

**TENDER ENQUIRY FOR VIS FOR FAN FOUNDATION FOR 2 X 800 MW TANGEDCO UPPUR
TPP-BTG**

Date: 18.11.2017

CORRIGENDA-1

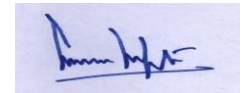
Tender Enquiry no.: PE/PG/UPP/E-5770/2017 Dt: 06.11.2017

DUE DATE
27-NOV-2017
02:00 PM IST

It may please be noted that bid submission due date for tender enquiry no. PE/PG/UPP/E-5770/2017 Dt: 06.11.2017 floated for "VIS FOR FAN FOUNDATION" package for subject project has been extended till 27.11.2017 (02.00 PM). Techno-commercial bid shall be opened on 27.11.2017 (03.00 PM). It may also be noted that drawings & revised Price format uploaded for this tender enquiry.

NO FURTHER EXTENSION FOR BID SUBMISSION SHALL BE GRANTED FOR THIS TENDER.

With Regards,
For & on behalf of BHEL



(Gaurav Gupta)
Dy. Mgr/PG-II/ BHEL-PEM

Please reply to:

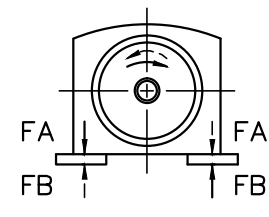
**Gaurav Gupta, Dy.Mgr
PG-II**

Power Project Engineering Institute Building
HRD & ESI Complex Plot No. 25, Sector -16 A,
BHEL-PEM, Noida-201301 (U.P.)

Tel No. 0120-4368685/4368519, Fax: 0120-4329106

[illegible]

MAX. FORCE CALCULATED FROM THE MAX. IMPULSE TORQUE - FM = 170 kN
 FORCE EXERTED BY WEIGHT ON EACH SIDE----- FG = 73 kN
 FOUNDATION LOAD ON EACH SIDE COMPRESSION - FA = FM+FG = 243 kN
 TENSILE FORCE - FB = FM-FG = 97 kN
 THE FORCE OCCUR ALTERNATIVELY INDEPENDENT OF THE DIRECTION OF ROTATION.



Technical drawing showing a cross-section of a fan foot assembly. The drawing includes the following labels and dimensions:

- Dimensions:**
 - 80 GROUT
 - 1750 TO FAN CENTRE
 - 2.160m
 - 10
- Components:**
 - FAN FOOT
 - SHIMS
 - THERMOCOLE SLEEVE
 - PACKERS
 - LEVELING SPINDLE (2nos. PER BOLT)
 - SHRINK FREE GROUT LIKE AGEL IV OR CONVEY-A-CR2 OR SHRINKOMP
- Other Labels:**
 - NORMAL GROUT
 - 11
 - 13
 - 12

2,380

80 BO GROUT

1550 TO FAN CENTRE

10

FAN FOOT

SHIMS

THERMOCOLE SLEEVE

PACKERS

LEVELLING SPINDLE
(20mm PER BOLT)

SHINK FREE GROUT LITE
PAGE IV OR CONCRETE-CP2
OR SHRINKOM

SECTION-CC

FAN FOOT

PRIMARY PACKER

NORMAL GROUT

2.090m

2.170m

1820 to FAN CENTRE

80 GROUT

10

750

SHRINK FREE GROUT LIKE CONCRETE OR PAGEL IV OR EQUIVALENT

SECTION-CC

Technical drawing of a motor foundation detail. The drawing shows a cross-section of a concrete foundation with a motor mounted on top. Key components labeled include: MOTOR, FDN. BOLT (REFER NOTE 20), SHIMS, THERMOCOLE SLEEVE, SOLE PLATE (REFER NOTE 20), NORMAL GROUT, and 106 GROUT. Dimensions include a total height of 3.090m, a base width of 2.984m, and a sleeve length of 325. A note indicates "SHRINK FREE GROUT LIKE AGEL IV OR CONEXTRA-GP2 OR SHRINKOMP" for the sleeve area. The bottom of the foundation is labeled "TO BE SAND".

	FORCE [N]	FORCE [N]	FORCE [N]	FORCE [N]	FORCE [N]
LOAD POINT	STATIC VERTICAL	DYNAMIC VERTICAL	STATIC HORIZONTAL IN AXIS DIRECTION	STATIC HORIZONTAL ACROSS TO AXIS	DYN. HORIZONTAL ACROSS TO AXIS
<i>I</i>	+47000	±1100	±17000	±3400	±1100
<i>II</i>	+36200	±1850 ±21000	±36.30	±3000	±1550 ±18000
<i>III</i>	+25900	±1600		±5200	±1600
<i>IV</i>	+18000	±1600		±5200	±1600

[illegible]

633.70

2.045

4.09

88 HOLES Ø18
EQUALISED ON

19x136=2584

27x125=3375

2470

3250

22 HOLES 118

SECTION 22

106 GROUT

1760 700 700 1760

45° 45°

CUT-OUT FOR CABLE ENTRY 500 SQ.-2 No

300 300

400 400

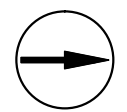
1000 1000

790 3.09m

Diagram description: This is a cross-sectional elevation of a bridge pier. The pier has a total width of 1760 units at the top and 1000 units at the base. The top width is divided into three sections: 700 units on the left, 700 units in the middle, and 1760 units on the right (which includes the 700-unit middle section and an additional 1060 units). The base width is divided into two 1000-unit sections. The height of the pier is 300 units on the left and 790 units on the right. A cut-out for cable entry is located on the right side, with a width of 500 units and a height of 3.09m. The cut-out is a trapezoidal shape with 45-degree sloped sides. The pier is shown with a hatched pattern indicating construction details. Dimensions are given in units, and the cut-out height is in meters.

30/2		12401	Stat. and dyn. forces caused by air stream of suction box in vert. direction
30/1		52856	Stat. and dyn. forces caused by air stream of suction box in horiz. direction
16		19113	Axial thrust of the fan (due to pressure increase)
15		165370	Load during starting sequence by short-circuit torque of the motor
14	—		Foundation
13/2		31190	Max. load when lifting the fan housings upper part
13/1		20680	Max. load when lifting the rotor assembly
12		89060	Unbalance in case of damage
11		7954	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		4950	Radial load on motor shaft
6		1618	Axial thrust on motor shaft for motor with fixed bearing
5	900		Intermediate shaft with coupling
4	4630		Diffuser with tail fairing
3	2108		Complete rotor assembly
2	7546		Fan housing with straightener vane section and nose fairing
1	4315		Suction box with inlet nozzle and intermediate shaft cover
ID. NO.	(m) MASS IN (KG) INCLUDING INSULATION	(F) FORCE IN (N)	DESIGNATION 

REFER DRG. No. 0-00-022-77262
(KEY PLAN SHOWN IS INFORMATIVE ONLY. FOR EXACT
LOCATION, REFER GA OF BOILER SECTIONAL PLAN - SECTION 'AA')



01. THE LOADS INDICATED ON FOUNDATION ARE WITHOUT ALLOWANCES FOR VIBRATIONS. CIVIL DESIGNERS ARE RESPONSIBLE FOR PROPER DESIGN OF FOUNDATION TAKING INTO ACCOUNT THE ALLOWANCES FOR VIBRATION ALLOWED.
02. THE DIFFERENT NATURAL FREQUENCIES OF THE FOUNDATION HAVE TO BE 20% AWAY FROM THE SPEED FREQUENCY, $f_{nmax} = n/60$ AND 15% AWAY FROM THE DOUBLE OF THE SPEED FREQUENCY, $2 \times f_{nmax}$. THIS MEANS: $0.8x f_n$ TO $1.2x f_n$ AND $0.85x(2x f_n)$ TO $1.15x(2x f_n)$.
SPEED FREQUENCY $f_{nmax} = 16.5$ HZ
($2 \times f_{nmax}$) = 33.0 HZ
03. THE STIFFNESS OF THE FOUNDATION HAS TO BE AT LEAST $C_F > 1.0E+06$ 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. ELEVATIONS & POCKET DEPTH 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 & FASTENERS RELATED TO MOTORS WILL BE IN THE SCOPE OF MOTOR SUPPLIER (BHEL BHOPAL UNIT)

TYPE	: FAF 26/12.5-1
NO. OF FANS PER BOILER	: TWO (IDENTICAL)
WEIGHT OF ROTATING PARTS	: 2300 Kg
GD ² OF FAN	: 1300 Kg.m ²
SPEED OF FAN	: 990 RPM
MAXIMUM WEIGHT TO BE HANDLED FOR MAINTENANCE	: 2400 Kg

MAKE	:	M/s. BHEL/BHOPAL
RATING	:	2500KW/99RPM/159AMP/11KV
TYPE	:	1LA7905-6, TETV, IP55
WEIGHT OF MOTOR	:	14600 Kg
WEIGHT OF ROTATING PARTS	:	3300 Kg
GD ² OF MOTOR	:	868 Kg.m ²
MOTOR DRG. NO.	:	1 402 00 41428
METHOD OF COOLING	:	IC 511
MAXIMUM WEIGHT TO BE HANDLED FOR MAINTENANCE	:	15000 Kg

ROLLER BRG. - NU 238M BORE Ø190
 BALL BRG. - 6238 MC 3
 LUBRICATION - IOC GREASE SERVOGEM 3 OR EQUIV.
 GREASE QTY. - 1400 GRAMS (INITIAL FILLING)
 RELUBRICATION - 2000 OPERATING HRS. 60g.

VL.	ROLLER BRG. - NU 232M BORE Ø160
	LUBRICATION - IOC GREASE SERVOGEM 3 OR EQUIV.
	GREASE QTY. - 500 GRAMS (INITIAL FILLING)
	RELUBRICATION - 2000 OPERATING HRS. 60g.

16	FAN SHAFT	42 CR Mo4	1
15	OUTLET EXPANSION JOINT	IS: 2062 & FABRIC	1
14	INLET EXPANSION JOINT	IS: 2062 & FABRIC	1
13	SHIMS	ASTM A240	AS REQD
12	PRIMARY PACKER	ASTM A105	AS REQD
11	FOUNDATION FASTENERS FOR FAN	ASTM A1605	13
10	COUPLING GUARD	IS : 2062	1
09	SPACER COUPLING	STEEL	1
08	MOTOR WITH FNDN. FASTENERS	2500 KW /996 RPM	1
07	BLADES	ENAC~AIS9Mg16	16
06	IMPELLER HUB	P500 NH	1
05	HOUSING CORE	IS : 2062	1
04	DIFFUSER	IS : 2062	1
03	OUTLET GUIDE VANE ASSY.	IS : 2062	1
02	IMPELLER HOUSING	IS : 2062	1
01	SUCTION CHAMBER	IS : 2062	1
SL NO	DESCRIPTION	MATERIAL	QTY.
BILL OF MATERIAL			

		CUSTOMER: TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LTD.		CUSTOMER Nos. : R838 & R839	
		CUSTOMER'S CONSULTANT: LAHMEYER INTERNATIONAL (INDIA) PVT. LTD			
PROJECT:		2X800MW UPPUR STPP (UNIT#1&2) IN RAMANATHAPURAM DISTRICT, TAMILNADU			
		BHARAT HEAVY ELECTRICALS LTD. BOILER AUXILIARIES PLANT RANIPET - 632 406			
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		DRN P.SARAVANAN Sd/- 20.12.2010		DESIN T.P.KUMAR Sd/- 20.12.2010	
		GND T.P.KUMAR Sd/- 20.12.2010		APPD P.M.JAVID Sd/- 20.12.2010	
TITLE		GA DRAWING FOR FD FAN WITH FOUNDATION PLAN AND LOADING DATA - FAF 26/12.5-1			
		DEPT. SCALE N.T.S		DRAWING NO.	
		SIGN		1-00-098-29097	
				SHEET - REV. 01	

WATER FLOW RATE (FOR TWO ELEMENTS)	= 630 LPM
WATER INLET / OUTLET TEMPERATURE	= 38°C / 43°C
PRESSURE DROP	= 380 mbar
OPERATING PRESSURE	= Max. 6 bar
TEST PRESSURE	= 9 bar

[illegible][illegible]

1. FOUNDATION SLEEVE OF THE MOTOR TO BE USED WHILE CASTING FAN FOUNDATION. CIVIL DESIGNER TO ENSURE AVAILABILITY OF MOTOR SLEEVE AT SITE BEFORE CASTING FOUNDATION.
2. FAN IS SIZED TO TAKE CARE OF FUTURE INSTALLATION OF De-Nox EQUIPMENT (PREDICTED HEAD). HOWEVER SECOND STAGE BLADES & OGV ARE NOT COVERED IN THE SCOPE OF SUPPLY. ANNUAL ADAPTER DUCT SHALL BE PROVIDED IN PLACE OF SECOND STAGE OGV.

LETTER NO. CE/Projects/SE/E/THP/E9/A1/EUPUPR-(PTG)/D.123/16
dtd. 30.09.16.

ELEVATION CC

FOUNDATION SLEEVE
(REFER NOTE-21)

MOTOR

SHIMS 13

1120 TO MOTOR CENTRE

4.750m

1320

620

120 GROUT

110

7

53

250

100GSO

Ø168

330GSO

Oil supply unit

Fdn. Bolt M16x300

0.500m

200

100 SQ.

SHRINK FREE GROUT

Diagram illustrating the cross-section of the base frame for the cooling/sealing air fan. The structure consists of a concrete base (50 GROUT) and a base frame (BASE FRAME FOR COOLING/SEALING AIR FAN) supported by four vertical columns (SHRINK FREE GROUT). The columns are embedded in the base, and the height of the columns is indicated as 0.300m and 200.

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, $f_{max} = n/60$ AND 15% AWAY FROM THE DOUBLE OF THE SPEED FREQUENCY, $2 \times f_{max}$. THIS MEANS : $0.85f_n$ TO $1.2f_n$ AND $0.85(2f_n)$ TO $1.15(2f_n)$.
SPEED FREQUENCY $f_{max} = 12.42$ Hz
 $(2 \times f_{max}) = 24.84$ HZ.
03. THE STIFFNESS OF THE FOUNDATION HAS TO BE AT LEAST $Cf_1 = 0.04 \times 10^6$ 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 THEREFORE 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 ± 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-SHRINKING 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, DPN, SLEEVE & FASTENERS RELATED TO MOTORS ARE IN THE SCOPE OF MOTOR SUPPLIER (BHEL FPDAL 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.

TYPE	: SAF 41/22.4-2
NO. OF FANS PER BOILER	: TWO (IDENTICAL)
WEIGHT OF ROTATING PARTS	: 18500 Kg
GD ² OF FAN	: 41100 kg.m ²
SPEED OF FAN	: 745 RPM
MAXIMUM WEIGHT TO BE HANDLED FOR MAINTENANCE	: 19000 Kg

MAKE	: M/s. BHHEL/BHOPAL
TYPE	: 1TF6743-8, IP55
CAPACITY	: 8450 KW/746 RPM/536 AMP/11 KV
WEIGHT OF MOTOR	: 32000 Kg
WEIGHT OF MOTOR	: 10200 Kg
GD ² OF MOTOR	: 6468 kg.m ²
MOTOR DRG. NO.	: 1 402 00 41423
METHOD OF COOLING	: IC81W
MAXIMUM WEIGHT TO BE HANDLED FOR MAINTENANCE	: 32500 Kg

REACTION DUE TO WEIGHT ON EACH SIDE (G)	= 170 kN
MAX. SHORT CIRCUIT FORCE (MS)	= 460 kN
REACTION DOWNWARD (MS+G)	= 630 kN
REACTION UPWARDS (MS-G)	= 290 kN

01. THE FORCES OCCUR ALTERNATELY INDEPENDENT OF THE DIRECTION OF ROTATION. (REFER LOADING ON FOUNDATION TABLE)
02. THE TRANSFER OF VIBRATIONS 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 $\pm 25\%$ & -20% FROM ONE & TWO TIMES RUNNING SPEED FREQUENCIES & TWO TIMES THE ELECTRICAL FREQUENCY.

		CUSTOMER: TAMILNADU GENERATION AND DISTRIBUTION CORPORATION LTD.	
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CUSTOMER'S CONSULTANT:
LAHMEYER INTERNATIONAL (INDIA) PVT. LTD.

PROJECT: 2X800MW UPPUR STPP (UNIT#1&2)
IN RAMANATHAPURAM DISTRICT, TAMILNADU

	BHARAT HEAVY ELECTRICALS LTD. BOILER AUXILIARIES PLANT RANIPET - 632 406
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		NAME	SIGN	DATE
		DRN P.SARAVANAN	Sd/-	20.12
		DESN P.R.KUMAR	Sd/-	20.12
		CHD P.M.KUMAR	Sd/-	20.12
		APPD P.M.JAVIN	Sd/-	20.12

TITLE	GA DRAWING FOR ID FAN WITH FOUNDATION PLAN AND LOADING DATA - SAF 41/22.4-2					
					DRAWING NO.	

			DEPT.	SCALE	N.T.S.	DRAWING NO.	
			SIGN			1-00-099-29098	
						SHEET	REV. 01

Diagram illustrating a cross-section of a grout column. The column is composed of a central core of "SHRINK FREE GROUT LIKE CONCRETE OR SHRINK FREE CONCRETE - GFC" surrounded by "NORMAL GROUT". The column is capped with a "CASING FOOT" and a "PRIMARY PACKER". The height of the column is indicated as 3.020m. The column is shown within a larger structure, with dimensions 2870 and 100 GROUT also indicated.

SHIMS
FDN. BOLT
CASING FOOT
PRIMARY PACKER
NORMAL GROUT

2870 TO FAN
3.020m
10
100 GROUT

SHIM LINE
OR
CONCRETE GP2

Figure 10 is a cross-sectional diagram of a housing foot. It shows a concrete casing foot embedded in a wall. A primary packer is placed between the casing foot and the main wall structure. Normal grout is used for the base and sides of the casing foot. The diagram includes dimensions for the casing foot (250 to 300 mm), the primary packer (12 mm), and the grout layer (100 mm). It also shows the required embedment depth for the housing foot (3.50m) and the suction chamber foot (3.14m).

The diagram illustrates a cross-section of a grout column. At the top, a 'CASING FOOT' is shown above a 'PRIMARY PACKER'. The main body of the column is filled with 'NORMAL GROUT'. A central vertical pipe is shown, with a section labeled 'SHRINK FREE GROUT LIKE PANELAV OR SHRINKCRETE OR CONXETRIA = CP2'. To the right of the column, vertical dimensions are indicated: '2395 TO FACE' and '2750 TO FACE' for the casing, and '3.50m (FOR HOUSING FOOT)' and '3.140m (FOR SUC. CHAMBER FOOT)' for the grout column. A horizontal dimension of '10' is shown at the top right, and a vertical dimension of '100 GROUT' is shown at the bottom right.

Technical drawing of a rectangular plate with the following dimensions and specifications:

- Overall width: 31x130=4030
- Overall height: 41x28=5248
- Inner width: 5130
- Inner height: 3900
- 144 HOLES $\varnothing 18$

136 HOLES ON P.C.D 548
AVOIDING AXES

136X2 647=360
1.324

Ø18

Ø360

Technical drawing of a foundation cross-section. The drawing shows a foundation with a total width of 3600 mm (1850 mm + 1850 mm) and a total height of 1320 mm. The top surface is sloped at 45°. The foundation is divided into two main sections, each 1850 mm wide. The top section has a height of 1100 mm. The bottom section has a height of 150 mm. The foundation is shown with a 4.870m depth. The drawing includes a note: "CUT OUT FOR CABLE ENTRY 500SQ. - 2 Nos." and a dimension of 150 mm for the bottom section. The right side of the drawing is labeled "120 GROUT".

30/2	—	116225	Stat. and dyn. forces caused by air stream of suction box in vert. direction
30/1	—	7394	Stat. and dyn. forces caused by air stream of suction box in horiz. direction
16	113875		Axial thrust of the fan (due to pressure increase)
15	807210		Load during starting sequence by short-circuit torque of the motor
14	—		Foundation
13/2	107230		Max. load when lifting the fan housings upper part
13/1	178310		Max. load when lifting the rotor assembly
12	701410		Unbalance in case of damage
11	42176		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	16610		Radial load on motor shaft
6	18496		Axial thrust on motor shaft for motor with fixed bearing
5	3020		Intermediate shaft with coupling
4	13280		Diffuser with tail fairing
3	18176		Complete rotor assembly
2	24290		Fan housing with straightener vane section
1	14550		Suction box nose fairing and inlet nozzle and intermediate shaft cover
ID. NO.	(m) MASS IN (KG)	(F) FORCE IN (N)	DESIGNATION

	DE	NDE
BEARING SIZE	ø250	ø250
OIL QTY.	6 LPM	6 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

	±2500	±12400	±21100 ±350800
	+315100 -87200	±12400	±21100 ±350800
	±73000	±18500	±3700
	±3700	±18500	±3700
±3700	±9900	±9900	±3700
±6000	±14500	±12900	±6000
±6200			
±107800	±24900	±24900	±5300 ±93200
	±17400	±17400	±3700
Dynamic load on the particle	Stat. horiz. Dead load horiz. in axis Direction	Stat. horiz. Dead load horiz. across to the axis	Dyn. Horiz. Load Dynam. Load horiz. across to the axis

13	SHIMS	ASTM A240	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	8450 KW/748 RPM	1
07	BLADES	GGG 40 OR EQUIVALENT (NONDULAR CAST IRON)	20
06	IMPELLER HUB	LOAD RING: Wt:5500 OR EQUIVALENT Welding hub, Support ring, Others: P355NH OR EQUIVALENT	1
05	HOUSING CORE (FAN HUSING HUB)	IS : 2062 OR EQUIVALENT	1
04	DIFUSER	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
SL NO	DESCRIPTION	MATERIAL	QTY.
BILL OF MATERIAL			

BILL OF MATERIAL

REV 01	DATE 01.03.2017	ALTERED SARAVANAN	CHECKED S.AGARWAL	APPROVED P.M.JAVID
01. MOTOR AND ITS FOUNDATION DETAILS UPDATED. 02. TITLE BLOCK UPDATED.				

[illegible][illegible]

4 POCKETS 120 SQ. IN. DEPTH 400

500 1500 2500

500

REFER KEY PLAN FOR EXACT LOCATION OF LOS

	DE	NDE
BEARING SIZE	180X150	180X150
OIL FLOW RATE	5.5 LPM	5.5 LPM
MAX. OIL INLET PRESSURE	0.2 TO 0.5 bar	0.2 TO 0.5 bar
OIL GRADE	ISO VG 68 OR EQUI.	ISO VG 68 OR EQUI.
LUBRICATION TYPE	FORCED OIL LUBRICATION	

Technical drawing of a rectangular plate. The overall dimensions are 1913 mm by 1513 mm. The plate has a central rectangular area of 1900 mm by 2500 mm. The outer border is 1513 mm wide and 1913 mm high. The inner border is 1900 mm wide and 2500 mm high. The plate has 68 holes, each with a diameter of 18 mm. The holes are arranged in a grid pattern along the perimeter and in the center.

Technical drawing of a cable tray layout. The drawing shows a top-down view of a tray with a total width of 1130 and a total length of 106. The tray is divided into sections with widths of 900, 1100, 1100, and 900. The length is divided into sections of 1650, 800, 800, and 1650. A 30° angle is indicated on the left and right sides. A cut-out for cable entry is shown on the right side, with dimensions 500 and 300. The cut-out is labeled "CUT-OUT FOR CABLE ENTRY 500 SQ.-2 Nos.".

SECTION-AA

80 GROUT

1340 TO FAN CENTRE

2.695m

10

FAN FOOT

NORMAL GROUT

SHIMS 13

THERMOCOL SLEEVE

PACKERS 12

LEVELING SPINDLE (2Nos. PER BOLT)

TO BE SAND FILLED

SHRINK FREE GROUT LINE PAGEL IV OR CONCRETE-GP2 OR SHRINKOMP

80 GROUT

170 TO FAN CENTRE

FAN FOOT

NORMAL GROUT

11

SHIMS 13

THERMOCOLE SLEEVE

PRIMARY PACKER

2.865m

10

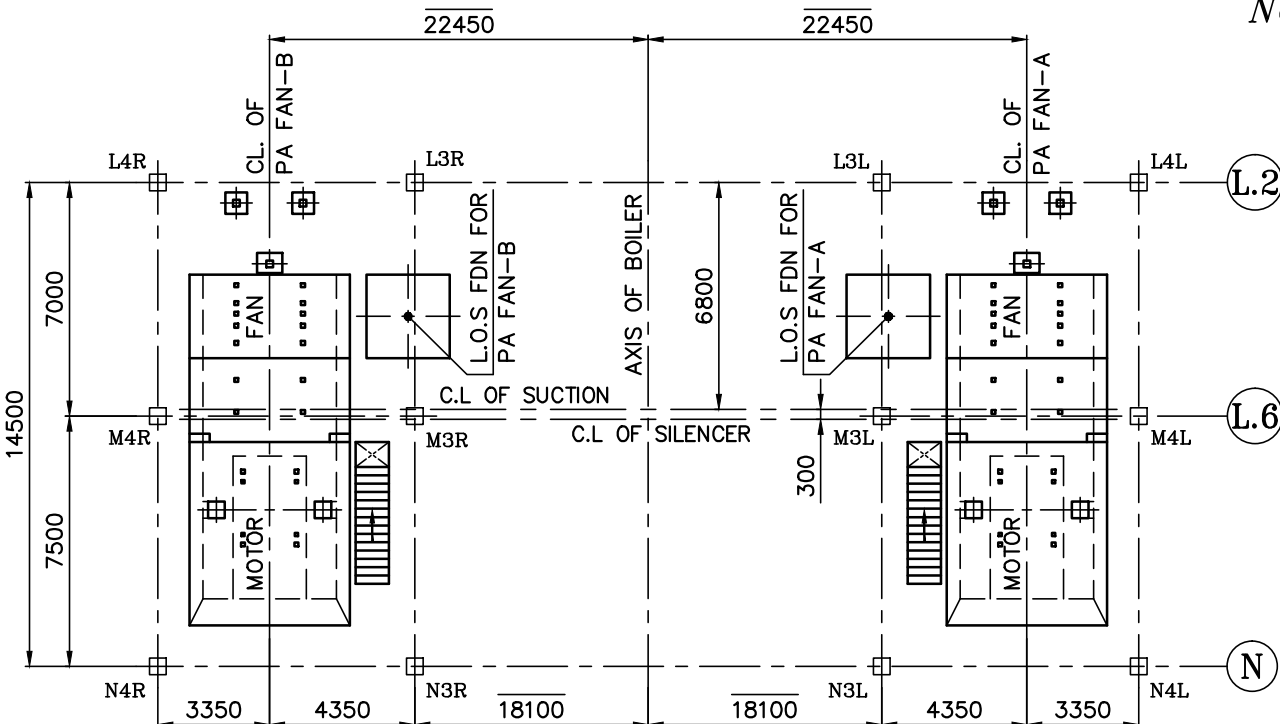
LEVELING SPINDLE
(2Nos. PER BOLT)

SHRINK FREE GROUT LIKE
PAGES IV OR CONCREXTRA-GP2
OR SHRINKOMP

TO BE SAND

Technical drawing of a pile cap cross-section. The drawing shows a central pile with a motor at the top, connected to a normal grout sleeve. A thermocol sleeve is shown around the pile, and a sole plate is at the bottom. Dimensions include a total height of 11.30, a top section of 3.009m, and a bottom section of 3.25. Labels include 'MOTOR', 'NORMAL GROUT', 'THERMOCOL SLEEVE', 'SOLE PLATE', 'SHIMS', '08', '1000 TO MOTOR', '106 GROUT', 'TO BE SAND FILLED', 'SHRINK FREE GROUT LIKE PAGEL IV OR CONCRETA-GP2 OR SHRINKOMP', and '325'.

(KEY PLAN SHOWN IS INFORMATIVE ONLY. FOR EXACT LOCATION, REFER GA OF BOILER SECTIONAL PLAN - SECTION 'AA')

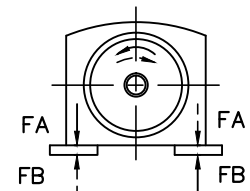


01. THE LOADS INDICATED ON FOUNDATION ARE WITHOUT ALLOWANCES FOR VIBRATIONS. CIVIL DESIGNERS ARE RESPONSIBLE FOR PROPER DESIGN OF FOUNDATION TAKING INTO ACCOUNT OF THE ALLOWANCES FOR VIBRATION ALSO.
02. THE DIFFERENT NATURAL FREQUENCIES OF THE FOUNDATION HAVE TO BE 20% AWAY FROM THE SPEED FREQUENCY, $f_{max} = n/60$ AND 15% AWAY FROM THE DOUBLE OF THE SPEED FREQUENCY, $2 \times f_{max}$. THIS MEANS: $0.8x f_n$ TO $1.2x f_n$ AND $0.85x(2x f_n)$ TO $1.15x(2x f_n)$.
SPEED FREQUENCY $f_{max} = 24.83$ HZ
 $(2 \times f_{max}) = 49.66$ HZ
03. THE STIFFNESS OF THE FOUNDATION HAS TO BE AT LEAST $CF > 1.0E+06$ N/mm FOR EACH LOAD POINT OF THE FOUNDATION IN ALL TRANSVERSAL AND VERTICAL DIRECTIONS RELATING TO THE FAN AXIS. IT HAS TO BE TAKEN INTO CONSIDERATION THAT ON SETTLING 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 MUST 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 $+0mm/-25mm$.
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. GRADE OF GROUT SHALL BE 1 GRADE HIGHTHER THAN CONCRETE.
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. 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 & FASTENERS RELATED TO MOTORS WILL BE IN THE SCOPE OF MOTOR SUPPLIER (BHEL FOUNDATION UNIT)

TYPE : PAF 20/11.2-
NO. OF FANS PER BOILER : TWO
WEIGHT OF ROTATING PARTS : 2500 kg
GD² OF FAN : 1800 kg.m²
SPEED OF FAN : 1490 RPM
MAXIMUM WEIGHT TO BE
HANDLED FOR MAINTENANCE : 2500 kg

MAKE	: M/s. BHEL/BHOPAL
TYPE	: 1LA7924-4, TETV, IP55
CAPACITY	: 3350 KW/1491 RPM/202 AMP/11 KV
GD ² OF MOTOR	: 1060 kg.m ²
WEIGHT OF MOTOR	: 15500 kg
WEIGHT OF ROTATING PARTS	: 4000 kg
MOTOR DRAWING NUMBER	: 1 402 00 41420
MAXIMUM WEIGHT TO BE HANDLED FOR MAINTENANCE	: 15500 kg

MAX. FORCE CALCULATED FROM THE MAX. IMPULSE TORQUE (FM) = 142 kN
 FORCE EXERTED BY THE WEIGHT ON EACH SIDE (FG) = 78 kN
 FOUNDATION LOAD ON EACH SIDE COMPRESSION (FA) = FM+FG = 220 kN
 TENSILE FORCE (FB) = FM-FG = 64 kN
 THE FORCE OCCUR ALTERNATIVELY INDEPENDENT OF THE DIRECTION OF ROTATION



REV	DATE	ALTERED	CHECKED	APPROVED
01	09.03.2017	SARAVANAN	S.AGARWAL	P.M.JAVID
01. MOTOR AND ITS FOUNDATION DETAILS UPDATED.				
02. KEY PLAN ADDED.				
03. TITLE BLOCK UPDATED.				
04. DISPOSITION OF THE CONCRETE STAIRCASE LOCATION ALTERED AS PER BHEL/TRICHY LAYOUT DRAWING.				
05. LOAD TABLE UPDATED.				