

REQUEST FOR QUOTATION

	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore – 560026 INDIA	RFQ NUMBER: UPKM00053 RFQ DATE: 14-10-2016	Due Date/Day : 14-11-2016 MON Time : 13:00 HRS Tender Box : Reception Area Opening Venue : NEW ENGG. BLDG
(address for communication) : To,		(for all correspondence) Purchase Executive : UPENDER KUMAR Phone : 080-2698 9572 Fax : 080-2674 2498 E-mail : upender@bheledn.co.in	

Sl. No.	Description	Total Qty.	Unit	Delivery Qty.	Delivery Date
1.	DR0704960079: Controller & Interfaces for SFC of LIS Controller and Interfaces for EDN Manufactured power modules as per PS/445/2547	12*	No.	12*	As per SCC

Total Number of Items – 1

* - Read attached SCC (Special Conditions of Contract) for details.

THREE PART BID - SUBMIT PQR DETAILS, TECHNO-COMMERCIAL BID AND PRICE BID IN THREE SEPARATE SEALED COVERS.

NOTES :

1. This RFQ is Governed by :
 - a. INSTRUCTIONS TO BIDDERS/SELLERS(Doc No :BHEL:EDN:ITB-SHOP) available at www.bheledn.com (RFQ-PO Terms & Conditions)
 - b. GENERAL CONDITIONS OF CONTRACT FOR PURCHASE(Doc no :BHEL:EDN:GCC-SHOP) available at www.bheledn.com (RFQ-PO Terms & Conditions)
 - c. Any other specific Terms and Conditions mentioned.
2. Bidders / Representatives who would like to be present during opening of offers are required to furnish authorization letter for the same.

For and On behalf of BHEL.

UPENDER KUMAR
Control Equipment

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**INSTRUCTIONS TO BIDDERS / SELLERS****A. Scope & Applicability :-**

These Instructions along with all the details, terms & conditions in the RFQ and General Conditions of Contract (Document No: BHEL: EDN: SHOP: GCC: Rev00) shall apply for this REQUEST FOR QUOTATION (RFQ) and any resulting Order(s) / Agreement(s).

B. Definitions :-

Throughout the documents referred to in A above the following terms shall have the meanings assigned to them, unless the subject matter or the context requires otherwise.

- **The Purchaser** means Bharat Heavy Electricals Limited (a Central Public Sector Enterprise) incorporated under the Companies Act, 1956 having its registered office at BHEL House, Siri Fort, New Delhi-110049, India acting through its Electronics Division / Electronics Systems Division at Bangalore and shall be deemed to include its successors and assigns. It may also be referred to as BHEL.
- **The Bidder** means the person, firm, company or organization to whom the RFQ is addressed / submits an offer against such RFQ and shall be deemed to include its successors, representative heirs, executors and administrator as the case may be. It may also be referred to as Seller, Contractor, Supplier or Vendor.

C. General :-

1. All correspondence / clarifications shall be addressed to the contact person given in the RFQ / Purchase Order/Agreement.
2. In case of non-participation in the tender, regret letter with reason shall be sent by the vendor to the purchaser. If a vendor fails to respond against three consecutive tenders for the same item, he will be liable for removal as a registered vendor of BHEL for the item.
3. All timings are Indian Standard Time (IST).
4. Bidders shall not engage the services of the firms banned by BHEL. List of such banned firms is available at website www.bhel.com. Offers of the bidders who are on the banned list/who engage the services of banned firms shall be rejected.
5. The bidder along with its associate/collaborators/ sub-contractors/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 any fraud or suspected fraud as soon as it comes to their notice.
6. Any consultant or consultant firm including any of its affiliates or associates shall not be eligible to participate in tender / s for the related goods or works or services for the same project, for which they were engaged for the consultancy services by BHEL.

7. Agents / Representatives of OEMs / Principals :-

- a. BHEL prefers to deal directly with Original Equipment Manufacturers (OEMs) / Principal for all its purchases. However, if the OEM / Principal insist on engaging the services of an Agent/Representative, such Agent / Representative will be allowed to represent only one OEM / Principal in the same tender. Either the Agent / Representative could bid on behalf of the OEM / Principal or the OEM / Principal could bid directly but not both. Incase bids are received from both the OEM / Principal and the Agent/ Representative, the bid received from the Agent/Representative will be ignored.
- b. Agent/Representative authorized by the OEM/Principal in turn cannot further sub authorize any other firm for submitting the offer or for placement of order.
- c. Valid Authorization letter from the OEM / Principal to quote and negotiate on behalf of OEM / Principal to be submitted by the respective Agent/Representative.

8. The Purchaser Reserves the Right to :-

- a. Cancel / retender the RFQ at any time before placement of Purchase Order / Agreement, without assigning any reason.
- b. Change the quantity to be ordered and the delivery schedule before placement of PO with mutual agreement with the seller. c. Adopt any method(s) of bidding including Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.
- d. Split the quantity in the RFQ among bidders for ordering.
- e. Accept / not accept whole / part of any offer(s).
- f. Accept / Reject any of the counter terms / deviations offered by bidder.
- g. Seek information / clarifications / confirmations relevant to the RFQ from the bidder(s) and fix deadlines for furnishing of the same by the bidder(s) and not to consider the offer(s) of such bidder(s) for further processing who fail to provide such information / clarifications / confirmations within the deadline fixed.
- h. Negotiate with the L1 bidder.
- i. Take necessary action as per prevalent BHEL Policy, with regard to the bidder(s) / vendor(s) who is/are :-
 - (i) Non-responsive.
 - (ii) Found to have been involved in unfair practices / actions contrary to business ethics /actions restricting competition.
 - (iii) Withdrawing offers after opening of Part I bid / s.

D. Guidelines for Making the Offer :-

1. Separate offer in English language addressed to the Purchase Executive shall be made for each RFQ in Single part/two parts/three parts as indicated in the RFQ.
2. a) **Single Part Bid:** Complete offer i.e., techno commercial bid and price bid to be made in single part. Offer shall be placed in a sealed envelope superscribed with RFQ No & Due Date.
b) **Two Part Bid :** Offer shall be made in two parts as detailed below:
"Techno-commercial Bid (Part I Bid) placed in a sealed envelope super scribed with RFQ No , Due date & "Techno Commercial Bid (Part I Bid)" & "Price Bid (Part II Bid)" placed in a separate sealed envelope superscribed with RFQ No, Due Date & "Price Bid (Part II Bid)". Both the sealed envelopes shall be placed in another sealed envelope superscribed with RFQ No & Due date
c) **Three Part Bid:** Offer shall be made in three parts as detailed below:
"Pre-Qualification Bid (Part I Bid)" in a sealed cover superscribed with RFQ No, Due Date and "Pre-Qualification Bid (Part I Bid)" , "Techno-commercial Bid (Part II Bid)" placed in a separate sealed envelope super scribed with RFQ No , Due date & "Techno commercial Bid (Part II Bid)" & "Price Bid (Part III Bid)" in another separate sealed envelope superscribed with RFQ No, Due date and "Price Bid (Part III Bid)". All the three sealed envelopes shall be placed in another sealed envelope superscribed with RFQ No & Due date.
3. Offers for RFQs on EPS (E-Procurement System) shall be made only on the template on EPS portal. All documents as required shall be uploaded on the portal.
4. Offer shall be in accordance with and complete in all respects with regard to the requirements of the RFQ.
5. Offers of Vendors who already have a valid Technical/Commercial MOU with BHEL-EDN for the items of the RFQ shall mention the relevant MOU reference No and give only such other details not covered in the MOU.
6. Corrections / overwriting shall be avoided. Corrections if any shall be respectively incorporated in all the bids (part-I / II / III i.e, Prequalification Bid / Techno-commercial Bid/ Price Bid) as applicable and shall be duly authenticated at each instance of correction by the authorized signatory with name and designation.
7. Offer shall have a minimum validity period of 90 days from the due date of the RFQ.
8. Please refer Clauses E and F below for Standard Commercial Terms and commercial deviations and loading of offers.
9. Bidders to be considered as Micro and Small Enterprises (MSEs) are required to submit the documents as per **Annexure I**.
10. **Non acceptance/deviations if any to the terms and conditions of the RFQ shall be clearly and explicitly mentioned in the offer, otherwise it will be treated that all the terms and conditions of the RFQ are accepted by the bidder in total.**
11. **Pre-Qualification Bid:** Shall have all details required as per RFQ along with documents as applicable.
12. **Techno Commercial Bid:**
 - a. Shall include BHEL material code and description as per RFQ and details of the item offered including make/model/part no along with relevant documents like drawings/data sheets/catalogs/BOMs etc. as applicable.
 - b. Commercial terms such as delivery period, delivery terms, payment terms, taxes and duties as applicable. Delivery quoted shall be earliest firm in terms of no of days/weeks/months from the date of PO/Drawing Approval/Manufacturing clearance as applicable. It is recommended to avoid delivery terms such as 'ex-stock', 'subject to prior sale' or 'delivery at the earliest', 'subject to release of PO within ----- period' and 'delivery range eg X-Y weeks'. **(Please Refer Clause 15 of General Conditions of Contract (Document No: BHEL: EDN: SHOP: GCC: Rev00) is applicable for delayed deliveries)**
 - c. In case the bidder quotes for imported material to be supplied directly to BHEL / Destination, the minimum amount of CVD that will be passed on to BHEL for availing CENVAT credit to be indicated.
13. **Price Bid:**
 - a. Most competitive price(s) to be quoted.
 - b. Shall include Price details such as currency ,item unit price, total price, discounts if any, packing forwarding charges ,freight, insurance , taxes and duties indicating the nature(eg ED, Cess, VAT) as applicable.
 - c. **Quoted price(s) shall be FIRM and valid till the complete execution of Purchase Order / Agreement, except where price variation is specifically included in RFQ terms in which case the price(s) quoted shall be in accordance with the price variation formula given in the RFQ.**
 - d. Prices in both figures and words to be indicated.
 - e. Applicable documents shall be submitted to the purchaser at the time of supply for availing CENVAT/VAT credits.
 - f. The price quoted against each item shall be for units stated in the RFQ. Where quotation is in terms of a unit other than that in the RFQ, relationship between the two units shall be clearly brought out.
 - g. Registration details of the bidder such as TIN number, ECC number, KVAT / CST / GST / Service Tax Number as applicable shall be mentioned (applicable for bidders within India).

E. Purchaser's Standard Commercial Terms :-

1. Unless specified otherwise in the RFQ , following are the Purchaser's standard commercial terms:-

SI No	Description	For Purchase within India	For Foreign Purchase(Direct Imports)
i	Delivery Terms	For High Sea Sales(HSS) :- CIF Destination Airport (Name of Airport as given in the RFQ) For other than HSS :- Door Delivery to BHEL Stores ,Bangalore with Freight and Insurance paid	FCA International Gateway Airport (For shipment by air, Refer Annexure II for details) OR FOB Sea Port (for shipment by sea)
ii	Payment Terms	100% direct payment with 45 days credit from the date of : a) Receipt of material for Door delivery BHEL stores b)Receipt of complete set of documents for High Sea Sales c)Invoice for Ex-works delivery	100% against sight draft with 45 days credit on negotiation of complete set of documents
iii	Reckoning of Delivery Date	For Door Delivery at BHEL Stores:- Date of receipt of material at BHEL Stores. For High Sea Sales(HSS) :- Date of receipt of complete set of High Sea Sales documents For Delivery Terms of Ex-works /Negotiation of Documents Through Bank:- Date of invoice Where Pre Shipment Inspection at seller's works is applicable :- Inspection call for the date on which material is ready for inspection supported with documents such as TC's/ COC's as applicable.	For Delivery Terms of Ex-works :- Date of invoice For Delivery Terms of CIF/CIP/ FCA / FOB Date of House Airway Bill(HAWB) / Bill of Lading / Date of receipt by BHEL's Freight Forwarder whichever is earlier
iv.	Penalty for Delayed Delivery	As per clause 15 of General Conditions of Contract (DOC.NO.BHEL :EDN:GCC-SHOP:REV:00)	
v	Cancellation/ Termination of Contract & Risk Purchase	As per Clause 24 of General Conditions of Contract (DOC.NO.BHEL:EDN:GCC – SHOP :REV:00)	

2. When Bank Guaranty (BG) is applicable as per RFQ terms, the same shall be from any one of the BHEL Consortium of Banks (Refer **Annexure III**) in the prescribed format as per **Annexure IV**. The bank Guarantee shall be sent directly to BHEL by the issuing bank.

F. Commercial Deviations / Offered Terms & Loading of Offers :-

Unless specified otherwise in the RFQ and if the Purchaser decides to accept offers with deviations in respect of the standard commercial terms given at Clause No. E1 above, such offers will be subjected to loading on the **quoted basic material value** as detailed below:-

SI No	Deviation on	Nature of Deviation / Offered Terms	Loading %
i	Delivery Terms	For purchase within India :- Other than SI No.1 (i) of clause E above.	10
ii.	Payment Terms	For purchase within India :- 1) Payment against delivery/Proforma payment against receipt of material	15
		2) Payment against documents through bank – Delivery of material on production of consignee copy of LR	15*
		3) Credit period less than 45 days, but not less than 15 days.	10
		4) Payment against documents through bank with consignment door delivered to BHEL stores (without consignee copy of LR) and 45 days credit period.	2*
		For foreign purchase :- 1) Payment through At Sight Letter of Credit	10
		2) Payment through Letter of Credit with usance credit of 45 days	5
		3) Sight Draft with credit period less than 45 days	5
iii	Penalty for Delayed Delivery	1) Non – Acceptance	10
		2) Partial Acceptance (X%)	(10 – X)

* All bank charges shall be to seller's account. If bank charges of BHEL banker are to BHEL's account then **additional loading of 2% on the quoted basic value** is applicable.

NOTE: Offer/ s with payment terms other than the standard payment terms indicated at E1(ii) or Deviated Payment Terms with loading indicated at F(ii) above are liable for rejection.

G. Submission of Offers:

Offers shall be submitted as indicated below **within the due date and time** indicated in the RFQ/Any subsequent change intimated by Purchaser.

SI No.	Offer For	Mode of Submission
i	RFQs on EPS	Shall be made on the EPS (e-Procurement System) portal in line with the instructions given therein. Notes : a) To quote for the RFQs published through EPS vendors should have class III, 2048 Bit digital signature certificate (DSC) for both encryption and signing obtained from Certifying Authority (CA) authorized by Govt. of India through their Licensed Registering Authority (LRA). b) All required documents shall be uploaded before due date and time. Availability of power, internet connectivity, etc. is the sole responsibility of the bidder. Assistance required if any, may be availed from the Seller's Manual available on EPS portal of BHEL/ help line numbers of BHEL's Service Provider
ii	Other RFQs	Shall be dropped in the appropriate tender box as per details given in the RFQ OR May be Sent through post/courier/Fax/Email/EDI to the Purchase Executive/Fax No/Email ID indicated in the RFQ * * Bidders may adopt this mode at their own risk. The Purchaser does not own any responsibility / liability for delays in receipt / loss of secrecy of such offers. Such offers shall be received well in advance to enable them to be dropped in the tender box in time.

NOTE :

OFFERS RECEIVED BEYOND DUE DATE AND TIME WILL NOT BE CONSIDERED

H. Processing of Offers Received:

1. Only offers received in the mode and within the due date and time indicated in RFQ will be considered for processing.
 2. The following offers may not be considered for processing
 - a) Incomplete
 - b) Conditional
 - c) With deviations other than listed in clause F above
 3. If non acceptance to any of the terms & conditions of the RFQ or deviations if any are not clearly mentioned in the offer, it will be treated that all the terms & conditions of the RFQ are accepted by the bidder in total.
 4. If offer is revised within the due date and time of the RFQ on e-Procurement System, latest will be available for processing. In other cases the latest offer will be considered for processing only when there is a clear indication of the same, otherwise BHEL reserves the right to consider/not consider any of the offers received.
 5. **For offers on EPS, in case of any contradictions/inconsistency between the offered details on the bid template and those in the attachments, the offered details on the bid template only will be considered.**
 6. If a range is given for delivery, longest duration in the given range will be considered as the quoted delivery. If any drawing / sample / technical datasheets/Quality Assurance Plan approval or Manufacturing Clearance by Purchaser is involved the quoted delivery will be considered from the date of such Approval / Clearance by the Purchaser. Bidder to clearly indicate the time (in terms of no of days / weeks from the date of PO) for submission of such Drawings /Data Sheets/ Samples/QAP to the Purchaser.
 7. Changes in offer (Impact Bid)/Discounts or revised offers given after opening of Part-I bid will not be considered unless the same is sought by the Purchaser due to any change(s) in technical scope and / or specifications and / or commercial terms & conditions. In case of withdrawal of any Technical/Commercial deviation(s) by the bidder before opening of price bids, revision of price/impact bid will not be considered.
 8. Any discount on the already submitted offer by the bidder on its own will be considered provided it is received on or before the due date and time of offer submission and clearly mentions "Discount offer to be considered along with the original offer "(on the envelope also). The discount will be applied on pro-rata basis to all the items unless mentioned otherwise by the bidder.
 9. In case of two / three part bids, price bids of the techno-commercially accepted offers, only will be opened on a subsequent date, with prior intimation.
 10. Offers considered with commercial deviations will be subject to loading as per clause F above.
 11. In case BHEL decides to go for Reverse Auction Guidelines as **per Annexure V** are applicable. Only those bidders who have given their acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit "**online sealed bid**" in the Reverse Auction. Non submission of "**online sealed bid**" by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue. In case BHEL decides **NOT to adopt Reverse Auction** method of bidding, the sealed price bids and price impacts if any, of all the techno commercially qualified bidders already submitted and available with BHEL shall be opened as per BHEL's standard practice.
 12. Evaluation of Price bids will be done on the basis of "**Total Cost to Purchaser**" taking into consideration:
 - d) Basic material value, taxes and duties, packing and forwarding charges, freight and insurance, any other costs and loading for deviations if any, as applicable.
 - e) CENVAT/MODVAT/VAT credit benefits available to BHEL.
 - f) Calculated costs of freight, insurance and clearance charges as applicable, for foreign purchases.
 - g) RFQ item wise prices unless specified otherwise in the RFQ terms.
 - h) The offered quantity if offered quantity is more than the RFQ quantity
 - i) For offers in foreign currency, the exchange rate (TT selling rate of State Bank Of India (SBI)) will be taken as under :-

Single Part Bids: -	Date of tender opening
Two / Three part bids / Reverse Auction: -	Date of Part-1 bid opening
- If the relevant day happens to be a bank holiday then the FOREX rate (TT selling rate) as on the previous bank (SBI) working day will be taken.
13. Any typographical error, totaling mistakes, currency mistake, multiplication mistake, summing mistakes etc. observed in the price bids will be evaluated as per Clause 11.2.3 "Non-conformities between the figures and words of the quoted prices" of "Manual on Policies & Procedures for purchase of goods" issued by Ministry of Finance / Government of India.(Refer **Annexure VI**). BHEL's decision will be final in this regard.
14. Ranking (L-1, L-2 etc.) will be done only for the techno-commercially accepted offers.
15. Purchase Preference for MSE Vendors will be considered as per **Annexure VII**.

I. Despatch, Invoicing and Documentation :-

1. All goods shall be consigned to the Consignee details as given in the Purchase Order.
2. Quantity of goods in invoice / delivery challan shall tally with the goods delivered.
3. For delivery terms Ex-Works, the Seller shall intimate the readiness of goods to BHEL/BHEL's authorized freight forwarder/BHEL's authorized transporter and the goods shall be handed over to the BHEL's authorized freight forwarder/BHEL authorized transporter / agency assigned by BHEL. Goods can also be despatched as mutually agreed between BHEL and Seller.
4. Packing shall be road / rail / air / sea worthy as applicable for adequate protection against transit damages.
5. **Delivery timings at BHEL stores(On all working days) :-**
09.00 AM to 03.00 PM (Monday to Friday)
09.00 AM to 11.00 AM (Saturday)
Deliveries other than the timings indicated shall be done with prior permission from the purchase executive.
6. The invoice shall be in accordance with the PO duly supported with documents as called in the PO and shall contain the following details :-
BHEL PO No and PO Item no., BHEL material code and description, Quantity, Vendor's name, Address.
7. The rates shall be as per applicable PO rates. Indicate the basic rate, duties & taxes as applicable along with Vendor TIN number (applicable for dispatches from within India).
8. For issue of "C" Forms duly filled up format as per **Annexure VIII** shall be sent to email id: **cform@bheledn.co.in**.
9. **Documents :-**
Seller shall arrange to send the documents as applicable as per **Annexure IX** to the Purchaser, along with dispatch of goods. Any addition / exclusion to such documents shall be as specified in the Purchase Order.

J. Information on Processing of Payment :-

1. All direct payments will be made through Electronic Fund transfer (EFT). Vendor shall furnish e-payment particulars duly authenticated by their respective Bankers as per BHEL standard format (Refer **Annexure X**), if not registered with the purchaser earlier.
2. In case of High Sea Sales and Foreign Purchases, customs clearance of the consignment landed on Indian Sea / Air ports will be done by BHEL based on the original documents provided by Seller. All warehousing charges due to delay in submission of complete and or correct documents to BHEL may be charged to Seller's account.
3. Statutory deductions, if any, will be made and the deduction certificate shall be issued. In case Seller does not provide PAN details, the TDS deduction shall be at the maximum percentage stipulated as per the provisions of Income Tax Act.
4. Bills/Invoices will be processed for payment only if they are complete in all respects, correct and supported with relevant documents as applicable. Any delays in this regard will result in consequent delays in payment.

GENERAL CONDITIONS OF CONTRACT FOR PURCHASE

1. Applicable Conditions :-

These General Conditions of Contract for Purchase (GCP) apply to all enquiries, tenders, requests for quotations, orders and agreements concerning the supply of goods and the rendering of related services (hereinafter referred to as "deliveries") to Bharat Heavy Electricals Limited, Electronics Division / Electronics Systems Division (hereinafter referred to as "BHEL" or the Purchaser) or its projects / customers. Any deviations from or additions to these 'General Conditions of Contract for Purchase' require Purchaser's express written consent. The general terms of business or sale of the Seller shall not apply to the Contract. Acceptance or receipt of shipments or services or effecting payment shall not mean that the general terms of business or sale of the Seller have been accepted by the Purchaser. Purchase orders, Orders, agreements and amendments thereto shall be binding if made or confirmed by the Purchaser in writing.

2. Definitions :-

Throughout these conditions and in the specifications, the following terms shall have the meanings as assigned hereunder, unless the subject matter or the context requires otherwise.

- a. **'Purchaser'** means Bharat Heavy Electricals Limited (a Central Public Sector Enterprise) incorporated under the Companies Act, 1956 having its registered office at BHEL House, Siri Fort, New Delhi-110049, India acting through its Unit Electronics Division / Electronics Systems Division at Bangalore and shall be deemed to include its successors and assigns. It may also be referred to as BHEL.
- b. **'Seller'** means the person, firm, company or organization on whom the Purchase Order is placed and shall be deemed to include the seller's successors, permitted assigns, representatives, heirs, executors and administrators, as the case may be. It may also be referred to as Contractor, Supplier or Vendor.
- c. **'Contract'** shall mean and include the Purchase Order(also referred to as the "Order" or 'PO'), letter of intent(LOI) / letter of acceptance or award(LOA) along with tender / offer / bid submitted by the Seller, the General Conditions of Contract and Special Conditions of Contract for Purchase, Specifications, Inspection / Quality Plan, Schedule of Prices and Quantities, Drawings, if any enclosed or to be provided and the samples or patterns if any to be provided under the provisions of the Contract, by the Purchaser or his representative. Any conditions or terms stipulated by the tenderer / bidder in the tender / offer / bid or subsequent letters shall not form part of the Contract unless specifically accepted in writing by the Purchaser.
- d. **'Parties to the Contract'** shall mean the Seller and the Purchaser and Party shall mean either the Seller or the Purchaser.

3. Order of Precedence:-

In case of any inconsistency or contradiction between any of the documents, the order of precedence shall be Purchase Order, LOI / LOA, specific agreement, Special Conditions of Contract and General Conditions of Contract for commercial conditions; and specific agreement on technical conditions, Special Technical Conditions and General Technical conditions, RFQ / Offer.

4. Interpretation :-

In the contract, except where the context requires otherwise:-

- a. words indicating one gender include all genders;
- b. words indicating the singular also include the plural and words indicating the plural also include the singular;
- c. provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing, and
- d. "Written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record.

5. Ordering and Confirmation of Order :-

The Seller shall send the acceptance of the LOI / Purchase Order within two weeks or such other period as specified/agreed by BHEL from the date of LOI / Purchase Order. Purchaser reserves the right to revoke the order placed if the order acceptance differs from the original order placed. Purchaser shall only be bound after it has agreed explicitly in writing to be in agreement with the deviations. The acceptance of deliveries or supplies by Purchaser as well as payments made in this regard shall not imply acceptance of any deviations. The Purchase order will be deemed to have been accepted by the Seller, if no communication to the contrary is received within two weeks (or the time limit as specified / agreed by the Purchaser) of the receipt of the order.

6. Execution :-

The Seller shall execute the whole contract in the most approved, substantial and workman like manner as per the contracted terms. The Seller shall comply with all laws, ordinances, rules, and regulations bearing upon the performance of its obligations under the terms of the Contract.

7. Progress Reports and Documentation :-

After receipt of Purchase Order, seller should submit required documents like drawings, bill of materials, datasheets, catalogues, quality plan, test procedure, type test report, O & M Manuals and / or any other relevant documents as per Specification / Purchase Order, as indicated in the Purchase order .At any stage within the contract period, the seller shall notify of any error, fault or other defect found in BHEL's documents / specifications or any other items for reference. If and to the extent that (taking account of cost and time) any seller exercising due care would have discovered the error, fault or other defect when examining

the documents / specifications before submitting the tender, the time for completion shall not be extended. However if errors, omissions, ambiguities, inconsistencies, inadequacies or other defects are found in the seller's documents, they shall be corrected at his cost, notwithstanding any consent or approval. The Seller shall submit periodic reports as to the progress in execution of the contract and in such form as may be called for by the Purchaser. The submission and acceptance of such reports shall not prejudice the rights of the Purchaser in any manner.

8. Product Information, Drawings and Documents :-

The Seller shall, as per agreed date / s but not later than the date of delivery, provide information and drawings which are necessary to permit the Purchaser to use, erect, commission, operate and maintain the product. Such information and drawings shall be supplied in the number of copies agreed upon.

9. Non-disclosure and Information Obligations :-

The Seller shall provide Purchaser with all information pertaining to the delivery in so far as it could be of importance to Purchaser. The Seller shall not reveal any confidential information (including price) in relation to the contract in general and those which it may acquire from the purchaser during the course of execution of the contract in particular, to its own employees not involved with the tender / Contract & its execution and delivery or to third parties, or make use of such information pertaining to any data, designs, drawings, specifications and other information furnished to it by the Purchaser, unless Seller seeks a permission to do so from the Purchaser and the Purchaser has agreed to this in writing beforehand. The Seller shall not be entitled to use the Purchaser's name in advertisements and other commercial publications without prior written permission from Purchaser.

10. Intellectual Property Rights; Licenses :-

If any patent design, trade mark, copyright, trade secret or any other intellectual property rights apply to the products / goods supplied, or delivery or accompanying documentation, Purchaser or its Customer shall be entitled to the legal use thereof free of charges by means of a non-exclusive, assignable, transferrable, sub-licensable, worldwide, perpetual license as duly granted by the owner or licensor of such right. All intellectual property rights that arise or developed during or due to the execution of the contract or delivery of the goods by the Seller and by its employees or third parties involved by the Seller for performance of the Contract belong to Purchaser. The Seller is obliged under the contract to do everything necessary to obtain or establish the above mentioned rights in favor of Purchaser. The Seller guarantees that the execution of the contract including goods and its delivery does not infringe any of the intellectual property rights of third parties. The Seller shall do everything necessary to obtain or establish the alternate acceptable arrangement pending resolution of such (alleged) claims by third parties, if any. The Seller agrees to indemnify, defend, and hold harmless Purchaser, its officers, employees, agents, representatives, successors, assigns, or any of the Purchaser's customers buying or using the goods or services, against any actual or alleged infringement of such intellectual property interests or claims by third parties in this regard and shall reimburse Purchaser for any liabilities, damages, penalties, injuries, claims, demands, actions, costs and expenses (including, without limitation, reasonable legal and other professional fees and expenses) suffered as a result thereof.

11. Inspection and Testing :-

Prior written notice of at least 10 days shall be given along with internal test certificates / COC and applicable test certificates. Materials will be inspected by BHEL-EDN-QS/CQS or BHEL nominated Third Party Inspection Agency (TPIA) or BHEL authorized Inspection Agency or Customer / Consultant or jointly by BHEL & Customer / consultant. All tests have to be conducted as applicable in line with approved Quality plan or QA Checklist or Purchase specification and original reports shall be furnished to BHEL for verification / acceptance for issue of dispatch clearance. All costs related to inspections & re-inspections shall be borne by vendor. Whether the Contract provides for tests on the premises of the vendor or any of his Sub-contractor/s, vendor shall be responsible to provide such assistance, labour, materials, electricity, fuels, stores, apparatus, instruments as may be required and as may be reasonably demanded to carry out such tests efficiently. Cost of any type test or such other special tests shall be borne by BHEL only if specifically agreed to in the purchase order.

12. Quality and Condition of the Delivery :-

The Seller shall guarantee that the delivery:-

- a. Is of good quality and free from defects and in the case of services rendered that they are performed by skilled personnel and that new materials are used;
- b. corresponds exactly with the provisions of the Contract, the reasonable expectations of Purchaser regarding the characteristics, quality and reliability of the delivery;
- c. is suitable for the purpose for which it is intended by its very nature or which is evident from the specifications or the Contract;
- d. Complies with legal requirements applicable in India and other (international) Government regulations, as applicable.
- e. Complies with the customary norms and standards in the relevant branch of trade or industry.

The Seller shall be responsible for compliance with applicable technical, safety, quality, environmental requirements and other regulations in relation to its products, packaging, and raw and ancillary materials.

13. Packaging and Dispatch :-

The seller shall package the deliverables safely and carefully and pack them suitably in all respects considering the peculiarity of the material for normal safe transport by Sea / Air / Rail / Road to its destination suitably protected against loss, damage, corrosion in transit and the effect of tropical salt laden atmosphere. The packages shall be provided with fixtures / hooks and sling marks as may be required for easy and safe handling by mechanical means. Each package must be marked with consignee name, P.O Number, BHEL material code, Package No., Gross weight & Net weight, Dimensions (LxBxH) and seller's name. The packing shall allow for easy removal and checking of

goods on receipt and comply with carrier's conditions of packing or established trade practices. **Packing list of goods inside each package with P.O item no.& Quantity must also be fixed securely outside the box to indicate the contents. If any consignment needs special handling instruction, the same shall be clearly marked with standard symbols / instructions. Hazardous material should be notified as such and their packing, transportation and other protection must conform to relevant regulations.**

14. Delivery :-

Delivery shall be as per Purchase Order delivery terms. Trade terms such as DDL, FOR, EXW, FOB, CFR etc., if stipulated in the order shall be construed in accordance with the version of the INCOTERMS applicable at the time of ordering, without prejudice to the provisions contained in these conditions. The delivery date(s) or delivery period(s) as stipulated in the Contract shall be firm and binding and shall apply to the entire delivery for each PO item. Partial shipments may, however, be permitted by the purchaser.

15. Penalty :-

The time or period of delivery as stipulated in the schedule of delivery shall be deemed to be the essence of the contract. Should circumstances arise whereby the deadline for an agreed delivery date(s) or period(s) is expected to be exceeded, the seller shall inform purchaser hereof without delay. If delay in delivery is caused by any of the circumstances mentioned in clause 25 (Force Majeure) or which are caused exclusively by the acts of purchaser, the purchaser shall extend the time for delivery by a period which is reasonable having regard to all the circumstances in the case.

a. For delay in documentation :-

In the event of delay in submission of complete set of documents (like drawings, bill of materials, datasheets, catalogues, quality plan etc. as called in tender specifications including soft copies wherever applicable) in required sets beyond three weeks (or as agreed / indicated in the Purchase Order) from the date of Purchase Order, penalty at 0.5% (half percent) per week or part thereof, limited to a maximum of 5% (five percent) of the basic material value of the Purchase Order will be applicable.

b. For delay in delivery :-

In the event of delay in agreed contractual delivery as per Purchase Order, penalty @ 0.5 % (half percent) per week or part thereof but limited to a max of 10% (ten percent) value of delayed portion (basic material cost) will be applicable. Delivery will commence from the date of document approval by customer / BHEL or date of issue of manufacturing clearance, whichever is later in cases where such approval/manufacturing clearance is applicable as per PO. Where pre shipment inspection is applicable, the date for which Inspection call is issued by vendor along with test certificates / test reports / Certificate of Conformance / calibration reports, as proof of completion of manufacturing will be treated as date of deemed delivery for penalty calculation. In the absence of furnishing such document indicated above as proof of completion of manufacturing along with inspection call, actual date of inspection will be considered as date of deemed delivery and BHEL will not be responsible for delay in actual date of inspection. Penalty for delayed documentation/delayed delivery, if applicable, shall be deducted at the time of first payment. If penalty is applicable for duration of less than a week, penalty @ 0.5% (half percent) of the basic material value will be deducted.

Imposition, recovery or settlement of this penalty shall not affect any rights of the purchaser to claim enforcement of specific performance of the contract, compensation and/or to terminate the contract.

16. Assignment of Rights & Obligations; Subcontracting:

Vendor is not permitted to subcontract the delivery or any part thereof to third party or to assign the rights and obligations resulting from this agreement in whole or in part to third parties without prior written permission from BHEL. Any permission or approval given by BHEL shall, however, not absolve the vendor of the responsibility of his obligations under the Contract.

17. Transfer of Ownership, title and Risk :-

The risk for the delivery remains with the Seller until the goods are delivered at the agreed place and acknowledged by the Purchaser/his authorized representative.

18. Price, Invoicing and Payment :-

The agreed prices are fixed prices in the currency as specified in the Purchase Order. They shall include packing, forwarding, loading and carriage to the place specified by the Purchaser and are inclusive of all applicable taxes, duties etc. except for those specifically agreed between the Seller and Purchaser. Further, Seller shall indemnify and hold harmless Purchaser from all claims and liabilities, damages, penalties, injuries, claims, demands, actions, costs and expenses (including, without limitation, reasonable legal and other professional fees and expenses) arising from Seller's failure to report or pay any taxes, tariffs or duties for which Seller is responsible. The method of invoicing shall be without prejudice to the parties' agreement as to the place of performance. Indian Agent's commission if payable and so specified in the Purchase Order shall be paid in Indian Rupees, considering the SBI TT selling exchange rate prevailing on the date of Purchase Order, after successful completion of the contract. If so stipulated in the order, the Seller shall furnish, on receipt of the Purchase Order or along with order acknowledgement, the Billing break-up of prices (BBU) for approval by the Purchaser in respect of the major items / components going into the equipment. This BBU is required by the Purchaser for admitting the claims of the Seller if part shipments are contemplated and also to facilitate custom clearance after payment of applicable duties in case of imports. Purchaser shall be entitled to suspend payment for as long as required supporting documents / details remain outstanding and any consequential demurrage / wharfage shall be to the account of the Seller. Payment

does not imply in any respect whatsoever a waiver of Purchaser's right to performance of the Contract. Purchaser is entitled to set off claimable debts against claimable liabilities with the Seller by means of a set off note.

19. Contract Variations; Increase or Decrease in the Scope of Supply :-

The purchaser may vary the contracted quantities during execution, due to exigencies of project requirements with mutual consent of the seller.

20. Guarantee / Warranty :-

Wherever required, and so provided in the specifications / Purchaser Order, the Seller shall guarantee that the goods supplied shall comply with the specifications laid down, for materials, workmanship and performance. If within the guarantee period, the delivery is found to be non-compliant including those with the stipulations in Clause 12 (Quality and Condition of Delivery) of these Conditions, the Seller shall, for its own account, replace, repair, or re-execute the delivery at Purchaser's discretion when first requested to do so within two weeks or mutually agreed period, without prejudice to Purchaser's other legal rights. If the Seller continues to default on its obligations, Purchaser has the right to proceed to replace, repair or re-execute the order at the Seller's expense, with or without help from third parties. Purchaser shall notify the Seller of the exercise of this right in advance where possible. Unless otherwise specified, guarantee period shall be minimum 12 months from the date of commissioning or 18 months from the date of supply whichever is earlier. The guarantee period shall be extended by the period during which the goods are not in compliance with the stipulations in Clause 12 (Quality and Condition of Delivery). A guarantee period as described above shall apply afresh to replaced, repaired or re executed parts of a delivery. The decision of the Purchaser in regard to the Seller's liability under this clause shall be conclusive. This clause shall survive termination / completion of contract.

21. Shortages / Replacements :-

In the event of shortage on receipt of goods and / or on opening of packages at BHEL, all such shortages shall be made good within a reasonable time that BHEL may allow from such intimation and free of cost.

22. Transit Damages :-

In the event of receipt of goods in damaged condition or having found them so upon opening of packages at BHEL Supplier shall make good of all such damages within a reasonable time from such intimation by BHEL. In case BHEL raises an insurance claim, the cost of material limited to insurance settled amount less handling charges will be reimbursed.

23. Rejection / Replacement :-

The Seller shall arrange replacement / repair under its obligation under the contract within two weeks from the date of intimation or mutually agreed period. The rejected goods shall be taken away by the Seller and replaced on DDP (Delivered duty Paid)/ FOR - BHEL Stores / designated destination basis within such period. In the event of the Seller's failure to comply, Purchaser may take appropriate action including disposal of rejections and replacements, at the cost and risk of the Seller. In case defects attributable to Seller are detected during processing of the goods at purchaser's / his subcontractor works, the Seller shall be responsible for replacement / repair of the goods as required by the Purchaser at Seller's cost. In such cases expiry of guarantee/warranty will not be applicable.

24. Cancellation / Termination of Contract and Risk Purchase :-

- a. Purchaser shall have the right to completely or partially terminate the Contract by means of written notice to that effect without prejudicing its other rights and remedies, in an event of default by the Seller :-

Events of default:-

- (i) The Seller fails to perform within the time specified in the Contract or any extension thereof;
- (ii) The Seller defaults on one or more of the obligations or program of work as contained in the Contract.
- (iii) The Seller is declared bankrupt or insolvent or is ordered to be wound up, its business has been shut down or liquidated, a substantial part of its assets have been attached, or the business has been transferred to a third party. In case of partnership firm any dissolution of partnership shall be also considered as an event of default.
- (iv) Any misrepresentation or hiding of material fact if detected at a later stage
- (v) The delivery is rejected after inspection or re-inspection.
- (vi) Export license not granted to Seller by the concerned Government.
- (vii) Incapacity of seller for any other reason to deliver or perform the contract.

BHEL shall have the right to cancel / foreclose the Order / Contract, wholly or in part, in case it is constrained to do so, on account of any decline, diminution, curtailment or stoppage of the business. In the event of termination, the risk and liability attached to the items already delivered but not of use to Purchaser, as determined by Purchaser, remains with the Seller. Such items shall then be at the Seller's disposal and they are to be collected or removed by the Seller. The Seller shall immediately refund any payments in respect of such items if already made by the Purchaser before the termination, and in any case not later than 30 days.

- b. In the event of termination due to reasons or defaults by the Seller, the Purchaser may at his option procure from any source, on such terms and in such manner as he deems appropriate, goods not delivered or others of similar description where goods exactly complying are not readily procurable, in the opinion of the Purchaser, which opinion shall be final, at the risk and cost of the Seller and the Seller shall be liable to the Purchaser for any risks and excess cost. The cost of purchases made by the Purchaser at the risk and cost of the Seller shall be worked out after loading 10% overhead / handling charges on the cost of materials and related services procured from alternate source / s. Provided, however, that the Seller shall continue the

performance of the Contract to the extent not cancelled or terminated under the provisions of this clause. The Seller shall on no account be entitled to any gain on such re-purchases by the Purchaser.

- c. Termination of the Contract, from whatever cause arising, shall be without prejudice to the rights of the parties accrued under the Contract up to the time of termination.

25. Force Majeure :-

Notwithstanding anything contained in the purchase order or any other document relevant thereto, neither party shall be liable for any failure or delay in performance to the extent said failures or delays are caused by the "Act of God" and occurring without its fault or negligence, provided that, force majeure will apply only if the failure to perform could not be avoided by the exercise of due care and vendor doing everything reasonably possible to resume its performance. A party affected by an event of force majeure shall give the other party written notice, with full details as soon as possible and in any event not later than three (3) calendar days of the occurrence of the cause relied upon. If force majeure applies, dates by which performance obligations are scheduled to be met will be extended for a period of time equal to the time lost due to any delay so caused.. Notwithstanding above provisions, Purchaser shall reserve the right to cancel the order / Contract, wholly or partly, in order to meet the overall project schedule and make alternative arrangements for completion of deliveries and other schedules. Purchaser may takeover partly processed material at a mutually agreed price.

26. Indemnification :-

Vendor is fully responsible for ensuring that all legal compliances and safety guidelines are followed in course of the contract. Notwithstanding any other clause herein to the contrary, the Seller shall indemnify, hold and save harmless, and defend, at its own expense, the Purchaser, its officials, agents, servants and employees from and against all suits, claims, demands, and liability of any nature or kind, including their costs and expenses, arising out of acts or omissions of the Seller, or the Seller's employees, officers, agents or sub-contractors, in the performance of this Contract. This provision shall extend, inter alia, to claims and liability in the nature of employee's compensation and products liability. The obligations under this clause do not lapse upon termination of this Contract.

27. Non-waiver of Defaults :-

If any individual provision of the Contract is invalid, the other provisions shall not be affected.

The failure of Purchaser,

- a. To enforce any of the terms and conditions of the Contract.
Or
b. To exercise any right or privilege granted to Purchaser.

Under the Contract or under law shall not release the Seller from any of the warranties or obligations under the Contract and shall not be construed as a waiver thereof and the same shall continue in full force and effect.

28. Limitation of Liability :-

Vendor's liability towards this contract is limited to a maximum of 100% of the contract value and consequential damages are excluded. However the limits of liability will have no effect in cases of criminal negligence or willful misconduct. The total liability of Vendor for all claims arising out of or relating to the performance or breach of the Contract or use of any Products or Services or any order shall not exceed the total Contract price.

29. Settlement of Disputes :-

Except as otherwise specifically provided in the Purchase Order, decision of BHEL shall be binding on the vendor with respect to all questions relating to the interpretation or meaning of the terms and conditions and instructions herein before mentioned and as to the completion of supplies / work / services, other questions, claim, right, matter or things whatsoever in any way arising out of or relating to the contract, instructions, orders or these conditions or otherwise concerning the supply or the execution or failure to execute the order, whether arising during the schedule of supply / work or after the completion or abandonment thereof. Any disputes or differences among the parties shall to the extent possible be settled amicably between the parties thereto, failing which the disputed issues shall be settled through arbitration. Vendor shall continue to perform the contract, pending settlement of dispute(s).

30. Arbitration Clause :-

In case amicable settlement is not reached in the event of any dispute or difference arising out of the execution of the Contract or the respective rights and liabilities of the parties or in relation to interpretation of any provision in any manner touching upon the Contract, such dispute or difference shall (except as to any matters, the decision of which is specifically provided for therein) be referred by either party to the sole arbitration of an Arbitrator appointed by the Unit head of Electronics division of BHEL. Vendor shall have no objection even if the Arbitrator so appointed is an employee of BHEL or has ever dealt / had to deal with any matter relating to this Contract. Subject as aforesaid the provisions of the Arbitration and Conciliation Act, 1996 of India or any statutory modification or re-enactment thereof and the rules made there under and for the time being in force shall apply to the arbitration proceedings under this clause. It is a term of contract that the party initiating arbitration shall specify the dispute or disputes to be referred to arbitration under this clause together with the amount or amounts claimed in respect of each such dispute. The venue for the arbitration shall be Bangalore, India. The award of the arbitrator shall be a speaking award and shall be final, conclusive and binding on all parties to this contract.

- a. The cost of Arbitration shall be borne equally by the parties.
b. Notwithstanding the existence of any dispute or difference or any reference for the arbitration, the Seller shall proceed with and continue without hindrance the performance of the work under the Contract with due diligence and expedition in a professional manner.



31. Applicable Laws and Jurisdiction of Courts :-

The Contract shall be governed by the substantive laws of India. This contract shall be construed and interpreted in accordance with the laws of India and shall have exclusive jurisdiction of courts in Bangalore, Karnataka State, India.

32. General Terms:

That any non-exercise, forbearance or omission of any of the powers conferred on BHEL and /or any of its authorities will not in any manner constitute waiver of the conditions hereto contained in these presents. That the headings used in this agreement are for convenience of reference only. That all notices etc., to be given under the Purchase order shall be in writing, type script or printed and if sent by registered post or by courier service to the address given in this document shall be deemed to have been served on the date when in the ordinary course, they would have been delivered to the addressee.

ANNEXURE – I

BENEFITS FOR MSE SUPPLIERS AS PER MSMED ACT 2006 AND PUBLIC PROCUREMENT POLICY 2012

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 CA certificate (Format enclosed at page 2 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.

Certificate by Chartered 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 the Books of Accounts 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 the Ministry of Small Industries vide its notification
No.S.O.1722 (E) dated October 5, 2006:
Rs.Lacs.
- 2. For Service Enterprises:** Investment in equipment (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 the MSMED Act, 2006:
Rs.Lacs.

The above investment of Rs. Lacs in within permissible limit of
Rs..... Lacs for.....Micro / Small (Strike off which is not applicable)
Category under MSMED Act 2006.

(or)

The company has been graduated from its original category (Micro/Small) (Strike off which is not applicable)
and the date of graduation of such enterprise from its original category 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 of MSME.

Date:

(Signature)

Name -

Membership Number -

Seal of Chartered Accountant

ANNEXURE-II

LIST OF INTERNATIONAL GATEWAY AIRPORTS

SCHEDULE NO	COUNTRY	CURRENCY CODE	AIRPORT
D01	UK	GBP	LONDON (HEATHROW)
D02	UK	GBP	NEW CASTLE
D03	UK	GBP	OXFORD. CHETLAM
D04	UK	GBP	BRISTOL. WELLINGBOROUGH
D05	UK	GBP	BIRMINGHAM
D06	UK	GBP	EAST MIDLANDS
D07	UK	GBP	MANCHESTER
D08	UK	GBP	LEEDS
D09	UK	GBP	GLASGOW
D10	FRANCE	EURO	PARIS (ROISSY) & LYON
D11	SWEDEN	EURO	STOCKHOLM
D12	SWEDEN	EURO	GOTHENBERG & MALMO
D13	ITALY	EURO	ROMA, MILAN
D14	ITALY	EURO	TURIN, BOLOGNA, FLORENCE
D15	NETHERLANDS	EURO	AMSTERDAM, ROTTERDAM
D16	AUSTRIA	EURO	VIENNA, LINZ, GRAZ
D17	BELGIUM	EURO	ANTWERP, BRUSSELS
D18	DENMARK	DKK	COPENHAGEN
D19	JAPAN	JPY	TOKYO, OSAKA
D20	SINGAPORE	SGD	SINGAPORE
D21	CANADA	CAD	TORONTO
D22	CANADA	CAD	MONTREAL
D23	USA	USD	NEW YORK, BOSTON
D24	USA	USD	CHICAGO
D25	USA	USD	SAN FRANCISCO, LOS ANGELES
D26	USA	USD	ALANTA, HOUSTON
D27	GERMANY	EURO	MUNICH, KOLN, DUSSELDORF, HANNOVER, HAMBURG, STUTTGART, DAMSTADT, MANIHIEM, NURUMBERG
D28	GERMANY	EURO	FRANKFURT

D29	GERMANY	EURO	BERLIN
D30	SWITZERLAND	SFR	BASLE, ZURICH, GENEVA
D31	SPAIN	EURO	BARCELONA
D32	AUSTRALIA	AUD	SYDNEY
D33	AUSTRALIA	AUD	MELBOURNE
D34	AUSTRALIA	AUD	PERTH
D35	CZECH	EURO	PRAGUE
D36	HONG KONG	HKD	HONG KONG
D37	NEW ZELAND	NZD	AUCKLAND
D38	RUSSIA	USD	MOSCOW
D39	SOUTH KOREA	USD	KIMPO INTERNATIONAL, INCHEON
D40	FINLAND	EURO	HELSINKI
D41	ROMANIA	EURO	BUCHAREST
D42	NORWAY	EURO	OSLO
D43	IRELAND	EURO	DUBLIN
D44	ISRAEL	USD	TEL AVIV
D45	UAE	USD	DUBAI
D46	OMAN	USD	MUSCAT
D47	EGYPT	USD	CAIRO
D48	TAIWAN	USD	TAIPEI
D49	UKRAINE	USD	KIEV
D50	CHINA	USD	SHANGHAI, SHENZHEN
D51	PHILIPINES	USD	MANILA
D52	MALAYSIA	USD	KUALALUMPUR, PE NANG
D53	CYPRUS	USD	LARNACA
D54	SOUTH AFRICA	USD	JOHANNESBERG, DURBAN
D55	SLOVAKIA	EURO	BARTISLOVA
D56	SAUDI ARABIA	SAR	RIYADH
D57	TURKEY	EURO	ISTANBUL
D58	THAILAND	USD	BANGKOK
D59	BRAZIL	USD	SAO PAULO, RIO DE JANEIRO

ANNEXURE-III

LIST OF CONSORTIUM BANKS

BANK GUARANTEE (BG) SHALL BE ISSUED FROM THE FOLLOWING BANKS ONLY:

	Nationalized Banks		Nationalized Banks
1	Allahabad Bank	19	Vijaya Bank
2	Andhra Bank		Public Sector Banks
3	Bank of Baroda	20	IDBI
4	Canara Bank		Foreign Banks
5	Corporation Bank	21	CITI Bank N.A
6	Central Bank	22	Deutsche Bank AG
7	Indian Bank	23	The Hong Kong and Shanghai Banking Corporation Ltd. (HSBC)
8	Indian Overseas Bank	24	Standard Chartered Bank
9	Oriental Bank of Commerce	25	The Royal Bank of Scotland N.V.
10	Punjab National Bank	26	J P Morgan
11	Punjab & Sindh Bank		Private Banks
12	State Bank of India	27	Axis Bank
13	State Bank of Hyderabad	28	The Federal Bank Limited
14	Syndicate Bank	29	HDFC Bank
15	State Bank of Travancore	30	Kotak Mahindra Bank Ltd
16	UCO Bank	31	ICICI Bank
17	Union Bank of India	32	IndusInd Bank
18	United Bank of India	33	Yes Bank

Note:

- BG should be directly sent to BHEL by the issuing Bank along with covering letter.
- All BGs must be issued from BHEL consortium banks listed above.
- BHEL may accept BG from other Public Sector Banks also which are not listed above.
- BG will not be accepted from Scheduled Banks and Co-operative Banks.
- In case BG is issued from a bank located outside Indian Territory and is issued in foreign currency, the BG must be routed through and confirmed by any one of the above mentioned consortium banks.
- This list is subject to changes. Hence vendors are requested to check this list every time before issuing BGs.

**ANNEXURE IV****BANK GUARANTEE FOR SECURITY DEPOSIT (PROFORMA)**

In consideration of the Bharat Heavy Electricals Limited, having its registered office at BHEL House, Siri Fort, New Delhi – 110 049 the concerned division being (indicate name of the concerned division of BHEL) (hereinafter called BHEL).

having agreed to exempt (hereinafter called “the said Contractor(s)” from the demand, under terms and conditions of agreement dated made between BHEL and for..... (hereinafter called “the said Agreement) of security deposit for the due fulfillment by said contractors of the terms and condition contained in the said agreement, on production of bank guarantee for Rs.

(Rupees only)

We (hereinafter referred to as “the Bank”) at the request of (indicate the name of Bank)

contractor(s) do hereby undertake to pay to BHEL an amount not exceeding Rs..... against any loss or damage caused to or suffered or would be caused to or suffered by BHEL, by reason of any breach by the said contractor(s) of any of the terms or conditions contained in the said Agreement.

2. We do hereby undertake to pay the

(indicate the name of Bank)

amounts due and payable under this guarantee without any demur, merely on a demand from BHEL stating that the amount claimed is due by way of loss or damage caused to or would to or suffered by BHEL by reason of breach by the said contractor(s) of any of the terms and conditions contained in the said Agreement or by reason of the contractor(s) failure to perform the said Agreement. Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, out liability under this guarantee shall be restricted to an amount not exceeding Rs.....

3. Weundertake to pay to BHEL any money so demanded notwithstanding

(indicate the name of Bank)

any dispute or disputes raised by contractor (s) supplier(s) in any suit or processing pending before any court or tribunal relating thereto our liability under these presents being absolute and unequivocal. The payment so made by under this bond shall be valid discharge of our liability for payment thereunder and the contractor(s) shall have no claim against us for making such payment.

4. further agree that the guarantee herein (indicate the name of Bank) contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and the it shall continue to be enforceable till all the dues of BHEL under or by virtue of the said Agreement have been fully paid and its Agreement have been fully and properly carried out by the said contractor(s) and accordingly discharge this guarantee unless a demand or claim under this guarantee is made on us in writing on or before we shall be discharged form all liability under this guarantee thereafter.



i. Wefurther agree with BHEL that BHEL shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder, to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said contractor(s) from time to time or to postpone any time or from time to time any of the powers exercisable by the BHEL against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reasons of any such variation, of extension being granted to the said Contractor(s) or for any forbearance, act, or commission on the part of BHEL or any indulgence BHEL to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would but for its provisions, have effect of so relieving us.

ii. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s)

/ Supplier(s)

iii. We lastly undertake not to revoke this

(indicate the name of Bank)

guarantee during its currency except with the previous consent of BHEL in writing.

iv. The address of BHEL of services, correspondence in respect of matters relating to this guarantee shall be :

ADDRESS OF THE CONCERNED DIVISION OF BHEL.

Address of the Bank in full

Dated the Day of Pin

Code :

Telegraphic Code :

For

(Indicate the name of the Bank)

Telex No:

Fax No.: Witness:

1.

2.

ANNEXURE- V

GUIDELINES FOR REVERSE AUCTION PROCEDURE

Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to “REVERSE AUCTION PROCEDURE” i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit “online sealed bid” in the Reverse Auction. Non-submission of “online sealed bid” by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.
3. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.
4. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.
5. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.
6. Bidders have to fax the Compliance form before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.
7. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at “Total Cost to BHEL” like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.
8. Reverse auction will be conducted on scheduled date & time.
9. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.
10. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, as provided on case-to-case basis to Service provider within two working days of Auction without fail.
11. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL’s standard practice.
12. Bidders shall be required to read the “Terms and Conditions” section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the “Business Rules of Reverse Auction”, which will be communicated before the Reverse Auction.
13. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per* extant BHEL guidelines, shall be initiated by BHEL and the results of the RA scrapped/ aborted.
14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.
15. In case BHEL decides to go for reverse auction, the H1 bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

Business Rules for Reverse Auction

This has reference to tender no **{tender number....date...}**. BHEL shall finalize the Rates for the supply of **{item name}** through Reverse Auction mode. BHEL has made arrangement with M/s. **{Service provider}**, who shall be BHEL's authorized service provider for the same. Bidders should please go through the guidelines given below and submit acceptance of the same.

The technical & commercial terms are as per (a) BHEL Tender Enq. No. **{...}** dated **{...}**, (b) Bidders' technical & commercial bid (in case of two part bid) and (c) subsequent correspondences between BHEL and the bidders, if any.

1. Schedule for reverse auction: The Reverse Auction is tentatively scheduled on **{date}**:

- **Online Sealed Bid:-**

☐ **{Start Time:**

☐ **Close Time: }**

- **Online Reverse Auction:-**

☐ **{Start Time:**

☐ **Close Time:}**

2. Auction extension time: If a bidder places a bid in the last **{...}** minutes of closing of the Reverse Auction and if that bid gets accepted, then the auction's duration shall get extended automatically for another **{...}** minutes, for the entire auction (i.e. for all the items in the auction), from the time that bid comes in. Please note that the auto-extension will take place only if a bid comes in those last **{...}** minutes and if that bid gets accepted as the lowest bid. If the bid does not get accepted as the lowest bid, the auto-extension will not take place even if that bid might have come in the last **{...}** minutes. In case, there is no bid in the last **{...}** minutes of closing of Reverse Auction, the auction shall get closed automatically without any extension. However, bidders are advised not to wait till the last minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc.

The above process will continue till completion of Reverse Auction.

Complaints/ Grievances, if any, regarding denial of service or any related issue should be given in writing thru e-mail/ fax to M/s. **{Service provider}** with a copy to BHEL within 15 minutes from the initial closing time of Online Reverse Auction.

3. Bid price: The Bidder has to quote the F.O.R. destination Price inclusive of Packing & Forwarding charges, all the routine & type tests as per tender scope, ED + cess, CST against C-form, Freight (bidder to provide original Freight paid receipt), insurance charges, etc. including loading (if indicated by BHEL due to deviations in commercial terms) for the Items specified. Details are as shown in Excel Sheet for calculation of Landed cost.

Note: For the consideration of L1 bidder, the bid value shall be reduced by loading amount, if applicable.

4. Bidding currency and unit of measurement: Bidding will be conducted in **{Indian Rupees per Unit}** of the material as per the specifications **{...}**

In case of foreign currency bids, exchange rate (TT selling rate of State Bank of India) as on scheduled date of tender opening (Part-I bid in case of two part bid) shall be considered for conversion in Indian Rupees.

5. Validity of bids: Price shall be valid for **{... days}** from the date of reverse auction. These shall not be subjected to any change whatsoever.

6. Lowest bid of a bidder: In case the bidder submits more than one bid, the lowest bid at the end of Online Reverse Auction will be considered as the bidder's final offer to execute the work.

7. Post auction procedure: BHEL will proceed with the Lowest Bid in the Reverse Auction for further processing.

8. Procedure of Reverse Auctioning :

i. **Online Sealed Bid:** This duration of online sealed bid will be **{...}** minutes. All bidders to submit their online sealed bids during this period.

- ii. **Online Reverse Auction:** The „opening price“ i.e. start price for RA and „bid decrement“ will be decided by BHEL.
- iii. If BHEL decides the lowest online sealed bid as the starting price, then the lowest bidder in online sealed bid shall be shown as current L1 automatically by the system and no acceptance of that price is required. System shall have the provision to indicate this bid as current L1.
- iv. Bidders by offering a minimum bid decrement or the multiples thereof can displace a standing lowest bid and become “L1” and this continues as an iterative process.
- v. After the completion of the online reverse auction, the Closing Price (CP) shall be available for further processing.

9. If no bid is received in the auction system/ website within the specified time duration of the online RA, then BHEL will scrap the online reverse auction process and proceed with the conventional mode of tendering (opening of the envelope sealed bids earlier submitted by the bidders).

In cases where no bidder accepts the start price, the RA may be treated as failed and sealed envelope price bids of all the techno-commercially qualified bidders shall be opened and the tender processed accordingly. Wherever the techno-commercially acceptable bidder(s) had agreed to participate in the RA and had failed to submit the online sealed bid, the envelope sealed bids of such bidder(s) shall not be entertained.

Wherever, the evaluation is done for individual items of the package, and no bid is received for some of the item(s), RA will be considered as failed for these item(s), re-reverse auction/ retendering will be conducted for these items.

10. Only those bidders who have submitted the „online sealed bid“ within the scheduled time shall be eligible to participate further in RA process. However, the H1 bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

11. Any commercial/ technical loading shall be intimated to bidders prior to RA. The excel sheet provided in this regard shall cover all these aspects. Commercial/ technical loading if any, shall be added by the respective bidder in its price during online sealed bid & Online Reverse Auction. Modalities of loading & de-loading shall be separately intimated to the bidders.

12. Computerized reverse auction shall be conducted by BHEL (through M/s {*Service Provider*}), on pre-specified date, while the bidders shall be quoting from their own offices/ place of their choice. Internet connectivity shall have to be ensured by bidders themselves.

During the RA if a bidder is not able to bid and requests for extension of time by fax/ e-mail/ phone then time extension of additional 15 minutes will be given by the service provider provided such requests come before 5 minutes of auction closing time. However, only one such request per bidder can be entertained.

Despite this extension if bidder fails to upload his prices due to extreme case of failure of Internet connectivity, (due to any reason whatsoever may be) it is the bidders' responsibility/ decision to send fax communication immediately to M/s. {*Service provider*}, furnishing the price the bidder wants to bid online with a request to the service provider to upload the faxed price on line so that the service provider will upload that price on line on behalf of the Bidder. It shall be noted clearly that the concerned bidder communicating this price to service provider has to solely ensure that the fax message is received by the service provider in a readable/ legible form and also the Bidder should simultaneously check up with service provider about the clear receipt of the price faxed. It shall also be clearly understood that the bidder shall be at liberty to send such fax communications of prices to be uploaded by the service provider only within the closure of Bid time and under no circumstance it shall be allowed beyond the closure of Bid time /reverse auction. It shall also be noted that the service provider should be given a reasonable required time by the bidders, to upload such prices online and if such required time is not available at the disposal of the Service provider at the time of receipt of the fax message from the bidders, the service provider will not be uploading the prices and either BHEL or the service provider are not responsible for this unforeseen circumstances. In order to ward-off such contingent situation bidders are requested to make all the necessary arrangements/ alternatives whatever required so that they are able to circumvent such situation and still be able to participate in the reverse auction successfully. Failure of power or loss of connectivity at the premises of bidders during the Reverse auction cannot be the cause for not participating in the reverse auction. On account of this, the time for the auction cannot be extended and neither BHEL nor M/s. {*Service provider*} is responsible for such eventualities.

13. Proxy bids: Proxy bidding feature is a pro-bidder feature to safe guard the bidder's interest of any internet failure or to avoid last minute rush. The proxy feature allows bidders to place an automated bid in the system directly in an auction and bid without having to enter a new amount each time a competing bidder submits a new offer. The bid amount that a bidder enters is the minimum that the bidder is willing to offer. Here the software bids on behalf of the bidder. This obviates the need for the bidder participating in the bidding process until the proxy bid amount is decrementally reached by other bidders. When proxy bid amount is reached, the bidder (who has submitted the proxy bid) has an option to start participating in the bidding process.

The proxy amount is the minimum amount that the bidder is willing to offer. During the course of bidding, the bidder cannot delete or change the amount of a proxy bid.

Bids are submitted in decrements (decreasing bid amounts). The application automates proxy bidding by processing proxy bids automatically, according to the decrement that the auction originator originally established when creating the auction, submitting offers to the next bid decrement each time a competing bidder bids, regardless of the fact whether the competing bids are submitted as proxy or standard bids. However, it may please be noted that if a manual bid and proxy bid are submitted at the same instant manual bid will be recognized as the L1 at that instant.

In case of more than one proxy bid, the system shall bid till it crosses the threshold value of „each lowest proxy bid“ and thereafter allow the competition to decide the final L1 price.

Proxy bids are fed into the system directly by the respective bidders. As such this information is privy only to the respective bidder(s).

14. Bidders are advised to get fully trained and clear all their doubts such as refreshing of Screen, quantity being auctioned, tender value being auctioned etc.

15. M/s. {Service provider}, shall arrange to demonstrate/ train the bidder or bidder's nominated person(s), without any cost to bidders. M/s. {Service provider}, shall also explain the bidders, all the rules related to the Reverse Auction/ Business Rules Document to be adopted along with bid manual. Bidders are required to give their compliance on it before start of bid process.

16. Successful bidder shall be required to submit the final prices, quoted during the Online Reverse Auction in Annexure - VII after the completion of auction to M/s. Service provider besides BHEL, duly signed and stamped as token of acceptance without any new condition other than those already agreed to before start of auction.

17. Any variation between the final bid value and that in the confirmatory signed price breakup document will be considered as tampering the tender process and will invite action by BHEL as per extant guidelines in vogue.

18. Bidders' bid will be taken as an offer to execute the work/ supplies the item as per enquiry no. {...} dt. {...}. Bids once made by the bidder, cannot be cancelled/ withdrawn and bidder shall be bound to execute the work as mentioned above at bidder's final bid price. Should bidder back out and not execute the contract as per the rates quoted, BHEL shall take action as per extant guidelines in vogue.

19. Bidders shall be assigned a **Unique User Name & Password** by BHEL or M/s. {Service provider}. Bidders are advised to change the Password and edit the information in the Registration Page after the receipt of initial Password from BHEL/ M/s. {Service provider} to ensure confidentiality. All bids made from the Login ID given to the bidders will be deemed to have been made by the bidders/ bidders' company.

20. Bidders shall be able to view the following on their screen along with the necessary fields during Online Reverse Auction:

- a. Leading (Running Lowest) Bid in the Auction (only total price of package)
- b. Bid Placed by the bidder
- c. Start Price
- d. Decrement value

21. After receipt of the system report from the Service Provider after completion of the Online Reverse Auction, BHEL will decide upon the winner. BHEL's decision on award of contract shall be final and binding on all the Bidders.

- 22.** BHEL reserves the right to cancel the Reverse Auction process/ tender at any time, before ordering, without assigning any reason.
- 23.** BHEL shall not have any liability to bidders for any interruption or delay in access to the site irrespective of the cause. In such cases, the decision of BHEL shall be binding on the bidders.
- 24.** Other terms and conditions shall be as per bidder's techno-commercial offers and other correspondences, if any, till date.
- 25.** Bidders are required to submit their acceptance to the terms/ conditions/ modalities before participating in the Reverse Auction in the process compliance Form as per *Pg.6 of Annexure V*
- 26.** BHEL can decide to extend, reschedule or cancel any Auction with prior intimation to all bidders.
- 27.** If there is any clash between this business document and the FAQ available, if any, in the web site of M/s. {Service provider} the terms& conditions given in this business document will supercede the information contained in the FAQs. Any changes made by BHEL/ service provider (due to unforeseen contingencies) after the first posting shall be deemed to have been accepted if the bidder continues to access the portal after that time.



Process Compliance Form

(The bidders are required to print this on their company's letterhead and sign, stamp before faxing)

To

- M/s. {Service provider}

- Postal address}

Sub: Agreement to the Process related Terms and Conditions

Dear Sir,

This has reference to the Terms & Conditions for the Reverse Auction mentioned in the RFQ document for {Items} against BHEL enquiry/ RFQ no.{.....} dt. {.....}

This letter is to confirm that:

- 1) The undersigned is authorized official/ representative of the company to participate in RA and to sign the related documents.
- 2) We have studied the Reverse Auction Terms & Conditions and the Business rules governing the Reverse Auction as mentioned in your letter and confirm our agreement to them.
- 3) We also confirm that we have taken the training on the auction tool and have understood the functionality of the same thoroughly.
- 4) We also confirm that, in case we become L1 bidder, we will email/ fax the price confirmation & break up of our quoted price (including that of line items) as per *pg.7 of Annexure- V* within **two** working days (of BHEL) after completion of RA event, besides sending the same by registered post/ courier both to M/s. BHEL and M/s. {Service provider.}

We, hereby confirm that we will honor the Bids placed by us during the auction process.

With regards

Signature with company seal

Name –

Company / Organization

Designation within Company / Organization

Address of Company / Organization

- Sign this document and Fax it to M/s {Service provider} at {.....} prior to start of the Event.

- Attach a signed copy of the RFQ document along with the Agreement Form/ Process Compliance form and
d/s{Service provider}

**RA price confirmation and breakup****To**

- **M/s.** Service provider
- Postal address

CC: M/s BHEL

{Unit-

Address-}

Sub: **Final price quoted during Reverse Auction and price breakup**

Dear Sir,

We confirm that we have quoted.

Rs.{_____} for item covered under tender enquiry No. {...} dt.{...}

Total price of the items covered under above cited enquiries is inclusive of {Packing & forwarding, E.D., C.S.T., freight and insurance charges upto {...} District,{...} State and Type Test Charges etc., (exclusive of service tax), other as per NIT} as our final landed prices as quoted during the Reverse Auction conducted today {date} which will be valid for a period of {_____} days.

The price break-up including that of line items is as given below.

Total - Rs.

Thanking you and looking forward to the valuable order from BHEL.

Yours sincerely,

For _____

Name:**Company:****Date:****Seal:**

ANNEXURE- VI

EXTRACT FROM “MANUAL ON POLICIES & PROCEDURES FOR PURCHASE OF GOODS”

11.2.3. Non-conformities between the figures and words of the quoted prices:

Sometimes, non-conformities/errors are also observed between the quoted prices in figures and that in words. The same is to be taken care of as indicated below:

(a) If, in the price structure quoted for the required goods, 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 to (a) and (b) above.

If there is such discrepancy in an offer, the same is to be conveyed to the tenderer with target date on the above lines and if the tenderer does not agree to the observation of the purchaser, the tender is liable to be ignored.

ANNEXURE – VII

PURCHASE PREFERENCE FOR MSE VENDORS:

- a. MSE vendors quoting within a price band of $L1 + 15\%$ shall be allowed to supply up to 20% of the requirement against this tender provided
- b. The MSE vendor matches the L1 price
- c. L1 price is from a non MSE vendor
- d. L1 price will be offered to the nearest vendor nearest to L1 in terms of price ranking (L2 - nearest to L1). In case of non-acceptance by the MSE vendor (L2) next ranking vendor will be offered who is within the $L1 + 15\%$ band (if L3 is also within 15% band).
- e. 20% of the 20% (i.e. 4% of the total enquired quantity) will be earmarked for SC/ST owned MSE firms provided conditions as mentioned in (1) and (2) are fulfilled.



ANNEXURE – VIII
REQUEST FOR C FORM

NAME OF VENDOR :-										
VENDOR CODE ALLOTTED BY BHEL :-										
BHEL PONO	INVOICE N	INVOICE DATE	INVOICE AMOUNT	SUPPLY FROM - STATE	SUPPLY TO - STATE	CST TIN NUMBER FOR THE SUPPLY	INVOICE AMOUNT BAISC+ED+CST ONLY	C FORM QTR	YEAR	SUPPLY TO BHEL EDN / SITE

ANNEXURE – IX

LIST OF DOCUMENTS TO BE SUBMITTED DURING DESPATCH OF GOODS :-

Seller shall arrange to send the following documents to the Purchaser, immediately on dispatch of goods: Any addition / exclusion to such documents shall be as specified in the Purchase Order.

For despatches from within India :-

To be sent with the material			To be sent to purchase executive		
1	Delivery challan	(1 copy)	1	Commercial invoice	(1 original +1 extra copy)
2	Excise gate pass (if excise duty is applicable) duplicate for transporter	(1 copy)	2	Excise gate pass (if excise duty is applicable) original for buyer	(1 copy)
3	Transporters docket if received through transporter	(1 copy)	3	Inspection report / Test report Test certificate (if called for in the PO)	(1 copy)
4	Inspection report / Test report Test certificate (if called for in the PO)	(1 copy)	4	Warranty certificate(if called for in the PO)	(1 copy)

For despatches from outside India :-

To be given to BHEL Freight Forwarder	To be submitted to bank
Invoice & Packing list	Set of documents as per PO / LC

For high sea sales (HSS) :-

01	Original Invoice in Indian Rupees : three copies
02	Original High sea sales agreement on Rs. 200/- stamp paper (notorised) with two Xerox copies
03	Original Cargo Arrival Notice : with two copies
04	Original Invoice in Foreign Currency : with two copies
05	Original packing list : two copies
06	Original AWB copy (duly endorsed) : two copies
07	Original letter to Customs Officer - either Mumbai or Bangalore (depending on the airport of destination) : with one copy
08	Original Letter to OCTROI Officer : with one copy
09	Original Delivery Order copy from the freight forwarder : with one copy

**ANNEXURE – X****Electronic Funds Transfer (EFT) OR Paylink Direct Credit Form**Please Fill up the form in **CAPITAL LETTERS** only.

TYPE OF REQUEST(Tick one): _____ CREATE _____ CHANGE

BHEL Vendor / Supplier Code:

Company Name :

Permanent Account Number(PAN):

Address

City: _____

PINCODE

STATE

Contact Person(s)

Telephone No:

Fax No:

e-mail id:

1 Bank Name:

2 Bank Address:

3 Bank Telephone No:

4 Bank Account No:

5 Account Type: Savings/Cash Credit

6 9 Digit Code Number of Bank and branch
appearing on MICR cheque issued by Bank

7 Bank swift Code(applicable for EFT only)

8 Bank IFSC code(applicable for RTGS)

9 Bank IFSC code(applicable for NEFT)

A I hereby certify that the particulars given above are true, correct and complete and that I, as a representative for the above named Company, hereby authorise BHEL, EDN, Bangalore to electronically deposit payments to the designated bank account.

B If the transaction is delayed or not effected at all for reasons of incomplete or incorrect information, I would not hold BHEL / transferring Bank responsible.

C This authority remains in full force until BHEL, EDN, Bangalore receives written notification requesting a change or cancellation.

D I have read the contents of the covering letter and agree to discharge the responsibility expected of me as a participant under ECS / EFT.

Date:

Authorised Signatory:

Designation:

Telephone NO. with STD Code

Company Seal

**Bank Certificate**

We certify that _____ has an Account No _____ with us and
we confirm that the bank details given above are correct as per our records.

Date: _____ (.....)

Place: _____ Signature _____

Please return completed form along with a blank cancelled cheque or photocopy thereof to:

Bharath Heavy Electricals Ltd,

Attn:

Electronics Division, Mysore Road,

BANGALORE - 560 026

In case of any Query, please call : concerned Purchase Executive



SPECIAL CONDITIONS OF CONTRACT

REF.: RFQ NO. UPKM000053

This “Special Conditions of Contract” will form an integral part of the contract as and when the RFQ culminates into a Purchase Order / Contract.

A. INTEGRITY PACT:

Integrity commitment will be applicable in the tender process and execution of contracts.

Independent External Monitor (IEM) Name: **Shri D.R.S Chaudhary, IAS (Retd.)**

Please find enclosed a copy of integrity pact agreement. The same has to be filled and signed by authorized signatory who signs the bid and to be submitted along with techno-commercial offer. Only those vendor/bidders who have entered into such an integrity pact with BHEL would be competent to participate in the bidding. In other words, entering into this pact would be preliminary qualification.

B. QUANTITY:

RFQ quantity is 12 sets. Supplier are requested to submit the price considering the same. Initially BHEL shall issue Purchase Order only for 12 sets within the offer validity i.e., 90 days from Technical Bid opening date. However, BHEL reserve the right to order 4 more sets for meeting the anticipated requirement, if arises. For these anticipated 4 Nos., the unit price quoted for 12 sets shall be valid for 1 year from the placement of Purchase Order for 12 sets. Evaluation of L1 vendor shall be done based on 12 sets. A copy of un-priced bid (price bid without mentioning the prices) format is to be submitted along with Technical Bid.

C. DELIVERY SCHEDULE:

a. Drawings/documents submission by vendor. List of drawings/documents required to be submitted shall be intimated to L1 vendor along with Purchase Order.	within 4 weeks from PO date
b. Drawing approval & manufacturing clearance by BHEL	within 4 weeks from submission date
c. Supply of material by vendor	within 12 weeks from drawing approval and/or manufacturing clearance

D. SCOPE OF SUPPLY:

Sr. No.	Item Description / Details	UOM	Qty.
1.	Supply of Fully Assembled Controller Panel containing the Controller Electronics and necessary interfaces for Converter / Inverter of BHEL EDN make Thyristor based SFC Panels as per PS4452547	Set	12
2.	Supply of Interface Elements to be mounted in BHEL Thyristor Stack Panels – to be supplied loose	Set	12
3.	Supply of spares as per Spec. No. PS4452547. Item wise breakup to be submitted separately	Set	12

E. SCOPE OF SERVICE:

Sr. No.	Item Description / Details	UOM	Qty.
1.	Assembly and Testing Charges at EDN as per Cl. No. 21 of Spec. No. PS4452547. Approx. total no. of days in 9 visits at EDN shall be 70 working days	No. of days	70
2.	Commissioning Charges at Pranahita Chevella LIS – Package 6, 8, 10 and 11, Telangana State, India as per Cl. No. 22 of Spec. No. PS4452547. Approx. total no. of days in 16 visits at site shall be 115 working days	No. of days	115

INTEGRITY PACT

Between

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at “BHEL House”, Siri Fort, New Delhi – 110049 (India) hereinafter referred to as “The Principal”, which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

and

_____, (description of the party along with address), hereinafter referred to as “The Bidder/ Contractor” which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for

_____. The Principal values full compliance with all relevant laws of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint Independent External Monitor(s), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

- 1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-
 - 1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
 - 1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
 - 1.1.3 The Principal will exclude from the process all known prejudiced persons.
- 1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section 2 – Commitments of the Bidder(s)/ Contractor(s)

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
 - 2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in

order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

- 2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. 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.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/ PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- 2.1.4 The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 – Disqualification from tender process and exclusion from future contracts

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidders(s)/ Contractor(s) from the tender process or take action as per the separate “Guidelines for Suspension of Business Dealings with Suppliers/ Contractors” framed by the Principal.

Section 4 – Compensation for Damages

- 4.1 If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

Section 5 – Previous Transgression

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section 6 – Equal treatment of all Bidders/ Contractors/ Sub-contractors

- 6.1 The Bidder(s)/ Contractor(s) undertake(s) to demand from his sub-contractors a commitment consistent with this Integrity Pact. This commitment shall be taken only from those sub-contractors whose contract value is more than 20% of Bidder's/ Contractor's contract value with the Principal.
- 6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.
- 6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 – Criminal Charges against violating Bidders/ Contractors /Sub-contractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section 8 –Independent External Monitor(s)

- 8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- 8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The Bidder(s)/ Contractor(s) accepts that the Monitor has the right to access without restriction to all contract documentation of the Principal including that provided by the Bidder(s)/ Contractor(s). The Bidder(s)/ Contractor(s) will grant the monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his contract documentation. The same is applicable to Sub-contractor(s). The Monitor is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Sub-contractor(s) with confidentiality.
- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
- 8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or

take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

- 8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.
- 8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC / PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
- 8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.
- 8.10 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

- 9.1 This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.
- 9.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 – Other Provisions

- 10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.
- 10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- 10.3 If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- 10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- 10.5 Only those bidders/ contractors who have entered into this agreement with the Principal would be competent to participate in the bidding. In other words, entering into this agreement would be a preliminary qualification.

For & On behalf of the Principal
(Office Seal)

For & On behalf of the Bidder/ Contractor
(Office Seal)

Place-----

Date-----

Witness: _____
(Name & Address) _____

Witness: _____
(Name & Address) _____

Pre-Qualification Criteria

1. The vendor shall be an Original Equipment Manufacturer (OEM) of SFC Equipment. Only the OEM can submit offers.
2. The vendor should have the capability to design / configure Controllers and Interfaces for starting of large rating pumps driven by synchronous motors. The vendor should have already designed, supplied and installed at least 2 numbers of similar equipment of rating minimum 8MW – either as controller/interface or complete SFC/LCI equipment in India or abroad during the past 10 years and these must be operating satisfactorily for at least past one year. The Reference List of SFC/LCI supplies made giving the ratings supplied, year of supply and commissioning and details of the customers with contact details etc. to be provided along with the offer.
3. The vendor or their authorized service representatives shall have trained engineers for commissioning & service for the offered equipment and shall be in a position to provide prompt after sales service and spares support for our installations. This service network shall necessarily be available in India.
4. The vendor shall be in a position to undertake AMC or provide service support for the equipment supplied, after the expiry of the warranty / guarantee period either directly or through a service representative.

Note:

- a. Pre-Qualification will be carried out based on the details furnished by the vendor.
- b. The Pre-Qualification criteria are mandatory requirements and the technical bids will be evaluated only when the Pre-Qualification criteria are met.

Checklist for Pre-Qualification Criteria

Sl. No.	Vendor Confirmation to the points above	Reference of documents attached
1	Yes / No	
2	Yes / No	Experience list
3	Yes / No	
4	Yes / No	



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REVISION HISTORY SHEET

REV. NO.	DATE	NATURE OF CHANGE	REASONS	PREPARED BY	APPROVED BY
00	23-05-2016	FIRST ISSUE	-----		

REVISION 00

APPROVED BY
Subbalakshmi L

PREPARED BY
M M Bharat Kumar

ISSUED BY
VFD ENGG.

DATE
23-05-2016

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**PURCHASE SPECIFICATION OF CONTROLLER AND INTERFACES
FOR THYRISTOR BASED STATIC FREQUENCY CONVERTER (SFC)
FOR LIFT IRRIGATION PUMPS**

MATERIAL CODE: DR0704960079

1. Project Details

Sl. No.	Parameter	Specification
1	Project Location	Pranahita Chevella LIS – Packages 6, 8, 10 and 11, Telangana State, India
2	Project Title	Pranahita Chevella Lift Irrigation Scheme
3	Customer	Stage 6 – Navayuga Engineering Stages 8, 10 and 11 – Megha Engineering and Infrastructure Ltd (MEIL)
4	Consultant	Telangana State Power Generation Corporation Ltd. (TSGENCO)
5	User	Irrigation & CAD Department, Telangana

2. Environment Specifications

Sl. No.	Parameter	Specification
1	Maximum Ambient Temperature	47°C
2	Minimum Ambient Temperature	20°C
3	Equipment Design Temperature	50°C (Necessary derating in SFC Rating shall be done to account this)
4	Relative Humidity	98%
5	Altitude	The equipment are mounted in an underground pump house
6	Location of VFD Panels	Indoor, Ventilated Room with Air Conditioning
7	Seismic Zone	As per IS-1893-Zone-V

REVISION 00

APPROVED BY
Subbalakshmi L

PREPARED BY
M M Bharat Kumar

ISSUED BY
VFD ENGG.

DATE
23-05-2016

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3. Input and Transformer Data

Sl. No.	Parameter	Specification
1	System Voltage / Frequency / Phase	11kV / 50Hz / 3
2	Voltage Variation	+/- 10%
3	Frequency Variation	+/- 5%
4	Combined Voltage and Frequency Variation	+/- 10%
5	Fault Level	40kA for 3 sec
6	Input Transformer Type	Oil Filled, mounted in open air / naturally ventilated shed
7	Distance between Input Transformer and SFC	~ 100 metres
8	Cables from Transformer to SFC Input	4 runs, 1 core, 300 sq mm. or 2 runs, 1 core, 630 Sqmm per phase – Aluminium conductor, XLPE insulation, Armoured. Exact sizes and numbers will be provided during detailed engineering stage.
9	Scope of Input Transformer	Will be procured by BHEL. General Specification to be provided by Vendor in Technical Offer. This should contain HV and LV MVA, number of LV windings (if required), LV voltages, vector group, % impedance, special features required etc. Calculations for Transformer Ratings shall be provided in the Offer.
10	Output Transformer Type	Oil Filled, mounted in open air / naturally ventilated shed
11	Distance between Output Transformer and SFC	~ 100 metres
12	Cables from SFC Output to Transformer	4 runs, 1 core, 300 sq mm. or 2 runs, 1 core, 630 Sqmm per phase – Aluminium conductor, XLPE insulation, Armoured. Exact sizes and numbers will be provided during detailed engineering stage.
13	Scope of Output Transformer	Will be procured by BHEL. General Specification to be provided by Vendor in Technical Offer. This should contain HV and LV MVA, number of LV windings (if required), LV voltages, vector group, % impedance, special features required etc. Calculations for Transformer Ratings shall be provided in the Offer.

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4. Motor / Machine and Pump Data

Sl. No.	Parameter	Specification			
1	Type	Synchronous Motor driving Vertical Francis Pump			
2	Scope	Manufactured by BHEL			
3	Rated Output	Package 6 7x127.6MW Pumps	Package 8 7x139MW Pumps	Package 10 4x106MW Pumps	Package 11 4x134.8MW Pumps
4	Rated Voltage	11kV	13.8kV	11kV	13.8kV
5	Total Inertia T-m ²	5435	5190	4740	Later
6	Duty Class	As per Torque-Speed Curves for Stages 6 and 8 attached. Torque-Speed Curves for Stages 10 and 11 will be provided during detailed engineering in the event of order. However, for estimation purposes, they can be considered similar to the Torque-Speed curves attached with variations for ratings.			
7	Starting Time	300s			
8	Motor Parameters	The motor parameters shall be as per the attached Excitation Data documents for Packages 6, 8, 10 and 11. Some minor changes may be anticipated after detailed design of the motor is completed.			

5. Scope:

Sl. No.	Scope of Supply	Description
1	Fully Assembled Controller Panel containing the Controller Electronics and necessary interfaces for Converter / Inverter of BHEL EDN make Thyristor based SFC Panels.	SFC Vendor – 12 sets – 3 each per package
2	Interface Elements to be mounted in BHEL Thyristor Stack Panels – to be supplied loose.	SFC Vendor – 12 sets – 3 each per package

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6. SFC Specifications

Sl. No.	Parameter	Specification
1	Drive	Starting of large rating pump in air. Water depression System in BHEL scope.
2	Input Voltage	From Input Transformer in Section 3 above
3	Torque vs Speed	Attached for Packages 6 & 8. For Packages 10 & 11 during detailed engineering.
4	Single Line Diagram	See Attachment
5	Output Voltage of SFC	As per Vendor Specification. Output Transformer in section.3 above.
6	Source Thyristor Bridge - 6pulse (BHEL supply)	As per attached drawing. Thyristor: BHtU71346, PIV 5200V – 4 numbers in series per arm (total 24 numbers in 6 arms) Snubber R: 20R Snubber C: 1.8 μ F Inductor: 290 μ H, 1000A
7	Scope of DC Reactor	BHEL intends to source the air cored DC Reactor. Vendor to provide the rating and technical specifications including special requirements, if any. These Reactors will be mounted in the open yard around 100 metres from the SFC Panels.
8	Motor Thyristor Bridge – 6 pulse (BHEL supply)	As per attached drawing. Thyristor: BHtU71346, PIV 5200V - 4 numbers in series per arm (total 24 numbers in 6 arms) Snubber R: 20R Snubber C: 1.8 μ F Inductor: 290 μ H, 1000A
9	System Integration	All necessary interlocks as required for safe and reliable operation of SFC system shall be provided in the system. The synchronization from SFC to the grid should be bumpless. SFC shall be suitable to start the pump – motors smoothly with impeller in dewatered condition and without inrush current. The motor must be soft started and must reach 90% of the speed in 5 minutes. The SFC shall be suitable to start one pump at a time, either from local panel or from remote control panel / MMI panel.

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Sl. No.	Parameter	Specification
10	SFC Controller Panel Construction	a) Protection Class: IP42 b) Panel: Free standing, floor mounting type, comprising of rigid welded structural frames with Cold Rolled Sheet Steel enclosure of minimum thickness 2 mm for load bearing and 1.6 mm for other members. All doors and removable covers shall have neoprene gaskets. Ventilating louvers shall have easily removable and washable dust filters. c) Cooling: Forced Air / Natural as per Vendor's standard design. Suitable thermal switch for exit air temperature monitoring shall be incorporated. d) Earth Bus – minimum 50*6 mm Copper. e) Painting: 2 Coats of Primer and 2 Coats of Finish Paint to be given for all surfaces of enclosure. Paint shall be Epoxy Based with Powder Coated Finish. Exterior and Interior: RAL7032 Light Grey Paint Thickness: 60 Microns (minimum). Exact paint shade will be confirmed during detailed engineering. f) Limiting Dimensions: Height of Panels from finished floor level shall be 2400mm g) For incoming and outgoing control cables and LT power cables, undrilled removable Gland Plates shall be provided – to be drilled at site. Gland Plates shall be minimum 3 mm thick.

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Sl. No.	Parameter	Specification
11	Storage Temperature	-40°C to +60 °C
12	Vibration	According to IEC68-2-6
13	Interference	According to IEC801 parts 2,3,4 Immunity: The panels shall be designed so as to have low Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI).
14	Controller Interface Requirements Details to be provided in Technical Offer	a) Firing Pulses Outputs to individual Source and Motor Bridge Thyristors Gate Cathode leads. b) Processing of Voltage and Current Feedbacks for control and display from Source and Motor Thyristor Bridges c) 3 numbers of Output Breaker controls d) Excitation Control for smooth starting of the motor from the Controller. Typical signal exchange for SFC Controller to Excitation is attached in Excitation writeup. e) Interface to DCS for SFC Status and Control f) Process Inputs and Outputs like Push Buttons, Relays, Indication Lamps, Meters etc.
15	SFC Controller Requirements	a) Local/Remote: Selector switch shall be provided for operator to select type of operation: Local – Operation from SFC Panel for Start Control on door mounted interface; Remote – Operation from DCS Panel. b) Door Mounted Local Start / Stop / Speed Increment / Speed Decrement Push Button to be provided c) Door Mounted Lockable Push Button to be provided with 2NO + 2 NC contact for Emergency Stop. One normally open contact to be wired to Terminal Block for external Interlocking / Annunciation d) Anti condensation Heater: One Space heater with switch fuse and variable setting thermostat to be provided inside the Controller Panel. e) PLC: PLC shall be provided for Interlocking and Protection (if required) f) Every Panel shall be provided with CFL/LED illumination Lamp with limit switch and MCB. 240V power socket with MCB shall be provided. g) Drive Configuration tool for programming I/Os and logics.



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Sl. No.	Parameter	Specification
16	Controls and Monitoring	a) SFC shall be with an interactive and user-friendly door mounted digital operator interface with LCD display and sealed membrane type keypad. b) The operator interface shall be used for drive programming, drive monitoring and drive trouble shooting. The operator interface must also be able to start and stop the drive, reset SFC faults and manually adjust the SFC's starting parameters. c) The operator interface shall have LED indicators for SFC Fault, SFC Run, and SFC Ready etc. d) The operator interface shall allow monitoring of SFC operating conditions including speed, current, voltage, power etc. e) Messages shall be alphanumeric in nature. All the fault messages shall be in English. f) Provision shall be made available for remote operation and control by Auto Sequencer system when speed reaches 90% of rated speed. g) The operator interface shall be able to display all real time operating variables and all drive programming parameters. h) All SFC operating parameters shall be stored in nonvolatile memory. i) The drive shall have built in monitoring of following parameters as minimum on its digital operator interface and these parameters shall also be displayed at Plant DCS: Output Frequency Output Current Motor Speed Output Voltage Output Power Digital Input Status Digital Output Status Analog Input Status j) Diagnostic tools for troubleshooting fault/alarm messages. Checklist for tracing alarm/fault should be provided.



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Sl. No.	Parameter	Specification
16	Controls and Monitoring	j) Necessary transducer shall be provided with 4-20 mA output for indicating Motor Speed, Motor Current and Motor kW in the DCS. Transducer shall be capable of driving 500 ohms load. k) The following indications shall be provided on the SFC Panel Door: i) Motor Running ii) Motor Stopped/Tripped iii) Source Breaker ON iv) Auxiliary Control Supply ON v) SFC Ready vi) SFC Alarm vii) SFC On viii) SFC Fault xi) Emergency Stop Activated l) The SFC shall store fault logs of minimum last 10 faults in memory. m) The interface details of SFC shall be incorporated as required for data communication with DCS/ MMI system with serial interfaces using RS485 and RS 422 data links. Necessary hardware shall be included in the scope and the interface protocol (i.e. Modbus or Profibus) shall be defined.
17	Protection	Following protections shall be built in within the SFC and any other protection as required: a) Instantaneous Over current b) Ground Fault Protection c) Over Voltage/Under Voltage - SFC shall be able to withstand >20% dip in supply voltage for 2 secs without damage to semiconductors. d) Output Phase Loss e) Phase Sequence Protection f) Input Phase Loss/Single Phasing Preventer g) Over Speed h) Loss of Cooling Fans i) Transformer Fault / Alarm



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Sl. No.	Parameter	Specification
18	Auxiliary Supply	a) Auxiliary Supply – 415V, 3 ϕ , 50Hz – Feeder Power rating to be specified by the Vendor b) UPS feeder is provided with a Voltage of 240V AC for Controller boards. kVA Rating is to be given by the Vendor. It is preferable that all other Auxiliary Supplies required for SFC System shall be derived from input feeder of SFC.
19	Mandatory Spares and Commissioning Spares	Supplier should list item wise price for the following spares. Priced List of Spares quoted for shall be provided in the Technical Offer. Any spares required during commissioning shall be made available at the time of Commissioning

Mandatory Spares (25% of the quantities below to be supplied for each Package)

S.No	Items	Qty	Description
1	Electronic Cards	8 sets of each type	Vendor to provide a list of the cards which constitute the set including individual item prices. Set of cards must include all the types of electronic cards (PCBs) used in the system.
2	Power Supply	8 sets of each type	Vendor to specify the number of types used in the equipment
3	Gate Driver Modules	8 sets of each type	Same as above
4	Interface Modules	8 sets of each type	Same as above
5	Cooling Fan Assembly for Controller	8 sets of each type	Same as above
6	Fuses	16 numbers of each type	Same as above
7	Contactors	8 numbers of each type	Same as above
8	Meters	8 numbers of each type	Same as above
9	Relays	8 numbers of each type	Same as above
10	MCBs	8 numbers of each type	Same as above
11	Fibre Optic Cable and Plugs	8 numbers of each type	Same as above
12	Indication Lamps	8 numbers of each type and colour	Same as above
13	Push Buttons	8 numbers of each type and colour	Same as above



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Sl. No.	Parameter	Specification
20	Testing and Quality Plan	a) Routine tests shall be carried out on Controller Panel as per relevant standards. b) Test Protocol and Quality Plan shall be submitted along with offer. These documents shall explicitly list out all final tests done on the fully assembled Controller Panel at Vendor's works.
21	System Integration (in Vendor's Scope)	a) System Engineering for SFC Controller and Interfaces with BHEL make Thyristor Stacks and BHEL supplied Equipment as listed above. b) Support for final SFC Testing at BHEL works at Bangalore
22	Inspection, Training and Commissioning Support	a) Final Inspection: BHEL representative will be present at manufacturer's works for witnessing of final testing. This is to be incorporated in the Quality Plan. No charges shall be applicable for witnessing of final tests. b) Training: Training for persons from BHEL / Customer for a total period of 8 man weeks at BHEL-EDN/manufacturer's works and 1week of training at site for site engineers. Detailed contents of training programme to be provided by the vendor during detailed engineering phase. c) Commissioning: Commissioning of SFC Controller System at site shall be in the scope of Vendor. Final Acceptance shall be based on successful completion of the same. d) Any replacement of failed/damaged items during commissioning shall be exclusively at Vendor's cost. e) Vendor is advised to stock necessary spares and ensure easy availability to facilitate trouble free commissioning.
23	Software for Computer Interface	This software should be an easy to use commissioning tool for drives and full version of this software shall be provided along with the system. The interface details of SFC shall be incorporated as required for data communication with DCS system with serial interfaces with RS485 data links. Necessary hardware shall be included in the scope and the interface protocol (Modbus/Profibus) shall be provided.
24	Maintenance	The procedure for maintenance of SFC Controller panels and the schedule thereof shall be mentioned in the offer.



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Sl. No.	Parameter	Specification
25	Confirmations/Deviations to Specification	Point-wise confirmation to this specification to be given along with offer. Deviations, if any, shall be indicated separately. If there are no deviations to the specifications, supplier shall mention the same explicitly. A reply from vendor stating that “Equipment will generally meet the specifications” will not be accepted by BHEL. Clause-wise Confirmation / Clarifications of all Clauses in the Purchase Specifications 1 to 24 of this Specification.

Point No.	Page No.	Confirmation / Clarification / Information / Deviation	Details	Remarks, if any

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7. Documentation

Sl. No.	Parameter	Specification
1	Attached Documents	a) Single Line Diagram b) Excitation Writeup c) SFC Inputs for Stages 6, 8, 10 and 11 d) Excitation Data for Stages 6, 8, 10 and 11 e) Torque-Speed Curves for Stages 6 and 8 f) Thyristor Catalogue – U71346 g) Thyristor Stack Components
2	Technical Information required along with Offer	a) Dimensional Drawing of Panel along with minimum clearance to be maintained for effective cooling b) Interface Scheme c) Weight d) Heat Loss for Air Conditioning System sizing e) Technical Catalogue of SFC Controller and Interface System being offered f) Type Test Certificates of tests conducted on the SFC Controller (if available) g) Reference List of such systems for similar application supplied by the Vendor h) Confirmation / Clarification / Information / Deviation List as per Point 25 above.
3	Information / Confirmations required along with offer	a) Manufacturer Name (OEM) b) After Sales Service and Support shall be given by the Vendor for a minimum period of 15 (fifteen) years after commissioning. Address of the Sales and Service Representatives in India with complete contact details: Name/Telephone/Email are to be provided during order execution stage. c) Vendor shall give a notice of at least 1 year to the end user of the equipment before phasing out the product / spares to enable the end user for placement of order for spares and services.

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A4 – 11

PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P.S NO. : PS/445/2547

REV. NO: 00

PAGE 13 OF 13

Sl. No.	Parameter	Specification
4	Technical (unpriced) and Commercial (priced) Bids – For Evaluation	a) SFC Controller System and Interfaces b) Mandatory Spares c) BHEL-EDN Assembly/Testing Support Charges d) Commissioning Charges
5	Information required for BHEL approval, within 3 weeks from the Date of Placement of Purchase Order	a) OGA Drawing of SFC Controller Panel showing sizes of panel, weight, Heat Loss etc. b) Schematics for Controller and Interface c) General Arrangement Drawing of SFC Controller Panel d) Bill of Materials – Panel and Loose Items e) Test Protocol and Quality Plan
6	Information Required along with Supply. Maintenance Manuals and Documentation	a) Erection, Commissioning and Maintenance Manuals along with Final Drawings and Documentation – 4 Copies b) 2 nos. CD ROM consisting of the above. c) Test and Guarantee Certificates. d) Complete Bill of Material (item wise) for the equipment supplied.

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CONTROLLED COPY
WHEN IN RED 03



BHARAT HEAVY ELECTRICALS LIMITED



THYRISTOR BHtU61/BHtU71

FLAT PACK TYPE THYRISTOR FOR $U_{DRH}, U_{RRH} = 4400 - 5200 \text{ V}$
 $I_{TAV} = 2500 \text{ A}$

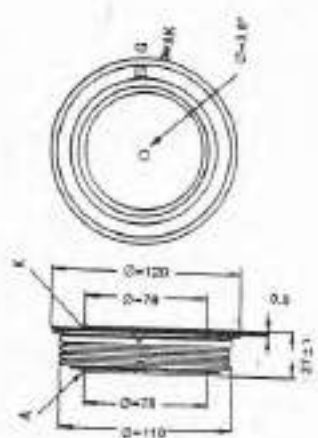
APPLICATION : Large rating industrial applications such as line commutated converters of all types like controlled or regulated rectifiers, single phase and three phase rectifiers, etc.,
 Static Var Compensation (SVC).
 High Voltage DC Transmission (HVDC).

ELEMENT : Fully diffused Silicon.
 Current and thermal conduction through noble metal compression bonded contact.

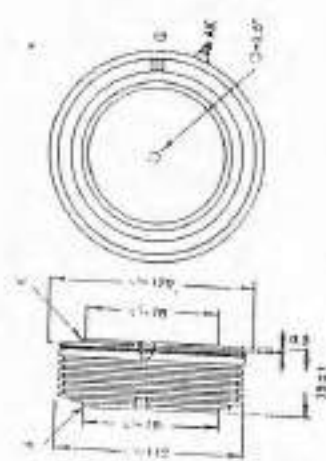
HOUSING : Flat pack housing with contact surfaces Nickel plated.

POLARITY : As shown in outline diagram below.

BHtU61



BHtU71



BHARAT HEAVY ELECTRICALS LIMITED, ELECTRONICS DIVISION,
 P.B.NO. 2606, MYSORE ROAD, BANGALORE 560 026, INDIA.
 PHONE : 624284; GRAMS : BHARATELEC; FAX : (080)610137,610534
 TELEX : 0845-2436 A 8151 BHCE IN; RABMH : 404100000014
 EMAIL : hthbng@bhel.ernet.in

SCP/03/95/50/006

MANUFACTURED UNDER COLLABORATION WITH ABB SEMICONDUCTORS AG, SWITZERLAND.

CHARACTERISTIC VALUES	SYMBOLS	VALUES	CONDITIONS
Maximum off-state and reverse leakage currents	I_{DRH} , I_{RRH}	400 nA	$\theta_J < 125^\circ\text{C}$, U_{DRH} , U_{RRH}
On-state threshold voltage	$U_T(T_0)$	1.0 V	$\theta_J = 125^\circ\text{C}$, For estimation of power loss, $i_T = 1300 - 4000$ A
On-state differential resistance	r_T	0.225 mΩ	
Holding current	I_H	50-125 nA 20-75 nA	$\theta_J = 25^\circ\text{C}$ $\theta_J = 125^\circ\text{C}$
Latching current	I_L	150-900 nA 100-700 nA	$\theta_J = 25^\circ\text{C}$ $\theta_J = 125^\circ\text{C}$
Turn-on delay time	t_{gd}	3.0 μs	$U_D = 0.4 \times U_{DRH}$, $I_{Te} = 2$ A, $t_r = 0.5$ μs
Turn-off time	t_q	300-700 μs	$\theta_J = 125^\circ\text{C}$, $I_T = 3000$ A, $di_T/dt = -5$ A/μs, $U_R > 200$ V, $U_D < 67\% U_{DRH}$, $dU_D/dt = 20$ V/μs
Reverse recovery charge	Q_{rr}	5500 - 7500 μAs	$\theta_J = 125^\circ\text{C}$, $I_T = 3000$ A, $di_T/dt = -5$ A/μs, $U_R > 200$ V

GATE TRIGGER VALUES	SYMBOLS	VALUES	CONDITIONS
Maximum gate trigger current and voltage	I_{gt}	400 nA	$\theta_J = 25^\circ\text{C}$
	U_{gt}	2.60 V	
Maximum gate non-trigger current and voltage	I_{gd}	10 nA	$\theta_J = 125^\circ\text{C}$
	U_{gd}	0.30 V	

BHtU61/BHtU71

GATE TRIGGER VALUES	SYMBOLS	VALUES	CONDITIONS
Maximum peak gate current and voltage	I_{TGH}	10 A	-
	U_{TGH}	12 V	
Maximum peak negative gate voltage	U_{TGH}	10 V	-
Maximum mean gate power loss	P_G	3 W	-

THERMAL CHARACTERISTICS

PARAMETERS	SYMBOLS	VALUES	CONDITIONS
Junction temperature range for continuous operation	θ_J	-40 to +125 °C	-
Storage temperature range	θ_S	-40 to +150 °C	-
Thermal resistance for Direct Current (DC) (Junction to Case)	R_{THJC}	0.008 K/W 0.016 K/W 0.016 K/W	Double side cooling Anode side cooling Cathode side cooling
Thermal resistance (Case to Heatsink)	R_{THCH}	0.003 K/W 0.006 K/W 0.006 K/W	Double side cooling Anode side cooling Cathode side cooling

MECHANICAL CHARACTERISTICS

PARAMETERS	SYMBOLS	VALUES	CONDITIONS
Mounting force	F	70 + 7 kN	-
Weight of thyristor	m	1.45 kg 1.85 kg	BHtU61 BHtU71
Acceleration	a	100 m/s ²	With device clamped
Surface creep distance	D_s	35 mm 53 mm	BHtU61 BHtU71
Air strike distance	D_a	14 mm 22 mm	BHtU61 BHtU71

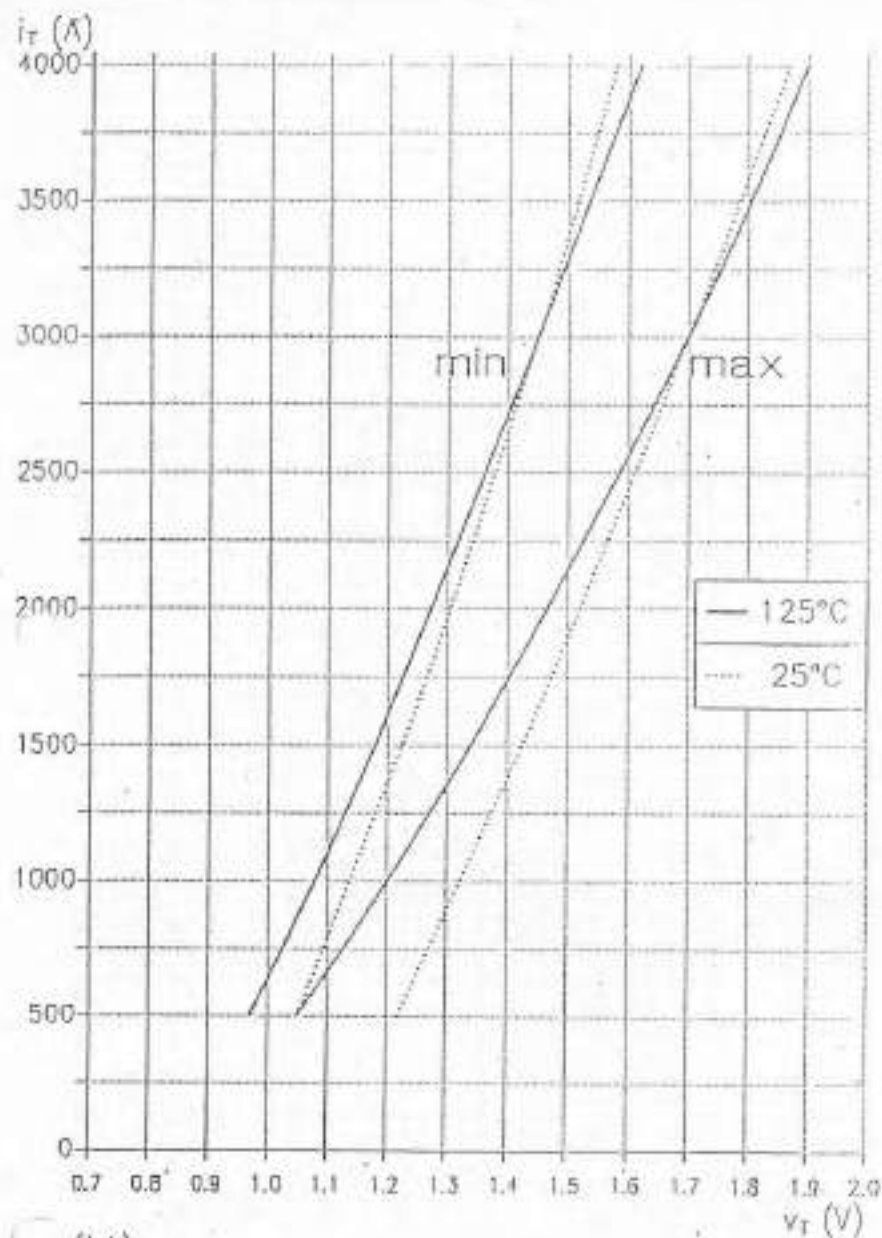


Fig.1

On-state current i_T vs on-state voltage v_T . Normal current range.

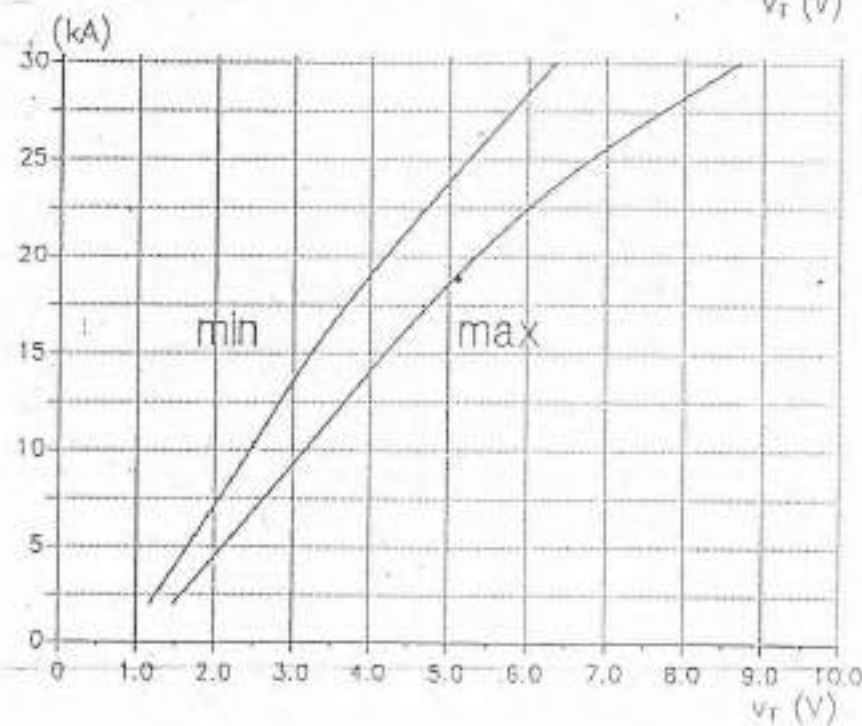


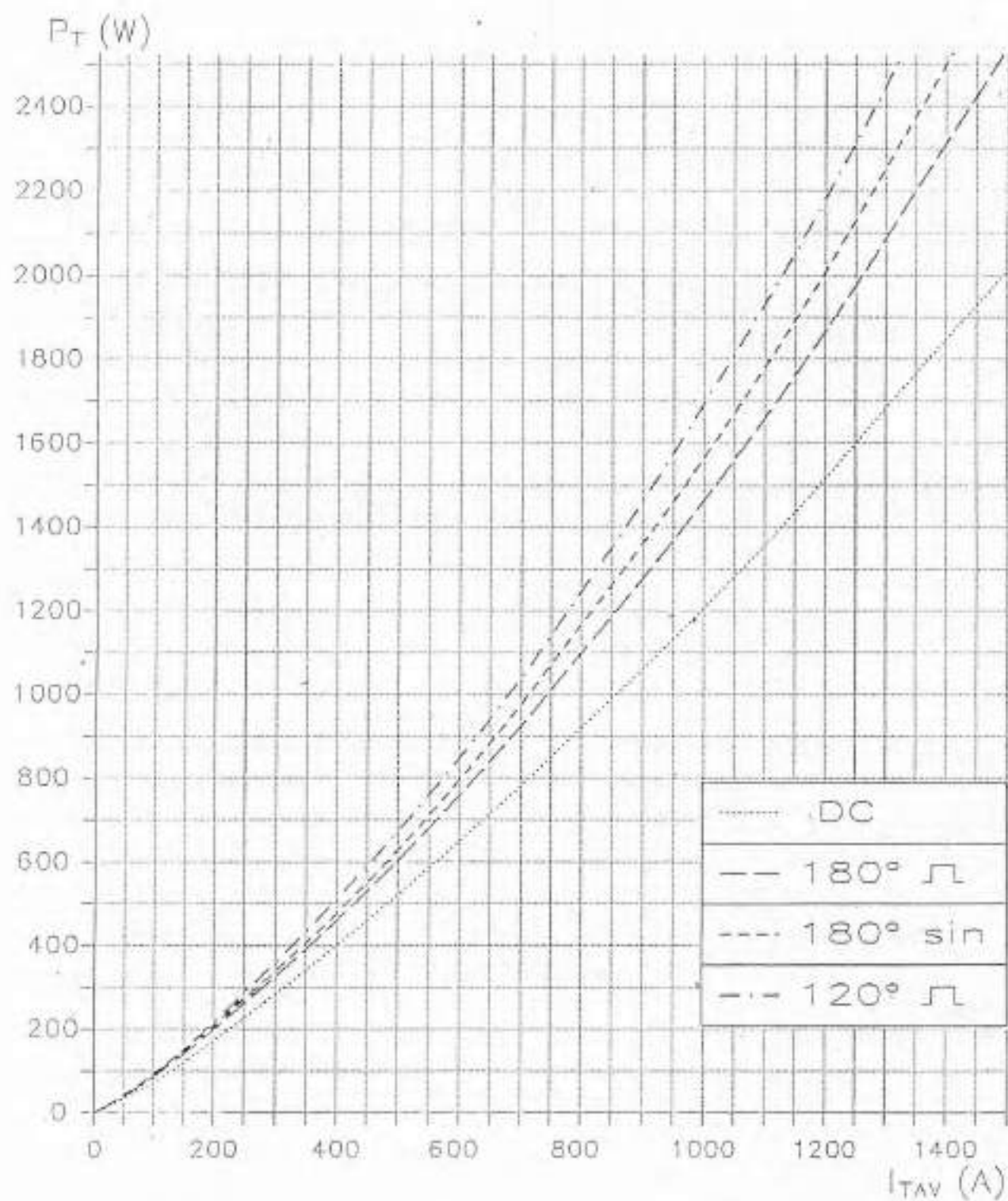
Fig.2

On-state current i_T vs on-state voltage v_T ($\theta_{JA} = 0$ to $\theta_{JA}(\max)$).

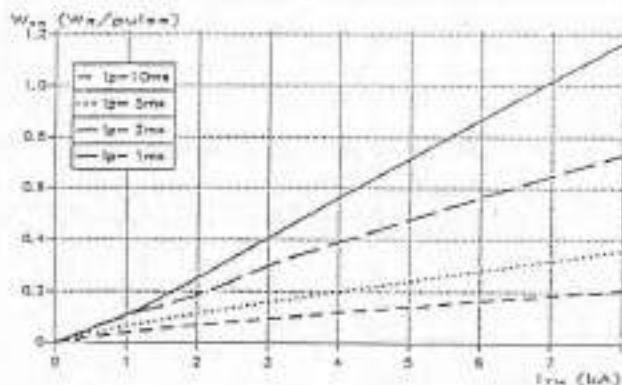
Fig.3

On-state power loss P_T vs mean
on-state current I_{TAV}

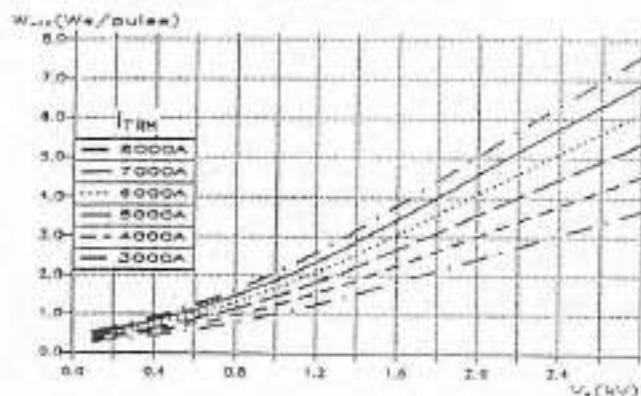
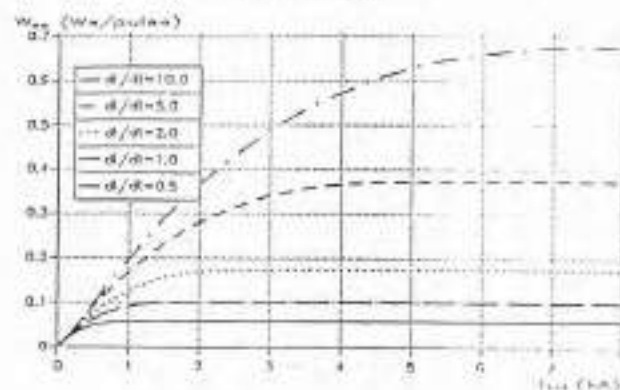
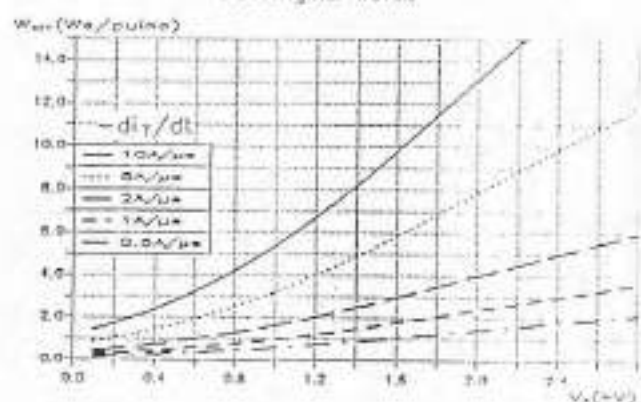
($\theta_{(T)} = \theta_{(T)max}$)



Turn-on losses.

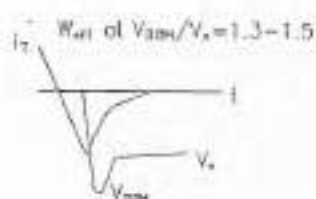
Fig.4. $W_{on}=f(I_{TRM}, t_p)$ $T_{vj}=125^\circ\text{C}$
Half sinusoidal waves

Turn-off losses.

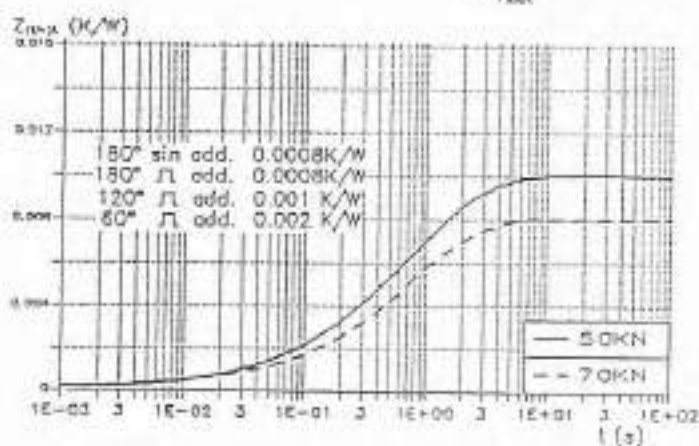
Fig.6. $W_{off}=f(V_{ce}, I_{TRM})$ $T_{vj}=125^\circ\text{C}$
Half sinusoidal wavesFig.5. $W_{on}=f(I_{TRM}, di/dt)$ $T_{vj}=125^\circ\text{C}$
Rectangular wavesFig.7. $W_{off}=f(V_{ce}, di/dt)$ $T_{vj}=125^\circ\text{C}$ $I_{TRM} > 1000$
Rectangular waves

$$P_{TOT} = P_T + W_{on} \cdot f + W_{off} \cdot f$$

$$P_T = \frac{1}{T} \int_0^T i_T \cdot v_T dt$$

Voltage drop model: $V_T = A + B \cdot i_T + C \cdot \ln(i_T + 1) + D \cdot i_T^2$

Item	Item	A	B	C	D
500	10000	-0.006184	0.000229	0.175791	0.006495



	1	1	2	3
R_{th} (K/W)	0.0036	0.0035	0.0010	
τ (s)	1.0231	0.5199	0.0160	

Fig.8.

Thermal impedance $Z_{TH(jc)}$ function in case.

$$Z_{TH(jc)} = \sum_{i=1}^n R_i (1 - e^{-t/\tau_i})$$

Analytical function for dc.

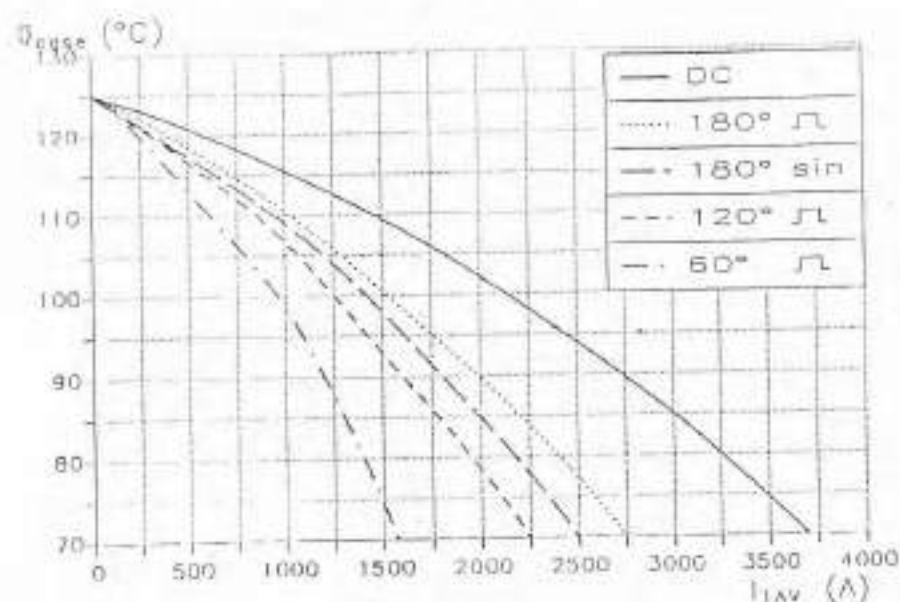


Fig. 9.

Max. permissible case temperature $\theta_{ср,св}$
vs mean on-state current I_{1AV} .
Double sided cooling (USC).

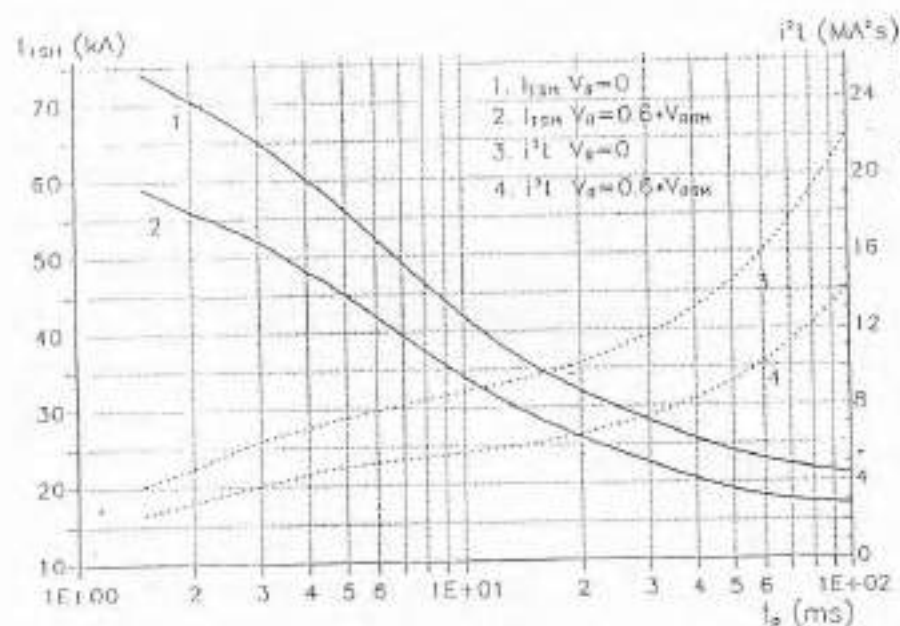


Fig. 10.

Surge on-state current I_{1SH} vs pulse length t_p . Half-sine wave. $\theta_{(t_p)} = \theta_{(t_p)max}$.

i^2t vs pulse length t_p . Half sine wave.

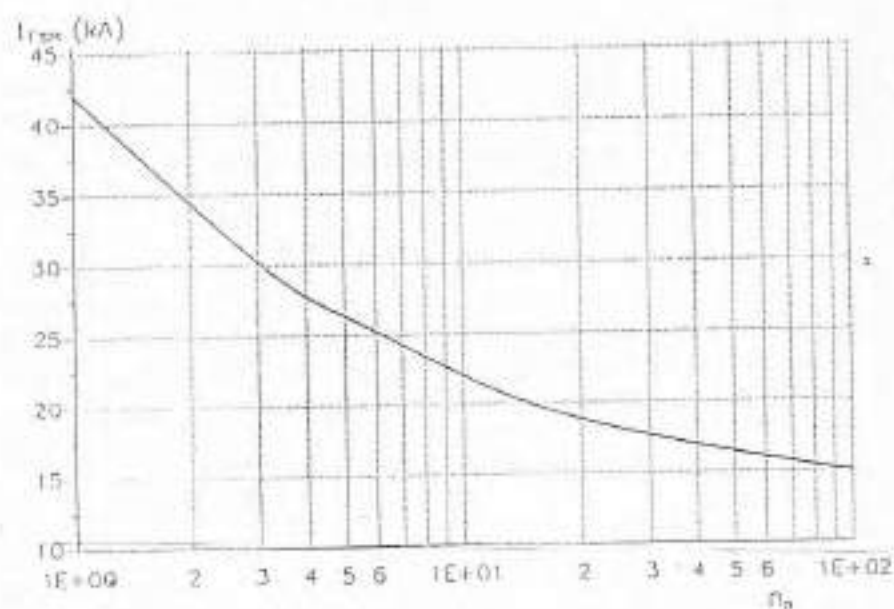


Fig. 11.

Surge on-state current I_{1SH} vs number
of pulses n_p . Half-sine wave pulses,
10 ms, 50 Hz. $\theta_{(t_p)} = \theta_{(t_p)max}$.

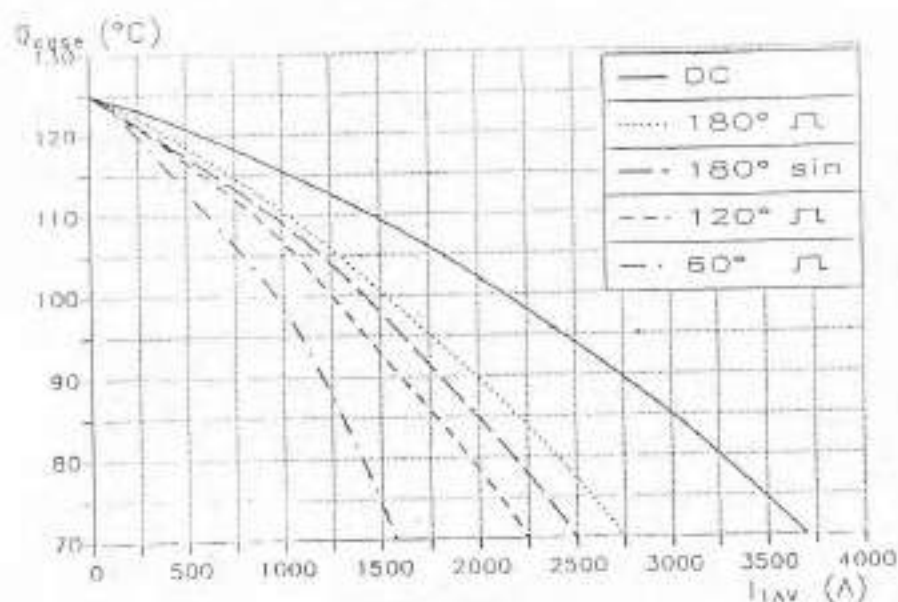


Fig. 9.

Max. permissible case temperature θ_{cmax}
vs mean on-state current I_{TAV} .
Double sided cooling (USC).

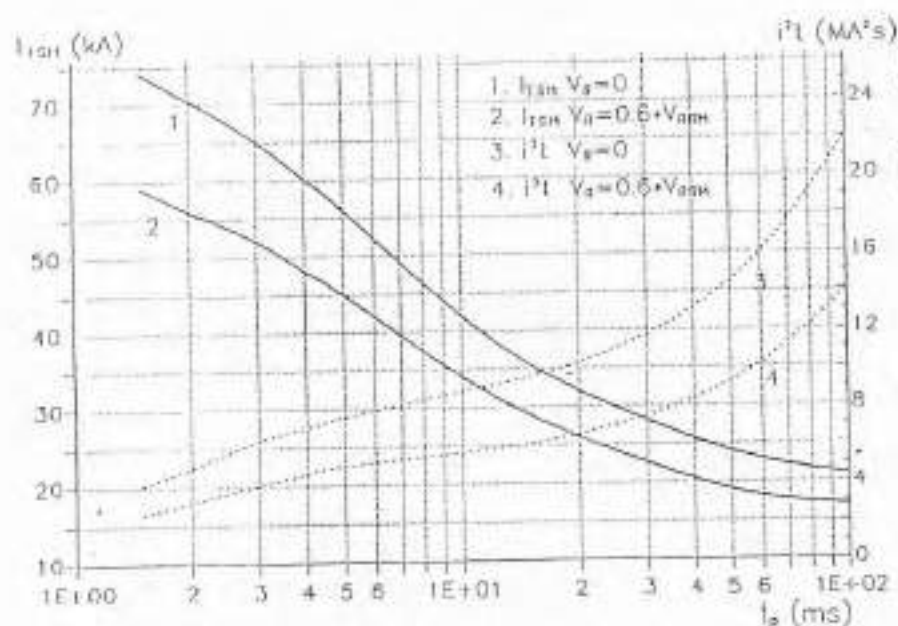


Fig. 10.

Surge on-state current I_{TSH} vs pulse length
 t_p , Half-sine wave, $\theta_{(TSH)} = \theta_{(TSH)max}$.

i^2t vs pulse length t_p , Half sine wave.

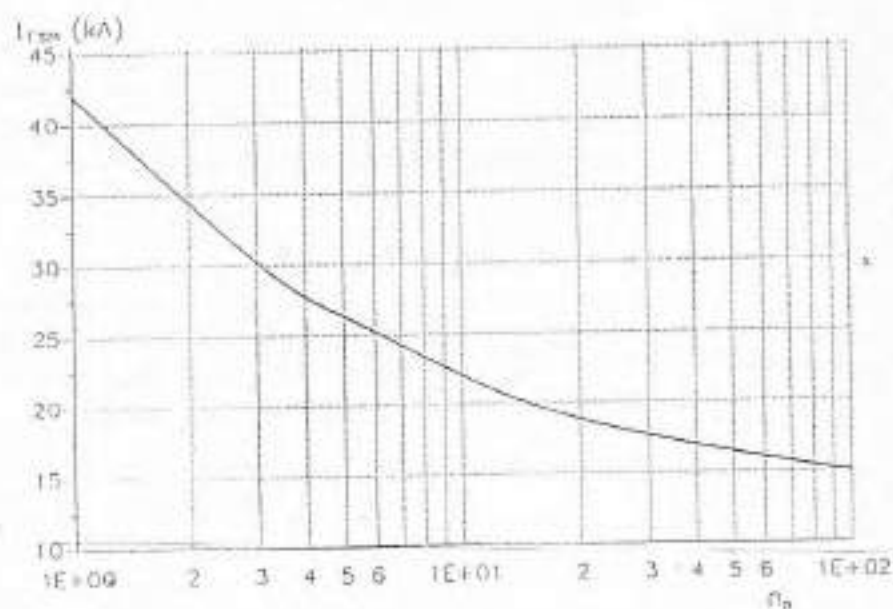


Fig. 11.

Surge on-state current I_{TSH} vs number
of pulses n_p , Half-sine wave pulses,
10 ms, 50 Hz, $\theta_{(TSH)} = \theta_{(TSH)max}$.

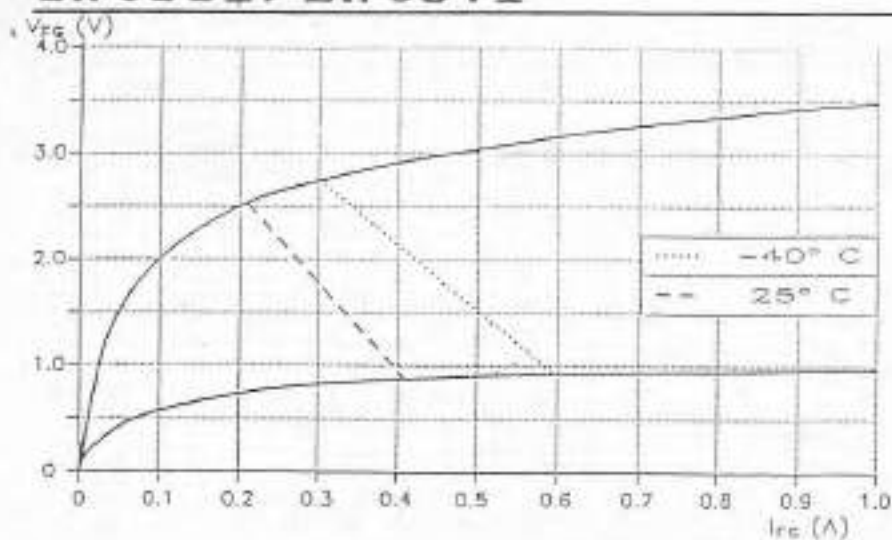


Fig. 12.

Gate trigger characteristics. Forward gate voltage V_{FG} vs forward gate current I_{FG} . Lower limits of certain triggering. Anode-cathode voltage ~ 6 V.

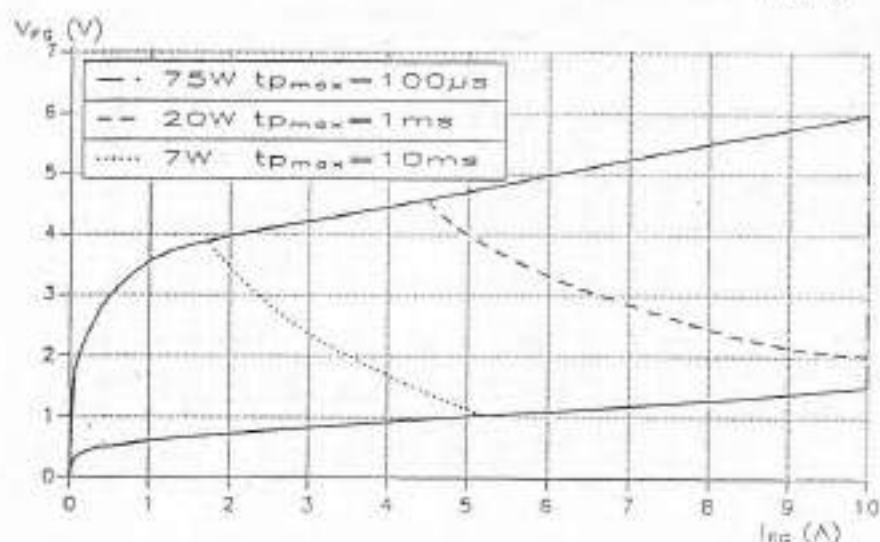
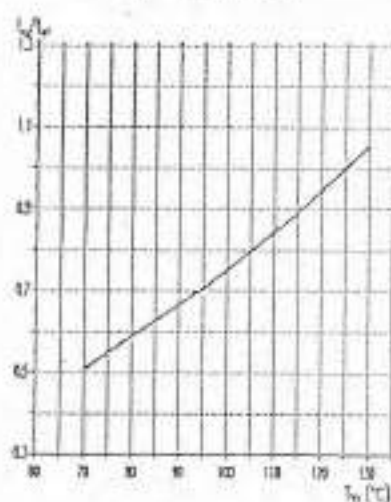
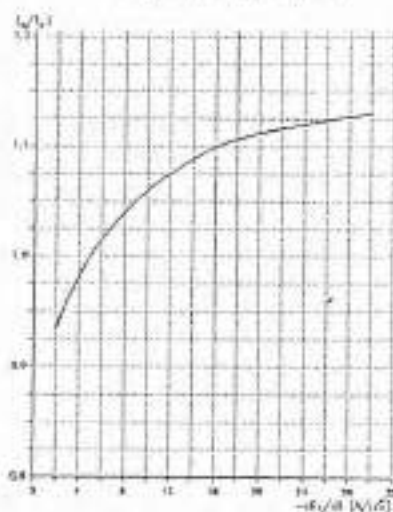
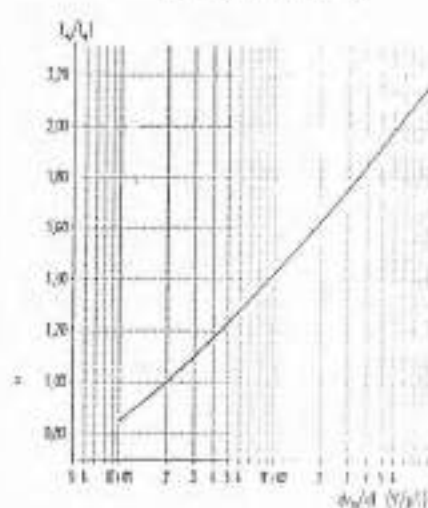


Fig. 13.

Max. peak power loss in the gate for different gate pulse lengths. Forward gate voltage V_{FG} vs forward gate current I_{FG} .

Variation of turn-off time

Fig. 14. $I_q/I_{q1} = f(T_{q1})$ Fig. 15. $I_q/I_{q1} = f(-di/dt)$ Fig. 16. $I_q/I_{q1} = f(dv/dt)$ 

$$I_q = I_{q1} + I_{q1}/I_{q1}(T_{q1}) + I_{q1}/I_{q1}(-di/dt) + I_{q1}/I_{q1}(dv/dt)$$

wherein:

I_{q1} at conditions stated on page 2.

I_q at varying conditions.

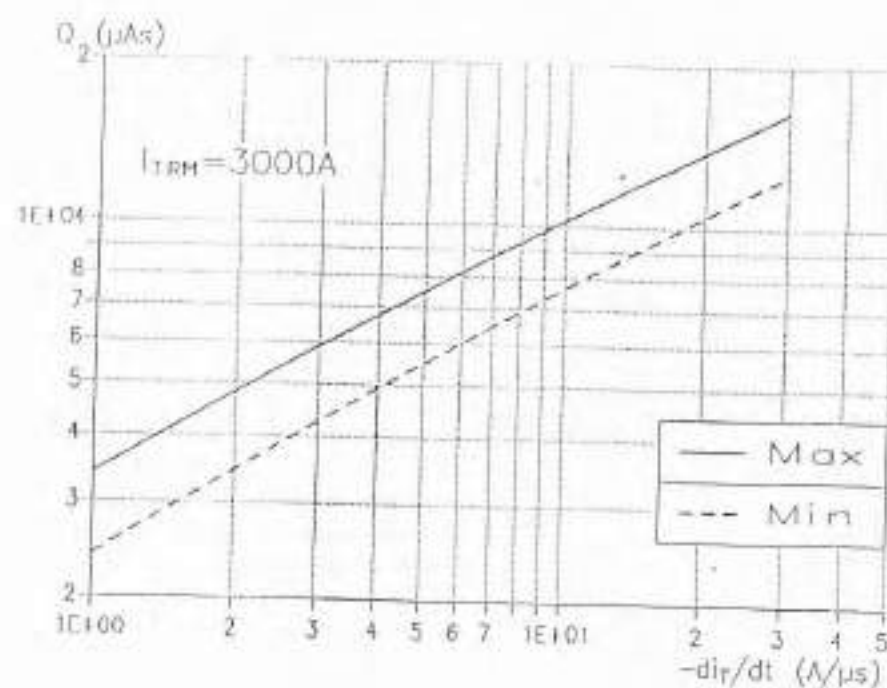


Fig. 17.

Recovery charge Q vs decay rate of on-state current $-di_T/dt$. $\theta_{(v)} = \theta_{(v)}_{max}$.

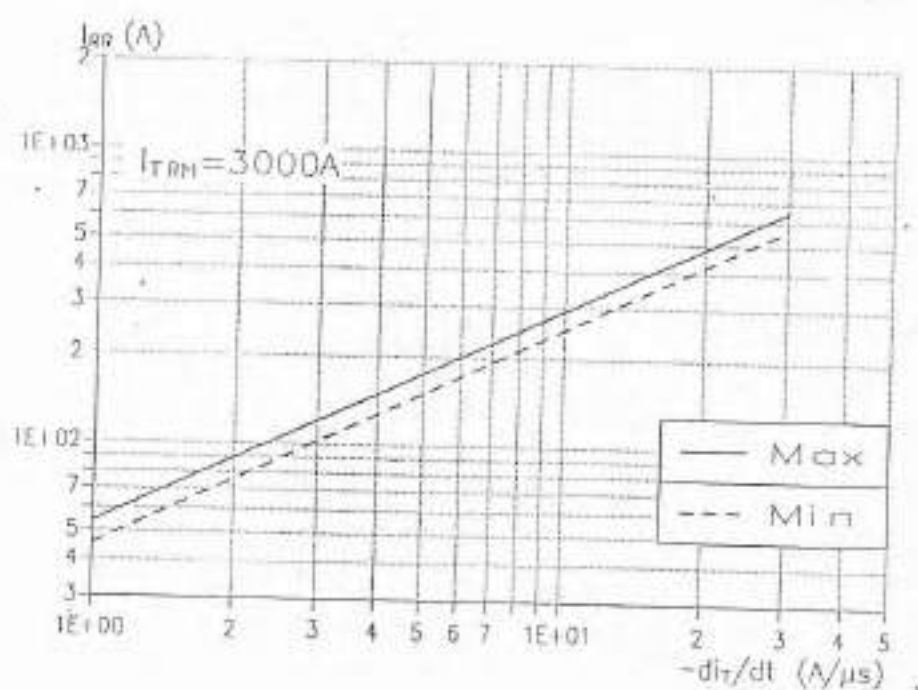


Fig. 18.

Peak reverse recovery current I_{RR} vs decay rate of on-state current $-di_T/dt$. $\theta_{(v)} = \theta_{(v)}_{max}$.

B H E L !		MOTOR EXCITATION DATA		!sheet: 01 of 01	
! HGE-2016 !					
=====					
!customer/project : PCL-10/MEIL/TENGESCO					
!w.o.no. : no.of units :4					
=====					
! MOTOR /! HYDRO / VERTICAL / LIS MOTOR					
=====					
! kva ! 99579 ! amps ! 5227 ! rpm ! 200.00! d r i v e					
rating	! kv !11.0+ 10%!	p f !	0.950 !	h z !50+3.0%!	V.FRANCIS
=====					
! xd ! 0.964 ! xdd ! 0.226 ! tdod ! 6.78 !rf20 ! 0.1829					
machine	! xq ! 0.645 ! xddd ! 0.182 ! tdd ! 1.59 !rf75 ! 0.2224				
constants	! xl ! 0.118 ! tdodd ! 0.043 ! tddd ! 0.03 !rf130! 0.2620				
=====					
e x c i t a t i o n				!amps !	volt ! res.!
=====					
a !open circuit :	rated voltage-	11.00 kv		! 637!	134!0.204!
=====					
b !rated load:	94600kw	99579kva	11.00kv	50.0hz0.95pf!	986! 241!0.240!
=====					
c !rated load:	94600kw	99579kva	12.10kv	48.5hz0.95pf!	1141! 286!0.248!
=====					
d !over load:	105952kw	111528kva	11.00kv	50.0hz0.95pf!	1042! 262!0.248!
=====					
e !over load:	105952kw	111528kva	12.10kv	48.5hz0.95pf!	1186! 306!0.255!
=====					
f !synch.cond:	51781kva.	11.00kv	zpf leading	! 986!	241!0.240!
=====					
g !line charging:	0kva	11.00kv	zpf leading	! 637!	121!0.183!
=====					
h !short circuit:	full load	stator current		! 533!	123!0.204!
=====					
i !ceiling	: for 10 second duration			!	!
=====					
excitation! t y p e		! STATIC			
!=====!					
equipment ! r a t i n g !	1400 a	360 v	504 kw	v ceiling	
=====					
field current at instant of f.c.b! a.c.comp.!				1076 amps	
opening under 3-phase short circuit !				!	
(maximum prior to load) ! d.c.comp.!				2815 amps	
=====					
! additional information:					
site conditions :		amb.temp.:	oc	altitude:	humidity:
auxiliary supply:			ac		dc
! field winding test voltage: 3.6 kv(rms) for 60 seconds					
! rti shunt rat: 1500a/75mv					
! rti shunt location : in positive pole of field breaker					
! rti shunt scope : rti suppliers scpoe/electronics div blore					
! rti shunt drawing : 32590601006					
=====					
!revision:		!distribution!hydrogenerator engineering division			
		!-----! bharat heavy electricals limited			
		! hge: 2	! bhopal		
		! hse: 2	!-----!		
		!	! prepared	! approved	! d a t e
		!	!-----!	!-----!	
!date:		!	BPS	!	AD ! 15-02-2016
=====					

```

=====
! B H E L !          Motor   excitation data          !sheet: 01 of 01 !
! HGE-2016 !
=====
!customer/project : PCL-11/TENGenco
!w.o.no. :                      no.of units :5
=====
!generator/!  hydro / vertical /Motor
=====
!      !kva ! 80000 ! amps ! 4199 ! rpm ! 250.00! d r i v e !
! rating !====!=====!=====!=====!=====!=====!=====!
!      ! kv !11.0+ 10%! p f ! 0.950 ! h z !50+3.0%! V.francis!
=====
!      ! xd ! 1.096 ! xdd ! 0.242 ! tdod ! 6.57 !rf20 ! 0.1629 !
! machine !====!=====!=====!=====!=====!=====!=====!
!      ! xq ! 0.675 ! xddd ! 0.180 ! tdd ! 1.45 !rf75 ! 0.1981 !
! constants !====!=====!=====!=====!=====!=====!=====!
!      ! xl ! 0.122 !tdodd ! 0.042 ! tddd ! 0.03 !rf130! 0.2333 !
=====
!                  e x c i t a t i o n                  !amps ! volt ! res.!
=====
! a !open circuit :rated voltage- 11.00 kv                ! 546! 103!0.182!
=====
! b !rated load: 76000kw 80000kva 11.00kv 50.0hz0.95pf! 925! 202!0.214!
=====
! c !rated load: 76000kw 80000kva 12.10kv 48.5hz0.95pf! 997! 224!0.221!
=====
! d !over load: 88160kw 92800kva 11.00kv 50.0hz0.95pf! 1003! 225!0.221!
=====
! e !over load: 88160kw 92800kva 12.10kv 48.5hz0.95pf! 1063! 245!0.227!
=====
! f !synch.cond: 46400kva. 11.00kv zpf leading           ! 925! 202!0.214!
=====
! g !line charging: 0kva 11.00kv zpf leading            ! 545! 93!0.163!
=====
! h !short circuit: full load stator current             ! 544! 112!0.182!
=====
! i !ceiling : for 10 second duration                    !      !      !
=====
! excitation! t y p e !                      STATIC
!      !====!=====!=====!=====!=====!=====!=====!
! equipment ! r a t i n g ! 1200 a 300 v 360 kw          v ceiling !
=====
! field current at instant of f.c.b! a.c.comp.! 900 amps
! opening under 3-phase short circuit !      !
! (maximum prior to load )            ! d.c.comp.! 2589 amps
=====
! additional information:
! site conditions :amb.temp.:      oc altitude:      humidity:
! auxiliary supply :      ac      dc
! field winding test voltage : 3.0 kv(rms) for 60 seconds
! rti shunt rat : 1200/75 mv
! rti shunt location : in positive pole of field breaker
! rti shunt scope : rti suppliers scope
! rti shunt drawing : 32590601005/32590601006/32590601007/32590601008
=====
!revision:          !distribution!hydrogenerator engineering division !
!                  !-----! bharat heavy electricals limited !
!                  ! hge: 2 ! bhopal !
!                  ! hse: 2 !-----!
!                  ! prepared !approved ! d a t e !
!                  !-----!-----!-----!
!date:              !      !      !      ! 26/10/2015 !
=====
!no.hge/          / /          date: 26/10/2015
! Sr. manager(d)/hse
! (attn.mr. )
! cc:
=====

```

B H E L !		motor excitation data		!sheet: 01 of 01	
! HGE-2016 !					
=====					
!customer/project : PCL-6/NAVYUGA ENGG. COMPANY LTD./TENGENCO					
!w.o.no. : no.of units :7					
=====					
! motor/ ! hydro / vertical / LIS motor					
=====					
! kva ! 122105 ! amps ! 6409 ! rpm ! 200.00! d r i v e					
rating	=====	=====	=====	=====	=====
! kv !11.0+ 10%! p f ! 0.950 ! h z !50+3.0%! V.FRANCIS PUMP					
=====					
! xd ! 1.185 ! xdd ! 0.279 ! tdod ! 7.64 !rf20 ! 0.1623					
machine	=====	=====	=====	=====	=====
! xq ! 0.794 ! xddd ! 0.225 ! tdd ! 1.80 !rf75 ! 0.1974					
constants	=====	=====	=====	=====	=====
! xl ! 0.147 !tdodd ! 0.040 ! tddd ! 0.03 !rf130! 0.2325					
=====					
e x c i t a t i o n				!amps !	volt ! res.!
=====					
! a !open circuit :rated voltage- 11.00 kv				! 637!	120!0.181!
=====					
! b !rated load:116000kw 122105kva 11.00kv 50.0hz0.95pf!				1095!	238!0.213!
=====					
! c !rated load:116000kw 122105kva 12.10kv 48.5hz0.95pf!				1229!	274!0.220!
=====					
! d !over load:127600kw 134316kva 11.00kv 50.0hz0.95pf!				1156!	258!0.220!
=====					
! e !over load:127600kw 134316kva 12.10kv 48.5hz0.95pf!				1281!	293!0.226!
=====					
! f !synch.cond: 66547kva. 11.00kv zpf leading				! 1095!	238!0.213!
=====					
! g !line charging: 0kva 11.00kv zpf leading				! 637!	107!0.162!
=====					
! h !short circuit: full load stator current				! 655!	134!0.181!
=====					
! i !ceiling : for 10 second duration				!	!
=====					
excitation! t y p e		! STATIC			
!=====!					
equipment ! r a t i n g !		1500 a 350 v 525 kw		v ceiling	
=====					
field current at instant of f.c.b! a.c.comp.!				1075 amps	
opening under 3-phase short circuit !				!	
(maximum prior to load) ! d.c.comp.!				2849 amps	
=====					
! additional information:					
site conditions :amb.temp.:		oc altitude:		humidity:	
auxiliary supply:		ac		dc	
! field winding test voltage: 3.5 kv(rms) for 60 seconds					
! rti shunt rat: 1500a/75mv					
! rti shunt location : in positive pole of field breaker					
! rti shunt scope : rti suppliers scpoe/electronics div blore					
! rti shunt drawing : 32590601006					
=====					
!revision:		!distribution!hydrogenerator engineering division			
!		!-----! bharat heavy electricals limited			
!		! hge: 2		! bhopal	
!		! hse: 2		!-----!	
!		!		! prepared !approved ! d a t e	
!		!		!-----!	
!date:		!		! BPS ! AD ! 31-10-2015	
=====					

! B H E L ! MOTOR EXCITATION DATA! SHEET: 01 OF 01 !
! HGE-2016 ! REV-01 !

! CUSTOMER/PROJECT : MEIL / TGENCO / PRANHIT-ST-VIII !
! W.O.NO. : 39008 TO 12 A231-- NO.OF UNITS : 7 !

! SYNCHRONOUS MOTOR/ HYDRO / VERTICAL !

RATING	kva	120842	amps	5056	rpm	214.29	drive
	kv	13.8+ 10%	pf	0.950	hz	50+3.0%	V. FRANCIS
MACHINE	xd	1.346	xdd	0.285	tdod	7.93	rf20 0.2183
CONSTANTS	xq	0.873	xddd	0.182	tdd	1.68	rf75 0.2655
	x1	0.144	tdodd	0.055	tddd	0.04	rf130 0.3127

E X C I T A T I O N		AMPS	VOLT	RES.
a	open circuit : rated voltage- 13.80 kv	477	120	0.244
b	rated load: 114800kw 120842kva 13.80kv 50.0hz 0.95pf	873	254	0.287
c	rated load: 114800kw 120842kva 15.18kv 48.5hz 0.95pf	944	283	0.296
d	over load: 140056kw 147427kva 13.80kv 50.0hz 0.95pf	991	297	0.296
e	over load: 140056kw 147427kva 15.18kv 48.5hz 0.95pf	1047	322	0.304
f	synch. cond: 69484kva. 13.80kv zpf leading	873	254	0.287
g	line charging: 78000kva 13.80kv zpf leading	70	19	0.218
h	short circuit: full load stator current	553	151	0.244
i	ceiling : for 10 second duration			

! EXCITATION! TYPE ! STATIC !

! EQUIPMENT ! R A T I N G ! 1200A 370 V 444 KW V CEILING !

FIELD CURRENT AT INSTANT OF F.C.B! A.C.COMP.!	598 AMPS	} EDN TO DECIDE
OPENING UNDER 3-PHASE SHORT CIRCUIT ! (MAXIMUM PRIOR TO LOAD) ! D.C.COMP.!	2192 AMPS	

! ADDITIONAL INFORMATION:

SITE CONDITIONS : AMB. TEMP. :	OC	ALTITUDE:	HUMIDITY:	} AS PER CONTRACT
AUXILIARY SUPPLY:	AC		DC	
FIELD WINDING TEST VOLTAGE: 3.7 KV(RMS) FOR 60 SECONDS				
RTI SHUNT RAT: 1200/75MV				
RTI SHUNT LOCATION : IN POSITIVE POLE OF FIELD BREAKER				
RTI SHUNT SCOPE : RTI EDN SCOPE				
RTI SHUNT DRAWING : 32590601006				

! REVISION: REV-01 ! DISTRIBUTION! HYDROGENERATOR ENGINEERING DIVISION !

! RATED PUMP INPUT AND !-----! BHARAT HEAVY ELECTRICALS LIMITED !
! MAX. MOTOR CAPACITY ! HGE: 2 ! BHOPAL !

! HAVE BEEN CHANGED FROM! HSE: 2 !

! 109MW TO 114.8 MW AND!

! 134MW TO 139 MW !

! RESPECTIVELY. !

! DATE: 24-10-2015 !

! A.K. PURE !
! A. BISWAS !

! PREPARED ! APPROVED ! DATE !

! SD/- !

! A.K. PURE !

! SD/- !

! A. BISWAS !

! 18-09-2014 !

SFC EXCITATION SYSTEM

Initial Excitation power required for SFC starting is switched on before start of SFC system. Constant excitation which is 80% of no load excitation value is given up to minimum speed i.e. 30Hz. After minimum speed is reached a command from SFC is given to excitation system for enabling V/F ratio up to 90% nominal speed.

Auto Sequencer (unit control board-UCB) will take over control when machine reaches 90% speed. Controls of Speed Raise / Speed Lower is done by the Auto Sequencer (unit control board-UCB) until machine reaches 50 Hz rated speed.

Synchronization is done by Auto Sequencer in Auto Sequence system (UCB) by matching machine voltage and frequency with Grid voltage and frequency. Main Excitation system will take over from the initial excitation system after the synchronization of machine. Change over power contactors are provided for switch over from initial to main excitation.

Motor synchronized Command from motor circuit breaker is given for switching off SFC system by tripping the SFC output circuit breaker and source breaker respectively.

Both Excitation System and Auto Sequencer control system, including the system of selecting the pump and SFC combination is manufactured and supplied by BHEL. Electronics Division, Bangalore.

Signals from Excitation system to SFC

1. Excitation ON contact

Signals from SFC to Excitation system

1. First sequence speed reached contact. i.e. CB1 (bypass breaker) open, CB2 and CB3 closed.
2. Minimum speed reached contact for enabling V/F ratio.

Signal from SFC to DCS/UCB

1. 90% speed reached contact for speed control(raise/lower)

PRANHITA CHEVELLA LIFT IRRIGATION SCHEME

System Details:

Parameter	Stage 6	Stage 8	Stage 10	Stage 11
Pump Capacity	7x127.6MW Pumps (11kV)	7x139MW Pumps (13.8kV)	4x106MW Pumps (11kV)	5x88.5MW Pumps (11kV)
Number of SFCs	3	3	3	3
SFC Input Voltage	11kV $\pm$ 10%	11kV $\pm$ 10%	11kV $\pm$ 10%	11kV $\pm$ 10%
Fault Level	40kA for 3 sec	40kA for 3 sec	40kA for 3 sec	40kA for 3 sec
Ambient temperature	50°C	50°C	50°C	50°C
Design ambient	50°C	50°C	50°C	50°C
Humidity	98%	98%	98%	98%

Motor/Pump Data:

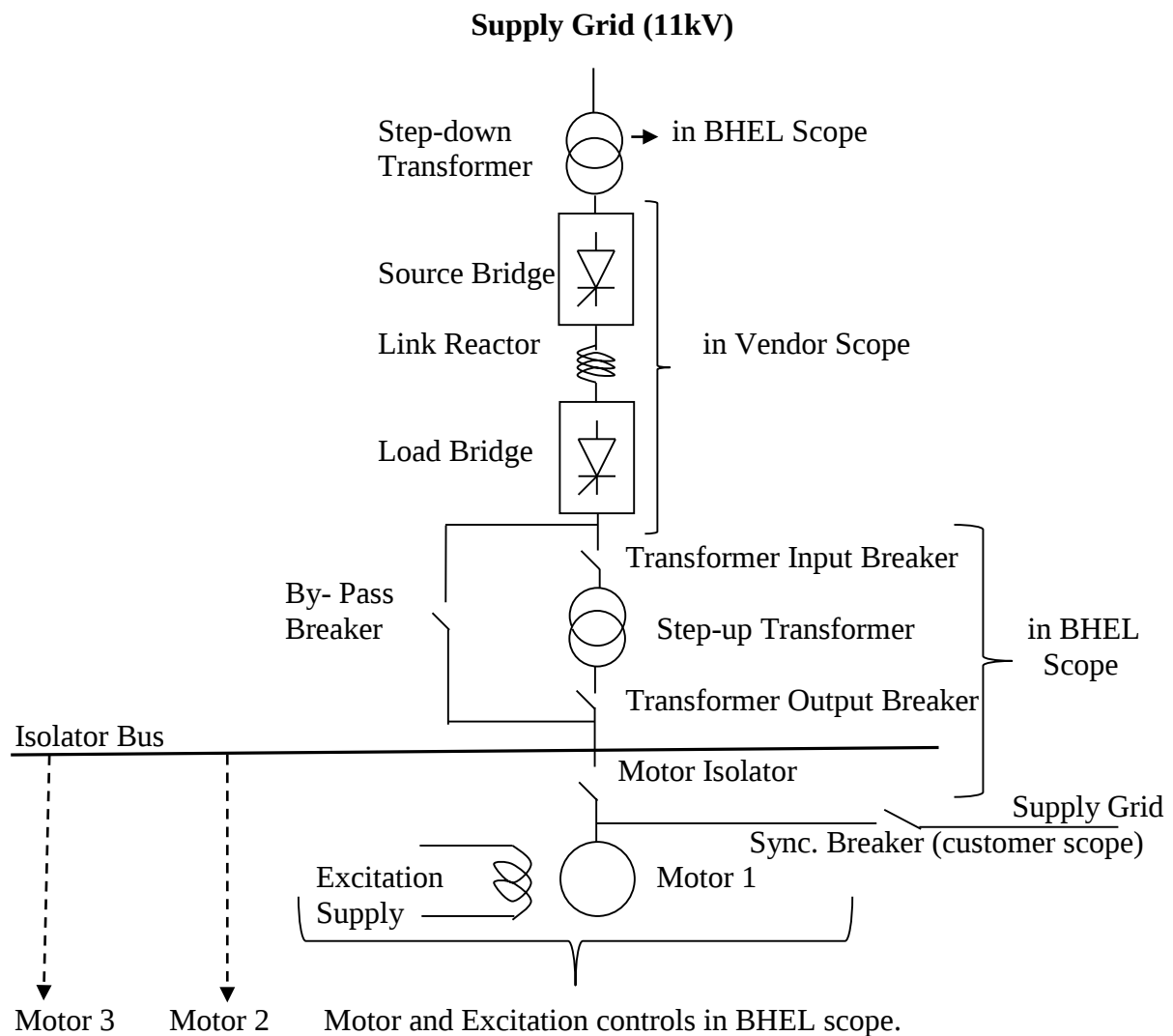
Parameter	Stage 6	Stage 8	Stage 10	Stage 11
Voltage, Power and Speed	7x127.6MW Pumps (11kV), 200rpm SFC 6940kW	7x139MW Pumps (13.8kV), 214.29rpm SFC 7000kW	4x106MW Pumps (11kV), 200rpm SFC 6475kW	5x88.5MW Pumps (11kV), 250rpm SFC 5210kW
Torque/Speed Curves	Available	Available	X	X
Inertia values (Total InertiaT-m ²)	5435	5190	4740	2770
Starting time	300s	300s	300s	300s
Direct axis reactance Xd	1.18	1.34	X	1.096
Direct axis transient reactance Xdd (X'd)	0.28	0.28	X	0.242
Direct axis sub transient reactance Xddd (X''d)	0.22	0.19	X	0.180
Quadrature axis reactance Xq	0.79	0.87	X	0.675
Quadrature axis transient reactance X'q	0.79	0.86	X	X
Quadrature axis sub transient reactance X''q	0.27	0.21	X	X

Excitation Data:

Parameter	Stage 6	Stage 8	Stage 10	Stage 11
Maximum Excitation Power Rating	525kW	444kW	504kW	360kW
Maximum Excitation Current Rating	1500A	1200A	1400A	1200A
Maximum Excitation Voltage Rating	350V	370V	360V	300V
Motor Field Current for Motor Starting	565A	420A	565A	485A
Motor Field Voltage for Motor Starting	110V	132V	110V	95V

Brief Description of SFC:

Static Frequency Converter is a system for starting and accelerating large synchronous machines. SFC takes power from the supply grid at constant voltage and constant frequency, and converts it into power of variable voltage and frequency in order to start and accelerate the synchronous machine synchronously. The machine is then synchronised to the supply grid and SFC is disconnected. Since this is made of solid state devices and has no moving parts, it is also called Static Starter.

**Single Line Diagram**

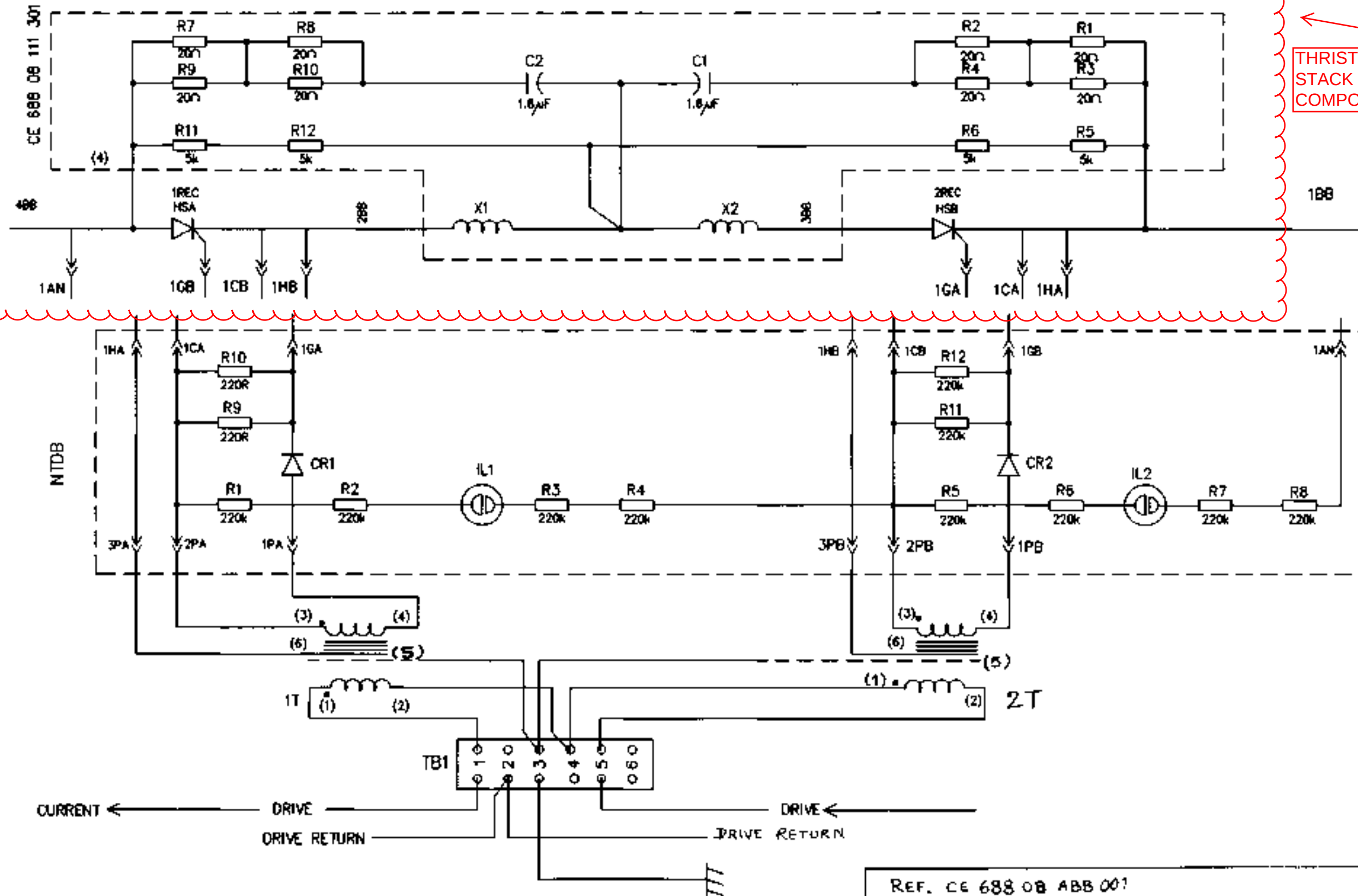
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DESIGN AND DATE	REF. ORG. NO.
-----------------	---------------

INVENTORY NO.

Doc. No. 688 08 889



THRISTOR
STACK
COMPONENTS

REF. CE 688 08 ABB 001

GE 5220 CMAE

BHARAT HEAVY ELECTRICALS LIMITED
ELECTRONICS DIVISION, BANGALORE.

CARD CODE

TITLE	SCHEMATIC FOR HSLCI MODULE
-------	----------------------------

No. OF SHEETS	02
SHEET No	02

DEPT	CODE
------	------

SNE	406
-----	-----

M D. NO

DRG	3	688	08	50001
Nq				

REV 01

HYDROGENERATOR ENGINEERING DIVISION

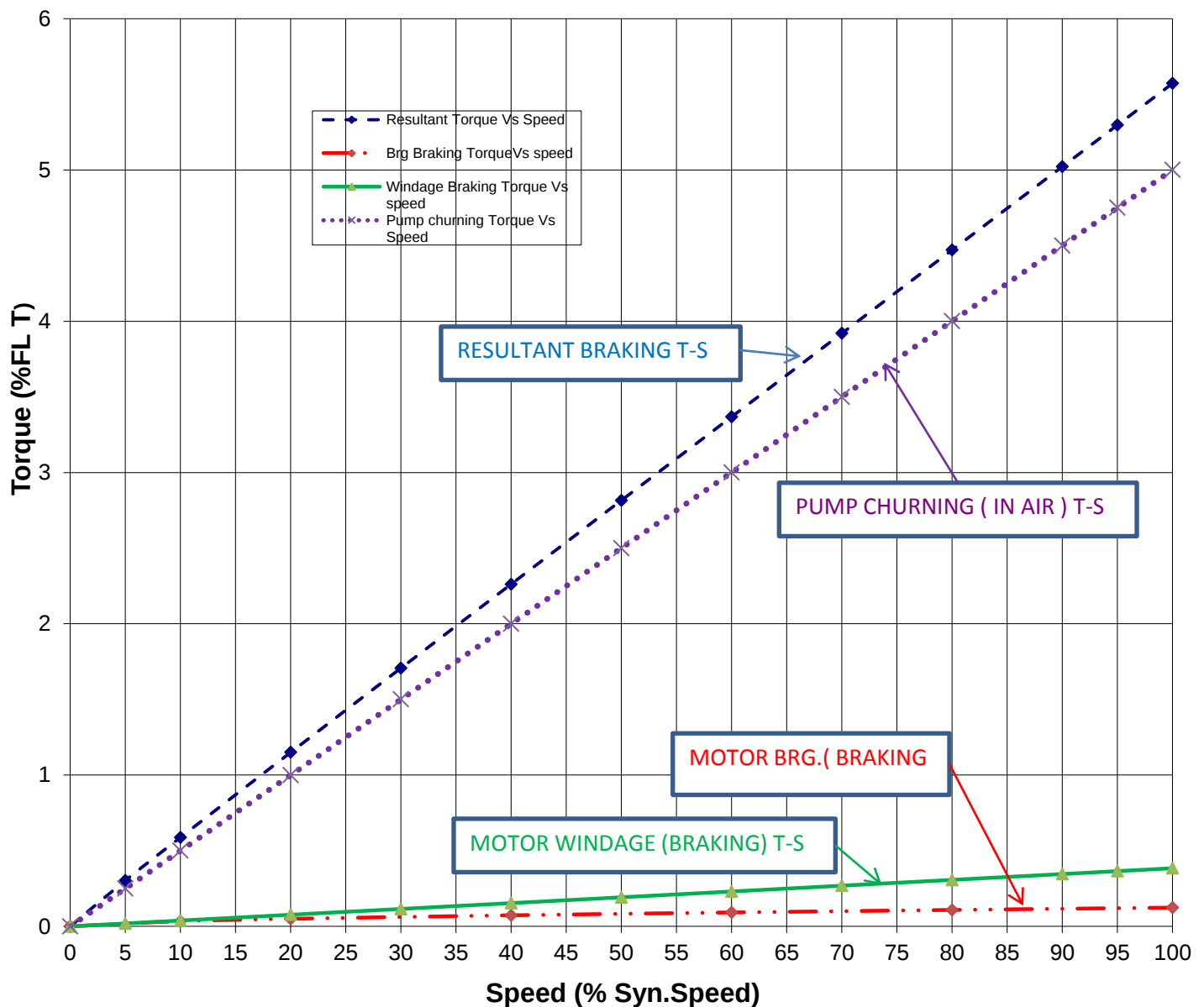
BHEL, BHOPAL

HGE /PCL-6-MOTOR/NECL/2016/

Dtd.07.05.2016 / Rev.00

Maximum Motor Capacity - 127600Kw, Rated pump input = 104100 kW
Rated full load pump torque =4972.9 KNm, Rated speed =200 RPM, 11 KV,
30 Pole, Synchronous motor

PRANHITA-STAGE-VI LIS MOTORS (BRAKING TORQUE V/S SPEED)



Prepared By: B.P.Swain

Checked By: P.K.Verma

Approved By: A. Dixit

HYDROGENERATOR ENGINEERING DIVISION

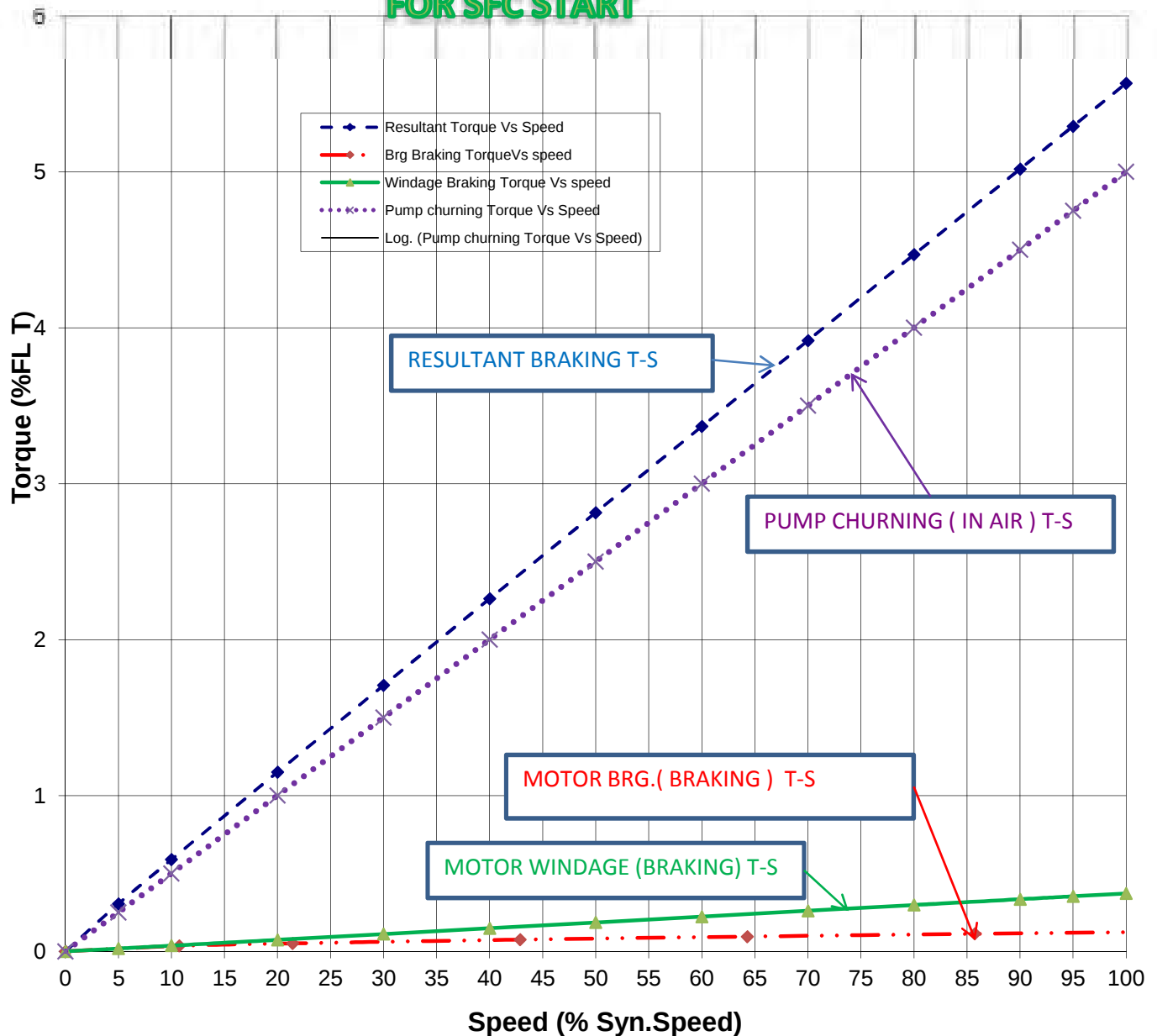
BHEL, BHOPAL

HGE /PCL-8-MOTOR/MEIL/2016/ 833

Dtd.26.03.2016 / Rev.00

Maximum Motor Capacity - 140000Kw, Rated pump input = 113940 kW
Rated full load pump torque =5080 KNm, Rated speed =214.3 RPM, 13.8KV,
28 Pole, Synchronous motor

PRANHITA-STAGE-VIII LIS MOTORS (BRAKING TORQUE V/S SPEED) FOR SFC START



Prepared By: A.K.PURE

Checked By: GOPAL M.

Approved By: A. Biswas