 AA701	CHECK VALVE	DUAL PLATE CHECK	50	WAFER	CPVC	#150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID TRANSFER PUMP 90PBM51AP001 OUTLET CHECK VALVE	
178	90PBM	51 AA504	BALL VALVE	MANUAL LEVER OPERATED	50	SOCKET UNION	CPVC/ EPDM	#150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID TRANSFER PUMP 90PBM51AP001 OUTLET VALVE	
179	90PBM	51 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	PRESSURE GAUGE 90PBM51CP501 ROOT VALVE	
180	90PBM	51 AA505	BALL VALVE	MANUAL LEVER OPERATED	65	SOCKET UNION	CPVC/ EPDM	#150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID TRANSFER PUMP 90PBM51AP002 INLET VALVE	
181	90PBM	51 AA403	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID TRANSFER PUMP 90PBM51AP002 INLET DRAIN VALVE	
182	90PBM	51 AA404	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID TRANSFER PUMP 90PBM51AP002 OUTLET DRAIN VALVE	
183	90PBM	51 AA702	CHECK VALVE	DUAL PLATE CHECK	50	WAFER	CPVC	#150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID TRANSFER PUMP 90PBM51AP002 OUTLET CHECK VALVE	
184	90PBM	51 AA506	BALL VALVE	MANUAL LEVER OPERATED	50	SOCKET UNION	CPVC/ EPDM	#150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	ACID TRANSFER PUMP 90PBM51AP002 OUTLET VALVE	
185	90PBM	51 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	PRESSURE GAUGE 90PBM51CP502 ROOT VALVE	
186	90PBM	51 AA507	BALL VALVE	MANUAL LEVER OPERATED	50	FF; SOCKET UNION	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	BULK ACID STORAGE TANK INLET VALVE	
187	90PBM	51 AA303	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	PRESSURE TRANSMITTER 90PBM51CP001 ROOT VALVE	
188	90PBM	51 AA508	BALL VALVE	MANUAL LEVER OPERATED	50	FF; SOCKET UNION	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	BULK ACID STORAGE TANK OUTLET VALVE	
189	90PBM	51 AA406	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	LEVEL INDICATOR 90PBM51CL001 VENT	
190	90PBM	51 AA407	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	LEVEL INDICATOR 90PBM51CL001 DRAIN	
191	90PBM	51 AA301	BALL VALVE	MANUAL LEVER OPERATED	50	FF; THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	LEVEL INDICATOR 90PBM51CL001 TOP ROOT VALVE	
192	90PBM	51 AA302	BALL VALVE	MANUAL LEVER OPERATED	50	FF; THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	LEVEL INDICATOR 90PBM51CL001 BOTTOM ROOT VALVE	
193	90PBM	51 AA408	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	LEVEL INDICATOR 90PBM51CL002 VENT	
194	90PBM	51 AA409	BALL VALVE	MANUAL LEVER OPERATED	15	THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101	PAGE 4/6	LEVEL INDICATOR 90PBM51CL002 DRAIN	

DE NORA WATER TECHNOLOGIES**PROJECT :** 2X660MW ENNNORE SEZ COAL BASED STPP**VALVE LIST****DOCUMENT NO.:** PE-V11-412-174-A124**CLIENT :** BHEL**PLANT:** ELECTRO CHLORINATION PLANT

NO	TAG No.	VALVE TYPE	TYPE	DESIGN DATA						SERVICE OF VALVE	MAKE	REFERENCE DRAWING	REMARKS	REV
				SIZE	CONN	MATERIAL	RATING	P [barg]	T [°C]					
195	90PBM 51 AA303	BALL VALVE	MANUAL LEVER OPERATED	50	FF; THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	LEVEL INDICATOR 90PBM51CL002 TOP ROOT VALVE	
196	90PBM 51 AA304	BALL VALVE	MANUAL LEVER OPERATED	50	FF; THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	LEVEL INDICATOR 90PBM51CL002 BOTTOM ROOT VALVE	
197	90PBM 51 AA405	BALL VALVE	MANUAL LEVER OPERATED	25	FF; THREAD	CPVC/ EPDM	# 150	6	60	33% HCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	BULK ACID STORAGE TANK DRAIN VALVE	
198	90PBM 52 AA501	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	ACID CLEANING PUMP 90PBM52AP001 INLET VALVE	
199	90PBM 52 AA701	CHECK VALVE	DUAL PLATE CHECK	80	WAFER	CPVC	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	ACID CLEANING PUMP 90PBM52AP001 OUTLET CHECK VALVE	
200	90PBM 52 AA502	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	ACID CLEANING PUMP 90PBM52AP001 OUTLET VALVE	
201	90PBM 52 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	PRESSURE INDICATOR 90PBM52CP501 ROOT VALVE	
202	90PBM 53 AA501	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	ACID CLEANING PUMP 90PBM53AP001 INLET VALVE	
203	90PBM 53 AA701	CHECK VALVE	DUAL PLATE CHECK	80	WAFER	CPVC	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	ACID CLEANING PUMP 90PBM53AP001 OUTLET CHECK VALVE	
204	90PBM 53 AA502	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	ACID CLEANING PUMP 90PBM53AP001 OUTLET VALVE	
205	90PBM 53 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	PRESSURE INDICATOR 90PBM53CP501 ROOT VALVE	
206	90PBM 54 AA501	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	HCL SUPPLY TO ELECTROLYZER ISOL VALVE	
207	90PBM 54 AA502	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	EJECTOR 90PBM54BN001 INLET ISOL VALVE 1	
208	90PBM 54 AA503	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	HCL SUPPLY AND RETURN LINE SEPARATION VALVE	
209	90PBM 54 AA701	CHECK VALVE	DUAL PLATE CHECK	80	WAFER	CPVC	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	HCL SUPPLY AND RETURN LINE CHECK VALVE	
210	90PBM 54 AA401	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	HCL RETURN LINE FROM GENERATORS DRAIN VALVE	
211	90PBM 54 AA504	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	ACID DRAW BACK ISO VALVE	
212	90PBM 54 AA505	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	ACID CLEANING TANK 90PBM508B001 ACID RETURN VALVE	
213	90PBM 52 AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	# 150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	ACID CLEANING PUMP 90PBM52AP001 INLET DRAIN VALVE	
214	90PBM 53 AA401	BALL VALVE	MANUAL LEVER OPERATED	20	THREAD	CPVC/ EPDM	# 150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	ACID CLEANING PUMP 90PBM53AP001 INLET DRAIN VALVE	
215	90PBM 52 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	PRESSURE TRANSMITTER 90PBM52CP001 ROOT VALVE	
216	90PBM 50 AA503	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	# 150	6	60	6% HCl	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 4/6	MANUAL FILL POINT ISOLATION VALVE	
217	90PBM 60 AA401	BALL VALVE	MANUAL LEVER OPERATED	25	SOCKET UNION	CPVC/ EPDM	#150	6	60	NAOH	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	NAOH DRUM 90PBM60B001 DRAIN VALVE	
218	90PBM 60 AA501	BALL VALVE	MANUAL LEVER OPERATED	25	SOCKET UNION	CPVC/ EPDM	#150	6	60	NAOH	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	NAOH DRUM 90PBM60B001 FILL VALVE	
219	90PBM 60 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	FF	CPVC/ EPDM	#150	6	60	NAOH	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	LEVEL GAUGE 90PBM60CL501 TOP ROOT VALVE	
220	90PBM 60 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	FF	CPVC/ EPDM	#150	6	60	NAOH	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	LEVEL GAUGE 90PBM60CL501 BOTTOM ROOT VALVE	
221	90PBM 61 AA501	BALL VALVE	MANUAL LEVER OPERATED	40	SOCKET UNION	CPVC/ EPDM	#150	6	60	WASTEWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	N-PIT DEWATERING PUMP 90PBM61AP001 OUTLET VALVE	

DE NORA WATER TECHNOLOGIES
PROJECT : 2X660MW ENNINORE SEZ COAL BASED STPP

VALVE LIST
DOCUMENT NO.: PE-V11-412-174-A124

CLIENT : BHEL

PLANT: ELECTRO CHLORINATION PLANT

NO	TAG No.	VALVE TYPE	TYPE	DESIGN DATA						SERVICE OF VALVE	MAKE	REFERENCE DRAWING	REMARKS	REV
				SIZE	CONN	MATERIAL	RATING	P [barg]	T [°C]					
222	90PBM 61 AA701	CHECK VALVE	BALL CHECK	40	SOCKET UNION	CPVC	#150	6	60	WASTEWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	N-PIT DEWATERING PUMP 90PBM61AP001 OUTLET CHECK VALVE	
223	90PBM 61 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	WASTEWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	PRESSURE GAUGE 90PBM61CP501 ROOT VALVE	
224	90PBM 62 AA501	BALL VALVE	MANUAL LEVER OPERATED	40	SOCKET UNION	CPVC/ EPDM	#150	6	60	WASTEWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	N-PIT DEWATERING PUMP 90PBM62AP001 OUTLET VALVE	
225	90PBM 62 AA701	CHECK VALVE	BALL CHECK	40	SOCKET UNION	CPVC	#150	6	60	WASTEWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	N-PIT DEWATERING PUMP 90PBM62AP001 OUTLET CHECK VALVE	
226	90PBM 62 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	WASTEWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	PRESSURE GAUGE 90PBM62CP501 ROOT VALVE	
227	90PBM 61 AA502	BALL VALVE	MANUAL LEVER OPERATED	25	SOCKET UNION	CPVC/ EPDM	#150	6	60	WASTEWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	N-PIT DEWATERING PUMP COMMON OUTLET VALVE	
228	90PBM 61 AA503	BALL VALVE	MANUAL LEVER OPERATED	40	SOCKET UNION	CPVC/ EPDM	#150	6	60	WASTEWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	N-PIT DEWATERING PUMP COMMON RECIRCULATION VALVE	
229	90PBM 70 AA501	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPOCHLORITE TANK (SW INTAKE) 90PBM70B8001 INLET VALVE	
230	90PBM 70 AA502	BUTTERFLY	MANUAL LEVER OPERATED	100	LUG	SEAT: EPDM; STEM: S3316	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPOCHLORITE TANK (SW INTAKE) 90PBM70B8001 OUTLET VALVE	
231	90PBM 70 AA401	BALL VALVE	MANUAL LEVER OPERATED	50	FF: SOCKET UNION	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPOCHLORITE TANK (SW INTAKE) 90PBM70B8001 DRAIN VALVE	
232	90PBM 81 AA501	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPOCHLORITE TANK (NCTPS) INLET VALVE 1	
233	90PBM 82 AA501	BUTTERFLY	MANUAL LEVER OPERATED	100	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPOCHLORITE TANK (NCTPS) INLET VALVE 1	
234	90PBM 81 AA502	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPO CONT DOSING PUMP (SW INTAKE) 90PBM81AP001 INLET VALVE	
235	90PBM 81 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	DP TRANSMITTER PDT 90PBM81CP002 INLET ROOT VALVE	
236	90PBM 81 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	DP TRANSMITTER PDT 90PBM81CP002 OUTLET ROOT VALVE	
237	90PBM 81 AA303	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	DP INDICATOR PDI 90PBM81CP001 INLET ROOT VALVE	
238	90PBM 81 AA304	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	DP INDICATOR PDI 90PBM81CP001 OUTLET ROOT VALVE	
239	90PBM 81 AA701	CHECK VALVE	WAFER DUAL PLATE	50	WAFER	CPVC	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPO CONT DOSING PUMP (SW INTAKE) 90PBM81AP001 OUTLET CHECK VALVE	
240	90PBM 81 AA503	BUTTERFLY	MANUAL LEVER OPERATED	50	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPO CONT DOSING PUMP (SW INTAKE) 90PBM81AP001 OUTLET VALVE	
241	90PBM 81 AA305	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	PRESSURE GAUGE 90PBM81CP501 ROOT VALVE	

DE NORA WATER TECHNOLOGIES
PROJECT : 2X660MW ENNNORE SEZ COAL BASED STPP

VALVE LIST
DOCUMENT NO.: PE-V11-412-174-A124

CLIENT : BH&L

PLANT: ELECTRO CHLORINATION PLANT

NO	TAG No.	VALVE TYPE	TYPE	DESIGN DATA						SERVICE OF VALVE	MAKE	REFERENCE DRAWING	REMARKS	REV
				SIZE	CONN	MATERIAL	RATING	P [barg]	T [°C]					
242	90PBM 81 AA306	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	PRESSURE TRANSMITTER 90PBM81CP003 ROOT VALVE	
243	90PBM 81 AA307	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	PRESSURE TRANSMITTER 90PBM81CP004 ROOT VALVE	
244	90PBM 82 AA502	BUTTERFLY	MANUAL LEVER OPERATED	80	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPO CONT DOSING PUMP (SW INTAKE) 90PBM82AP001 INLET VALVE	
245	90PBM 82 AA301	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	DP TRANSMITTER PDT 90PBM82CP002 INLET ROOT VALVE	
246	90PBM 82 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	DP TRANSMITTER PDT 90PBM82CP002 OUTLET ROOT VALVE	
247	90PBM 82 AA303	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	DP INDICATOR PDI 90PBM82CP001 INLET ROOT VALVE	
248	90PBM 82 AA304	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	DP INDICATOR PDI 90PBM82CP001 OUTLET ROOT VALVE	
249	90PBM 82 AA701	CHECK VALVE	WAFER DUAL PLATE	50	WAFER	CPVC	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPO CONT DOSING PUMP (SW INTAKE) 90PBM82AP001 OUTLET CHECK VALVE	
250	90PBM 82 AA503	BUTTERFLY	MANUAL LEVER OPERATED	50	WAFER	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPO CONT DOSING PUMP (SW INTAKE) 90PBM82AP001 OUTLET VALVE	
251	90PBM 82 AA305	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	PRESSURE GAUGE 90PBM82CP501 ROOT VALVE	
252	90PBM 82 AA306	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	PRESSURE TRANSMITTER 90PBM82CP003 ROOT VALVE	
253	90PBM 82 AA307	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	PRESSURE TRANSMITTER 90PBM82CP004 ROOT VALVE	
254	90PBM 62 AA302	BALL VALVE	MANUAL LEVER OPERATED	25	THREAD	CPVC/ EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	PRESSURE TRANSMITTER 90PBM62CP001 ROOT VALVE	
255	90PBM 70 AA503	BUTTERFLY	MANUAL LEVER OPERATED	100	LUG	CPVC/EPDM	#150	6	60	SEAWATER/NaOCL	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 5/6	HYPOCHLORITE TANK (SW INTAKE) 90PBM70B8001 NOZZLE N3 VALVE	
256	90PBM 90 AA015	BALL VALVE	MANUAL LEVER OPERATED	15	FF; THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 6/6	SAMPLING PUMP 90PBM90AP110 INLET VALVE	
257	90PBM 90 AA803	BALL VALVE	MANUAL LEVER OPERATED	15	FF; THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 6/6	PRESSURE INDICATOR 90PBM90CP501 ROOT VALVE	
258	90PBM 90 AA605	BALL VALVE	MANUAL LEVER OPERATED	15	FF; THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 6/6	SAMPLING PUMP 90PBM90AP110 OUTLET VENT VALVE	
259	90PBM 90 AA016	BALL VALVE	MANUAL LEVER OPERATED	15	FF; THREAD	CPVC/ EPDM	#150	6	60	SEAWATER	Georg Fischer/ Astral	PE-V11-412-174-A101 PAGE 6/6	RESIDUAL CHLORINE ANALYZER 90PBM90C0001 INLET VALVE	

S.No.	Drawing/Document No.	Rev	Description	Remarks
01.	PE-DG-412-100-E049	3	ELECTRICAL EQUIPMENT & CABLE TRAY LAYOUT IN ELECTRO CHLORINATION PLANT	B,C

MEMO

S.No.	Desein/ TANGEDCO'S Comments	BHEL Reply dated 27.09.2018 along with R2	Desein/ TANGEDCO'S Comments	BHEL Reply dated 20.11.2018 along with R3	Desein/ TANGEDCO'S Comments	BHEL Reply dated 13.01.2023 along with R4
1	In section A-A, minimum head room clearance of 3.0 metres to be provided.	There is no manual movement b/w wall of Switchgear room & Section A-A. Height of pedestal from FGL is 200 mm. Same has been incorporated in Section A-A in R-2.	Not acceptable. Refer comments noted.	Please refer revised layout R-3. Pedestal has been shifted close to the wall along row 'A'. Since pedestal is near to the wall, there is no requirement of 3.0 metres head room clearance.	The pedestals are too close to the window. there will also be interference in maintenance of windows. Please arrangement accordingly	Incorporated in R-4. Please refer drawing no. PE-DG-412-100-637-C002 (ELECTROCHLORINATION ARCH.DRAWING ELEVATION) & Section(s), for further details, as mentioned below: (i) Bottom of the window is located at an elevation of (+) 0.9 Mtr from FFL (i.e. 0.0 Mtr). However, the pedestal outside the building starts from FGL (-) 0.5 Mtr. Top of the pedestal including trays is (+) 0.7 Mtr. Therefore, there is 200 mm vertical clearance available from top of pedestal (including trays) to bottom of the window. Hence no vertical obstruction between them. (ii) Horizontal clearance between A-row wall and pedestals has been revised from 0.64 Mtr. To 1.1 Mtr. in Rev-4. Thus there is no horizontal obstruction, even with opened window leaflets (i.e. 450mm). (iii) Window maintenance shall be done from inside of the MCC room. Adequate clearance for the same is available within the switchgear MCC room.

