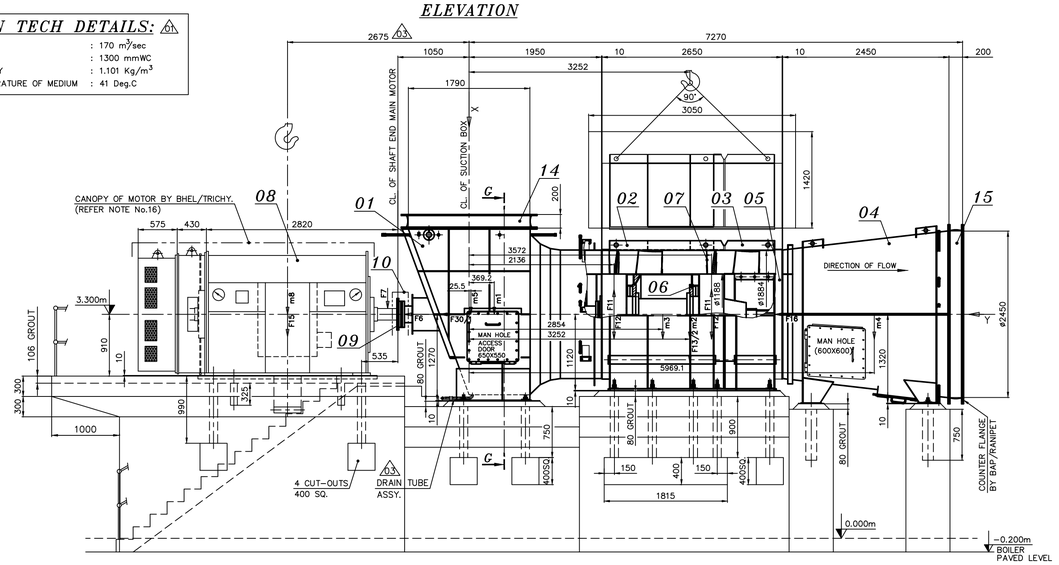
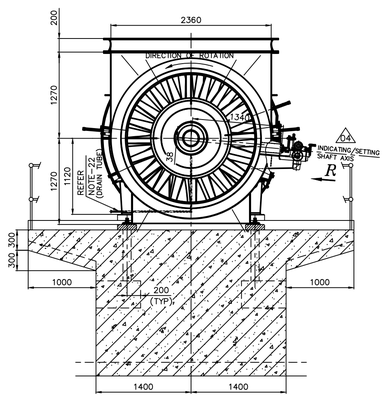
FAN TECH DETAILS: 01

FLOW	:	170 m^3/sec
HEAD	:	1300 mmWC
DENSITY	:	1.101 Kg/m^3
TEMPERATURE OF MEDIUM	:	41 Deg.C

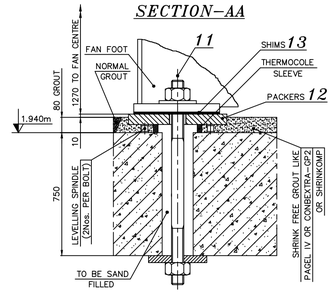
ELEVATION



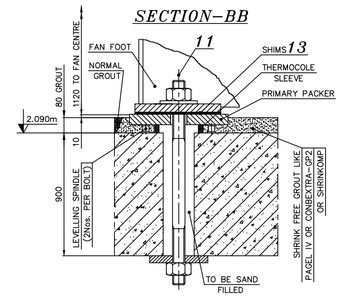
SECTION–GG



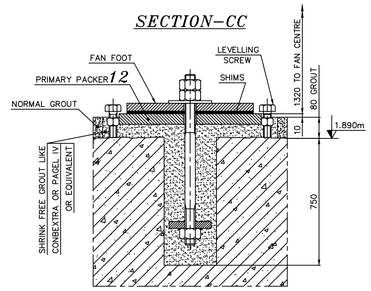
SECTION–AA



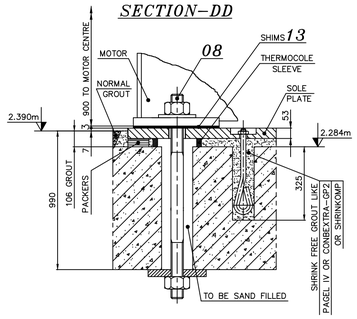
SECTION–BB



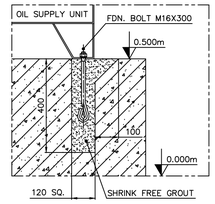
SECTION–CC



SECTION–DD

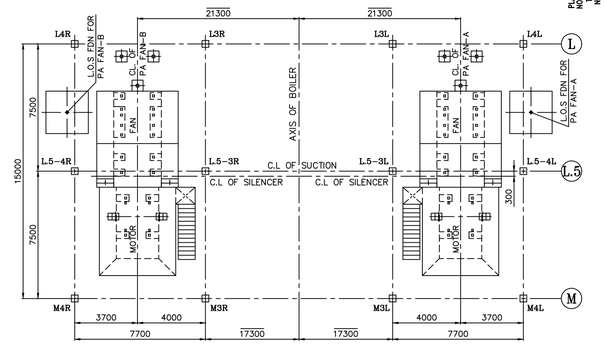


SECTION–FF

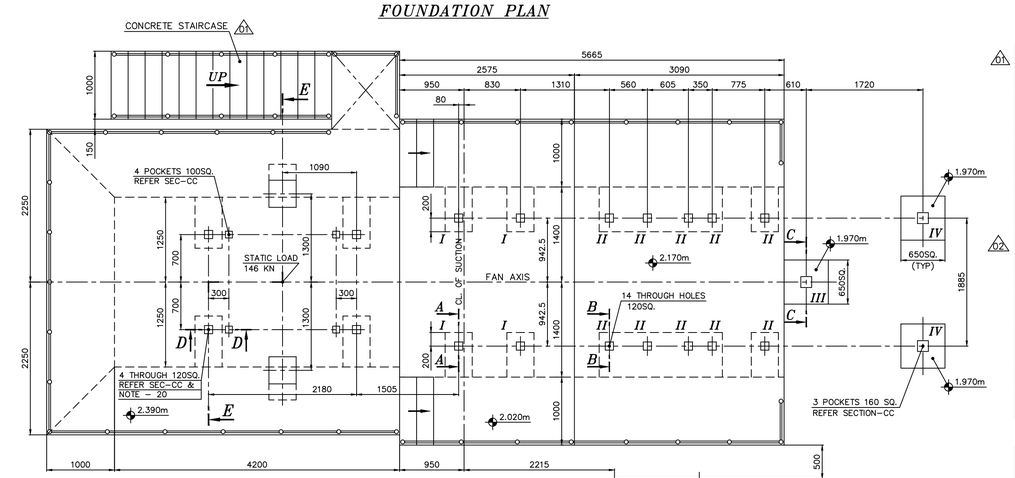


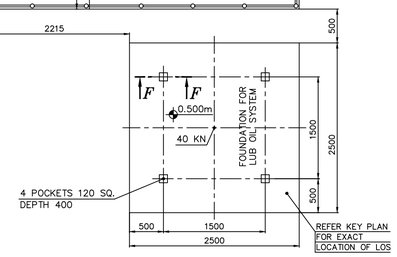
KEY PLAN 04

REFER DRG. No. 0−00−022−77466 & 0−00−022−77467
(FOR EXACT LOCATION, REFER GENERAL ARRANGEMENT OF BOILER SECTIONAL SEC. SIDE ELEVATION – SECTION 'EE' & BOILER PLAN – SECTION 'AA')



FOUNDATION PLAN





IMPORTANT NOTE: 02

BHEL/SITE C&I SHALL ENSURE INSTALLATION OF STALL WARNING INSTRUMENTS AS PER ERECTION DRAWING NO. 3−00−000−40682 RELEASED BY BHEL/RANIPET AND IMPLEMENTATION OF STALL WARNING CONTROL LOGIC FOR FAN AS PER SCHEME & WRITE−UP OF AUTO CONTROL RELEASED BY BHEL/TRICHY C&I

ID. NO.	(m) MASS IN (KG) INCLUDING INSULATION	(F) FORCE IN (N)	DESIGNATION
30/2		6567	Stat. and dyn. forces caused by air stream of suction box in vert. direction
30/1		18567	Stat. and dyn. forces caused by air stream of suction box in horiz. direction
16		30038	Axial thrust of the fan (due to pressure increase)
15		–	Load during starting sequence by short−circuit torque of the motor
14	–		Foundation
13/2		21240	Max. load when lifting the fan housings upper part
13/1		36520	Max. load when lifting the rotor assembly
12		63631	Unbalance in case of damage
11		17217	Max. rotating load due to unbalance of the fan rotor
10	–		Oil supply unit with oil filling
9	–		Frame of the motor
8	–		Drive motor
7		3685	Radial load on motor shaft
6		1422	Axial thrust on motor shaft for motor with fixed bearing
5	670		Intermediate shaft with coupling
4	2510		Diffuser with tail fairing
3	3722		Complete rotor assembly
2	4810		Fan housing with straightener vane section and nose fairing
1	2580		Suction box with inlet nozzle and intermediate shaft cover

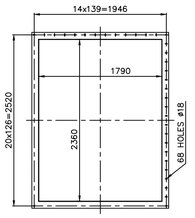
SL NO	DESCRIPTION	MATERIAL	QTY.	THICKNESS (MM) 03
17	BEARINGS (ANTIFRICTION)	NU 336 M.C3	2	–
		7240 B.MP.UA	3	–
16	FAN SHAFT	42 CrMo4	1	–
15	OULET EXPANSION JOINT	IS:2062 & FABRIC EXP.PIECE	1	–
14	INLET EXPANSION JOINT	IS:2062 & FABRIC EXP.PIECE	1	–
13	SHIMS	ASTM A240	AS REQD.	–
12	PRIMARY PACKER	IS : 2062	9	–
11	FOUNDATION FASTENERS FOR FAN	ASTM A105	17	–
10	COUPLING GUARD	IS : 2062	1	–
09	SPACER COUPLING	CLASS 4/IS 2004	1	–
08	MOTOR WITH FNDN. FASTENERS	3000 KW / 1494 RPM	1	–
07	BLADES	ENAC−AlSi9MgT6 (BHN MIN 75)	40	–
06	IMPELLER HUB	P.355 NH	1	–
05	HOUSING CORE	IS : 2062	1	10
04	DIFFUSER	IS : 2062	1	6
03	OUTLET GUIDE VANE ASSY.	IS : 2062	1	12
02	IMPELLER HOUSING	IS : 2062	1	8
01	SUCTION CHAMBER	IS : 2062	1	6

BILL OF MATERIAL

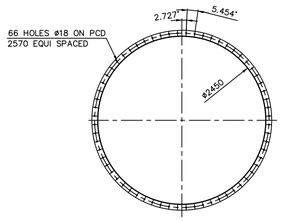
IV	+13200	±900	±6000	±900
III	+17600	±900	±6000	±900
II	+17800	±2100 ±8500	±3100 ±1800	±1800 ±7300
I	+34300	±700	±9500 ±4800	±700
Point Forces in [N]	Dead Load Vertical +	Dynamic Load Vertical +/−	Stat. horiz. Dead Load horiz. in axial Direction +	Stat. horiz. Dead Load horiz. across to the axis +/−
				Dyn. horiz. Dyn. Load horiz. across to the axis +/−

FOUNDATION LOAD DATA

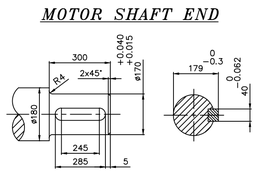
SUCTION FLANGE



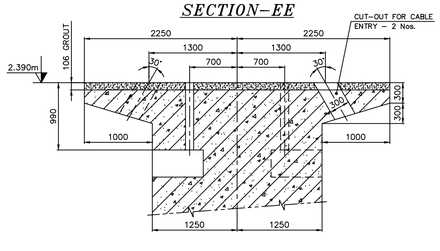
DELIVERY FLANGE



MOTOR SHAFT END

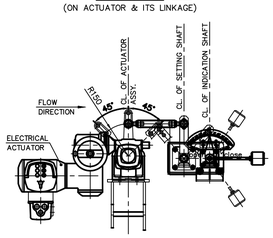


SECTION–EE



VIEW–R 04

(ON ACTUATOR & ITS LINKAGE)



NOTES:−

01. THE LOADS INDICATED ON FOUNDATION ARE WITHOUT ALLOWANCES FOR VIBRATIONS. CIVIL DESIGNERS ARE RESPONSIBLE FOR PROPER DESIGN OF FOUNDATION TAKING INTO ACCOUNT OF THE ALLOWANCES FOR VIBRATION ALSO.
02. THE DIFFERENT NATURAL FREQUENCIES OF THE FOUNDATION HAVE TO BE 20% AWAY FROM THE SPEED FREQUENCY, fnmax = n/60 AND 15% AWAY FROM THE DOUBLE OF THE SPEED FREQUENCY, 2 X fnmax. THIS MEANS: 0.8xfn TO 1.2xfn and 0.85x(2xfn) TO 1.15x(2xfn).
SPEED FREQUENCY fnmax = 24.83 HZ
(2 * fnmax) = 49.66 HZ
03. THE STIFFNESS OF THE FOUNDATION HAS TO BE AT LEAST CF > 1.0E+06 N/mm IN LONGITUDINAL, TRANSVERSAL AND VERTICAL DIRECTIONS RELATING TO THE FAN AXIS. IT HAS TO BE TAKEN INTO CONSIDERATION THAT ON SETTLING OF THE FOUNDATION THE TOTAL NATURAL FREQUENCIES OF THE FOUNDATION CAN ARISE DUE TO THE SOIL COMPACTION AND THE RESULTING INCREASES OF THE ELASTIC MODULUS.
AN UNEVEN SETTLING OF THE FOUNDATION HAS TO BE EXCLUDED.
04. THE RATIO OF THE FOUNDATION MASS TO THE ROTOR MASS HAS TO BE GREATER THAN 25.
05. ADOPT IS: 2974 / PART−IV FOR THE FOUNDATION DESIGN.
06. THE CONNECTING DUCTS AT INLET AND OUTLET OF FAN MUST BE SELF SUPPORTED AND SHOULD NOT BE WELDED WITH EXPANSION JOINTS.
07. FOUNDATION POCKETS SHOULD BE PERPENDICULAR TO THE FLAT SURFACES OF FOUNDATION.
08. ACCURATE TEMPLATES SHALL BE USED FOR LOCATING CORES FOR POCKET HOLES TO ENSURE THEIR DIMENSIONAL ACCURACY.
09. TOLERANCE BETWEEN ANY TWO POCKET CENTRES IS ±5 mm.
10. TOLERANCE ON CONCRETE LEVELS $^{+0}_{-25}$mm.
11. IN AREAS WHERE SOLE PLATES AND ANCHOR PLATES ARE TO BE INCORPORATED IN FOUNDATION CONCRETE, THE SIZE OF THE COARSE AGGREGATE USED SHALL NOT EXCEED 20 mm AND DOWN GRADED TO FACILITATE CHIPPING AND SCRAPPING AND THEREBY ENSURING MAXIMUM CONTACT ON THE MATING AREAS.
12. NON−SHRINK GROUT SHALL BE USED AS MENTIONED IN SECTIONAL VIEWS. FOR PREPARATION OF PRIMARY PACKERS & SHIMS, LEVELLING OF PRIMARY PACKERS AND LOCATION OF LEVELLING SPINDLES, SITE SHALL REFER PROCEDURE FOR NON−SHRINK GROUTING & SHIMMING RELEASED BY BAP/RANIPET.
13. GROUTING SHOULD BE DONE ONLY AFTER FINAL ALIGNMENT OF FAN.
14. ELEVATIONS & POCKET DEPTH SHOWN IN FOUNDATION PLAN ARE INCLUDING GROUTING THICKNESS.
15. GROUTING IS IN THE SCOPE OF ERECTION GROUP OF BHEL/AUTHORISED AGENCY.
16. HANDRAILS, STEEL PLATFORMS & CANOPY FOR MOTOR AND THEIR EMBEDMENTS ARE IN THE SCOPE OF BHEL/TRICHY.
17. FAN FOUNDATION SHOULD NOT BE USED AS SUPPORT FOR OTHER STRUCTURES OR EQUIPMENTS.
18. FOUNDATION CONFIGURATION SHOWN IN THIS DRAWING IS ONLY INFORMATIVE/TYPICAL. COMPLETE DETAILS OF FOUNDATION WILL BE FINALISED BY CIVIL DESIGNERS.
19. FOR MOTOR ERECTION, REFER MOTOR SUPPLIER'S ERECTION MANUAL.
20. BASE FRAME, SOLE PLATE, PACKER PLATE, SHIMS, FOUNDATION BOLTS & FASTENERS RELATED TO MOTORS WILL BE IN THE SCOPE OF MOTOR SUPPLIER (BHEL BHOPAL UNIT)
21. DRAIN LINE (TUBE 17.2x2.3) FROM THE FAN HOUSING SHALL BE ROUTED TO THE NEAREST DRAIN PIT BY BHEL/PIPING CENTRE.
22. EL.0.0M CORRESPONDS TO RL(+)3.80M WHICH IS FINISHED FLOOR LEVEL (FFL) OF TG BUILDING. BOILER PAVED LEVEL IS EL.(−)0.20M.
23. KEY PHASER MARKER REFERENCE SLOT OF DIMENSION 30X15X3mm IS PROVIDED IN COUPLING HUB ON MOTOR SIDE. SENSOR INSTALLATION (IF APPLICABLE) ON MACHINE AND DESIGN/FIXING THE BLOCKS FOR BRACKET MOUNTING ON MACHINE FACE/BEARING CASING OR ANY OTHER RECOMMENDED LOCATION SHALL BE DONE BY VMS SUPPLIER. 01
24. MAXIMUM PERMISSIBLE NOISE LEVEL IS 85 dB(A) WHEN MEASURED AT 1 METRE FROM FAN CASING.
25. LUBE OIL SYSTEM FOR PA FAN SHALL BE PROVIDED WITH SUITABLE CANOPY.
26. BHEL TRICHY'S DRAWNG "PA & FD FAN HANDLING ARRANGEMENT" WITH DRAWING NO. 1−99−100−40911 TO BE REFERRED FOR PA FAN HANDLING ARRANGEMENT. 02
27. TROLLEY WITH HOIST – CAPACITY 20.0/5.0 TONS: LIFT 6.0/9.5M. 03

FAN DETAILS:

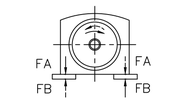
TYPE	:	AXIAL FAN
MODEL	:	PAF 19/11.8−2
NO. OF FANS PER BOILER	:	TWO (IDENTICAL)
WEIGHT OF ROTATING PARTS	:	3800 Kg
GD^2 OF FAN	:	1300 Kg.m^2
SPEED OF FAN	:	1490 RPM
MAXIMUM WEIGHT TO BE HANDLED FOR MAINTENANCE	:	4000 Kg

MOTOR DETAILS:

MAKE	:	M/s. BHEL/BHOPAL
RATING	:	3000 KW/1494 RPM/183 AMP/11 KV
TYPE	:	1LA7905−4, TETV, IP55
WEIGHT OF MOTOR	:	14500 Kg
WEIGHT OF ROTATING PARTS	:	2700 Kg
GD^2OF MOTOR	:	560 Kg.m^2
MOTOR DRG. NO.	:	1 402 00 41476
MAXIMUM WEIGHT TO BE HANDLED FOR MAINTENANCE	:	15000 Kg

FOUNDATION LOAD OF MOTOR

MAX. FORCE CALCULATED FROM THE MAX. IMPULSE TORQUE (FM) = 148 kN
FORCE EXERTED BY THE WEIGHT ON EACH SIDE---------- FG = 72.5 kN
FOUNDATION LOAD ON EACH SIDE COMPRESSION – FA = FM+FG = 220.5 kN
TENSILE FORCE – FB = FM−FG = 75.5 kN
THE FORCE OCCUR ALTERNATIVELY INDEPENDENT OF THE DIRECTION OF ROTATION.



CUSTOMER Nos. : R678 & R679

REV	DATE	ALTERED	CHECKED	APPROVED
04	02.03.2019	SARAVANAN	PRASANNA	P.M.JAVID

01. BLADE PITCH ACTUATOR UPTD. AS ELECTRICAL TYPE AS COMMENTED BY CUSTOMER.
02. VIEW−R UPDATED.
03. DETAIL−U DELETED.

REV	DATE	ALTERED	CHECKED	APPROVED
03	22.01.2019	SARAVANAN	PRASANNA	P.M.JAVID

DOCUMENT REVISED AND RESUBMITTED BASED ON MOM MADE DURING 5th ERM dtd. 7th−9th JAN'19 AT BHEL/TRICHY.

REV	DATE	ALTERED	CHECKED	APPROVED
02	21.12.2018	SARAVANAN	UMASHANKAR	P.M.JAVID

BASED ON CUSTOMER COMMENTS DATED 13.12.18
01. BLADE HARDNESS ADDED IN BOM.
02. NOTES 25 & 26 ADDED.

REV	DATE	ALTERED	CHECKED	APPROVED
01	24.10.2018	SARAVANAN	PRASANNA	P.M.JAVID

BASED ON CUSTOMER COMMENTS DATED 15.10.18
01. FAN TECHNICAL DETAILS ADDED.
02. KEY PLAN UPDATED.
03. TITLE BLOCK UPDATED.
04. '*' MARKED DIMENSIONS UPDATED.
05. NOTES 23 & 24 ADDED.

REV	DATE	ALTERED	CHECKED	APPROVED
05	22.04.2019	SARAVANAN	PRASANNA	P.M.JAVID

01. CONSULTANT NAME UPDATED AS TCE FROM DESEIN AS PER MOM DTD: 09.04.2019 AT TCE OFFICE, BANGALORE.
02. THICKNESS COLUMN ADDED IN BOM.

PROJECT: 2 X 660MW UDANGUDI SUPERCRITICAL TPP – STAGE I

OWNER: TAMILNADU GENERATION & DISTRIBUTION CORPORATION LTD.
5th Floor, Western Wing, NPKRR Maaligai
144, Anna salai, Chennai−600002

OWNER'S CONSULTANT: TATA CONSULTING ENGINEERS LIMITED
BANGALORE, INDIA

BHARAT HEAVY ELECTRICALS LTD.
NEW DELHI
BOILER AUXILIARIES PLANT: RANIPET – INDIA−623 406
EQUIPMENT: STEAM GENERATOR

	NAME	SIGN	DATE
DRAWN	P.SARAVANAN	Sd/−	11.05.2018
CHECKED	T.P.KUMAR	Sd/−	12.05.2018
APPROVED	P.M.JAVID	Sd/−	12.05.2018

TITLE: GA DRAWING FOR PA FAN WITH FOUNDATION PLAN AND LOADING DATA – PAF 19/11.8−2

ALL DIMENSIONS ARE IN MILLIMETERS
PROJECTION | SCALE: N.T.S | SHEET: 1 OF 1
BHEL DRAWING No.: 1−00−100−29190
REV: 05

Size A1