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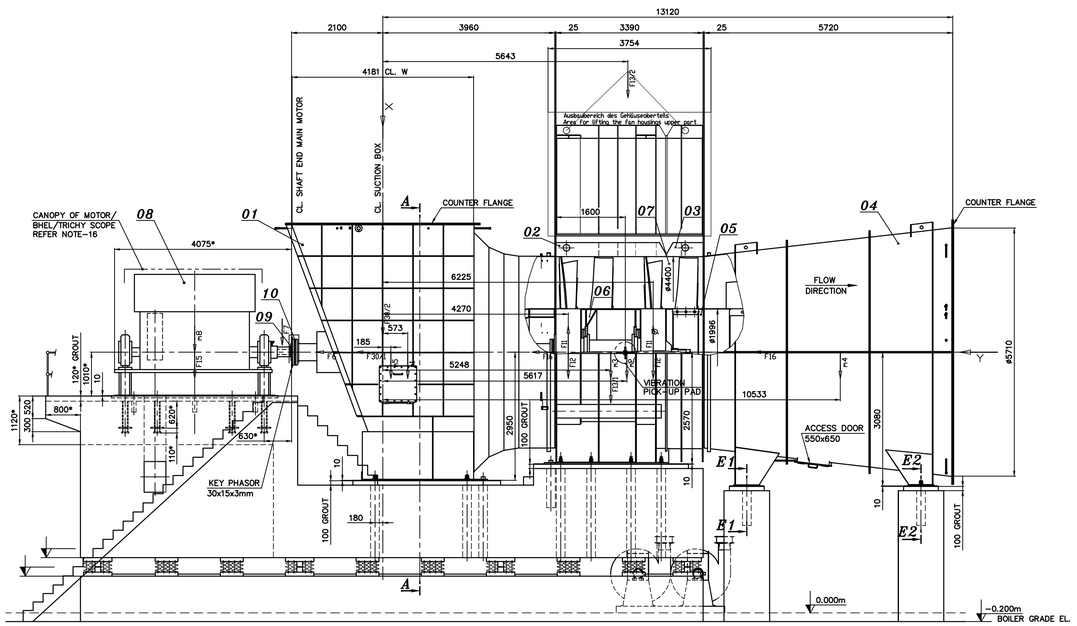
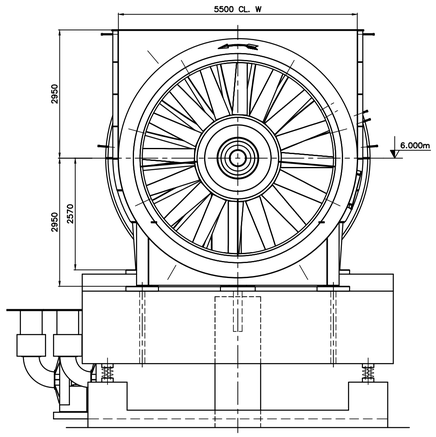
MAX.ALLOWABLE BEARING VIBRATION:

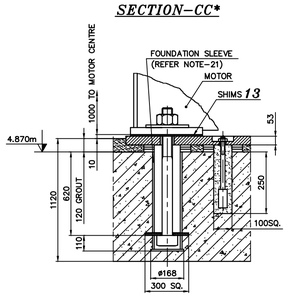
SET POINTS FOR VIBRATION:	
ALARM	TRIP
7mm/s [rms]	14mm/s [rms]



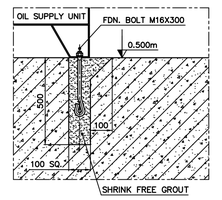
SECTION–AA



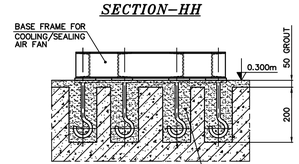
SECTION–CC*



SECTION–FF



SECTION–HH



KEY PLAN

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 FREQUENCY 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. = 9.8 HZ (2 * fnmax.) = 19.7 HZ
03. THE STIFFNESS OF THE FOUNDATION HAS TO BE ATLEAST 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 IS TO BE USED. REFER GENERAL SPECIFICATIONS ISSUED BY BHEL/RANIPET FOR NON–SHRINK GROUT. THIS ALSO CONTAINS THE PREPARATIONS OF PRIMARY PACKERS & SHIMS.
13. GROUTING SHOULD BE DONE ONLY AFTER FINAL ALIGNMENT OF FAN.
14. ELEVATION & POCKET DEPTHS SHOWN IN FOUNDATION PLAN ARE INCLUDING GROUTING THICKNESS.
15. GROUTING IS IN 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. TYPE AND DETAILS OF FOUNDATION ARE TO BE FINALISED BY CIVIL DESIGNERS.
19. FOR MOTOR ERECTION, REFER MOTOR SUPPLIER'S ERECTION MANUAL.
20. BASE FRAME, SOLE PLATE, FOUNDATION BOLTS, FDN. SLEEVE & FASTENERS RELATED TO MOTORS ARE IN THE SCOPE OF MOTOR SUPPLIER (BHEL BHOPAL UNIT)
* 21. FOUNDATION SLEEVE OF THE MOTOR IS TO BE EMBEDDED IN THE CONCRETE AS PER THE DIMENSION SHOWN. AFTER CONCRETE HAS SET, THE EXCESS PROTRUDING HEIGHT TO BE SUITABLY CUT–OFF.

FAN DETAILS:–

TYPE	: SAF 44/20–2
NO. OF FANS PER BOILER	: TWO (IDENTICAL)
WEIGHT OF ROTATING PARTS	: 13000 Kg
GD^2 OF FAN	: 30000 kg.m^2
SPEED OF FAN	: 590 RPM

MOTOR DETAILS:–*

MAKE	: M/s. BHEL/BHOPAL
RATING	: 5925 KW /597 RPM/381 AMP/11 KV
FRAME SIZE	: 11F4553–3
WEIGHT OF MOTOR	: 30000 Kg
WEIGHT OF ROTOR	: 10000 Kg
GD^2 OF MOTOR	: 4760 kg.m^2
MOTOR DRG. NO.	: 1 402 00 41258

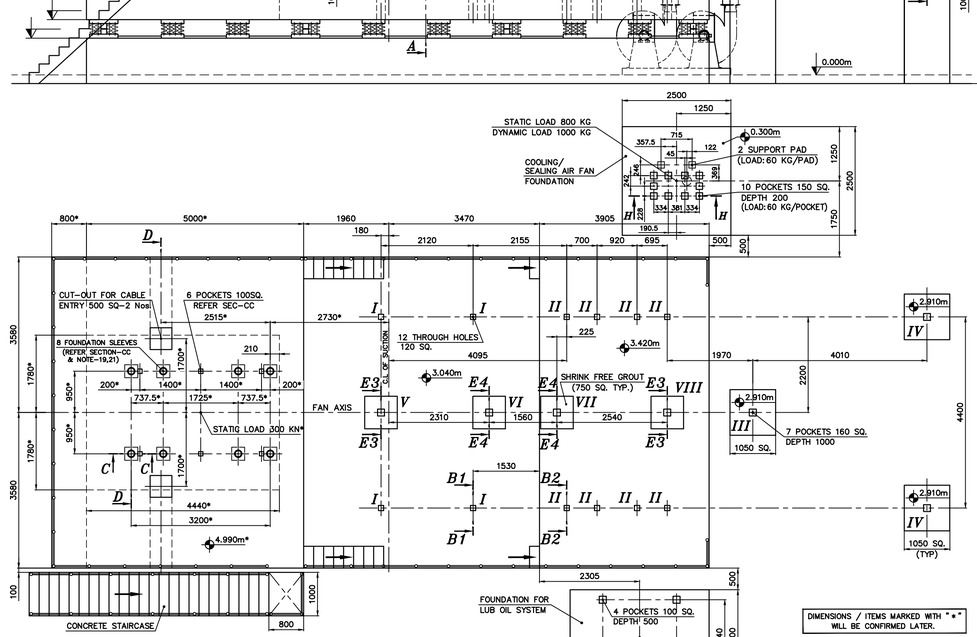
LOADING ON MOTOR FOUNDATION*

REACTION DUE TO WEIGHT ON EACH SIDE (G)		= 150 kN
MAX. SHORT CIRCUIT FORCE (MS)		= 508 kN
REACTION DOWNWARD	(MS+G)	= 658 kN
REACTION UPWARDS	(MS–G)	= 358 kN

MOTOR NOTES:*

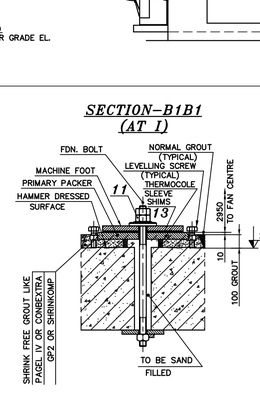
01. THE FORCES OCCUR ALTERNATELY INDEPENDENT OF THE DIRECTION OF ROTATION. (REFER LOADING ON FOUNDATION TABLE).
02. THE TRANSFER OF VIBRATION FROM SURROUNDING EQUIPMENT HAS TO BE AVOIDED BY SUITABLE LAYOUT OF FOUNDATION.
03. THE FIRST NATURAL FREQUENCIES OF THE FOUNDATION AFTER ERECTION OF THE MACHINE MUST DIFFER ATLEAST +25% & –20% FROM ONE & TWO TIMES RUNNING SPEED FREQUENCIES & TWO TIMES THE ELECTRICAL FREQUENCY.

FAN IS SIMILAR TO ID FAN OF CADARWARA 2X800 MW

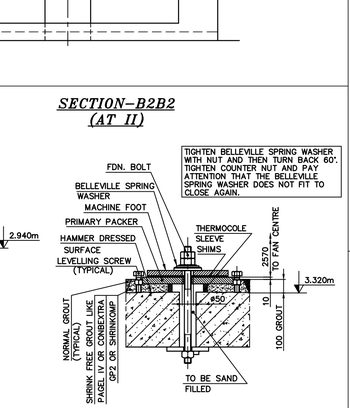


DIMENSIONS / ITEMS MARKED WITH "*" WILL BE CONFIRMED LATER.

SECTION–B1B1 (AT I)

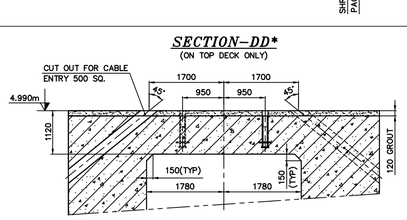


SECTION–B2B2 (AT II)

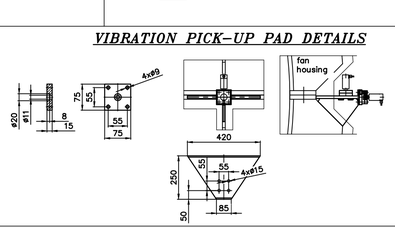


SECTION–DD*

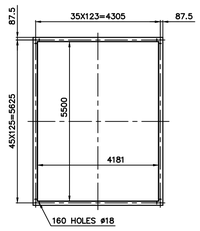
(ON TOP DECK ONLY)



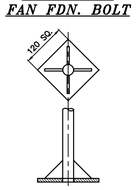
VIBRATION PICK–UP PAD DETAILS



SUCTION FLANGE

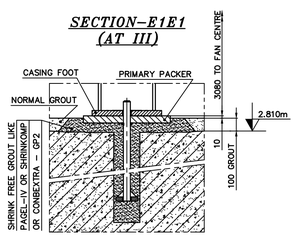


BOTTOM OF FAN FDN. BOLT

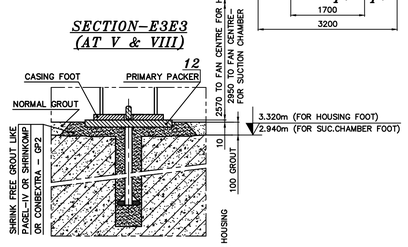


VIII			±2500	±12500	±11800 ±227000
VII			+225400 −97700	±12500	±11800 ±227000
VI			±69100	±21300	±5000
V			±4300	±21300	±5000
IV	+63600	±4900	±12800	±12800	±4900
III	+94100	±8100	±18900	±14800	±8100
II	+99400	±3500 ±71500	±19900	±19900	±3000 ±61900
I	+81000	±5000	±16200	±16200	±5000
Point Forces in [N]	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 (+ / −)

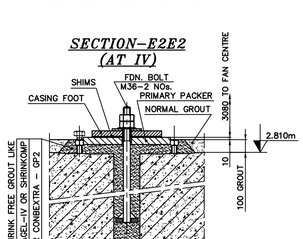
SECTION–E1E1 (AT III)



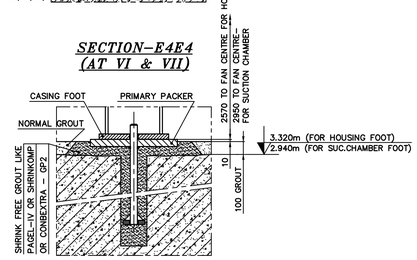
SECTION–E3E3 (AT V & VIII)



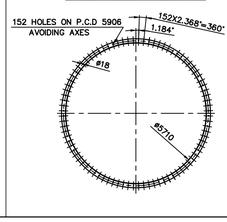
SECTION–E2E2 (AT IV)



SECTION–E4E4 (AT VI & VII)



DELIVERY FLANGE



30/2		−78592	Stat. and dyn. forces caused by air stream of suction box in vert. direction
30/1		−5726	Stat. and dyn. forces caused by air stream of suction box in horiz. direction
16		63842	Axial thrust of the fan (due to pressure increase)
15		601580	Load during starting sequence by short–circuit torque of the motor
14	–		Foundation
13/2		119020	Max. load when lifting the fan housings upper part
13/1		125160	Max. load when lifting the rotor assembly
12		453990	Unbalance in case of damage
11		23511	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		14355	Radial load on motor shaft
6		22530	Axial thrust on motor shaft for motor with fixed bearing
5	2610		Intermediate shaft with coupling
4	17800		Diffuser with tail fairing
3	12758		Complete rotor assembly
2	26960		Fan housing with straightener vane section
1	19720		Suction box nose fairing & inlet nozzle and intermediate shaft cover
ID. NO.	(m) MASS IN (KG)	(F) FORCE IN (N)	DESIGNATION

SL NO	DESCRIPTION	MATERIAL	QTY.
13	SHIMS	S.S	AS REQD.
12	PRIMARY PACKER	IS : 2062	AS REQD.
11	FOUNDATION FASTENERS FOR FAN	ASTM A105	19
10	COUPLING GUARD	IS : 1079	1
09	SPACER COUPLING	STEEL	1
08	MOTOR WITH FNDN. FASTENERS	5925 KW/ 597 RPM *	1
07	BLADES	GGG 40 OR EQUIVALENT (NODULAR CAST IRON)	16
06	IMPELLER HUB	LOAD RING: WstE500 OR EQUIVALENT Welding hub, Support ring, Others: P355NH OR EQUIVALENT	1
05	HOUSING CORE (FAN HOUSING HUB)	IS : 2062 OR EQUIVALENT	1
04	DIFFUSER	IS : 2062 OR EQUIVALENT	1
03	OUTLET GUIDE VANE ASSY.	IS : 2062 OR EQUIVALENT	1
02	IMPELLER HOUSING	IS : 2062 OR EQUIVALENT	1
01	SUCTION CHAMBER	IS : 2062 OR EQUIVALENT	1

BILL OF MATERIAL

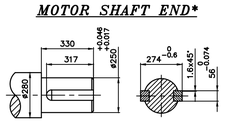
MOTOR BEARING LUBRICATION DETAILS:*

	DE	NDE
BEARING SIZE	ø250	ø250
OIL QTY.	5 LPM	5 LPM
OIL INLET PRESSURE	0.2 TO 0.5 kg/cm^2	0.2 TO 0.5 kg/cm^2
MAX. OIL INLET TEMP.	43°C	43°C
OIL GRADE	ISO VG 68 OR EQUI.	ISO VG 68 OR EQUI.
LUBRICATION TYPE	FORCED OIL LUBRICATION	

MOTOR COOLER DATA:*

WATER FLOW RATE (FOR TWO ELEMENTS)	= 350 LPM
WATER INLET / OUTLET TEMPERATURE	= 39°C/45°C
PRESSURE DROP	= 380 mbar
OPERATING PRESSURE	= max. 6 bar
TEST PRESSURE	= 9 bar

MOTOR SHAFT END*



REV	DESCRIPTION	DATE	DRAWN BY	CHECKED BY	APPR'D BY
00	ISSUED FOR NTPC REVIEW	09.07.2014	P.S.N	S.AGARWAL	V.P.SHYAM

BHEL CUSTOMER NOS. R821 & R822

NTPC DRG NO 9549–102–PVM–B–018

CUSTOMER NTPC — NTPC LIMITED. (A Government of India Enterprise)

PROJECT DARLIPALI SUPER THERMAL POWER PROJECT
STAGE–I 2 X 800MW
STEAM GENERATOR PACKAGE

BHEL — BHARAT HEAVY ELECTRICALS LIMITED., BOILER AUXILIARIES PLANT RANIPET – 632 406

TITLE: GA DRAWING FOR ID FAN WITH FOUNDATION PLAN AND LOADING DATA SAF 44/20–2

ALL DIMENSIONS IN MILLIMETRE | PROJECTION | SCALE N.T.S | BHEL DRG. NO. 1–00–099–28962 | REV. 00

Size A1

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