BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS GROUP, MATERIALS MANAGEMENT
BHEL, INDUSTRY SECTOR, INTEGRATED OFFICE COMPLEX,
LODHI ROAD, NEW DELHI-03
Phone:-011-41793338, Fax: - 011 – 24365869, E-mail – pramodk@bhelindustry.com

TENDER NOTICE

TENDER ENQUIRY NO. **E- 4573285,** DATE: **29.02.08,** DUE DATE: **28.03.08, TIME: - 10.00 AM**

ITEM (PRODUCT) : **UPS PACKAGE (415 V AC, 3-ph, 80 KVA, Qty-8 nos. & 240 V AC, 1 ph, 5KVA, Qty. - 4 nos. and associated equipments)**

PROJECT : **BALIA BHIWADI HVDC PROJECT**

Sealed quotations are invited for supply and supervision of Erection, Testing and Commissioning(ETC) for the items mentioned in the enquiry attached in two part format i.e. Techno commercial Bid and Price Bid separately. Please find enclosed following document pertaining to this enquiry:

1.	Tender Enquiry	2.	Terms & Conditions for Indigenous tender enquiry
3.	Schedule of Commercial Deviations	4.	Schedule of Technical Deviations
5.	Activity Schedule	6.	Schedule of Prices
7.	Supplier Registration Form	8.	Technical Specification

You are requested to submit your most competitive offer so as to reach us positively before the tender opening date & time. **THE TENDERS NOT RECEIVED WITHIN SCHEDULED DATE AND TIME ARE LIKELY TO BE IGNORED**. BHEL shall not be responsible for any postal delay. Please note that the ordering will be subject to the approval of vendor / sub-contractor by our ultimate customer.

Vendors may also submit filled in 'Supplier Registration Form' alongwith supporting documents in line with sr. no. 7 above within a weeks time for getting yourself registered with BHEL and customer approval.

For any further clarification
Contact Person:

PRAMOD KHANDURI
DY. MANAGER (TBMM)
PH NO.011-41793338/41793145,FAX NO.-011-24365869

Dy. Manager (TBMM)

SHEET ..... OF .....

1	2	3	4	5	6	7	8
भा एच ई एल BHEL	फोन / Phone : तार / Gram : टेलेक्स / Telex : फैक्स / Fax :	भारत हेवी इलेक्ट्रिकल्स लिमिटेड, Bharat Heavy Electricals Ltd; (भारत सरकार का उपक्रम/A Govt of India Undertaking) TBMM, Transmission Business Group, N Delhi	इंक्वायरी ENQUIRY	कूट संकेत Cord Code	इंक्वायरी/Enquiry क्र.No.	दिनांक/Date	कुल मदें Total Items
				MF3	E:45:73:285	29:02:08	

9	10	11	12	13	14	15	16	17	18
काटा CA.TY.	पुनरीक्षण/REVISION संकेत/Code	क्र.No.	दिनांक/Date	कोटेशन हेतु निर्धारित तिथि/Due date for Quotation	विक्रेता संकेत Vendor Code	काटा संख्या/No. of C.A.T.Y.2	काटा संख्या/No. of C.A.T.Y.3	मांगपत्र क्रमांक Indent No.	सामग्री की आपूर्ति शर्तें/Supply Condition of Material :
1	1	0	29:02:08	28:03:08	----	—	—	3422708312	As per enclosed specifications

प्रति/To,

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20 इमारी आवश्यकताएँ/OUR REQUIREMENTS	
1. परीक्षण प्रमाण पत्र/Test Certificate	[ ]
2. गारंटी प्रमाण पत्र/Guarantee Certificate	[ ]
3. अनुदेश पुस्तिका/Instruction Booklet	[ ]
4. नमुना/Sample	[ ]
5. मूल गेट पास/Original Gate Pass	[Yes]
6.	[ ]

21 तकनीकी सुपुर्दगी शर्तें/Technical Delivery Conditions :
As per enclosed specifications

22 निरीक्षण आवश्यकताएँ/Inspection Requirements:
As per enclosed specifications

23 काटा A.TY.	24 अक्र. Sl.No.	25 सामग्री संकेत Material Code	26 विवरण और विनिर्देश Description & Specification	27 इकाई Unit	28 मात्रा Quantity	सुपुर्दगी योजना/Delivery Schedule: 29 लॉट नं Lot No.	30 मात्रा Quantity	31 गंतव्य स्थान Destination	32 दिनांक Date
2			UPS package as per clause no 1.4 of	Nos	As per BOQ	1	As per BOQ	Ballia	31 07 08
2			enclosed Tech Specification no. PTDH121/P-00			2	As per BOQ	Bilwai	15 07 08
2			4364/ED3.271.CAH-A, TB-291-316-057						
2									
2									

प्रिय महोदय, / Dear Sirs

33

कृपया उपर्युक्त सामग्री के लिये हमारे संलग्न निबंधनों एवं शर्तों के अन्तर्गत अपनी सबसे कम दर का कोटेशन देने का कष्ट करें, जो हमारे पास निर्धारित दिनांक के पूर्वाह्न 11.00 बजे तक या उससे पहले पहुंच जाना चाहिये. कृपया नोट करें कि :
Please submit your lowest Quotation for the above materials, subject to our terms & conditions enclosed.

1. यह केवल कोटेशन हेतु अनुरोध मात्र है, आदेश नहीं.
   This is only a request for Quotation & not an order.
2. लघु उद्योग संस्थानों को कोटेशन बीजक में अपना स्म० उ० पं० क्रमांक दर्शाना चाहिये
   Small Scale Industries should indicate SSI Regn. No. in Quotation/Invoice.
3. यदि आप इस इंक्वायरी के संदर्भ में कोई कोटेशन नहीं दे रहे हैं, तो कृपया खेदपत्र भेजने का कष्ट करें.
   In case you are not making an offer against this Enquiry, we request you to post a regret letter.

अभ्युक्तियाँ/Remarks :

35 संलग्न दस्तावेज/DOCUMENTS ENCLOSED

1. ड्राईंग/Drawing	[ ]
2. केटलॉग/Catalogue	[ ]
3. क्रय विनिर्देश/Purchase Specification	[ ]
4. गुणता निगरानी योजना/Quality Surveillance plan	[ ]
5.	[ ]

36 भारत हेवी इलेक्ट्रिकल्स लिमिटेड के लिये तथा उसकी ओर से
for and on behalf of Bharat Heavy Electricals Ltd.

29/2/08

(हस्ता. एवं मुहर / Sign & seal)

BHEL/TBG/GTC/02-07

BHARAT HEAVY ELECTRICALS LTD.
(TRANSMISSION BUSINESS GROUP)
TERMS AND CONDITIONS FOR INDIGENOUS TENDER ENQUIRY

This Format is to be submitted in original duly signed by bidder. Deviation, if any, is to be brought out clearly in Schedule of Commercial deviation giving clause wise deviation. Any condition / clarification / deviation mentioned elsewhere may not be accepted.

Sr. No	Terms & Conditions
1.	1. Sealed quotations are invited for the items mentioned in the enquiry. Quotations should be typed and free from over writing and erasures, corrections or additions must be clearly written both in words and figures and attested and otherwise offer may be rejected. 2. Bidder must ensure that their quotation is received / dropped in the tender box on or before 10.00 AM of the due date of opening in **Material Management Division,** **Transmission Business Group,** **BHEL, Industry Sector,** **Integrated Office Complex,** **Lodhi Road, New Delhi – 110 003.** 3. The same shall be opened at 10.30 AM on the same day. Tenders received late may be rejected. Bidders sending tenders by courier or post, to ensure that it is delivered one day before as same day delivery may not reach above office by due time. 4. Bids are to be submitted in Two parts: i) Techno-commercial bid (Part I) – To be submitted in duplicate. A copy of price bid (Part II) (without prices) is also to be enclosed in Part I bid. ii) Price bid (Part II) – To be submitted only in one copy in a separate sealed envelope. This should not contain any Technical or Commercial Terms. The rates should be quoted both in figures and words. In case of any difference between figures and words, the quoted rate in words will prevail over figure. Both Part I and Part II bids are to be sealed in separate envelope and both envelops to be kept in another common envelope. Each envelope should be sealed and super scribed with enquiry no., item / package name, project name and due date of opening. 5. For any Technical clarification, please contact Mr. A.K. Das, Sr. Manager(TBEM) BHEL, Integrated Office Complex, Lodhi Road, New Delhi – 110 003 Phone : 011-41793294 Fax :011-24369509 E-mail :akdas@bhelindustry.com For any commercial clarification please contact person issuing enquiry.

Sr. No	Terms & Conditions
	6. Price bid should not contain any information / description / terms & condition other than given in Part-I of the bid except prices, otherwise bid is liable for rejection. **7. Price bid submitted along with the bid shall remain valid up to validity of offer. Unsolicited Supplementary / Revised price bid submitted during validity period of offer, unless asked by BHEL, shall not be considered. With-drawl of quotation by the bidder, at any stage after its opening, may entail blacklisting of vendor.**
2.	**PRICES:** **A.1.** Unless specifically indicated, all prices shall be **FIRM.** No enhancement of rate for whatever cause unless and until asked by BHEL will be allowed. **B** The prices shall be quoted by the vendors considering following. **B.2. Deemed export** i) Prices are to be quoted considering following benefits: 1 Excise Duty Exemption. 2. Custom duty benefit for imported material. ii) For availing above benefits, BHEL shall provide following documents. 1. Excise Duty Exemption certificate will be issued to the bidder by Power grid by which Excise duty to be paid by bidder will be exempted. 2. PAC will be issued for availing custom duty benefit for the CIF value. iii) In case of import benefit in deemed export projects, bidder to indicate import content (CIF value) in the price bid.
	C. The prices are to be quoted on FOR (Works) basis. Assembly and commissioning at site of the UPS are in bidder scope The break-up of price shall be as under:- **a) Ex-works Price:** Ex- works price including packing & forwarding charges. **b) Excise duty:** Exempted is Exempted, hence not to be quoted. **c) Sales Tax:** ST / VAT /CST (against C-form) to be quoted as percentage in un-price and price bid. In case of interstate sale-in-transit supplier have to provide E1/E2 form. **e) Entry tax / Octroi Charges:** Any Entry tax / Octroi applicable at destination / destination state shall be paid extra on proof of such payment. **f) Freight & Insurance:** Freight and Transit Insurance shall be other contractor's scope, therefore not to be quoted. **g) Type Test charges:** If asked in the technical specification, is to be quoted separately for each Test along with taxes and duties applicable on them. **h) Erection / Commissioning supervision charges:** If asked in the technical specification, to be quoted separately along with taxes and duties applicable on them. Note : The purchase order shall be placed on Ex-works basis.
3.	**TERMS OF PAYMENT :** a. 100% of Ex-works value along with 100% taxes, duties within 60 days from the

Sr. No	Terms & Conditions
	date of receipt of invoice. The invoice must contain following documents in 3 sets (Original + 2 copies) - Acknowledgement of receipt of materials by M/s Siemens's authorised representative. - Delivery Challan / Packing list (casewise) - Despatch Clearance given by BHEL, - Guarantee certificate, - All Test reports and inspection reports, - Performance Bank Guarantee copy. Terms of payment for Type test charges: 100% payment with taxes and duties on acceptance of test reports by BHEL on certification by BHEL engineering within 60 days from the date of receipt of clear invoice. Terms of payment for Supervision charges: 100% payment against completion with taxes and duties on certification by BHEL site within 60 days from the date of receipt of clear invoice.
4.	**INTEREST LIABILITY** In case of any delay in payment due to any reason, BHEL shall not pay any interest on delayed payment.
5.	**GUARANTEE :** The equipment / material shall be guaranteed for 18 months from the date of delivery or 12 months from the date of commissioning, which ever is earlier. The defective material / component shall be replaced free of cost at site.
6.	**PERFORMANCE BANK GUARANTEE :** Bidder shall furnish along with first invoice Performance BG / deposit as per one of following 3 options. Option A A single rolling Bank Guarantee of Rs 20 lakhs initially valid for one year for all the orders being executed for Transmission Business Group, BHEL. Option B BG for 10% of the total Ex-works PO value, valid for 24 months from the date of first delivery. PO value at the time of first invoice for the particular order shall be considered for calculation of BG amount. Option C Retention of 10% of the total Ex-works PO value by BHEL from the first bill in lieu of Performance Bank Guarantee, to be released after expiry of 24 months from the date of first delivery. The Bank guarantee shall be from State Bank of India / State bank of Hyderabad / State Bank of Travancore / State Bank of Mysore / Canara Bank / Bank of Baroda / Punjab National Bank / Deutsche Bank / HDFC Bank / Standard Chartered Bank / CITI Bank / ICICI Bank / IDBI Bank / HSBC / any other Nationalised Bank. The original BG should be sent by issuing Bank directly to AGM(Finance), TBG, BHEL.
7.	**FINAL ENGINEERING DOCUMENTATION:** Final documentation as called in the specification is to be submitted within 3 months from the date of despatch of material. In case of default, the Performance BG is liable to be en-cashed.

Sr. No	Terms & Conditions
8.	**INSPECTION :** BHEL / customer / third party shall inspect equipment / material before despatch. Stage inspection during manufacturing may also be carried out. Material to be despatched only after getting Despatch Clearance from BHEL. Supplier shall send inspection call on prescribed format (web site) only, with an advance notice of 15 days.
9.	**DESPATCH DOCUMENTS :** Following despatch documents are to be immediately sent to purchaser on despatch. - Acknowledgement of receipt of materials by M/s Siemens authorised representative - Copy of delivery challan / packing list - Guarantee certificate
10.	**DELIVERY PERIOD:** Bidder to specify delivery period in weeks from the date of LOI / PO. Time for conduction of type test, if required, is to be separately indicated. Note: Date of material receipt by M/s SIEMENS shall be considered as delivery date.
11.	**DELAYED DELIVERY:** In case of delay in execution of order beyond the lot wise contractual delivery, an amount of ½ % of total Ex-Works Value per week or part there-of subject to maximum of 5% of total Ex-Works value of P.O. will be withheld.
12.	**VALIDITY :** The offer shall be valid for 120 days from the due date of opening.
13.	**ACCEPTANCE / REJECTION OF TENDER :** BHEL reserves the right to reject in full or part, any or all tender without assigning any reason thereof. BHEL also reserves right to vary the quantities mentioned in the tender.
14.	**EVALUATION :** Comparative statement shall be prepared based on overall quantity basis unless otherwise indicated in the enquiry. Evaluation of offers shall be done on the basis of delivered cost to BHEL.
15.	**DEVIATION :** The bids having deviation(s) w.r.to tender are liable for rejection. However, BHEL, at its discretion, may load the prices for evaluation of offer with prior intimation to bidder.
16.	**ARBITRATION :** All cases of disputes emanating from and relating to this contract, the matter shall be referred to the sole arbitration of Unit Head / GM, BHEL or any other person (including an employee of BHEL, even though he had to deal with the matter relating to this contract in any manner) nominated by him to act as sole arbitrator. The arbitration shall be under 'The arbitration and contract act 1996' and the rules there under as amended from time to time. The arbitrator may from time to time with the consent of the parties enlarge the time for making and publishing the award. The venue of arbitration shall be any Indian city as decided by BHEL.
17.	**LEGAL SETTLEMENT :** All suits/claims in respect of this contract shall be in the courts having jurisdiction at New Delhi.
18.	**SUBCONTRACTING :** In case further subcontracting of BHEL order or part thereof is envisaged by supplier, the same can be done after written permission is obtained from BHEL. However it shall not absolve the supplier of the responsibility of fulfilling BHEL

Sr. No	Terms & Conditions
	purchase order requirements.
19.	**RISK PURCHASE :** In case the successful bidder fails to supply or fails to comply with the terms & conditions of the purchase order, BHEL reserves the right to source such material/ component / equipment/ system from any other agency at the risk and cost of the successful bidder.
20.	**ADJUSTMENT OF RECOVERY:** Any amount payable by the supplier under any of the condition of this contract shall be liable to be adjusted against any amount payable to the supplier under any other works / contract awarded to him by any BHEL unit. This is without prejudice to any other action as may be deemed fit by BHEL.
21.	**FORCE MAJEURE CONDITION:** If by reason of war, civil commotion, act of god, Government restrictions, strike, lockout which are not in control of supplier the deliveries are delayed, supplier shall not be held responsible.
22	**SPECIAL CONDITION :** Progress of manufacturing schedule to be given every fortnightly and likely readiness of the material to be intimated one month in advance to organise inspection and logistics

Signature of Bidder
Seal

TENDER ENQUIRY NO. **E** _____, DATE: _____

SCHEDULE OF COMMERCIAL DEVIATION

The following are the deviations/ variations exception from the General Terms and Conditions:

SL. NO.	CLAUSE NO. OF GENERAL TERMS AND CONDITION	STATEMENT OF DEVIATION

- **In case, this schedule is not submitted, it will be presumed that the equipment/ material to be supplied under this contract is deemed to be in compliance with the General Terms and Conditions.**
- If there is NIL deviation, even then the format to be filled as **NIL DEVIATION.**

Note: Continuation Sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this scheduled.

Signature of the authorized representative of

Place: - .....

Bidder's name:.....

Date: - .....

Designation.....

Company Seal:.....

TENDER ENQUIRY NO. **E** _____, DATE: _____,

SCHEDULE OF TECHNICAL DEVIATION

The following are the deviations/ variations exception from the Specification:

SECTION	CLAUSE NO. / PAGE NO.	STATEMENT OF DEVIATION/ VARIATIONS/EXCEPTIONS

- **In case, this schedule is not submitted, it will be presumed that the equipment/ material to be supplied under this contract is deemed to be in compliance with the General Terms and Conditions.**
- If there is NIL deviation, even then the format to be filled as **NIL DEVIATION.**

Note: Continuation Sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this scheduled.

Signature of the authorized representative of

Place: - .....

Bidder's Name :.....

Date: - .....

Designation:.....

Company Seal:.....

TENDER ENQUIRY NO. **E-** _____, DATE: _____,

BHEL/TBG/ATS/01

ACTIVITY SCHEDULE
(SEPARATE ACTIVITY SCHEDULE TO BE FILLED-UP FOR EACH PROJECT BY THE SUPPLIER)

Sl. NO.	ACTIVITY	ACTIVITY TIME IN **WEEKS**	CUMULATIVE TIME IN **WEEKS** FROM LOI / PO DATE	REMARKS IF ANY
1.	Submission of Documents necessary for getting manufacturing clearance like Drawings, Date sheet etc.			
2.	Approval of documents from BHEL / Customer *			
3.	Manufacturing time			
4.	Inspection call			
5.	Customer Inspection & Despatch Clearance			
~~6.~~	~~Transportation to Destination.~~			
~~7.~~	~~Erection Testing & Commissioning (ETC)~~			

Note: 1) * Supplier must ensure the completeness and correctness of the requisite documents before submission for approval. Delay in approval on account of incomplete/inadequate information shall be the responsibility of supplier.

2) Inspection call should be given in the prescribed format only. Inspection calls not in the prescribed format shall not be entertained.

3) Qty. to be offered for Inspection should be in accordance within Delivery- schedule - lot BHEL reserves the right not to entertain multiple inspection calls for a Delivery- lot and delay on this account shall be the responsibility of Supplier.

Signature of Supplier
Date :

SCHEDULE OF PRICE

(BIDDER TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

Enquiry No-_____,Dt_____

Sl. No.	Description of Item	Unit	Qty.	Unit Ex-works Price (Rs.)	Total Ex-works (Col.5 x 4) (Rs.)	~~Unit F & I~~ ~~(Rs.)~~	~~Total F & I (Col.7 x 4)~~ ~~(Rs.)~~	* Excise Duty (% of Col. 6) (Rs.)	# CST / ST (% of Col.6+9) (Rs..)	Total F.O.R Works (Col.6+8+9+10) (Rs.)	ETC Supervision Charges (Rs.)	Service Tax (Rs.)	Total ETC Supervision Charges (Col. 12+13) (Rs.)
1	2	3	4	5	6	~~7~~	~~8~~	9	10	11	12	13	14
						Not to be quoted	Not to be quoted	NIL					
	Total												

NOTE :

1 PLEASE NOTE THAT UNPRICED COPY OF PRICE BID (i.e. WITH ALL PRICE BLANKED) SHALL BE FURNISHED ALONGWITH TECHO-COMMERCIAL BID.

2 REQUIRED COPIES OF FORMAT BE MADE & DETAILS MAY BE ANNEXED.

3 THE PRICES MUST BE QUOTED IN THE PRESCRIBED UNIT ONLY.

4 SALE TAX RATE AS APPLICABLE FOR SPECIFIED DESTINATION SHALL BE QUOTED IN CASE OF CST RATE AGAINST "C" FORM SHALL BE QUOTED.

5 **THE VENDORS MUST INDICATE THE APPLICABLE TARIFF NOS. UNDER WHICH EXCISE DUTY AND / OR CST WOULD BE PAID BY THEM TO THE TAX AUTHORITIES.**

6 **IF A VENDOR SUBMITS AN OFFER WITH REDUCED EXCISE DUTY AND / OR CST APPLICABLE THAN NORMALLY PAID ON SUCH ITEMS, THEY SHOULD SUBMIT NECESSARY DOCUMENTARY PROOF FOR THE SAME. FURTHER THE ACTUAL RATE LIMITED TO THE REDUCED RATE SHALL BE APPLICABLE FOR ENTIRE CURRENCY OF THE CONTRACT IRRESPECTIVE OF ANY CHANGE IN TARIFF OR RATE . ANY INCREASE IN RATE SHALL BE ABSORBED BY THE SUPPLIER.**

7 INCASE OF VARYING ED SLAB RATES, CONFIRM YOUR OPTION FOR 'X' OR 'Y' (STRIKE OFF WHICH IS NOT APPLICABLE) IF NO OPTION IS MENTIONED - X SHALL BE TAKEN)

X : THE MAXIMUM EXCISE DUTY SLAB RATE BE CONSIDERED FOR PRICE COMPARISON. IN THE EVENT OF ORDER EXCISE DUTY AT ACTUAL BE PAI

Y: THE QUOTED EXCISE DUTY RATE BE CONSIDERED FOR PRICE COMPARISON. IN THE EVENT OF ORDER EXCISE DUTY AT ACTUAL RATE LIMITED TO QUOTED RATE BE PAID.

SIGNATURE AND SEAL OF TENDERER

BHARAT HEAVY ELECTRICALS LIMITED

Supplier Registration Form (Indian Supplier)

GUIDELINES TO INDIAN SUPPLIERS FOR FILLING UP

SUPPLIER REGISTRATION FORM

1. Registration Form may be obtained from Supplier Development Cell of respective BHEL Unit or downloaded from BHEL website www.bhel.com.
2. Any clarification with respect to procedure for registration may be obtained from the Supplier Development Cell of respective BHEL unit.
3. The Supplier Registration Form has four parts:

Part A	Organizational Information	Form no. VOR AA01
Part B	Quality System	Form no. VQS AA01
Part C	Technical Competence	Form no. VTC AA01
Part D	Score Sheet	Form no. VSS AA01

The set of formats to be filled by different category of suppliers is as follows:

Sl. No	Supplier Category	Formats
1.	Indian Suppliers (manufacturers)	- Organizational Information - Quality System - Technical Competence - Score sheet
2.	Agents / stockists / distributors / dealers	- Organizational Information - Score sheet

4. All sheets of above forms are to be filled up and signed by the authorized signatory.
5. Please attach separate sheet if the space provided is insufficient.
6. For any other information also, separate sheet may be attached.
7. Any information / clarification required by BHEL during evaluation must be given expeditiously.
8. Please ensure that all required enclosures are attached with the filled up Supplier Registration Form and list of enclosures is given as required.
9. The scoring of marks by Suppliers for self- assessment must be done as required against each information in all the above parts. Incomplete forms and forms without self assessment are likely to be rejected. If any question is not applicable or relevant to your organization, please mention accordingly. Questions left unanswered will get zero marks...
10. Scoring for questions on Quality System (Part B) is to done on 0-3 scale as follows:
    - 0 For non-compliance
    - 1 System exists in rudimentary stage
    - 2 System exists with minimal discrepancies
    - 3 System is in mature stage (i.e. meets all requirements)

The question with asterisk (*) mark is mandatory where supplier must achieve a minimum score of 2 marks.

11 Part-B of the form on Quality System need not be filled by ISO 9000-2000 accredited suppliers. Instead, the Table of Contents of Quality Manual may be submitted with the Registration Form.

12 Scoring for question on Technical competence is to be done on 0-3 scale as follows:

0 No capability
1 Requires continuous technical support of BHEL during execution of job.
2 Occasional technical support from BHEL
3 Can handle job without any technical support from BHEL.

The question with asterisk (*) mark is mandatory where supplier must achieve a minimum score of 2 marks.

13 Assessment Criteria shall be as follows:

Organizational Soundness: OS 1 : 85% and more
OS 2 : 70% to less than 85%
OS 3 : Less than 70%

Quality System: Q 1 - Overall system rating above 90%, rated 2 or better on all mandatory requirements and a rating of 70% or better in each section.
Q 2 - Overall system rating 80 to 90%, rated 2 or better in all mandatory requirements and a rating of 60% or better in each section.

Q 3 - Overall system rating above 70% and less than 80%, rated 2 or better on all mandatory requirements and a rating of 55% or better in each section.

Technical Competence: TC 1 - Above 90% and rated 2 or better in all mandatory reqts.
TC 2 - 80 to less than 90% and rated 2 or better in all mandatory requirements.
TC 3 - Above 70% and less than 80% and rated 2 or better in all mandatory requirements.

15 Please fill up the check-list given on next page and send along with the Supplier Registration Forms to BHEL.

BHARAT HEAVY ELECTRICALS LIMITED

Supplier Registration Form (Indian Supplier)

CHECK-LIST FOR INDIAN SUPPLIERS REGISTRATION FORM

Sl. No.	Check-Point	Yes/No
1.	Information against all points under "Organizational Information" (Part-A) has been given.	
2.	All enclosures and supporting documents have been enclosed.	
3.	Summary list of enclosures has been furnished as per S.N. 9.9 of Organizational Information form.	
4.	Are you an ISO 9001 -2000 accredited supplier?	
5.	If yes, have you enclosed "Table of Contents" of your Quality Manual and copy of ISO 9001 -2000 accreditation certificate?	
6.	If no, have you filled up Quality System formats given in Part B?	
7.	Technical requirements, specifications, drawings, standards have been obtained from BHEL before filling up Technical Competence, Part C.	
8.	All the pages of the form & enclosures have been signed by Authorized Signatory.	
9.	Scoring has been done in Part A, B and C.	
10	Total scoring has been done in score sheet Part D.	

Signature & seal

Date:

(Authorized Signatory)

Note: This check list is to be attached with the filled up Supplier Registration Form.

BHARAT HEAVY ELECTRICALS LIMITED

Supplier Registration Form (Indian Supplier)

Part A:

FORM NO. VORAA01 (INDIAN SUPPLIER)

ALL COLUMNS SHOULD BE PROPERLY FILLED IN THE SPACE PROVIDED FOR. WHEREVER IT IS NOT APPLICABLE, PLEASE WRITE "NOT APPLICABLE". INCOMPLETE OR INCORRECT FORMS MAY NOT BE CONSIDERED. PLEASE ATTACH SEPARATE SHEET, IF SPACE AVAILABLE IS INADEQUATE.

SUPPLIERS HAVE TO ALLOT MARKS IN THE RELEVANT COLUMNS.

ORGANISATIONAL INFORMATION						
NAME OF THE APPLICANT SUPPLIER SEEKINGG REGISTRATION:- D&B D-U-N-S NUMBER: (DUN & BRADSTREET NINE DIGIT IDENTIFICATION NUMBER, NOT MANDATORY						
1.0 PRODUCTS / SYSTEM / SERVICES FOR WHICH REGISTRATION IS APPLIED FOR:				MARKS	MARKS BY SUPPLIER	MARKS BY BHEL
SL. NO.	DESCRIPTION	SIZE & RANGE	MFG.STD / IS / DIN / BS, ETC.			
				1		
TOTAL MARKS				1		

SUPPLIERS AUTHORISED SIGNATORY

BHEL CERTIFIED ASSESSOR

BHARAT HEAVY ELECTRICALS LIMITED

Supplier Registration Form (Indian Supplier)

ORGANISATIONAL INFORMATION

	Marks	Marks by Suppliers	Marks by BHEL
2.0 GENERAL INFORMATION :			
2.1 NAME OF APPLICANT SUPPLIER SEEKING REGISTRATION : HEAD OFFICE ADDRESS : TELEPHONE : FAX : E-MAIL : WEB SITE :	1		
2.2 NAME OF THE WORKS/DIVISION : ADDRESS : TELEPHONE : FAX : E-MAIL : WEB SITE :	1		
2.3 BRANCH OFFICE ADDRESS (IF ANY): TELEPHONE : FAX : E-MAIL :	1		
2.4 NAME OF CHIEF EXECUTIVE / PROPRIETOR / PARTNER & ADDRESS:	1		
2.5 OFFICIAL TO BE CONTACTED FOR CLARIFICATON : NAME : DESIGNATION: ADDRESS: TELEPHONE : FAX : E-MAIL : WEB SITE :	1		
TOTAL MARKS	5		

SUPPLIER'S AUTHORISED SIGNATORY **BHEL CERTIFIED ASSESSOR**

ORGANISATIONAL INFORMATION

3.0 OWNERSHIP INFORMATION :	MARKS	MARKS BY SUPPLIER	MARKS BY BHEL
DOCUMENTS TO BE FURNISHED			
3.1 GOVT. OF INDIA UNDERTAKING :	1		
OR			
STATE GOVT. UNDERTAKING :			
OR			
LIMITED COMPANY, : MEMORANDUM AND ARTICLES OF ASSOCIATION			
OR			
PRIVATE COMPANY, : MEMORANDUM AND ARTICLES OF ASSOCIATION			
OR			
CO-OPERATIVE SOCIETY, : SOCIETY RULES AND BYE LAWS			
OR			
PARTNERSHIP FIRM , : PARTNERSHIP DEED			
OR			
PROPRIETORSHIP, : PROFESSION TAX REGN. AND MUNICIPAL REGN.			
ANY OTHER (SPECIFY) :			
3.2. NATURE OF BUSINESS : (MANUFACTURING UNIT/AGENTS/ DISTRIBUTORS/STOCKISTS)	1		
3.3. YEAR OF ESTABLISHMENT :	1		
TOTAL MARKS	3		

SUPPLIER'S AUTHORISED SIGNATORY **BHEL CERTIFIED ASSESSOR**

BHARAT HEAVY ELECTRICALS LIMITED

Supplier Registration Form (Indian Supplier)

ORGANISATIONAL INFORMATION FOR THE PREVIOUS FOUR YEARS							Marks by Supplier	Marks by BHEL
4.0	FINANCIAL INFORMATION		Year 1	Year 2	Year 3	Year 4	$ (See below)	$ (See below)
			(Years in ascending order, Money value in Rs. Lakhs)					
4.1	NET WORTH (Share Capital +Reserves)							
	Growth over previous year (%)							
4.2	LONG TERM DEBT / LOAN							
4.3	DEBT EQUITY RATIO Long term Debt (4.2) Net worth (4.1)							
4.4	INVESTMENT IN: Land & Building							
	Plant & Machinery							
	Other Fixed Assets							
4.5	NET CURRENT ASSETS							
	a) Cash on hand	1						
	b) Account receivable	1						
	c) Inventories	1						
	Total	1						
	CURRENT LIABILITY							
	a) Sundry creditors							
	b) Interest accrued but not due							
	c) Credit balance in sundry debtors	2						
	d) Other liabilities							
	Total							
	CURRENT RATIO Current assets {4.5 (1)} Current liability {4.5 (2)}	3						
4.6	SALES							
	Growth over previous year (%)							
4.7	PROFIT BEFORE TAX							
	Growth over previous year (%)							
4.8	PROFIT AFTER TAX							
	Growth over previous year (%)							
4.9	Whether the supplier has been referred to BIFR/NCLT. (If YES, **enclose details**)					YES / NO		
4.10	Whether the supplier is a potential sick company. (If YES, **enclose details**)					YES / NO		
Copies of annual accounts (Balance Sheet) for last four years along with Audit Report is to be submitted. Above details shall be highlighted in Balance Sheet.						Total Marks (out of 10)		

SUPPLIER'S AUTHORISED SIGNATORY **BHEL CERTIFIED ASSESSOR**

$: ONE MARKS EACH TO BE GIVEN FOR COMPLETE REPLY AGAINST SL. Nos. 4.1 to 4.10 (Total 10 marks)

ORGANISATIONAL INFORMATION				
		MARKS	MARKS BY SUPPLIER	MARKS BY BHEL
5.0	REGISTRATION PARTICULARS			
5.1	INCOME TAX PERMANENT ACCOUNT NO. : (ENCLOSE COPY OF CERTIFICATE)	1		
5.2	CENTRAL SALES TAX REGISTRATION NUMBER : (ENCLOSE COPY OF CERTIFICATE)	1		
5.3	STATE SALES TAX REGISTRATION NUMBER : (ENCLOSE COPY OF CERTIFICATE)	1		
5.4	EXCISE DUTY REGISTRATION NUMBER : (ENCLOSE COPY OF CERTIFICATE)	1		
5.5	SERVICE TAX REGISTRATION NUMBER : (ENCLOSE COPY OF CERTIFICATE)			
5.6	EXCISE CONTROL CODE NUMBER : (ENCLOSE COPY OF CERTIFICATE)	1		
5.7	NATIONAL SMALL SCALE INDUSTRIES REGISTRATION NO. : (VALIDITY UPTO) (ENCLOSE COPY OF CERTIFICATE)	1		
5.8	SMALL SCALE INDUSTRIES REGISTRATION NO. : (VALIDITY UPTO) (ENCLOSE COPY OF CERTIFICATE)	1		
5.9	ANCILLARY STATUS RECOGNISED BY	1		
	TOTAL MARKS	9		
	SUPPLIER'S AUTHORISED SIGNATORY		BHEL CERTIFIED ASSESSOR	

ORGANISATIONAL INFORMATION

	MARKS	MARKS BY SUPPLIER	MARKS BY BHEL
6.1 TOTAL ORGANISATIONAL STRENGTH : (ATTACH ORGANISATION CHART)	1		
GRADUATES DIPLOMA SKILLED NON-SKILLED			
ADMN & COMMERCIAL :			
ENGINEERING :			
TECHNOLOGY :			
MANUFACTURING :			
QUALITY :			
MAINTENANCE :			
SITE MANAGEMENT :			
OTHERS :			
TOTAL :			
6.2 STANDBY ARRANGEMENT FOR POWER : (GIVE DETAILS)	1		
6.3 DOES THE COMPANY SELL ITS PRODUCT DIRECTLY : YES / NO	1		
6.4 IF NO, FURNISH NAME, ADDRESS : OF AUTHORISED DEALER/STOCKIST WHOSE COMMITMENTS WILL BE HONOURED BY THE COMPANY.	1		
TOTAL MARKS	4		

SUPPLIER'S AUTHORISED SIGNATORY

BHEL CERTIFIED ASSESSOR

ORGANISATIONAL INFORMATION

7.0 LIST OF MANUFACTURING FACILITIES : (INCLUDING MATERIAL HANDLING FACILITY)					MARKS	MARKS BY SUPPLIER	MARKS BY BHEL
SL. NO.	DESCRIPTION & SPECIFICATION OF MACHINE & ITS MAKE YEAR OF MAKE & YEAR OF INSTALLATION	ACCURACY & FINISH ATTAINABLE	NO. OF MACHINES INSTALLED	REMARKS			
	IN-HOUSE FACILITIES ----------				1		
	OUT-SOURCED FACILITIES, IF ANY ----------						
TOTAL MARKS					1		

SUPPLIER'S AUTHORISED SIGNATORY

BHEL CERTIFIED ASSESSOR

ORGANISATIONAL INFORMATION

8.0. LIST OF MEASURING FACILITIES, TESTING-EQUIPMENT AND INSPECTION FACILITIES :						MARKS	MARKS BY SUPPLIER	MARKS BY BHEL
SL. NO.	DESCRIPTION OF EQUIPMENT	SIZE, RANGE, CAPACITY & ACCURACY	MODE AND MAKE	LAST DATE OF CALIBRATION	QUANTITY			
	IN-HOUSE FACILITIES ----------					1		
	OUT-SOURCED FACILITIES, IF ANY ----------							
TOTAL MARKS						1		

SUPPLIER'S AUTHORISED SIGNATORY

BHEL CERTIFIED ASSESSOR

BHARAT HEAVY ELECTRICALS LIMITED

Supplier Registration Form (Indian Supplier)

ORGANISATIONAL INFORMATION

9.0 OTHER PARTICULARS :	MARKS	MARKS BY SUPPLIER	MARKS BY BHEL
9.1 IF THE COMPANY IS ALREADY IN BUSINESS WITH ANY OF BHEL UNITS, GIVE : 9.1.1 BHEL UNIT'S NAME : 9.1.2 SUPPLIER REGISTRATION NO. : 9.1.3 ITEMS FOR WHICH REGISTERED & THEIR SPECIFICATION : (ENCLOSE PROOF OF SUCCESSFUL EXECUTION OF ATLEAST 3 PURCHASE ORDERS)	1		
9.2 IS THE COMPANY APPROVED BY ASME / NTPC / NPC / EIL / DGS&D / RAILWAYS / IBR / LLOYDS ETC? : YES/NO (ENCLOSE DOCUMENTARY EVIDENCE)	1		
9.3 IS THE COMPANY AN ISO 9001-2000 APPROVED?: YESS/NO (ENCLOSE CERTIFICATE)	1		
9.4 IS THE COMPANY AN ISO:14000 APPROVED?: YES/NO (ENCLOSE CERTIFICATE)	1		
9.5 IS THE COMPANY OHSAS-18000 APPROVED? : YES/NO (ENCLOSE CERTIFICATE)	1		
9.6 TECHNICAL COLLABORATOR : (FOREIGN OR INDIGENOUS) (ENCLOSE DOCUMENTARY EVIDENCE)	1		
9.7 NAME & ADDRESS OF CONCERN(S) HAVING SUBSTANTIAL INTEREST IN : (NAME OF THE OTHER COMPANY, COMMON DIRECTOR, PARTNER, OWNER ETC.)	1		
TOTAL MARKS	1		

SUPPLIER'S AUTHORISED SIGNATORY

BHEL CERTIFIED ASSESSOR

ORGANISATIONAL INFORMATION

	MARKS	MARKS BY SUPPLIER	MARKS BY BHEL
9.8 DIRECTORS / PARTNERS, IF RELATED TO ANY BHEL EMPLOYEE. NAME : STAFF NO. : DESIGNATION : DEPARTMENT : RELATIONSHIP :	1		
9.9 IF ANY EX-BHEL PERSONNEL IS EMPLOYED BY THE COMPANY, MENTION HIS / HER DETAILS OF LAST POSTING. NAME : STAFF NO. : DESIGNATION : DEPARTMENT : DATE OF LEAVING SERVICE :	1		
9.10 COMPANY'S WEEKLY HOLIDAYS : WORKS OFFICE	1		
9.11 EXPERIENCE LIST: (ATTACH LIST OF PRESENT CUSTOMERS WITH NAME & ADDRESS FOR OFFERED/SIMILAR TYPE & SIZE OF ITEM / EQUIPMENT FOR WHICH REGISTRATION HAS BEEN SOUGHT AND WITH WHOM YOU HAVE CONTINUOUS BUSINESS SINCE LAST THREE YEARS)	1		
9.12 LIST OF ENCLOSURES : ATTACH LIST OF ENCLOSURES	1		
10 I/WE GIVE THE UNDERTAKING THAT BHEL DRAWINGS & SPECIFICATIONS SHALL NOT BE USED IN ANY WAY DETRIMENTAL TO THE INTEREST OF BHEL AND / OR FOR SUPPLY OF ANY MATERIAL, PRODUCT OR SERVICES DIRECTLY OR INDIRECTLY TO ANY OTHER CUSTOMER.	--	--	--
TOTAL MARKS	5		

SUPPLIERS AUTHORISED SIGNATORY BHEL CERTIFIED ASSESSOR

BHARAT HEAVY ELECTRICALS LIMITED

Supplier Registration Form (Indian Supplier)

PART B (QUALITY SYSTEM): PAGES 11-13 OF 17 NEED NOT BE FILLED BY ISO 9001-2000 ACCREDITED SUPLIERS

FORM NO. VQSAA01 (INDIAN SUPPLIER)

I. INCOMING MATERIAL CONTROL	PROCEDURE 0-3		SYSTEM IN EFFECT 0-3		RECORDS 0-3	
	MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL
1. A FORMALIZED SUPPLIER RATING, EVALUATION, CERTIFICATION PROGRAMME HAS BEEN ESTABLISHED WHEREIN QUALITY PERFORMANCE IS ONE OF THE CRITERIA.						
***2. INCOMING SHIPMENT IS VERIFIED PRIOR TO STORAGE OR USE.**						
TOTAL MARKS						

II. PROCESS CONTROL	PROCEDURE 0-3		SYSTEM EFFECT 0-3		RECORDS 0-3	
	MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL
*1.WORK INSTRUCTIONS ARE DOCUMENTED, UPDATED & FOLLOWED BY WORKERS.						
*2.REQUIRED TOOLS, JIGS, FIXTURES ARE IDENTIFIED AND USED.						
3. PROCEDURE FOR QUALIFICATION, IF APPLICABLE, AND REVALIDATION OF QUALIFICATION OF WORKERS. EXIST SUCH AS: ▪ WELDERS ▪ NDT PERSONNEL						
4. PREVENTIVE MAINTENANCE ACTIVITIES ARE PERFORMED ON CRITICAL MACHINES & RECORDS KEPT.						
5. MATERIAL IDENTIFICATION AND ACCEPTANCE STATUS IS MAINTAINED THROUGHOUT THE MANUFACTURING PROCESS & DURING STORAGE						
*6.AVAILABILITY OF UPDATED DRAWING/ SPECIFICATION AT WORKPLACE.						
7. PRESERVATION, PAINTING & PACKING PROCEDURE EXISTS.						
TOTAL MARKS						

Scoring for questions on Quality System (Part B) is to be done on 0-3 scale as follows:-
0- Non Compliance; 1- System exists in Rudimentary Stage; 2- System exists with minimal discrepancies
3- System is in Mature Stage i.e. meets all requirements

The question win asterisk (*) mark is mandatory where supplier must achieve a minimum score of 2-marks.

SUPPLIERS AUTHORISED SIGNATORY **BHEL CERTIFIED ASSESSOR**

III.	CONTROL OF NON-CONFORMANCE	PROCEDURE 0-3		SYSTEM IN EFFECT 0-3		RECORDS 0-3	
		MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL
*1.	RECORD OF REWORK/ RECTIFICATION IS KEPT.						
2.	SYSTEM OF REVIEW AND ANALYSIS OF REPEATED FAILURES AND THEIR PREVENTION IN FUTURE.						
	TOTAL MARKS						

IV.	CONTROL OF MEASURING & MONITORING DEVICES	PROCEDURE 0-3		SYSTEM IN EFFECT 0-3		RECORDS 0-3	
		MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL
1.	SYSTEM OF CALIBRATION OF GAUGES, FIXTURES & INSTRUMENTS EXISTS						
*2.	MASTER GAUGES / STANDARDS ARE TRACEABLE TO RECOGNIZED NATIONAL STANDARDS.						
	TOTAL MARKS						
VI	CONFORMANCE TO SAFETY REQUIREMENTS :	PROCEDURE 0-3		SYSTEM IN EFFECT 0-3		RECORDS 0-3	
		MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL
*1.	ADEQUATE SAFETY PRECAUTIONS ARE BEING TAKEN IN PLANT FOR ALL PERSONNEL.						
	TOTAL MARKS						

SUPPLIERS AUTHORISED SIGNATORY

BHEL CERTIFIED ASSESSOR

V. CUSTOMER SUPPLIER COMMUNICATION	PROCEDURE 0-3		SYSTEM IN EFFECT 0-3		RECORDS 0-3	
	MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL
*1. TENDER DOCUMENTS ARE REVIEWED WITH REFERENCE TO CUSTOMER REQUIREMENT BOTH TECHNICALLY & FROM DELIVERY POINT OF VIEW. IN CASE OF DEVIATION, IN TECHNICAL SPECIFICATIONS AND DELIVERY CONDITIONS, THE DEVIATIONS ARE IDENTIFIED AND CLEARLY SPELT OUT IN OFFER.						
2. SYSTEM OF SUBMISSION OF DOCUMENTS LIKE: (A) INVOICE. (B) PACKING LIST. (C) TEST CERTIFICATE. (D) INSPECTION DATA.						
3. ORGANIZATION OF AFTER SALES SERVICE AND RESPONSE TIME FOR ATTENDING COMPLAINTS.						
TOTAL MARKS						

SUPPLIERS AUTHORISED SIGNATORY

BHEL CERTIFIED ASSESSOR

BHARAT HEAVY ELECTRICALS LIMITED

Supplier Registration Form (Indian Supplier)

Part C:

TECHNICAL COMPETENCE

TECHNICAL COMPETENCE (WHERE DESIGN SPECIFICATION IS GIVEN BY BHEL)	MARKS 0-3	
	MARKS BY SUPPLIER	MARKS BY BHEL
*1. SUPPLIER UNDERSTANDS THE PRODUCT SPECIFICATION.		
2. SUPPLIER UNDERSTANDS THE INSPECTION REQUIREMENTS.		
*3. SUPPLIER HAS PROCESS CAPABILITY TO ACHIEVE THE PRODUCT SPECIFICATION/DIMENSIONAL REQUIREMENT.		
4. SUPPLIER HAS EXPERIENCED MANPOWER TO CARRY OUT THE JOB.		
TOTAL MARKS OUT OF POSSIBLE (12) = ------- %		

OR

TECHNICAL COMPETENCE (WHERE PERFORMANCE SPECIFICATION IS GIVEN BY BHEL)	PROCEDURE 0-3		SYSTEM IN EFFECT 0-3		RECORDS 0-3	
	MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL	MARKS BY SUPPLIER	MARKS BY BHEL
1. DESIGN CAPABILITY						
2. ADEQUACY OF QUALITY ASSURANCE PLAN						
*3. PROCESS CAPABILITY FOR COMPONENTS						
*4. ADEQUATE OF TESTING						
TOTAL MARKS OUT OF POSSIBLE (36) = --------- %						

Here:

Score of 0 indicates "No capability"
Score of 1 indicates "Requires continuous technical support of BHEL during Execution of job"
Score of 2 indicates "Occasional technical support from BHEL"
Score of 3 indicates "Can handle BHEL's job without any Technical Assistance."

The question with asterisk (*) mark is mandatory where supplier must achieve a minimum score of 2 marks.

SUPPLIER'S AUTHORISED SIGNATORY **BHEL CERTIFIED ASSESSOR**

BHARAT HEAVY ELECTRICALS LIMITED

Supplier Registration Form (Indian Supplier)

Part D: **SCORE SHEET**

1. ORGANISATIONAL SOUNDNESS :

Each question should be answered. No question is to be left unanswered. If any of the questions is not relevant to your organization, please mention so against that question (but do not leave the question unanswered). Each question answered carries (1) mark. Questions left unanswered will get (0) score.

SL NO	PARAMETER	CRITERIA	RANGE	MARKS	MARKS BY SUPPLIER	MARKS BY BHEL
1.	**NET WORTH** REFER SL.NO.4.1 OF SUPPLIER REGISTRATION FORM PAGE 4/17, PART A. AVERAGE OF THREE YEARS TO BE WORKED OUT	GROWTH OVER THE PREVIOUS YEAR	MORE THAN 10%	4		
			5 - 10 %	3		
			LESS THAN 5%	1		
2.	**SALES FOR CURRENT YEAR** SL. NO.4.6 OF PAGE 4/17, PART A	GROWTH OVER THE PREVIOUS YEAR	MORE THAN 10%	4		
			5 - 10%	3		
			> 0 < 5%	1		
			0% & BELOW	0		
3.	**DEBT EQUITY RATIO** I.E. LONG TERM DEBT / SHARE CAPITAL (SL.NO.4.3 OF PAGE 4/17, PART A)	1 : 1		4		
		1.1 UP TO 1.5:1		3		
		1.6 & ABOVE :1		1		
4.	**CURRENT RATIO** I.E. CURRENT ASSETS/CURRENT LIABILITY (SL. NO.4.5 OF PAGE 4/17, PART A)	2 : 1		4		
		LESS THAN 2 UPTO 1.1:1		3		
		1:1		1		
5.	**PROFIT BEFORE TAX** SL. NO.4.7 OF PAGE 4/17 , PART A	GROWTH OVER THE PREVIOUS YEAR	MORE THAN 10%	4		
			5 - 10%	3		
			LESS THAN 5%	1		
6.	**PROFIT AFTER TAX** SL. NO. 4.8 OF PAGE 4/17 , PART A	GROWTH OVER THE PREVIOUS YEAR	MORE THAN 10%	4		
			5 - 10%	3		
			LESS THEN 5%	1		

SUPPLIER'S AUTHORISED SIGNATORY **BHEL CERTIFIED ASSESSOR**

BHARAT HEAVY ELECTRICALS LIMITED

Supplier Registration Form (Indian Supplier)

Part D: **SCORE SHEET**

SL. NO.	PARAMETER	MARKS	MARKS BY SUPPLIER	MARKS BY BHEL
7.	SL. NO. 4.9 OF PAGE 4/17 , PART A – IF REFERRED TO BIFR / NCLT	(-) 24		
8.	SL. NO. 4.10 OF PAGE 4/17 , PART A – IF POTENTIALLY SICK	(-) 12		
9.	FOR SUPPLIER HAVING STANDBY ARRANGEMENT OF POWER. (SL. NO. 6.2 OF PAGE 6/17 , PART A)	3		
10.	SUPPLIER HAVING CONTINUOUS BUSINESS FOR MARE THAN 3 YEARS. (SL. NO. 9.8 OF PAGE 10 /17 , PART A) BEYOND 3 CUSTOMERS UPTO 3 CUSTOMERS NO CUSTOMER	 4 3 0		
11.	MANUFACTURING FACILITIES : (SL. NO. 7.0 OF PAGE 7/17 , PART A) SUPPLIER HAVING ADEQUATE FACILITIES SUPPLIER HAVING SUBSTANTIAL FACILITY SUPPLIER HAVING INADEQUATE FACILITIES	 3 2 0		
12.	MEASURING AND TESTING FACILITIES : (SL. NO. 8.0 , PAGE 8/17 , PART A) ADEQUATE MEASUREMENT FACILITIES SUBSTANTIAL MEASURING FACILITIES INADEQUATE FACILITIES	 3 2 0		
13.	If answer to Question 9.3 of page 9/17, part A is yes i.e. ISO 9001 company If answer to Question 9.4 of page 9/17, part A is yes i.e. ISO 14000 company If answer to Question 9.5 OF PAGE 9/17, part A is yes i.e. ISO 18000 company	3 1 1		
	TOTAL MARKS SCORED (SL. 01 TO 13 ABOVE)	42		
	TOTAL MARKS SCORED (PAGE 01 TO 10)	46		
	TOTAL MARKS (ORGANISATIONAL SOUNDNESS)	88		
	TOTAL MARKS (ORGANISATIONAL SOUNDNESS) : PERCENTAGE (%)			
	CATEGORY OF SUPPLIER : OS 1 (85 % & MORE) OS 2 (70 % TO LESS THAN 85 %) OS 3 (LESS THAN 70 %)	Mention Category		

SUPPLIER'S AUTHORISED SIGNATORY

BHEL CERTIFIED ASSESSOR

BHARAT HEAVY ELECTRICALS LIMITED

Supplier Registration Form (Indian Supplier)

Part D: **SCORE SHEET**

QUALITY SYSTEM (SCORING CRITERIA):

	SUMMARY:	MARKS SCORED / OUT OF POSSIBLE (BY SUPPLIER)		MARKS ASSESSED / OUT OF POSSIBLE(BY BHEL)	
I.	Incoming Material Control	---------- / 18	------%	---------- / 18	------%
II.	Process Control	---------- / 63	--------%	---------- / 63	--------%
III.	Control of Non-Conformance	---------- / 18	--------%	---------- / 18	--------%
IV	Control of measuring & monitoring	---------- / 18	--------%	---------- / 18	--------%
V.	Conformance to Safety Requirements	---------- / 09	--------%	---------- / 09	--------%
VI.	Customer-Supplier Communication	----------/ 27	--------%	---------- / 27	--------%
	TOTAL =	----------/ 153	--------%	----------/ 153	--------%
	Category of Supplier Q1 (Tick category)	- Overall system rating above 90%, rated 2 or better on all mandatory requirement and a rating of 70% or better in each section or supplier is ISO 9001:2000 certified (subject to verification).			
	Q 2	- Overall system rating 80 to 90%, rated 2 or better in all mandatory requirement and a rating of 60% or better in each section.			
	Q 3	- Overall system rating above 70% and less than 80%, rated 2 or better on all mandatory requirements and a rating of 55% or better in each section.			

TECHNICAL COMPETENCE:

Tick category as per score on page 14.

SUMMARY:	MARKS SCORED / OUT OF POSSIBLE 12 OR 36 MARKS (BY SUPPLIER)		MARKS ASSESSED / OUT OF POSSIBLE 12 OR 36 MARKS (BY BHEL)	
Technical competence or	---------- / 12	------%	---------- / 12	------%
Technical competence	---------- / 36	--------%	---------- / 36	--------%
Category of Supplier TC 1 – TC 2 – TC 3 –	Above 90 % and rated 2 or better in all mandatory requirements. 80 to less than 90% and rated 2 or better in all mandatory requirements. Above 70% and less than 80% and rated 2 or better in all mandatory requirements.			

SUPPLIER'S AUTHORISED SIGNATORY **BHEL CERTIFIED ASSESSOR**

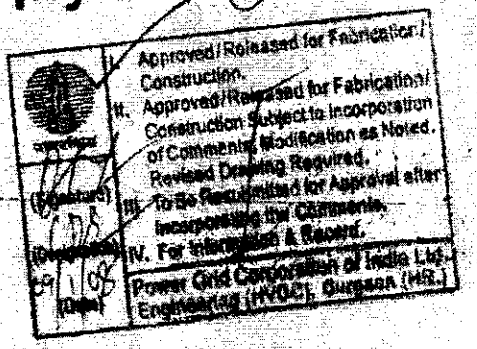
SIEMENS

PTDH121/P-004364/ED3.271.CAH-A
BHEL DOC NO. TB-291-316-057

No. of Document – Rev.

Un-Interrupted Power Supply

Cat-I



Equipment Specification

Converter Station Ballia
Converter Station Bhiwadi

Ballia-Bhiwadi Project
Powergrid Corporation of India Ltd.

2500 MW HVDC Bipole Terminal Package
Contract Agreement No.: C-46002-S656-1/CA-II

Index of Revisions

Rev.	Date	Revised Items	Page	Remarks	Signature Date Name of Reviewer	Date Name of Approver
0	24.09.2007			First Issue	24.09.2007 Neeraj Kumar	24.09.2007 A.K. Das/ R. Koul
A	29.11.2007	2.2.2.3, 3.3.4, 3.9.3	8, 14, 32	Second Issue	29.11.2007 Neeraj Kumar	29.11.2007 A.K. Das/ R. Koul

Copy

Siemens / BHEL	Quantity
PTD H121	1
Siemens Ltd.	1
BHEL	1

Owner	Quantity
Powergrid	2

Siemens, Power Transmission and Distribution

Bharat Heavy Electricals Limited

Index:

1 Scope, Specific Technical Requirements and Quantities

1.1 Scope

This technical specification covers the requirements of design, manufacture, testing at works, packing and loading at works of UPS.

M/S SIL will place order for transportation, unloading, storage and ETC for of these items at both sites.

Manufacturer shall provide supervision for each unit during erection and testing at site.

The scope shall encompass and include all the activities listed above.

1.2 Terminology

The following terminology shall be applicable for the purpose of interpreting the relevant clauses of the specification

Project title	± 500 KV 2500 MW HVDC Ballia - Bhiwadi Bipole Terminal Package
Owner	Power Grid Corporation of India Limited (PGCIL)

1.3 Qualifying Requirement

Bidder should have manufacturing facility for manufacturing 80kVA UPS or higher size at his works in India. Bidder should have executed similar size projects successfully in the past and the same shall be in operation as on the date of bid.

1.4 Bill of Quantity

Sl. No.	Item	Ballia	Bhiwadi
1.	415V A.C, 3-phase, 50Hz, 80kVA UPS complete with required Battery (back-up time 5 min.)and accessories for valve cooling)as per enclosed block diagram PTDH121/P-004364/TD3.271 .APP1.CAH	4 Nos.	4 Nos.
2(a)	240V A.C, 1-phase, 50Hz, 5kVA duplicated UPS complete with required Battery (back up time 30 min.) and accessories for HMI, Monitors & Printers) as per enclosed block diagram sketch-1	2 Nos.	2Nos.
2(b)	UPS output AC distribution Board/as per enclosed block diagram sketch-1	1 No.	1 No.
2(c)	Required Power, control and network cables etc.	1 Lot	1 Lot
3	Spares- i) Set of fuses (3 fuses of each type and rated current) ii) Fans (If UPS are forced air cooled)	1 set 3 Nos.	1 set 3 Nos.

1.5 Supervision charges for ETC

Bidder shall quote lump-sum price for supervision of ETC of the offered UPS. The required instruments for commissioning shall be brought by the bidder.

1.6 Abbreviations

AC	Alternating Current
CB	Circuit Breaker
HVDC	High Voltage Direct Current
MCB	Miniature Circuit Breaker
SBS	Static Bypass Switch
UPS	Uninterruptible Power Systems

1.7 Special Tools and Maintenance Equipment

Equipment for which no special tools are needed during erection, maintenance, repair or replacement is preferred. However, if special tools are needed, they shall be clearly identified and included in the scope of supply as an option. The scope of supply shall also include one complete set of maintenance equipment and tools together with any specialised measuring and testing equipment, if necessary.

1.8 Interfaces

1.8.1 Interfaces to Power Supply

Two independent 415 V (3- phases) 4 wire 50 Hz AC power supplies will be provided for each valve cooling system. All equipment shall be suited for operation in a range of 415 V ±10% without failure and influence on lifetime. In case of under voltage, a switchover between the two AC inputs will be initiated by the valve cooling control system. DC operated contactors will be used for the automatic switchover. In case of a total loss of the 415V AC mains supply a diesel generator will be started. During the starting time of the generator the AC power for the main pump motors shall be supplied by two independent UPS running in split-load parallel operation. The cooler fans and spray water pump will be out of operation.

240 V (1-phase) 2 wire 50 Hz AC power supplies will be provided for each pole HMI UPS system. All equipment shall be suited for operation in a range of 240 V ±10% without failure and influence on lifetime. DC operated contactors will be used for the automatic switchover. In case of a total loss of the 240V, it will automatically be fed from DG supply.

1.8.2 Interfaces to Station Control

The interface to the station control shall be done by the Siemens digital interface unit SU200 supplied by Siemens installed in other cubicles

The required interface signals for the I/O unit SU200 are:

Binary signals: 220 V DC (dry contacts)

2 Equipment Specification

2.1 General

This section covers the general technical requirements of UPS. In case of any discrepancies between the requirements mentioned in this section and those specified in other sections of this specification, this shall prevail after section 1 and shall be treated as binding requirements.

2.2 Design Requirements

2.2.1 UPS for HMI

The UPS system shall provide continuous ac power to critical loads in the event of power failure, e.g the converter computer control system.

The UPS shall be connected to the converter computer control system. The UPS shall consist of the following, but not limited to, main components:

The battery charger
Maintenance free Battery
The static inverter

The UPS system shall consist of: (refer block diagram sketch-1)

Two number UPS Systems in parallel redundant mode for supplying load.
One set each of Maintenance free batteries for each UPS System with backup duration of 30 minutes
UPS output AC Distribution Boards.
Power, control and network cables

The UPS shall be designed for continuous-duty, on-line operation and shall be based on solid-state design technology to provide uninterrupted power supply for Critical loads mentioned above. The control of the UPS system shall be microprocessor based providing monitoring and control of rectifier/charger, Inverter, static switches, firing and logic control.

Each UPS system provided by the Contractor shall include all of the following subsystems as well as any other components and support hardware necessary for complete and proper operation of the UPS:
Rectifier/charger unit

a) Inverter unit
b) Battery Low Voltage Disconnect device
c) Static bypass switches
d) Manual maintenance bypass switches
e) Load transformer and filters
f) Control panels, automatic controls and protection
g) Hardware and software as required for parallel operation of UPS systems
h) All necessary cables, MCCBs/ MCBs/ switches/ fuses

UPS Operation shall be as stated below:

In the event of a loss of utility AC source, the UPS equipment shall provide uninterrupted power to the critical loads from the output of the UPS inverter subsystems through batteries.

The UPS systems shall operate in parallel redundant configuration sharing the connected load. The UPS shall primarily use the inverter sub-system to deliver AC

power to the computer system loads. In case of failure of any one UPS, the other healthy UPS shall continuously supply the power to the computer system loads without any interruption. If the other healthy UPS also fails then automatically static by-pass of UPS shall start supplying the connected load through AC mains without any interruption. The manual maintenance Bypass shall be provided for each of the UPS separately to extend AC raw power supply to computer systems in case of complete failure or shutdown of UPS systems. The UPS system shall provide continuous A.C. power to critical loads in the event of power failure, e.g. the converter computer control system.

2.2.2 UPS for Valve Cooling

1) Two solid state uninterruptible AC power systems (industrial version) in split-load parallel operation shall be provided for the cooling pump motors of a valve cooling system (see appendix 1)

2) The equal distribution of the user loads of the UPS shall be made by a control unit

3) Each of the two systems provided in each pole of each converter station shall be capable of supplying 100% of the full load

4) The UPS shall be installed in a metal-clad cubicles with front door, all equipment built in accessible from the front side

5) The cubicles shall be suitable for installation against a wall

6) The UPS shall consist of a separate battery charger, storage battery, static inverter and static bypass switch

7) The UPS shall be supplied from the 415 V AC 3 ph system generating a 415 V AC 3 ph current with regulated voltage and frequency

8) During normal operation the pump motors are switched onto the inverter system. If a fault occurs in the inverter system, the static bypass unit will switch the load to the mains without any interruption in supply. However, for this switching operation, it is essential that the inverter system is permanently phase-synchronised with the mains power supply

9) In case of a failure in one UPS the consumers shall be supplied by the second UPS without interruption

10) Each UPS shall be rated for the following duty: On loss of the mains AC supply the battery/inverter system and the static bypass switch shall be capable of supplying a motor rated 3 phase, 50 Hz, 415 V and 55 kW for a period of 5 minutes. The starting of the valve cooling standby main pump motor shall be blocked when no AC mains supply is available (battery supply)

11) The motor starting current shall be supplied from the mains supply system via static bypass switch and not via inverter, if necessary. Motor starting current: approx. 800 A (approx. 3 s). During start-up of a main pump motor a retransfer to the inverter output shall be blocked for several seconds. After starting there shall be an auto-

matic change-over back onto inverter supply system. Each static bypass unit shall be suitable for up to 5 pump motor starts within 10 minutes

12) The UPS shall be of fully electronic standard design

13) UPS efficiency shall not be less than 80 %, from 25% load to 100% load with a power factor higher than 0.8 ind

14) Integrated manual bypass for service activities shall be provided. The manual bypass shall be blocked in case of split-load parallel operation. Energy recovery and short circuits can occur in case of parallel operation of one inverter output and one closed manual bypass

15) High short-circuit current for safe and instant trip of the protection device of the connected consumers

16) Fuse switch disconnector for static bypass switch (SBS) and DC section

17) Natural or forced air cooled with 2 x 100% fans fed by own AC UPS

18) AC input voltage	415 V (3 phase), 4 wire, 50 Hz, grounded
19) Range of AC input voltage variation	±10% rated conditions
20) SBS input voltage and frequency grounded	415 V (3 phase), 4 wire, 50 Hz,
21) UPS output Voltage grounded with deviation (static) with deviation (dynamic) at sudden load change	415 V (3 phase), 4 wire, 50 Hz, ±1% ±5% 0 - 100% - 0
22) UPS output voltage setting range	±5%
23) UPS output voltage sinusoidal with a total harmonic content	≤3%
24) Range of frequency for synchronising	47.5 - 52.5 Hz
25) Output rated power	80 kVA per UPS
26) Overload capability	150 % for 1 minute
27) Permissible ambient temperatures	0 ... +40 °C
28) Permissible humidity acc. to	IEC
29) Degree of Protection	IP 21
30) Noise level	≤60 dB

31) Height of the cubicles — up to 2200 mm

32) Efficiency — ≥80%

33) Accessories shall be as per Block diagram PTDH121/P-004364/TD3.271.APP1.CAH

2.3 Monitoring and measuring devices

Detailed fault alarms including collective fault alarm as potential-free changeover relay contacts wired to terminal strip and additional visual signalling at front door.

Single phase over voltage and under voltage supervision

DC over voltage and under voltage supervision

Integrated supervision of thyristor fuses

Overload monitor

Fuse supervision of auxiliary and control circuits

Short circuit proof design of non-fused auxiliary and control circuits

Voltmeter (inverter input and SBS output side) and ammeter (load side) or digital test system with display of voltage, current and frequency.

2.4 Remote monitoring of UPS

The following alarms shall be wired to external terminals for remote monitoring (potential-free change-over relay contacts, 220 V DC - see clause 2.3 Interfaces)

Battery discharging signal
Status of manual bypass
Collective UPS fail

The collective UPS fail signal for remote monitoring shall include:

Mains fault (with delay of approx. 60 s)
UPS fault
Fan fault (when UPS are forced air cooled)
Battery charger fault
Static bypass switch fault

2.5 Batteries

1) The storage batteries shall be maintenance free. They shall be of the valve regulated lead-acid type conforming to IEC 60 896-2. If other types are offered, please specify

2) Each battery shall be installed in a separate metal-clad cubicle with front door, all equipment built in accessible from the front side

3) The cubicles shall be suitable for installation against a wall.

4) The battery system voltage shall be selected by the Manufacturer.

5) The battery shall be sized to meet the total load requirement for 5 minutes or 30 minutes(as the case may be) under normal running arrangements

6) All necessary inter-cell and external connectors to the battery charger/inverter of the UPS shall be included. These connectors shall be shrouded and suitably designed for any mechanical loadings

7) The batteries shall have easy access for installation and replacement

The battery capacity and the battery system voltage shall be selected by the tenderer and shall be included in the tender return.

2.6 Standards

"Standards" means IS, IEC, IEEE, ISO and DIN standards or codes, practices and regulations such as Electra. Where a particular standard is specified, a different but equivalent standard may be used, if approved by the Employer

At least the following standards are applicable and mentioned here for guidance

The UPS shall be in accordance with:

- IEC 60 146-2 — Semiconductor converters
  Part 2: Self-commutated semiconductor converters Including direct d.c. converters
- IEC 62 040-1-1 — Un-interruptible power system(UPS)
  Part 1: General and safety requirements for UPS used in operator access area
- IEC 62 040-2 — Uninterruptible power systems (UPS)
  Part 2: Electromagnetic Compatibility (EMC) require ments
- IEC 62 040-3 — Uninterruptible power systems (UPS)-
  Part 3: Method of specifying the performance and test requirements

2.7 Tests

All tests on the equipment have to be carried out in accordance with common industrial practice in order to demonstrate compliance with the specification and applicable standards

Factory Tests

Before delivery to site a factory test will be performed. All test documentation, including test specification and any existing test reports will be submitted together with an inspection and test plan.

Type Test

Routine Test

The routine tests must be conducted on each unit and shall ensure the necessary manufacturing quality. The Manufacturer shall propose a test program, which is covering the requirements of standard systems. However, if any of the following tests is not covered, the manufacturer shall include them in his test plan.

UPS:

Visual inspection

Checking of auxiliary devices

Insulation test

Checking of the protective devices

Light load and functional test

Measurement of output voltage

Confirmation of output voltage adjustable range

Transfer test (static bypass switch)

Site tests

The Manufacturer shall propose a program for pre-commissioning tests

Appendices

1. Block diagram for valve cooling UPS PTDH121/P-004364/TD3.271.APP1.CAH
2. Block diagram for UPS for HMI Sketch-1

3 General Technical Requirements

This clause stipulates the General Technical Requirements under the Contract and will form an integral part of the Technical Specification.

The provisions under this clause are intended to supplement general requirements for the materials, equipments and services covered under other clause of tender documents and are not exclusive. However in case of conflict between the requirements specified in this clause and requirements specified under other clause, the requirements specified under respective clauses shall prevail.

3.1 Site Information

Table 3.1 - 1 Table for Site Information

	Particular		***BALLIA***	***BHIWADI***
a)	Customer/ Purchaser/ Owner		Power Grid Corporation of India Ltd (PGCIL)	
b)	Project Title		±500 kV, 2500MW HVDC Ballia-Bhiwadi Bipole Terminal Package associated with Ballia Bhiwadi Transmission System	
c)	Location		Near village Imbrahhimpatti/ Bhind about 7 km on bhimpura-fatehpur road, Approx. 75 km from Ballia Dist HQ & 35 kms from Mau dist HQ.	Bhiwadi (State - Rajasthan), around 60 Kms from Delhi city
d)	Nearest Rail Head		Ballia	Bhiwadi/Gurgaon
e)	Postal Address		To follow	To follow
f)	Design ambient temp.		50°C	50°C
g)	Seismic acceleration (horizontal)		Ah= 0.3g according to IS1893-part 1-2002, clause 6.4.2 for zone 4	
h)	Site Wind Pressure		As per IS-875 (Part III)-1987, Ballia and Bhiwadi converter stations lie in Zone IV with basic wind speed of 47m/s at 10m height above mean ground level. Risk level coefficient / factor = 1.07	
i)	Isokeraunic Level		50 days per year	
j)	Relative Humidity		Max. 100%	
k)	Rain fall Intensity		In 24 hours: 250mm 30mm/hr (for drainage system Design)	

3.2 Instruction to bidders

3.2.1 The bidders shall submit the technical requirements, data and information as per the technical data sheets provided in the appropriate clause of bid document.

3.2.2 The supplier shall furnish catalogues, engineering data, technical information, design documents, drawings etc., fully in conformity with the technical specification.

3.2.3 Equipment furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/or

needed for erection, completion and safe operation of the equipment as required by applicable codes though they may not have been specifically detailed in the Technical Specifications unless included in the list of exclusions. Materials and components not specifically stated in the specification but which are necessary for commissioning and satisfactory operation of the switchyard/substation unless specifically excluded shall be deemed to be included in the scope of the specification and shall be supplied without any extra cost. All similar standard components/parts of similar standard equipment provided, shall be inter-changeable with one another.

3.2.4 The Contractor shall supply type tested (including special tests as per tech. specification) equipment and materials. The test reports shall be furnished by the Contractor, along with equipment/ material drawings. In the event of any discrepancy in the test reports, (i.e., if any test report is not acceptable due to any design/ manufacturing changes or due to non-compliance with the Technical Specification and/ or applicable standard), the tests shall be carried out without any additional cost implication to the PURCHASER. The PURCHASER reserves the right to get any or all type/tests conducted/repeated.

3.3 Standards

3.3.1 The works covered by the specification shall be designed, engineered, manufactured, built, tested and commissioned in accordance with the Acts, Rules, Laws and Regulations of India.

3.3.2 The equipment to be furnished under this specification shall conform to latest issue (with all amendments) of specified standards. In addition to meeting the specific requirement called for in clause 1 and 2 of the Technical Specification, the equipment shall also confirm to the general requirement of the applicable standards, which shall form an integral part of the specification.

3.3.3 The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intended to complement each other.

3.3.4 The Bidder shall also note that list of standards presented in this specification is not complete. Whenever necessary the list of standards shall be considered in conjunction with specific IS/IEC. All equipments shall confirm to PGCIL technical specification and relevant IS/IEC standards as the case may be.

3.3.5 When the specific requirements stipulated in the specifications exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.

3.3.6 Other internationally accepted standards which ensure equivalent or better performance than the standards specified / other clauses for various equipments shall also, be accepted, however the salient points of difference shall be clearly brought out in the offer along with English language version of such standard. The equipment conforming to standards other than specified / individual clauses for various equipments shall be subject to Purchaser's/ owner's approval.

3.3.7 The bidder shall clearly indicate in his bid the specific standards in accordance with which the works will be carried out.

3.4 Engineering data & drawings

3.4.1 The list of drawings/documents which are to be submitted to the purchaser shall be discussed and finalised. The contractor shall necessarily submit all the drawings/documents unless any thing is waived. The contractor shall submit 5 (five) sets of drawings/ design documents/ data/ test reports as may be required for the approval of purchaser.

3.4.2 Drawings

3.4.2.1 All drawings submitted by the Contractor including those submitted at the time of bid shall be in sufficient detail to indicate the type, size, arrangement, material description, Bill of Materials, weight of each component, break-up for packing and shipment, dimensions, internal & the external connections, fixing arrangement required and any other information specifically requested in the specifications.

3.4.2.2 Each drawing submitted by the Contractor shall be clearly marked with the name of the Purchaser, the unit designation, the specifications title, the specification number and the name of the Project. If standard catalogue pages are submitted, the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be in metric units.

3.4.2.3 Further work by the Contractor shall be in strict accordance with these drawings and no deviation shall be permitted without the written approval of the Purchaser, if so required.

3.4.2.4 The review of these data by the Purchaser will cover only general conformance of the data to the specifications and documents interfaces with the equipment provided under the specifications, external connections and of the dimensions which might affect substation layout. This review by the Purchaser may not indicate a thorough review of all dimensions, quantities and details of the equipment, materials, any devices or items indicated or the accuracy of the information submitted. This review and/or approval by the Purchaser shall not be considered by the Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and documents.

3.4.2.5 All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings shall be at the Contractor's risk. The Contractor may make any changes in the design which are necessary to make the equipment conform to the provisions and intent of the Contract and such changes will again be subject to approval by the Purchaser. Approval of Contractor's drawing or work by the Purchaser shall not relieve the contractor of any of his responsibilities and liabilities under the Contract.

3.4.2.6 All engineering data submitted by the Contractor after final process including review and approval by the Purchaser shall form part of the Contract Document and the entire works performed under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the Purchaser in Writing.

3.5 Approval Procedure

3.5.1 All technical description, specifications, literature, correspondence, prints, drawings, instruction manuals, test reports, photographs, booklets, schedules and all supplementary data or documents furnished in compliance with the requirements of the Contract, shall become the property of the Owner/Purchaser and the costs shall be considered as included in the Contract price.

3.5.2 The Contractor shall be responsible for any time delay, misinterpretation, error and conflict during design, manufacturing, testing and erection of the Works resulting from non-compliance with the requirements of this Specification.

3.5.3 The Owner/Purchaser shall have the right to make copies of any documents, data, reports, information and the like supplied by the Contractor in connection with the Works. The Owner/Purchaser shall not impart the information of these documents to any other manufacturer or competitor but he shall be free to use these for preparation of technical papers, reports etc.

3.5.4 The Contractor is not required to supply detailed drawings whose purpose is manufacture only but in case such information is specifically asked for by the Purchaser during evaluation of Bid, finalisation of Contract or during execution of the Contract, the Bidder/Contractor shall comply.

3.5.5 All drawings, documents manual etc. as specified in this clause shall have to be provided separately for each clause.

3.5.6 The Contractor shall submit consolidated list of all symbols used in any drawing, data and information under three (3) separate headings namely Civil, Mechanical & Electrical. If symbols other than IS or IEC are used the Contractor shall submit consolidated list of these symbols and their significance under a separate clause.

3.5.7 All documentation shall be in English language.

3.5.8 REQUIREMENTS FOR SUBMISSION OF DOCUMENTS, INFORMATION AND DATA BY THE CONTRACTOR

3.5.8.1 The Contractor shall submit to the Owner/Purchaser all documents in accordance with an approved schedule of submissions and shall submit any further information (in the form of drawings, documents, manuals, literature, reports etc.) when asked by the Owner/Purchaser while commenting/approving any drawings/documents etc. All applicable documents shall be provided for each converter/repeater station separately.

3.5.8.2 The documents which are subject to the approval of the Owner/Purchaser shall be identified by the Contractor with the stamp "FOR APPROVAL". All other documents shall be submitted to the Owner/Purchaser for information and shall be identified by the Contractor with the stamp "FOR INFORMATION". The schedule of

submissions shall set forth which documents shall be subject to the approval of the Owner/Purchaser and which documents shall be for information & subject to comments by the Owner/Purchaser.

3.5.8.3 The sequence of submissions of all documents shall be such that the necessary information is available to enable the Owner/Purchaser to approve or comment the document, as the case may require when the documents are received.

3.5.8.4 The sequence of submission of the documents shall be subject to the approval of the Owner/Purchaser and shall be in accordance with the following procedures.

3.5.8.5 The Contractor in preparing the aforesaid schedule shall make an allowance of at least seven (7) calendar days for the delivery from the Contractor's office in India to the Purchaser and a further seven (7) calendar days for the delivery from the Purchaser to the Contractor's office in India. Otherwise the Contractor may arrange for delivery and acceptance of mail at/from Purchaser's office by hand.

3.5.8.6 The contractor shall supply the documentation system for Owner's/Purchaser's approval in five (5) hard copies for drawings and three (3) hard copies for technical reports as required. Soft copies of all documents shall also be sent by e-mail and the Purchaser will endeavour to give his approval/comments through e-mail also. On category I approval of soft copy, the contractor shall furnish five (5) sets of hard copies for stamping. After electronic approval of the documents in Category I (defined later in this clause), requisite number of hard copies of documents as detailed subsequently shall be provided. The final documentation for the project shall be supplied in five (5) sets of hard copies and seven (7) sets of CDs for each site.

3.5.8.7 The additional copies of some documents however shall be given by the contractor on demand

3.5.8.8 In case a "SUBSEQUENT" revision of any document is made due to any reason whatsoever, a revision of the same, highlighting the changes shall be submitted for Owner's/Purchaser's specific approval/ information in required number of copies as detailed earlier. After approval, such document shall be (re)submitted as per requirement of Clause 3.5

3.5.9 DOCUMENTS FOR APPROVAL

3.5.9.1 The Purchaser shall be allowed thirty (30) calendar days (exclusive of the aforesaid 14 days delivery time) to approve the Contractor's submissions. The submissions for approval shall be returned to the Contractor marked in one of the following ways :

Cat-I : Approved.
Cat-II : Approved with Comments.
Cat-III : Returned for correction.
Cat-IV : For information

3.5.9.2 The first notations "I" or "II" shall be deemed to permit the Contractor to proceed with the work shown on the document, except in the case of notation "II" the work

shall be done subject to the corrections indicated thereon and/or described in the letter of transmittal. The Contractor shall bear the full responsibility for proceeding with the Works prior to receipt of the release in notation "I" from the Owner/Purchaser.

3.5.9.3 In case of notation "II", the Contractor shall include the alterations required & re-submit the document within Thirty (30) days from date of Purchaser's letter of transmittal.

3.5.9.4 In case of notation "III", the Contractor shall include the alterations required and resubmit the document to the Purchaser, within twenty one (21) days, from date of letter of transmittal, so that such document can be returned with the notation "I" or "II".

3.5.9.5 It may also be noted that the approval/commenting by the Owner/Purchaser does not relieve the Contractor of any of his contractual obligations & his responsibilities for correctness of dimensions, materials, weights quantities or any other in formation contained therein, as well as the conformity of designs with Indian Statutory laws and the Technical Specifications as may be applicable. The approval also does not limit the Owner's/Purchaser's rights under the Contract.

3.5.9.6 The Purchaser may notify the Contractor by telex or telefax of the approval of documents.

3.5.9.7 All copies of documents identified" FOR APPROVAL" shall bear owner's/ purchaser "APPROVED" stamp for use in the field.

3.5.9.8 When a drawing/document is approved/commented and as such stamped, a marked print shall be sent back to the Contractor. The Contractor shall then include the required alterations and resubmit prints to the Purchaser.

3.5.9.9 The following is a tentative list of the documents and drawings which shall require the approval of the Owner/Purchaser :

1. Schedule of drawings and data.
2. System Engineering studies including studies to finalize design criteria as well as equipment and station design.
3. Preliminary operating manuals.
4. Drawings and details for interfaces.
5. Equipment specifications and drawings.
6. Nameplates.
7. Quality/Inspection plans & Quality control programs.
8. Equipment test procedures.
9. Instruction manuals.
10. Control panel's, cubicle's and cabinet's master legend list.
11. Panel/cubicle layout.
12. Simplified one-line (electrical & flow) diagrams.
13. Detailed one-line diagrams.
14. Other building/equipment layout.
15. Civil work general layouts & other detailed drawings.
16. Civil works and structural design.

17. Outline general arrangement of equipments.
18. Sub-system testing, System testing & complete commissioning procedures.

3.5.9.10 These approved documents shall be considered as the working documents. However the Technical Specification and connected documents shall prevail over these documents in case a decision is required on interpretation.

3.5.10 DOCUMENTS FOR INFORMATION

Other documents required "for information" in accordance with specification shall be handled as follows and as detailed in Clause 3.5.9.

Eventual comments to such documents shall be forwarded to the Contractor through letter or telex and marked on one print, when necessary.

The Contractor shall not delay the Works pending the receipt by the contractor of the comments on documents submitted to the Owner/Purchaser for information. However, the Owner/Purchaser shall have the right to comment on all the documents submitted by the Contractor, when, in the opinion of the Owner/Purchaser the document does not comply with the Contract or otherwise. The Contractor shall satisfactorily demonstrate that the information contained in the aforesaid document does meet the requirements of the Contract or revise the document in order that the information shall comply with the requirements of the Contract.

3.5.11 DRAWINGS AND DATA

3.5.11.1 Drawings, as herein below set forth, shall be submitted to the Owner/Purchaser and shall be complete and include catalogues, leaflets and all information necessary for complete interpretation of the drawings by the Owner/Purchaser. All drawings shall show the materials, dimensions, finish, fits, clearances, tolerances, bolting and such other information as is necessary to demonstrate to the Owner / Purchaser that all items covered by the drawings are in compliance with the requirements of the Contract.

3.5.11.2 Not later than 90 (ninety) days after completion of the HVDC station commissioning and prior to take over of the Station by the Owner, the Contractor shall supply tracings of the last revision of all drawings produced for this project, stamped as "AS BUILT". These drawings, when applicable, shall show all corrections made during field commissioning.

3.5.12 REQUIREMENTS FOR EQUIPMENT DRAWING AND DATA

3.5.12.1 Control Panels, Cubicles and Control Cabinets :

(i) All panels, cubicles and cabinets shall be identified.

(ii) On each layout drawing (for approval), at the right corner, a small "key plan" shall be shown. This key plan shall indicate the physical relationship of the particular panel, cubicle or cabinet with respect to the overall arrangement, as well as the minimum space required for maintenance.

(iii) General arrangement drawings (for approval) shall include weights, overall dimensions and necessary internal and external views, showing conduits, terminal blocks and wiring.

(iv) All plant, equipment and devices which appear on the drawings shall be identified by the Contractor's bill of material item number and their device (function) numbers.

(v) A floor plan drawing (for approval) showing panel mounting details and space for cable entrance shall be provided.

3.5.12.2 Equipment Outline and Detailed Assembly Drawings (for approval) :

(i) Outline drawings of all apparatus shall give at least weights, overall dimensions, shipping dimensions, handling and dismantling dimensions with relevant weights and loadings to be considered for support structure and foundation design.

(ii) Drawings shall show location and details of all conduits, pipes, main connectors, grounding connectors, interconnections, supporting structures, operating mechanisms, control cabinets and the like.

(iii) Connections to pipe, conduit, etc., shall be clearly indicated.

(iv) Assembly drawings shall furnish all necessary details to permit field installation of the equipment. Such drawings shall include reference to the tools and instruments to be used in each case.

3.5.12.3 Wiring Diagram (for information) :

(i) A margin shall be left vacant on both sides of the drawings. This space shall be used to make interconnections with external equipment.

(ii) The cable termination shall show in detail how every core in the cable is connected to the equipment terminal blocks.

(iii) All cable parts in a section of an equipment shall be together in the cable. This means that it is possible for an electrician to connect cables in one section without interference with others.

(iv) The connection of both ends of the cable shall be shown on the interconnection tables for each connected equipment. All connections shall therefore be shown twice.

(v) The cable schedule shall include following information :

- Type of cable.

- Number of cores and size.
- Cable number.
- Addresses by equipment item designation in both ends.
- Cable routing. At complex routing a special cable drawing with the route can be added.

3.5.12.4 Final Bills of Material (for information) :

(i) Only one bill of material shall be made for each equipment and for each station. It shall describe and provide the characteristics of all devices used on the switchboards for that station.

(ii) The following minimum information shall be provided for each item as applicable:

- Quantity;
- Identification (series, type);
- Catalogue and instruction leaflet number;
- Main electrical characteristics, as applicable (voltage and current ratings, watts, ohms, microfarads, and the like);
- Function (synchronizing switch, bolted fault relay, and the like);
- Device (function) number;
- Range or setting;
- Specific characteristics such as indicating meter scales and coil ratings, auxiliary current transformer or potential transformer ratios, meter constants, number of contacts and lock-out relays, auxiliary relay pick-up and drop-out characteristics, relay case type, test switch pole arrangement and the like.

3.5.12.5 Nameplates (for approval) :

Each equipment shall have a separate nameplate drawing. These drawings shall include at least the following: Bill of material item number, dimensions, material, engraving method, fixing details and all specific information related to the equipment as required in their particular Specification.

3.5.12.6 Detailed One Line Diagrams and Three Line Schematics (for approval) :

The detailed diagrams shall be an amplification of the simplified one line diagrams.

All protective relays, auxiliary devices, meters, test switches, primary and back-up or alternate current circuits, primary and back-up or alternate potential circuits, potential and current polarizing circuits, synchronizing circuits, carrier transmitter-receiver coupling and line tuning equipment shall be shown. Ample space shall be provided for the addition of details relative to future exits and switchgear.

All switchgear shall show rated current and interrupting rating (where applicable) and type. Transformer data shall include MVA, voltage, impedance and connection for each winding.

All voltage transformers shall have all taps, turn ratios, polarity marks and type of connections shown.

All current transformers shall have polarity marks, all taps and actual type of connections shown.

All relays, meters and devices shall be identified.

The assigned oscillograph channel number for each analogue input shall be shown near the symbol indicating that analogue input to the oscillograph. Oscillograph starting sensors shall be shown.

3.5.12.7 General Equipment Details (for information) :

These drawings shall be prepared to show all the necessary erection and manufacturing details of all equipment to be installed in the switchyards and inside the various station buildings. However these drawings shall not be copies of manufacturer's drawings.

3.5.12.8 Cable and Trenches Layout and Sections (for approval)

3.5.12.9 Buildings - Equipment Layout (for approval) :

The Contractor shall prepare a separate drawing for each floor of each building included in the Works, showing all the electrical, communication and mechanical equipment, including: panels, cubicles, batteries, battery chargers, transformers, valve groups, cooling systems, air-conditioning and ventilation systems, motor and motor-generator sets, pumps etc and their interfaces. Each room shall be completely identified. These drawings shall also show all the outside dimensions of the above said equipment, their doors (if any) and the clearances to walls and doors.

These drawings shall have cross references with the corresponding grounding system, lighting and outlet and cable system drawings.

3.5.12.10 Cable Diagrams (for information) :

These drawings shall show the terminal blocks and the interconnection cables between equipment, between equipment and panels and between panels. These drawings shall have cross references with the corresponding manufacturer's drawings and termination schedules. Termination schedules shall include, at least, the number of the cable, the cable size, the origin and destination, the function and the identification of trays, trenches and conduits where the cable lays.

3.5.12.11 Calculation Sheets (for approval) :

These documents shall be provided for grounding grid, lightning shielding, outlets, lighting, A/c ventilation, bus bar, battery and the like.

3.5.12.12 Bill of Material (for information) :

Each group of drawings like grounding system, station services, and ac switchyards shall have a separate bill of material.

3.5.13 INSPECTIONS PLANS AND DOCUMENTATION (for approval)

3.5.13.1 The Contractor shall submit in required number copies for the Owner's/Purchaser's approval an inspection plan (quality plan) describing the inspection system and comprising a flow chart indicating the inspections to be carried out and their sequence in the manufacturing stages.

3.5.13.2 The inspection plan shall be such that it can be related to the manufacturing program. The plan shall also include a description of the inspection methods employed with reference to the Contractor's written inspection procedures.

3.5.13.3 Separate inspection plans describing the inspection systems for equipment supplied by each sub-Contractor, in the same form as that of the Contractor, shall be submitted for the approval of the Owner/Purchaser.

3.5.13.4 In addition to the inspection plans referred to above, the Contractor shall submit complete and satisfactory evidence of possessing a working scheme assuring the control of all critical activities pertinent to the assurance of quality, and objective evidence (by means of quality manuals and appropriate forms, etc.) of this capability to employ and maintain quality control to meet the required quality level of the manufacture and construction of the Works.

3.5.13.5 Contractor's Quality Control Program in the context of this Clause means the implementation of a quality assurance program by means of which full conformance of material and workmanship to best quality standards can be achieved effectively and economically by the Contractor's control and surveillance of all essential inspection operations, and periodic verification of the results of the manufacture of equipment and the assembly, erection and installation of equipment at the sites.

3.5.13.6 Certified (by an independent authority) test reports of factory type tests for standard equipment may be accepted by the Owner/Purchaser. These certified reports of previous tests on essentially similar and identical standard equipment, which may be accepted by the Owner/Purchaser at the Owner's/Purchaser's sole discretion, in lieu of one or more type tests, shall be submitted.

3.5.13.7 Required number of copies of all test reports, including those supplied by Sub-Contractors, and shall be submitted to the Owner/Purchaser for approval. The Contractor shall include in the report all additional data equired by the Owner/Purchaser to permit a clear understanding of the reports.

3.5.13.8 All test reports shall be certified and shall contain the signature of the Inspector as having witnessed the test, unless such witnessing has been specifically waived by the Owner/Purchaser. A certified test report shall beissued for each test.

3.5.14 INSTRUCTION MANUALS AND OPERATING MANUALS

(for approval)

3.5.14.1 The Contractor shall provide Instruction & Maintenance Manuals for each part of the Plant and Equipment included in the Works and Operating Manuals for each Station.

3.5.14.2 The Instruction Manuals and Operating Manuals shall be arranged in an organized library adequately cross referenced to facilitate issuing clauses of the manuals as required by the work i.e. erection instructions shall be required before operating & maintenance instructions.

3.5.14.3 Seven (7) preliminary copies of the manuals shall be provided by the Contractor for the Approval of the Owner/Purchaser. Manuals shall include identification mark to identify any part of the manual which is revised.

3.5.14.4 All Manuals provided by the Contractor shall be fully detailed and specifically prepared for the Works and equipment provided. General manuals not specifically prepared for the Works shall not be acceptable.

3.5.14.5 The instruction manuals shall at least contain :

a) A general description of all components (extracts from manufacturing technical product bulletins shall be acceptable only for minor items).

b) Erection instructions such as :

- Inspection to be made at arrivals;
- Tolerances;

- Recommendations for handling & Storage of components;
- Information on erection marks;
- Approximate weight of parts;
- Important aspects and cautions with regard to erection (as tools and/or special instruments);
- Tightness torque;
- Detailed Drawings;
- Isometric Drawings;
- Interface Drawing List.

c) Pre-commissioning Instruction :
The purpose of these tests is to detect transport damages and to check that the installation is properly performed (simple functional test on the equipment).

d) Material and part list.

e) Adjustments (and assembly) including design clearances and settings (where applicable).

f) Complete sets of drawings as finally issued, reduced to the size of the manual and having graphic scales.

g) Operating Instructions :
- General (including sequence of operation, if applicable);
- Specific (dealing with any unusual features or safety precautions).

h) Maintenance instructions, including recommended maintenance plan & necessary practices and requirements for assembling, repair and dismantling of the Works and equipments and for identification of parts requiring replacement under normal and emergency conditions, as well as required adjustments to be made and readings to be taken during initial operation.

i) Periodic Preventive Maintenance Schedule.

3.5.15 CONTENTS OF OPERATION MANUALS

3.5.15.1 Operator oriented functional descriptions of the equipment. The description shall include basic information related to the equipment including operational restric-

tions, functional characteristics, rating, accessories, interlocking devices and auxiliary devices.

3.5.15.2 Operator oriented description of the protection and control systems, including basic information on the systems, control sequences, start stop and restart sequences, grounding and cautions.

3.5.15.3 Description of the equipment auxiliary systems, (if applicable)

The scheduled dates for the submission of the drawings as well as for, any data/information to be furnished by the Owner/Purchaser would be discussed and finalised at the time of award.

Notes:

a) The contractor may please note that all resubmissions must incorporate all comments given in the earlier submission by the Owner/Purchaser or adequate justification for not incorporating the same must be submitted failing which the submission of documents is likely to be returned.

b) The drawings which are required to be referred frequently during execution should be submitted on cloth lined paper. The list of such drawings shall be finalised with the Contractor at the time of Award.

c) All major drawings shall be submitted in AUTOCAD Version 12 or better.

d) The instruction Manuals shall contain full details of drawings of all equipment being supplied under this contract, their exploded diagrams with complete instructions for storage, handling, erection, commissioning, testing, operation, trouble shooting, servicing and overhauling procedures.

e) If after the commissioning and initial operation of the substation, the instruction manuals require any modifications/ additions/changes, the same shall be incorporated and the updated final instruction manuals shall be submitted by the Contractor to the Owner/Purchaser.

f) The Contractor shall furnish to the Owner/Purchaser, catalogues of spare parts also.

3.6 Material / workmanship

3.6.1 General Requirement :

3.6.1.1 Where the specification does not contain references to workmanship, equipment, materials and components of the covered equipment, it is essential that the same must be new, of highest grade of the best quality of their kind, conforming to best engineering practice and suitable for the purpose for which they are intended.

3.6.1.2 In case where the equipment, materials or components are indicated in the specification as "similar" to any special standard, the Purchaser shall decide upon the question of similarity. When required by the specification or when required by the Purchaser the Contractor shall submit, for approval, all the information concerning the materials or components to be used in manufacture. Machinery, equipment, materials and components supplied, installed or used without such approval shall run the risk of subsequent rejection, it being understood that the cost as well as the time delay associated with the rejection shall be borne by the Contractor.

3.6.1.3 The design of the Works shall be such that installation, future expansions, replacements and general maintenance may be undertaken with a minimum of time and expenses. Each component shall be designed to be consistent with its duty and suitable factors of safety, subject to mutual agreements. All joints and fastenings shall be devised, constructed and documented so that the component parts shall be accurately positioned and restrained to fulfil their required function. In general, screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from the Purchaser.

3.6.1.4 Whenever possible, all similar parts of the works shall be made to gauge and shall also be made interchangeable with similar parts. All spare parts shall also be made interchangeable and shall be made of the same materials and workmanship as the corresponding parts of the equipment supplied under the specification. Where feasible, common component units shall be employed in different pieces of equipment in order to minimize spare parts stocking requirements. All the equipment of the same type and rating shall be physically and electrically interchangeable.

3.6.1.5 All materials and equipment shall be installed in strict accordance with the manufacturer's recommendation(s). Only first-class work in accordance with the best modern practices will be accepted. Installation shall be considered as being the erection of equipment at its permanent location. This, unless otherwise specified, shall include unpacking, cleaning and lifting into position, grouting, levelling, aligning, coupling of or bolting down to previously installed equipment bases/foundations, performing the alignment check and final adjustment prior to initial operation, testing and commissioning in accordance with the manufacturer's tolerances, instructions and the Specification. All factory assembled rotating machinery shall be checked for alignment and adjustments made as necessary to re-establish the manufacturer's limits suitable guards shall be provided for the protection of personnel on all exposed rotating and / or moving machine parts and shall be designed for easy installation and removal for maintenance purposes. The spare equipment(s) shall be installed at designated locations and tested for healthiness.

3.6.1.6 The Contractor shall apply oil and grease of the proper specification to suit the machinery, as is necessary for the installation of the equipment. Lubricants used for installation purposes shall be drained out and the system flushed through where necessary for applying the lubricant required for operation. The Contractor shall apply all operational lubricants to the equipment installed by him.

3.6.1.7 All oil, grease and other consumables used in the Works/ Equipment shall be purchased in India unless the Contractor has any special requirement for the specific application of a type of oil or grease not available in India. In such is the case he shall declare in the proposal, where such oil or grease is available. He shall help Purchaser in establishing equivalent Indian make and Indian Contractor. The same shall be applicable to other consumables too.

3.6.1.8 A cast iron or welded steel base plate shall be provided for all rotating equipment which are to be installed on a concrete base unless otherwise agreed to by the Purchaser. Each base plate shall support the unit and its drive assembly, shall be of design with pads for anchoring the units, shall have a raised up all around and shall have threaded in air connections, if so required.

3.6.2 Provisions for Exposure to Hot and Humid Climate

Outdoor equipment supplied under the specification shall be suitable for service and storage under tropical conditions of high temperature, high humidity, heavy rainfall and environment favourable to the growth of fungi and mildew. The indoor equipments located in non-air conditioned areas shall also be of same type.

3.6.2.1 Space Heaters

3.6.2.1.1 The heater shall be suitable for continuous operation at 240 V as supply voltage. On-off switch and fuse shall be provided.

3.6.2.1.2 One or more adequately rated thermostatically connected heaters shall be supplied to prevent condensation in any compartment. The heaters shall be installed in the compartment and electrical connections shall be made sufficiently away from below the heaters to minimize deterioration of supply wire insulation. The heaters shall be suitable to maintain the compartment temperature to prevent condensation.

3.6.2.1.3 suitable anti condensation heaters with the provision of thermostat shall be provided.

3.6.2.2 Fungi Static Varnish

Besides the space heaters, special moisture and fungus resistant varnish shall be applied on parts which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where the treatment will interfere with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application of the varnish.

3.6.2.3 Ventilation Opening

Wherever ventilation is provided, the compartments shall have ventilation openings with fine wire mesh of brass to prevent entry of insects and to reduce to a minimum the entry of dirt and dust. Outdoor compartment Openings in equipment shall be provided with shutter type blinds and suitable provision shall be made so as to

avoid any communication of air / dust with any part in the enclosures of the control cabinets, Junction boxes and Marshalling boxes, panels etc.

3.6.2.4 Degree of Protection

The enclosures of the control cabinets, Junction boxes and Marshalling boxes, panels etc. to be installed as detailed here under:
The minimum requirements for panels are as follows :

a) Installed out door: IP- 55

b) Installed indoors in air-conditioned area: IP-31

c) Installed in covered area: IP-52

d) Installed indoors in non air-conditioned area where possibility of entry of water is limited: IP-41.

e) For LT Switchgear (AC & DC distribution Boards): IP-52.

The degree of protection shall be in accordance with IS:13947 (Part-I) / IEC-947 (Part-I) / IS 12063 / IEC 529. Type test report for degree of protection test, on each type of the box shall be submitted for approval.

3.6.3 Rating Plates, Name Plates and Labels

3.6.3.1 Each main and auxiliary item of substation is to have permanently attached to it in a conspicuous position a rating plate of non-corrosive material upon which is to be engraved manufacturer's name, year of manufacture, equipment name, type or serial number together with details of the loading conditions under which the item of substation in question has been designed to operate, and such diagram plates as may be required by the Purchaser. The rating plate of each equipment shall be according to IEC requirement.

3.6.3.2 All such nameplates, instruction plates, rating plates of transformers, reactors, CB, CT, CVT, SA, Isolators, C & R panels and PLCC equipments shall be bilingual with Hindi inscription first followed by English. Alternatively two separate plates one with Hindi and the other with English inscriptions may be provided.

3.6.4 First Fill Of Consumables, Oil and Lubricants

All the first fill of consumables such as oils, lubricants, filling compounds, touch up paints, soldering/brazing material for all copper piping of circuit breakers and essential chemicals etc. which will be required to put the equipment covered under the scope of the specifications, into successful Operation, shall be furnished by the Contractor unless specifically excluded under the exclusions in these specifications and documents.

3.7 Design Improvement / coordination

3.7.1 The bidder shall note that the equipment offered by him in the bid only shall be accepted for supply. However, the Purchaser or the Contractor may propose changes in the specification of the equipment or quality thereof and if the Purchaser & contractor agree upon any such changes, the specification shall be modified accordingly.

3.7.2 If any such agreed upon change is such that it affects the price and schedule of completion, the parties shall agree in writing as to the extent of any change in the price and/or schedule of completion before the Contractor proceeds with the change. Following such agreement, the provision thereof, shall be deemed to have been amended accordingly.

3.7.3 The Contractor shall be responsible for the selection and design of appropriate equipments to provide the best co-ordinated performance of the entire system. The basic design requirements are detailed out in this Specification. The design of various components, sub-assemblies and assemblies shall be so done that it facilitates easy field assembly and maintenance.

3.7.4 The Contractor has to coordinate designs and terminations with the agencies (if any) who are Consultants/Contractor for the Purchaser. The names of agencies shall be intimated to the successful bidders.

3.7.5 The Contractor will be called upon to attend design co-ordination meetings with the Engineer, other Contractor's and the Consultants of the Purchaser (if any) during the period of Contract. The Contractor shall attend such meetings at his own cost at New Delhi or at mutually agreed venue as and when required and fully cooperate with such persons and agencies involved during those discussions.

3.8 Quality Assurance Programme

3.8.1 To ensure that the equipment and services under the scope of this Contract, whether manufactured or performed within the Contractor's Works or at his Subcontractor's premises or at the Purchaser's site or at any other place of Work, are in accordance with the specifications, the Contractor shall adopt a suitable quality assurance programme to control such activities at all points, as necessary. Such programme shall be broadly outlined by the Contractor and shall be submitted by the contractor after the award of contract and finally accepted by the Purchaser after discussions. However, in case detailed valid programme approved by purchase for the equipment already exist, same would be followed till its validity. A quality assurance programme of the contractor shall generally cover the following:

(a) Contractor's organisation structure for the management and implementation of the proposed quality assurance programme;

(b) Documentation control system;

(c) Qualification data of bidder's key personnel;

(d) The procedure for purchases of materials, parts components and selection of sub-Contractor's services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases etc.

(e) System for shop manufacturing and site erection controls including process controls and fabrication and assembly control;

(f) Control of non-conforming items and system for corrective actions;

(g) Inspection and test procedure both for manufacture and field activities;

(h) Control of calibration and testing of measuring instruments and field activities;

(i) System for indication and appraisal of inspection status;

(j) System for quality audits;

(k) System for authorising release of manufactured product to the Purchaser

(1) System for maintenance of records;

(m) System for handling storage and delivery; and

(n) A quality plan, detailing out the specific quality control measures and Procedures adopted for controlling the quality characteristics relevant to each item of equipment furnished and/or services rendered.

The Purchaser or his duly authorised representative reserves the right to carry out quality audit and quality surveillance of the system and Procedure of the Contractor/ his vendors quality management and control activities.

3.8.2 Quality Assurance Documents

The Contractor shall be required to submit the following Quality Assurance Documents as stipulated in the Quality Plan at the time of purchaser's inspection of equipment/ material.

3.9 Inspection, Type testing & Inspection certificate

3.9.1 All equipment being supplied shall conform to type tests including additional type tests including additional type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective clauses. Purchaser reserves the right to witness any or all the type tests. The contractor shall intimate the purchaser the detailed program about the tests at least three (3) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

3.9.2 The reports for all type tests and additional type tests as per technical specification shall be furnished by the Contractor along with equipment / material drawings. The type tests conducted earlier should have either been conducted in accredited laboratory (accredited based on ISO / IEC Guide 25 / 17025 or EN 45001 by the national accredition body of the country where laboratory is located) or witnessed by the representative(s) of POWERGRID or Utility. The test reports submitted shall be of the tests conducted within last 5 (five) years prior to the date of bid opening. In case the test reports are of the test conducted earlier than 5 (five) years prior to the date of bid opening, the contractor shall repeat these test(s) at no extra cost to the purchaser.

In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design / manufacturing changes (including substitution of components) or due to non-compliance with the requirement stipulated in the Technical Specification or any/all additional type tests not carried out, same shall be carried out without any additional cost implication to the Purchaser.

3.9.3 The Purchaser intends to repeat the type tests and additional type tests on transformers, reactors, cables and battery chargers for which test charges shall be payable as per provision of contract. The price of conducting type tests and additional type tests shall be included in Bid price and break up of these shall be given in the relevant schedule of Bid Proposal Sheets. These Type test charges would be considered in bid evaluation. In case Bidder does not indicate charges for any of the type tests or does not mention the name of any test in the price schedules, it will be presumed that the particular test has been offered free of charge. Further, in case any Bidder indicates that he shall not carry out a particular test, his offer shall be considered incomplete and shall be liable to be rejected.

3.9.4 The Purchaser, his duly authorised representative and/or outside inspection agency acting on behalf of the Purchaser shall have at all reasonable times free access to the Contractor's/sub-vendors premises or Works and shall have the power at all reasonable times to inspect and examine the materials and workmanship of the Works during its manufacture or erection if part of the Works is being manufactured or assembled at other premises or works, the Contractor shall obtain for the Engineer and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works. Inspection may be made at any stage of manufacture, despatch or at site at the option of the Purchaser and the equipment if found unsatisfactory due to bad workmanship or quality, material is liable to be rejected.

3.9.5 The Contractor shall give the Purchaser/inspector thirty (30) days written notice of any material being ready for joint testing including contractor and POWERGRID. Such tests shall be to the Contractor's account except for the expenses of the inspector. The purchaser / inspector unless witnessing of the tests is virtually waived, the Purchaser/ inspector will attend such tests within thirty (30) days of the date of which the equipment is notified as being ready for test/ inspection, failing which the Contractor may proceed with the test which shall be deemed to have been made in the Inspector's presence and the Contractor shall forthwith forward duly certified copies of test reports in triplicate to the Inspector.

3.9.6 The Purchaser or Inspector shall, within fifteen (15) days from the date of inspection as defined herein give notice in writing to the Contractor, of any objection to any drawings and all or any equipment and workmanship which in his opinion is not in accordance with the Contract. The Contractor shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Purchaser /Inspector giving reasons therein, that no modifications are necessary to comply with the Contract.

3.9.7 When the factory tests have been completed at the Contractor's or Sub-Contractor's works, the Purchaser/ inspector shall issue a certificate to this effect within fifteen (15) days after completion of tests but if the tests are not witnessed by the Purchaser/inspector, the certificate shall be issued within fifteen (15) days of receipt of the Contractor's Test certificate by the Engineer/ Inspector. Failure of the Purchaser/inspector to issue such a certificate shall not prevent the Contractor from proceeding with the Works. The completion of these tests or the issue of the certificate shall not bind the Purchaser to accept the equipment should, it, on further tests/ after erection, be found not to comply with the Contract. The equipment shall be dispatched to site only after approval of test reports and issuance of MICC by the Purchaser.

3.9.8 In all cases where the Contract provides for tests whether at the premises or at the works of the Contractor or of any Sub-Contractor, the Contractor except where otherwise specified shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Purchaser /Inspector or his authorized representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the Purchaser /Inspector or to his authorized representative to accomplish testing.

3.9.9 The inspection by Purchaser and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed quality assurance programme forming a part of the Contract.

3.9.10 The Purchaser will have the right of having at his own expenses any other test(s) of reasonable nature carried out at Contractor's premises or at site or in any other place in addition of aforesaid type and routine tests, to satisfy that the material comply with the specification.

3.9.11 The Purchaser reserves the right for getting any field tests not specified in respective clauses of the technical specification conducted on the completely assembled equipment at site. The testing equipments for these tests shall be provided by the Purchaser.

3.10 Tests

3.10.1 Pre-commissioning Tests

On completion of erection of the equipment and before charging, each item of the equipment shall be thoroughly cleaned and then inspected jointly by the Purchaser and the Contractor for correctness and completeness of installation

and acceptability for charging, leading to initial pre-commissioning tests at Site. The list of pre-commissioning tests to be performed is given in respective chapters and shall be included in the Contractor's quality assurance programme.

3.10.2 Commissioning tests

3.10.2.1 The testing equipments required for testing and commissioning shall be arranged by the Contractor.

3.10.2.2 The specific tests requirement on equipment has been brought out in the respective chapters of the technical specification.

3.10.2.3 The Contractor shall be responsible for obtaining statutory clearances from the concerned authorities for commissioning the equipment and the switchyard. However necessary fee shall be reimbursed by POWERGRID on production of requisite documents.

3.11 Packaging & protection

3.11.1 All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. On request of the Purchaser, the Contractor shall also submit packing details/associated drawing for any equipment/material under his scope of supply, to facilitate the Purchaser to repack any equipment/material at a later date, in case the need arises. While packing all the materials, the limitation from the point of view of availability of Railway wagon sizes in India should be taken into account. The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. Any demurrage, warping and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor. Purchaser takes no responsibility of the availability of the wagons.

3.11.2 All coated surfaces shall be protected against abrasion, impact, discolouration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all valves and piping and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage.

3.12 Finishing of metal surfaces

3.12.1 All metal surfaces shall be subjected to treatment for anti-corrosion protection. All ferrous surfaces for external use unless otherwise stated elsewhere in the specification or specifically agreed, shall be hot-dip galvanized after fabrication. High tensile steel nuts & bolts and spring washers shall be electro galvanized to service condition 4. All steel conductors including those used for earthing/grounding (above ground level) shall also be galvanized according to IS: 2629.

3.12.2 Hot Dip Galvanising

3.12.3 The minimum weight of the zinc coating shall be 610 gm/sq. m and minimum thickness of coating shall be 85 microns for all items thicker than 6mm. For items lower than 6mm thickness requirement of coating thickness shall be as per relevant ASTM. For surface which shall be embedded in concrete, the zinc coating shall be 610 gm/sq. m minimum.

3.12.4 The galvanized surfaces shall consist of a continuous and uniform thick coating of zinc, firmly adhering to the surface of steel. The finished surface shall be clean and smooth and shall be free from defects like discoloured patches, bare spots, unevenness of coating, spelter which is loosely attached to the steel globules, spiky deposits, blistered surface, flaking or peeling off, etc. The presence of any of these defects noticed on visual or microscopic inspection shall render the material liable to rejection.

3.12.5 After galvanizing, no drilling or welding shall be performed on the galvanized parts of the equipment excepting that nuts may be threaded after galvanizing. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanization.

3.12.6 The galvanized steel shall be subjected to six one minute dips in copper sulphate solution as per IS-2633.

3.12.7 M Sharp edges with radii less than 2.5 mm shall be able to withstand four immersions of the Standard Preece test. All other coatings shall withstand six immersions. The following galvanizing tests should essentially be performed as per relevant Indian Standards.

- Coating thickness
- Uniformity of zinc
- Adhesion test
- Mass of zinc coating

3.12.8 Galvanised material must be transported properly to ensure that galvanised surfaces are not damaged during transit. Application of zinc rich paint at site shall not be allowed.

3.12.9 Painting

3.12.9.1 All sheet steel work shall be degreased, pickled, phosphated in accordance with the IS-6005 "Code of practice for phosphating iron and sheet". All surfaces, which will not be easily accessible after shop assembly, shall beforehand be treated and protected for the life of the equipment. The surfaces, which are to be finished painted after installation or require corrosion protection until installation, shall be shop painted with at least two coats of primer. Oil, grease and dirt shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

3.12.9.2 After phosphating, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute dichromate solution and oven drying. The phosphate coating shall be sealed with application of two coats of ready mixed, stoving type zinc chromate primer. The first coat may be "flash dried" while the second coat shall be stoved.

3.12.9.3 After application of the primer, two coats of finishing synthetic enamel paint shall be applied, each coat followed by stoving. The second finishing coat shall be applied after inspection of first coat of painting.

3.12.9.4 The exterior colour of the paint shall be as per shade no. 697 (for outdoor) & 692 (for indoor) of IS-5 and inside shall be glossy white for all equipment, marshalling boxes, junction boxes, control cabinets, panels etc. unless specifically mentioned under respective clauses of the equipments. Each coat of primer and finishing paint shall be of slightly different shade to enable inspection of the painting. A small quantity of finishing paint shall be supplied for minor touching up required at site after installation of the equipment.

3.12.9.5 In case the Bidder proposes to follow his own standard surface finish and protection procedures or any other established painting procedures, like electrostatic painting etc., the procedure shall be submitted along with the Bids for Purchaser's review & approval.

3.13 Handling, Storing and Installation

3.13.1 In accordance with the specific installation instructions as shown on manufacturer's drawings or as directed by the Purchaser or his representative, the Contractor shall unload, store, erect, install, wire, test and place into commercial use all the equipment included in the contract. Equipment shall be installed in a neat, workmanlike manner so that it is level, plumb, square and properly aligned and oriented. Commercial use of switchyard equipment means completion of all site tests specified and energisation at rated voltage.

3.13.2 Contractor may engage manufacture's Engineer to supervise the unloading, transportation to site, storing, testing and commissioning of the various equipment being procured by them separately. Contractor shall unloaded, transport, store, erect, test and commissioning the equipment as per instructions of the manufacture's supervisory Engineer(S) and shall extend full cooperation to them.

3.13.3 In case of any doubt/misunderstanding as to the correct interpretation of manufacturer's drawings or instructions, necessary clarifications shall be obtained from the Purchaser. Contractor shall be held responsible for any damage to the equipment consequent to not following manufacturer's drawings / instructions correctly.

3.13.4 Where assemblies are supplied in more than one section, Contractor shall make all necessary mechanical and electrical connections between sections including the connection between buses. Contractor shall also do necessary adjustments/alignments necessary for proper operation of circuit breakers, isolators and their operating mechanisms. All components shall be protected against damage during unloading, transportation, storage, installation, testing and commissioning. Any equipment damaged due to negligence or carelessness or otherwise shall be replaced by the Contractor at his own expense.

3.13.5 Contractor shall be responsible for examining all the shipment and notify the Purchaser immediately of any damage, shortage, discrepancy etc. for the purpose of Purchaser's information only. The Contractor shall submit to the Purchaser every week a report detailing all the receipts during the weeks. However, the Contractor shall be solely responsible for any shortages or damages in transit, handling and/or in storage and erection of the equipment at Site. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor.

3.13.6 The Contractor shall be fully responsible for the equipment/material until the same is handed over to the Purchaser in an operating condition after commissioning. Contractor shall be responsible for the maintenance of the equipment/material while in storage as well as after erection until taken over by Purchaser, as well as protection of the same against theft, element of nature, corrosion, damages etc.

3.13.7 Where material / equipment is unloaded by Purchaser before the Contractor arrives at site or even when he is at site, Purchaser by right can hand over the same to Contractor and there upon it will be the responsibility of Contractor to store the material in an orderly and proper manner.

3.13.8 The Contractor shall be responsible for making suitable indoor storage facilities, to store all equipment which requires indoor storage.

3.13.9 The words 'erection' and 'installation' used in the specification are synonymous.

3.13.10 Exposed live parts shall be placed high enough above ground to meet the requirements of electrical and other statutory safety codes.

3.13.11 The design and workmanship shall be in accordance with the best engineering practices to ensure satisfactory performance throughout the service life. If at any stage during the execution of the Contract, it is observed that the erected equipment(s) do not meet the above minimum clearances as given in clause 4.7.1 the Contractor shall immediately proceed to correct the discrepancy at his risks and costs.

3.13.12 Equipment Bases

A cast iron or welded steel base plate shall be provided for all rotating equipment which is to be installed on a concrete base unless otherwise agreed to by the Pur-

chaser. Each base plate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units, shall have a raised lip all around, and shall have threaded drain connections.

3.14 Tools and Tackles

The Contractor shall supply with the equipment one complete set of all special tools and tackles for the erection, assembly, dis-assembly and maintenance of the equipment. However, these tools and tackles shall be separately, packed and brought on to Site.

3.15 Auxiliary supply

3.15.1 The sub-station auxiliary supply is normally met through a system having the following parameters. The auxiliary power for station supply, including the equipment drive, cooling system of any equipment, air-conditioning, lighting etc shall be designed for the specified Parameters as under. The DC supply for the instrumentation and PLCC system shall also conform to the parameters as indicated in the following :

Table 3.15 - 1 Table for Auxiliary Supply

Normal Voltage	*Variation in Voltage*	*Frequency in Hz*	*Phases*	*Neutral Connection*
415V	± 10%	50 ± 5%	3 or 4 Wire	Solidly Earthed
240 V	± 10%	50 ± 5%	1 or 2 Wire	Solidly Earthed
220V	187 - 242 V	DC	-	Isolated 2 wire system
48 V	40.8 - 57.6	DC	-	Isolated 2 wire system positive earthed

Combined variation of voltage and frequency shall be limited to ± 10%.

3.16 Lamps and sockets

3.16.1 Lamps

All incandescent lamps shall use a socket base as per IS-1258, except in the case of signal lamps.

3.16.2 Sockets

All sockets (convenience outlets) shall be suitable to accept both 5 Amp & 15 Amp pin round Standard Indian plugs. They shall be switched sockets with shutters.

3.16.3 Hand Lamp

A 240 Volts, single Phase, 50 Hz AC plug point shall be provided in the interior of each cubicle with ON-OFF Switch for connection of hand lamps.

3.16.4 Switches and Fuses

3.16.4.1 Each panel shall be provided with necessary arrangements for receiving, distributing, isolating and fusing of DC and AC supplies for various control, signalling, lighting and space heater circuits. The incoming and sub-circuits shall be separately provided with switchfuse units. Selection of the main and Sub-circuit fuse ratings shall be such as to ensure selective clearance of sub-circuit faults. Potential circuits for relaying and metering shall be protected by HRC fuses.

3.16.4.2 All fuses shall be of HRC cartridge type conforming to IS:9228 mounted on plug-in type fuse bases. Miniature circuit breakers with thermal protection and alarm contacts will also be accepted. All accessible live connection to fuse bases shall be adequately shrouded. Fuses shall have operation indicators for indicating blown fuse condition. Fuse carrier base shall have imprints of the fuse rating and voltage.

3.17 Motors

Motors shall be "Squirrel Cage" three phase induction motors of sufficient size capable of satisfactory operation for the application and duty as required for the driven equipment and shall be subjected to routine tests as per applicable standards. The motors shall be of approved make.

3.17.1 Enclosures

a) Motors to be installed outdoor without enclosure shall have hose proof enclosure equivalent to IP 55 as per IS: 4691. For motors to be installed indoor i.e. inside a box, the motor enclosure, shall be dust proof equivalent to IP 44 as per IS: 4691.

b) Two independent earthing points shall be provided on opposite sides of the motor for bolted connection of earthing conductor.

c) Motors shall have drain plugs so located that they will drain water resulting from condensation or other causes from all pockets in the motor casing.

d) Motors weighing more than 25 Kg. shall be provided with eyebolts, lugs or other means to facilitate lifting.

3.17.2 Operational Features

a) Continuous motor rating (name plate rating) shall be at least ten (10) percent above the maximum load demand of the driven equipment at design duty point and the motor shall not be over loaded at any operating point of driven equipment that will rise in service.

b) Motor shall be capable at given rated output without reduction in the expected life span when operated continuously in the system.

3.17.3 Starting Requirements

a) All induction motors shall be suitable for full voltage direct-on-line starting. These shall be capable of starting and accelerating to the rated speed along with the driven equipment without exceeding the acceptable winding temperature even when the supply voltage drops down to 80% of the rated voltage.

b) Motors shall be capable of withstanding the electrodynamic stresses and heating imposed if it is started at a voltage of 110% of the rated value.

c) The locked rotor current shall not exceed six (6) times the rated full load current for all motors, subject to tolerance as given in IS: 325.

d) Motors when started with the driven equipment imposing full starting torque under the supply voltage conditions specified under Clause 15.0 shall be capable of withstanding at least two successive starts from cold condition at room temperature and one start from hot condition without injurious heating of winding. The motors shall also be suitable for three equally spread starts per hour under the above referred supply condition.

e) The locked rotor withstand time under hot condition at 110% of rated voltage shall be more than starting time with the driven equipment of minimum permissible voltage by at least two seconds or 15% of the accelerating time whichever is greater. In case it is not possible to meet the above requirement, the Bidder shall offer centrifugal type speed switch mounted on the motor shaft which shall remain closed for speed lower than 20% and open for speeds above 20% of the rated speed. The speed switch shall be capable of withstanding 120% of the rated speed in either direction of rotation.

3.17.4 Running Requirements

a) The maximum permissible temperature rise over the ambient temperature of 50 degree C shall be within the limits specified in IS:325 (for 3 - phase induction motors) after adjustment due to increased ambient temperature specified.

b) The double amplitude of motor vibration shall be within the limits specified in IS: 4729. Vibration shall also be within the limits specified by the relevant standard for the driven equipment when measured at the motor bearings.

c) All the induction motors shall be capable of running at 80% of rated voltage for a period of 5 minutes with rated load commencing from hot condition.

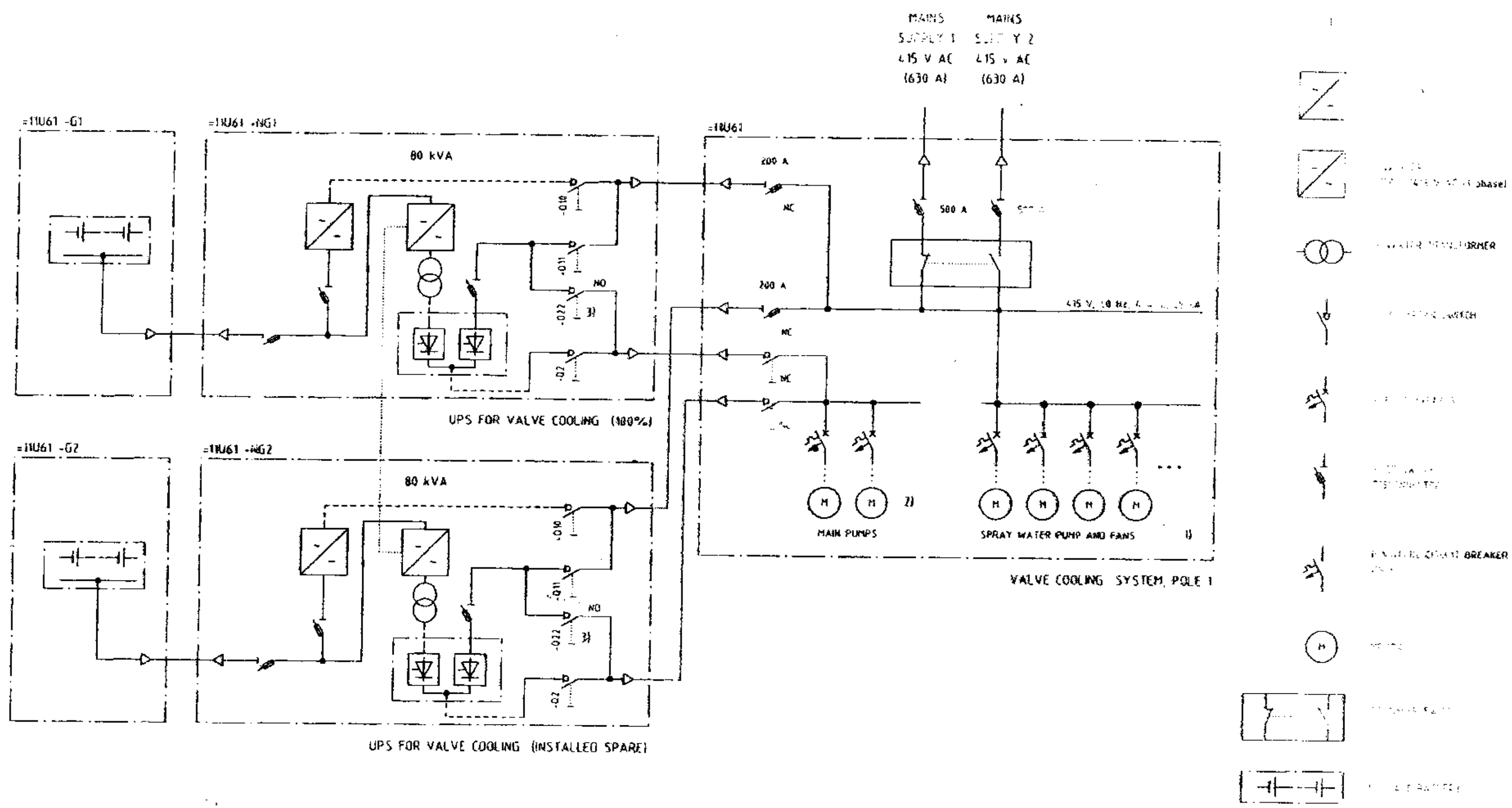
3.18 Testing and Commissioning

An indicative list of tests is given below. Contractor shall perform any additional test based on specialities of the items as per the field Q.P./Instructions of the equipment Contractor or Purchaser without any extra cost to the Purchaser. The Contractor shall arrange all instruments required for conducting these tests along with calibration certificates and shall furnish the list of instruments to the Purchaser for approval.

a) Insulation resistance.

b) Phase sequence and proper direction of rotation.

c) Any motor operating incorrectly shall be checked to determine the cause and the conditions corrected.



SCOPE OF SUPPLY:

=11U61 +NG1, =11U61 -G1 (CONVERTER STATION BALLIA)
=11U61 +NG2, =11U61 -G2 (CONVERTER STATION BALLIA)
=12U61 +NG1, =12U61 -G1 (CONVERTER STATION BALLIA)
=12U61 +NG2, =12U61 -G2 (CONVERTER STATION BALLIA)

=21U61 +NG1, =21U61 -G1 (CONVERTER STATION BHIWADI)
=21U61 +NG2, =21U61 -G2 (CONVERTER STATION BHIWADI)
=22U61 +NG1, =22U61 -G1 (CONVERTER STATION BHIWADI)
=22U61 +NG2, =22U61 -G2 (CONVERTER STATION BHIWADI)

1) PART OF VALVE COOLING SYSTEM

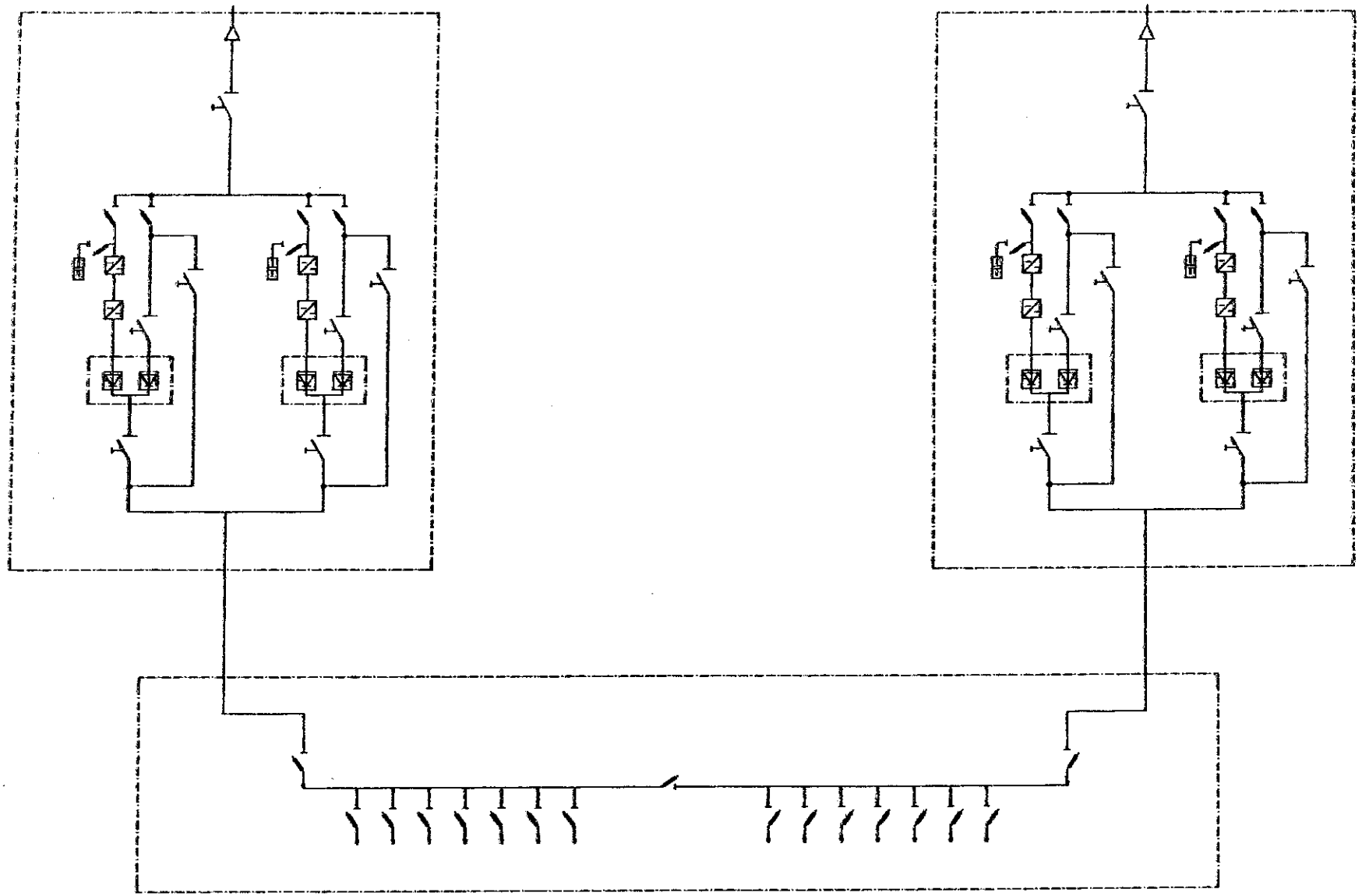
2) ONE MOTOR IN OPERATION, ONE MOTOR STANDBY

3) MANUAL BYPASS MUST BE BLOCKED IN PARALLEL OPERATION

FOR QUOTATION ONLY

PTDH121/P-004364/T03.271.APP1.CAH

Date 10.09.2007	HVDC BALIA - BHIWADI	Siemens AG
Drawn BREMER	2500MW DC 500kV	ELECTRICAL STATION SERVICES
Appr. FLEISCH	Orig./Repl.f./Repl.by	UPS FOR VALVE COOLING
Rev. Remarks Date Name Norm		Block diagram



DISTRIBUTION BOARD FOR UPS FOR HMI MONITOR PRINTRS ETC

SKETCH NO. 1