



ACOUSTIC ENCLOSURES FOR FANS (Tender)

BHEL is inviting offers from Vendors having experience in producing Noise Control Equipment like Acoustic Enclosures for Industrial / Power Plant applications. Tender specification & drawings can be down loaded from web site. Any clarifications and more details can be obtained from **Mr. D. Kumar, Manager/Purchase, BHEL – Ranipet. Phone No. 04172-254172, Cell No. 9442141827**

Brief Details about the tender.

1. Acoustic Enclosure for SA Fan as per specification TFN:Acoustic:TECH. Spec. Rev. 01 Dt. 25/09/2009(9 pages) Annexure 1,2,3,6 & 7, GA Drg. 0-00-098-21645 Rev. 02 and Arrangement Drg. 30-A-PROP-07255 Rev. 01 **QUANTITY – 4 Nos**
2. Acoustic Enclosure for ID Fan as per specification TFN:Acoustic:TECH. Spec. Rev. 01 Dt. 25/09/2009(9 pages) Annexure 1,2,3,5 & 7, GA Drg. 0-00-099-21646 Rev. 02 and Arrangement Drg. 30-A-PROP-07256 Rev. 0 **QUANTITY – 4 Nos**
3. Acoustic Enclosure for PA Fan as per specification TFN:Acoustic:TECH. Spec. Rev. 01 Dt. 25/09/2009(9 pages) Annexure 1,2,4,6 & 7, GA Drg. 0-00-100-21647 Rev. 02 and Arrangement Drg. 30-A-PROP-07257 Rev. 01 **QUANTITY – 4 Nos**

NOTE: Please refer the following pages for detailed specification and drawings in addition to Annexure - A & Annexure - F
Vendors in India can use Annexure - A.
Vendors in other countries can use Annexure - F

Addl. General Manager / Materials Management.

BHARAT HEAVY ELECTRICALS LIMITED

R35 - 415D

(A Govt. of India Undertaking)

Boiler Auxiliaries Plant

RANIPET - 632 406, TAMIL NADU, INDIA

Fax : ++91-4172 - 241131, 241179

Phone :

E-mail : --(04172)254533/254633

Email : --msravi@bhelrpt.co.in dkumar@bhelrpt.co.in

☐ This is only a request for quotation and not an order☐ Please read carefully the instructions given below and terms and conditions printed overleaf before quoting.☐ The Enquiry No. Date and Due date shall be superscribed on the cover containing your offer.**ENQUIRY**

ENQUIRY NUMBER AND DATE

DUE DATE

5291357E

15/12/2009

21/01/2010

TEST CERTIFICATE

GUARANTEE CERTIFICATE

SAMPLE

REV. NO. AND DATE

NO. OF ITEMS

DESTINATION

SHEET NO.

REQUIRED

REQUIRED

NOT REQD.

003

BHEL/STORES/RANIPET

1 / 4

SL. No.	MATERIAL CODE, DESCRIPTION AND SPECIFICATION	UNIT	QUANTITY	DELIVERY SCHEDULE		
				LOT NO.	DELIVERY QTY.	DELY. REQD b
001	R56929150000 ACOUSTIC ENCLOSURE FOR SA FAN AS PER SPECIFICATIONTFN: ACOUSTICS: TECH. SPEC. REV01 DT25/09/09(9PAGES) ANNEXURES 1, 2, 3, 6&7, GA DRG. 0-00-098-21645 REV. 02 AND ARRANGEMENT DRG. 30-A-PROP-07255 REV. 01	ST	4.000	01	4.000	24/04/2010
002	R56929160000 ACOUSTIC ENCLOSURE FOR ID FAN AS PER SPECIFICATIONTFN: ACOUSTICS TECH. SPEC. REV01 DT 25/09/09(9PAGES), ANNEXURS 1, 2, 5, 6&7, GA DRG. 0-00-099-21646. REV. 02 & ARRANGEMENT DRG. 30-A-PROP-07256. REV. 0	ST	4.000	01	4.000	24/04/2010
003	R56929170000 ACOUSTIC ENCLOSURE FOR PA FAN AS PER SPEC. TFN: ACOUSTICS TECH. SPEC. REV01 DT 25/09/09(9PAGES) ANNEXURES 1, 2, 4, 6&7, GA DRG. 0-00-100-21647. REV. 02&ARRANGEMENT DRG. 30-A-PROP-07257 REV. 01.	ST	4.000	01	4.000	24/04/2010

SUPPLIER'S NAME AND ADDRESS

MGR/EDC-FANS

FILE COPY: MASTER COPY

R5692915 R5692917 R5692916

Dear Sir,

Please submit your lowest quotation on FIRM PRICE, in duplicate subject to our terms & conditions printed overleaf for the above materials so as to reach us on or before the due date by 2.00 P.M.

1. Quotations will be opened at 2.30 P.M. on the due date in the presence of the tenderers who may like to be present.
2. No revision of prices will be entertained after tenders are opened.
3. Late tenders are liable to be rejected.
4. The purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any tender in part or full without assigning any reason whatsoever.
5. Manufacture's Name, Trade Mark or patent No., if any should be specified, illustrative leaflets giving particulars are required along with quotation wherever necessary.

Please quote Enquiry Number, Date, Due Date, Supplier Code and material code in all your correspondences.

For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED
 RANIPET

Manager (Purchase)

BHARAT HEAVY ELECTRICALS LIMITED

R35 - 415D

(A Govt. of India Undertaking)

Boiler Auxiliaries Plant

RANIPET - 632 406, TAMIL NADU, INDIA

Fax : ++91-4172 - 241131, 241179

Phone

E-mail

PHONE : -(04172)254533/254633

Email : -msravi@bhelrpt. co. in

- ☐ This is only a request for quotation and not an order
- ☐ Please read carefully the instructions given below and terms and conditions printed overleaf before quoting.
- ☐ The Enquiry No. Date and Due date shall be superscribed on the cover containing your offer.

dkumar@bhelrpt. co. in

ENQUIRY

ENQUIRY NUMBER AND DATE

DUE DATE

5291357E

15/12/2009

21/01/2010

TEST CERTIFICATE

REQUIRED

GUARANTEE CERTIFICATE

REQUIRED

SAMPLE

NOT REQD.

REV. NO. AND DATE

NO. OF ITEMS

003

DESTINATION

BHEL/STORES/RANIPET

SHEET NO.

2 / 4

SL. No.	MATERIAL CODE, DESCRIPTION AND SPECIFICATION	UNIT	QUANTITY	DELIVERY SCHEDULE		
				LOT NO.	DELIVERY QTY.	DELY. REQD. BY
	List of Suppliers					
	RECEIPT OF THIS ENQUIRY IS TO BE ACKNOWLEDGED BY A POSTCARD / FAX / EMAIL IF YOU ARE NOT QUOTING, PLEASE SEND REGRET LETTER QUOTING OUR ENQUIRY NUMBER					
	*** PLEASE QUOTE FOR SUPPLYING THE ITEMS WITH ECOFRIENDLY PACKAGING MATERIALS. ***					
	*** LET US AVOID WASTING OUR NATURAL RESOURCES AND WEALTH. ***					
	THIS ENQUIRY SHALL BE SUBJECT TO JURISDICTION OF THE COURTS AT RANIPET, VELLORE DT., TAMILNADU.					
	***** SPECIAL NOTE *****					
	ANY REVISED OFFER(S) SENT BY VENDORS ON THEIR OWN, AFTER THE TENDER OPENING, WILL BE TREATED AS "UNSOLICITED OFFER". SUCH OFFERS WILL NOT BE CONSIDERED AND NECESSARY ACTION AS DEEMED FIT WILL BE TAKEN BY BHEL ON THOSE VENDORS. HENCE COMPETITIVE OFFER TO BE GIVEN IN THE ORIGINAL QUOTE ITSELF.					
	IMPORTANT NOTE : (ATTACHMENT TO 5291357E)					
	01) OFFERERS ARE REQUESTED TO CAREFULLY READ THE FOLLOWING CONDITIONS AND GIVE THEIR SPECIFIC CONFIRMATION OF ACCEPTANCE IN TOTO.					
	2A) TIME IS THE ESSENCE OF CONTRACT.					
	2B) IN THE EVENT OF DELAY ON THE CONTRACTED DELIVERY, LIQUIDATED DAMAGES (LD) WILL BE LEVIED.					

SUPPLIER'S NAME AND ADDRESS

MGR/EDC-FANS

FILE COPY: MASTER COPY

R5692915 R5692917 R5692916

Dear Sir,

Please submit your lowest quotation on FIRM PRICE, in duplicate subject to our terms & conditions printed overleaf for the above materials so as to reach us on or before the due date by 2.00 P.M.

1. Quotations will be opened at 2.30 P.M. on the due date in the presence of the tenderers who may like to be present.
2. No revision of prices will be entertained after tenders are opened.
3. Late tenders are liable to be rejected.
4. The purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any tender in part or full without assigning any reason whatsoever.
5. Manufacture's Name, Trade Mark or patent No., if any should be specified, illustrative leaflets giving particulars are required along with quotation wherever necessary.

Please quote Enquiry Number, Date, Due Date, Supplier Code and material code in all your correspondences.

For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED
RANIPET

D: Mr 16/12/09

Manager (Purchase)

BHARAT HEAVY ELECTRICALS LIMITED

R35 - 415D

(A Govt. of India Undertaking)

Boiler Auxiliaries Plant

RANIPET - 632 406, TAMIL NADU, INDIA

Fax : ++91-4172 - 241131, 241179

Phone :

E-mail : --(04172)254533/254633

Email : --msravi@bhelrpt.co.in dkumar@bhelrpt.co.in

- ☐ This is only a request for quotation and not an order
- ☐ Please read carefully the instructions given below and terms and conditions printed overleaf before quoting.
- ☐ The Enquiry No. Date and Due date shall be superscribed on the cover containing your offer.

ENQUIRY

ENQUIRY NUMBER AND DATE

DUE DATE

5291357E

15/12/2009

21/01/2010

TEST CERTIFICATE

GUARANTEE CERTIFICATE

SAMPLE

REV. NO. AND DATE

NO. OF ITEMS

DESTINATION

SHEET NO.

REQUIRED

REQUIRED

NOT REQD.

003

BHEL/STORES/RANIPET

3 / 4

SL. No.

MATERIAL CODE, DESCRIPTION AND SPECIFICATION

UNIT

QUANTITY

DELIVERY SCHEDULE

LOT NO.

DELIVERY QTY.

DELY. REQD.

2C) LD WILL BE LEVIED AT THE RATE OF 0.5 % PER WEEK OR PART THEREOF ON THE CONTRACT VALUE.

2D) THE LD CEILING WILL BE 15 %.

2E) LD WILL BE A MANDATORY CONDITION IN THE PURCHASE ORDER.

3) IF NO CONFIRMATION OR COMMENTS ARE INCLUDED IN THE INITIAL OFFER BY THE TENDERER, IN THE EVENT OF PLACEMENT OF ORDER. THE ORDER WILL BE RELEASED WITH THE STANDARD LD CONDITION GIVEN ABOVE.

4) THE CONDITION WILL BE INCLUDED IN THE ORDER WITHOUT ANY FURTHER REFERENCE TO THE OFFERER AND NO CHANGES WILL BE PERMISSIBLE, POST ORDER RELEASE.

S. S. I. STATUS (APPLICABLE ONLY FOR INDIAN SOURCES)

A) ALL THE TENDERERS ARE REQUESTED TO SPECIFICALLY CONFIRM WHETHER THEY ARE REGISTERED S. S. I UNIT ALONG WITH THEIR OFFER. DOCUMENTARY EVIDENCE SHALL BE FURNISHED, IN SUPPORT OF THIS CLAIM. IF NO MENTION IS MADE, THEY WILL BE TREATED AS NON S. S. I WITHOUT ANY FURTHER REFERENCE ON THIS SUBJECT MATTER. B) IF YOU ARE ALREADY REGISTERED WITH US AS SSI, PL IGNORE POINT (A) ABOVE. C) HOWEVER ANY CHANGE IN YOUR SSI STATUS SHALL BE INTIMATED TO US FORTHWITH.

***** VALUE ADDED TAX (APPLICABLE ONLY FOR INDIAN SOURCES) *****

PLEASE INDICATE YOUR TIN (TAXPAYER IDENTIFICATION) NUMBER, COMMODITY CODE FOR EACH ITEM, DESPATCHING PLACE AND STATE, WHILE SUBMITTING YOUR OFFER.

***** E - PAYMENT (APPLICABLE ONLY FOR INDIAN SOURCES) *****

BHEL IS MAKING PAYMENTS THROUGH E-MODE. SUPPLIERS, WHO HAVE NOT AVAILED THEMSELVES OF THIS FACILITY, CAN E-MAIL TO PURCHASE EXECUTIVES TO OBTAIN NECESSARY FORMATS.

THE TENDERERS SHOULD FILL UP THE ENCLOSED SPECIFICATION DEVIATION DISPOSITION REPORT AND SEND BACK THE SAME WITHOUT FAIL.

PL. INDICATE CLEARLY THE PACKING, FORWARDING CHARGES AND THE ED & TAX CONCESSIONS APPLICABLE IF

SUPPLIER'S NAME AND ADDRESS

MGR/EDC-FANS

FILE COPY: MASTER COPY

R5692915 R5692917 R5692916

Dear Sir,

Please submit your lowest quotation on FIRM PRICE, in duplicate subject to our terms & conditions printed overleaf for the above materials so as to reach us on or before the due date by 2.00 P.M.

1. Quotations will be opened at 2.30 P.M. on the due date in the presence of the tenderers who may like to be present.
2. No revision of prices will be entertained after tenders are opened.
3. Late tenders are liable to be rejected.
4. The purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any tender in part or full without assigning any reason whatsoever.
5. Manufacture's Name, Trade Mark or patent No., if any should be specified, illustrative leaflets giving particulars are required along with quotation wherever necessary.

Please quote Enquiry Number, Date, Due Date, Supplier Code and material code in all your correspondences.

For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED
RANIPET

15/12/09

Manager (Purchase)

BHARAT HEAVY ELECTRICALS LIMITED

R35 - 415D

(A Govt. of India Undertaking)

Boiler Auxiliaries Plant

RANIPET - 632 406, TAMIL NADU, INDIA

Fax : ++91-4172 - 241131, 241179

Phone

E-mail

PHONE : -(04172)254533/254633

Email : -msravi@bhelrpt.co.in

☐ This is only a request for quotation and not an order☐ Please read carefully the instructions given below and terms and conditions printed overleaf before quoting.☐ The Enquiry No. Date and Due date shall be superscribed on the cover containing your offer.

dkumar@bhelrpt.co.in

ENQUIRY

ENQUIRY NUMBER AND DATE

5291357E

15/12/2009

DUE DATE

21/01/2010

TEST CERTIFICATE
REQUIREDGUARANTEE CERTIFICATE
REQUIREDSAMPLE
NOT REQD.

REV. NO. AND DATE

NO.OF ITEMS
003DESTINATION
BHEL/STORES/RANIPETSHEET NO.
4 /4

SL. No.	MATERIAL CODE, DESCRIPTION AND SPECIFICATION	UNIT	QUANTITY	DELIVERY SCHEDULE		
				LOT NO.	DELIVERY QTY.	DELY. REQD BY
	ANY. TIME IS THE ESSENCE OF CONTRACT.					

SUPPLIER'S NAME AND ADDRESS

MGR/EDC-FANS

FILE COPY: MASTER COPY

R5692915 R5692917 R5692916

Dear Sir,

Please submit your lowest quotation on FIRM PRICE, in duplicate subject to our terms & conditions printed overleaf for the above materials so as to reach us on or before the due date by 2.00 P.M.

1. Quotations will be opened at 2.30 P.M. on the due date in the presence of the tenderers who may like to be present.
2. No revision of prices will be entertained after tenders are opened.
3. Late tenders are liable to be rejected.
4. The purchaser shall be under no obligation to accept the lowest or any other tender and shall be entitled to accept or reject any tender in part or full without assigning any reason whatsoever.
5. Manufacture's Name, Trade Mark or patent No., if any should be specified, illustrative leaflets giving particulars are required along with quotation wherever necessary.

Please quote Enquiry Number, Date, Due Date, Supplier Code and material code in all your correspondences.

For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED
RANIPET

D. J. W. 15/12/09

Manager (Purchase)

TERMS AND CONDITIONS FOR INDIGENOUS OFFERS

- a) **Quotations :** Each Tender should be sent in duplicate in a sealed cover. Inner cover should be sealed with tender's distinctive seal and superscribed with correct Tender No., item of supply and due date of opening. Tender should not be addressed to any individual's names but only by designation and shall be addressed to Dy. Manager/Purchase, BHARAT HEAVY ELECTRICALS LIMITED, BOILER AUXILIARIES PLANT, INDIRA GANDHI INDUSTRIAL COMPLEX, RANIPET, VELLORE DISTRICT - 632406, INDIA.
1. Detailed Technical Literature / Write - up
2. Latest Catalogue covering the items in quote.
3. Detailed Dimensional Drawing.
- b) Tenders should be neatly typewritten and should be free from CORRECTION AND ERASURES. Corrections, if any, must be attested. All amount shall be indicated both in words as well as in figures. Where there is difference between amount quoted in words and figures, amount quoted in words shall prevail.
- c) Price should be net F.O.R. destination inclusive of risk in transit and remain valid for 60 days from the due date.
- d) If any Sales Tax is payable as extra to the quoted price it should be specifically stated in quotation failing which the purchaser will not be liable for payment of Sales Tax. Our TIN No. 33243560005 C.S.T. No. 239383 Dated 11-06-91.
- e) Products with I.S.I certification marks will be preferred.
- f) The applicable rate of excise duty shall be clearly indicated in the quotation itself.
- g) The tenderer shall fill up the specification Deviation Disposition Report either NIL or the deviation taken by the tenderer against the Tender specification.
2. **Samples :** Wherever possible samples should be submitted separately whether specifically requested or not, so as to reach the purchase on or before the due date of the enquiry. They should be clearly marked with the Enquiry No. and the date on the outside cover to facilitate identification.
3. **Packing and Marking :** The supplier shall arrange for securely protecting and packing the stores to avoid loss or damages during transit.
4. **Terms of Payment :** Payment will be made within 30 days of satisfactory receipt of materials at site. Where required by the purchase, the successful tenderer must send the operation and maintenance manuals, test certificates, drawings, etc., as called for, for the materials ordered. These should be sent immediately after despatch of the materials and a statement to that effect should be made in the invoice. Failure to comply with this provision will result in delay in payment of the bills. Goods despatched either by V.P.P. or by the documents presented through bank will not be accepted unless agreed to by the Purchaser.
The transporter's copy of Excise Invoice should accompany the material. The Original Invoice alongwith other documents shall be (a) routed through bank or (b) directly sent to us as called for in the contract. One set of the Advance copies of the above documents shall be sent to Manager / Finance (Stores Bill section), BHEL, BAP, RANIPET - 6 and one set to Dy. Manager / Purchase BHEL, BAP, RANIPET - 6.
5. **Security Deposit :** For purchase over Rs. 5000/- the successful tenderer/s if required may be requested to furnish a Bank Guarantee / Security Deposit for an appropriate value as may be determined by BHEL.
6. **Liquidated Damages :** It is clearly understood among the parties to the contract that "Time is the essence of the contract". Therefore, the delivery of the goods specified in the purchase order should be made within the time limit prescribed. Where the seller supplies or despatches the goods, beyond the delivery period specified, the Purchaser will have no obligation to accept the goods. If accepted, liquidated damages at the rate of 1/2% of the value of goods delayed for each week of delay or part thereof will be levied without prejudice to any other relief or compensation due to the purchaser under any other condition of this contract.
7. **Risk Purchase :** Alternatively, the purchaser at his option will be entitled the contract and to purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has failed to deliver or despatch within the time stipulated as aforesaid or if the same were not available, the best and the nearest available substitute therefor. The supplier shall be liable for any loss which the purchaser may sustain by reason of such risk purchases in addition to penalty at the rate mentioned in Clause 6 above.
8. **Preferential Delivery :** It should be noted that if a contract is placed on higher tenderer as a result of this invitation to tender in preference to the lowest acceptable offer in consideration to the earlier delivery, the seller will be liable to pay to the purchaser the difference between the contract rate and that of the lowest acceptable tender on the basis of final price F.O.R. destination including all elements of freights, sales tax, duties and other incidentals in case of failure to complete supplies in terms of such contract within the date of delivery specified in the tender and incorporated in the contract.

9. **MODVAT CREDIT :** If any Excise duty is payable, the chapter head/sub - head reference and the rate of duty should be quoted. If the tenderer is availing MODVAT credit for his input materials, the effect of proforma credit should be passed on to the purchaser. Tender under "MODVAT" shall be preferred.
10. **General :** a) The Purchaser reserves the right to split up the tender and place for individual items with different tenderers and also increase the quantity.

TERMS AND CONDITIONS FOR FOREIGN OFFERS

Offer : Offer in ENGLISH LANGUAGE AND IN TRIPLICATE IN A SEALED COVER superscribing the enquiry number and due date shall be submitted addressed to : THE DY. MANAGER / PURCHASE, BHARAT HEAVY ELECTRICALS LIMITED, BOILER AUXILIARIES PLANT, INDIRA GANDHI INDUSTRIAL COMPLEX, RANIPET - 632 406, TAMIL NADU, INDIA.

Offers should be firm for net FOB / FCA nearest Sea / air port price and C & F Chennai Port Price indicating the shipping specifications and the earliest delivery in the respect of others from overseas suppliers.

Documents :

- (i) Offers should be accompanied by detailed technical literature, catalogue and detailed dimensional drawing in ENGLISH and in TRIPLICATE, or otherwise the offers will not be considered.
- (ii) In case overseas suppliers route their accredited selling agents, a letter of authority should be furnished mentioning the name and address of their selling agents, who are authorised to bid, negotiate and conclude a contract on their behalf.

Agency Commission : In respect of offers from overseas suppliers, agency commission, if any, payable to their agents in India shall invariably be shown separately in the proforma invoice and this will be paid by us in India, in Indian Rupees, on satisfactory completion of the contract.

Spares : The tenderer should quote separately for spares that are required for two years trouble free operation. The spares offer should accompany the offer of main equipment, otherwise the quotation will be overlooked.

Validity : The offers for main equipment and spares shall be kept open for acceptance for 120 days (one hundred and twenty days) for the date of opening of the tender.

Test Certificates, Operating and Maintenance Manuals : The tenderer shall clearly mention in their offer that Test Certificates and Operating and Manuals, etc., as called for in technical specification, in the required number of copies will be provided at no extra cost. If any amount is payable as extra, the same shall be indicated separately in the offer.

Terms of payment : In the event of an order the purchaser will arrange for an unconfirmed irrevocable letter of credit against presentation of documents. Under no circumstances confirmed irrevocable letter of credit will be established by the purchaser.

General :

- (i) Preference will be given to suitable indigenous or ex-stock imported offers, failing which imported offers from incoming consignment against the indigenous supplies "Stock and sale Licence" will be accepted, if Stock and sale licence is not available with the indigenous suppliers, the same shall be indicated in their offer.
- (ii) The offer should reach us before the time of opening of tenders. The offer will be opened at 14.30 hours on the due date in the presence of the tenderers who may like to be present.
- (iii) **BANK GUARANTEE (if applicable) :** The supplier in the event of an order, should furnish a Bank Guarantee from an approved Bank at no extra cost in a proforma which will be supplied to the supplier, along with the order, for an amount equivalent to 10% of the value of the contract. The bank Guarantee should remain in full force and effect during the period that would be taken or successful completion of the contract and shall continue to be enforceable till 12 months from the date of receipt of consignment at purchaser's site or 18 months from the date of last shipment at the port of Delivery, whichever is earlier.
- (iv) **INCOTERMS :** The definition for terms shall be as per INCOTERMS 2000
- (v) **PLEASE QUOTE YOUR RATE FOR ALL THE FOLLOWING CONDITIONS.**
 - (a) FOB on at sight L/C
 - (b) On C & F Chennai Port India with at sight L/C.
 - (c) Rate on credit basis with rate of interest and period of credit.
 - (d) Rates with suppliers credit.

ANNEXURE –“A”**ENQ. No.****COMMERCIAL TERMS AND CONDITIONS****(To be filled in full and to be submitted along with offer)**

SL. NO.	DESCRIPTION	BHEL'S REQUIREMENT	SUPPLIER'S COMMENTS
01.	PRICE	Firm till completion of order.	
02.	DELIVERY TERMS	FOR, DESTINATION (BHEL,Ranipet-Stores)	
03.	PACKING&FORWARDING	Included. (if extra indicate in %)	
04.	FREIGHT & INSURANCE	Included.	
05.	EXCISE DUTY in %	To be indicated by supplier. (MODVAT copy to be provide along with supply)	
06.	SALES TAX in %	To be indicated by supplier. (concessional form C / XVII will be given)	
07.	OCTROI	If any,to supplier's account only.	
08.	PAYMENT	100% within 30 days after receipt & acceptance of materials at our end.	
09.	DELIVERY PERIOD	To be indicated by supplier	
10.	L.D.CLAUSE	As indicated in Enquiry(as per IMPORTANT NOTE) @0.5% per week, max of 15% for the delayed delivery.	
11.	OFFER VALIDITY	Minimum 90 days from the date of opening.	
12.	INSPECTION BEFORE DESPATCH	Will be done at Your Works Before Dispatch	
13.	TEST CERTIFICATE	Required	
14.	GUARANTEE CERTIFICATE (Period: 12 months from the date of commissioning (or) 18 months from the date of supply which ever is earlier.	Required	
15.	INSTALLATION & COMMISSIONING	Supplier's scope (if required)	
16.	PERFORMANCE BANK GUARANTEE (10% OF ORDER VALUE)	REQUIRED	
17.	O&M MANUAL	6 SETS	

Date :

SIGNATURE WITH SEAL

ANNEURE – “B” TO ENQUIRY NO:
REQUIREMENT OF TECHNICAL DETAILS /CONFIRMATION
(To be filled in full and to be submitted along with offer)

S.NO	DESCRIPTION	BHEL'S REQUIREMENT	SUPPLIER'S COMMENTS
01	SPECIFICATION	Clause wise / Point wise confirmation to be given in TOTO for all specifications& to be submitted along with offer. (i.e Xerox copy of specn duly filled with your acceptance / comments duly signed & sealed).	
02	DATA SHEET / DRGS	Filled Data Sheet and your Drgs are to be submitted along with offer. (if applicable).	
03	QUALITY PLAN	To confirm applicable QP will be followed. (OR) Your Quality Plan to be submitted for our review & approval along with offer.	
04	SPECIFICATION DEVIATION DISPOSITION REPORT (SDDR)	Attached SDDR to be filled & submit along with offer. (Even NO deviation is taken, NIL report to be submitted).	

Date:

SIGNATURE WITH SEAL

(to be submitted along with the offer)

SPECIFICATION DEVIATION DISPOSITION REPORT				
Specn			Item	
Enq.No & Date				
Vendor Name				
SPECN				
Page	Clause	Details Of Deviation With Reason		Disposition By Bhel
Signature Of Vendor				Reviewed By
		" AGREED DEVIATION "		APPROVED BY
		if any to be incorporated in the PO in the event of order.		

COMMERCIAL TERMS AND CONDITIONS

(To be filled in full and to be submitted along with offer)

SL. No.	DESCRIPTION	BHEL'S REQUIREMENT	SUPPLIER'S COMMENTS
01.	PRICE	Firm till completion of order	
02.	DELIVERY TERMS	FOB - SEA/AIR PORT Basis	
03.	PACKING&FORWARDING	Included. (if extra, to be indicated separately).	
04.	FREIGHT & INSURANCE	By BHEL A/C	
05.	PAYMENT	100% payment thro an unconfirmed irrevocable Letter of Credit only.	
06.	DELIVERY PERIOD	To be indicated by supplier	
07.	L.D.CLAUSE	As indicated in Enquiry (as per IMPORTANT NOTE) @0.5% per week, max of 15% for the delayed delivery	
08.	OFFER VALIDITY	Minimum 90 days from the date of opening.	
09.	TEST CERTIFICATE	Required	
10.	GUARANTEE CERTIFICATE (Period : 12 months from the date of commissioning (or) 18 months from the date of supply which ever is earlier.	Required	
11.	INSTALLATION & COMMISSIONING	Supplier's scope (if required)	
12.	PERFORMANCE BANK GUARANTEE (10% OF ORDER VALUE)	Required	
13.	O&M MANUAL	6 SETS	
14.	WEIGHT OF THE CONSIGNMENT	Furnish Weight of each item and Total consignment weight to decide mode of dispatch (AIR/SEA)	
15.	SPECIFICATION	Clause wise / Point wise confirmation to be given in TOTO for all specifications & to be submitted along with offer. (i.e Xerox copy of specn duly filled with your acceptance / comments duly signed & sealed).	
16.	SPECIFICATION DEVIATION DISPOSITION REPORT (SDDR)	Attached SDDR to be filled & submit along with offer. (Even 'NO' deviation is taken, NIL report to be submitted).	

Date :

Signature With Seal

(to be submitted along with the offer)

[illegible]



Noise control in fan installations

(Technical Specification)

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009	VPS + MGG	PSP + KGS	MSM
01	25-09-2009	VPS + MGG	PSP + KGS	MSM
02				
03				

Noise control in fan installations

1.0 Introduction

- a. The permissible noise level near the periphery of the draft fan system (including the drive motor and coupling) supplied for a boiler operation of a thermal power plant in export contract (French customer) needs to be restricted customer specified **sound pressure levels (dBA)**.
- b. Each boiler is provided with 2 numbers of Secondary Air (**SA**) fans, 2 numbers of Primary Air (**PA**) fans and 2 numbers of Induced Draft (**ID**) fans. The details of the fan supplied are placed in **Annexure – 1**.

2.0 Noise generation by the fans & layout

- a. Noise spectrum (sound pressure level in dBA) generated by each fan at different octave band frequency along with noise generated by drive motor and hydraulic coupling (applicable only for ID fan) is provided in **Annexure – 2**.
- b. Sound power level generated by the respective fan(s) at inlet & outlet sections is also provided – Refer **Annexure – 3, 4 & 5**.
- c. The configuration of the fans, foundation and layout details are furnished in the respective drawings listed in Annexure – 1. The nearness of other fans running as given in the key plan shall be taken into account while designing the enclosure.

3.0 Permissible noise level

Suitable noise attenuation features like silencer and or acoustic enclosure for the fan – motor – coupling system to be offered by the vendor to ensure that the overall noise level at 1 m distance from the surface of the respective equipment (fan / motor etc) and 1.5 m from the ground is restricted to **83 dBA**

4.0 Features required & Scope of supply / services

The features required and the scope of supply shall be as listed against each application in Annexure – 1.

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009	VPS + MGG	PSP + KGS	MSM
01	25-09-2009	VPS + MGG	PSP + KGS	MSM
02				
03				

a. Silencer

- i. The maximum pressure drop in each of the suction silencer shall be limited to 15 mmWC. The offer shall carry the typical drawing of the respective silencer with dimensions, weight, foot fixing location from the base of silencer, flow direction etc and details of internals – like construction of baffles, acoustic wool used etc. Perforated sheets, if used, shall be galvanized.
- ii. The external housing or casing shall be of rugged steel fabricated construction with proper stiffening. Suitable lifting hooks, supporting brackets shall be provided in the silencer. The support foot location in the casing wall shall be designed to suit the mounting elevation & support spacing (Refer typical silencer mounting drawing listed in Annexure -1).
- iii. The silencer may be split in segments for transportation purposes with joining possible preferably by bolting. Welding requirement in the field to limited to the barest minimum.

b. Suction hood & Transition

- i. The suction hood with suitable bird trash trap screen, up stream of silencer, transition (from underneath the silencer up to the elbow duct) and elbow duct (from bottom of transition duct to fan inlet expansion joint) shall be designed by the vendor and shall be of rugged fabricated steel construction. They shall be properly stiffened and shall be designed with suitable provision for lifting hooks. The design of the above components shall take in to account the transportation requirements by road (Over Dimensioned Consignment) and shall be suitably split for assembly in the field before erection (by bolting and or welding).
- ii. Detailed drawing (with bill of material, joining / welding details, developments, interconnection flange details etc) shall be submitted with the offer.

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009	VPS + MGG	PSP + KGS	MSM
01	25-09-2009	VPS + MGG	PSP + KGS	MSM
02				
03				

- iii. BHEL will fabricate the above components as per the vendor drawing and supply to customer. All the interconnecting fasteners, gasket ropes at various flange locations and the fixing bolts for the silencer foot shall be in the scope of BHEL.
- c. Insulation wool, fixing material & external cladding
 - i. In case of SA and PA fans, BHEL will be using the following for insulation of inlet ducting (starting from 50% of silencer height up to fan suction expansion joint including the transition elbow duct etc) and outlet ducting (from fan delivery expansion joint up to the duct termination – Air Heater inlet) – exposed ducting outside the acoustic shelter. The fan casing proper (handling atmospheric air) inside the acoustic shelter is NOT insulated.
 - 200 mm thick lightly resin bonded mineral wool (density of approx. 112 Kg / Cu.m) fixed to the duct surface by means of cleats
 - Galvanised iron sheet (0.63 mm thick) for external cladding of the insulation
 - ii. In case of ID fan, BHEL will be insulating the complete inlet ducting (from electrostatic precipitator outlet up to the fan inlet expansion joint) and outlet ducting (from fan delivery expansion joint up to the chimney inlet) with the above insulation arrangement. In addition the complete ID fan casing from inlet flange to outlet flange (handling hot flue gas) will be insulated.
 - iii. BHEL will supply the complete insulation wool, fixing material, cladding sheets etc for the above requirements. Vendor to consider the likely attenuation due to the above insulation in their design of overall noise attenuation system.
 - iv. Vendor to indicate the surface area of silencer, transition and other inlet ducting to be insulated in the case of SA and PA fans.

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009	VPS + MGG	PSP + KGS	MSM
01	25-09-2009	VPS + MGG	PSP + KGS	MSM
02				
03				

d. Acoustic enclosure

- i. The acoustic enclosure shall fully enclose the complete motor – coupling fan arrangement mounted on the concrete foundation.
- ii. The enclosure shall comprise of modular structure frames made out of mild steel channels, angles and pre fabricated high performance acoustic panels. The enclosure frames shall be suitable for fitment on the concrete foundation edges. The vendor shall recommend necessary interface arrangement) between the acoustic structure frames & concrete foundation – viz. any inserts (type, location and number off inserts) or all-round steel belt requirement (embedded angle).
- iii. The modular structural frame shall have features for easy assembly / dismantling through bolted arrangement. The acoustic panels shall be manufactured in sheet metal for assembly on to the modular structure frame around the fan & motor and shall be suitable for fastening by means of quick releasing clamps to facilitate easy assembling and dismantling.
- iv. The arrangement shall be suitably split and shall contain facility for dismantling a portion of the enclosure for attending to loading / unloading of fan casing / rotor parts, motor etc during annual overhauling and for other maintenance work on the equipment inside.
- v. Wherever the silencer or acoustic enclosure has been split for transportation or interface requirements, suitable “pairing match marks” shall be incorporated for easy identification during field assembly.
- vi. To take away the heat built up inside the acoustic enclosure, suitable ventilation arrangement consisting of ventilation intake and exhaust silencers shall be provided. Proper illumination shall be provided inside the acoustic enclosures. Supply of necessary internal wiring material, lighting, ventilation equipment and associated operation starters & switches shall be in the scope of vendor. BHEL will provide (240V AC, 1Ø, 50 Hz) power take off point near each fan foundation.

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009	VPS + MGG	PSP + KGS	MSM
01	25-09-2009	VPS + MGG	PSP + KGS	MSM
02				
03				

Vendor to supply wiring material starting from the power take off point (to be considered approximately 20 metres from the respective foundation). Vendor shall indicate the electric load burden for each enclosure

- vii. Acoustic enclosure may be considered to cover the total plinth area of respective fan foundation to a height of 3 meters from the foundation top level.
- viii. The enclosure shall have features like access door with suitable locking features for operation and maintenance staff to access the equipment inside for monitoring / data recording. Vendor shall provide complete information – installation manuals & drawings for sequential erection of the enclosure including the wiring details / lighting & ventilation locations for each type of fan.
- ix. The interface of the enclosure with the respective inlet and outlet ducting shall be properly sealed to prevent noise leakage to outside and the splitting of acoustic shelter shall be designed in such a way that these interface locations are properly addressed.
- x. The enclosure shall be aesthetically designed with proper surface coating & painting and shall be durable with good service life – under direct exposure to sun and rain.

e. Service required

The vendor shall quote for supervisory support on per diem basis – one official for two spells of visit – each 3 weeks for guiding the erection / commissioning team for installation, electrical interface etc. The offer shall be all inclusive per visit – travel to site, lodging near site, boarding and local transport at work spot etc. The site (Koniambo) is located in New Caledonia island near Australia.

5.0 Painting & Packing Requirements

- a. All steel parts (internal & external surfaces) shall be sand / shot blasted and applied with 2 coats of epoxy primer (each 30 micron thick) followed by 2 coats of epoxy paint (each 80 micron thick). The shade of the final paint will be specified at the time of order.

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009	VPS + MGG	PSP + KGS	MSM
01	25-09-2009	VPS + MGG	PSP + KGS	MSM
02				
03				

- b. All equipment, on clearance for despatch after BHEL inspection, shall be properly packed – export seaworthy packing.
- c. Unique items exclusive to an application (split assemblies at interface of ducting etc) shall be clearly labeled and linked to packing list.
- d. If items are modular in nature and can be interchanged with any fan application – like angles, channels, wires, lights etc, then, Bill of Material break-up of such items for each fan shall be presented in a tabular form linking the overall quantity to the packing list.
- d. The proposed packing list (list & quantity of items in each packed consignment) shall be shown to the BHEL inspector at the time of inspection and the corresponding linkage / traceability to the item inside the packing establishes before dispatch.

6.0 Inspection requirements

- a. Complete “internal inspection record” done by the vendor shall be sent along with the inspection call for BHEL inspection. The equipment will be inspected by BHEL and / or their authorized representative. Minimum 10 days advance notice is to be given for inspection.
- b. Silencers (100%) shall be trial assembled and subject to complete check of - dimensions, interface flange details (no. of holes, diameter, pitch etc), diagonal variations on internal flow dimension & corner holes and match mark features.
- c. Acoustic shelter of two different sizes randomly selected by BHEL inspector / their authorized representative shall be subject to trial assembly on temporary plinth area and verified for match marking, ease of assembly / dismantling, lighting / ventilation features.
- d. Painting effectiveness as per relevant IS

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009	VPS + MGG	PSP + KGS	MSM
01	25-09-2009	VPS + MGG	PSP + KGS	MSM
02				
03				

7.0 Details required with the offer

The offer shall contain

- a. Clause by Clause confirmation by vendor for each of the clauses of this specification – with remarks like “Noted” / “Accepted” / “Not accepted”. The case of clauses “not accepted” should once again be presented in a separate “List of deviations” with clear proposal of alternate design / feature / arrangement by the vendor. If there is no explicit “List of deviations” accompanying the offer, it will be deemed that vendor is accepting / confirming all the requirements called in this specification.
- b. Explicit overall noise level in dBA at 1 m distance from the periphery of equipment (fan – coupling – motor) and 1.5 m from ground (a) considered for design - before introduction of silencer & acoustic enclosure, (b) reduced noise level with only inlet silencer and / or casing acoustic insulation included and (c) reduced noise level including the outside acoustic enclosure
- c. Dimensional drawing of silencer for each fan application - with overall dimensions, interface details, mounting foot location (height from base of silencer & spacing), weight, surface area to be insulated etc
- d. Dimensional drawing of suction hood and transition for each fan application - with overall dimensions, interface details, weight of each item, surface area to be insulated etc
- e. Typical sketch of acoustic enclosure for each fan application – with overall dimensions, interface requirements with foundation, lighting / ventilation provision details in each enclosure, access door features, proposed splitting at the interface of inlet & exit ducting, electrical load burden and total weight of enclosure meant for each application
- f. Recommended arrangement for interface of acoustic enclosure with respective civil foundation – embedments / inserts to be taken care at foundation casting time
- g. Per diem rate quote for supervisory support as per clause 4(e)
- h. Reference list of installations with details of customer / application where similar equipment are supplied by the vendor – especially for power plant equipment – with copy of un-priced PO and date of commissioning

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009	VPS + MGG	PSP + KGS	MSM
01	25-09-2009	VPS + MGG	PSP + KGS	MSM
02				
03				

- i. Any test report of noise measurement done at any installations covered in client list indicated in TFN:Acoustics:QR Rev 01 – clause 3(b) with customer / end user acceptance certification
- j. List of erection & Commissioning spares – covering items like lights, switches etc – list, quantity and unit price
- k. Recommended spares for 5 year usage – list, quantity and unit price

8.0 Details required within 4 weeks of placement of order

The following drawings shall be submitted for approval by BHEL for each type of application for the ordered alternative – to be used at the time of inspection

- a. Final dimensional drawing of silencer
- b. Final manufacturing drawing of suction hood and transition duct with bill of material
- c. Final arrangement of acoustic shelter – with all internals, fixing arrangement etc

9.0 Details required before 4 weeks of dispatch

- a. Packing list containing exclusive material for each type of application – with linkage to respective drawings
- b. Packing list containing modular material (usable in any application) with break – application wise
- c. Erection & Commissioning instructions (manuals) for silencer & acoustic enclosure – especially fixing of frames to foundation, fixing of acoustic panels, laying of wiring, fixing of lights and ventilation equipment inside the enclosure. The manuals shall be submitted – 2 hard copies + 2 soft copies in CDs. The manuals shall include details on all items under scope of supply with relevant catalogues. The used model numbers shall be highlighted in the respective catalogue.
- d. Dismantling and assembly instructions – at interface locations and portion of the enclosure for accessing equipment inside for maintenance work

All manuals / instructions / drawings finally required to be submitted / left with end ser (customer) shall contain information in two languages – English & French

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009	VPS + MGG	PSP + KGS	MSM
01	25-09-2009	VPS + MGG	PSP + KGS	MSM
02				
03				

Requirement of noise control in fan installations

S No	Description ↓ \ Application →	SA Fan (NDV 21 Herakles)	PA Fan (NDV 14 Herakles)	ID Fan (NDZV 28 sidor)	Remarks
1	Fan Size / speed	Radial fan–2.1 meters impeller diameter – constant speed 1500 rpm	Radial fan– 1.4 meters impeller dia – constant 3000 rpm	Radial fan–2.8meters impeller dia – variable speed – Operating range 150 to 750 rpm	
2	Motor rating / speed	875 kW / 1500 rpm	1075 / 3000 rpm	775 kW / 750 rpm	
3	Medium handled by fan / Temp (° C)	Atmospheric air / 50	Atmospheric air / 50	Flue gas / 150	
4	No. of systems / boiler	2	2	2	
5	No. of boilers	2	2	2	
6	Arrangement of fan suction / discharge	Suction – open to atmosphere Discharge – ducted	Suction – open to atmosphere Discharge – ducted	Suction & Discharge – ducted	
7	Fan – coupling – motor General Arrangement & Foundation drawing	0-00-098-21645Rev02	0-00-098-21647 Rev02	0-00-098-21646 Rev02	
8	Typical arrangement of inlet silencer / suction hood and silencer supporting arrangement	30-A-PROP-07255Rev01	30-A-PROP-07257Rev01	30-A-PROP-07256Rev00	Vendor to indicate weight of hood + silencer + transition. BHEL to provide supporting structure
9	Noise spectrum (sound pressure level – dBA) of independent fan – motor - coupling	Refer Annexure - 2	Refer Annexure - 2	Refer Annexure - 2	In case of fans sound power level data at inlet & outlet also attached (Annexure 3, 4 & 5)
10	Features required (a) Inlet silencer (b) Suction hood + transition (c) Discharge silencer (d) Insulation – silencer to fan suction (e) Insulation – fan casing (f) Insulation – discharge ducting (g) Acoustic hood for system (to suit the resp. plinth area) (h) Acoustic hood for motor / couplg	Vendor scope BHEL scope Not required BHEL scope Not required BHEL scope Vendor scope Not required	Vendor scope BHEL scope Not required BHEL scope Not required BHEL scope Vendor scope Not required	Not required Not required Not required BHEL scope BHEL scope BHEL scope Vendor scope Not required	Fan Suc. & Disch. ducted Vendor to give drawings Fan discharge ducted BHEL to provide heat insul BHEL to provide heat insul BHEL to provide heat insul Including all features like lighting / exhaust etc

Prepared

VPS + MGG

Reviewed

PSP + KGS

Approved

MSM

Annexure - 2



BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
BOILER AUXILIARIES PLANT

Noise spectrum for fans of Koniyambo Nickel SAS 2x135MW CFBC boiler project

SOUND PRESSURE LEVEL MEASURED AT A DISTANCE OF 1M BESIDE THE PA FAN & MOTOR

Frequency Hz	63	125	250	500	1000	2000	4000	8000
PA Fan dB(A)	73	81	91.5	98	95	92	87	79
PA Motor dB(A)	57	69.5	77.7	92.6	88.4	84.5	86.7	83.9

SOUND PRESSURE LEVEL MEASURED AT A DISTANCE OF 1M BESIDE THE ID FAN, MOTOR & HYDRAULIC COUPLING

Frequency Hz	63	125	250	500	1000	2000	4000	8000
ID Fan dB(A)	73	81	91.5	98	95	92	87	79
ID Fan Hydraulic Coupling	65	70	73	76	78.5	81	75	72
ID Motor dB(A)	37.5	56.5	68.2	80.2	83.8	80.8	75.4	64

SOUND PRESSURE LEVEL MEASURED AT A DISTANCE OF 1M BESIDE THE SA FAN & MOTOR

Frequency Hz	63	125	250	500	1000	2000	4000	8000
SA Fan dB(A)	73	81	94.5	95	95	92	87	79
SA Motor dB(A)	33.4	53.1	72.1	83.1	87.5	84	78.7	68.5

 * CALCULATED: V.P.SHYAM SUNDAR *****
 * PROJECT : EXPORT Project ** K **
 * KKK V-NO.: SA FAN ** K K **
 * MODEL :NDV 21 HERAKLES *****

INPUT DATA
 VOL.FLOW (IN) = 41.400 M3/S
 DIAMETER =2175.0 MM
 INLET TEMP. = 40.0 GRD.C
 INLET DENSITY =1.1010 KG/M3
 INLET PRESSURE =1010.3 MBAR
 TOT.PRESS.RISE = 152.50 MBAR
 SPEED = 1500.0 UPM
 INPUT POWER = 753.0 KW
 EFFICIENCY =80.5 /100
 NUMBER OF BLADES=10 (-)
 DISTANCE BETWEEN IMPELLER AND CASE (VZ) IN MM 150.0

OUTPUT:

TIP SPEED = 170.8 M/S
 SOUND VELOCITY = 367.4 M/S
 MACH NUM. = .465
 TEMP.RATIO(T2/T1)= 1.051 (-)
 DENSITY(OUT) = 1.2058 KG/M3
 BLADE PASSING FREQUENCY = 250.0 HZ
 VOL.FLOW (OUT)= 37.802 M3/S

OCTAVE SOUND POWER LEVEL

LW

PRESCRIBED SURFACE INDEX A) OUTLET = 3.0 DB , B) INLET = 3.0 DB
 31.5 63 125 250 500 1000 2000 4000 8000 DB(A)

OUTLET :

DB 127.0 125.0 123.0 127.5 120.0 116.5 111.0 106.0 101.0

DB(A) 87.5 99.0 107.0 118.5 117.0 116.5 112.0 107.0 100.0 123.0

INLET :

DB 125.5 123.5 121.5 122.0 117.5 114.5 109.5 104.5 99.5

DB(A) 86.0 97.5 105.5 113.5 114.5 114.5 110.5 105.5 98.5 120.0

INLET, LOUVER DAMPERS CLOSED:

DB 112.5 112.5 112.5 115.0 112.5 112.5 112.5 110.5 105.5

DB(A) 73.0 86.0 96.0 106.5 109.5 112.5 113.5 111.5 104.5 118.5

OCTAVE SOUND PRESSURE LEVEL MEASURED AT A DISTANCE OF
 1M BESIDE THE FAN / COMPRESSOR
 PRESCRIBED SURFACE INDEX: 22.0 DB

DB 97.0 99.0 97.0 103.0 98.0 95.0 91.0 86.0 80.0

DB(A) 57.5 73.0 81.0 94.5 95.0 95.0 92.0 87.0 79.0 100.5

OCTAVE LEVEL OUTLET -7/+3 DB
 A-LEVEL OUTLET -3/+2 DB(A)
 OCTAVE LEVEL INLET -12/+3 DB
 A-LEVEL INLET -11/+2 DB(A)
 OCTAVE LEVEL 1M BESIDE -8/+3 DB
 A-LEVEL 1M BESIDE -6/+2 DB(A)

THE EMISSION VALUES ARE BASED ON MEASUREMENTS ACCORDING
 TO DIN 45635, CARRIED OUT WITH MICROPHONES WITH OMNIDIRECTIONAL
 CHARACTERISTIK UNDER FREE FIELD CONDITIONS.
 THE SAME STANDARD ALSO APPLIES TO A POSSIBLE GUARANTEE PROOF.

mon

 * CALCULATED: V.P.SHYAM SUNDAR *****
 * PROJECT : Export Project ** K **
 * KKK V-NO.: PA FAN ** K K **
 * MODEL :NDV 14 HERAKLES *****

INPUT DATA	OUTPUT:
VOL.FLOW (IN) = 28.900 M3/S	TIP SPEED = 235.0 M/S
DIAMETER =1496.0 MM	SOUND VELOCITY = 374.3 M/S
INLET TEMP. = 40.0 GRD.C	MACH NUM. = .628
INLET DENSITY =1.1010 KG/M3	TEMP.RATIO(T2/T1)= 1.090 (-)
INLET PRESSURE =1010.3 MBAR	DENSITY(OUT) = 1.2721 KG/M3
TOT.PRESS.RISE = 262.50 MBAR	BLADE PASSING FREQUENCY = 500.0 HZ
SPEED = 3000.0 UPM	VOL.FLOW (OUT)= 25.012 M3/S
INPUT POWER = 930.0 KW	
EFFICIENCY =75.5 /100	
NUMBER OF BLADES=10 (-)	
DISTANCE BETWEEN IMPELLER AND CASE (VZ) IN MM 100.0	

OCTAVE SOUND POWER LEVEL LW

PRESCRIBED SURFACE INDEX A) OUTLET = 1.5 DB , B) INLET = 1.5 DB
 31.5 63 125 250 500 1000 2000 4000 8000 DB(A)

OUTLET :
 DB 132.5 130.0 128.0 126.0 131.5 123.5 120.0 114.0 109.0

DB(A) 93.0 104.0 112.0 117.5 128.5 123.5 121.0 115.0 108.0 130.5

INLET :
 DB 131.0 128.5 126.5 124.5 126.0 121.0 117.5 112.5 107.5

DB(A) 91.5 102.5 110.5 116.0 122.5 121.0 119.0 113.5 106.5 126.5

INLET, LOUVER DAMPERS CLOSED:

DB 115.5 115.5 115.5 115.5 119.0 116.0 115.5 115.5 113.5

DB(A) 76.0 89.5 99.5 107.0 115.5 116.0 117.0 116.5 112.5 123.0

OCTAVE SOUND PRESSURE LEVEL MEASURED AT A DISTANCE OF
 1M BESIDE THE FAN / COMPRESSOR
 PRESCRIBED SURFACE INDEX: 20.5 DB

DB 97.0 99.0 97.0 100.0 101.0 95.0 91.0 86.0 80.0

DB(A) 57.5 73.0 81.0 91.5 98.0 95.0 92.0 87.0 79.0 101.0

OCTAVE LEVEL OUTLET -7/+3 DB
 A-LEVEL OUTLET -3/+2 DB(A)
 OCTAVE LEVEL INLET -12/+3 DB
 A-LEVEL INLET -11/+2 DB(A)
 OCTAVE LEVEL 1M BESIDE -8/+3 DB
 A-LEVEL 1M BESIDE -6/+2 DB(A)

THE EMISSION VALUES ARE BASED ON MEASUREMENTS ACCORDING
 TO DIN 45635, CARRIED OUT WITH MICROPHONES WITH OMNIDIRECTIONAL
 CHARACTERISTIK UNDER FREE FIELD CONDITIONS.
 THE SAME STANDARD ALSO APPLIES TO A POSSIBLE GUARANTEE PROOF.

may

 * CALCULATED: V.P.SHYAM SUNDAR *****
 * PROJECT : KONIAMBO ** K **
 * KKK V-NO.: ID FAN ** K K **
 * MODEL :NDZV 28 SIDOR *****

INPUT DATA OUTPUT:
 VOL.FLOW (IN) = 122.100 M3/S TIP SPEED = 108.6 M/S
 DIAMETER =2901.0 MM SOUND VELOCITY = 428.9 M/S
 INLET TEMP. =155.0 GRD.C MACH NUM. = .253
 INLET DENSITY = .7790 KG/M3 TEMP.RATIO(T2/T1)= 1.016 (-)
 INLET PRESSURE =1007.7 MBAR DENSITY(OUT) = .8031 KG/M3
 TOT.PRESS.RISE = 47.43 MBAR BLADE PASSING FREQUENCY = 131.1 HZ
 SPEED = 715.0 UPM VOL.FLOW (OUT)= 118.437 M3/S
 INPUT POWER = 692.0 KW
 EFFICIENCY =84.5 /100
 NUMBER OF BLADES=11 (-)
 DISTANCE BETWEEN IMPELLER AND CASE (VZ) IN MM 250.0

OCTAVE SOUND POWER LEVEL LW

PRESCRIBED SURFACE INDEX A) OUTLET = 10.0 DB , B) INLET = 10.0 DB
 31.5 63 125 250 500 1000 2000 4000 8000 DB(A)

OUTLET :
 DB 121.0 118.5 120.5 115.0 111.5 106.5 101.5 97.0 92.0
 DB(A) 81.5 92.5 104.0 106.5 108.5 106.5 103.0 98.0 91.0 113.5

INLET :
 DB 119.5 117.0 116.5 113.0 110.0 105.0 100.0 95.5 90.5
 DB(A) 80.0 91.0 100.5 104.5 106.5 105.0 101.5 96.5 89.5 111.5

INLET, LOUVER DAMPERS CLOSED:
 DB 108.5 108.5 109.5 108.5 108.5 108.5 106.0 101.5 96.5
 DB(A) 69.0 82.0 93.5 100.0 105.0 108.5 107.5 102.5 95.5 112.5

OCTAVE SOUND PRESSURE LEVEL MEASURED AT A DISTANCE OF
 1M BESIDE THE FAN / COMPRESSOR
 PRESCRIBED SURFACE INDEX: 25.0 DB

DB 91.5 93.5 94.5 94.5 92.5 89.5 85.5 80.5 74.5
 DB(A) 52.0 67.0 78.5 86.0 89.0 89.5 86.5 81.5 73.5 94.5

OCTAVE LEVEL OUTLET -7/+3 DB
 A-LEVEL OUTLET -3/+2 DB(A)
 OCTAVE LEVEL INLET -12/+3 DB
 A-LEVEL INLET -11/+2 DB(A)
 OCTAVE LEVEL 1M BESIDE -8/+3 DB
 A-LEVEL 1M BESIDE -6/+2 DB(A)

THE EMISSION VALUES ARE BASED ON MEASUREMENTS ACCORDING
 TO DIN 45635, CARRIED OUT WITH MICROPHONES WITH OMNIDIRECTIONAL
 CHARACTERISTIK UNDER FREE FIELD CONDITIONS.
 THE SAME STANDARD ALSO APPLIES TO A POSSIBLE GUARANTEE PROOF.

Unge

Price format – Supply**Annexure - 6**

Sl No	Description	SA Fan			ID Fan			PA Fan			Remarks
		Unit rate	Qty	Total Price	Unit rate	Qty	Total Price	Unit rate	Qty	Total Price	
1	Suction silencer										
2	Transition + Suction Hood (Engg document charges)										
3	Acoustic Enclosure										
	Applicable P&F, F&I, service charges, taxes & duties – towards landed cost										
	Total										

Sl No	Description	SA Fan			ID Fan			PA Fan			Remarks
		Unit rate	Qty	Total Price	Unit rate	Qty	Total Price	Unit rate	Qty	Total Price	
4	Recommended commg Spares										
	Item 1										
	Item 2										
5	Recommended Operation Spares										
	Item 1										
	Item 2										

Price format – Services

Sl No	No. of visits	No. of experts recommended	No. of days recommended per expert	Per diem rate	To & fro charges	Boarding / Lodging / Transport	Total	Remarks
6	Visit # 1							
7	Visit # 2							
	Total including service charges – if any							



BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
BOILER AUXILIARIES PLANT
Ranipet – 632 406

Annexure 7

Noise control in fan installations ***(Qualification Requirement & Evaluation Procedure)***

[To be read along with Technical Specification TFN : Acoustics : Tech Spec]

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009			
01	25-09-2009			
02				

Noise control in fan installation – Offer submission & Evaluation Procedure

1. Introduction

Enclosed is the technical specification **TFN: Acoustics: Tech spec Rev 01** for offer of silencer and acoustics enclosure for fans in a thermal power plant.

2. Offer submission procedure

The vendors shall submit their offer in “three parts” – **three independent sealed envelopes** – superscribed respectively as below

- i. **Qualification Requirement Bid** – BHEL Ranipet Enquiry No. xxxx
- ii. **Technical & Commercial Bid** – BHEL Ranipet Enquiry No. xxxx
- iii. **Price Bid** – BHEL Ranipet Enquiry No. xxxx

All the three above covers shall be kept inside a **common sealed cover** superscribing the same as “**Offer for BHEL Ranipet Enquiry No. xxxx**”

3. Qualification Requirement Bid (Envelope 1)

- a. The vendor becomes eligible to participate in the tender only if the vendor meets the **Qualification Requirement (QR)** as defined in point 3 (b) below
- b. The bidder should have designed, engineered, manufactured and supplied **at least two (2) systems with silencer and or acoustic enclosure for industrial rotating equipment application of speed ≥ 1400 rpm and power (drive capacity or generating capacity) rating of ≥ 800 kW in the recent five years (since 30 Sep 2004) – of which at least one (1) should be in successful operation for a period of minimum two years as of 30 Sep 2009.** In case the offer is based on a consortium approach, the bidder shall ensure that that the respective consortium partners – mainly engineering & design group and manufacturing group – individually meet the “Qualification Requirement”.

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009			
01	25-09-2009			
02				

- c. The vendor shall submit the details of such installation (clientele list) covering the following

- Name of project with complete address of site
- Plant unit rating – size / application equipment and corresponding speed and drive rating
- Customer details – name / contact phone / mail id
- Details of design & manufacturing partner (for consortium bids)
- Month & year of order and supply
- Month & year of commissioning

in a separate sealed envelope – “Qualification Requirement Bid”.

4. Technical & Commercial Bid (Envelope 2)

The Technical & Commercial bid (sealed envelope) shall contain

- a. all the details called for in point 7.0 of the enclosed Technical Specification TFN: Acoustics: Engg Spec Rev 01 dt. 25-09-2009 - **wherever price details are to be indicated those places are to be left blank.**
- b. All applicable duties / taxes, payment terms, delivery details, warranty / guarantee and all other terms & conditions **except price reference** to be presented in this cover
- c. The **price format** shall be as specified in **Annexure 6** and **confirmation to have followed the format** shall be indicated in the “Technical & Commercial Bid” – **without indicating any price.**

5. Price Bid (Envelope 3)

The price bid shall be in a sealed envelope – and shall exactly follow the format in **Annexure 6. All applicable add-ons like – packing & forwarding charges, freight & insurance and applicable service charges, taxes & duties – shall be clearly indicated. All the above add-ons shall be indicated as percentage of the basic price of the supply**

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009			
01	25-09-2009			
02				

6. Tender Evaluation Procedure

BHEL reserves the right to reject any offer at any of the following stages on report of unsatisfactory past performance from any other BHEL unit / project. The sequence of evaluation is below:

Stage 1

On the specified tender opening date / time indicated in the enquiry, the **Common Cover** will be opened. This will be followed by opening of **Envelope 1** (Qualification Requirement Bid) on the same day.

Stage 2

Based on evaluation of the details presented in Envelope 1, the vendors who qualify for the next stage of the evaluation (opening of Envelope 2 – Technical & Commercial Bid) will be decided. Only such of those vendors will be informed of the date & time of opening of **Envelope 2**.

Stage 3

After detailed technical evaluation of the offers / discussion, vendors found technically suitable for next stage of price bid opening (**Envelope 3**) will be intimated. Price comparison will be inclusive of loading defined in pt (7) below

The **price comparison will be based on landed cost** (at BHEL stores) **converted to Indian Rupee** (based on exchange rate quoted by State Bank of India on the day of tender opening) **of all the applicable items under scope of supply and add-ons bundled in to one single price** (as per price format) **including charges for erection & commissioning for two visits of 3 weeks each (notional) taking in to account one expert and loading as per clause 7 below.**

The recommended spares pricing will be for information basis and will not be considered for comparison. The recommendations will only be discussed during price negotiation. BHEL reserves the right to decide the final list & quantity of spares.

Such of those vendors who wish to participate in the tender opening(s), should attach an authorization letter which shall be duly signed and stamped in original, identifying the representative proposed to be deputed for tender opening.

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009			
01	25-09-2009			
02				

7. Loading for payment terms & longer delivery

All the vendors shall strictly abide by the “standard Terms & Conditions” enclosed with enquiry – including payment terms. Any deviation from the same will be liable for appropriate loading.

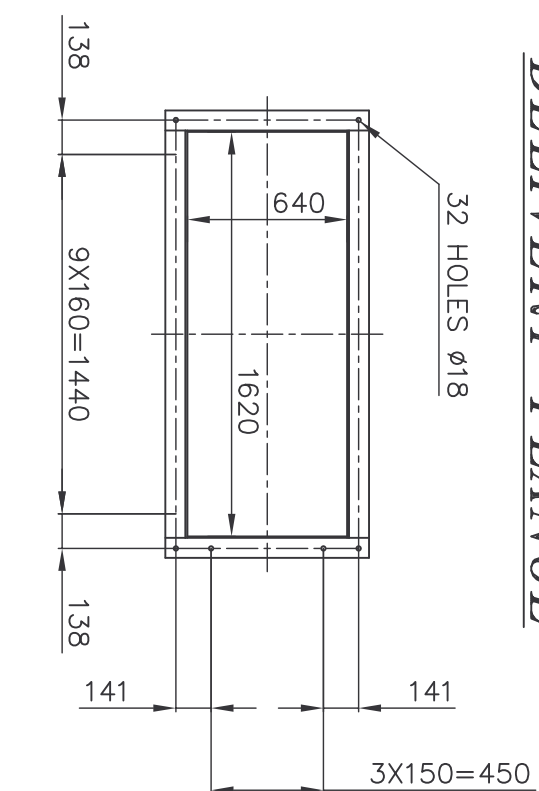
Offers calling for “advance” will be rejected at Stage 2.

In case of payment terms calling for “milestone based stage payments”, the prices quoted by the vendors will be loaded at the rate of 12% per annum for the payments effected at various stages.

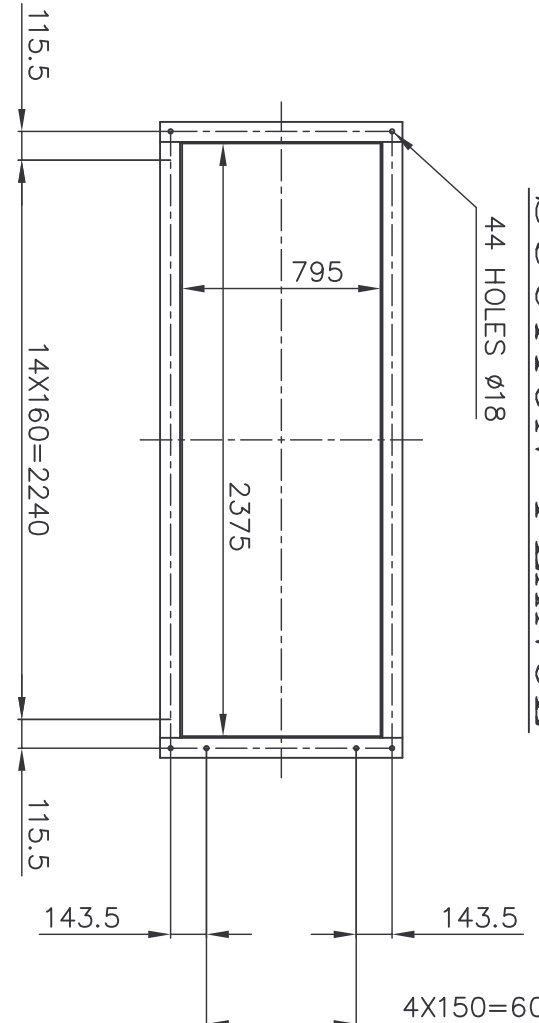
The delivery expected for full completion of all supplies (all items called for in this enquiry) is 16 weeks from the date of purchase order (PO). Vendors quoting deliveries earlier than this will be acceptable. For vendors quoting delivery beyond 16 weeks, penalty of 1% per week on offered value will be loaded. However **vendors quoting delivery beyond 24 weeks will be rejected at Stage 2.**

Rev	Date	Prepared	Reviewed	Approved
00	01-06-2009			
01	25-09-2009			
02				

DELIVERY FLANGE

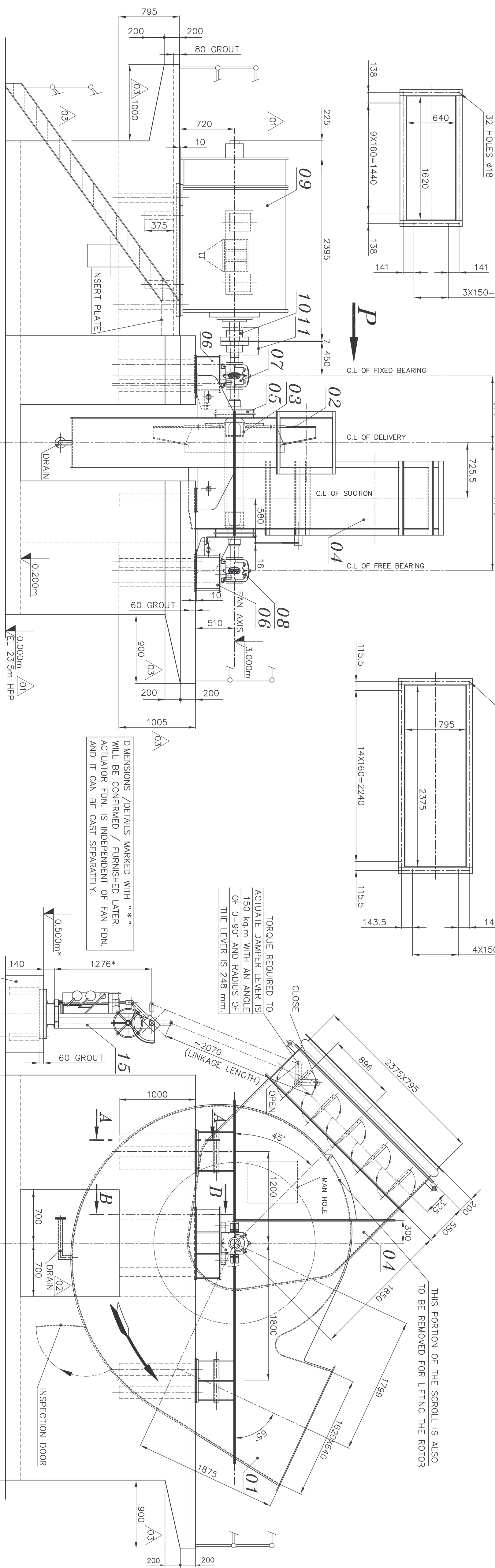


SUCTION FLANGE

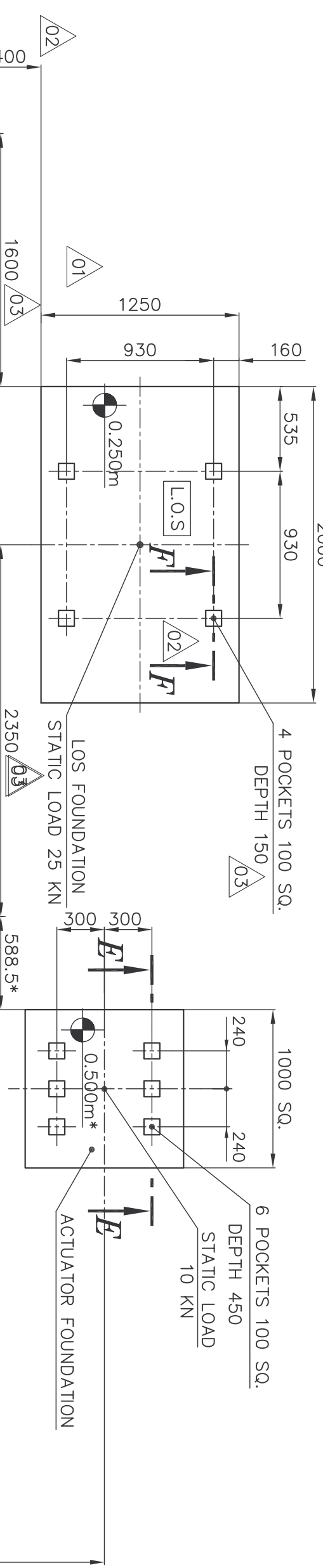


VIEW-P

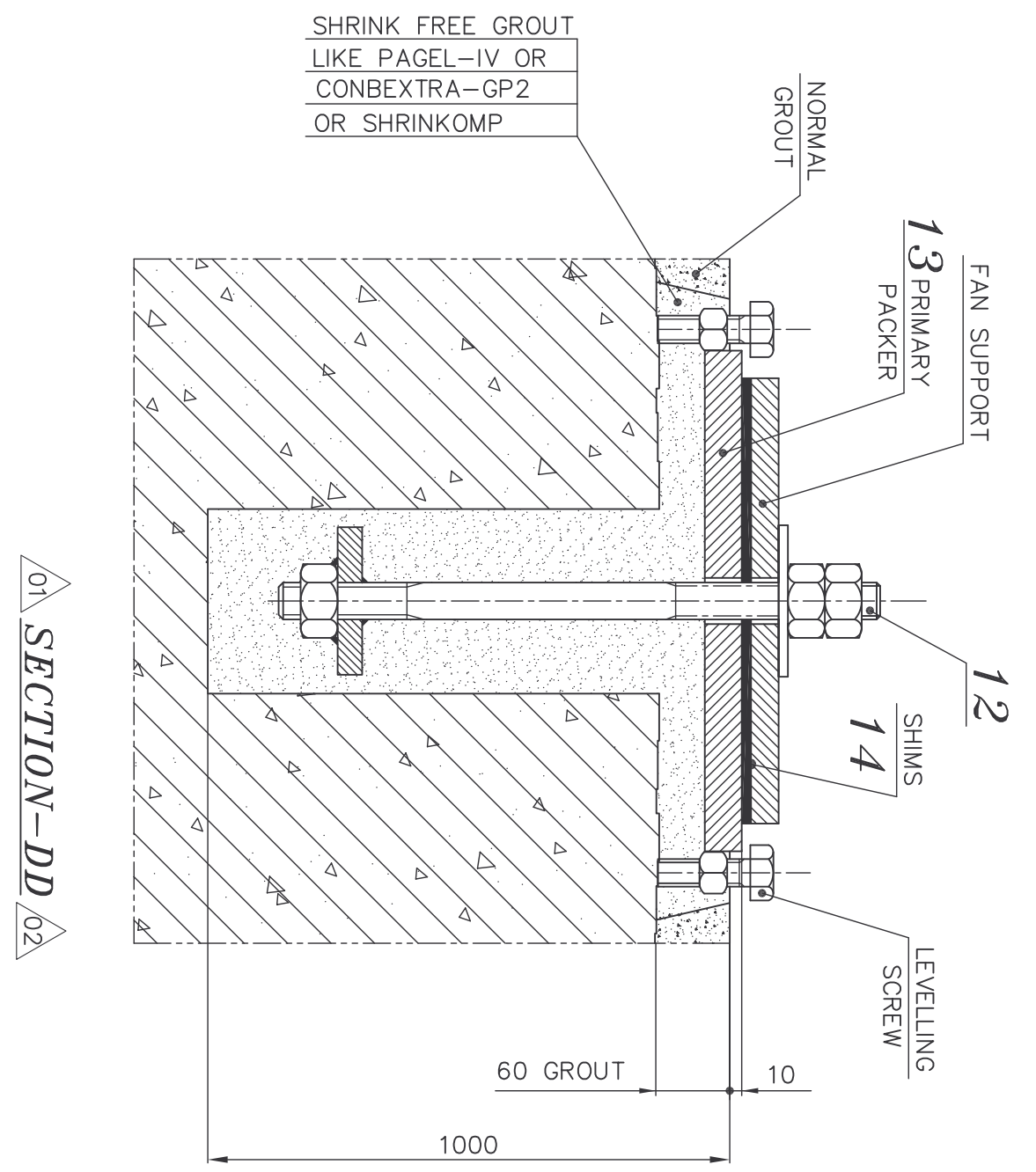
(WITHOUT MOTOR & ITS FOUNDATION)



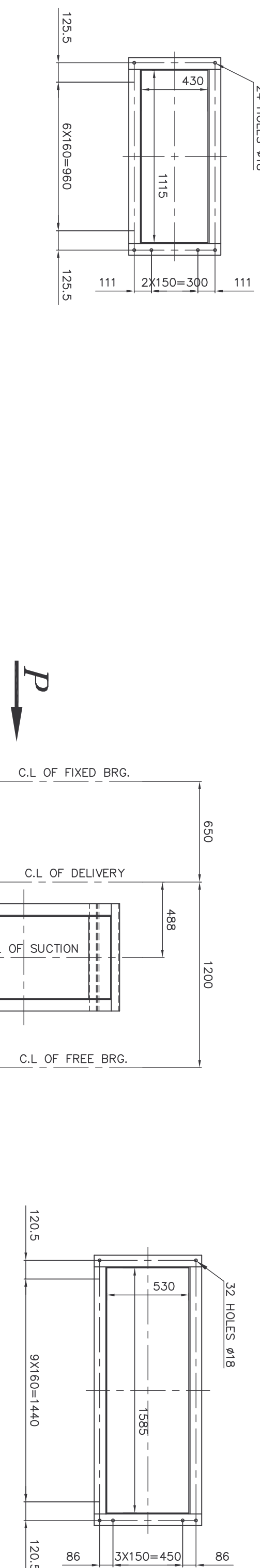
FOUNDATION PLAN



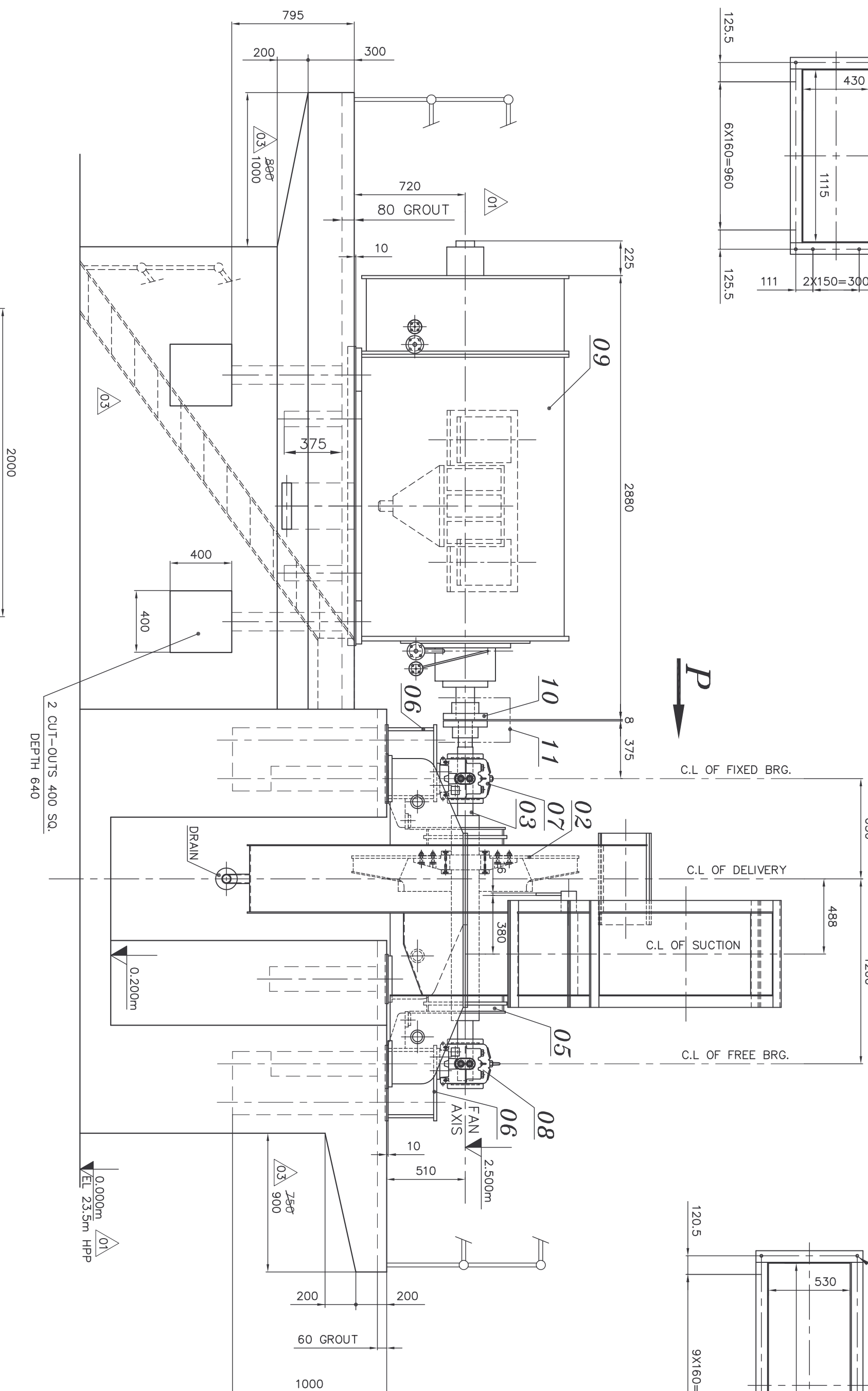
SECTION-AA



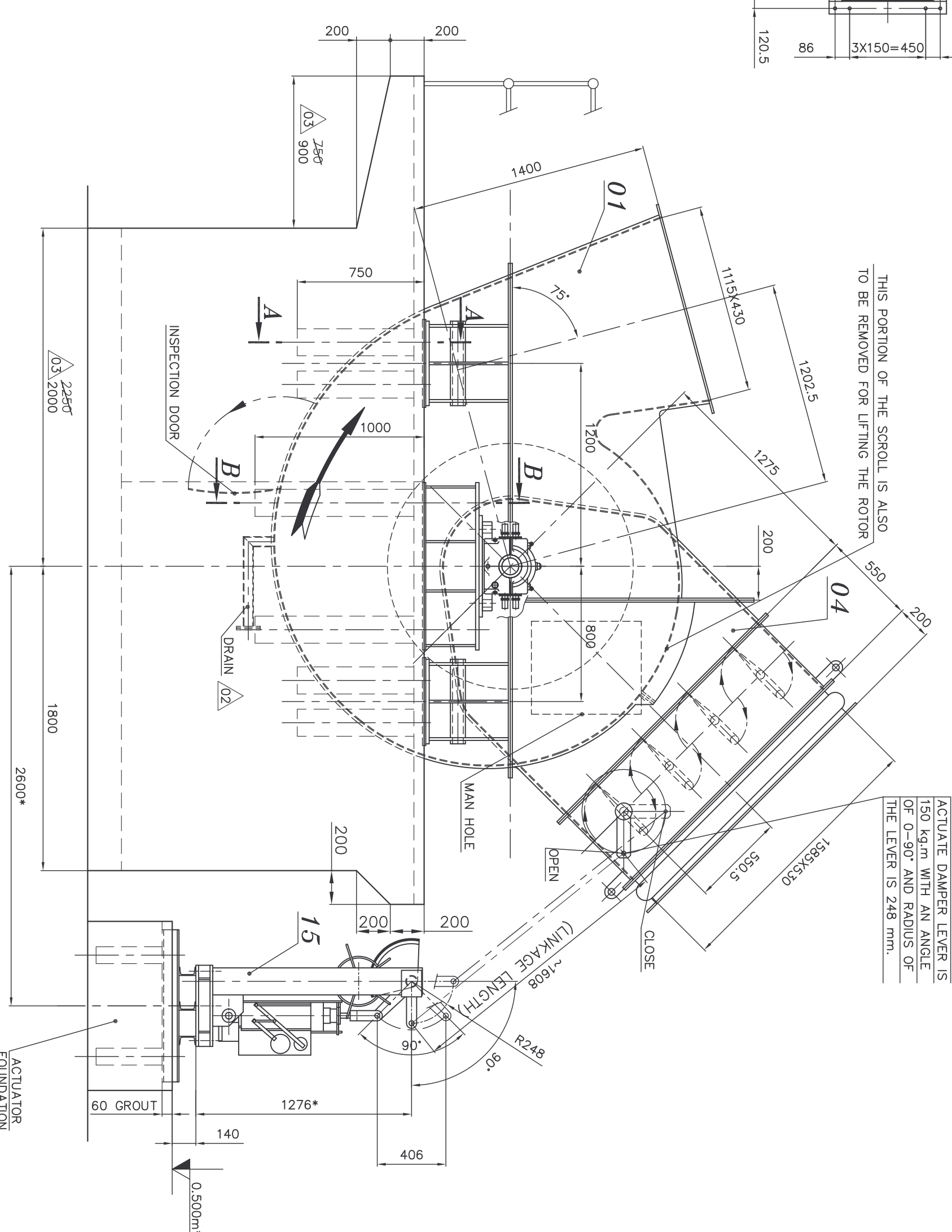
DELIVERY FLANGE



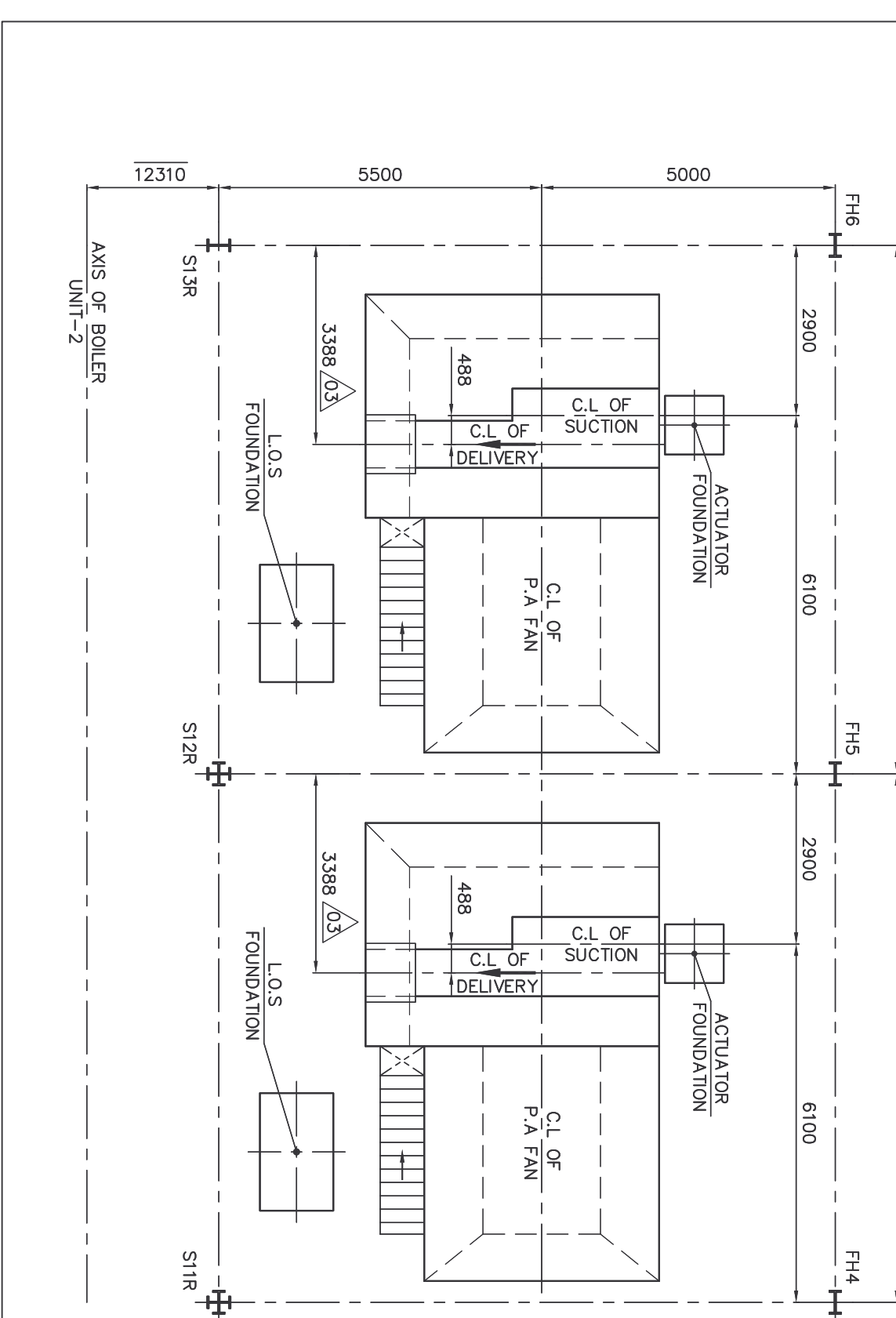
SUCTION FLANGE



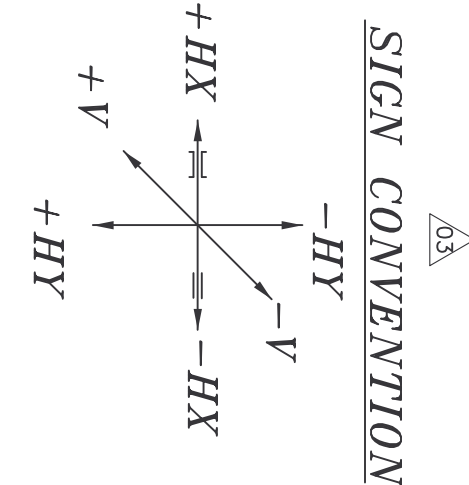
VIEW-P



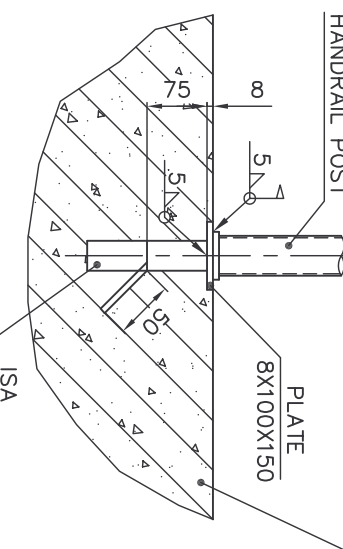
LOAD DATA FOR FOUNDATION

[illegible]

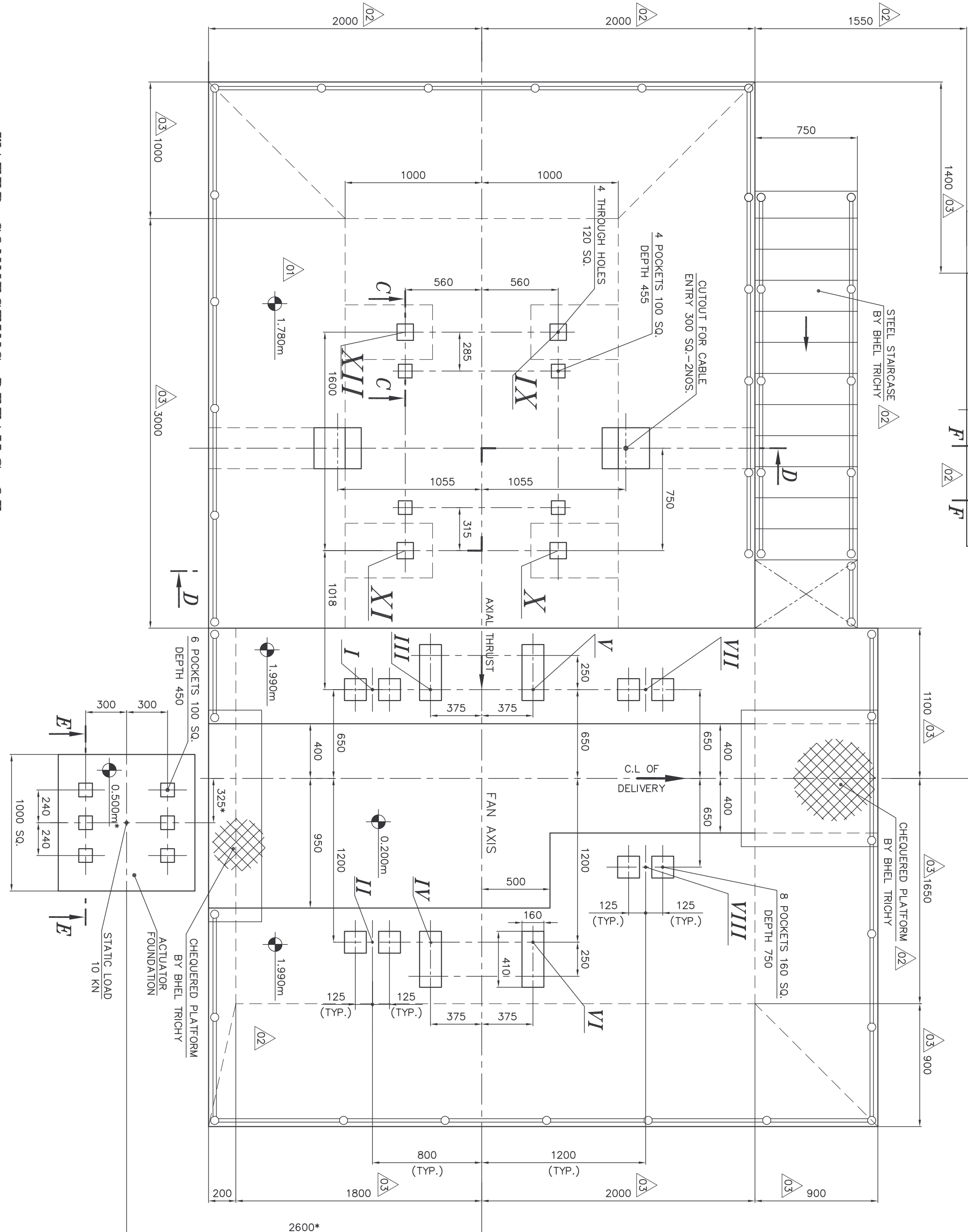
SIGN CONVENTION



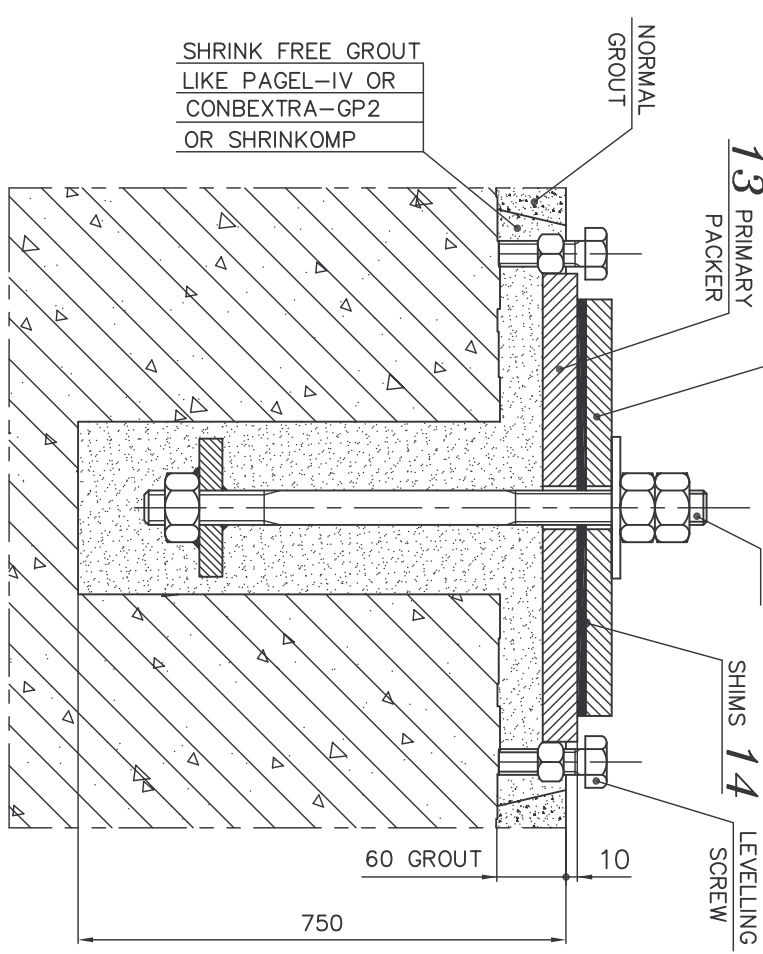
TYP. ANCHORING DETAIL



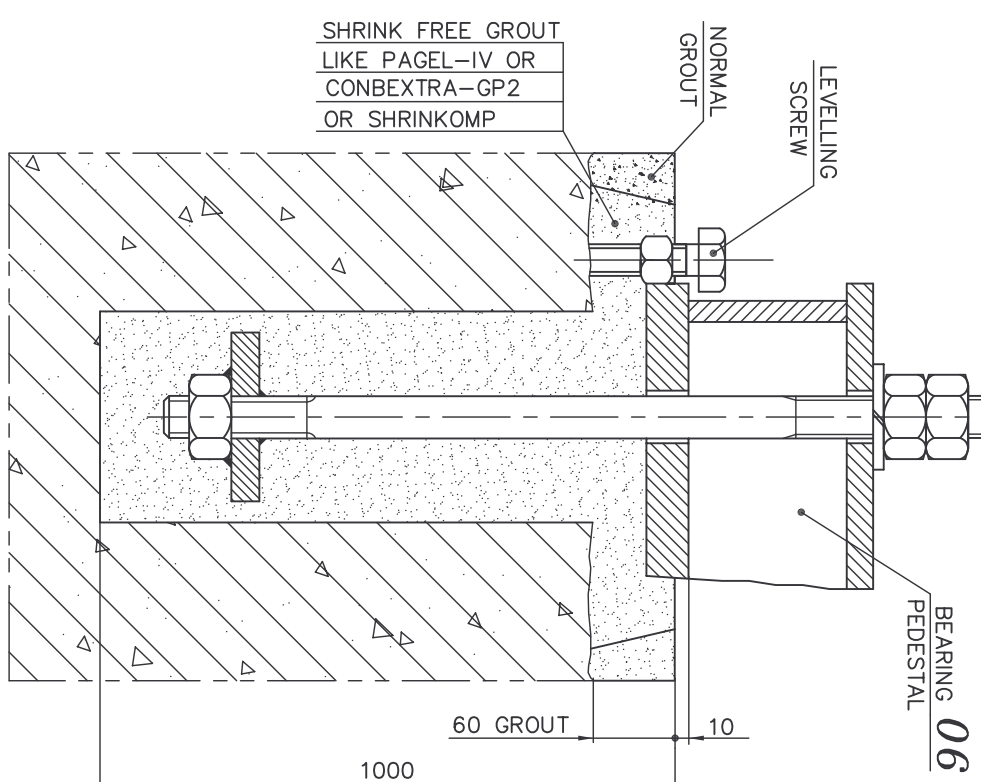
FOUNDATION PLAN



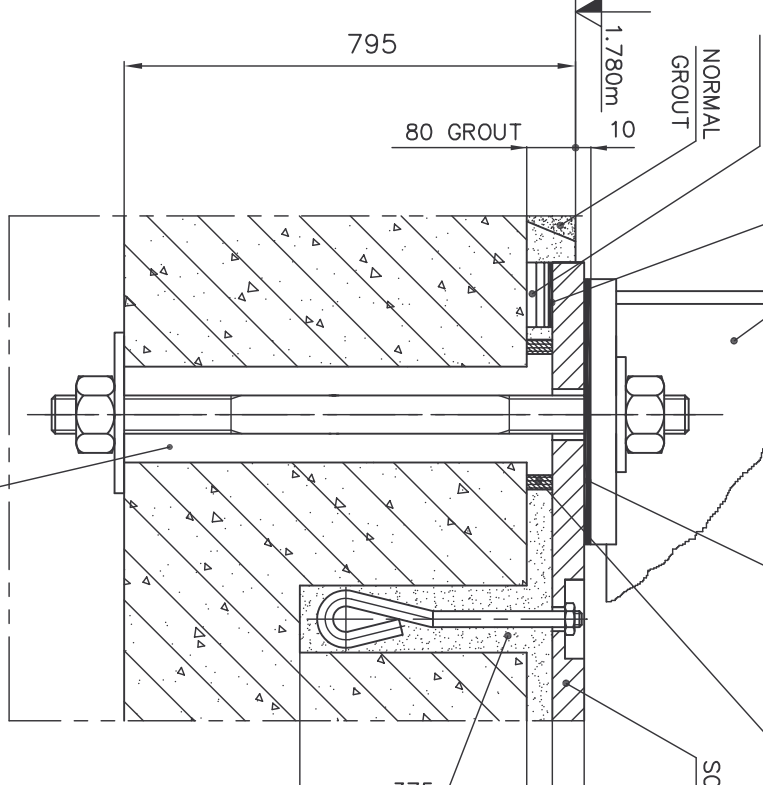
SECTION-AA



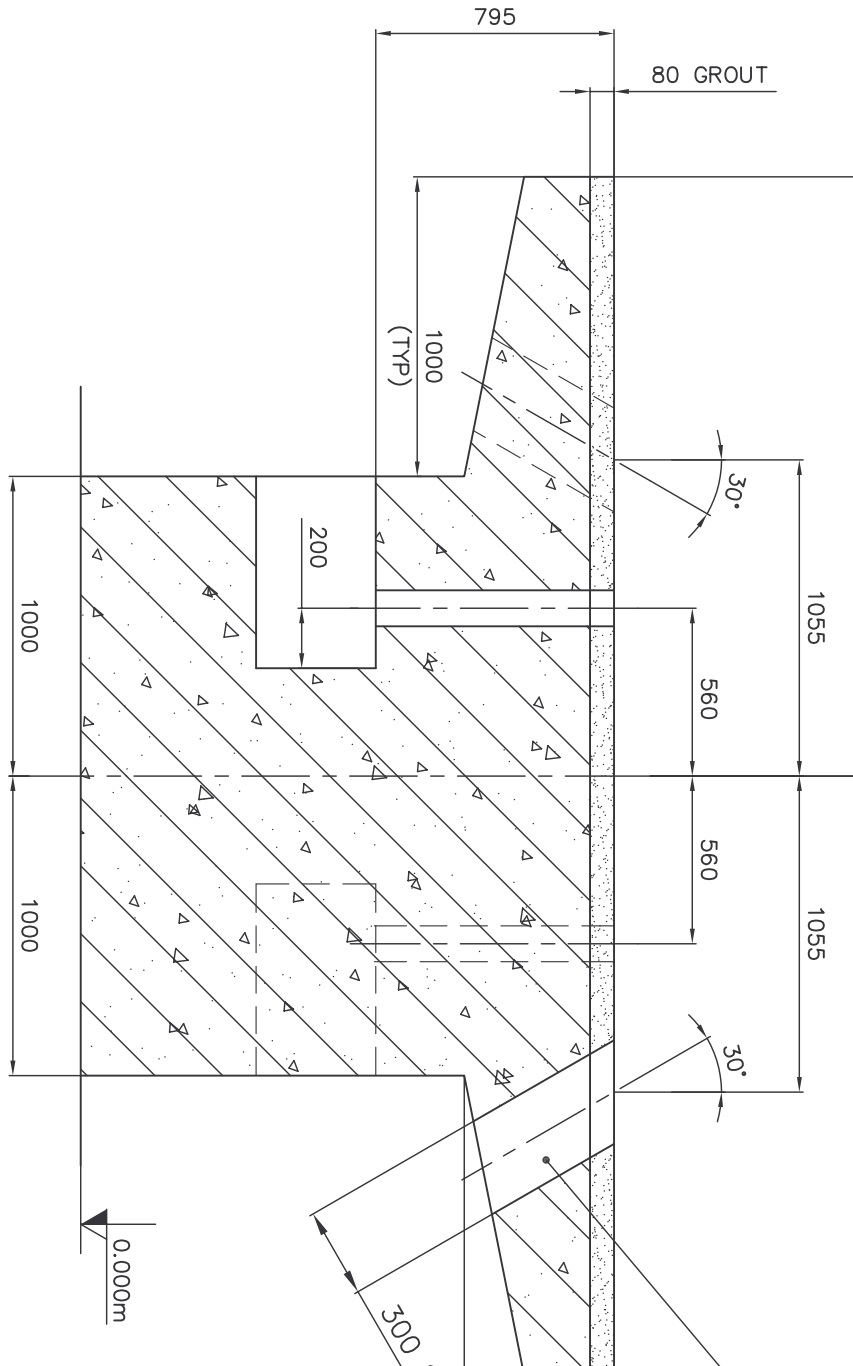
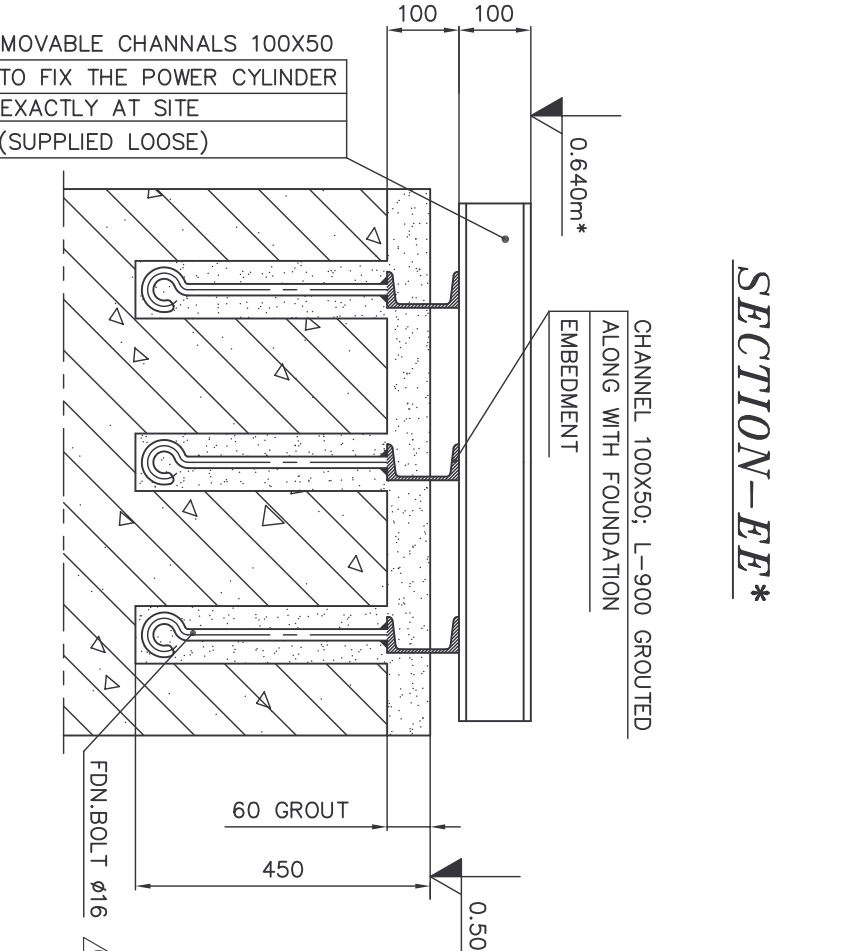
SECTION-BB



SECTION-CC



SECTION-CC

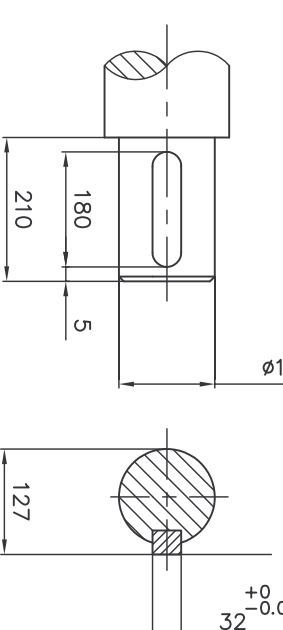


SECTION-FF*

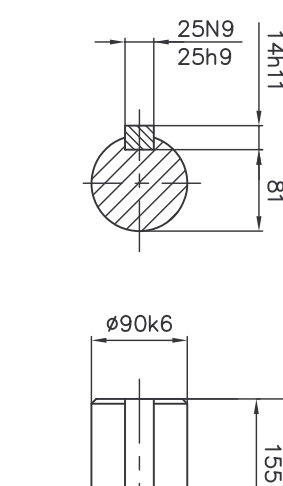
Sl. No	Description	Material	Ref. Poem
01	ACTIVATOR	SIL-DRIVER	56-0333
14	SHIMS	5.5	AS REQD.
15	PRIMARY PACKERS FOR PAN	15 2000 G/A	4
12	PRIMARY FASTENERS FOR PAN	ASTM 1018	16
11	COUPLING SHAFT	15 2002	1
10	CONNECTING COUPLING	STEEL	1
09	MOTOR	1075 W/6 HZ	1
08	REG. BEARING ASSEMBLY	3-1/2" B/6 HZ	1
07	REG. BEARING ASSEMBLY	3-1/2" B/6 HZ	2
06	LEADEN SHIM	15 2002 G/A	1
04	SECTION CHAMBER	15 2002 G/A	1
03	SHUTT	STEEL 2 1/2" X 1/2"	1
02	WHEELER	15 2002 G/A	1
01	SPRAL CHAMBER	15 2002 G/A	1
00	DESCRIPTION	MATERIAL	QTY

BILL OF MATERIAL PER FAN

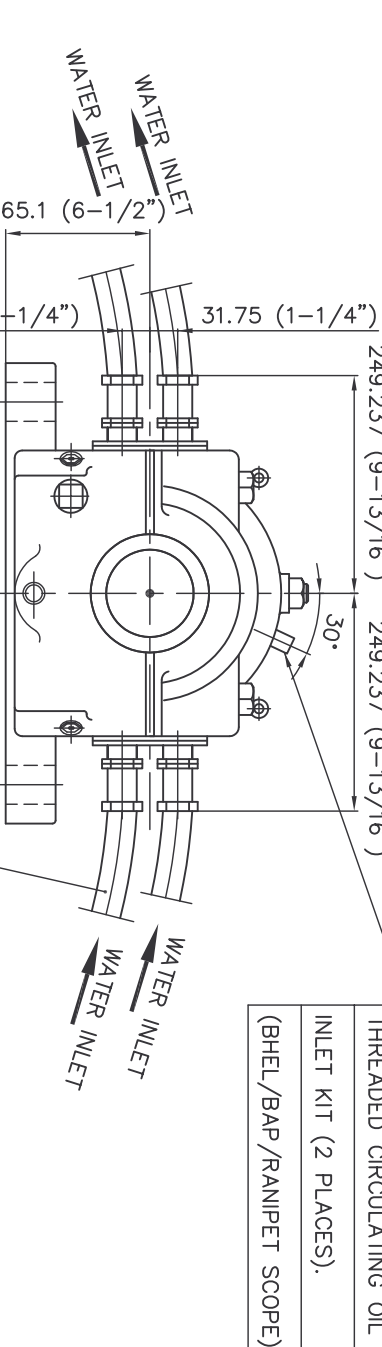
MOTOR SHAFT END Δ_{01}



FAN SHAFT END



3-15/16" RTL BEARING



WIND & SEISMIC LOADS ON FAN FOUNDATION DUE TO ACOUSTIC ENCLOSURE

FAN	SEISMIC LOAD ON FAN FOUNDATION DUE TO THE ACOUSTIC ENCLOSURE(NN)						WIND LOAD ON FAN FOUNDATION DUE TO THE ACOUSTIC ENCLOSURE					
	Hx (kN)	V1 (kN)	V2 (kN)	L1 (m)	Hx (kN)	V1 (kN)	V2 (kN)	L1 (m)	Hx (kN)	V1 (kN)	V2 (kN)	L2 (m)
PRIMARY AIR FAN	±25	±9.8	±9.8	7.65	±40	±20.5	±25.5	4.7	±52	±20.4	±20.4	7.65
										±44.2	±44.2	4.7

- | | |
|--|---|
| <p>ASSUMPTIONS MADE:</p> <p>1. THE TOTAL LOAD IS COMPOSED AT A RATIO OF 1/3 VIBRATIONS (AS PER THE PROBLETS) & 2/3 THE ACTUAL CG IS ABOVE 1/2 DUE TO THE LOAD BY ACUSTIC ENCLOSURE CILING.</p> <p>2. CORRESPONDING ROR SAFE DESIGN, THE CG FOR WIND LOAD IS ALSO ASSUMED TO BE 1 METER INSTEAD OF 1/2.</p> <p>3. IDENTIFYING MIGHT OF ACUSTIC ENCLOSURE: 10000 kg/m²</p> | <p>LEADING OF THE ACUSTIC ENCLOSURE (FOR PA-FAN 1.0)</p> <p>1. THE REACTION FORCE'S CAUSED BY WIND & SEISMIC LOAD ON FAN FOUNDATION DUE TO THE ACUSTIC ENCLOSURE (KN)</p> <p>2. THE LENGTH OF THE FAN FOUNDATION ALONG X-Y DIRECTION RESPECTIVELY.</p> |
|--|---|

REV	DATE	FILED R.N.R. #
03	16.06.09	CHKD & APPD V.P.S. <i>VP</i>

01. DRAWING UPDATED AS PER CONSULTA
COMMENTS, Dt. 16.03.2009.
a. FAN FOUNDATION UPDATED.

02. FOUNDATION CONFIGURATION UPDATED.

- a. ADDED.
- b. KEY PLAN UPDATED.
- c. ELEVATION LEVEL INDICATED.

CAUTION: THE INFORMATION CONTAINED HEREIN IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE. IT MUST NOT BE USED IN ANY MANNER THAT COULD BE DETRIMENTAL TO THE INTERESTS OF THE UNITED STATES.

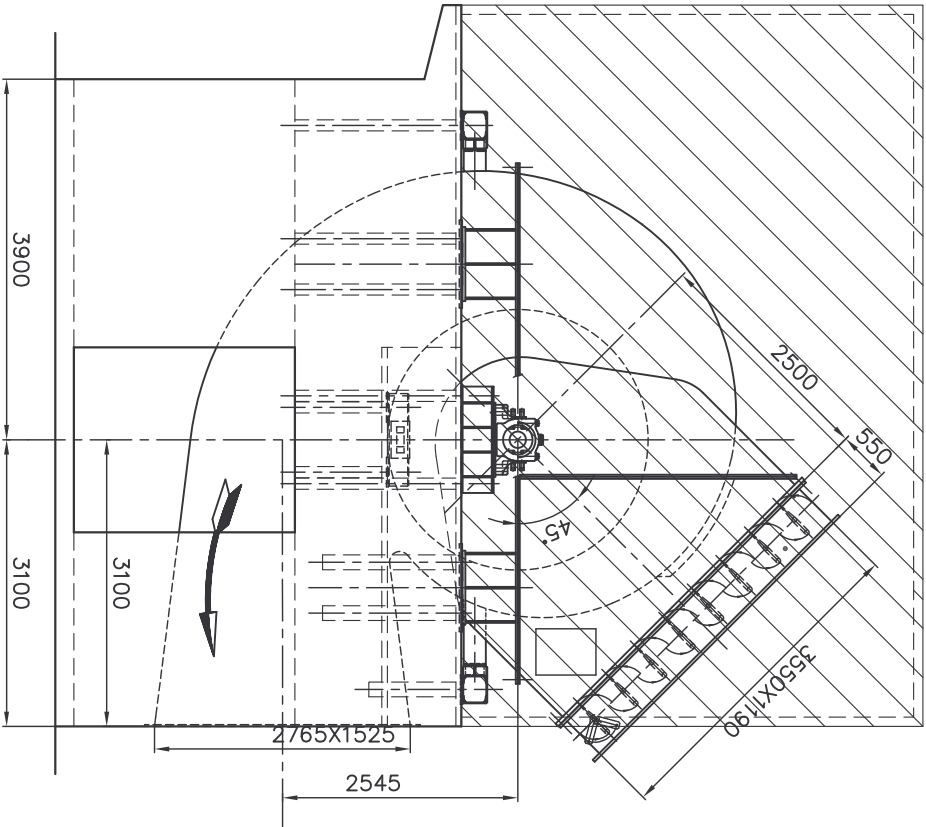
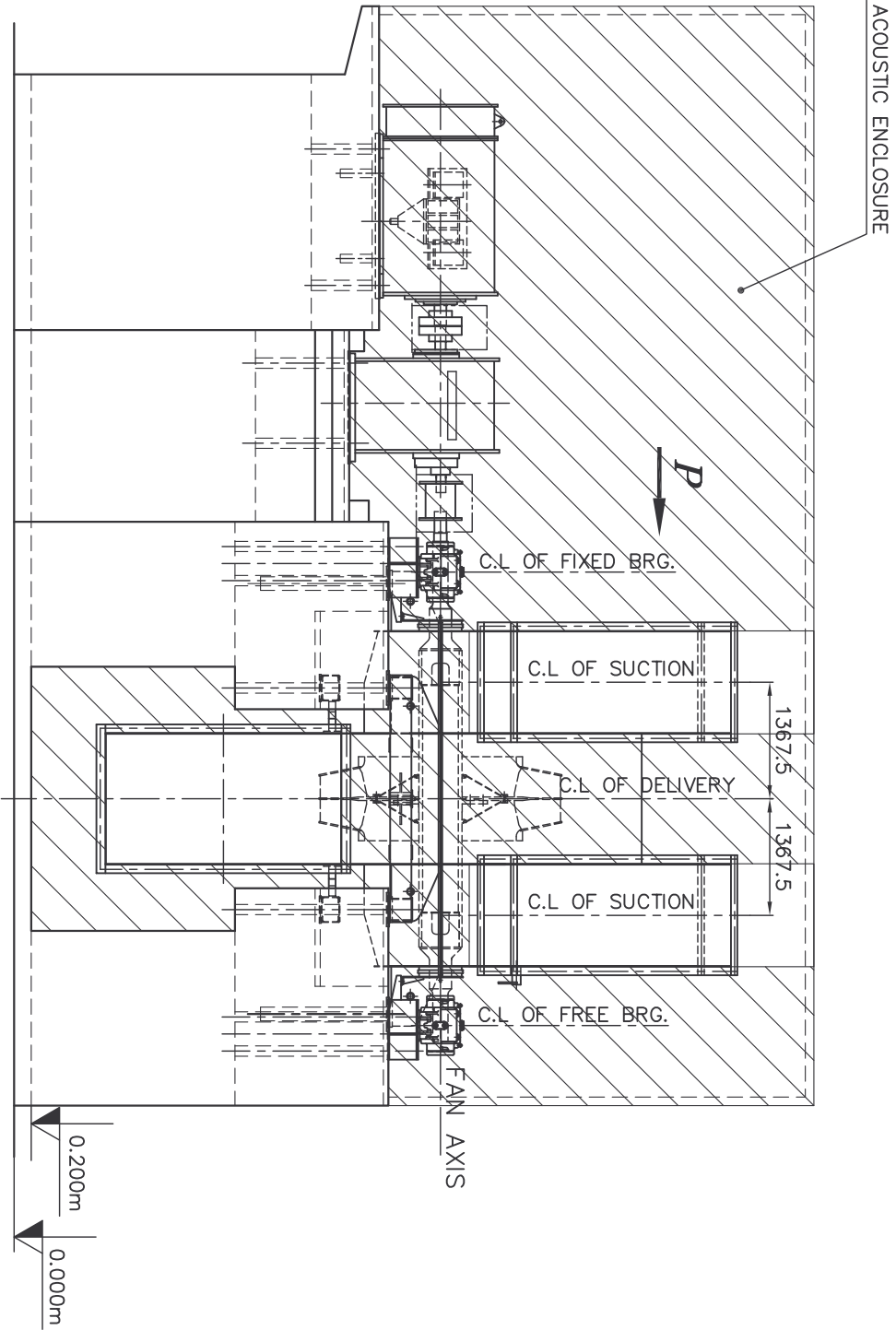
ALL DIMENSIONS ARE IN MILLIMETRES



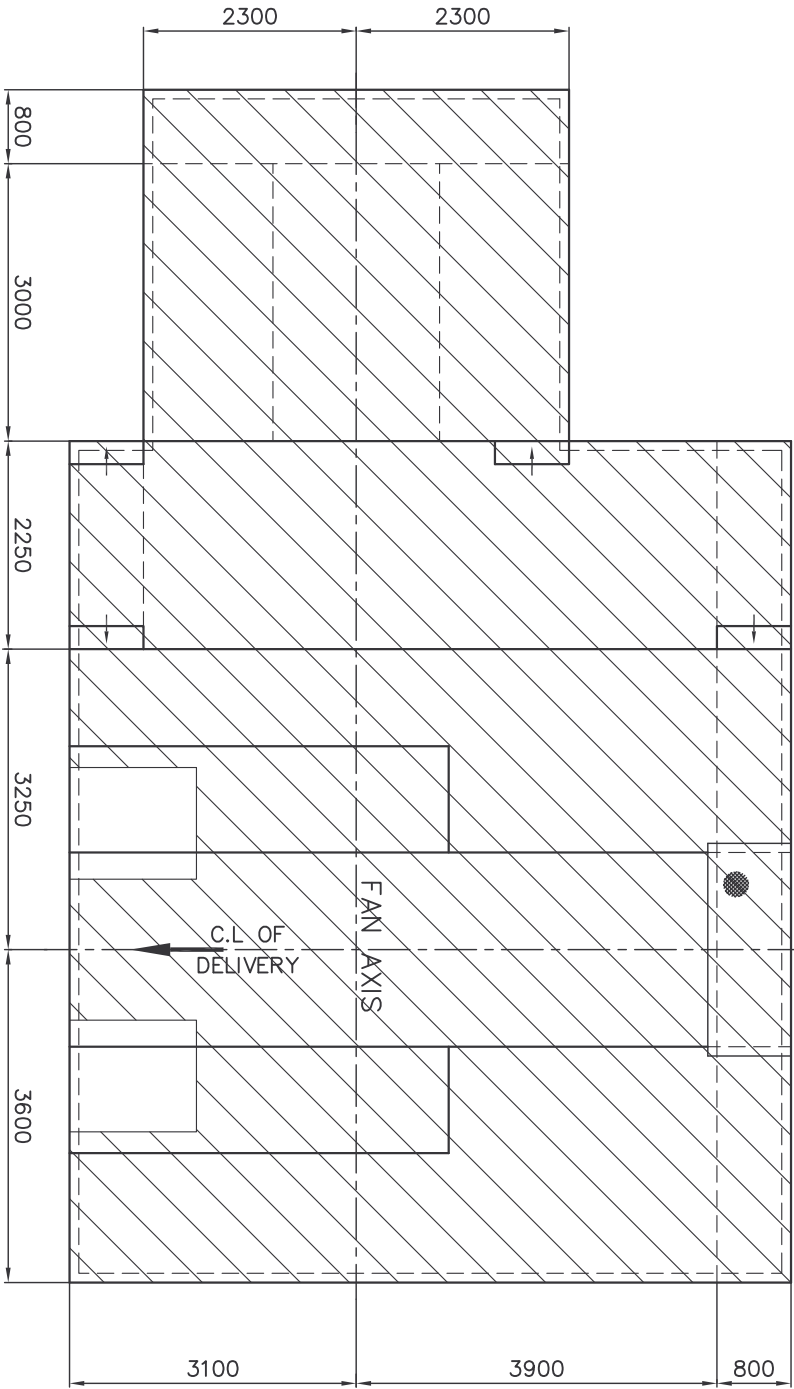
Technical drawing of a bolt head and nut. The bolt head is shown in elevation as a hexagon with a central hole and in plan view as a circle with a central hole. The nut is shown in elevation as a hexagon with a central hole and in plan view as a circle with a central hole. Dimensions are given in millimeters.

11364 Kg/s, 132 bar(o), 535±5° C

7	REV. 03
---	------------

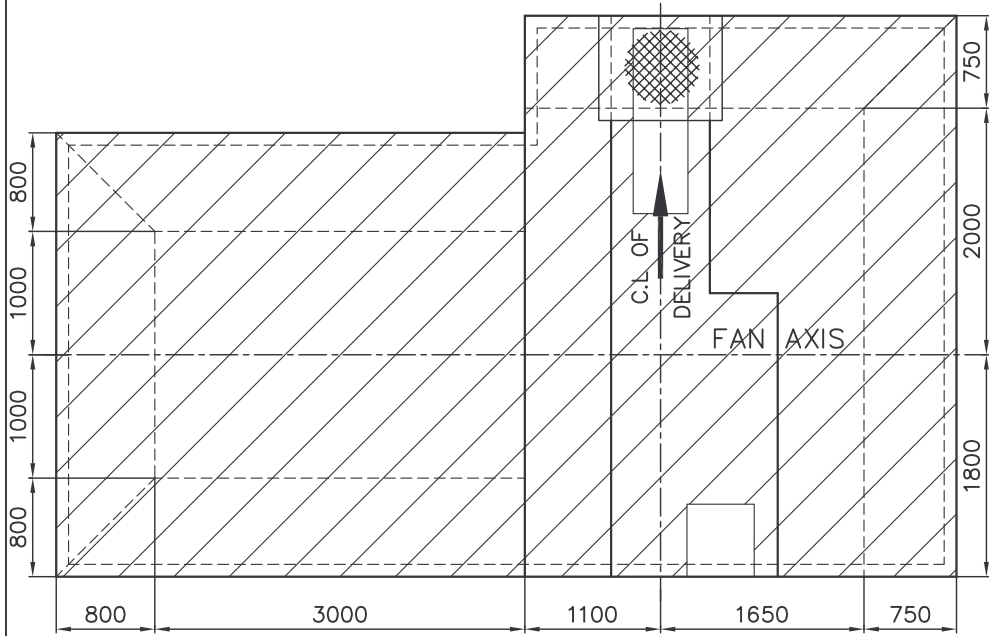
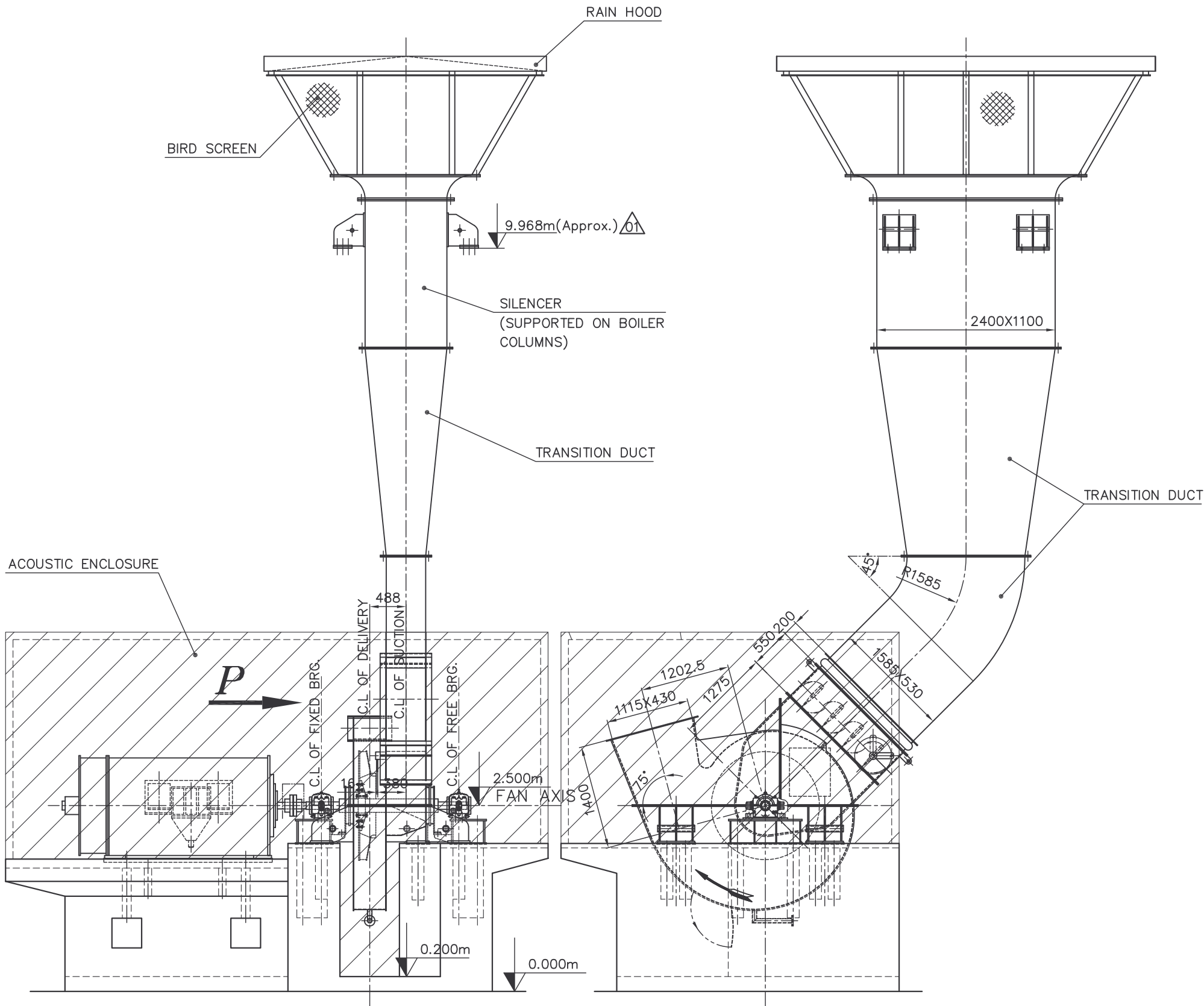


VIEW-P
(WITHOUT MOTOR & HYDRAULIC COUPLING
AND THEIR FOUNDATIONS)



PROJECT		CUSTOMER Nos. R124 & R125	
KONIAMBO NICKEL PROJECT 2 x 135 MW CFBC BOILERS 113.64 Kg/s; 132 bar(a);, 535±5° C / 535±5° C			
BHARAT HEAVY ELECTRICALS LTD. BOILER AUXILIARIES PLANT RANIPET – 632 406			
DRN.	K.N.R	TITLE	
CHD.	V.P.S	ARRANGEMENT OF	
APPD.	P.S.P	ACOUSTIC ENCLOSURE	
DATE	09.08.2008	FOR INDUCED DRAFT FAN	
ALL DIMENSIONS ARE IN mm		SKETCH NO.	REV.
		30-A-PROP-07256	00

VIEW-P
(WITHOUT MOTOR & ITS FOUNDATION)



CUSTOMER Nos.
R124 & R125

PROJECT **KONIAMBO NICKEL PROJECT**
2 x 135 MW CFBC BOILERS
113.64 Kg/s; 132 bar(a); 535±5° C /535±5° C



BHARAT HEAVY ELECTRICALS LTD.
BOILER AUXILIARIES PLANT
RANIPET - 632 406

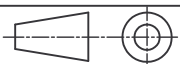
DRN.	K.N.R	<i>K. Natarajan</i>
CHD.	V.P.S	<i>V.P. Suresh Babu</i>
APPD.	P.S.P	<i>P. S. Prasad</i>
DATE	09.08.2008	

TITLE
**ARRANGEMENT OF SILENCER
AND ACOUSTIC ENCLOSURE
FOR PRIMARY AIR FAN**

REV	DATE	ALTERED	S.SURESH BABU
01	06.06.09	CHKD & APPD	V.P.SHYAM

01.SILENCER SUPPORT ELEVATION INDICATED.

ALL DIMENSIONS ARE IN mm

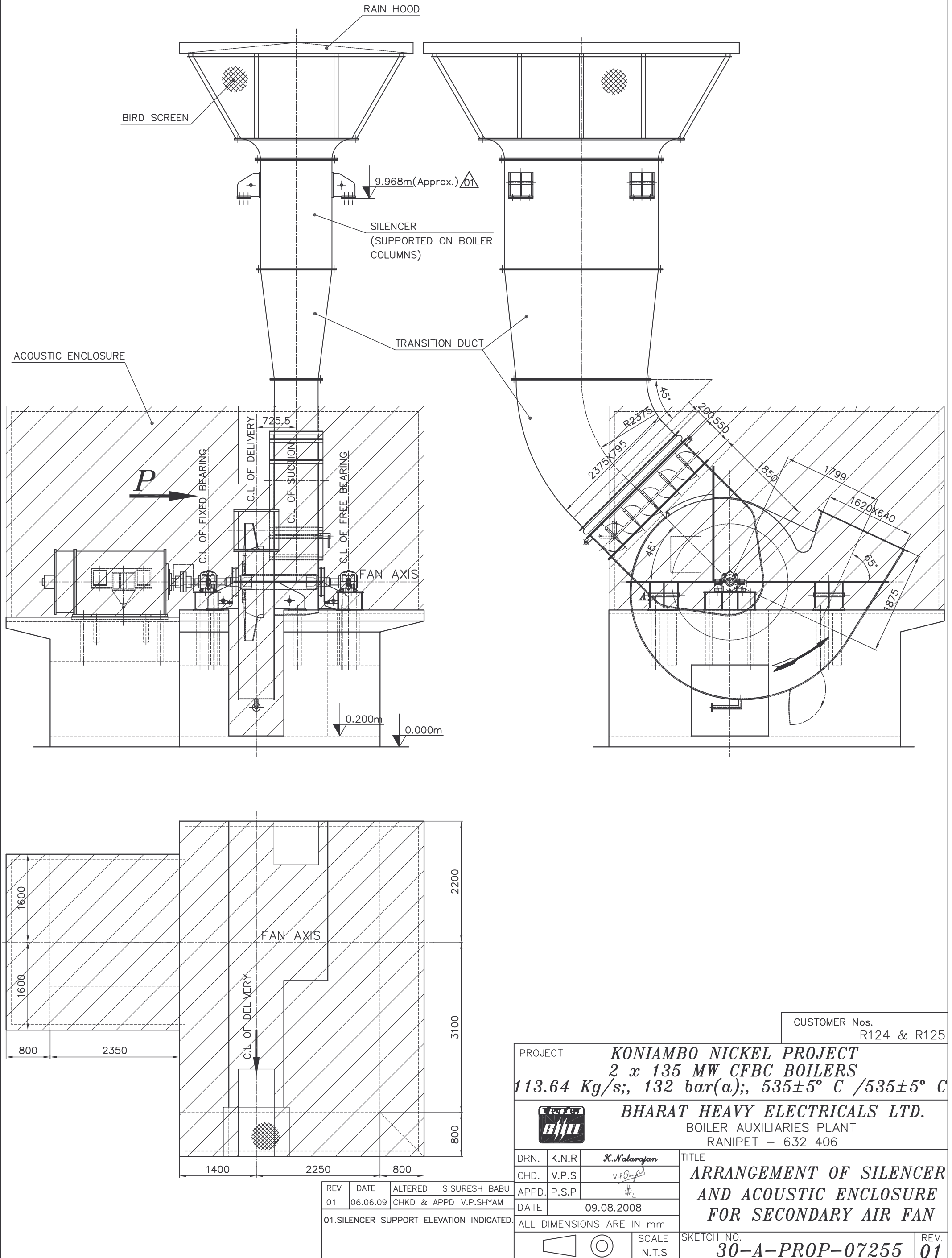


SCALE
N.T.S

SKETCH NO.
30-A-PROP-07257

REV.	01
------	-----------

VIEW-P
(WITHOUT MOTOR & ITS FOUNDATION)





BHARAT HEAVY ELECTRICALS Ltd.

RANIPET 632 406

Phone No: 04172 254526, Fax: 04172 241176

BHEL reply to comments on noise level from EK:

Date:18.06.2009

1.What distance away from the surface were the measurements taken?

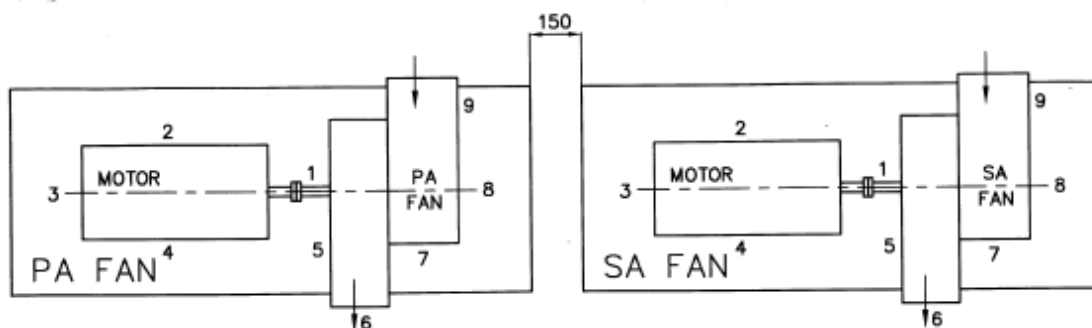
The measurements were made at a distance of 1m from the surface of the equipment.

2.Are levels in dB or dBA?

The noise levels are in dBA .

3.Provide overall noise level(dBA) for all measurement locations?

Overall noise level for all measurement locations:



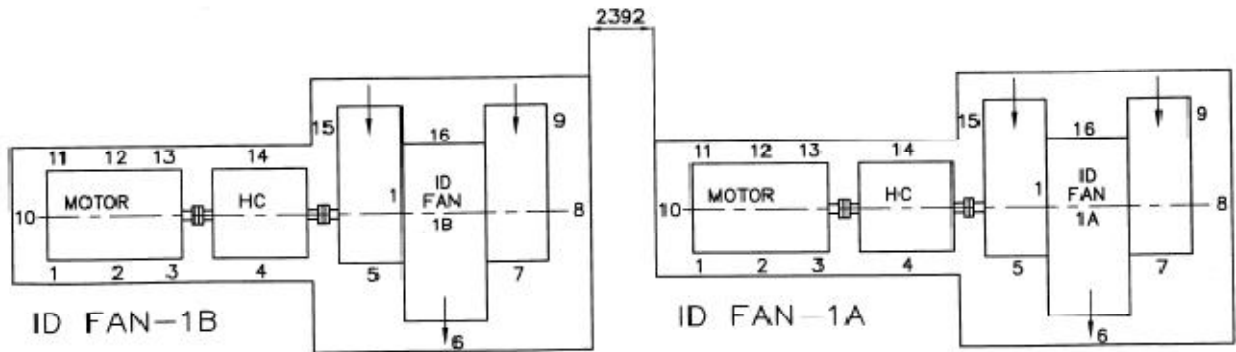
Overall Noise at various locations	PA fan NDV 13	SA FAN NDV 21
Location 1	97.7	99.1
Location 2	94.0	95.6
Location 3	95.6	97.2
Location 4	95.9	97.1
Location 5	103.0	105.5
Location 6	96.5	100.6
Location 7	98.2	105.6
Location 8	101.1	98.4
Location 9	100.4	95.3



BHARAT HEAVY ELECTRICALS Ltd.

RANIPET 632 406

Phone No: 04172 254526, Fax: 04172 241176



Overall Noise at various locations	ID fan 1A NDZV 28	ID fan 1B NDZV 28
Location 1	83.8	82.0
Location 2	84.1	83.9
Location 3	84.9	85.5
Location 4	85.3	86.3
Location 5	79.6	81.4
Location 6	75.9	77.6
Location 7	75.1	76.3
Location 8	72.5	78.7
Location 9	74.8	79.6
Location 10	85.6	86.9
Location 11	82.6	83.9
Location 12	85.4	85.6
Location 13	85.4	86.3
Location 14	86.9	86.4
Location 15	85.4	84.8
Location 16	84.6	85.5



BHARAT HEAVY ELECTRICALS Ltd.

RANIPET 632 406

Phone No: 04172 254526, Fax: 04172 241176

4. Must also provide discharge and intake noise levels.

Noise measurements were not made specifically at inlet and outlet of fans. The locations where the measurements were made are as already indicated.

5. Order of magnitude error with this measurement.

Corrected and given below

Fan Type: SA FAN

NDV21

FREQUENCY (Hz)	MEASURED NOISE LEVEL								
	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
31.5	85.5	83.1	84.1	84.2	89.9	86.8	89.2	85.5	83.1
63	87.3	85.1	85.9	86.2	91.6	88.6	90.8	87.3	84.8
125	89.1	87.0	87.9	87.8	93.6	90.5	93.2	89.4	86.9
250	91.9	85.5	87.1	86.7	102.0	93.7	101.9	91.6	86.1
500	92.7	87.7	91.2	91.2	98.6	94.2	99.8	90.4	87.1
1000	90.3	87.3	88.2	88.0	94.4	92.1	94.2	89.1	86.3
2000	88.7	86.0	87.0	86.4	92.4	89.5	92.2	88.1	85.2
4000	88.0	85.5	86.5	86.3	92.0	89.2	91.5	87.9	85.3
8000	88.2	86.1	87.0	86.9	92.4	89.4	91.8	88.2	85.9

Corrected Values for Location number 5.

6. Provide overall noise level for each location.

Same as comment number 3.

With Regards,

R.Giridharan

Engineer-EDC Fans