Bharat Heavy Electricals Limited
Heavy Electrical Equipment Plant, Haridwar-249403
Works Engineering & Services
Works Contract Section
NOTICE INVITING TENDER

(Open Tender)

Tender Document

Name of Work: "Hiring of 02 nos. balancing pedestals and electronics for over speed balancing installation in block-1".
Tender Enquiry No.: BHEL/HEEP/WEX-WCS/21-22/2140/20210001 DT 05.04.2021
Due date of Tender Opening: 27.04.2021
Type of Bid: Two Part

Place of Submission of Tender / Bid:

Through email at tendercell.heep@bhel.in
OR
Through Post at "Tender Room, Purchase Deptt., 4th floor,
Main Administrative Building, HEEP
BHEL Haridwar-249403 (Uttarakhand)"

1. *Himanshu Arora, Dy. Manager(WEX-WCS)*
Contact Address: WCS, ADM-4, BHEL (HEEP), Haridwar-249403
Email: harora@bhel.in ;
Phone: +91-1334-281932; Fax: +91-1334-226460

2. *Shiv Charan Meena, Manager (WEX-WCS)*
Contact Address: WCS, ADM-4, BHEL (HEEP), Haridwar-249403
Email: shiv.charan@bhel.in
Phone: +91-1334-284137; Fax: +91-1334-226460

3. *Tenzin Norsang, DGM (WEX-WCS)*
Contact Address: WCS, ADM-4, BHEL (HEEP), Haridwar-249403
Email: tenzin_n@bhel.in
Phone: +91-1334-281176; Fax: +91-1334-226460

Document can be downloaded from www.bhel.com/ www.bhelhwr.co.in
Note: *All corrigenda / addenda / amendments / time extensions / clarifications, etc. to the tender will be hosted on our website i.e. www.bhel.com / www.bhelhwr.co.in only and will not be published in any other media. Bidders should regularly visit above website to keep themselves updated.*

I/We agree with the above

Signature of Issuing officer

Signature of Bidder with Stamp

DETAILS OF TENDER DOCUMENT

The Tender document has been detailed as follows:

Part-I (TECHNO-COMMERCIAL BID)

1. Cover page
2. Index
3. Notice Inviting Tender (NIT)
4. Details of Bid & Bidder (To be filled by bidder)
5. General Instructions to Tenderer
6. General Terms & Conditions of Tender
7. Scope of Work
8. Payment Terms, LD & Penalty Condition
9. Pre-Qualification criteria (PQR)
10. Un-price Price Bid
11. Annexure-X
12. No Deviation Certificate
13. Check List
14. Annexure-E (Balancing Standards)

Part-II (PRICE BID)

1. Price Bid (ANNEXURE-F)

I/We agree with the above

Signature of Issuing officer

Signature of Bidder with Stamp

NOTICE FOR TENDER (NIT)

BHARAT HEAVY ELECTRICAL LIMITED
HEEP, Haridwar-249403(UTTARAKHAND)

Name of Dept	Works Engineering & Services (Works Contract Section)		
Phone	*01334-281932*	Fax	01334-226460
Email Address	harora@bhel.in; shiv.charan@bhel.in *tenzin_n@bhel.in ;*		
Contact Person	Himanshu Arora		
NIT Key.	20210001	Dated	05.04.2021
NIT No.	BHEL/HEEP/WEX-WCS/21-22/2140/20210001 DT 05.04.2021		
NIT No. on www.bhel.com			
NIT No. on www.bhelhwr.co.in			

Type Of Tender	**Open**			
#Tender Cost (in INR)	500 (Inclusive of Taxes) & NIL for tender downloaded from website			
EMD (in INR)	Rs. 57,600/-			
Period of completion of work	06 Months			
Two Part Bid /single bid	Two Part Bid			
NIT Value (in Rs.)	Rs. 28,80,000/- + GST extra as applicable			
Last Date of Sale of Tender	26.04.2021		**Time :**	02:30PM
Last Date of submission of Tender	27.04.2021		**Time :**	01:45PM
* **Date and Time for opening of Technical Bid**	27.04.2021		**Time :**	02:00PM
Place Of submission of Tender	**Through email: tendercell.heep@bhel.in Or** **Tender Room, Purchase Deptt., 4th floor, Main Administrative Building, BHEL , HEEP, Haridwar-249403 (Uttarakhand)**			

* In case of two-part bid, date of opening of Tender means the date of opening of Techno-commercial bid. However, date of opening of price bid shall be intimated to technically qualified parties. If the due date of tender opening happens to be a holiday, the tenders will be opened on the next working Tuesday/Friday.

Tender cost & EMD shall be submitted either in form of cash receipt issued by cash section, BHEL, HEEP, Haridwar (subject to provision of Income tax act) or Demand draft issued by any nationalised bank in favour of Sr. Accounts Officer (Cash), BHEL, HEEP, Haridwar separately in two different envelopes superscribed as Tender cost and EMD respectively. However Tender cost is non-refundable. ***Tender fee & EMD shall be exempted subject to submission of valid MSME/EM-II/NSIC Certificate (duly notarized or attested by a Gazetted officer) and Tender Fee shall be exempted for tender documents downloaded from website.***

Name of Work: "Hiring of 02 nos. balancing pedestals and electronics for overs peed balancing installation in block-1"

Contracting Executive Name: Himanshu Arora

Date:

1. BHEL reserves the right to accept or reject any/ all application(s) without assigning any reason thereof.
2. If any document submitted by tenderer found false at any stage, the tender/ work order will be cancelled immediately and the financial loss to BHEL if any in making alternative arrangement will be recovered from the contractor.
3. BHEL will not be responsible for the loss or delay of tenders in transit in any case.
4. All further corrigenda, addenda, amendments, time extensions, clarifications & etc. to the tender, if any shall only be notified on BHEL websites (www.bhel.com / www.bhelhwr.co.in) as applicable.
5. For detailed instructions/information refer the tender document on BHEL website.

I/We agree with the above

Signature of Issuing officer

Signature of Bidder with Stamp

Details of Bid & Bidder (To be filled by bidder)

(a) Bidder Offer No.: _____ Date: _____

(b) Legal Name of the bidder as in GST registration: _____

(c) GST registration No._____

(d)State_____

(e) Place of business_____

(f) Category of registration under GST (i.e. Registered dealer / Unregistered dealer/ dealer opted for Composition Scheme):

_____

(g) Address of the Bidder: _____

(h) Email Id and Contact No. of the Bidder: _____

(i) PAN No. Of Bidder (A copy of PAN Card to be submitted_____

Note: If GST registration is not applicable, Bidder shall submit justification of the same and will also provide supporting documents.

I/We agree with the above

Signature of Issuing officer

Signature of Bidder with Stamp

General Instructions to Tenderer

The Contractors who wish to participate should **go through the Tender documents thoroughly** and plan well before quoting, to ensure that the Tender process is not aborted / vitiated, due to their reasons.

1.0 Quoting & Signing the Tender

a. Before Quoting, the tenderers are advised to inspect the site of work and its environment and be well acquainted with the actual working and other relevant conditions, position of materials and labor. Tenderers are also requested to go through General -Terms & conditions, Special -Terms & conditions of tender, Scope of work, Technical Terms & Conditions, drawings and specifications and all other documents which are part of tender will form part of the agreement to be entered into.

b. While quoting the rate, the tenderer is advised to take into account the likely expenditure, taxes etc. during the operation of the Contract period from the date of commencement of work as directed by BHEL.

c. While quoting the rates the tenderer is advised to take into account all factors including any fluctuations in market rates. No claim will be entertained on this account after acceptance of the tender or during the execution of the contract.

d. All entries in Tender documents shall be clearly written in one ink or typed. All the corrections / cancellations / insertions, if any, shall be duly attested by the Bidders concerned.

e. Rates should be quoted as per the Price Bid. Rates quoted in any other form will not be accepted and is liable to be rejected.
   a) If, in the price structure quoted for the required goods / services / works, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by the quantity), the unit price shall prevail and the total price corrected accordingly, unless in the opinion of the purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price corrected accordingly.
   b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
   c) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject of e(a) and e(b) above.
   d) If there is such discrepancy in an offer, the same shall be conveyed to the bidder with target date up to which the bidder has to send his acceptance on the above lines and if the bidder does not agree to the decision of the purchaser, the bid is liable to be ignored.

f. The Bidder shall fill in all the required particulars of the Tender documents and also sign & Stamp on each and every page of the Tender documents (Techno- Commercial Bid, Price Bids, Terms & Conditions etc.) including corrigendum & the drawing attached therein while submitting their tender.

g. Should a Bidder find discrepancies or omissions in the Tender documents or should there any doubt as to their meaning, he should at once address the authority inviting the Tender, for clarification well before the due date, so as to submit his Tender in time.

h. Every endeavor is made to avoid any error which can materially affect the basis of the tender but the successful tenderer shall take upon himself to provide for the risk or any error which may be subsequently discovered and shall make no subsequent claim on account thereof.

i. Tenders not in accordance with the Tender conditions herein contained and the Tenders not in original ARE LIABLE TO BE REJECTED.

j. If a Bidder deliberately gives wrong information in his Tender or creates conditions favorable for the acceptance of his Tender, BHEL WILL REJECT SUCH TENDER AT ANY STAGE.

k. Words imparting singular number shall be deemed to include plural number and vice-versa where the context so requires.

l. Canvassing in any form, in connection with the Tender is strictly prohibited and such Tenders are bound to be rejected. All information furnished is taken to be authentic by the bidder for evaluation of the Tender. Should any information be found incorrect subsequently, at any later stage, the Tender / Contract shall be rejected / terminated and action as per BHEL Policy, rules & prevailing Guidelines shall be taken.

I/We agree with the above

Signature of Issuing officer

Signature of Bidder with Stamp

m. Should a Bidder's or a Contractor's or in the case of a firm or company of Contractors / any of its shareholder's or shareholder's relative be employed in BHEL Haridwar, the authority inviting the Tenders shall be informed in writing of this fact at the time of submission of the Tender, failing which the Tender may be disqualified, or if such fact subsequently comes to light, the Contract may be cancelled.
n. The Tender schedule and the Tender shall be deemed to form an integral part of the Contract to be entered into for this work.
o. Tenders are to be submitted in **Tender Room, Purchase Deptt., 4th floor , Main Administrative Building, BHEL, HEEP, Haridwar-249403 (Uttarakhand)** upto 01:45 PM on the date of tender opening. BHEL will not be responsible for any consequences that may arise leading to delay in submission of tender/bid.
p. Late and Delayed Tenders shall be rejected.
q. In case of Limited Tender Enquiry if you are not interested to submit the offer, please send a letter specifying the same.
r. Price bid should not be enclosed along with the techno commercial bid and other documents in the same cover/envelope. The price bids have to be given category wise in a sealed cover and the entire lot of price bid sealed covers will have to be kept in a separate large cover, duly sealed.

ALL THE REQUIRED DOCUMENTS SHALL BE FILLED IN THE SAME SERIAL ORDER AS PER THE FORMAT / COLUMN OF THE "TECHNO-COMMERCIAL BID". ALL THE PAGES SHALL BE SERIALLY NUMBERED ON THE RIGHT HAND SIDE TOP CORNER. PAGE NUMBERS AND DETAILS OF THE CONCERNED DOCUMENTS ALSO SHALL BE FILLED IN "TECHNO- COMMERCIAL BID" IN THE BOXES PROVIDED. ALL THE PAGES OF TENDER DOCUMENTS ARE TO BE DULY SIGNED AND STAMPED BY THE BIDDER.

s. All the envelopes shall be super-scribed with Name of work, NIT No. & Date of Tender Opening with the Name & Complete address of the bidder.
t. The envelope Containing Price Bid shall additionally be super-scribed as "PRICE BID" and the envelope containing Techno-commercial bid shall be additionally super-scribed with "TECHNO-COMMERCIAL BID".
u. Tender Fees & EMD or Proof related to exemption as required as per Terms & Conditions of Tender shall be kept in Techno-commercial bid envelope.
v. ***The contractor must ink sign and stamp on each page of tender document including supporting documents submitted with tender.***
w. The annual maintenance and service contract shall be governed as per the BHEL Works policy, Rules & General conditions of the contract.
x. Bidders shall enclose the certificate of satisfactory performance, from previous customer in the Techno-Commercial Bid envelope, along-with the tender documents in support of their claim of having minimum experience of similar works and /or provide all documents as per PQR criteria.
y. Vendor shall ensure meeting all statutory obligations as applicable during the contract period.
z. Deviation from any of the specified requirements should be clearly brought out on a separate sheet titled as deviation. In case of no deviation a ***"NO DEVIATION STATEMENT"*** shall be submitted with the tender (Techno-commercial offer).

2.0 Signing the Tender

a. The Tender shall be signed by the Authorized Signatory Only.
b. Authorized signatory shall be the Proprietor.
c. In case the Bidder is a Partnership Firm under Partnership Act, the Tender shall be signed by all the Partners of the firm or by Partner having authority to sign on behalf of all other partners. Copy of the authority should be enclosed.
d. In case the Bidder is a company, authorized signatory of the company. Copy of the authority will have to be enclosed.
e. In case of Power of Attorney (POA). A copy of the Power of Attorney, duly attested by the issuer shall accompany the tender.

I/We agree with the above

Signature of Issuing officer

Signature of Bidder with Stamp

f. If the POA is revoked during the existence of the contract, it shall be the responsibility of the of the issuer to inform the same to BHEL. The issuer shall remain bound by the acts committed under the POA till the date of such information to BHEL.

3.0 Date / Time for opening of Tender

a. Sealed covers so received will be opened at **Tender Room, Purchase Deptt., 4th floor, Main Administrative Building, BHEL, HEEP, Haridwar-249403 (Uttarakhand)** at 02:00 PM on the same day of due date of tender submission as per NIT (Notice inviting Tender) in the presence of the Bidders or their Authorised Representatives who may choose to witness the same.
b. The Techno Commercial bids only will be opened in case of two-part bid.
c. In case of two-part bid, the Price Bids of bidders, who are technically qualified will be opened later. The date & time of price bid opening will be informed to the technically qualified Bidders.

4.0 Witnessing the Tender opening

a. The representative of the Bidder may choose to witness the Tender opening and have to produce the Authorization Letter in the tender room, before opening of the Tender. The representatives without Authorization Letter will not be allowed to participate in the Tender opening.
b. Only one representative from one bidder will be allowed to participate in the Tender opening.

5.0 Quoting

a. Quoting best rate and the sanctity of the L1 status.
b. Quoting the lowest best rate is a must against this Tender. However, bidders are required to understand that the lowest rate offered by them or accepted by them, as the case may be should be honoured throughout the period of the Contract.

6.0 Participation

The Parties who have been suspended or black listed or banned by BHEL HEEP, Haridwar or any other BHEL Unit will not be allowed to participate in the Tender and the bidder should declare the same in the Tender. Even during the course of evaluation / finalization of Tender if it is found that some of the parties are black listed / barred from business transactions / under business hold, BHEL will reject their offer.

7.0 Validity of Offers:

The rates quoted shall be valid for acceptance for a minimum period of 120 days from the date of tender opening. Withdrawal of Tender or increasing the rates during this validity period is not allowed. Date of tender opening shall be date of opening of first/Techno-commercial bid.

8.0 Address for sending the offer:

The offer should be sent to address as below well in advance so that it reaches before or on due date and time through registered post or in person.

In charge, Tender Room, Purchase Deptt., 4th floor, Main Administrative Building, BHEL, HEEP, Haridwar-249403 (Uttarakhand).

I/We agree with the above

Signature of Issuing officer

Signature of Bidder with Stamp

Submission of E-mail bids:

1. Bidders may also submit tenders/bids through email from their official email id on tendercell.heep@bhel.in . Tenders/bids submitted through email should be in pdf format with separate password protection for both techno-commercial bid and price bid. The attached file name shall carry NIT/ Enquiry number and super scribed with techno-commercial Bid and Price Bid so that both bids can be separately identified before opening. The date and time of Price Bid opening will be informed to the technically qualified bidders normally two days before date of price bid opening.

   Bidder is required to share the password for opening of techno-commercial bid/ price bid through email on tendercell.heep@bhel.in after 01:45 PM (IST) on the opening date of Techno-commercial bid/ price bid. Bidder to share the relevant bid opening password only. However, if no password is received up to 04:00 PM (IST) bids will not be opened and shall be ignored.

   BHEL will not be responsible for any consequences that may arise due to submission of wrong password by the bidder.

   Bidder submitting offer through email shall be super scribed as per subject below:

   a. Tender Enquiry Reference no. (NIT no.) _____

   b. Bid opening date (Part 1, Techno commercial) _____
2. Bid submission through email will be considered as consent to open the bid without physically witnessing the event.
3. Bidders may submit EMD and tender fee through Electronic Fund Transfer credited in BHEL account (before time/ date of tender opening i.e. 01:45 PM (IST) on the scheduled date and attach receipt of online transaction along with the techno-commercial bid. BHEL account details are as below:

   NAME: BHEL HEEP COLLECTION A/C
   ADDRESS: RANIPUR, HARIDWAR
   ACCOUNT NO. : 10667995458
   IFSC CODE: SBIN0000586

Note: -

1. In case of any ambiguity/discrepancy between any clause of "General Terms & Conditions" and "Special Terms & Conditions, Scope of Work, Technical Terms & Conditions and Bill of Quantity" the clause of "Special Terms & Conditions, Scope of Work, Technical Terms & Conditions and Bill of Quantity" shall prevail.

I/We agree with the above

Signature of Issuing officer

Signature of Bidder with Stamp

General Terms & Conditions of Tender

1. GENERAL

These general terms & conditions shall apply to all the Tender Enquiries, notice inviting tenders, request for quotations concerning the works/services contracts pertaining to Bharat Heavy Electricals Ltd., HEEP, Haridwar (hereinafter referred to as BHEL or the Purchaser). In case of placement of order these conditions will become part of Work Order (W.O.) until unless the deviations are specifically agreed by BHEL.

2. DEFINITIONS

In these general conditions of contract the following terms shall have the meaning hereby assigned to them except where the context otherwise requires: -

(a) "***THE CONTRACT***" shall mean the notice inviting the tender and acceptance thereof and the formal agreement if any, executed between the Bharat Heavy Electricals Ltd., Heavy Electrical Equipment Plant, Haridwar and the contractor together with the documents referred to there in including these conditions, and any special conditions, specifications, designs, drawings etc. All these documents taken shall be deemed to form one contract and shall be complementary to one another.

(b) The **"TENDER DOCUMENT"** means the form of tender as applicable with General and Special Conditions of contract, and the specifications and/or drawings as given to contractors for the purpose of preparing their tender including "Notice Inviting Tender".

(c) The **"WORK"** means the work described in the tender documents in individual work order and/ or accompanying drawings and specifications as may be issued from time to time to the contractor by the Engineer-In-Charge in writing the power conferred upon them, including all modifications or additional works and obligations to be carried out either at the site or in factory, workshop or any other place as may be essentially required for the performance of the work.

(d) The **"SITE"** means the land and/ or other place on into or through which the work is to be executed under the contract or any adjacent land, part or structure which may be allotted to or used for the purpose of carrying out the contract.

(e) The **"CONTRACTOR"** shall mean the individual of firm or company whether incorporated or not, undertaking the work and shall include legal representatives of such individual or persons composing such firm or incorporated company or successors of such person, firms or company as the case may be and permitted assignee of such individual or firm or company.

(f) The abbreviations" Engr/Sr. Engineer / Dy. Mgr/ Mgr./ Sr. Mgr/ DGM/ Sr.DGM" means Engineer/ Senior Engineer/ Deputy Manager/ Manager/ Senior Manager/ Deputy General Manager/ Sr.Dy. General Manager respectively who will direct the contract.

(g) The **"ENGINEER-IN-CHARGE"** means the Engineer/ Sr. Engineer or any other executive deputed by BHEL to supervise the work or part of the work on behalf of the First Party.

(h) Accepting authority: As per BHEL Delegation of Power.

(i) **"APPROVED"** means the approval of directions of the Engineer/ Sr. Engineer or any other executive or person deputed by them for the particular purpose.
BHEL means the Bharat Heavy Electricals Limited/ HEEP plant of the said Company at Ranipur, Hardwar.

(j) The **"CONTRACT SUM"** means the sum accepted or the sum calculated in accordance with the prices accepted in tender and/ or the Contract rate as applicable to the contractor for the entire execution and full completion of the work.

(k) The **"FINAL SUM"** means the actual amount payable under the contract by BHEL to the contractor for the entire execution and full completion of the work.

(l) The **"TIME OF COMPLETION"** is the date or dates for completion of the work or any part of the work as set out in or ascertained in accordance with the individual work or the tender documents or any subsequent amendments thereto.

I/We agree with the above

Signature of Bidder/Contractor with Stamp

(m) A **"WEEK"** means seven days without regard to the number of hours worked in any day in that week.

(n) A **"DAY"** shall mean a day of 24 hours from midnight to midnight irrespective of the number of hours worked in that day.

(o) A **"WORK DAY"** means day other than that prescribed by the Negotiable Instruments Act, as being a holiday and consists of the number of hours of labour as commonly recognized by good employers in the trade, in the district where the work is carried out or as laid in the BHEL Rules and Regulations.

(p) **"DEVIATION ORDER"** means any order given by the Engineer-In-Charge to effect an alteration, addition or deduction, which does not radically affect the scope and nature of the contract.

(q) **"EMERGENCY WORK "** means any urgent measures which in the opinion of the Engineer-In-Charge become necessary during the progress of the work to obviate any risk of accident or failure or which become necessary for security.

(r) **"PROVISIONAL SUM"** or **"PROVISIONAL LUMPSUM"** means a lump sum included by the BHEL in the work for which details are not available at the time of inviting tender.

(s) **"PROVISIONAL ITEMS"** means items for which approximate quantities have been included in the tender documents.

3. EARNEST MONEY DEPOSIT

(a) Vendor is required to deposit the EMD as specified in NIT.

(b) EMD shall not carry any interest.

(c) Modes of deposit:
The EMD may be accepted only in the following forms:

(i) Cash deposit as permissible under the extant Income Tax Act (before tender opening)

(ii) Electronic Fund Transfer credited in BHEL account (before tender opening)

(iii) Banker's cheque/ Pay order/ Demand draft, in favour of BHEL (along with offer)

(iv) Fixed Deposit Receipt (FDR) issued by Scheduled banks/Public Financial Institutions as defined in the companies Act. **(FDR should be in the name of the contractor, a/c BHEL)**
In addition to above, the EMD amount in excess of Rs. Two Lakh may also be accepted in the form of Bank Guarantee from scheduled bank. The Bank Guarantee in such cases shall be valid for at least six months.

(d) Forfeiture of EMD
EMD by the Tenderer will be forfeited as per NIT conditions, if:

(i) After opening the tender and within the offer validity period, the tenderer revokes his tender or makes any modification in his tender which is not acceptable to BHEL.

(ii) The Contractor fails to deposit the required Security deposit or commence the work within the period as per LOI/ Contract.

(e) EMD by the tenderer shall be withheld in case any action on the tenderer is envisaged under the provisions of extant "Guidelines on Suspension of business dealings with suppliers/ contractors" and forfeited/ released based on the action as determined under these guidelines.

(f) EMD given by all unsuccessful tenderers shall be refunded normally within fifteen days of award of work.

(g) EMD of successful tenderer will be retained as part of Security Deposit.

(h) EMD deposited in any modes other than specified at (c) above shall lead to cancellation of the offer.

4. SECURITY DEPOSIT

(a) Successful vendor shall require to deposit security. The total amount of Security Deposit will be 5% of the contract value. EMD of the successful tenderer shall be converted and adjusted towards the required amount of Security Deposit.

(b) Modes of deposit:

I/We agree with the above

Signature of Bidder/Contractor with Stamp

The balance amount to make up the required Security Deposit of 5% of the contract value may be accepted in the following forms:

i) Cash (as permissible under the extant Income Tax Act)

ii) Local cheques of Scheduled Banks (subject to realization)/ Pay Order/ Demand Draft/ Electronic Fund Transfer in favour of BHEL

iii) Bank Guarantee from Scheduled Banks/ Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL

iv) Fixed Deposit Receipt issued by Scheduled Banks/ Public Financial Institutions as defined in the Companies Act (FDR should be in the name of the Contractor, a/c BHEL)

v) Securities available from Indian Post offices such as National Savings Certificates, Kisan Vikas Patras etc. (held in the name of Contractor furnishing the security and duly endorsed/ hypothecated/ pledged, as applicable, in favour of BHEL)

(c) BHEL will not be liable or responsible in any manner for the collection of interest or renewal of the documents or in any other matter connected therewith)

(d) The Security Deposit shall not carry any interest.

(e) The additional condition of Security Deposit (If any) shall be specified in Special Terms & Conditions of tender.

(f) Refund of Security Deposit

After completion of work awarded, provided always that the contractor shall first have been paid final bill and have rendered a "No Demand" certificate, the security deposit mentioned in condition above shall be refunded to the contractor as follows: 100% shall be released within 3 months of satisfactory completion of the work duly verified by Site/Engineer-In-charge.

5. COMMERCIAL TERMS

- Prices shall be quoted on "Firm Price" basis only.
- Validity of offer shall be for a minimum period of 120 days from the date of Tender Opening.

6. **SPECIAL CONDITIONS FOR MSME**

"MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM II certificate having deemed validity (five years from the date of issue of acknowledgement in EM II) or valid NSIC certificate or EM II certificate along with attested copy of a CA certificate (Format enclosed at Annexure -1 where deemed validity of EM II certificate of five years has expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their, bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer."

UAM need not required to be notarized or attested.

7. **SETTLEMENT OF DISPUTES/ARBITRATION**

In all cases of dispute, the matter shall be referred for ARBITRATION by sole arbitrator to be appointed by the Unit Head of Bharat Heavy Electricals Ltd., at HARIDWAR. The award of the Arbitrator shall be final and binding on both the parties. The place of Arbitration shall be Haridwar.

JURIDICTION: The courts of Haridwar, India, shall have exclusive jurisdiction.

8. RISK PURCHASE CLAUSE

In case of delays in supplies / defective supplies or non-fulfilment of any other terms & conditions given in the work order the purchaser/contracting executive may cancel the work order in full or part thereof and may also make the purchase of the material / service from elsewhere / alternative source at the risk and cost of supplier. Vendor/Contractor does not agree to above clause, their offer is liable to be rejected. In case any vendor/contractor accepts risk purchase clause initially and

I/We agree with the above

Signature of Bidder/Contractor with Stamp

subsequently declines to honour the term in the eventuality of RISK PURCHASE, they may be banned for business with BHEL."

9. FORCE MAJEURE CLAUSE

Notwithstanding any other thing contained anywhere else in the contract or WO (Work Order), In case the discharge of obligation under the contract by either party is impeded or made unreasonably onerous, neither party shall be considered in breach of the contract to the extent that performance of their respective obligation is prevented by an event of Force Majeure that arises after the effective date (WO date). In the above clause, Force Majeure means an event beyond the control of the parties to the contract which prevents a party from complying with any obligation of the contract including but not limited to:

a) Act of God (Such as but not limited to earthquake, drought, tidal waves, floods etc.).

b) War (whether war be declared or not), Hostilities Invasion, Act of foreign enemy etc.

c) Rebellion, revolution, insurrection, civil war etc.

d) Contamination of Radio Activity from any nuclear fuel or from any other nuclear waste or any other hazardous materials.

e) Riots, commotions, strike unless restricted to the employees of supplier.

f) Acts of terrorism.

g) Other unforeseeable circumstances beyond the control of the parties and which the affected party cannot avoid even by using its best efforts.

h) Cancellation of contract by customer.

i) Change in law / government. Regulation making the performance impossible.

The party claiming to be affected by force majeure shall notify the other party in writing immediately without delay on the intervention and on the cessation of such circumstances.

Irrespective of any extension of time, if an event of force majeure occurs and its effect continues for more than 180 days the affected party shall have right to cancel the contract.

As soon as reasonably practicable following the date of commencement of a Force Majeure Event, and within a reasonable time following the date of termination of a Force Majeure Event, either Party invoking it shall submit to the other Party reasonable proof of the nature of the Force Majeure Event and of its effect upon the performance of the Party's obligations under this Agreement.

The party shall, and shall ensure that its Subcontractors shall, at all times take all reasonable steps within their respective powers and consistent with Good Operating Practices (but without incurring unreasonable additional costs) to:

a) Prevent Force Majeure Events affecting the performance of the party's obligations under this Agreement.

b) Mitigate the effect of any Force Majeure Event.

c) Comply with its obligations under this Agreement.

If the war like situation has developed in a country where a seller's works is located in this W.O. or there is political instability and Indian Embassy located in that country forbids or advises for not having any business dealing with the sellers located in such zone / region/ country, then BHEL reserves the right to cancel the order.

10. FRAUD PREVENTION POLICY

The Bidder along with its associate / collaborators / sub – vendors / consultants / service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about fraud or suspected fraud as soon as it comes to their notice".

I/We agree with the above

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Fraud Prevention policy and List of Nodal Officers shall be hosted on BHEL website, vendor portals of Units / Regions intranet.

11. SUSPENSION OF BUSINESS DEALINGS WITH SUPPLIERS/CONTRACTORS

In order to protect the commercial interests of BHEL, it becomes necessary to take action against suppliers / contractors by way of suspension of business dealings, who either fail to perform or are in default without any reasonable cause, cause loss of business / money / reputation, indulged in malpractices, cheating, bribery, fraud or any other misconducts or formation of cartel so as to influence the bidding process or influence the price etc. Penal action can be initiated on the suppliers / Contractors in line with extant "Guidelines for Suspension of Business Dealings with Suppliers / Contractors". The abridged version of extant 'Guidelines for suspension of business dealings with suppliers / contractors' has been uploaded on http://www.bhel.com on "supplier registration page".

12. IMPLEMENTATION OF INTEGRITY PACT (IP)

Bidders shall submit Integrity Pact (IP), duly signed by its authorized signatory who signs in the offer, along with their techno-commercial bids wherever estimated tender value is Rs. 2 Crore or above. This pact shall be considered as a preliminary qualification for further participation.

12A. INTEGRITY PACT (IP)

i). IP is a tool to ensure that activities and transactions between the Company and its Bidders /Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitor (IEM) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.

Sl No	IEM	Email
1	Shri Arun Chandra Verma, IPS (Retd.)	acverma1@gmail.com
2	Shri Virendra Bahadur Singh, IPS (Retd.)	vbsinghips@gmail.com

ii). The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, in case of two/ three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

iii). Please refer Section-8 of the IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to the above IEM. All correspondence with the IEM shall be done through email only.

Note: No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are mentioned on the first page of tender documents.

13. DAMAGE & LOSS TO PRIVATE PROPERTY & INJURY TO CONTRACT EMPLOYEE

The Contractor shall at his own expense reinstate and make good to the satisfaction of BHEL and pay compensation for any injury, loss or damage occurred to any property or rights whatever including property and rights of BHEL (or agents) servants or employee of BHEL, the injury loss or damage arising out of or in any way in connection with the execution or purported execution of the Contract and further the Contractor shall indemnify, the BHEL against all claims enforceable against BHEL (or any agent, servant or employee of BHEL) or which would be so enforceable against BHEL where BHEL is a private person, in respect of any such injury (including injury resulting in death) loss or damage to any person whomsoever or property including all claims which may arise under the Workmen's Compensation Act or otherwise.

14. RIGHT OF ACCEPTANCE

a) BHARAT HEAVY ELECTRICALS LIMITED HARIDWAR reserves the right to reject any or all the bids / quotations without assigning any reason thereof. BHEL also reserves the right to increase or decrease the tendered quantities. Bidders should be prepared to accept order for reduced quantity without any extra charges.

I/We agree with the above

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b) Any discount /revised offer / bids submitted by a bidder on its own shall be considered, provided it is received on or before the due date and time of offer / bid submission (Part-1). Conditional discounts shall not be considered for evaluation of tenders.

c) Unsolicited discounts / revised offers / bids given after Part-1 bid opening shall not be accepted. No change in price will be permitted within the validity period asked for in the tender enquiry.

d) In case of changes in scope and / or technical specification and / or commercial terms & conditions having price implication, techno-commercially acceptable bidders shall be asked by BHEL to submit the impact of such changes on their price bids. In case a bidder opts to submit revised price bid instead of impact called for then the latest price bid shall prevail. However, in both situations, original price bid will be necessarily opened.

e) The bidder whose bid is technically not accepted will be informed & EMD wherever submitted shall be returned after finalization of contract. EMD shall be forfeited in the event of bidder opting out after tender opening.

f) BHEL reserves the right to short close the existing Purchase Order / Rate Contract / Work Order or any extension thereof at any stage.

15. PRICE SCHEDULE

a) Kindly quote your prices in figures and words both. In case of any discrepancy in value, the prices quoted in words shall be considered for evaluation and establishing L1 status.

b) Applicable IGST / CGST / SGST and any other statutory levy should be indicated separately and clearly in the bid / quotation
NB: Financial evaluation of L1, L2 ….Status will be on the basis of Landed Cost to BHEL.

16. **GST RELATED TERMS & CONDITIONS**

Bidder has to specify the following in their techno-commercial bid (part I bid in case of two part bid):

I. a) Legal Name of the bidder as in GST registration, GST registration No., State, Place of business, category of registration under GST i.e. Registered dealer / Unregistered dealer/ dealer opted for Composition Scheme,

b) HSN (Harmonised System Nomenclature) / SAC (Service Accounting Code), description of Goods/Services and applicable IGST / CGST / SGST rate and any other statutory levy, if any, for each item of Goods or Services.

II. a) Unregistered Dealer

Since in case of unregistered dealer, GST will have to be paid by BHEL under reverse charge mechanism, the same shall be added to the quoted price for evaluation bid.

b) Dealer opting for Composition Scheme

In case of registered dealer, who opt for composition scheme at the time of submission of bid, no GST will be payable to the bidder and also same will not be considered for evaluation of bid. Dealer has to declare in technical bid that no GST is shown separately in price bid. However, in case at the time of actual supply, the bidder charges GST at normal rate, the same shall be reimbursed subject to the availability of GST credit to BHEL. In case GST credit is not available to BHEL, no GST will be payable to the bidder.

III. Reimbursement of GST shall be made by BHEL-Haridwar on matching of Contractor inputs as mentioned below at GST portal and after ensuring of availability of input credit to BHEL, Haridwar. Hence, Contractor has to ensure compliance as follows-

a) Timely raising & submission of GST compliant Invoices
b) Timely receipt of Goods & Services
c) Timely and correct payment of applicable GST by supplier/contractor
d) Timely filing of return
e) Compliance of other applicable provisions on supplier/contractor:

I/We agree with the above

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Contractor has to also give consent to accept payment of tax after such matching in all cases where bills are submitted directly to BHEL-Haridwar or through bank or under LC or through any other mode.

IV. In the event of any disallowance of input credit (including reversal of credit) or applicability of interest or arising of any other financial liability on BHEL-Haridwar due to any default of supplier/contractor under GST such as non/delayed receipt of Good/Services, delayed raising & submission of invoices, delayed payment of tax, non/wrong declaration of sale by Contractor in return etc. or any other reason not attributable to BHEL, such implication shall be to supplier's/contractor's account and will be deducted from bills.

V. In the event of any change in the status of the bidder after submission of the bid but before the supply/service, GST applicable at the time of supply/service or GST quoted in the bid, based on the registration status of the bidder, whichever is lower shall be payable.

VI. Statutory Variation in Taxes & duties as applicable at the time of supply shall be payable. However, in the event of no change in law but bidder quoting certain tax structure in bid document which is lower than the applicable one, such amount shall be the maximum amount of tax that can be claimed by bidder.

VII. In case of Liquidated damage (LD) recovery, the applicable GST shall also be recoverable from the suppliers.

VIII. As per the extant GST rules, as of now it is not mandatory to file returns immediately and ITC has been allowed on self-declaration. In view of the changed scenario, the payment of GST shall made to the contractors simultaneously with their work/services invoices. The Contractors / vendors shall need to submit the undertaking as per the following format before such GST payments. However in case the availability of ITC on self-declaration is discontinued at the time of submission of invoice then the clause II above shall be applicable.

Certificate of Goods and Service to be furnished by Contractor with each bill / invoice

We hereby undertake that:

1. Goods and Service Tax charged in the following Invoices / Bill Numbers are in compliance with the provision of GST Act & Rules prevailing thereon:

Sl. No	PO No/ Work Order	Invoice No	Invoice date	GST Amount

2. Goods and Service Tax charged in the Bill / Invoice shall be paid by us within due time.

3. Any liability due to any delay / default in payment of GST, return filling or any other NON-compliance under GST Law / Rules, shall be to our account.

4. In the event of any non-compliance on our part, We indemnify BHEL for any financial burden / loss on account of GST / interest / penalty.

5. We give our consent to BHEL to recover any such financial burden if arises on BHEL due to any non-compliance from any outstanding bills. In the event of Nil outstanding, same shall be paid by us to BHEL.

6. In the event of any such default, we agree BHEL to pay all future GST reimbursement after verification of GST compliance under the law.

7. We understand that this arrangement shall be valid till the credit of Input Tax Credit (ITC) is available without online validation or further amendment if any affecting admissibility of ITC to BHEL.

Signature of Authorized Signatory (with seal)
GST No:

I/We agree with the above

Signature of Bidder/Contractor with Stamp

IX. The provisional GST registration number of Bharat Heavy Electrical Ltd, Heavy Electricals Equipment Plant, Ranipur, Haridwar is "05AAACB4146P1ZL" with state Code as "05" and State Name as "Uttarakhand".

17. SPECIAL POWERS OF TERMINATION

If at any time after the acceptance of the tender, BHEL shall for any reason whatsoever not require the whole or any part of the work, to be carried out, the Engineer In charge shall give notice in writing of the fact to the contractor, who shall have no claim to any payment of compensation or otherwise, howsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not derive in consequence of the foreclosing of the work.

The contractor shall be paid at contract rates for the full amount of the work executed including such additional work i.e., cleaning of site etc. as may be rendered necessary by the said foreclosing. He shall also be allowed a reasonable payment (as decided by the Accepting Officer) for any expenses sustained on account of labour and material collected but which could not be utilized on the work as verified by the Engineer In charge but the contractor shall not have any claim for compensation on account of any alterations having been made in the original specifications, drawings, designs and instructions involving and curtailment of the work as originally contemplated.

18. PUBLIC PROCUREMENT PREFERENCE TO MAKE IN INDIA, ORDER 2017

For this procurement, Public Procurement (Preference to Make in India), Order 2017 dated 15.06.2017, 28.05.2018, 29.05.2019 & 04.06.2020 and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of this NIT but before finalization of contract/ PO/WO against this NIT. In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and / or local content in respect of this procurement, same shall be applicable.

19. OVERWRITING IN PRICE BIDS

Bid should be free from correction, overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else shall be liable for rejection.

20. GENERAL NOTES

a. Rates shall be quoted in figures as well as in words and contractor must put his signature & Seal on each page of the tender documents / undertakings, while submitting his offer, failing of which tender may be liable for rejection.

b. BHEL reserves the right to cancel the tender at any stage of tendering till signing of agreement without assigning any reason(s) thereof. The tender cost in that event shall not be refunded.

c. The contractor shall not employ any worker less than 18 years of age during execution of his work.

d. In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders.
In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss / draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s).
Ranking will be done accordingly. BHEL's decision in such situations shall be final and binding."

e. The work shall be governed by the specifications, general terms & conditions of BHEL contract, special conditions, tender terms, environment related conditions, safety clause and any other relevant conditions applicable time to time.

f. The contractors are advised to see the site before quoting the rates.

g. BHEL reserves the right to award only a fraction or part of the work given in the bill of quantity.

I/We agree with the above

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h. Contractor found or reported for non-compliance of the legal obligations during the execution of the contract, shall be debarred from the issue of NITs for at least 01 year or till the proof of compliance is produced.

i. L1 may also be decided based on Reverse Auctioning based on the discretion of BHEL.

j. BHEL does not bind themselves to accept the lowest tender or any tender or to give any reason for their decision.

k. Contractor shall ensure all the safety provisions for the execution of the work awarded. It shall provide all the necessary PPE's (until & unless specified clearly about the issue of any PPE by BHEL in Special or any other Conditions of tender) to his workmen or any individual deployed by him for execution of the work and ensure usage of the same.

l. The evaluation currency for this tender shall be **INR.**

m. The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.

I/We agree with the above

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SCOPE OF THE WORK

Name of Work: Hiring of 02 nos. balancing pedestals and electronics for over speed balancing installation in block-1.

S. N.	DESCRIPTION	QTY	COMPLIANCE / REMARKS
1. 0	**PURPOSE:**		
	The balancing pedestals (Quantity=2 Nos.) and electronics are required for hire on rental basis for balancing of Turbo generator and exciter rotors in existing balancing tunnel of Overspeed Balancing Installation in Block-1 BHEL HEEP Haridwar.		
2. 0	**SCOPE OF SUPPLY:**		
	The scope of supply includes "Supply, Installation, Commissioning, Job Proving & Maintenance of 2 Nos. balancing Pedestals and electronics for Overspeed Balancing Installation in Block-1 for hire on rental basis for six month".	2 Nos.	
3.0	**WORKPIECE DIMENSIONS:**		
	Balancing Pedestals & electronics should be suitable to balance rigid and flexible rotors with following major dimensions: • Max. length of rotor : upto 15000 mm • Max. Rotor Diameter: upto 4000 mm • Rotor weight: 60 Tons max. i.e. max. permissible static load on one pedestal = 30Tons • Journal Diameter: max. upto 560 mm		
4.0	**INSTALLATION AND COMMISSIONING**		
4.1	Supplier shall bring in their balancing pedestals, measurement software and electronics circuitory required for balancing of Turbogenerator rotors and Exciter rotors at our existing balancing tunnel in block-1 on returnable basis. BHEL will allow the supplier to Install and commission the balancing pedestals in our existing balancing tunnel in block-1. **1. Installation and commissioning shall be in the scope of the supplier without any charges.** **2. De-installation whenever required shall also be in the scope of the supplier without any charge**		
4.2	All tools & tackles / equipments required during installation & commissioning of the balancing pedestals shall be brought by the vendor on returnable basis. Crane facility and lifting tackles like slings, ropes, D-Shackles shall be provided free of charges based on availability.		

I/We agree with the above

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4.3	Supplier shall make his own arrangement to bring the balancing pedestals and electronics to BHEL and also for return of the same in case supplier is not able to carry out successful balancing of prove out components or after end of the contract period.		
4.4	Supplier shall arrange for adequate protection and packing of the consignment so as to avoid loss and damage during transit and also take appropriate measures to prevent metal parts from rusting, corrosion and collision during transit. Handling instructions shall be clearly printed /painted on the packages. Each package should carry a detailed packing slip. Supplier shall be responsible for any loss/damage during transit due to defective/inadequate packing.		
5.0	**COMPATIBILITY OF BALANCING PEDESTALS & ELECTRONICS**		
	Supplier shall ensure compatibility of their supplied system with following.		
5.1	(A) WITH EXISTING TUNNEL The balancing pedestals, measurement software and electronics circuitory should be compatible to existing Tunnel, Drive motor, Transfer Trolley, Bed Rails, computers, output / display terminals etc. without changing the existing set up substantially.		
5.2	(B) WITH EXISTING TOOLINGS Balancing pedestals shall be suitable for Clockwise and anticlockwise direction of rotation, to existing toolings in use at BHEL i.e. Technological balancing Liners and Technological oil catchers. Drawings of the above toolings if required by the vendor shall be provided by BHEL.		
5.3	Supplier shall depute their representative to study the existing system and toolings in use at BHEL before submitting the offer. BHEL will allow the representative to study the existing system in BHEL.		
5.4	**NOTE:** Anything new required due to non-compatibility with the existing system / toolings at the time of installation & commissioning and job prove out shall be arranged by supplier without any cost implication.		
6.0	**BALANCING STANDARD**		
	Supplier to confirm that balancing will be carried out as per following BHEL Balancing Standards or better. • TG30006 Balancing of Brushless Exciter rotors • TG30008 Balancing of TG rotors of THRI and TARI designs. Both the standards are attached. (refer Annexure 'E')		
7.0	**PROVE OUT OF PEDESTALS AND ELECTRONICS**		

I/We agree with the above

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7.1	Supplier shall carryout prove out balancing of 2 nos. 660 MW and above rating Exciter rotors free of cost by their engineers, after installation and commissioning of the pedestals in the tunnel. In case vendor has already demonstrated prove out balancing of 02 nos. of 660MW and above rating exciter rotors at BHEL Haridwar works the prove out balancing as required above is waived off.		
7.2	In case supplier is not able to carry out successful balancing of prove out components, the balancing pedestals and electronics shall be taken back by the supplier without any payment i.e at no risk basis to BHEL.		
7.3	Subsequent to successful prove out of the balancing pedestals, BHEL will have the right to use the pedestals on exclusive use basis for a period of six months without any limitations on number or type of rotors being balanced on the pedestals.		
7.4	**Insurance of prove out component:** BHEL will carry out the Insurance of the prove out components (i.e. 2 nos 660MW rating exciter rotors) for one month for each rotor. Insurance premium cost will be deducted from the first running bill of the vendor after reckoning of hire period as per clause 8.1.		
8.0	**RECKONING OF HIRE PERIOD**		
8.1	Reckoning of hire period will start from the date of completion of successful free of cost balancing of prove out of 2 nos. 660 MW and above rating Brushless Exciter rotors as per cl. no. 7 by the supplier and certified by the Engineer (test bed). No payment shall be made to the supplier prior to this. In case of vendor who has already demonstrated prove out balancing of 02 nos. 660 MW and above rating Exciter rotors the reckoning of hire period will start from the date of successful installation and commissioning of pedestals at balancing installation at Block-1.		
8.2	BHEL can terminate the rental agreement during the period with one months' notice.		
9.0	**EXTENSION OF HIRE PERIOD**		
9.1	In case of satisfactory performance of the balancing pedestals & electronics, BHEL may extend the contract on same rates, terms and conditions up to six months.		
9.2	Validity of offer shall be for a minimum period of 180 days from the date of Tender Opening.		
10.0	**BALANCING TECHNIQUE AND TRAINING**		
	Supplier shall share the balancing technique being followed by them with all concerned in BHEL. Free of cost training on balancing pedestals, electronics and software to BHEL Engineers shall be provided by the supplier during prove out balancing of BHEL components at BHEL.		
11.0	**MAINTENANCE AND MACHINE CALIBRATION**		

I/We agree with the above

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11.1	Breakdown maintenance and machine calibration during the hire period will be provided free of cost by the supplier as and when required. In addition to breakdown maintenance preventive maintenance to be carried out on quarterly basis free of cost by the vendor. Supplier shall ensure ready availability of needed consumables / spares / tools & tackles at site during the entire tenure of the contract. In case if any complaint gets unattended for more than 2 days since informing to the supplier then penalty shall be levied on the supplier limited to the rate of rental charge per day from the date of complaint.		
11.2	Visit of maintenance and machine calibration personnel shall be free of cost during the contract period.		
12.0	**EXPERT VISITS**		
	Expert visits of upto 5 days in six months will be included free of cost by the supplier. Supplier to quote all inclusive charges i.e. transportation, boarding and lodging for visits beyond above free visits. BHEL will give call to the supplier as and when expert services shall be required.		
13.0	**OPERATION AND MAINTENANCE MANUALS :**	3 sets	
	Supplier to provide 3 sets of operation and maintenance manuals of the balancing Pedestals, Electronics and software. This should include detailed drawings/circuit diagrams with part numbers of spares/consumables etc. The same should be provided in CD-ROM also.		
14.0	**DELIVERY PERIOD:**		
	Material: Max. 3 months from the date of award of contract. Early delivery shall be acceptable.		

I/We agree with the above

Signature of Bidder/Contractor with Stamp

A) PAYMENT TERMS & CONDITIONS

(1) Payment Terms:

1. No advance payment shall be made to the vendor. Rental charges shall be payable on quarterly basis after reckoning/start of hire period as per cl. no.8 of Scope of work and on presentation of bills by the supplier after successful completion of 03 months along with submission of all necessary documents.
2. Running bills against work contractors shall be submitted for payment within 15 days from completion of quarter, unless there is some problem which shall be supported by document in this regards. BHEL will process such bills and release the payment within 30 days normally after receipt of bills.
3. Final bill against work contract shall be submitted to finance within one months from the date of actual completion of work contract i.e. within one month after final quarter, unless there is some problem which shall be supported by a document in this regard. Finance will process such bills and release the payment within one month normally after receiving the clear bill in finance.
4. All the payments shall be made through e-payment after submission of following documents along with the bill
    i) E-payment form duly filled (Form will be provided by BHEL).
    ii) Income tax exemption letter (if applicable).
    iii) GST certificate (Certificate Format will be provided by BHEL).
5. As per latest Input tax credit rules, time restriction has been imposed on availment of Input tax credit on input and input services. Wherever Input tax credit could not be availed within given time limit due to delay in submission of invoices or for any other reason attributable to vendors, loss of such Input tax credit will be recovered from such vendors.
6. Freight & transit insurance charges from dispatching station to BHEL, Haridwar shall be borne by the party.
7. The material will be dispatched to Central Plant stores, HEEP, BHEL, Haridwar with instructions to forward the same to Addl. General Manager (TEST BED), Block-1, HEEP, BHEL, Haridwar-249403.
8. Party not agreeing to our payment terms shall be rejected.

(2) LIQUIDATED DAMAGES (LD) CLAUSE): In cases of delay from schedule, attributable to the contractor due to any reason, LD @ 0.5% of the total order value per week of delay in deliveries subject to a maximum of 10% of the total order value. In case of any amendment /revision, the LD shall be linked to the amended /revised PO value.

3). Breakdown maintenance and machine calibration during the hire period will be provided free of cost by the supplier as and when required. In addition to breakdown maintenance preventive maintenance to be carried out on quarterly basis free of cost by the vendor. Supplier shall ensure ready availability of needed consumables / spares / tools & tackles at site during the entire tenure of the contract. In case if any complaint gets unattended for more than 2 days since informing to the supplier then penalty shall be levied on the supplier limited to the rate of rental charge per day from the date of complaint.

I/We agree with the above

Signature of Bidder/Contractor with Stamp

B) PRE-QUALIFYING REQUIREMENT

Considering indicative estimated value of the work **Rs. 28,80,000/- (exclusive of taxes)**, following PQR for subject work is recommended in line with the common PQR guidelines.

SL. NO	PRE QUALIFICATION CRITERIA	Bidders claim in respect of fulfilling the PQR Criteria Name and Description of qualifying criteria
A	**TECHNICAL CRITERIA**	Applicable
A.1	Bidder must be an Original Equipment Manufacturer (OEM) of Balancing pedestals and electronics or authorized representative of OEM. In case the bidder is an authorized representative, bidder should submit a valid Authorization document from the Original Equipment Manufacturer (OEM) of Balancing pedestals and electronics along with the offer.	
A.2	Bidder who wish to participate should have executed, during last seven years ending last day of month previous to the one in which applications are invited, work of hiring (rental basis / leasing) of one set of balancing pedestals and electronics for balancing of rotors upto 40 tonnes or more, for speed upto 3000 rpm or higher and over speeding at 3600 rpm or higher / OR similar work* as per the following: (a) One single work of similar nature valuing INR 23.04 Lacs or above "OR" (b) Two works of similar nature valuing each of INR 14.40 Lacs or above "OR" (c) Three works of similar nature valuing each of INR Rs 11.52 Lacs or above ***Similar work** means: - Supply, Installation and commissioning of one set of balancing pedestals and electronics for balancing of rotors upto 40 tonnes or more, for speed upto 3000 rpm or higher and over speeding at 3600 rpm or higher. In case the bidder being authorized representative, the condition shall be applicable for their principal, the detail from their principal is acceptable.	
A.3	The following information should be submitted by the vendor about the companies where referred balancing pedestals and electronics as per A.2 have been supplied. This is required from all the vendors for qualification of their offer. However, in case BHEL is one of the customers of bidder as per A.2 and bidder had balanced two rotors of 40 tonnes or more in BHEL successfully on their supplied pedestals & electronics then certificate of satisfactory performance (A.3.7) from BHEL is sufficient. In case the bidder being authorized representative, this condition shall be applicable for their principal, the detail from the principal's customer is acceptable.	
A.3.1	Name of the company / customer, where referred balancing pedestal and electronics set (s) is (are) commissioned.	
A.3.2	Complete postal address of the company / customer	
A.3.3	Month & Year of commissioning	
A.3.4	Parameters of balancing pedestals and electronics supplied (capacity in Metric Ton) & types of rotors and rpm for which pedestals are supplied.	

I/We agree with the above

Signature of Bidder/Contractor with Stamp

A.3.5	Name and designation of the contact person of the company / customer	
A.3.6	Phone, FAX no. & email address of contact person of the company / customer	
A.3.7	Agreement with Performance certificate clearly mentioning agreement no. and date from the customers regarding satisfactory performance of balancing pedestals and electronics supplied to them (Original Certificate or Through E-mail directly from the customer) for successful balancing and over speeding of at least one rotor as per A.2 after the date of successful commissioning of pedestals and electronics. The original performance certificate may be returned after verification by BHEL, if required.	
B	**FINANCIAL CRITERIA**	Applicable
B.1	**TURNOVER** Tenderers should have an average annual financial turnover of at least INR 8.64 Lacs of last three Financial Years (2017-2018, 2018-19 & 2019-20). Bidders shall submit copy of audited annual accounts (balance sheets and profit & loss account) in support of this.	

Notes :-

1. Relevant documents, meeting above requirements at Clause A and B shall be submitted by bidders otherwise their offer is liable to be rejected. Bidder to submit Balance Sheet and Profit and Loss Account for the respective years as given above along with all annexure. For verification purpose all submitted documents shall be self-attested and stamped by the bidder.
2. Tenderer must submit GST, Income Tax PAN No.
3. Name, Address, Phone no. and email of certificate issuing authority must be clearly mentioned by bidder in every relevant experience documents.
4. BHEL reserves the right to verify the information provided. Vendor is advised to attach only the relevant certificates against respective clause.
5. All the relevant documents required as per PQR should be submitted in an envelope along with the PQR.

I/We agree with the above

Signature of Bidder/Contractor with Stamp

UNPRICED PRICE BID

ANNEXURE-C

(Not to be filled. However, this is to be signed and submitted with Techno-commercial Bid)

Estimated Cost: Rs. 28,80,000/- GST extra as applicable) **Tender Cost:** Rs. 500/-

Date of Opening of Techno-commercial Bid (PART-1): 27.04.2021 **EMD value:** Rs.57,600/-

Period of Completion: 06 Months

Sl. No.	Item Description	Qty.	Unit	Quoted Rate in Figures (in INR)	Quoted Rate in Words (in INR)	GST Rate in percentage
1.	Hiring of 02 nos. Balancing Pedestal and Electronics for over speed Balancing installation in Block-1	6	PM	**XXXXXXXX**	**XXXXXXXXXX**	

Note:

1. Rate should be quoted in figures as well as in words. No cutting / Over Writing is allowed in rates. In case of contradiction between rate/percent quoted in figure and Words, the same mentioned in Words will prevail. For details refer General Instructions to Tenderer of Techno-Commercial Bid.

2. L1 will be decided after calculating price (multiplying rate and quantity)

3. GST shall be paid extra on actual basis.

   I/We have the read the Terms and Conditions and Contractual Obligation of contract as per the Techno-commercial Bid under this Tender Enquiry and undertake to fulfill all its requirement under the quoted rates.

I/We agree with the above

Signature of Bidder/Contractor with Stamp

ANNEXURE-'X'

Certificate by Charted Accountant on Letter Head

This is to certify that M/s …… (hereinafter referred to as 'company') having its registered office at ……is registered under MSMED Act 2006, Entrepreneur Memorandum No. Part –II ……Dtd: …… Category: …… (Micro/ small). (Copy enclosed).

Further verified from Books of account that the investment of the company as per the latest audited financial year…….. as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by Ministry of small scale Industries vide its notification No. S.O. 1722(E) Dtd. October 5 , 2006):
   Rs. …….. Lacs
2. **For Service Enterprises:** Investment in equipments (i.e. original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under MSMED Act, 2006):
   Rs. …….. Lacs

(Strike off whichever is not applicable)

The above investment of Rs…… Lacs is within permissible limit of Rs……Lacs for…… (Micro/ small) (Strike off whichever is not applicable) category under MSMED Act 2006.

Or

The company has graduated from its original capacity (Micro/ small) (Strike off whichever is not applicable) and date of graduation of such enterprise from its original capacity is……. (dd/mm/yy) which is within the period of 3 years from the date of graduation of such enterprise from its original category as notified vide S. O. No. 3322 (E) dated 01.11.2013 published in the gazette notification dated 04.11.2013 by ministry if MSME.

Date:
(Signature)
Name-
Membership No.-
Seal of Chartered accountant

I/We agree with the above

Signature of Bidder/Contractor with Stamp

Acceptance/ No Deviation Certificate

Notwithstanding anything mentioned in our bid, we hereby accept all terms and conditions of the above tender. Or we hereby accept all terms and conditions of the above tender except the following: (Give reference to Clause Nos. of Terms & Conditions which is not acceptable)

1.

2.

Note: Any deviation specified elsewhere in the tender shall not be considered. Deviations may or may not be accepted by BHEL.

I/We agree with the above

Signature of Bidder/Contractor with Stamp

Check List for Tenderer

Sr. No.	Details of Criteria	Yes/ No	Please fill the Detail/ Remarks/ Reference of documents attached in support of each point.
1	Ink Signed & stamped on each page of Techno-commercial bid		
2	Ink Signed & Stamped on each page of supporting Document		
3	Only Signed & stamped **Un-priced Price Bid**.		
4	Ink Signed & Stamped on both sides of Techno-commercial Bid and Supporting documents if print / photocopy has been taken on both sides of the paper		
5	Quoted **Price Bid** duly filled, signed and stamped, should be submitted separately in sealed envelope.		
6	MSME Documents (if applicable) self-attested		
7	Copy of GST Certificate.		
8	Copy of PAN card		

I/We agree with the above

Signature of Bidder/Contractor with Stamp

BALANCING OF BRUSHLESS EXCITER ROTORs

1.0 INTRODUCTION:

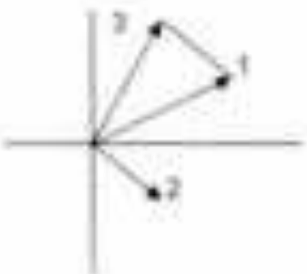
The description of the balancing process given herein refers to brushless exciter rotors. This rotor type belongs to the category of flexible rotors with one flexural mode within the operational speed range. The compensation of the unbalance is carried out in multi-correction planes.

In this case, not only the bearing vibrations are taken into account for balancing but also the vibration of the shaft. These shaft vibrations are measured by non-contact pick-ups in both directions horizontal and vertical.

All the measurements are taken at following balancing speeds:

- Operational speed (3000rpm)
- Near 1st Critical speed
- Low speed (below 1/3rd of the 1st Critical speed)

Measurements at low speed on the shaft representing the so-called shaft run out has to be subtracted from the measuring values taken at high speeds in order to get the dynamic component of the shaft vibration. The co-relation of the readings taken on the shaft and their components i.e. shaft run-out and vibration is depicted in figure here under:



Herein is:

1= Total reading taken at high speed on the shaft.

2= Shaft runout taken at low speed

3= Dynamic component of the shaft vibration.

Figure- 1

BL-1 (TR)	N. S. Rana				
TSX			TRANSLATED BY		
EMT	UDAY KUMAR		PREPARED BY	Reena Maurya	
QAX	B. B. Tripathy		CHECKED BY	S S Meena	
	NAME	DATE & SIGNATURE	SUPERVISED BY	Anupam Sharma	
			APPROVED : Rakesh Kumar (AGM/EME)		
REV NO. 06	SUPERSEDES		PREPARED EME	ISSUED TSX	DATE 22.09.1988
DT. 18.11.16					

It is recommended to carry out the balancing process in Cartesian components rather than in polar form. This recommendation refers to both the vibration measurements as well as the placement of balancing weights.

The rotor should be marked with a Cartesian coordinate system, the axes of which be named by "**X**" and "**Y**". In this way, a successive series of balancing measures can be taken by adding and removing weights in two components. Thus, only the groups of weights remaining in each correction plane should preferably be minimized to two. The total arrangement of correction planes is shown in figure-2a & 2b.

2.0 MARKING OF THE ROTOR & READINGS IN COMPONENTS:

The rotor is marked with "**X-Y**" coordinate system so that **+X** aligns with 0 degree, and **+Y** aligns with 90 degree and so on.

All readings during the balancing process are carried out in the components "X" and "Y" given below. The appropriate recording according to the figure is:

LEFT		RIGHT	
X	Y	X	Y
-30	-13	+15	-36

3.0 LOW SPEED BALANCING:

Low speed balancing is performed at speed where the dynamic behaviour of the rotor can be considered rigid at a speed less than 1/3rd of the first critical speed observed in the balancing facility.

The choice of appropriate process greatly depends on the kind of balancing machine used. In hard bearing machines the **abc-mode** shall be used which enables the unbalances in two selected planes to be directly indicated. The adjustment of the **abc-mode** is carried out according to figure-2a & 2b. Exciter Rotor assembly and balancing scheme drawings shall also be referred for dimensions of balancing planes and bearing locations.

If the compensating weights for the initial unbalance exceed 1/6th of the circumference of the balancing groove, the weight should be re-distributed to other planes.

The readings are taken in the components "**X**" and "**Y**" with the appropriate sensitivity factor "**s**" in terms of grams per div. The required no. of correction weights in the components "**X**" and "**Y**" are determined.

X = Scale divisions in "**X**" x **s/p**
Y = Scale divisions in "**Y**" x **s/p**
Where **p** = weight in grams of each balancing piece.

The same effect of the balancing move can also be achieved by removing weight pieces in the opposite axis of the component.

4.0 HIGH SPEED BALANCING:

As mentioned in Clause 1.0 above, three speeds are selected: operational, near the 1st critical and low speed. Bearing vibrations are measured at high speeds. Readings on the shaft are taken at high speeds and at low speed.

The shaft vibration values taken at low speed (approx. 600rpm or 1/3rd of first critical) on the shaft have to be subtracted from the values taken at higher speed as shown figure-1.

5.0 EVALUATION OF ONE TYPE OF BALANCE CORRECTION:

At high speed, the determination of correction weights is always carried out by test weights. The principle of this evaluation is same for all different type of weight configuration.

The procedure follows the steps shown below: (See Figure-3)

Take a set of readings in "**X-Y**" components at various speeds and select an appropriate balancing speed (Preferably the rated speed or a speed close to the critical speed).

Draw a graph with the axes "**X**" and "**Y**" and mark the 1st measuring point with the current number of the last balancing move.

Place the test weight **T** in one of the axes "**X**" or "**Y**".

The subsequent reading at the same balancing speed is marked in the graph with the current number of the move.

Connect the two measuring points and indicate the direction by an arrow and by an appropriate number of pieces and the respective **X-Y** axis of the test weight **T**.

Measure the length L of the connecting line.

Drop a perpendicular on to the (extended) connecting line and measure its length D.

Measure the distance E between the intersection and the point last measured.

Calculate number of required correction weights in each components as follows:

In the same axis as the test weight : T x E / L
Perpendicular to the test weight axis : T x D / L

Determine the appropriate "X-Y" components of the correction weight using a transparent "X-Y" coordinate system in the point last measured.

6.0 BALANCING WITH MORE THAN ONE WEIGHT TYPE:

The procedure shown in clause 5.0 above is confined exclusively to the evaluation of one correction weight type. It illustrates only the process. When balancing flexible rotors such as generators, exciters etc. the application of normally more than two different weight types can be mandatory. These various weight types may not be subsequently applied one after another but simultaneously.

The determination of correction weights can be done either "by hand" or with the assistance of mathematical methods. Hand balancing means the current vibration readings are depicted on vector diagrams. Each test weight will have associated with it an effect vector for each measuring point and each balancing speed. This results in a great amount of information which has to be simultaneously evaluated and manipulated. By iteration and compromise, a satisfactory approximation can be achieved which minimizes the vibration at rated speed as well as at the critical speeds.

Alternatively to manual balancing, the process can be carried out with the assistance of some computer programs. This determination of balance correction weights is based on so called influence coefficient method. A system of "2 x n" equations with "2 x z" unknowns, where

n = number of balancing speeds times measuring locations.
z = number of balance weight types to be applied

can be reduced to a system of "2 x z" equations with appropriate number of unknowns introducing the optimizing constraint that the sum square of residual vibrations be a minimum.

The solution can be optimized by introducing certain weighing factors. For the bearing vibrations whose order of magnitude is small, higher weighing factors are to be chosen.

The optimal selection of the weight types can be determined by some tentative calculations on the computer. A balancing move can be considered optimal if a significant improvement is achieved by a minimum of correcting weights.

The installation of correcting weights in the PMG exciter should be postponed to the end of the whole balancing process, if balancing plane available.

7.0 OVER-SPEED TEST:

An over-speed test is conducted, as soon as the vibrations at operating speed are achieved in the range of balancing norms for flexible rotors, refer **clause 8.0**, at 1.2 times of the rated speed for two minutes for new rotors.

Over-speed testing should be interrupted immediately if bearing vibrations (for **DH90** or equivalent) exceed 100 microns **(p-p)** or unbalance forces exceed 707333g.mm (all type pedestals). Recommendations of balancing machine supplier should also be followed to interrupt over-speed run for safety of balancing machine and rotor (also refer **clause 9.0**).

The main purpose of this test is anticipation of possible influence to which the rotor might be exposed during operation. By anticipating those influences before final balancing, significant changes in the state of balance during operation become less probable. The test can be carried out at any ambient temperature, also refer clause 9.0. At this stage, vibrations and any possible changes occurring are no quality criteria for the rotor.

Before over-speed test, the location of balance weights should be marked. After over-speed test, a visual inspection of the Rotor should be conducted. Any observed changes in the rotor should be immediately reported to the Engineering department before further balancing of the rotor.

8.0 FINAL BALANCING & BALANCE QUALITY:

8.1 EXCITER ROTORS WITH CONFIGURATION AS SHOWN IN FIGURE-2a (Example: EXCITER ROTORS OF THRI/500/600MW TGs):

After over-speed test, further balancing would be continued till the vibration level comes within the specified limit. A couple of more runs shall be made to further improve balance quality, which is determined in terms of maximum permissible residual vibrations.

The final results of balancing should be checked by taking measurements between 600rpm or 1/3rd of first critical speed and 3000rpm at increments and decrements of 100 rpm.

1. The **r.m.s.** values of vibration severity in mm/s measured after balancing on the bearing should not exceed the following limits (for balancing pedestal **DH90** or equivalent)

   At 1st Critical speed : Approx. 1.5 mm/s

   At Operational speed (3000rpm) : 0.3 mm/s

2. The values of residual unbalance, in **g.mm**, measured on the bearing pedestals should not exceed the limits according to balance **class G2.5** as per **ISO:1940** and **ISO:11342** for flexible rotors at all speeds.

   a. The permissible values of the **Residual Unbalance** for Exciter rotors for 500/ 600MW TG ratings are specified below (for all speeds other than near critical speed):

   Total Residual Unbalance on each pedestal : 38197 gm.mm **(#)**
   i.e. 0.6 x 2.5 x 1000 x Rotor weight / (2 x π(pi) x 50)

   Wt. of Exciter rotor (including balancing shaft) system for 500/600MW : 8000Kg

   b. To ensure balancing of rotor at critical speed, modal balancing shall be carried out inline of **clause 9.2.2** of **ISO:11342** (also iterated in Annexure-I).

   Permissible equivalent modal unbalance near first critical speed on each pedestal should not be greater than 60% of Permissible total residual unbalance on Exciter rotor.

   Example: For Exciter rotor of 500/ 600MW TG sets
   Weight of Exciter rotor (including balancing shaft) = 8000 Kg
   Total residual unbalance on Exciter rotor at operating speed ≤ 63662 g.mm

   Permissible equivalent first modal unbalance on each pedestal
   ≤ 0.6 x 63662 g.mm
   ≤ **38197 g.mm (#)**

   #: for any other exciter rotor, acceptable residual unbalance can be calculated according to rotor weight.

3. The shaft vibrations in terms of **Peak-to-Peak** amplitude in micron taken after balancing on the instrument Slip rings shall not exceed **50 micron** at operating speed and **150 micron** at critical speed after the value taken at 600 rpm (approx.) have been subtracted from the values taken at higher speeds.

The acceptance shall be based on either the limits specified for Residual Unbalance or bearing vibrations of the Exciter rotor and shaft vibrations.

8.2 EXCITER ROTORS WITH CONFIGURATION AS SHOWN IN FIGURE-2b (Example: EXCITERS OF 660/700/800MW TGs):

After over-speed test, further fine balancing would be continued till the final vibration and residual unbalance level come within the specified limits. More balancing runs shall also be made to further improve the balance quality, which is determined in terms of maximum permissible vibrations & residual unbalance.

Final results of balancing should be checked by taking measurements between 600 or 1/3rd of first critical speed and 3000rpm at increments and decrements of 100 rpm.

1. The **r.m.s.** values of vibration severity in mm/sec measured after balancing on the bearing should not exceed the following limits (for balancing pedestal **DH90** or equivalent):

   At 1st Critical speed : Approx. 1.5 mm/s

   At operating speed : 0.622 mm/s

2. The values of residual unbalance, in g.mm, measured on the bearing pedestals should not exceed the limits according to balance class **G2.5** as per **ISO: 1940** and **ISO: 11342** for flexible rotors at all speeds.

   a. The value of Residual Unbalance is specified below for Exciter rotors for 660/700/800MW TG ratings (for all speeds other than near critical speed):

      Total Residual Unbalance on each pedestal : 42017 g.mm **($)**
      i.e. 0.6 x 2.5 x 1000 x Rotor weight / (2π(pi) x 50)
      (Wt. of Exciter rotor and balancing shaft system for 660/700/800MW: 8800Kg)

   b. To ensure balancing of rotor on critical speed modal balancing shall be carried out inline of **clause 9.2.2** of **ISO: 11342** (also iterated in Annexure-I).

      Permissible equivalent modal unbalance near first critical on each pedestal should not be greater than 60% of Permissible total residual unbalance on Exciter rotor.

Example: For Exciter rotor of 660/700/800MW TG sets

Wt. of Exciter rotor (including balancing shaft) = 8800 Kg

Total residual unbalance on Exciter rotor at operating speed ≤ 70028 g.mm

Permissible equivalent first modal unbalance on each pedestal
≤ 0.6 x 70028 g.mm
≤ **42017 g.mm ($)**

$: for any other exciter rotor, acceptable residual unbalance can be calculated according to rotor weight.

3. The shaft vibrations in terms of Peak to Peak amplitude in microns taken during balancing on the shaft near PMG Hub should be recorded for reference.

The acceptance shall be based on either the limits specified for Residual Unbalance or Bearing vibrations of the Exciter rotor.

9.0 GENERAL INSTRUCTIONS:

1. The balance run should be tripped for all shaft probes installed at DE and NDE bearing pedestal in horizontal and vertical directions if
   - The overall (Sigma) shaft vibrations for all speed range exceed 600 microns p-p.
   - The difference of overall (Sigma) and 1X shaft vibration for all speed range exceeds 300 microns p-p.
2. The measured air temperature outside armature in balancing tunnel should not exceed 65°C for all speed ranges.
3. The lube oil inlet temperature for bearings is recommended to be set between 35°C and 45°C. It should not exceed 55°C.
4. The bearing metal temperature should not exceed 90°C for all speed ranges.

10.0 CROSS REFERRED STANDARDS:

FV100061, ISO:1940, ISO:11342

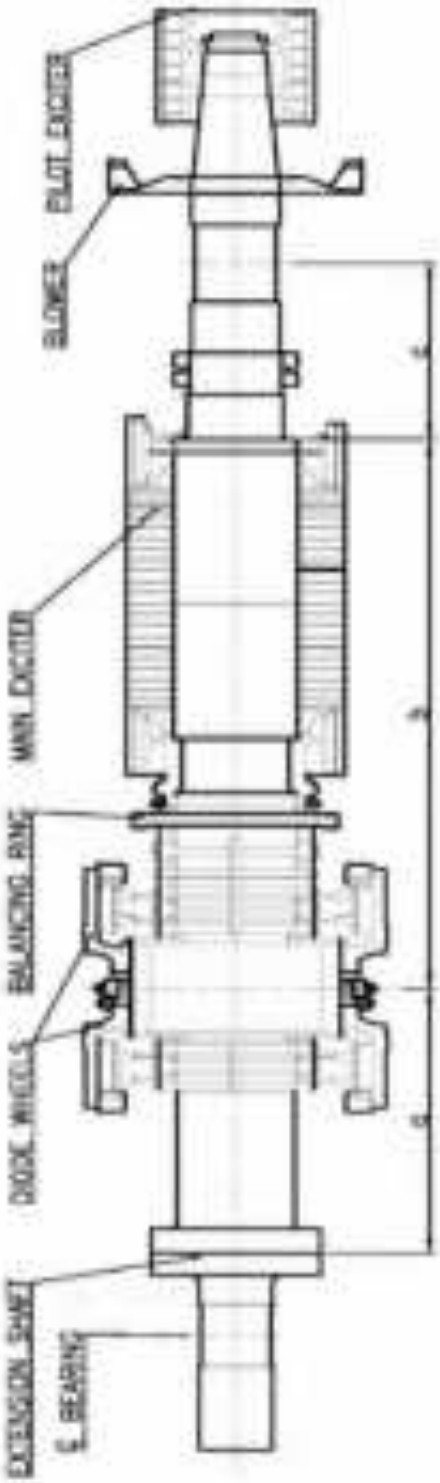


Figure- 2a

DATA OF EXCITER

RATING	TYPE	REF. DRG. NO	a	b	c
500/600 MW	B.Ex. 7090-3065-20	3-143-09-01085	1060	2162	708
210 MW	B.Ex. 5458-3065-8	3-143-09-01037	1000	1593	477
250 MW	B.Ex. 7082-3065-10	3-143-09-01062	1060	1663	617
80 MW	B.Ex. 5434-3065-4	3-143-09-01051	300	1235	870

ARRANGEMENT OF CORRECTION PLANES & APPLICATION OF LC

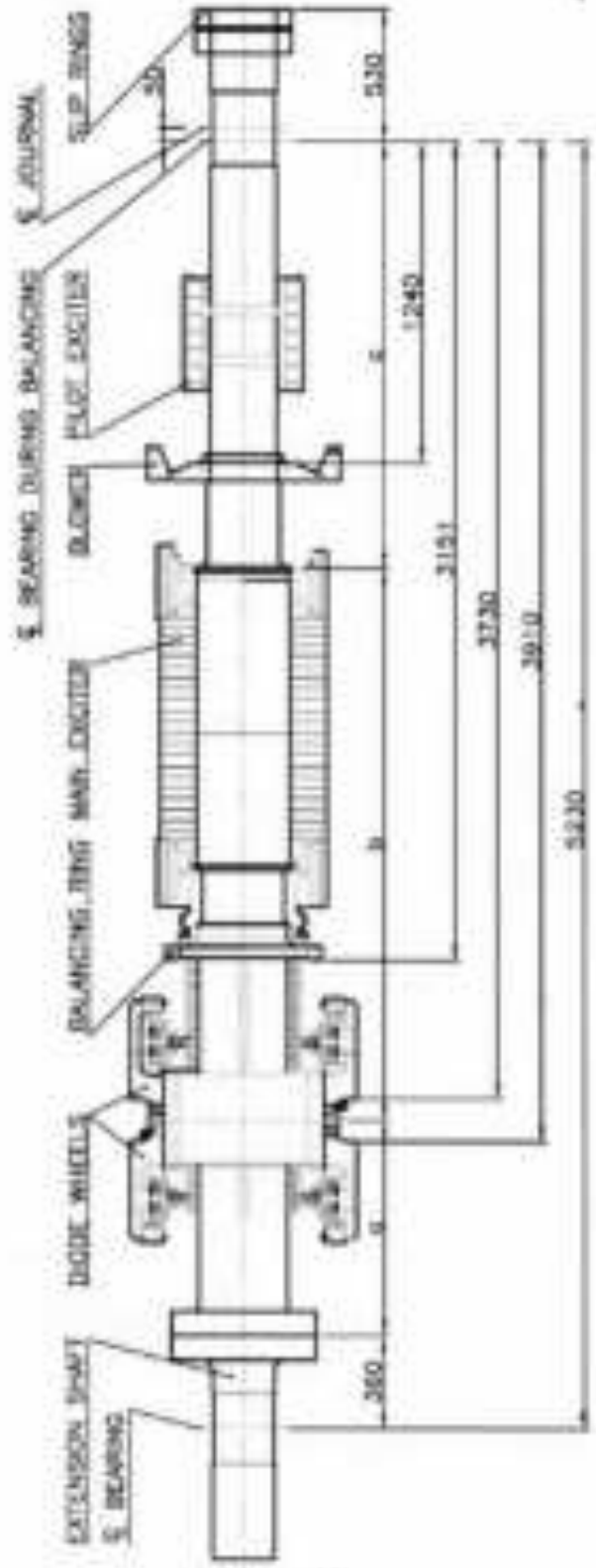


Figure- 2b

DATA OF EXCITER

RATING	TYPE	REF. DRG. NO.	a	b	c
600/700/800 MW	B Ex. 70/90-3046-30N	0-143-06-01038	1060	2162	1658

ARRANGEMENT OF CORRECTION PLANES & APPLICATION OF 'a, b, c' MODE

METHOD OF COMPUTATION OF CORRECTION WEIGHTS

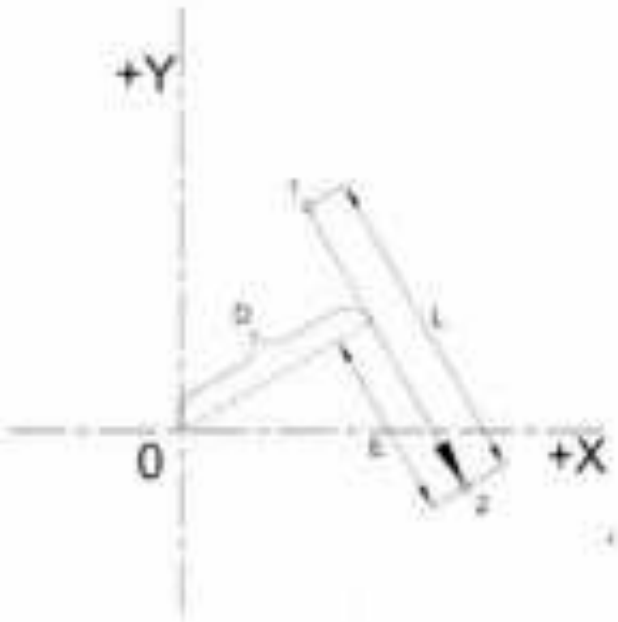


Figure-3

Annexure-I

PROCEDURE FOR MODAL BALANCING AT CRITICAL SPEEDS:

The procedure is as follows:

a) Mount the rotor in a high-speed balancing machine or other high-speed test facility.

b) If low-speed balancing is performed, the residual unbalance in the rigid rotor state may be assessed either by using the influence coefficient method, or by using the balancing machine and its capability to indicate unbalances in two planes.

c) Run the rotor to some safe speed approaching first flexural critical speed and note readings of bearing vibrations or forces.

d) Add a trial unbalance to the rotor. The unbalance should be sufficient to show a significant effect and should be placed axially where it will have the maximum effect on first mode. Take readings of bearing vibration or forces at the same speed as in c).

e) From the readings obtained in c) and d), compute vectorially the equivalent first modal unbalance. For example, this can be done graphically by the construction in **Figure-4**, in this case with single unbalance mass forming the trial mass set. The magnitude of equivalent first modal unbalance is

$$TU \times (AO / AB)$$

Where, **TU** is the **Trial Unbalance**

f) Remove the Trial Unbalance.

g) Run the rotor to some safe speed approaching second flexural critical speed, provided this is lower than the maximum safe service speed. Note readings of bearing vibrations or forces.

h) Add a trial unbalance to the rotor. This should be sufficient to show a significant effect and should be placed axially where it will have maximum effect on second mode. Take readings of bearing vibrations or forces at the same speed as in g).

i) From the readings obtained in g) and h) compute vectorially the equivalent second modal unbalance. The graphical procedure of e) may be used in this case.

j) Remove the trial unbalance.

k) Continue the operations for successive modes until the equivalent modal unbalances in all significant modes have been determined.

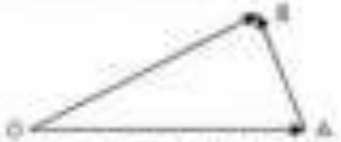


Figure-4: Vectorial effect of a trial mass set

BASED ON W 2333 OF KWU
DATED MAY 1989

BALANCING OF TG ROTOR TYPE THRI AND TARI

1.0 INTRODUCTION :

The balancing instructions described here apply to 2-pole generator rotor type THRI & TARI. Balancing of rotor may be carried on DJ 90 machine or DH 90 machine or any other machine. It is desirable to carry out balancing process in Cartesian components. Readings during balancing process are to be recorded preferably in X and Y components on the Vectormeter.

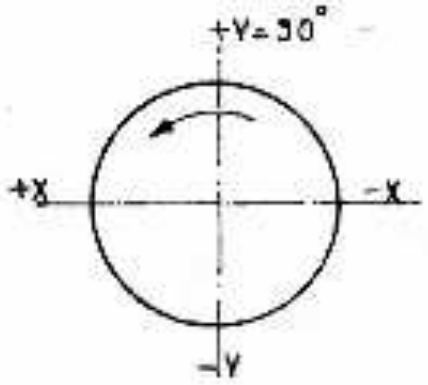
2.0 ALIGNMENT AND MARKING OF THE ROTOR :

The rotor is marked with a X-Y co-ordinate system so that the X-axis coincides with the neutral axis, the Y-axis with the pole axis. All balancing measures are carried out by respectively adding and removing weights in these components.

2.1 Alignment of TG Rotor with Balancing Machine: (Looking from Drive End)

As shown in Figure 1;

- +X aligns with 0 degree
- + Y aligns with 90 degree
- - X aligns with 180 degree
- - Y aligns with 270 degree



3.0 LOW SPEED BALANCING :

Low speed balancing is carried out in the two correction planes, preferably in the balancing grooves of the retaining rings at TE & EE. If the necessary balance corrections here are too large, the weights are to be appropriately distributed on the planes "EE core" & "TE core"(See Fig.1).

PREPARED BY	S.K. BHARDWAJ			NAME	SIGNATURE & DATE
CHECKED	SHEESH RAM				
QAA	S.S. TRIPATHI		TRANSLATED BY	HIMANSHU S. BATRA	05.10.16
TSX	LALIT KUMAR		WORKED BY	SHIVANGI GUPTA	05/10/16
			CHECKED BY	R.K. SHARMA	05.10.16
APPROVED DEPTT.	NAME	DATE & SIGNATURE	SUPERVISED BY	R.C. SHARMA	5.10.16

SUPERSEDES

APPROVED : A.K. MALHOTRA 11/11/93

Gr. NO. 6.00

REV NO. 02			PREPARED : EME	ISSUED : TSX	DATE : 11/11/1993
DATE 05.03.16					
CHANGE ADVICE NO	TGE-16-21	10.03.16			

INVENTORY NO. P-5880

As mentioned above, the correction weights necessary at low speed are indicated directly in the so called abc-mode. The setting of the abc-mode is carried out according to the rotor dimensions; whereby :

a – distance between the TE bearing centre and the TE retaining ring groove.

b = distance between the TE and EE retaining ring grooves.

c = distance between the EE retaining groove and EE bearing centre.

r 1 = radius of the TE retaining ring groove.

r 2 = radius of the EE retaining ring groove

Low speed balancing is performed at a speed where the dynamic behavior of the rotor can be considered rigid i.e. at a speed less than 1/3 of the 1st critical speed observed in the balancing facility.

The readings are taken in the components X and Y with the appropriate sensitivity factor "S" in terms of grams per division. The required number of correction weights in the components X and Y are determined.

X : scale divisions in X*S / P
Y : scale divisions in Y*S / P
Whereby P = weight in grams per balancing piece.

4.0 HIGH SPEED BALANCING :

Balancing at high speeds is always carried out in hard bearings. In this respect, the balancing procedure in either of the balancing facilities DH 90, DJ 90 or any other machine is the same in principle. With DH-90, additional stiffness must not be switched on.

While attempting balancing of TG rotors, following fundamentals shall be considered.

- One examines the rotor response to certain test weights at certain selected speeds and rated speed.
- One attempts to find an appropriate combination of correction weights which will minimize the vibrations within the whole speed range.

The different weight types to be applied to the rotor are shown in Figure 2.

While the first two weight sets may not affect the state of balance achieved at low speed, this restriction does not apply to the further types of correction weights. It is therefore, preferable to use initially the V-weight set and/or the S-weight set before using the others. As a general rule, the state of balance achieved at low speed should be affected as little as possible.

The V-weight set distributed to 3 planes is specified by the weight element placed in the centre plane. The compensating weights for the outer planes can be calculated by the formulae given in figure 3 according to the rotor dimensions.

The S-weight set distributed to 4 planes is specified by the weight element placed in the TE Core plane. The complementing counter weight of the same magnitude is placed in the opposite direction in the DE core plane. This internal couple unbalance is compensated by an equivalent couple unbalance in the outer planes as shown in Figure 2. The compensating weights are calculated by the formulae given in figure 3.

The specification of V & S weight sets should always refer to the X-Y components though the actual weights have to be allocated to the S-T components of the oblique-angled co-ordinates shown in Figure 1.

Transformation formulae from the X-Y system to the S-T system and vice versa are given below;

With ε – angle between a row of bolts and the pole axis

$S = (Y / \cos \varepsilon - X / \sin \varepsilon) / 2$

$T = (Y / \cos \varepsilon - X / \sin \varepsilon) / 2$

$X = (S - T) * \sin \varepsilon$

$Y = (S + T) * \cos \varepsilon$

The transformation can also be performed by graphical method. An appropriate diagram is reproduced in Fig. 4-A which refers quantitatively to the THRI 108/44 generator rotor with $\varepsilon = 32°$ and Figure 4-B is applicable to TARI 93/38 TG rotor with $\varepsilon = 20.8°$.

The often necessary superimposition of a series of different correction weight types can be correctly carried out only by the consistent treatment of the problem in a X-Y system. The performance of the often complex determination of correction weights to be placed in more than two planes can be facilitated by the use of a computer.

A series of runs with the above mentioned test weights is carried out at selected speeds / near critical speed and at rated speed in order to determine the so-called influence coefficients.

5.0 EVALUATION OF ONE TYPE OF BALANCE CORRECTION :

At high speed, the determination of correction weights is carried out by trial weights. The principle of this evaluation is the same for all types of weight configuration (see fig. 2) and for all kinds of balancing machines.

The procedure follows the steps shown below (see Fig. 5):

- Take a set of readings in X-Y components at various speeds and select an appropriate balancing speed.
- Draw a graph with the axis X & Y and mark the 1st measuring point with the current number of the last balancing move.
- Place the test weight T in one of the axis X or Y (using experience gained on previous rotors, if possible).
- The subsequent reading at the same balancing speed is marked in the graph with the current number of the move.
- Connect the two measuring points and indicate the direction by an arrow and by the appropriate number of pieces and the respective X-Y axis of the weight T.
- Measures the length L of the connecting line. Drop a perpendicular on to the (extended) connecting line and measure its length D.
- Measure the distance E between the intersection and the point last measured.
- Calculate the number of the required correction weights in each components as follows:
  In the same axis as the test weight : T*D/L
  Perpendicular to the test weight axis : T*D/L
- Determine the appropriate X-Y components of the correction weight using a transparent X-Y coordinate system in the point last measured (see detail in Figure 5).

6.0 BALANCING WITH MORE THAN ONE WEIGHT TYPE :

The procedure shown in clause 5 is confined exclusively to the evaluation of one correction weight type. It illustrates only the process. When balancing flexible rotors such as generators, the application of normally more than two different weight types may be required. These various weight types preferably to be applied simultaneously to reduce balancing time.

The determination of correction weights can be done either by hand or with the assistance of mathematical methods. Hand balancing means the traditional way of evaluation. Each test

weight will have associated with it an effect vector for each measuring point and each balancing speed. This results in a great amount of information which has to be simultaneously evaluated and manipulated. By iteration and compromise, a satisfactory approximation can be achieved which minimizes the vibration at rated speed as well as at the critical speeds.

Alternatively to manual balancing, the process can be carried out with the assistance of some computer programmes. This determination of balance correction weights is based on the so-called influence coefficient method. A system of 2 x n equations with 2 x z unknown whereby:

n = no. of balancing speed times measuring locations.
z = no. of balance weight types to be applied.

can be reduced to a system of 2 x z equations with the appropriate number of unknowns introducing the optimizing constraint that the sum square of the residual vibrations be a minimum.

The solution can be optimized by introducing certain weighting factors for each criterion. By choosing suitable factors, the residual level of certain vibrations can be satisfactorily reduced in order to achieve a good compromise.

The optimal selection of the various weight types can be determined by some tentative calculations on the computer. A balancing move can be considered optimal if a significant improvement is achieved by a minimum of correction weights.

The weight allocation matrix to be applied to the Allocation programme is shown in Figure 6.

Balancing weights should be applied at correction planes between TE & TG bearing journals during balancing process. TE coupling balancing weights shall only be used in the end of balancing process, if necessary.

7.0 OVERSPEED TEST :

An over speed test is conducted as soon as a state of balance is achieved. As changes in the state of balance are expected due to the test, there is no use completing the balancing process before this test.

Rotors shall be overspeeded at 120% speed for two minutes. For repair rotors/re-balancing of TG rotors, overspeeding norms shall be separately intimated by TGF.

During the test, the operator attention should be concentrated on watching the process rather than being distracted by reading and recording vibration data.

At this stage, the vibrations and any possible changes occurring are no quality criteria for the rotor and, therefore, do not require documentation.

Before the balancing process can be continued, a visual inspection of the rotor should be conducted. Any observed changes of the rotor should be immediately reported.

8.0 FINAL BALANCING AND BALANCE QUALITY :

After overspeeding test, further balancing would be continued till the vibration level comes within the specified limit. A couple of more runs shall be made to further improve the balance quality. In principle, the quality can be established by two criteria;

a) In terms maximum permissible vibrations.
b) In terms of the maximum permissible residual unbalance.

The first criterion is verified by taking measurements of the vibrations in the whole speed range. Whereas, the second of the above mentioned criteria describes the balancing quality as a property of the rotor itself and however, the appropriate assessment is rather complex for the flexible rotors.

Therefore, a balancing process should never be stopped as soon as the residual vibration level just reaches or just passes slightly below the limits. One should go on balancing as long as adequate corrections can be made. The final result of balancing should be checked by measurements taken between 600 and 3000 rpm at increments and decrements, respectively of 100 rpm.

The RMS values of the vibration severity in terms of mm/s measured after balancing in air or vacuum should not exceed the following limits; (For DH 90 and DJ 90 pedestals only)

	THRI 108/44	TARI 93/38	TARI 115/52
At the,			
1st critical speed	Approx. 0.5 mm/sec	Approx. 0.5 mm/sec	Approx.0.5 mm/sec
2nd critical speed	Approx. 1.0 mm/sec	Approx. 1.0 mm/sec	Approx. 1.0 mm/sec
Rated speed	0.6 mm/sec	0.6 mm/sec	0.8 mm/sec

For balancing as per criteria (b) the value of residual unbalance, in g-mm, measured on the bearing pedestals should not exceed the limit according to balance class G2.5 as per ISO 1940 OR ISO 11342 for flexible rotors at all speeds. This is valid for all types of machines.

The value of the residual unbalance for TG rotors (50 Hz application) is specified below :

Total residual unbalance on rotor = 8 x wt. of rotor (in kg) – (g-mm)
(for G2.5 Class)

Permissible equivalent modal unbalance = 0.6 x residual unbalance on rotor

The value of unbalance measured at bearing location at first critical speed should not exceed 2.5 times the permissible modal unbalance value.

Example

For THRI 108/40 rotor.

Wt. of rotor – 39877.5 kg
Total residual unbalance on rotor at operating speed 3000 rpm – 8 x 39877.5
= 319020 g-mm

Permissible equivalent first modal unbalance = 0.6 x 319020
= 191412 g-mm

FOR BALANCING IN VACUUM :

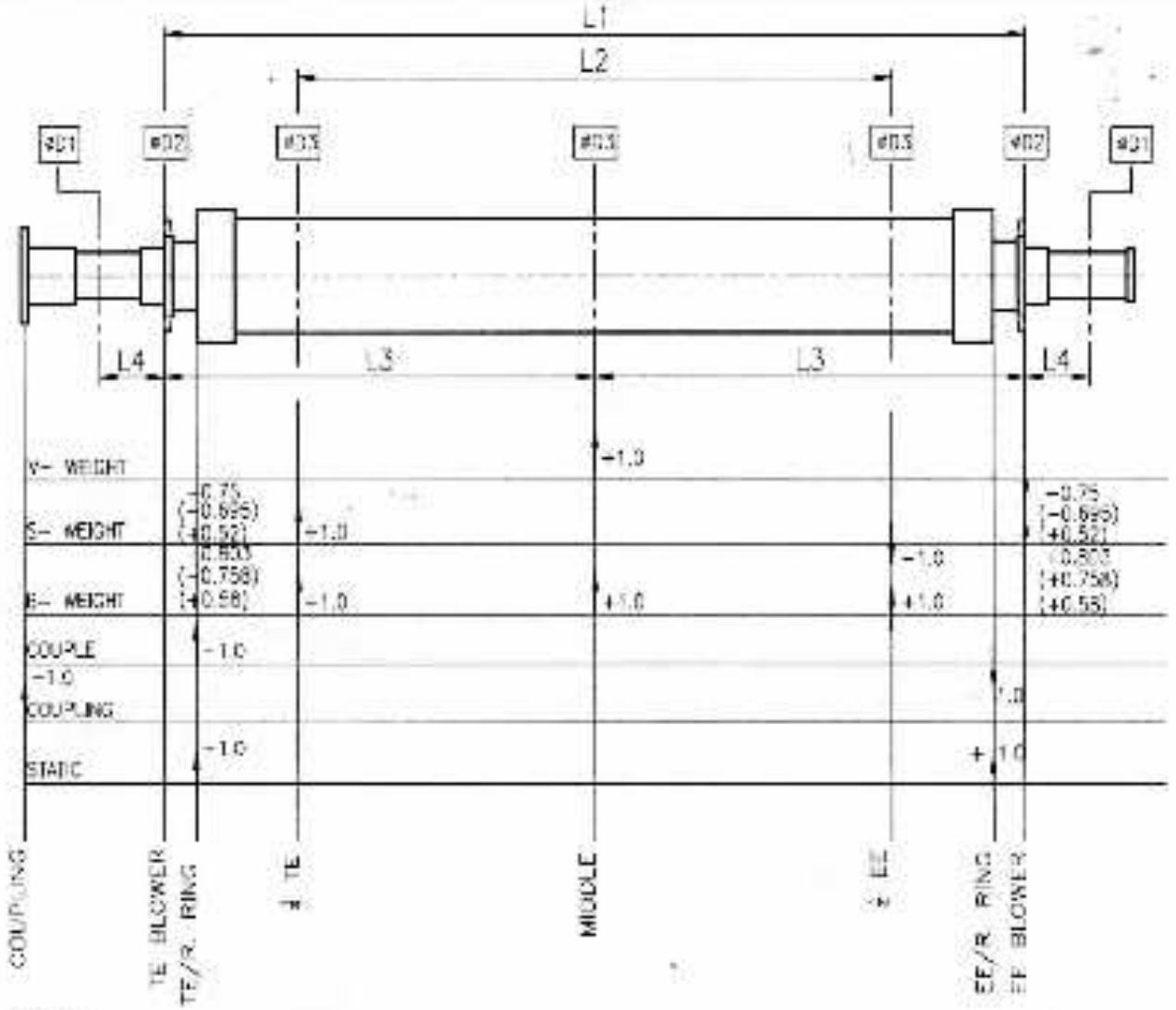
In case the balancing of the rotor is performed in vacuum, a 2nd run in air after final balance has to be made (duration 01 hour) taking measurements at 3000RPM in time intervals of 5 minutes. The rate of rise of speed should be a minimum 10 minutes, for speed rise from 0-3000 RPM. Expected difference between the beginning and end of this measurement is less than 3 mm/sec. The temperature of rotor shall be checked by contact thermometer at the end of air run on rotor core portion and it is expected to be 60-80°C. This is carried out to ensure thermal stability of rotor and the vibration level must not change abnormally with respect to that observed in vacuum.

9.0 **For electrical tests, refer standard TG-WIS-0678.**

CORRECTION PLANE MARKING

FIG. 1

REV. NO.				
03	तैयारकर्ता WORKED BY	SHIVANGI GUPTA		25.03.16
	जांचकर्ता CHECKED BY	R.K. SHARMA		



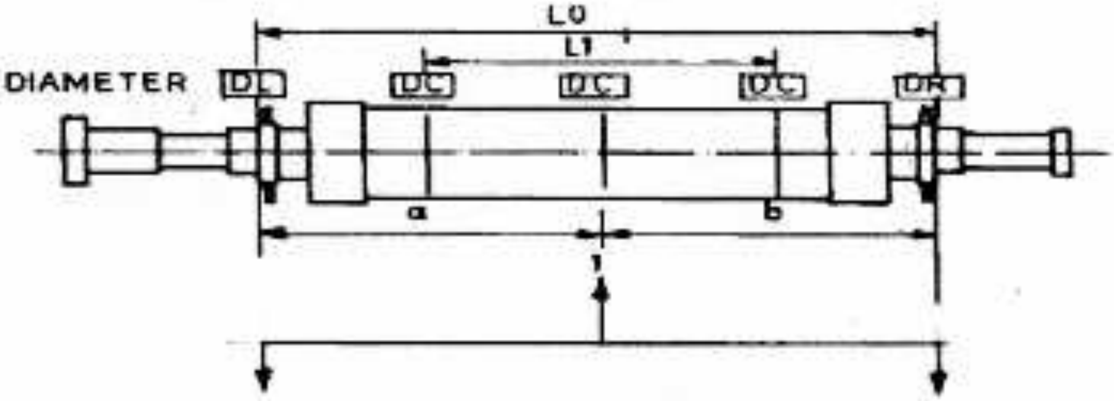
NOTE :-

1. FOR DETAILS OF DIAMETERS & LENGTHS (D1, D2 & L1, L2) SEE FG 5.
2. BRACKETED VALUES FOR TARI 93/38

BALANCING WEIGHT SETS FOR THRI -108/44, TARI-93/38, TARI-115/52

FIG. 2

REV. NO.					
03		बनाया/ WORKED BY	SHIVANGI GUPTA		05.03.16
		जांचकर्ता CHECKED BY	R.K. SHARMA		



V-WEIGHT

COMPENSATION WEIGHT LEFT	= CENTRE WEIGHT × $\frac{DC \times b}{DL \times L0}$
COMPENSATION WEIGHT RIGHT	= CENTRE WEIGHT × $\frac{DC \times a}{DR \times L0}$

S WEIGHT

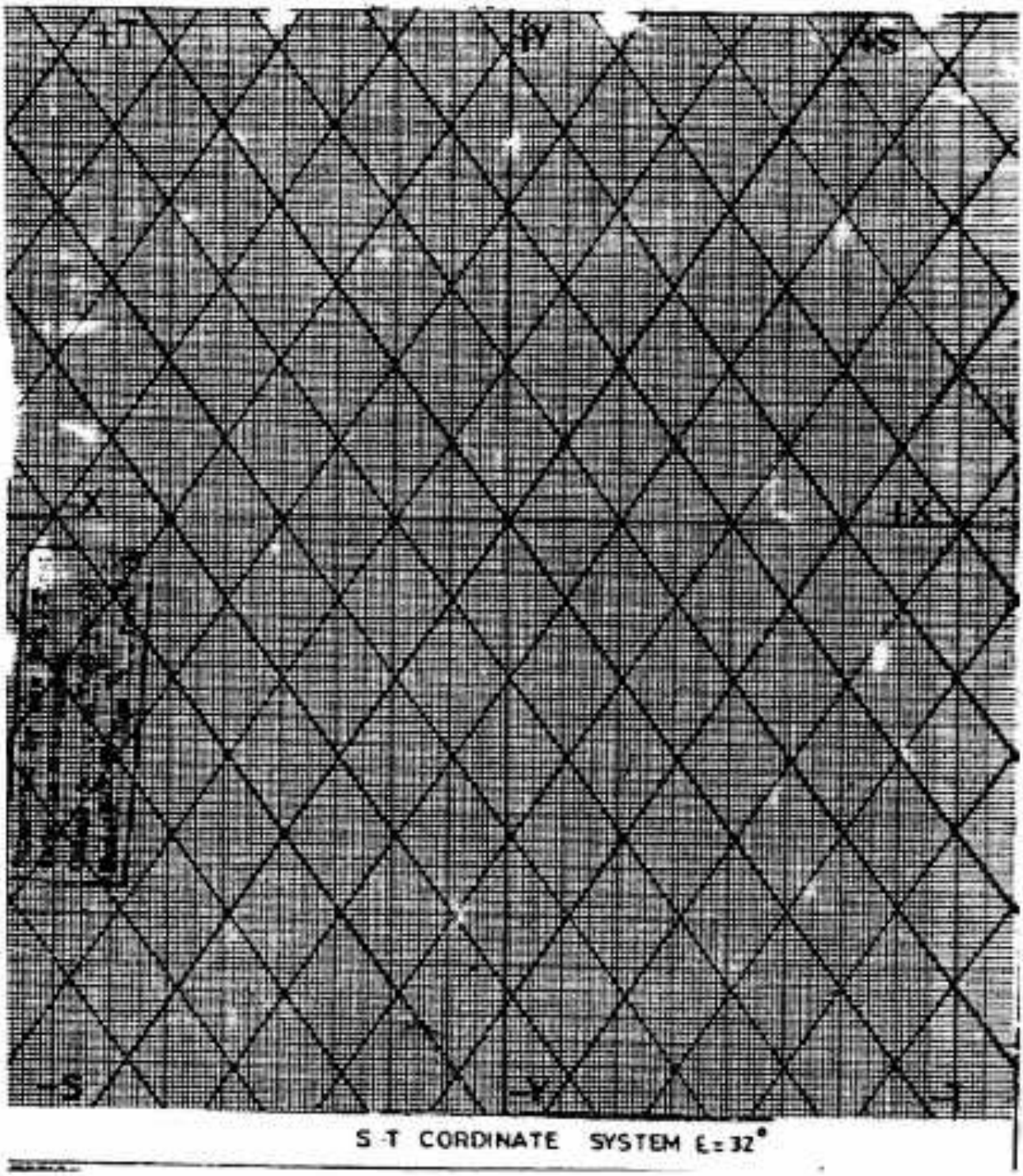
COMPENSATION WEIGHT LEFT	= CORE WEIGHT LEFT × $\frac{DC \times L1}{DL \times L0}$
COMPENSATION WEIGHT RIGHT	CORE WEIGHT LEFT × $\frac{DC \times L1}{DR \times L0}$

DETERMINATION OF COMPENSATION

FIG. 3

REV. NO.		निर्माणकर्ता WORKED BY	SHIVANGI GUPTA		05.03.16
03		जांचकर्ता CHECKED BY	R.K. SHARMA		5/3/16

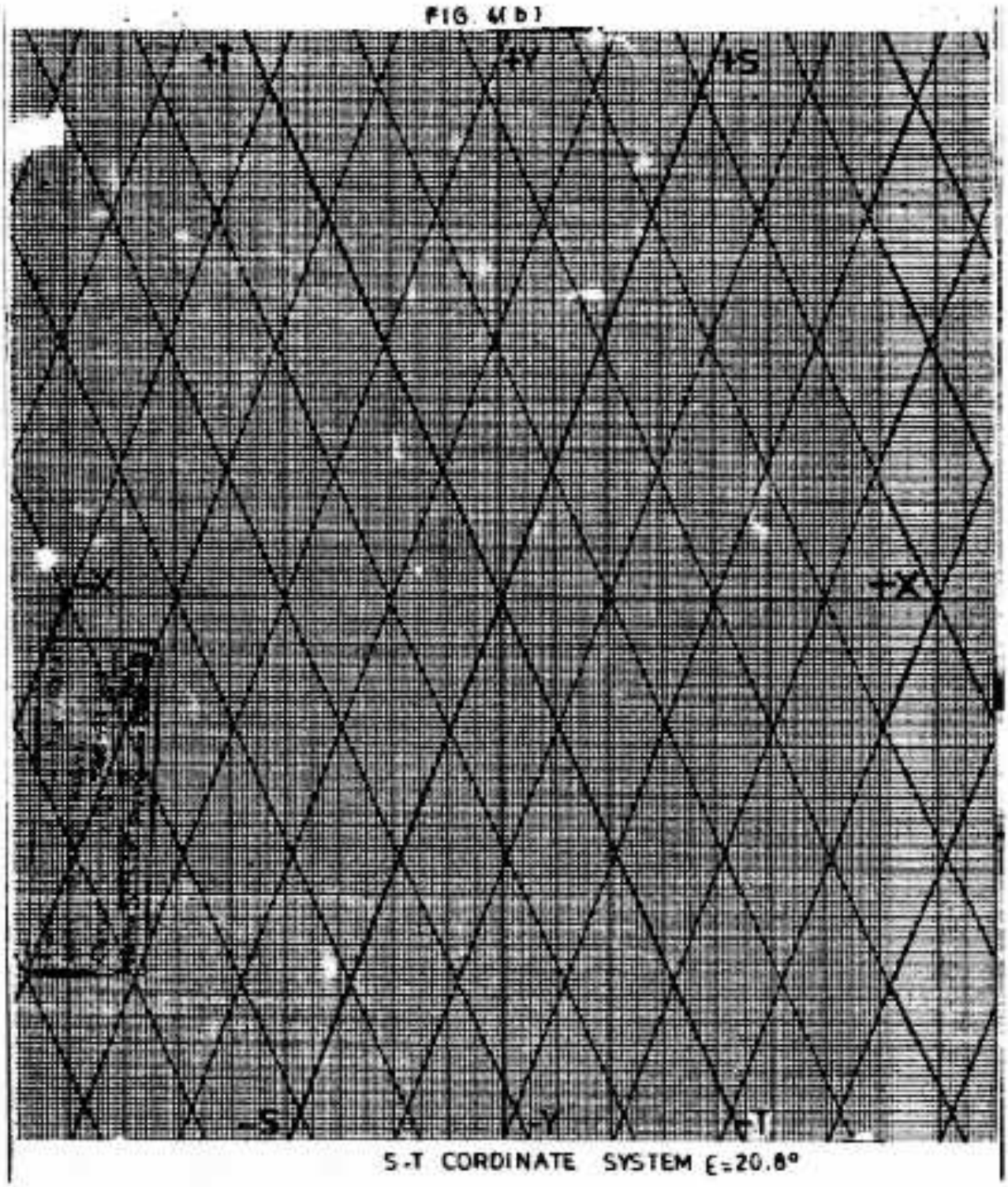
FIG 4 (a)



S-T CORDINATE SYSTEM ε = 32°

REV. NO.					
03		तैयारकर्ता WORKED BY	SHIVANGI GUPTA		05.03.16
		जांचकर्ता CHECKED BY	R.K. SHARMA		5/3/16

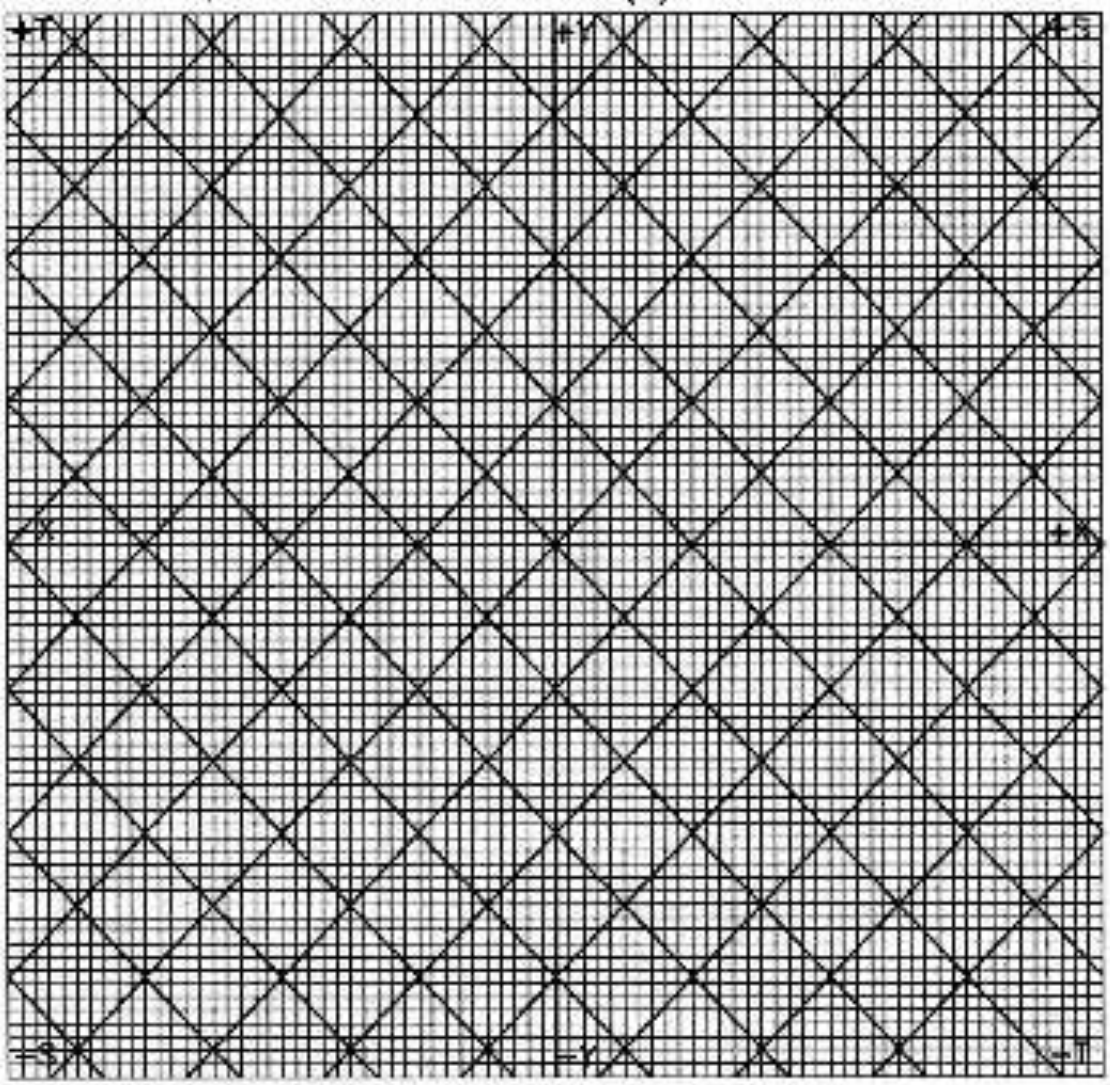
FIG. 4(b)



S-T CORDINATE SYSTEM ξ=20.8°

REV. NO. 03		तैयारकर्ता WORKED BY	SHIVANGI GUPTA	05-09-16
		जांचकर्ता CHECKED BY	R.K. SHARMA	

FIG. 6 (C)



S.T. CORDINATE SYSTEM ε=22.5°

REV. NO. 03		तैयारकर्ता WORKED BY	SHIVANGI GUPTA	
		जाँचकर्ता CHECKED BY	R.K. SHARMA	

METHOD OF COMPUTATION OF CORRECTION WEIGHTS

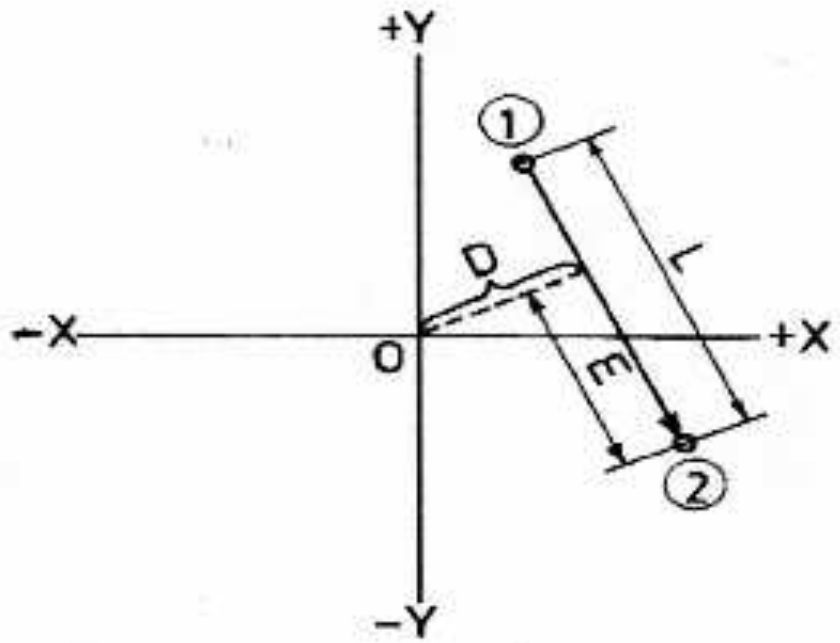


FIG -5

INVENTORY NO. P-5800

SIGN & DATE 11/3/16

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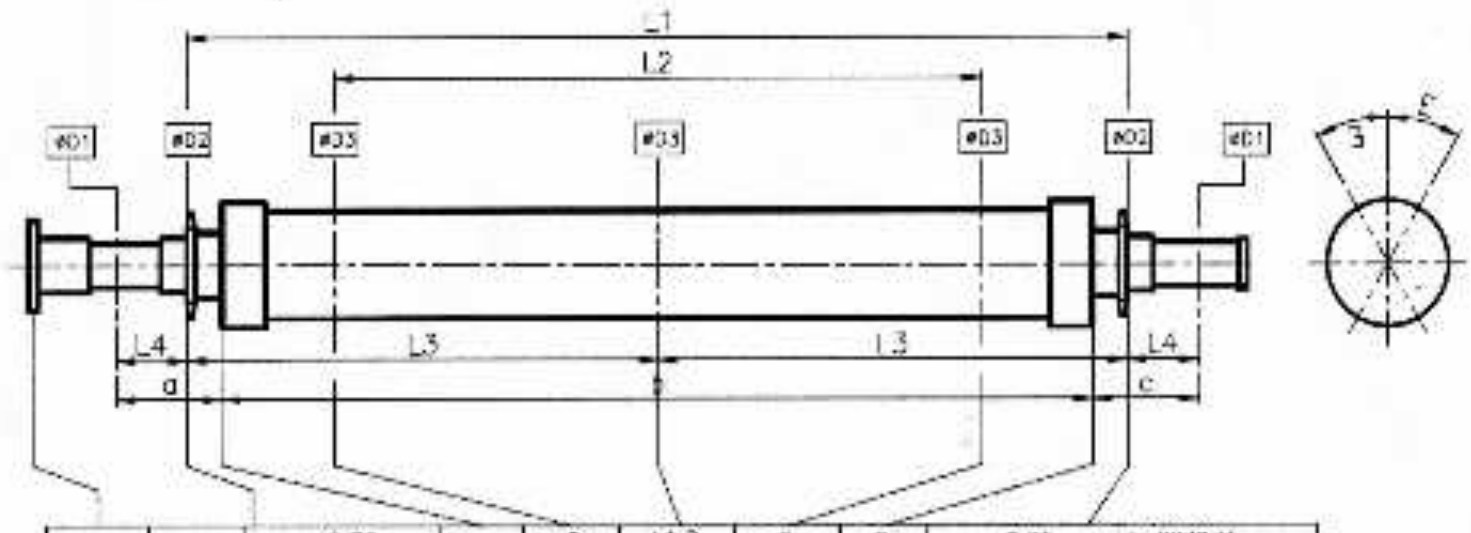
INVENTORY

REV. NO. 03



0	0	−0.75 (THRI 108/44) −0.695−93/38	0	0	+1.0	0	0	−0.75 (THRI 108/44) −0.695−93/38	V WEIGHT
0	0	−0.803 (THRI 108/44) −0.758−93/38	0	+1.0	0	−1.0	0	−0.802 (THRI 108/44) −0.758−93/38	S WEIGHT
0	0	0	0	+1.0	+1.0	+1.0	0	0	R WEIGHT
0	0	0	+1.0	0	0	0	−1.0	0	COUPLE
−1.0	0	0	0	0	0	0	0	0	COUPLING
0	0	0	+1.0	0	0	0	−1.0	0	STATIC
1	1	95	95	400	400	400	95	95	GRAMMES/PIECE

WEIGHT ALLOCATION MATRIX

FIG. 6

a	b	c	r1	r2	L1	L2	L3	L4	D1	D2	D3	E	Rotor type
1165	5540	1165	450.5	450.5	6430	3440	3215	720	390	634	952	32°	THRI 108/44
1005	5040	1005	390	390	5780	3150	2890	635	300	580	807	23.8°	TAR 93/38
1838	6624	1838	450	450	6624	3680	3312	1160	400	985	1026	22.5°	TAR 115/52

DESIGNED BY	SHIVANGI GUPTA
CHECKED BY	R.K. SHARMA
APPROVED BY	

उत्पाद मानक (हीप : हरिद्वार)

PRODUCT STANDARD (HEEP: HARIDWAR)

TG 30008

TS 15 Page 15 of 15

PRICE BID

Estimated Cost: Rs. 28,80,000/- GST extra as applicable) **Tender Cost:** Rs. 500/-
Date of Opening of Techno-commercial Bid (PART-1): 23.04.2021 **EMD value:** Rs. 57,600/-

Period of Completion: 06 Months

Sl. No.	Item Description	Qty.	Unit	Quoted Rate in Figures (in INR)	Quoted Rate in Words (in INR)	GST Rate in percentage
1.	Hiring of 02 nos. Balancing Pedestal and Electronics for over speed Balancing installation in Block-1	6	PM			

Note:

1. Rate should be quoted in figures as well as in words. No cutting / Over Writing is allowed in rates. In case of contradiction between rate/percent quoted in figure and Words, the same mentioned in Words will prevail. For details refer General Instructions to Tenderer of Techno-Commercial Bid.

2. L1 will be decided after calculating price (multiplying rate and quantity)

3. GST shall be paid extra on actual basis.

   I/We have the read the Terms and Conditions and Contractual Obligation of contract as per the Techno-commercial Bid under this Tender Enquiry and undertake to fulfill all its requirement under the quoted rates.

I/We agree with the above

Signature of Bidder/Contractor with Stamp