		<b>Project Engineering Management Bharat Heavy Electricals Limited (A Govt. Of India Undertaking)</b>		
<b>Enquiry</b>		<b>Phone</b>	<b>01204368960</b>	
		<b>Email</b>	<b>akashverma@bhhelpem.co.in karuna@bhhelpem.com</b>	
		<b>web:</b>	<b>www.bhel.com www.bhhelpem.com</b>	
<b>Notice Inviting Tender</b>				
<b>TWO PART BID Tender to be submitted in two parts</b>	<b>Enquiry Number: &amp; Enquiry date</b>	<b>E-5237/2016</b>	<b>Due date and time for submission of quotation:</b>	<b>20-June-2016</b>
		<b>27-May-2016</b>		<b>14:00 Hrs</b>

Nature of enquiry	Open Tender Enquiry		
Project	1X800 MW TSGENCO KOTHAGUDAM TPP		
Package	DC BATTERY CHARGER		
Scope	As per Tech Spec No	PE-TS-410-508-E002	
Detail tender documents are uploaded on websites	www.bhel.com www.bhhelpem.com		


Bidders are requested to quote the Enquiry number, date and due date in all your correspondences. This is only a request for quotation and not an order. Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before due date of tender opening. For office address refer point no 03 on page no 1 of 5

S.NO	Description	Quantity	Delivery
1	DC BATTERY CHARGER as per tech spec no PE-TS-410-508-E002	As per BOQ cum price schedule	<b>A. Delivery of Main Supply:</b> Within four (04) months from the date of documents approval in CAT-I / CAT-II. Vendor shall submit drgs/docs within 15 days from the date of PO and Every re-submission (if any) incorporating all BHEL/Customer comments shall be within 10 days from comments. In case there are delays of submission/re-submission of drawings/documents beyond above stated schedule, that much days of delay would be reduced from delivery period. <b>B. Delivery Schedule of Mandatory Spares:</b> Mandatory Spares and Tools & tackles (if any) are to be delivered along with the last consignment of main supply within the contractual delivery period. <b>C. Supervision of E&amp;C:</b> Vendor shall depute their representative to site for carrying out site activities within 2 weeks of intimation by BHEL subject to site readiness.

**Important points to be taken care during submission of offer**


1)	The offers of the bidders who are on the banned list as also the offers of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site <a href="http://www.bhel.com/vender_registration/vender.php">http://www.bhel.com/vender_registration/vender.php</a> .
2)	All corrigenda, addenda, amendments, time extensions, clarifications, etc. to the tender will be hosted on BHEL website (www.bhel.com) & BHEL-PEM website (www.bhhelpem.com) only. Bidders should regularly visit websites to keep themselves updated. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.
3)	Your best quotation/offer for the above requirement, in line with our terms and conditions (hosted on our website, as indicated above), should either be delivered in person or sent by COURIER/REGISTERED or SPEED POST, to the following address only: <b>Tender Room Bharat Heavy Electricals Ltd., Project Engineering Management PPEI Building, HRD &amp; ESI Complex, Plot No. 25, Sector - 16A, NOIDA - 201 301 (U.P.) Attention: 1) Mr. AKASH VERMA, (PG-II-2, ENGINEER), 2) Mr. Karuna Kaushik, (PG-II-2, Deputy Engineer) E-MAIL: akashverma@bhhelpem.co.in; karuna@bhhelpem.co.in Ph. No. PHONE 0120-4368960, 0120-4368569</b>

*Verma*  
27/5/16


		<b>Project Engineering Management Bharat Heavy Electricals Limited (A Govt. Of India Undertaking)</b>			
<b>Enquiry</b>		<b>Phone</b>	<b>01204368960</b>		
		<b>Email</b>	<b>akashverma@bhhelpem.co.in karuna@bhhelpem.com</b>		
		<b>web:</b>	<b>www.bhel.com www.bhhelpem.com</b>		
<b>Notice Inviting Tender</b>					
<b>TWO PART BID Tender to be submitted in two parts</b>		<b>Enquiry Number: &amp; Enquiry date</b>	<b>E-5237/2016 27-May-2016</b>	<b>Due date and time for submission of quotation:</b>	<b>20-June-2016 14:00 Hrs</b>


		B) Bidders to furnish scope matrix which should be clearly defined between foreign bidder and their Indian representative along with the offer for the Main Supply and Erection & Commissioning.
19)	MSE Suppliers	MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM II certificate having deemed validity (five years from the date of issue of acknowledgement in EM II) or valid NSIC certificate or EM II certificate along with attested copy of a CA certificate (Format enclosed at Annexure-1 where deemed validity of EM II certificate of five years has expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 in case of two part bid). Non submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in the above required documents are not submitted before price bid opening. Documents should ne notarized or attested by a Gazetted officer.
20)	Online Registration Portal	Online Registration Portal is operational in BHEL. Non-registered Vendors, who wish to apply for registration with BHEL-PEM, have to apply through Online Registration Portal available at www.bhhelpem.com -> vendor section -> Online Supplier Registration. All credentials and/or documents duly signed and stamped related to registration has to be uploaded on the website and submit the application for registration. One set of hard copy of the filled-up SRF downloaded from Online Registration Portal duly signed and stamped has to be submitted.
21)	Address for any correspondence	Bharat Heavy Electricals Ltd. Project Engineering Management PPEI Building, HRD & ESI Complex, Plot No. 25, Sector - 16A, NOIDA - 201 301 (U.P.)  1) Mr. AKASH VERMA,(PG-II-2,ENGINEER) 2) Mr. Karuna Kaushik,(PG-II-2,Deputy Engineer) E-MAIL: akashverma@bhhelpem.co.in;karuna@bhhelpem.co.in Ph. No. PHONE 0120-4368960,0120-4368569
22)	Basis for quotation	Indigenous Bidders to quote on FOR site basis and foreign bidders to quote on C&F Mumbai Sea Port basis (INSURANCE shall be in BHEL scope as per clause no 17.0 of GCC Rev 06). However FOR site price for foreign bidder will be calculated by loading their C&F mumbai sea port price as per GCC rev 06.
23)	Regret Letter	In case you are not making an offer against this enquiry, you are requested to send a regret letter so as to reach us on or before the due date & time.

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27/5/16

		<b>Project Engineering Management Bharat Heavy Electricals Limited (A Govt. Of India Undertaking)</b>			
<b>Enquiry</b>          <b>Notice Inviting Tender</b>		<b>Phone</b>	<b>01204368960</b>		
		<b>Email</b>	<b>akashverma@bhhelpem.co.in</b> <b>karuna@bhhelpem.com</b>		
		<b>web:</b>	<b>www.bhel.com</b> <b>www.bhhelpem.com</b>		
<b>TWO PART BID</b> <b>Tender to be submitted in</b> <b>two parts</b>		<b>Enquiry</b> <b>Number: &amp;</b> <b>Enquiry date</b>	<b>E-5237/2016</b>  <b>27-May-2016</b>	<b>Due date and</b> <b>time for</b> <b>submission</b> <b>of quotation:</b>	<b>20-June-2016</b>  <b>14:00 Hrs</b>


<b>10)</b>	<b>Prices</b>	Prices shall remain firm as per GCC REV 06
<b>11)</b>	<b>Freight Charges Percentage</b>	For Indigenous Supplies, Bidders have to quote freight charges in percentage of quoted Total Ex-works prices.
<b>12)</b>	<b>Fraud Prevention Policy</b>	The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website <a href="http://www.bhel.com">http://www.bhel.com</a> and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.
<b>13)</b>	<b>Evaluation</b>	Evaluation shall be done on over all L1 basis (Total cost to BHEL)
<b>14)</b>	<b>Part of tender document</b>	Bidders to note that following forms the part of Tender Documents : A) General Conditions of Contract (GCC) Rev. 06 B) Technical Specification No PE-TS-410-508-E002 C) Price format D) Special Conditions of Contract (SCC REV 01 of project) E) Financial PQR. F) NIT CONDITIONS & other Enclosures  Bidders to note that offers shall be submitted strictly in accordance with the requirements of the above Tender Documents & all the above Tender Documents along with post-bid agreements/MoMs (during Techno-Commercial evaluation) shall automatically become the part of the Order/Contract after its finalisation.
<b>15)</b>	<b>Bidders not registered in BHEL PEM</b>	The bidders (who are not registered with BHEL-PEM) to download the Supplier Registration Form (SRF) from <a href="http://www.bhel.com">www.bhel.com</a> or <a href="http://www.bhhelpem.com/Vendor%20Corner.aspx">http://www.bhhelpem.com/Vendor%20Corner.aspx</a> and submit the same duly filled in along with credentials- experience list, performance certificates and other statutory data to our Vendor Development section with intimation to us.
<b>16)</b>	<b>Deviations (if any) in Annexure II</b>	Bidders to note that Deviations (if any) are to be listed only in 'Annexure II: Deviation Sheet' of GCC Rev. 06. Any deviation mentioned or shown separately or found hidden in offer, will not be taken cognizance of.
<b>17)</b>	<b>Foreign bidders quoting along with their Authorised Indian associates</b>	Foreign bidders quoting along with their Authorised Indian associates to comply with BHEL corporate circular AA:MM:AGENCY dated 06th August 2010 for the guidelines regarding dealings with Indian agents of Foreign bidders (as enclosed).
<b>18)</b>	<b>Joint Bidding</b>	In case of joint bidding please note following:- A) Consent letter is required for acceptance of part order by foreign bidder and balance by Indian vendor. Total overall responsibility including submission of BG of the contract shall be the foreign bidder.


  
 27/5/16


		<b>Project Engineering Management Bharat Heavy Electricals Limited (A Govt. Of India Undertaking)</b>		
<b>Enquiry</b>  <b>Notice Inviting Tender</b>		<b>Phone</b>	01204368960	
		<b>Email</b>	akashverma@bhhelpem.co.in karuna@bhhelpem.com	
		<b>web:</b>	www.bhel.com www.bhhelpem.com	
<b>TWO PART BID Tender to be submitted in two parts</b>	<b>Enquiry Number: &amp; Enquiry date</b>	E-5237/2016 27-May-2016	<b>Due date and time for submission of quotation:</b>	20-June-2016 14:00 Hrs

<b>Terms and condition</b>		
<p>Vendors are requested to read the following points / guidelines / instructions and ensure that the offer is prepared and submitted strictly as per the requirements. Offers with insufficient details would not be considered for evaluation. The following points / guidelines / instructions are part and parcel of the tender and non-compliance will result in rejection of offer.</p>		
1)	<b>General Guidelines and instructions while submitting offer</b>	Bidders are advised to go through the GCC Rev-06 while submitting the offers. Bidders may download GCC Rev 06 from following link ( <a href="http://bhhelpem.com/Documents/GCC/GCC-Rev.06.pdf">http://bhhelpem.com/Documents/GCC/GCC-Rev.06.pdf</a> )
2)	<b>Integrity pact</b>	Not Applicable
3)	<b>Pre-Qualifying Requirements</b>	Bidders have to provide the required details as per TECHNICAL PRE-QUALIFICATION REQUIREMENT CRITERIA (enclosed as NIT Tender Documents) in their Techno-Commercial offer. Bids of only those bidders shall be evaluated who meet the Technical Pre-Qualifying requirements.
4)	<b>Submission of offer</b>	Bidders have to submit their offers in line with clause no. 2.0 of "Instructions to Bidders" of GCC Rev. 06.
5)	<b>Conditional Enquiry</b>	Bidders have to note that this is a conditional OPEN Tender enquiry. Price bid (Part-II) opening/RA participation of those bidders, who are not approved by end Customer, shall be subjected to following: <ul style="list-style-type: none"> <li>a) Approval of bidder by the customer. Same shall be taken up by BHEL with the customer based on the credentials/reference list being submitted by the bidder.</li> <li>b) Clause no. 2.2 of GCC Rev06.</li> </ul>
6)	<b>Order of precedence</b>	Bidders have to note that TERMS AND CONDITIONS of the tender shall be as per Notice Inviting Tender (NIT) conditions, Special Conditions of Contract (SCC) of Project & General Conditions of Contracts (GCC, Rev. 06) Order of precedence shall be as per clause NO. 35.0 Of GCC Rev. 06 (GENERAL COMMERCIAL TERMS & CONDITIONS).
7)	<b>Price bid (Part-II) opening/RA participation</b>	Price bid (Part-II) opening/RA participation of those bidders, who are not approved by end Customer, shall be subjected to approval of bidder by the customer. Same shall be taken up by BHEL with the customer based on the credentials/reference list being submitted by the bidder.
8)	<b>Reverse Auction (RA)</b>	Bidders have to note that BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. For details refer clause no. 13.0 of "Instructions to Bidders" of GCC Rev. 06.
9)	<b>CIF</b>	CIF is not available for subject package of subject project. For any import, if any, shall be on merit basis.

*Sharma*  
27/5/16

		<b>Project Engineering Management Bharat Heavy Electricals Limited (A Govt. Of India Undertaking)</b>		
<b>Enquiry</b>     <b>Notice Inviting Tender</b>		<b>Phone</b>	<b>01204368960</b>	
		<b>Email</b>	<b>akashverma@bhhelpem.co.in karuna@bhhelpem.com</b>	
		<b>web:</b>	<b>www.bhel.com www.bhhelpem.com</b>	
<b>TWO PART BID Tender to be submitted in two parts</b>	<b>Enquiry Number: &amp; Enquiry date</b>	<b>E-5237/2016  27-May-2016</b>	<b>Due date and time for submission of quotation:</b>	<b>20-June-2016  14:00 Hrs</b>

<b>24)</b>	<b>Digital Signature</b>	Foreign and indigenous bidders participating in subject tender will necessarily have to buy class III DSCs (Digital Signature Certificate) issued by the certifying authorities in India. Basic procedure /checklist is uploaded on www.bhel.com" for participating in future tender enquires through e procurement.
<b>25)</b>	All other terms and condition shall be applicable as per GCC rev 06,SCC rev 01 of project, NIT ,subsequent corrigendum( if any ) AND TECHNICAL SPECIFICATION PE-TS-410-508-E002	
Thanking You.  Yours faithfully, For and on behalf of BHEL  AKASH VERMA, (PG-II-2, ENGINNER)		
<b>Enclosures:</b> <ol style="list-style-type: none"> <li>1. Technical Specification No PE-TS-410-508-E002</li> <li>2. Price format/s</li> <li>3. Special Conditions of Contract Rev 01</li> <li>4. Technical PQR.</li> <li>5. BHEL corporate circular AA:MM:AGENCY dated 06th August 2010</li> <li>6. ANNEXURE-I (RA Guidelines)</li> <li>7. Annexure II – Deviation Sheet (Enclosed with Price schedule)</li> <li>8. Fraud Prevention Policy</li> </ol>		

	<b>PRE-QUALIFICATION REQUIREMENTS FOR DC BATTERY CHARGER</b>	PE-PQ-999-508-E002
		REVISION NO. 02 DATE 29/04/2016
		SHEET NO. 1 OF 1

**ITEMS :**

DC battery Charger, Battery Fuse Box and Discharge Resistor.

Vendor may be considered for evaluation for one or more of the following type of 220V/110 V DC battery chargers :

Type 1 - Static SCR type full wave fully Controlled, Rating 300A and above

Type 2 - IGBT Technology based, Rating 300A and above

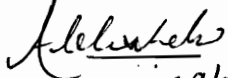
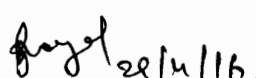
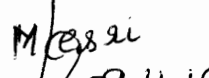
Type 3 - SMPS based, Rating 300A and above

**SCOPE:** Supply : YES; Erection & Commissioning : NO; Supervision of Erection & Commissioning : YES;

1	Vendor should be designer & manufacturer of the applicable type of Battery charger.
2	Availability of type test certificates conducted at independent Lab or witnessed by third party as per IS/ International standards for the applicable type of Battery charger.
3	In-house capability to carry out all routine and acceptance tests as per IS/ International standards for the applicable type of Battery charger.
4	<p>Option -1 : Performance certificates for min. 2 years of trouble free operation at two(2) different installations/sites for the applicable type of battery Charger. Performance certificate should be from end user only.</p> <p style="text-align: center;">OR</p> <p>Option-2 : Repeat order received from 2 different purchasers / end users for the applicable type of battery chargers during last 5 years provided the gap between award of two PO's is minimum 2 years.</p> <p style="text-align: center;">OR</p> <p>Option-3 : 1 no. performance certificate (as per Option-1) and 1 no. repeat order (as per Option-2).</p> <p style="text-align: center;">OR</p> <p>Option-4 : Successful execution of a major order for BHEL-PEM for the applicable type of battery Charger.</p>
5	Minimum two (2) nos. purchase orders for the applicable type of battery charger shall be submitted which should not be more than five(5) years old from the date of application for registration or date of techno- commercial bid opening (as applicable) for establishing continuity in business.

**NOTE:**

Supplier to comply to "general points of PQR" available at <http://bhhelpem.com/vensection/PMD/PMD.aspx>  
In case supplier is not OEM, the offer shall be evaluated as per point no 1 of "general points of PQR".

PREPARED BY  NAME: ABHISHEK DESIGNATION: Dy. Mgr.	REVIEWED BY  NAME: RAJNISH GOYAL DESIGNATION: AGM	APPROVED BY  NAME: MEENA KESRI DESIGNATION: AGM & DH(E)
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**BHEL PEM-ELECTRICAL**

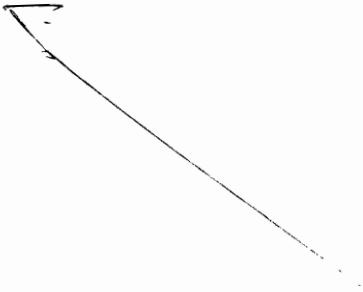
**PRE-QUALIFYING REQUIREMENTS FOR DC BATTERY CHARGER**

**ANNEXURE – I**

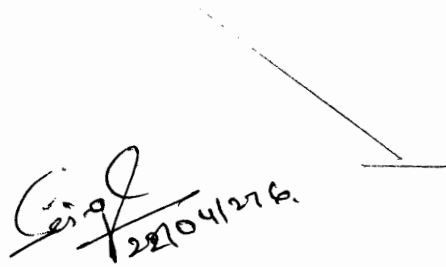
**PROJECT SPECIFIC CRITERIA AGAINST ENQUIRY**

**PROJECT: 1 X 800MW KOTHAGUDEM TPS**

- 1) Bidders should have manufactured and supplied at least two (2) numbers of static automatic voltage regulator type Battery Chargers of rating 500A and above, at least one (1) each at two (2) different industrial installations, which should be in successful operation for at least two (2) years as on 24/12/2014. Bidders to submit relevant documents in support of above.



[Dealing Engineer]



[Controlling Officer]

[Section Head]

[DH-Electrical]

**Bharat Heavy Electricals Limited**  
(A Govt. Of India Undertaking)  
POWER SECTOR, PROJECT ENGINEERING MANAGEMENT  
Power Project Engg. Institute, Plot No. 25, Sector 16 - A,  
HRDI & ESI Complex, NOIDA 201 301 (UP)



**SPECIAL CONDITIONS OF CONTRACT (REV 00)**

**FOR 1 X 800 MW KOTHAGUDEM STPP, UNIT # 12 Job No. 410**

These Conditions shall be read in conjunction with General Condition of Contract (GCC) enclosed along with the tender enquiry. In case of any conflict or inconsistency, the requirement of SCC shall prevail over the GCC.

1.0	Project Name	1X 800 MW KOTHAGUDEM STPP, UNIT# 12
2.0	Ultimate Customer (TSGENCO)	Telangana State Power Generation Corporation Ltd.
3.0	Location of Plant	<p><b>Location:</b> At Paloncha, Khamman District, Telangana State, India</p> <p><b>Access by:</b></p> <p><b>Nearest Railway Station:</b> Bhadrachalam road (known as Kothagudem) at a distance of 12km. Kothagudem – Bhadrachalam national highway branches off to the power station site near village Paloncha.</p> <p><b>Nearest Airport:</b> Vijayawada airport ( 128km near )</p> <p><b>Nearest sea port:</b> Vishakhapatnam Sea Port.</p> <p><b>Access by road:</b> 30KM from Bhadrachalam. 300KM from Hyderabad.</p> <p><b>Major Towns/ Cities:</b> Bhadrachalam, Palwancha and Yellandu.</p> <p><b>Availability of Land:</b> Within existing Thermal Power Station</p> <p><b>Latitude:</b> 170 36' 40"N.</p> <p><b>Longitude:</b> 800 42' 03"E.</p> <p><b>Elevation above MSL:</b> 89m.</p>
4.0	Consignee Address / BHEL Site Office Address	Later
	Notes:	<p>1. Consignee address in LR should be strictly as per Sl. No. 04.</p> <p>2. Vendor to note that to effect "Sale in Transit", BHEL shall issue "Delivery Note" to the Transporter for transferring the ownership from BHEL to customer (TSGENCO).</p> <p>Delivery note shall be carried by transporter along with other dispatch documents</p>
5.0	Buyer and Paying Authority	<p><b>A) For Inter-State sales (where CST is applicable):</b></p> <p>1. For those packages, for which PO is placed by BHEL-PEM -<u>PEM, Noida</u>.</p> <p>2. For those packages for which PO is placed by BHEL-PSWR &amp; LOA is issued by BHEL-PEM - <u>BHEL-PSSR, Chennai</u>.</p>
		<p><b>B) FOR Intra-State sales (where VAT is applicable):</b></p> <p>1. For those packages, for which PO is placed by BHEL-PEM-<u>Paying Authority shall be BHEL-PEM, Noida. However Buyer will be BHEL HPEP RC Puram Hyderabad</u>. Detailed requirements are enclosed as Annexure I which are to be followed strictly.</p> <p>2. For those packages for which PO is placed by BHEL-PSSR &amp; LOA is issued by BHEL-PEM -<u>Paying Authority shall be BHEL-PSSR, Chennai. However Buyer will be BHEL HPEP RC Puram Hyderabad</u>. Detailed requirements are enclosed as Annexure I which are to be followed strictly.</p>

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**Bharat Heavy Electricals Limited**  
(A Govt. Of India Undertaking)  
POWER SECTOR, PROJECT ENGINEERING MANAGEMENT  
Power Project Engg. Institute, Plot No. 25, Sector 16 - A,  
HRDI & ESI Complex, NOIDA 201 301 (UP)



6.0	Mode of Dispatch	By Road/Rail/Sea on Door Delivery and freight Pre-Paid Basis.
7.0	Road Permit Required	Later.
8.0	Transit Insurance	In Customer Scope.  Vendor shall inform the following details of dispatches to the Underwriter (refer details below) under intimation to BHEL-PEM and BHEL Site office:  (1) Policy No. (2) Consignee Name. (3) Consignment Details (items with their weights and value (in INR)). (4) Project Name and P.O. No. (5) LR No. and date, Despatch origin and destination details, Inv. No..
	Policy No.	Later.
	Underwriters	Later.
9.0	BHEL-PEM TIN No.	09765702874
10.0	Customer CST & VAT Nos.	TSGENCO CST No. - Later TSGENCO TIN / VAT No. - Later TSGENCO TAN No. - Later TSGENCO PAN No. - Later
11.0	Unloading at site	- By BHEL site office for Supply packages. (The Vendor shall furnish LR wise Gross Wt. of the consignment for the purpose of handling the consignment by BHEL site contractor).  - By Vendor for Turnkey i.e. Supply and Erection & Commissioning Packages.
12.0	Storage at site	- By BHEL site for Supply packages.  - By Vendor for Turnkey i.e. Supply and Erection & Commissioning Packages.
13.0	Movement of Material within Site	- By BHEL site for Supply packages.  - By Vendor for Turnkey i.e. Supply and Erection & Commissioning Packages.
14.0	Provision of facilities at Site (Applicable for Turnkey Packages)	<b>Construction Power:</b>  Construction Power at 11 KV level shall be provided at one point in the project "Site" free of cost.  <b>Construction Water:</b>  Construction water shall be provided free of cost at one point.
15.0	Inspection Agency (Domestic supplies)	Vendor shall give inspection call in line with approved QAP/Customer Hold Points to Regional BHEL-CQS center / Third Party Inspection Agency (as informed by PEM) on "BHEL CQS Website"; with a copy of inspection call to BHEL-PEM for arranging Customer/Third Party participation (Where ever applicable), with an advance notice of 15 days for participation in inspection/ Joint inspection on the proposed date. The MDCC shall be issued by customer based on the BHEL-CQS/TPIA report OR Joint inspection report of BHEL CQS/TPIA & Customer (Wherever applicable).

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16/12/14

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	<p>Inspection Agency (Imported supplies)</p>	<p>In case of Imported Supplies advance notice of 30 days for participation in inspection (if applicable, in line with approved QAP/Customer Hold Points) to be given.</p> <p>The Test Certificates &amp; Inspection reports duly accepted by the Foreign Vendor Inspection agency in line with approved QAP/Customer Hold Points shall be submitted to BHEL-PEM, NOIDA. The above Inspection reports &amp; Test certificates shall be reviewed by PEM-Engineering in line with the Technical Specifications &amp; Approved Data sheets and then sent to customer for their clearance. The customer dispatch clearance (MDCC) will be given to the Foreign Vendor or their representative in India through BHEL-PEM after acceptance/clearance of above test certificates by Customer.</p>
<p>16.0</p>	<p>Dispatch Documents required (to be furnished by Vendor for payment)</p>	<p><b><u>For Despatch Payment</u></b></p> <p><b>For materials originating from Indian Territory</b></p> <p>(a). One (1) original and Six (6) copies of the clean rail/lorry receipt.</p> <p><b>For payment</b> Receipted LR (signed &amp; stamped)/ confirmation from site regarding receipt of packages/ Boxes original / copy.</p> <p>(b). One (1) original and Six (6) copies of signed Invoices (Paying Authority along with TIN No. should be mentioned, for VAT cases Annexure-I to be followed).</p> <p>(c). One (1) original and Seven (7) copies of Challan and Packing List (clearly showing number of packages, gross weight and net weight).</p> <p>(d). Six (6) copies of inspection certificate, if any issued by the customer.</p> <p>(e). Eight (8) copies of Customer/BHEL MDCC.</p> <p>(f). Six (6) copies of Approved Test Certificates if any.</p> <p>(g). Delivery order- Two (2) copies.</p> <p>(h). Guarantee Certificate – One (1) Original + One (1) copy.</p> <p>(i). Insurance Intimation - Two (2) copies.</p> <p>(j). CQIR / Inspection Reports – One (1) Original + One (1) copy.</p> <p>(k). PVC Calculation and copy of all applicable indices, if PVC applicable. – Two (2) copies.</p> <p><b>For materials originating from non-Indian Territory</b></p> <p>(a). Three (3) original and Seven (7) copies of clean bill of lading or One (1) clean original Airway Bill &amp; Four (4) copies, in case of air freight.</p> <p>(b). One (1) original and Six (6) copies of signed Invoices (Paying Authority along with TIN No. should be Mentioned).</p> <p>(c). One (1) original and Seven (7) copies of Packing List (clearly showing number of packages, gross weight and net weight).</p> <p>(d). Six (6) copies of certificate of country of origin.</p>

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**Bharat Heavy Electricals Limited**  
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**POWER SECTOR, PROJECT ENGINEERING MANAGEMENT**  
**Power Project Engg. Institute, Plot No. 25, Sector 16 - A,**  
**HRDI & ESI Complex, NOIDA 201 301 (UP)**



		<p>(e). Eight (8) copies of Customer/BHEL MDCC.</p> <p>(f). Six (6) copies of inspection certificate, if any, issued by the customer/his authorised representative.</p> <p>(g). Six (6) copies of certificate from the vendor to the effect that drawings and catalogues for customs clearance purpose have been kept with the packages for shipment.</p> <p>(h). Six (6) copies of certificate from the vendor to the effect that the contents in each case are not less than that entered in the invoices and guaranteed as new and as per the relevant technical specifications.</p> <p>(i) Shipping Specification – One (1) copy.</p> <p>(j). Quality Certificate – One (1) copy.</p> <p>(k). Approved Test Certificates if any. - Six (6) copies.</p> <p>(l). Guarantee Certificate – One (1) Original + One (1) copy.</p> <p>(m). Inspection Reports – One (1) Original + One (1) copy.</p> <p>(n). PVC Calculation and copy of all applicable indices, if PVC applicable. – Two (2) copies.</p> <p><b>For Claiming Freight, MRC &amp; Services Payments refer GCC.</b></p>
17.0	Material Receipt Certificate (MRC).	<p><b>FOR Packages wherever E&amp;C is in the scope of Vendor, The vendor shall arrange Material Receipt Certificate from the project site, duly signed by Customer and BHEL-Site after receipt &amp; physical verification of the material at site.</b></p> <p><b>FOR Supply Packages, Material Receipt Certificate shall be arranged by BHEL-PEM. Vendor to provide copy of receipted LRs to enable BHEL-PEM to obtain MRC from site.</b></p>
18.A	Taxes & Duties (For Domestic Bidder)	<p>All bidders/vendors to note that this project is a NON Mega Power Project. However, Essentiality certificate shall be issued by TSGENCO (Customer) for availing concessional custom duty under project Import Regulations.</p> <p>Essentiality certificate shall be issued by TSGENCO through BHEL for the items to be imported by the vendor for specified items, limited to CIF content mentioned in the NIT, for availing concessional duty.</p> <p>The bidder has to indicate in their offer, the import contents (if any) for the package i.e. list of items along with qty., currency of import, country of import &amp; CIF value.</p> <p>Availability of CIF for the packages, if any, shall be intimated in NIT.</p>

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		<p>Concessional Sales Tax against issuance and exchange of form 'C' &amp; 'E1/E2' / VAT, as applicable, are to be quoted by the bidder in their offer.</p> <p>Bidders has to note that in order to derive the total Landed Cost to BHEL, following pricing elements shall also be considered in evaluation:</p> <ol style="list-style-type: none"> <li>i. ED (as applicable on self-manufactured items),</li> <li>ii. CST/VAT (as applicable),</li> <li>iii. Freight (including service Tax),</li> <li>iv. Service Tax ((as applicable for Supply Packages)</li> </ol> <p>However, Service Tax quoted in case of Turn-Key packages shall not be considered in evaluation.</p> <p>VAT for Intra-state despatch shall be paid subject to conditions specified in Annexure I.</p> <p>Wherever cenvat credit, if applicable could not be availed by BHEL within statutory time limit of six months(as per cenvat credit rule,2014) due to delay in submission of invoices or for any other reason attributable to bidder/contractor, liability towards loss of such cenvat credit(Excise duty/service tax etc.) should be passed on to bidders/contractors.</p> <p><b>Entry Tax/ Octroi:</b> If any, shall be payable extra at actuals by TSGENCO. Hence, the same should not be considered in the offer.</p>
18.B	<p>Taxes &amp; Duties  (For Order Directly to Foreign Bidders)</p>	<p>In case of Order on foreign Vendor, the dispatches shall be on FOB (Port of Dispatch) basis and the Taxes Duties in the country of dispatch (origin) shall be borne by Foreign Bidder &amp; to be accounted in the prices quoted to BHEL/PEM/NOIDA.</p> <p>The taxes duties applicable in India shall be borne by BHEL/PEM/NOIDA as port clearance/handling in India shall be done by BHEL-PEM/BHEL ROD for the direct order placed by PEM to the foreign bidder.</p> <p>Evaluation shall be done as per provisions of GCC.</p>
19.0	<p>Packing, Identification &amp; marking</p>	<ul style="list-style-type: none"> <li>• The supplier shall include and provide for securely protecting and packing the materials so as to avoid loss or damage during handling &amp; transport by air, sea, rail and road.</li> <li>• All packing shall allow for easy removal and checking at site. Special precaution shall be taken to prevent rusting of steel and iron parts during transit by sea. Gas seals or other materials shall be adopted by the Contractor for protection against moisture during transit.</li> <li>• The number of each package in a shipment shall be shown in fraction, numerator showing number of the package and the denominator showing total number of packages in a lot / consignment. The packages number shall be generally prepared in the sequence in which they will be required for erection.</li> <li>• Each package delivered under the Contract shall be marked by and at the expense of the supplier and such marking must be distinct and in English language (all previous irrelevant markings being carefully obliterated). Such marking shall show the description and quantity of contents, the name and</li> </ul>

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		<p>address of consignee, the gross weight and net weight of the package, the name of the Contractor with a distinctive number of mark sufficient for purposes of identification. All markings shall be carried out with such materials as to ensure quickness of drying, fastness and indelibility. Each equipment or parts of equipment shall, when shipped or railed or otherwise dispatched be tagged with reference to the assembly drawings and corresponding part numbers. Each bale or package shall contain a packing note quoting specifically the name of the Contractor, the number and date of contract and the name of the office placing the contract, nomenclature of the stores and include a schedule of parts for each complete equipment giving the part numbers with reference to the assembly drawing and the quantity of each part, drawings nos. and tag numbers.</p> <ul style="list-style-type: none"> <li>• Rotor bearings should not be used as a support while packing.</li> <li>• Besides wherever necessary, packing shall bear a special marking "TOP", "BOTTOM", "DO NOT TURN OVER", "KEEP DRY", "HANDLE WITH CARE", etc.</li> <li>• All packing cases, containers (excluding marine container), packing and other similar materials shall be new.</li> <li>• Notwithstanding anything stated in this clause, the Contractor shall be entirely responsible for loss, damage or depreciation or deterioration to the materials &amp; supplies due to faulty and/or insecure packing.</li> <li>• One copy of respective standard manufacturer's erection instruction/operation instruction manual shall be kept in each package/container for immediate reference.</li> <li>• Each and every package box shall be marked with the following, as a minimum:             <ul style="list-style-type: none"> <li>(i). Name and address of Consignee :</li> <li>(ii). Project reference :</li> <li>(iii). Contract No.:</li> <li>(iv). Packing No.: (1/10, 2/10, 3/10 ..... when there are 10 packages For one consignment)</li> <li>(v). Net Weight/Gross Weight :</li> <li>(vi). Port of Loading :</li> <li>(vii). Destination Port: Vishakhapatnam Sea Port.</li> <li>(viii). Packing Mark : [symbols indicating "TOP" and other special markings as per clause 10.10.(4) &amp; 10.10.(6) above]</li> <li>(ix). Type of Equipment :                 <ul style="list-style-type: none"> <li>"E" (for Equipment supply)</li> <li>"T" (for Tools &amp; Tackles)</li> <li>"S" (for Mandatory Spares)</li> </ul> </li> </ul> </li> <li>• Two copies of packing list should be kept in case/package No. 1 of each consignment of the goods and four copies in each case (three inside the box and one copy in a special packet at the outer side of the Box).</li> </ul>
20.0	Commissioning spares	<p>The commissioning spares shall be properly packed separately in separate box and each spare shall be properly tagged giving details (to match the description given in the packing slip) to facilitate their proper identification. Three copies of packing list is to be kept inside the box and one copy in a special packet at the outer side of the Box.</p>

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21.0	Mandatory Spares	The Mandatory spares shall be properly packed separately in separate box indicating Mandatory Spares in bold letters and each spare shall be properly tagged giving details i.e. item number of the equipment in line with the Ultimate Customer Contract & Number per item (to match the description given in the packing slip) to facilitate their proper identification by ultimate customer M/s TSGENCO. Three copies of packing list along with Manufacturing drawing no. Reference, Catalogue reference etc. is to be kept inside the box and one copy in a special packet at the outer side of the Box.		
22.0	Submission of Final Drawing / Documents along with O&M Manual, Type Test Certificates (if any)	As per GCC/ Technical specification/ Kickoff meeting.		
	Prepared By	Checked & Reviewed By	Vetted By Finance	Approved By
Name:	NAINA SINGH	ANUJ KUMAR	checked w.r.t.	PERMINDER SINGH
Designation:	DY. MGR.	DGM	taxes & duties	AGM/DH
Signature:	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
Date:	16/12/14	16/12/14	17/12/14	17/12/14

based on <sup>mkp</sup> confirmation.

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Annexure-I

SPECIAL CONDITIONS OF CONTRACT (REV 00)

FOR 1 X 800 MW KOTHAGUDEM STPP, Job No. 410

In order to avail the benefit of input tax credit available to BHEL in case of VAT leviable on intra-state transaction between BHEL and vendor, & to fulfill the compliances as per requirements of applicable State's VAT law, the following modality shall be applicable:

BHEL has identified a nodal agency in each State to take care of VAT compliances in the State in which project is located. For the subject project nodal agency shall be:

BHEL, HPEP, RC Puram Hyderabad, Medak- 502 032  
VAT TIN No. 36360151179

Nodal agency is defined as Buyer in such cases, where VAT is applicable.

Vendors' original tax invoice for intra State transactions is one of important documents for availing Input Tax credit. In this regard the following may be noted by all vendors for strict compliance:

- As a general rule, a tax invoice must be original, must contain vendor's TIN No with full address, invoice no & date, product description with unit rate, quantity, value, VAT rate, VAT amount, gross value of bill, **buyer i.e. BHEL's address with TIN No**, (as given above) special marking like "Original" and/or "valid for input credit"/ Buyer can take credit against this" etc as per applicable State VAT law.
- Please note that BHEL's address and TIN to be mentioned in vendors tax invoice shall be **principal place of business & applicable TIN No. of nodal agency of BHEL, as given above. In no case the vendors, invoices shall be addressed to BHEL PEM nor shall they contain our TIN as buyer.**
- As original tax invoice of vendors are to be furnished to nodal unit for assessment/VAT audit purposes, extra copy of Original invoice is required to be submitted by vendors for retaining with bank payment voucher.
- Original tax invoice along with extra copy of Original Tax invoice in line with respective state VAT law shall be essential document to be submitted by vendor for claiming payment.
- Vendor shall also furnish a certificate/statement/document as prescribed under applicable State VAT law. Please note that some of the States requires additional certificate/documents e.g. Haryana requires certificate in form C-4 in addition to original tax invoice.
- Please note that reimbursement/payment of VAT shall be subject to furnishing of Vat complaint tax invoice and other certificate/document as per applicable State VAT law.
- Tax invoice must show Vat rate & VAT amount separately and in no case all inclusive prices is to be shown in the tax invoice since input credit is not admissible in case VAT is not indicated separately.
- In case vendor is unable to furnish Vat compliant tax invoice & other certificate/document, VAT shall not be reimbursed by BHEL.

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# BHEL FRAUD PREVENTION POLICY

## 1.0 Introduction

BHEL, a public sector enterprise, is an integrated power plant equipment manufacturer and one of largest engineering and manufacturing company in India engaged in design, engineering, manufacturing, construction, testing, commissioning and servicing of a wide range of products and services for core sectors of the economy viz. Power, Transmission, Industry, Transportation, Renewable energy, Oil & Gas and Defense.

All organizations are subject to risks of fraud. Frauds negatively impact the reputation and brand value of organization. Vigilant handling of fraud cases within organisation sends clear signals to the public, stakeholders and regulators about the management attitude towards fraud risks and organisation's fraud risk tolerance.

All levels of management, staff, internal and external auditors have responsibility for dealing with fraud risk.

Section 143(3) (i) of the Company Act, 2013 requires auditors to report about the adequacy of internal Financial controls in the Company and the operating effectiveness of such controls. Further, as per General Direction issued by C&AG vide circular No. 294/CA-II/Cord/A/cs instructions/30-2008 dated 22.04.2010, auditors are required to comment on Risk of Frauds in their reports.

BHEL has already put in place various policies, systems and procedures to guide employees for undertaking various transactions within and outside organisation to conduct the same in a transparent & uniform manner e.g. Purchase Policy, Works Policy along with Delegation of Powers (DOP), HR Policy, Conduct, Discipline and Appeal Rules for employees, Standing Orders etc. Keeping in view the BHEL approach in following Corporate Governance principles proactively, it is appropriate that a Fraud Prevention Policy is formulated and implemented

## 2.0 Policy Objectives

2.1 Objective of the Policy is to provide a system for detection, prevention and reporting of a fraud detected or suspected; and handling of such matters pertaining to fraud.

2.2 The Policy is expected to ensure and provide for the following:

2.2.1 To ensure that management is aware of its responsibilities for detection and prevention of fraud and for establishing procedures for preventing fraud and/or detecting fraud when it occurs.

## BHEL FRAUD PREVENTION POLICY

2.2.2 To provide a clear guidance to employees and others dealing with BHEL forbidding them from involvement in any fraudulent activity and the action to be taken by them where they suspect any fraudulent activity;

2.2.3 To conduct investigations into fraudulent or suspected fraudulent activities; and

2.2.4 To provide assurance that any and all suspected fraudulent activity/ activities will be fully investigated.

2.2.5 To provide training on fraud prevention and identification.

### 3.0 Scope of Policy

The policy applies to fraud or suspected fraud in connection with business transactions with BHEL committed by employees, ex-employees working as advisors/ consultants, persons engaged on adhoc / temporary/ contract basis, vendors, suppliers, contractors, customers, lenders, consultants, service providers, any outside agencies or their employees/ representatives, or any other parties.

### 4.0 What is Fraud?

4.1 Fraud is any intentional act or omission designed to deceive others, resulting in the victim suffering a loss and/or perpetrator achieving a gain.

4.2 As per Section.447(1) of The Companies Act, 2013 Fraud is defined as follows:

- **"fraud"** in relation to affairs of a company or anybody corporate, includes (a) any act, (b) omission, (c) concealment of any fact or (d) abuse of position committed by any person or any other person with the connivance in any manner -
  - with intent to deceive,
  - to gain undue advantage from, or
  - to injure the interests of the company or its shareholders or its creditors or any other person, whether or not there is any wrongful gain or wrongful loss
- **"Wrongful gain"** means the gain by unlawful means of property to which the person gaining is not legally entitled.
- **"Wrongful loss"** means the loss by unlawful means of property to which the person losing is legally entitled.

## BHEL FRAUD PREVENTION POLICY

### 5.0 Actions Constituting Fraud

5.1 While fraudulent or suspected fraudulent activity could have a very wide range of coverage, the following are some of the act(s) which constitute fraud.

5.2 The list given below is only illustrative and not exhaustive:-

5.2.1 Forgery or unauthorised alteration of any document or account belonging to the Company

5.2.2 Forgery or unauthorised alteration of cheque, bank draft, E-banking transaction(s) or any other financial instrument etc.

5.2.3 Misappropriation of funds, securities, supplies or others assets by fraudulent means etc.

5.2.4 Falsification of records, submitting fake claims or claims with altered documents / supporting, removing the documents from the files and / or replacing it by a fraudulent one etc.

5.2.5 Wilful suppression of facts/deception in matters of appointment, placements, submission of reports, tender committee recommendations etc. as a result of which a wrongful gain(s) is/are made to one and wrongful loss(s) to the others.

5.2.6 Utilizing Company funds / assets for personal or other than official purposes.

5.2.7 Verification and authorization / certification of bills for payment (goods / services) without completion of supply / completion of works as per Purchase Order / Work Order.

5.2.8 Destruction, disposition, removal of records or any other assets of the Company with an ulterior motive to manipulate and misrepresent the facts so as to create suspicion/suppression/cheating as a result of which objective assessment/decision would not be arrived at.

5.2.9 Wilful delay in reporting recoveries / adjustments from suppliers / vendors bills.

5.2.10 Allowing / unauthorized use of Company assets by outsiders like vendors / suppliers / sub-contractors.

5.2.11 Any other act that falls under the gamut of fraudulent activity.

# BHEL FRAUD PREVENTION POLICY

## 6.0 Responsibility for Fraud Prevention

6.1 Following personnel's are responsible to ensure that there is no fraudulent act committed by them while performing any business transaction(s) with BHEL:

- Every employee
- Ex-employee working as advisor / consultant
- Person engaged on adhoc/temporary/contract basis
- Vendor / supplier / contractor / bidder / service provider
- Customer / Consultant
- Lender
- Any outside agency / their representative / employee who have a business relationship with BHEL

6.2 As soon as it is learnt that a fraud or suspected fraud has taken or is likely to take place, same should immediately be reported to Nodal officer

## 7.0 Nodal Officers and their Responsibility

### 7.1 Nodal Officer

Nodal officers shall be notified by management. All Direct Reporting Officers (DROs) to Unit Head / Construction Managers to be designated as Nodal Officers. List of Nodal Officer(s) would be displayed at BHEL web site / Intranet.

### 7.2 Fraud Prevention and Detection

All Nodal Officers shall be responsible for implementing the Fraud Prevention Policy of the Company and prevention and detection of fraud as per this Policy. It is the responsibility of all Nodal Officers to ensure that complete mechanism in respect of Fraud Prevention Policy is in place within his administrative / functional area of control.

#### 7.2.1 Fraud Prevention

7.2.1.1 Create an ethical and transparent environment by training and implementing policies, guidelines and procedures.

7.2.1.2 Familiarise each employee with the types of improprieties that might occur in their area.

7.2.1.3 Educate employees regarding the measures to be taken for prevention and detection of fraud.

## BHEL FRAUD PREVENTION POLICY

7.2.1.4 Create a culture whereby employees are encouraged to report any fraud or suspected fraud which comes to their knowledge, without any fear of victimization.

7.2.1.5 Promote awareness among the employees of ethical principles subscribed to by the Company through CDA Rules/Standing orders.

7.2.1.6 Maintain record of complaints/cases received and submit annual report to Nodal Officer in Corporate Finance.

### 7.2.2 Fraud Detection

Ensure that along with preventive controls, Detective mechanism are also in place. Some examples of detective mechanism are segregation of duties, reconciliation, audits, independent reviews, physical inspection, periodic inventory check, surprise checks etc.

## 8.0 Reporting of Fraud

8.1 All employees of BHEL, representative of vendors, suppliers, contractors, consultants, service providers or any other agencies doing any type of business with BHEL as soon as he / she comes to know of any fraud or suspected fraud or any other fraudulent activity must report such incident. Such reporting shall be made to the designated Nodal Officers.

The reporting of the fraud normally should be in writing. In case the reporter is not willing to furnish a written statement of fraud but is in position to give sequential and specific transaction of fraud / suspected fraud, then the officer receiving the information/Nodal Officer should record such details in writing as narrated by the reporter and also maintain the details about the identity of the official/ employee / other person reporting such incident.

In case the reporter ask for protection, the protection available under Clause 5.0 of Whistle Blower Policy of Company notified vide Corporate HR Circular no. 024/LLX/2014 dated 16.09.2014 shall be extended to the reporter.

8.2 All reports of fraud or suspected fraud shall be handled with utmost speed and shall be coordinated by Nodal Officers

8.3 Officer receiving input about any suspected fraud / Nodal officers shall ensure that all relevant records, documents and other evidence are immediately taken into custody and protected from being tampered with, destroyed or removed by suspected perpetrators of fraud or by any other official under his influence.

# **BHEL FRAUD PREVENTION POLICY**

## **9.0 Investigating Procedure**

9.1 The "Nodal Officer" shall act as co-ordinator and refer the details of the fraud/suspected fraud to Unit head for intimating the same to the concerned Director. The Director after considering report of Nodal Office / Unit head may refer the case to Internal Auditor (IA) or Corporate Vigilance for further investigation.

9.2 This input would be in addition to the intelligence, information and investigation of cases of fraud being investigated by the Vigilance Deptt. on their own as part of their day to day functioning.

9.3 After completion of the investigation, appropriate action which could include administrative action, disciplinary action, civil or criminal action or closure of the matter if it is proved that fraud is not committed etc. depending upon the outcome of the investigation shall be undertaken.

9.4 Vigilance Department or IA shall report to concerned Director the result of the investigation undertaken by them to seek orders for further action.

## **10.0 Incorporation of Fraud Prevention Policy in Tenders /MOUs etc.**

10.1 A clause may be added in all the NITs that

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

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

## **11.0 Administration and Review of the Policy**

The Chairman and Managing Director, BHEL shall be the Appropriate Authority for administration and revision of this Policy.

## ANNEXURE II

## DEVIATION SHEET (COST OF WITHDRAWAL)

PROJECT:- 1X800 MW TSGENCO KOTHAGUDAM TPP

PACKAGE :DC BATTERY CHARGER

NAME OF VENDOR:-

SL NO	VOULME/ SECTION	PAGE NO.	CLAUSE NO.	TECHNICAL SPECIFICATION / TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWL OF DEVIATION	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWL OF DEVIATION (POSITIVE/ NEGATIVE)	REASON FOR QUOTING DEVIATION
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**TECHNICAL DEVIATIONS**


**COMMERCIAL DEVIATIONS**


**PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE**

NAME	DESIGNATIONS	SIGN & DATE

**NOTES:**

- For self manufactured items of bidder, cost of withdrawal of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.
- For directly dispatchable items, cost of withdrawal of deviation will be applicable on the basic price including taxes, duties & freight.
- All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format.
- Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of.
- Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawal of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable.
- Bidder shall furnish price copy of above format along with price bid.
- The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser.
- Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered.
- For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawal of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not
- Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be accepted.
- All techno-commercial terms and conditions of NIT shall be deemed to have been accepted by the bidder, other than those listed in unpriced copy of this format.
- Cost of withdrawal is to be given separately for each deviation. In no event bidder should club cost of withdrawal of more than one deviation else cost of withdrawal of such deviations which have been clubbed together shall be considered as NIL.
- In case nature of cost of withdrawal (positive/negative) is not specified it shall be assumed as positive.
- In case of discrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.

**Terms & Conditions of Reverse Auction**

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

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit 'online sealed bid' in the Reverse Auction. Non-submission of 'online sealed bid' by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.
3. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.
4. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.
5. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.
6. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.
7. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.
8. Reverse auction will be conducted on scheduled date & time.
9. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.

10. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, (Annexure VII) as provided on case-to-case basis to Service provider within two working days of Auction without fail.
11. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL's standard practice.
12. Bidders shall be required to read the "Terms and Conditions" section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the 'Business Rules of Reverse Auction', which will be communicated before the Reverse Auction.
13. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per extant BHEL guidelines*, shall be initiated by BHEL and the results of the RA scrapped/ aborted.
14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.
15. In case BHEL decides to go for reverse auction, the H1 bidder(s) (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

**TELANGANA STATE POWER GENERATION  
CORPORATION LIMITED**

**1X800MW KOTHAGUDEM TPS**

**VOLUME – IIB**

**TECHNICAL SPECIFICATION  
FOR  
220V DC BATTERY CHARGER**

**SPECIFICATION NO: PE-TS-410-508-E002, R0**



**BHARAT HEAVY ELECTRICALS LIMITED  
POWER SECTOR  
PROJECT ENGINEERING MANAGEMENT  
NOIDA, UP (INDIA) – 201301**



**TECHNICAL SPECIFICATION FOR  
220V DC BATTERY CHARGER**

**1X800 MW KOTHAGUEDEM TPS**

**SPECIFICATION NO. PE-TS-410-508-E002**

**VOLUME II B**

**SECTION**

**REVISION 0**

**SHEET**

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TOTAL NO. OF SHEETS = 70 (INCLUDING COVER/ SEPARATOR SHEETS)

IT IS CONFIRMED THAT OUR TECHNICAL OFFER COMPLIES WITH THE SPECIFICATION IN TOTO, &  
THAT THERE ARE NO TECHNICAL DEVIATIONS.

-----  
BIDDER'S STAMP & SIGNATURE  
(REFER INSTRUCTION NO. 1 OF INSTRUCTION TO BIDDERS)



**TECHNICAL SPECIFICATION FOR  
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**INSTRUCTIONS TO BIDDERS FOR PREPARING TECHNICAL OFFERS**

1. Two signed and stamped copies of the following shall be furnished by all bidders as technical offer:
  - a. Unpriced Price Schedule (Annexure-I: BOQ & price schedule, as enclosed with the specification) with “Quoted” word against each item, bidder’s signature and company stamp.
  - b. A copy of this sheet (“Instructions to Bidders for Preparing Technical Offer”), with bidder’s signature and company stamp.
  - c. A copy of previous sheet (“List of Contents”), with bidder’s signature and company stamp.
  - d. A copy of (“Deviation Schedule”), with “NO DEVIATION” and bidder’s signature and company stamp.
  - e. Datasheet-B duly filled with bidder’s signature and company stamp.
2. No technical submittal such as copies of type test certificates, data Sheets, write-up, drawing, technical literature, etc. is required during tender stage. Any such submission, even if made, shall not be considered as part of offer.
3. Confirmations/ comments (if any) regarding delivery schedules shall be furnished as part of the commercial offer. Any reference elsewhere/ covering letter of technical offer shall not be considered by BHEL.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder’s covering letter shall not be considered by BHEL, and bidder’s offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the charger description/ quantities, notes etc. from those given in Annexure-I to Section-C of specification [Bill Of Quantities] shall not be considered (i.e., technical description, quantities, notes etc. as per specification shall prevail).

-----  
BIDDER'S STAMP & SIGNATURE



**TECHNICAL SPECIFICATION FOR  
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**1X800 MW KOTHAGUDEM TPS**

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**PREAMBLE**

1.0 The Tender documents contains three (3) volumes. The bidder shall meet the requirements of all three volumes.1.1

**VOLUME - I CONDITIONS OF CONTRACT**

This consists of four parts as below:-

- Volume – IA** This part contains Instructions to bidders for making bids to BHEL.  
**Volume – IB** This part contains General Commercial Conditions of the Tender & includes provision that vender shall be responsible for the quality of item supplied by their sub-vendors.  
**Volume – IC** This part contains Special Conditions of Contract.  
**Volume – ID** This part contains Commercial conditions for Erection & Commissioning site work, as applicable.

1.2 **VOLUME – II TECHNICAL SPECIFICATION**

Technical requirements are stipulated in Volume – II, which comprises of:-

- Volume – IIA** General Technical Conditions.  
**Volume – IIB** Technical Specification including Drawings, if any.

1.3 **VOLUME – IIB**

This volume is sub-divided in to following sections:-

- Section – A** This section outlines the Intent of Specification  
**Section – B** This section provides “Project Information”.  
**Section – C** This section indicates Technical Requirements specific to Contract.  
**Section – D** This section indicates General Technical Requirements.

**Data sheet - A :-** Specific data and other requirements pertaining to the equipment.

**Data sheet – B: -** To be duly filled by Bidder and furnished with the Technical offer.

**Data sheet – C: -** Indicates data / documents to be furnished after the award of Contract as per agreed schedule by the vendor (as applicable).

**Quality plan**

2.0 **This requirements mentioned in Section – C / Data Sheet – A shall prevail and govern in case of conflict between the same and the corresponding requirements mentioned in the descriptive portion in Section – D( General Technical Requirements).**



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**VOLUME II B**

**SECTION -A**

**1 X 800 MW KOTHAGUEM TPS**

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## **SECTION-A**

### **SCOPE OF ENQUIRY**

- 1.0 This specification covers the design, manufacture, inspection and testing at manufacturer's works, proper packing and delivery to site of 220V DC Battery Chargers as mentioned in different sections of this specification for **1 X 800 MW KOTHAGUEM TPS**.
- 2.0 It is not the intent to specify herein all the details of design & manufacture. However, the equipment shall conform in all respects to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation up to bidder's guarantee.
- 3.0 The general terms and conditions, instructions to bidders and other attachment referred to elsewhere are hereby made part of the Technical Specification.
- 4.0 The bidders shall be responsible for and governed by all requirements stipulated hereinafter.
- 5.0 Deviations, if any should be brought at very clearly on deviation sheet enclosed with specification only, Otherwise it will be presumed that the bidder's offer is in line with what has been stated/ asked for in this specification.
- 6.0 The offer should be complete with technical data, catalogue, brochures and drawings as applicable.
- 7.0 The documents shall be in English language and MKS system of units.



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**SECTION-B**  
**PROJECT INFORMATION**

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## CONTENT

CLAUSE NO.	DESCRIPTION
1.00.00	INTRODUCTION
2.00.00	APPROACH TO SITE
3.00.00	LAND
4.00.00	SOURCE OF COAL
5.00.00	SOURCE OF WATER
6.00.00	ASH DISPOSAL AREA
7.00.00	SALIENT DESIGN DATA

## PROJECT SYNOPSIS AND GENERAL INFORMATION

### 1.00.00 INTRODUCTION

The proposed 1x800 MW Kothagudem Thermal Power Station (KTPS), Stage-VII, Unit-12 would be set up by Telangana State Power Corporation Ltd. (TSGENCO) at Kothagudem, Telangana. The proposed Power Plant will be installed adjacent to the existing D colony of Kothagudem Thermal Power Station, at Kothagudem.

The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given here in under is for general guidance and shall not be contractually binding on the Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.

### 2.00.00 APPROACH TO SITE

Site is located in the existing D Colony of Kothagudem Thermal Power Station, which is at a distance 30 km from temple town of Bhadrachalam and 300 km from Hyderabad by road. The Nearest railway station is Bhadrachalam Road (Known as Kothagudem) at a distance of 12 km. Kothagudem- Bhadrachalam National Highway branches off to the power station site near village Paloncha.

### 3.00.00 LAND

Land is primarily required for the main plant & auxiliaries (BTG) and balance of plant (BOP) like ash handling, coal storage, cooling tower, switchyard etc., which is available within the existing plant boundary.

The existing colony is to be dismantled, and the land of about 137 acres will be used for the main plant building, water facilities, switchyard, coal handling etc. The raw water reservoir will be located adjacent to the existing raw water reservoirs.

230 acres of land required for Ash Dyke will be procured. Land is available for staff colony, which is to be constructed by the EPC contractor.

### 4.00.00 SOURCE OF COAL

100% Imported and Blended coal (50% imported + 50% indigenous) will be used. Indigenous coal shall be sourced from Suliaryi coal mines, Madhya Pradesh.

5.00.00 SOURCE OF WATER

Source of water (total quantity of water is 2192 m<sup>3</sup>/hr) is Godavari River near Burgampahad & water will be pumped through existing GRP pipe line (of length approx. 26 km).

6.00.00 ASH DISPOSAL AREA

Ash shall be dumped in the ash dump area which will be about 9 km from plant. The ash dyke area of 230 acres is adequate for 1x800 MW unit as per MOEF norms.

7.00.00 SALIENT DESIGN DATA

7.01.00 Meteorological data of site is given below:-

Elevation above MSL : 89 m

Monthly highest temperature : 44.9 °C

Monthly lowest temperature. : 12.9 °C

Rainfall

Average.: 1031 mm

Max. : 100 mm/ hr

Mean Wind speed : 5.8 kmph

Relative Humidity

Max : 82%

Min : 35%

Seismic Zone : Zone-III as per IS- 1893 (Part-IV)

~~[Climatological data of Khammam is attached for reference].~~



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## **SECTION – C**

### **SPECIFIC TECHNICAL REQUIREMENTS**



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### 1.0 SCOPE OF ENQUIRY

This specification covers the design, manufacture, assembly, testing and inspection at vendor's/sub-vendor's works, packing and despatch to site, Supervision of commissioning & testing of 220V DC battery charger as described in the various sections of this specification. The equipment shall generally conform to IS. In this specification though erection and commissioning is not included in vendor's scope, the vendor shall still not be absolved of his responsibility of establishing the correctness of equipment at site.

### 2.0 EQUIPMENT AND SERVICES TO BE FURNISHED BY THE BIDDER

The bidder shall supply the equipment in accordance with the various sections of this specification. The bill of material is enclosed as Annexure-I.

### 3.0 SERVICES AND EQUIPMENT TO BE EXCLUDED

- A) Civil works like foundation and cable cellar, flooring of the charger room etc.
- B) Ventilation of charger room
- C) DCDB
- D) Battery
- E) Erection & commissioning of the equipment
- F) Power and control cables except internal wiring of charger

### 4.0 SYSTEM CONCEPT

#### 4.1 Main Plant 220V DC SYSTEM:

220V DC system shall be an ungrounded system comprising of two sets of batteries (2X100%) with associated one no.(1) of float cum-boost (FCB) charger and one no.(1) of float charger (FC) for each battery, one no. (1) Common standby float cum-boost (FCB) charger and one sectionalised 1X100% DCDB. The 220V DC system is designed to cater the control, protection, interlocking, emergency lighting and emergency dc drives for main plant and associated station (excluding CHP & Switchyard). The load duty cycle and typical single line diagram for 220V battery and charger connections for Main Plant is enclosed as Annexure-II and Annexure-III respectively.

#### 4.2 Raw Water PH 220V DC SYSTEM:

220V DC system shall be an ungrounded system comprising of two sets of batteries (2X100%) with associated one no. (1) float cum-boost (FCB) charger for each battery, one no. (1) Common float cum-boost (FCB) charger and one sectionalised 1X100% DCDB. The 220V DC system is designed to cater the control, protection, interlocking for Raw Water PH area. The load duty cycle and typical single line diagram for 220V battery and charger connections for Raw Water PH is enclosed as Annexure-IV and Annexure-V respectively.



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- 4.3 Each float cum boost charger will have a 'FLOAT/BOOST' selector switch for selection of battery charging mode. 'AUTO/MANUAL' selector switch for selection of battery charging control mode along with voltage/ current setter for both FC and FCB charger shall be provided. The float cum boost charger shall have provision for float equalising, and boost charging the battery through manual selection. The boost mode selection in the selector switch should give start command to the FC charger and stop command in case of float mode selection through suitable mechanism.

Under normal conditions, the 'FLOAT/BOOST' selector switch shall be in float mode. Float charging current of the battery shall be supplied by the FCB charger, which is continuously monitored. In case this current exceeds a certain value, the FCB charger can be switched over to 'BOOST' mode manually for charging at a higher rate only after load-isolating breaker is open. Now the FC charger will cater the load and battery is charged by FCB in boost mode. When the battery is fully charged, the FCB charger shall manually brought back to 'FLOAT' mode by closing the isolating breaker manually and Float charger shall switch off.

- 4.4 Under normal conditions, FCB charger will cater continuous loads and trickle charging current to batteries. In case of failure of AC, battery will meet the DC load requirement. After restoration of power, the FCB charger will supply the loads as well as trickle charge the battery. Under discharge condition, battery will be put to boost charge by FCB charger while the FC charger will continue to supply DC loads. In boost mode, FCB chargers are suitable to charge the fully discharged battery (at end cell voltage of 1.80V) up to 2.75V/ cell in 10 hours.

- 4.5 Suitable electrical interlock will be provided in the charger to ensure that boost charging can commence only after the relevant load-isolating breaker in the DCDB is open. This ensures availability of both redundant feeders to the loads when any charger is isolated from the system for boost charging. However, in case of failure of any FCB charger, the common stand by FCB charger will take over automatically and feed in corresponding section of DCDB and provide trickle charging to associate battery. The operational philosophy/mechanism of DC SYSTEM shall be developed by vendor and decided during detailed engineering for approval of BHEL/TESGENCO without any commercial implication to BHEL.

- 4.6 Chargers designed for single and parallel operation with battery and shall be provided with following features:

- The charger output regulation shall be  $\pm 1\%$  from no load to full load (0% load to 100% load) with an input power supply voltage & frequency variation on feeding System. (Voltage variation: -15% to 10%, frequency variation: +3% to -5% and Combined voltage and frequency variation: 10%).
- The charger will be provided with automatic digital voltage regulation in float mode and automatic constant current regulation in boost mode.
- Ripple content at rated continuous load will be limited to  $\pm 1\%$  peak to peak.



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- DC voltage setting adjustment of AVR for float charging will be  $\pm 10\%$  of nominal voltage.
  - DC current adjustment for boost charging will be 30% to 100% of maximum boost charging current. Output voltage shall be adjustable between 240-297V.
  - Current stabilization for constant current regulator for boost charging will be  $\pm 2\%$ .
  - The rectifier transformer shall have  $\pm 2 \times 2.5\%$  taps on primary side.
  - Minimum permissible power factor at rated continuous load will be 0.8
  - Voltage stabilization for constant voltage regulation will be:
    - (a)  $\pm 1\%$  of set DC voltage with -15% to 10% variation in supply voltage.
    - (b)  $\pm 5\%$  during transient.
  - One moving coil DC voltmeter and ammeter of size 96x96 mm of suitable range For each charger with necessary shunts for local and remote metering.
  - Each battery charger shall be provided with one (1) no. Voltage transducer and one (1) no. Current transducer for monitoring the DC output and as analog input to DDCMIS. Each charger shall also be provided with "DC Voltage transducer" for monitoring the battery output Voltage and as analog input to DDCMIS. These transducers shall have twin-channel output of 4-20mA.
- 4.7 The rectifier shall utilize diodes / thyristors and heat sinks rated to carry 200% of the load Current continuously.
- 4.8 The voltage at load terminal will not exceed the limits of +10% and -15% of nominal System voltage for 220V DC system. The output voltage of float charger shall be adjustable between 230V to 240V.
- 4.9 Chargers will be suitable for continuous operation at AC voltage variation of -15% to 10%, frequency variation of +3 to -5% and combined voltage and frequency variation of 10% (absolute).
- 4.10 The 220V DC power cable between battery to DCDB and charger to DCDB will be single core copper cable (BHEL scope). The HRC fuse box shall be located near battery. The Main HRC fuse on battery and charger output shall also have alarm contact.
- 4.11 The charger shall be designed to operate at an ambient air temperature of 50°C. It will be located indoor but in a hot, humid and tropical atmosphere.
- 4.12 Suitable annunciation in DDCMIS shall be provided like charger trouble, battery on Boost mode etc. Further 4-20mA signals to DDCMIS shall be provided for important Parameters like charger O/P voltage, Charger O/P current and battery voltage. Charger panels shall also be provided with charger I/P & O/P Voltmeter & Ammeter, battery Voltmeter & Ammeter.
- 4.13 The float-cum-boost charger and Float charger panels will house load terminals, meters, annunciators and LED type indicating lamps.



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4.14 Meters shall be provided with necessary shunts for local and remote metering. The instruments shall be flush mounted type, dust proof, moisture resistant and should have easy accessible means for zero adjustment.

4.15 For ungrounded DC system, suitable ground fault detection system shall be provided in the battery charger panel to detect the ground fault on either polarity for annunciation in the charger panel.

**5.0 ALARM, PROTECTION, METERING AND INDICATIONS**

5.1 Fault indicating lamps for battery and chargers shall be provided on charger cubicle.

5.2 Each charger shall have minimum twelve point alarm facia to be provided with audio visual alarm annunciation arrangement, actuating devices, circuitry, legend and push buttons (accept, reject and test), and hooter for the following important alarms for various abnormal conditions. Also the initiating contacts shall be provided for remote alarm for each of the chargers. The alarms shall be provided on the CRT in the control room.

- AC supply failure
- AC Input fuse blown
- Charger over load
- DC system under voltage
- DC system over voltage
- DC system earth fault
- Charger overload
- SCR fuse blown
- Filter fuse blown
- Battery on boost charge
- Charger fail
- Float cum boost charger in float mode
- Battery earth fault
- DC output fuse blown

For all above alarms, a group alarm for each charger "Battery charger Trouble" shall be provided on the DDCMIS/ Electrical control panel (ECP). Separate contacts shall be provided for "Battery earth fault" annunciation at remote.

Initiating contacts for all alarm points shall also have electrically separate spare set of contacts wired to the terminal block for future use. On occurrence of a fault, the corresponding window will light up and stay lighted until the fault is cleared and the reset button is pressed. In addition, any additional indication / alarms considered necessary during detailed engineering shall also be provided without any commercial implication. Each battery charger shall have minimum two (2) nos. spare annunciation channels and window facia. All alarm contacts shall be rated 5.0A at 220V DC and 10 Amp. at 240V AC

5.3 Following protections are to be provided for battery and chargers:



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- Under voltage protection for DC system
- Over voltage protection for DC system
- Current limiting and AC under voltage protection for chargers
- Over current protection on DC side
- Fuse for short circuit protection of the battery
- Earth fault protection for DC system
- Fuse failure indication on DC side

5.4 Each charger panel shall be provided with the following meters. Meters shall be 96 x 96 mm switchboard type, 90 deg scale, antiglare glass, accuracy class 2.0, with zero adjuster on the front.

- AC input voltmeter with Voltmeter Selector switch
- AC input ammeter with Current Selector switch
- One (1) D.C. ammeter (for charger output, Range 0 – 150% of rated full Load charger output) .
- One (1) D. C. voltmeter (for charger output)
- One (1) D. C. voltmeter (for battery output voltage)
- One (1) D. C. ammeter for Battery charging/ discharging current (Centre zero type Ammeter)
- One (1) D.C. ammeter for monitoring trickle charging current.
- Shunts for local and remote metering.
- Voltage selectors switch to measure DC bus voltage between positive to earth, negative to earth and positive to negative.

5.5 Each Charger shall be equipped with LCD display, so the system or particular module operation parameters can be locally or remotely viewed / monitored. Following parameters to be displayed:

- Input AC voltage
- Input AC current
- Charging voltage
- Charging current
- Load voltage
- Load current
- Battery voltage
- Battery current

5.6 Following minimum indications with cluster LEDs will be provided on each charger panel:

- Charger power supply ON (at all three phases)
- Charger D.C. output healthy
- Control supply ON
- Annunciation DC healthy
- FCB in boost mode



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- FCB in float mode
- FCB in Equalising mode

5.7 The charger panels shall be provided with lamp, heater and receptacle circuits shall have individual ON-OFF switch fuse units/MCCB:

- Internal illumination lamp with door switch, the lamp shall be located in the ceiling and guarded with protective cage.
- Space heater with thermostat control.
- 5 pin 6A receptacle with plug.
- Individual switch fuse unit for lamp, heater and receptacle circuits
- Communication plug

### 6.0 PORTABLE SINGLE CELL BOOST CHARGER

Portable single cell boost charger shall be supplied with all accessories like input & output cables, Glands & Lugs/ connectors, trolley, ammeter etc. It will be used for boost charging a cell while operating as part of a battery bank, even if another charger is connected, without removing it from service. Length of input cable & output cable shall be minimum 40m and 20m respectively for each charger.

### 7.0 DISCHARGE RESISTOR

Portable type battery discharge resistor panels shall be supplied with shunt suitable for 10 hrs. Discharge rate as per battery capacities indicated in the BOQ cum price schedule (Annexure-I).

Resistor Unit shall be an assembly consisting of copper-nickel alloy wire grid elements supported by stainless steel tie rods. The resistor bank shall have adequate trimming facility (coarse and fine) to maintain a constant current against falling voltage during discharge operation. An ammeter shall be provided on the unit to monitor discharge current of battery. The Discharge resistor panel terminal shall be made suitable for connection to the single string battery or batteries connected in parallel.

### 8.0 BATTERY FUSE BOX

Battery fuse of adequate rating meeting the load duty cycle (ANNEXURE-II for Main Plant Battery and Annexure-IV for Raw Water PH Battery) shall be supplied. Battery fuse box shall have suitable termination arrangement for terminating the cables informed during detailed engineering stage.

Minimum rating of Battery Fuse Box shall be as indicated in the BOQ cum price schedule (Annexure-I).

9.0 All busbars and bus connections shall be adequately sized to limit the maximum Temperature rise to 40°C under rated load condition. The maximum allowable Temperature rise shall be 55°C at joints. All bus connections shall be shrouded.



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10.0 Bidder to furnish list of sub-vendor(s) for bought out items. Make of equipment / components shall be subject to BHEL/TESGENCO approval after award of contract without any commercial implication.

11.0 For the purpose of design an ambient temperature of 50 deg.C and relative humidity of 85% shall be considered.

**12.0 TESTS ON CHARGER**

12.1 Following routine tests will be conducted on charger:

- Visual checks for dimensions and general arrangement
- Wiring checks
- Functional checks
- Voltage regulation for rated input supply for loads from 0-100% with  $\pm 10\%$  input voltage variation
- Load test to show the charger can deliver the rated duty without the current limiter device operating/ Load limiter test
- Ripple measurement by oscilloscope at different loads
- Demonstration of guaranteed efficiency and power factor
- Insulation test with 500V megger (Dielectric test)
- High voltage test, excluding electronic controller, at 2kV AC for one minute
- Routine test on components parts

12.2 Following type tests will be conducted on charger:

- **Heat run test to be conducted on all chargers. The test is to be conducted on all Ten (10) chargers applicable as per BOQ cum price schedule (Annexure-I) as given below.**
  - a) 3 Nos. Charger at BOQ (Annexure-I) Sl. No. 1
  - b) 2 Nos. Charger at BOQ (Annexure-I) Sl. No. 2
  - c) 3 Nos. Charger at BOQ (Annexure-I) Sl. No. 4
  - d) 1 No. Charger at BOQ (Annexure-I) Sl. No. 3
  - e) 1 No. Charger at BOQ (Annexure-I) Sl. No. 5

**12.3** Refer quality plan enclosed with this specification for detailed testing requirement. The Quality plan shall be subject to BHEL/ customer approval after award of contract without any commercial or delivery implication. Inspection shall be carried out as per BHEL/ customer approved Quality plan.

13 Bidder has to submit test certificates for their bought out items.

14 DELIVERY: Delivery of equipment shall be as per NIT.

**15 TECHNICAL AND QUALITY DOCUMENTATION TO BE SUBMITTED**

15.1 By All Bidders



**TECHNICAL SPECIFICATION FOR  
220V DC BATTERY CHARGER**

**SPECIFICATION NO. PE-TS-410-508-E002**

**VOLUME II B**

**SECTION -C**

**1 X 800 MW KOTHAGUDEM TPS**

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As technical offer:

- (i) Unpriced Price Schedule (Annexure-I, BOQ as enclosed with the specification) with bidder's signature and company stamp.
- (ii) A copy of the sheet "Instructions to Bidders for Preparing Technical Offer" with bidder's signature and company stamp.
- (iii) A copy of sheet "List of Contents" with bidder's signature and company stamp.
- (iv) A copy of ("Deviation Schedule"), with "NO DEVIATION" and bidder's signature and company stamp.
- (v) Data sheet – B duly filled by bidder with bidder's signature & company stamp.

15.2 Documents to be submitted after award of contract shall be as given in Annexure-VI.

15.3 No. of prints to be submitted by vendor after award of contract shall be as per Annexure-VII.

**16 PROVENNESS CRITERIA (PROJECT SPECIFIC PRE QUALIFICATION CRITERIA)**

a) Vendor should have manufactured and supplied at least two (2) numbers of static automatic voltage regulator type Battery Chargers of rating 500A and above, at least one (1) each at two (2) different industrial installations, which should be in successful operation for at least two (2) years as on 24/12/2014.

b) Bidders to submit relevant documents in support of above.

17. Bidders to offer the chargers of optimized dimension and preferably within the size Mentioned below (for chargers mentioned at BOQ Item Sl. No. 1 & 2)

- a) 220V, 850A FCB Charger at BOQ Sl. No. 1 : 3000mm (Width) x 1200mm(Depth) x 2400mm(height)
- b) 220V, 570A Float Charger at BOQ Sl. No. 2 : 2000mm (Width) x 1200mm(Depth) x 2400mm(height)

## 18 Battery Charger

### 18.1 General

- Chargers mentioned at BOQ Annexure-I, Sl. No.1 shall be forced/ natural air cooled and chargers mentioned at BOQ Annexure-I, Sl. No.2,3,4,5 shall be natural air cooled. All chargers shall be solid-state type with full wave,fully controlled, bridge configurations.
- a) Chargers mentioned at BOQ Annexure-I, Sl. No.1 shall be forced/ natural air cooled and chargers mentioned at BOQ Annexure-I, Sl. No.2,3,4,5 shall be natural air cooled. All chargers shall be solid-state type with full wave,fully controlled, bridge configurations.
  - b) The charger shall be provided with (but not limited to) microprocessor based automatic voltage control, current limiting circuitry, smoothing filter circuit and soft-start feature, under/ over voltage protection and earth fault detection.
  - c) Voltage/current control shall be stepless, smooth and continuous. Voltage control shall be possible either in "Auto" mode or in "Manual" mode. An "Auto-Manual" selector switch shall be provided for this purpose.
  - d) The charger shall be self-protecting against all AC and DC transients and steady state abnormal currents and voltages.
  - e) Charger AC input and DC output shall be electrically isolated from each other and also from panel ground.
  - f) Isolation shall also be provided between power and control circuits.
  - g) Radio frequency suppressor/screening shall be provided with the charger to limit the noise level/interference to radio and other communication equipment to be installed in the same building.

### 18.2 Construction

- a) The charger shall comprise a continuous line up of free-standing, floor mounted sheet steel panels, with access from both from front as well as from rear.
- b) -DELETED-

- c) The panel shall conform to the degree of protection IP 42. Minimum thickness of sheet metal used shall be 2 mm for load bearing members and 1.6 mm for non-load bearing members.
- d) Access doors shall be with concealed hinges and neoprene gaskets. Ventilating louvers shall be covered with fine wire mesh. Door over 600 mm width shall be of double-leaf design.
- e) -DELETED-
- f) All indicating instruments, control switches etc. shall be flush mounted on the front face of the panels. However potentiometer shall be provided inside the panel. Nameplates of approved size and type shall be provided for all circuits and devices both at front & inside of the panel.
- g) All bus bar and bus connections shall be of high conductivity copper and adequately sized to limit the maximum temperature within the permitted value. All bus connection shall be silver plated.
- h) Heat –shrinkable insulating sleeves shall be provided for bus bars. All bus connections shall be color coded for easy identification.
- i) Bus bars shall be supported and braced to withstand the stress due to maximum short circuit current and also to take care of any thermal expansion.

### 18.3 Charger Equipment

- a) All power diode and control rectifiers shall be silicon type. Rectifier transformer shall be resin impregnated in vacuum, dry type, double wound with copper conductor and class-F insulated with temperature rise limited to class-B having off-circuit tap  $\pm 2.5\%$  on primary side. LC filter suppressor shall be provided in the output to minimize ripple content and to keep the value within the specified limit.
- b) The diode & bridge elements shall be liberally sized for forward current, minimum momentary overloads & voltage spikes. The current & peak inverse voltage (PIV) should be chosen accordingly. Wherever necessary power semiconductor device shall be provided with over current and over temperature protection by using special fuses.  

Blocking diodes shall be fully rated and shall have redundancy so that failure of a single diode shall not incapacitate the system in any way.
- c) Isolating switches shall be heavy duty, load break type, operated by an external handle with provision for padlocking in ON & OFF position.
- d) AC Changeover switch shall be 3 position, 4 pole, load break type with 2 NO + 2 NC auxiliary contacts. The switch shall be installed in such a manner that the operating handle shall be accessible only after opening the front door.

- e) Double pole, double throw DC switch shall be load break type with 2 NO + 2 NC auxiliary contacts.
- f) Control switches shall be dust protected, heavy duty, switchboard type complete with escutcheon plates. Contacts shall be silver plated, rated 10A at operating voltage.  
  
Selector switch shall be maintained contact, lockable stay-put type with knob handle. Meter selector switch shall be four-position type.  
  
Ground fault detection switch shall be three-position type spring return to neutral.
- g) Push button shall be heavy duty, shrouded, push to actuate type with colored button and inscription plate. Each push button shall have 2 NO + 2 NC contacts, rated 10A at 240V AC and 5.0A at 220V DC.
- h) Contactor shall be air-break type with hand reset type thermal overload relays having in built temperature compensator and single phase preventor. Contactor duty class shall be AC-3.
- i) Fuses shall be HRC type, mounted on insulated fuse carriers, which are mounted on fuse bases. Wherever it is not possible to mount fuses on carriers, fuses shall be directly mounted on plug-in type of base. In such cases, one set of insulated fuse pulling handles shall be supplied with each board. Kick-off fuses (trip fuses) with alarm contacts shall be provided for all DC fuses. Semi conducting device fuses shall be fast-acting. All upstream fuses shall be properly coordinated with corresponding down stream fuses.
- j) Indicating lamps shall be clustered of LEDs suitable for the duty involved. The body shall be made of polycarbonate Unbreakable lens. LEDs shall be protected by inbuilt fuse with surge suppressor or leakage voltage glow protection. Both lamps and lens shall be replaceable from front.
- k) ~~DELETED-~~
- l) Ground fault relay shall be provided to detect DC system ground leakage current.
- m) Switch fuse shall be provided to receive incoming AC supply.

## 18.4

### Alarms

- a) Solid–state, audio visual annunciation system shall be provided for battery chargers. Annunciation system shall operate on 220V DC.
- b) One (1) minimum twelve-points alarm facia shall be provided on each charger panel, complete with proper actuating devices, circuitry, legends, push buttons (Accept, Reset and Test) and hooter.
- c) -DELETED-
- d) The arrangement shall be such that on occurrence of a fault the corresponding window will light up and stays lighted until the fault is cleared and reset button is pressed.
- e) Each time a window lights up, a master relay will get energized to provide group alarm signals for Owner/Purchaser's remote panel.
- f) -DELETED-
- g) The alarm shall be compatible with central DCS/SCADA

## 18.5

### Transducers

Each battery charger shall be provided with one (1) no. voltage transducer and one (1) no. current transducer for monitoring the DC output. Transducer shall have 4-20mA dual output.

Charger panel shall be provided with the following transducers:

- a) DC voltage transducer at each charger output.
- b) DC current transducer at each charger output.
- c) DC voltage transducer at battery output.

## 18.6 Controls

The following (but not limited to) manual controls shall be provided on the front of each charger panel :

- a) Charger ON/OFF push button.
- b) Selection of float or boost charge in case of float-cum-boost charger.
- c) Voltage setters for setting the output of float/ equalizing / boost charge. Setting shall be independent of each other so that setting of one voltage shall not require resetting other.
- d) Ground fault detection switch with indicating lamps.
- e) Current limit setter/ charging rate.
- f) Under/Over voltage relay including battery earth fault monitoring relay.
- g) Acknowledge-Reset-Test push buttons for annunciation system. The color of reset buttons shall be BLACK.

## 18.7 Wiring/Cabling

- a) The panels shall be completely wired-up. All wiring shall be routed through wiring troughs.

- b) Wiring shall be done with flexible, 1100V grade, fire resistance PVC insulated switchboard wires with stranded copper conductors of 2.5 mm<sup>2</sup> for control and current circuits and 1.5 mm<sup>2</sup> for voltage circuits.
- c) Each wire shall be identified, at both ends, with interlocking type permanent markers bearing wire numbers as per Bidder's Wiring Diagrams. AC / DC wiring shall have separate color-coding.
- d) Wire termination shall be made with crimping type connectors with insulating sleeves. Wires shall not be spliced between terminals.
- e) All spare contacts of relays, timers, auxiliary switches and other devices shall be wired up to the terminal block.
- f) Gland plate shall be of 4 mm thick, non-magnetic material and suitable for single-phase cable entry from bottom. Cable terminal board with cable lugs and double compression cable glands shall be provided in each panel for termination of incoming and outgoing cable.

## 18.8

### Terminal Block

- a) 1100V grade, multi way terminal block complete with mounting channel, binding screws and washers for wire connections and marking strip for circuit identification shall be provided for terminating the panel wiring. Terminals shall be stud type, suitable for terminating 2 nos. 2.5 mm<sup>2</sup> stranded copper conductor and provided with acrylic insulating cover.
- b) Not more than two wires shall be connected to any terminal. Spare terminals equal in number to 20% active terminals shall be furnished. Separate terminal blocks shall be used for AC/ DC wiring termination.
- c) Terminal blocks shall be located to allow easy access. Wiring shall be so arranged that individual wires of an external cable can be connected to consecutive terminals.
- d) Terminal blocks used for interface with DDCMIS via termination cabinet shall be suitably sized to facilitate proper termination of interconnecting cables.

## 18.9

### Grounding

- a) The charger panels shall have fully rated ground bus with two ground terminals, one at each end.
- b) Each terminal shall comprise two-bolt drilling with G.I. bolts, nuts and bimetallic washers for connecting to 50x6 mm G.I. flat. Ground bus shall be bolted to the panel structures, effectively grounding the entire assembly. The cases of meters, relays and switching devices shall be grounded through sheet steel structure.
- c) Wherever, the schematic diagrams indicate a definite ground at the panel, a single wire for each circuit thus grounded shall be run independently to the ground bus and connected thereto.

## 18.10

### Tropical protection

- a) All equipment accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion.
- b) Screens of corrosion resistant material shall be furnished on all ventilating louvres to prevent the entrance of insects.

#### 18.11

##### **Painting**

- a) The sheet metal of the panels shall be thoroughly cleaned by chemical agents (7-tank process) as required to produce a smooth clean surface free of scales, grease and rust.
- b) Both interior and exterior surfaces of the panels shall be powder coated and finished with two (2) coats of paints of approved shades.
- c) The paint shall be carefully selected to withstand tropical heat, rain etc. The paint shall not scale off or crinkle or removed by abrasion due to normal handling.
- d) Sufficient quantity of touch up paint shall be furnished for application after installation at site.

#### 18.12

##### **Nameplate**

- a) Name plate shall be provided for each panel and for each equipment/device mounted on it.
- b) The material shall be anodized aluminum/ lamicaid, 3mm thick, with white letter on black background.
- c) Name plate shall be held by self-tapping screws. The size of name plates shall be approximately 20mm x 75mm for equipment and 40mm x 150mm for panels.
- d) Name plates for panels shall be provided both on the front, rear and also inside the panels.
- e) Control and meter selection switches shall have integral nameplates. Nameplates for all other devices shall be located below the respective devices both inside and outside the panel.
- f) Instrument and devices mounted on the face of the panels shall also be identified on the rear with the instrument / device number. The number may be painted on or adjacent to the instrument or device case.
- g) Caution notice of suitable metal plate shall be affixed at the back of each panel.
- h) Bus bar clamp-on sensor, maximum DC current: 50A

**1X800 MW KOTHAGUDEM TPS  
ANNEXURE-I  
BOQ CUM PRICE SCHEDULE FOR 220V DC BATTERY CHARGER**

Sr. No.	Item code	Item Description	Unit	Quantity	Unit Price	Total Price	Remarks
1	508-12010-A	FLOAT CUM BOOST CHARGER1, 220V DC, 850A (MAIN PLANT)	NOS	3			
2	508-12007-A	FLOAT CHARGER, 220V DC, 570A (MAIN PLANT)	NOS	2			
3	508-12027-A	PORTABLE SINGLE CELL BOOST CHARGER1, 0-3V DC, 285A (MAIN PLANT)	NOS	1			
4	508-12011-A	FLOAT CUM BOOST CHARGER2, 220V DC, 25A (RAW WATER PH)	NOS	3			
5	508-12028-A	PORTABLE SINGLE CELL BOOST CHARGER2, 0-3V DC, 25A (RAW WATER PH)	NOS	1			
<b>6</b>	<b>508-12001-A</b>	<b>BATTERY FUSE BOX</b>					
6.1		BATTERY FUSE BOX (MAIN PLANT)	NOS	2			BATTERY FUSE BOX OF ADEQUATE RATING AS PER LOAD DUTY CYCLE (ANNEXURE-II OF SPECIFICATION). MINIMUM RATING 1250A.
6.2		BATTERY FUSE BOX (RAW WATER PH)	NOS	2			BATTERY FUSE BOX OF ADEQUATE RATING AS PER LOAD DUTY CYCLE (ANNEXURE-IV OF SPECIFICATION). MINIMUM RATING 25A.
<b>7</b>	<b>508-12005-A</b>	<b>DISCHARGE RESISTOR</b>					
7.1		DISCHARGE RESISTOR (MAIN PLANT)	NOS	1			DISCHARGE RESISTOR WITH SHUNT SUITABLE FOR 10HRS DISCHARGE RATE FOR 4815AH LEAD ACID PLANTE BATTERY (THREE PARALLEL STRINGS OF 1605AH BATTERY i.e. 3 X 1605 AH)
7.2		DISCHARGE RESISTOR (RAW WATER PH)	NOS	1			DISCHARGE RESISTOR WITH SHUNT SUITABLE FOR 10HRS DISCHARGE RATE FOR 125AH LEAD ACID PLANTE BATTERY
<b>8</b>	<b>508-12006-A</b>	<b>E &amp; C SPARES</b>					
8.1		E&C SPARES FOR FLOAT CUM BOOST CHARGER (MAIN PLANT) at BOQ Sl. No. 1.0	SET	1			
8.1.1		FUSE LINK WITHOUT HOLDER					
a		AC I/P HRC FUSE LINK	NOS	6			
b		GLASS FUSE	NOS	6			
c		CONTROL HRC FUSE LINK	NOS	6			
d		RECTIFIER FUSE LINK	NOS	6			
e		FILTER CAPACITOR FUSE LINK	NOS	6			
f		DC O/P FUSE LINK	NOS	6			
8.1.2		INDICATING LAMP					
a		AC I/P LAMP RED COLOR	NOS	6			
b		AC I/P LAMP YELLOW COLOR	NOS	6			
c		AC I/P LAMP BLUE COLOR	NOS	6			
d		DC O/P LAMP	NOS	6			
8.2		E&C SPARES FOR FLOAT CHARGER (MAIN PLANT) at BOQ Sl. No. 2.0	SET	1			
8.2.1		FUSE LINK WITHOUT HOLDER					
a		AC I/P HRC FUSE LINK	NOS	6			
b		GLASS FUSE	NOS	6			
c		CONTROL HRC FUSE LINK	NOS	6			
d		RECTIFIER FUSE LINK	NOS	6			
e		FILTER CAPACITOR FUSE LINK	NOS	6			
f		DC O/P FUSE LINK	NOS	6			
8.2.2		INDICATING LAMP					
a		AC I/P LAMP RED COLOR	NOS	6			
b		AC I/P LAMP YELLOW COLOR	NOS	6			
c		AC I/P LAMP BLUE COLOR	NOS	6			
d		DC O/P LAMP	NOS	6			

**1X800 MW KOTHAGUDEM TPS  
ANNEXURE-I  
BOQ CUM PRICE SCHEDULE FOR 220V DC BATTERY CHARGER**

8.3		E&C SPARES FOR FLOAT CUM BOOST CHARGER (RAW WATER PH) at BOQ Sl. No. 4.0	SET	1		
8.3.1		FUSE LINK WITHOUT HOLDER				
a		AC I/P HRC FUSE LINK	NOS	6		
b		GLASS FUSE	NOS	6		
c		CONTROL HRC FUSE LINK	NOS	6		
d		RECTIFIER FUSE LINK	NOS	6		
e		FILTER CAPACITOR FUSE LINK	NOS	6		
f		DC O/P FUSE LINK	NOS	6		
8.3.2		INDICATING LAMP				
a		AC I/P LAMP RED COLOR	NOS	6		
b		AC I/P LAMP YELLOW COLOR	NOS	6		
c		AC I/P LAMP BLUE COLOR	NOS	6		
d		DC O/P LAMP	NOS	6		
<b>9</b>	<b>508-12000-B</b>	<b>MANDATORY SPARES</b>				
9.1		MANDATORY SPARES FOR FLOAT CUM BOOST CHARGER (MAIN PLANT) at BOQ Sl. No. 1.0	SET	1		
9.1.1		FUSES & FUSE LINKS	SET	1		1 SET REFERS TO "100% OF TOTAL QUANTITY FOR EACH TYPE AND RATING OF FUSES USED IN THE SYSTEM"
9.1.2		SCR	NOS	4		FOR EACH TYPE AND RATING
9.1.3		DIODE	NOS	4		FOR EACH TYPE AND RATING
9.1.4		INDICATING LAMP	NOS	5		ASSORTED TYPE
9.1.5		ELECTRONIC MODULE/ PCB/ CARD	NOS	1		1 (ONE) NO. OF EACH TYPE USED IN THE SYSTEM
9.1.6		PULSE TRANSFORMER	SET	2		
9.2		MANDATORY SPARES FOR FLOAT CUM BOOST CHARGER (RAW WATER) at BOQ Sl. No. 4.0	SET	1		
9.2.1		FUSES & FUSE LINKS	SET	1		1 SET REFERS TO "100% OF TOTAL QUANTITY FOR EACH TYPE AND RATING OF FUSES USED IN THE SYSTEM"
9.2.2		SCR	NOS	4		FOR EACH TYPE AND RATING
9.2.3		DIODE	NOS	4		FOR EACH TYPE AND RATING
9.2.4		INDICATING LAMP	NOS	5		ASSORTED TYPE
9.2.5		ELECTRONIC MODULE/ PCB/ CARD	NOS	1		1 (ONE) NO. OF EACH TYPE USED IN THE SYSTEM
9.2.6		PULSE TRANSFORMER	SET	2		
<b>10</b>	<b>508-12024-A</b>	<b>TYPE TEST</b>				
10.1		HEAT RUN TEST	SET	10		HEAT RUN TEST TO BE CONDUCTED ON EACH CHARGER INDICATED AT BOQ SL.NO. 1,2,3,4 & 5 ( i.e. TEST TO BE CONDUCTED ON ALL 10 NOS. CHARGERS).
<b>11</b>	<b>508-12019-A</b>	<b>SITE VISIT CHARGES</b>				REFER NOTE - 1, 2 & 3
11.1		LUMP SUM CHARGES PER VISIT FOR ENGINEER (EXCEPT DAILY CHARGES)	VISIT	2		REFER NOTE - 1, 2 & 3
11.2		LUMP SUM DAILY CHARGES FOR ENGINEER	DAYS	10		REFER NOTE - 1, 2 & 3
NOTES :						
1) AMOUNT PAYABLE FOR ENGINEER PER VISIT TO SITE = VISIT CHARGES AS PER SL. NO. 11.1 ABOVE + (DAILY CHARGES AS PER SL. NO. 11.2 ABOVE X NO. OF DAYS AT SITE) (TO BE CERTIFIED BY BHEL SITE).						
2) THE VISIT CHARGES SHALL BE INCLUSIVE OF CHARGES OF AIR FARE/TRAIN FARE , BOARDING/LODGING, LOCAL CONVEYANCE, MEDICAL , INSURANCE ETC.						
3) SITE VISIT CHARGES SHALL BE APPLICABLE FOR ANY VISIT MADE BY VENDOR AT SITE AFTER RECEIVING THE INSTRUCTION FROM BHEL FOR DEPUTATION OF VENDOR REPRESENTATIVE. THE VISIT CAN BE CALLED FOR SUPERVISION OF COMMISSIONING & TESTING ETC.						
4) ALL CABLE GLANDS & LUGS AT CHARGER, FUSE BOX & DISCHARGE RESISTOR END ARE IN BIDDER'S SCOPE.						
5) DETAILED LIST OF MANDATORY SPARES (FOR MEETING THE ABOVE REQUIREMENT) SHALL BE SUBMITTED BY VENDOR AFTER AWARD OF CONTRACT. THE LIST SHALL BE SUBJECT TO APPROVAL OF BHEL/ CUSTOMER WITHOUT ANY PRICE IMPLICATION TO BHEL.						



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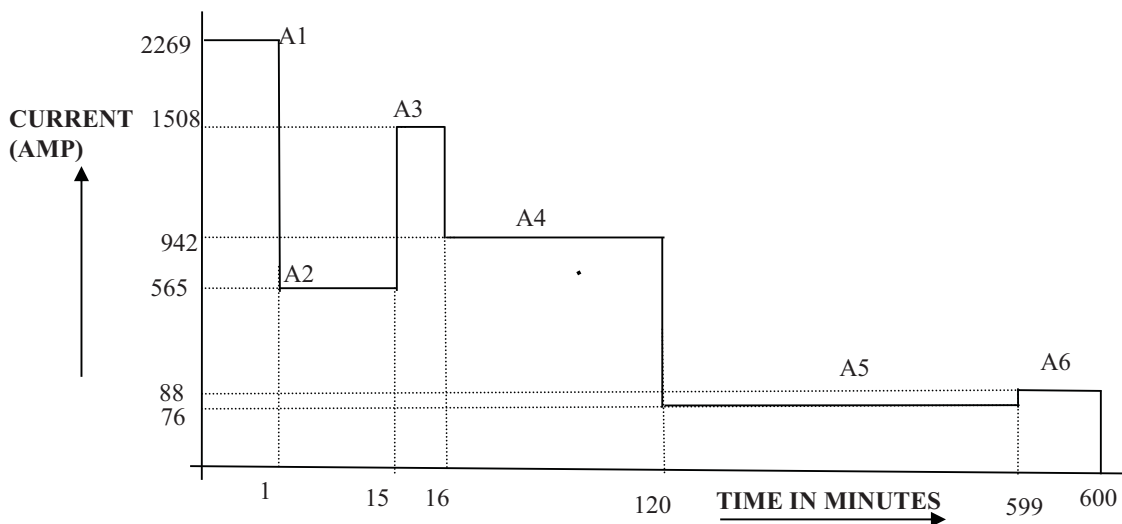
1 X 800 MW KOTHAGUDEM TPS

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**ANNEXURE-II**

**LOAD DUTY CYCLE OF MAIN PLANT BATTERY**



**FACTORS TO BE CONSIDERED FOR BATTERY SIZING:**

- |                                  |                              |
|----------------------------------|------------------------------|
| 1. AGEING FACTOR                 | : 1.25                       |
| 2. MIN.ELECTROLYTIC TEMP.        | : 7.9 °C                     |
| 3. END CELL VOLTAGE              | : 1.80V PER CELL             |
| 4. DESIGN MARGIN                 | : 20%                        |
| 5. TEMPERATURE CORRECTION FACTOR | : As per manufacturer's data |
| 6. NO. OF CELLS                  | : 108                        |



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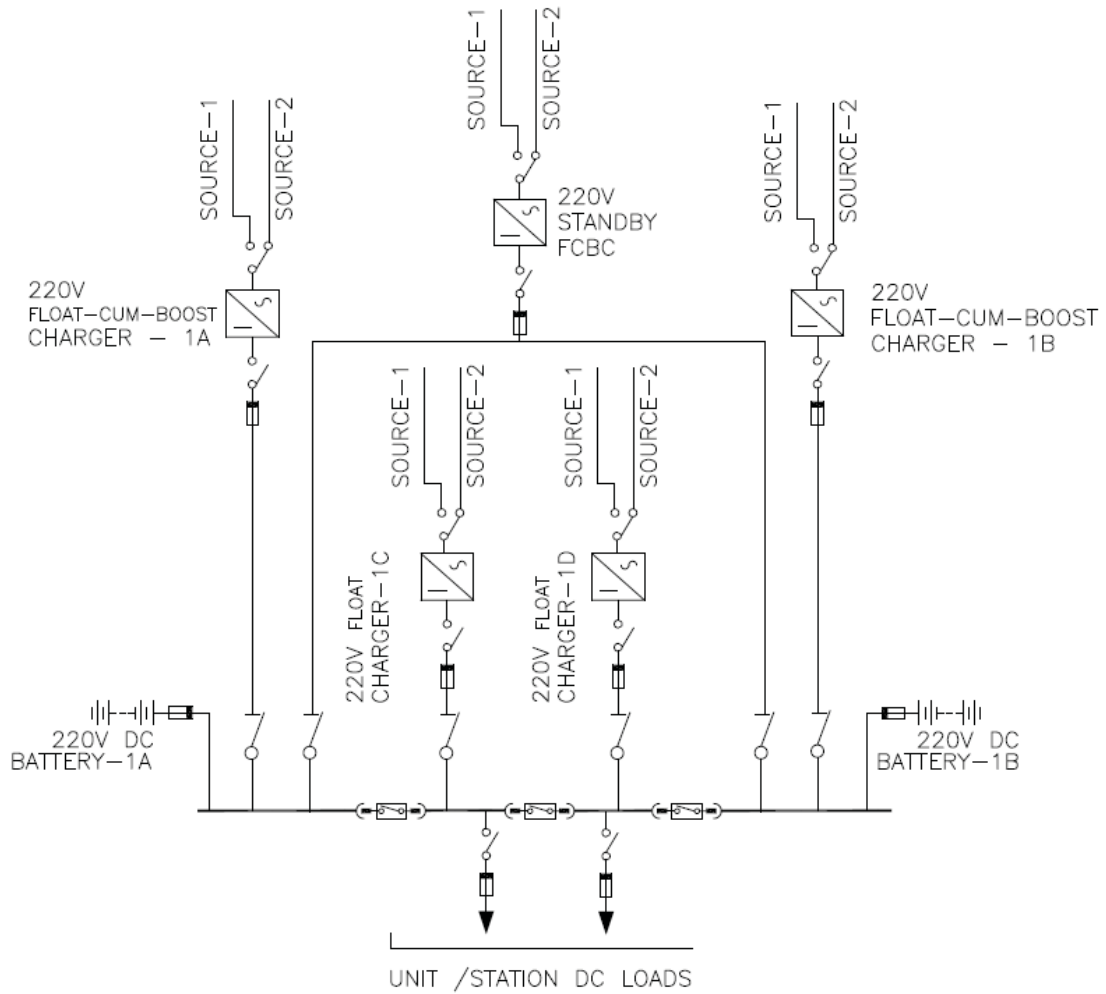
**1 X 800 MW KOTHAGUDEM TPS**

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**ANNEXURE-III**

**ONE LINE DIAGRAM FOR 220 V DC SYSTEM OF MAIN PLANT**





**TECHNICAL SPECIFICATION FOR  
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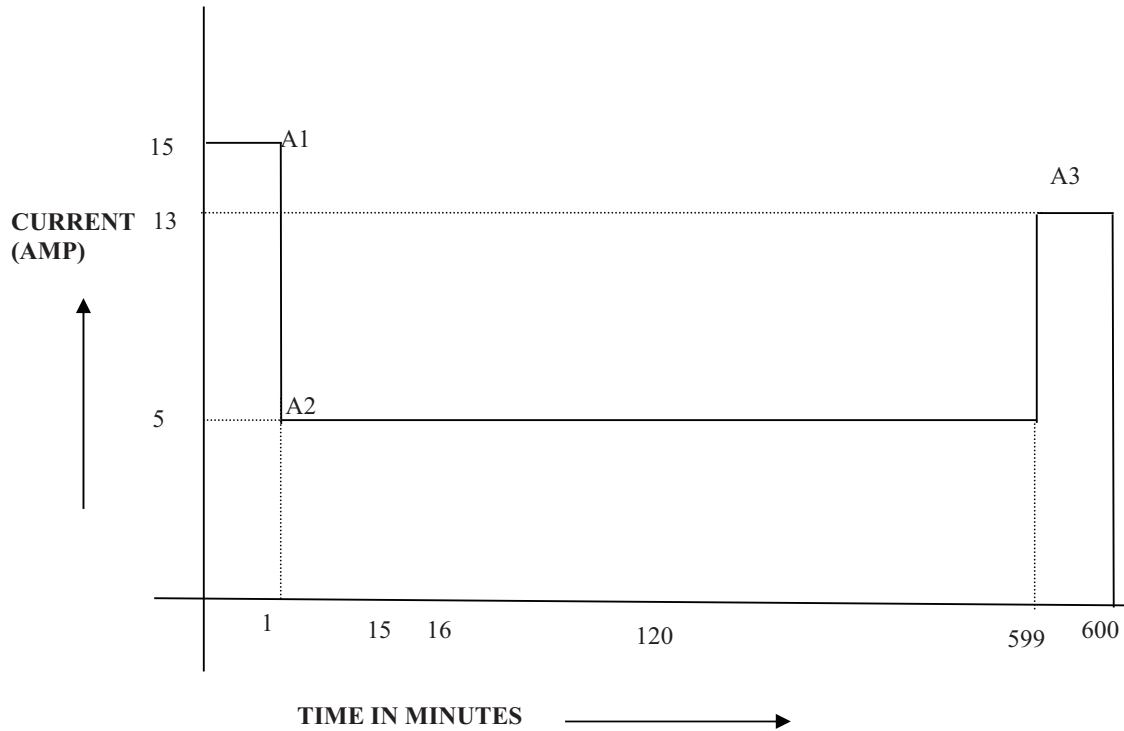
1 X 800 MW KOTHAGUDEM TPS

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**ANNEXURE-IV**

**LOAD DUTY CYCLE OF RAW WATER PH BATTERY**



**FACTORS TO BE CONSIDERED FOR BATTERY SIZING:**

- |                                  |                              |
|----------------------------------|------------------------------|
| 1. AGEING FACTOR                 | : 1.25                       |
| 2. MIN.ELECTROLYTIC TEMP.        | : 7.9 °C                     |
| 3. END CELL VOLTAGE              | : 1.80V PER CELL             |
| 4. DESIGN MARGIN                 | : 20%                        |
| 5. TEMPERATURE CORRECTION FACTOR | : As per manufacturer's data |
| 6. NO. OF CELLS                  | : 108                        |



**TECHNICAL SPECIFICATION FOR  
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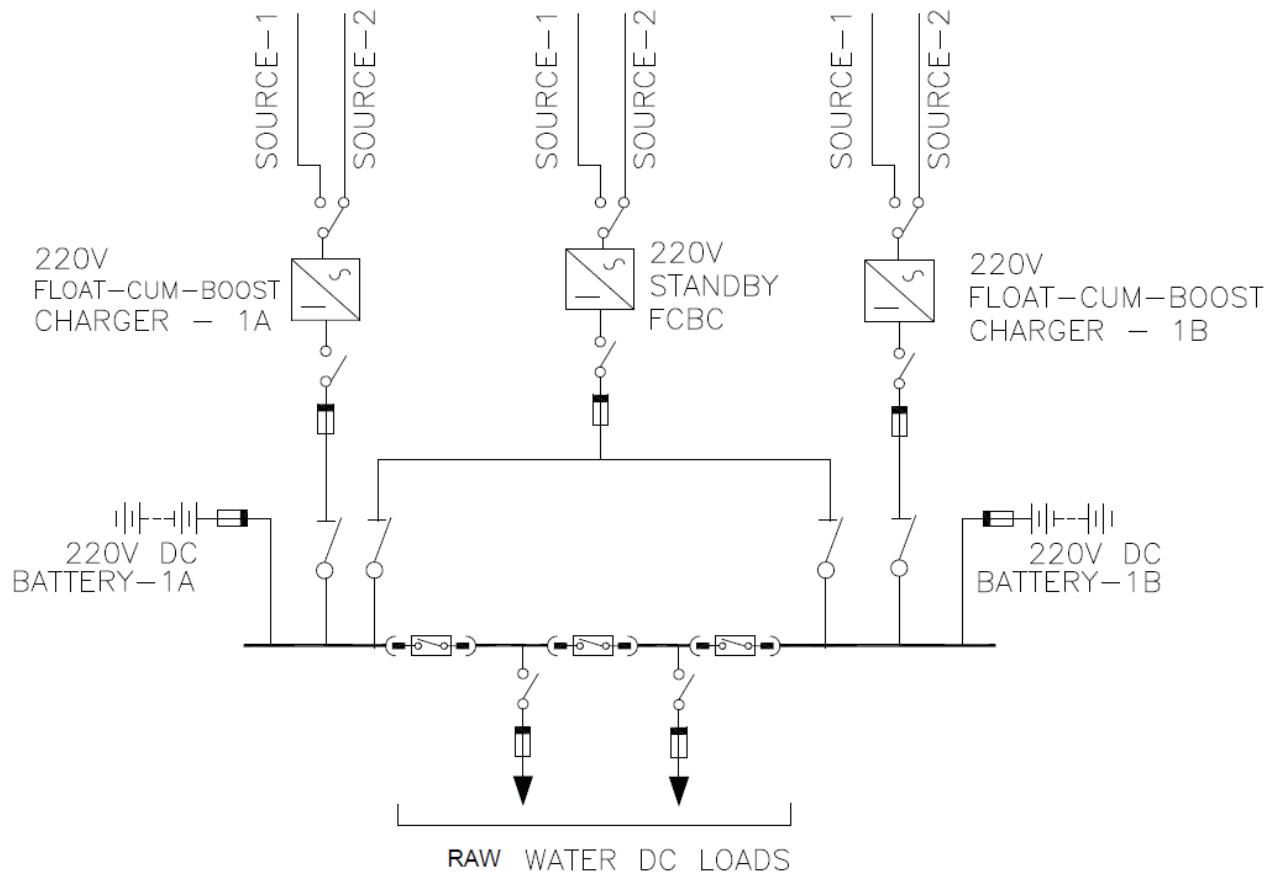
1 X 800 MW KOTHAGUDEM TPS

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**ANNEXURE-V**

**ONE LINE DIAGRAM FOR 220 V DC SYSTEM OF RAW WATER PH**





**TECHNICAL SPECIFICATION FOR  
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**ANNEXURE-VI**

**LIST OF STANDARD DELIVERABLES FOR DC BATTERY CHARGER**

<b>SL. No.</b>	<b>DOCUMENT TITLE</b>	<b>DWG. / DOCUMENT No.</b>	<b>Submission Schedule</b>
1	Data Sheet for Battery Charger	PE-VO-410-508-E101	Within two weeks of award of contract
2	General Arrangement drawing for Battery Charger	PE-VO-410-508-E102	Within two weeks of award of contract
3	Schematic/ Power Circuit diagram for Battery Charger	PE-VO-410-508-E103	Within two weeks of award of contract
4	Internal Layout drawing for Battery Charger	PE-VO-410-508-E104	Within two weeks of award of contract
5	Bill of Material for Battery Charger with list of makes	PE-VO-410-508-E105	Within two weeks of award of contract
6	Operation Write up for Battery charger	PE-VO-410-508-E106	Within two weeks of award of contract
7	Fault level Calculation for Battery Charger	PE-VO-410-508-E107	Within two weeks of award of contract
8	Calculation of Transformer kVA and Rectifier for Battery Charger	PE-VO-410-508-E108	Within two weeks of award of contract
9	Thyristor rating and fuse co-ordination calculation	PE-VO-410-508-E109	Within two weeks of award of contract
10	Filter Circuit Calculation for Battery charger	PE-VO-410-508-E110	Within two weeks of award of contract
11	AC Power consumption in float mode & boost mode	PE-VO-410-508-E111	Within two weeks of award of contract
12	List of E & C Spares for Battery Charger	PE-VO-410-508-E112	Within two weeks of award of contract
13	List of Mandatory Spares for Battery Charger	PE-VO-410-508-E113	Within two weeks of award of contract
14	O&M Manual for Battery Charger	PE-VO-410-508-E114	After despatch of Charger
15	Field Quality plan for Battery Charger	PE-VO-410-508-E115	Within two weeks of award of contract
16	Type test reports for the Battery Charger	PE-VO-410-508-E116	Within two weeks of award of contract
17	Circuit diagram and GA of battery discharge panel	PE-VO-410-508-E117	Within two weeks of award of contract
18	Circuit diagram and GA of battery fuse box	PE-VO-410-508-E118	Within two weeks of award of contract
19	Termination Arrangement At Battery Charger Terminals	PE-VO-410-508-E119	Within two weeks of award of contract
20	Quality Plan for Battery Charger	PE-QP-999-508-E003, REV. 0	Within two weeks of award of contract

**TECHNICAL SPECIFICATION FOR  
220V DC BATTERY CHARGER**

SPECIFICATION NO. PE-TS-410-508-E002

VOLUME II B

SECTION -C

1 X 800 MW KOTHAGUDEM TPS

REVISION 0

SHEET

**ANNEXURE-VII****No. OF DRAWINGS / DOCUMENTS REQUIRED FROM VENDOR**

No. of prints to be submitted by vendor after award of contract shall be as under:

S. NO.	DESCRIPTION	No. hard /soft copies	No. of CD-ROMs	REMARKS
1	Docs. /drgs. for approval (First submission)	PDF File + 4 Hard copies	NIL	
2	Drgs. / docs. for approval (Second & subsequent submission till approval)	PDF File + 4 Hard copies	NIL	
3	Final approval drgs. / docs. for Distribution after CAT-1.	PDF File + 10 Hard Copies	4 CD-ROM	
4	As Built drgs./doc.	PDF File + 10 Hard Copies	6 CD-ROMS	
5	Operation, Erection & Maintenance manual for approval	PDF File + 2 Hard Copies	NIL	
6	Approved Operation & Maintenance Manual for distribution	PDF File + 10 Hard Copies	6 CD-ROMS	
7	Type Test Certificates/ Reports for approval	PDF+ 2 hard Copies	NIL	
8	Type Test Certificates/ Reports for distribution	10 hard Copies	6 CD-ROMS	

ITEM DESCRIPTION	VENDOR NAME	ADDRESS	PHONE
AC CONTACTORS	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
AC CONTACTORS	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447
AC CONTACTORS	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
AC CONTACTORS	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59
AC CONTACTORS	BCH	20/4, MATHURA ROAD, FARIDABAD, HARYANA-121006	0129-4293000
AC MCCB	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	011-3088 7520-29
AC MCCB	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
AC MCCB	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
AC MCCB	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447
AC MCCB	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59
AC MCCB	CROMPTON GREAVES	RAIL TRANSPORTATION SYSTEMS,VANDANA BUILDING, 11, TOLSTOY MARG, TOLSTOY MARG, NEW DELHI, DL 110001	011 3041 6300
AIR CIRCUIT BREAKER	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59
AIR CIRCUIT BREAKER	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
AIR CIRCUIT BREAKER	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447
AIR CIRCUIT BREAKER	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
AIR CIRCUIT BREAKER	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	011-3088 7520-29
AUXILIARY RELAYS	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	0129-2567580, 09871799449
AUXILIARY RELAYS	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000
AUXILIARY RELAYS	JYOTI LTD.	JYOTI LIMITED, E&CS DIVISION,3/15, BIDC, GORWA,VADODARA - 390 016, E-MAIL ID: ECS@JYOTI.COM	Ph. No.:+91-265-2281214 , Fax No.:+91-265-2281214
AUXILIARY RELAYS	OEN INDIA LTD	29/1479, VYTILLA, COCHIN - 682 019 KERALA, INDIA	Phone : +91 484 2301132, 2303709 Fax : +91 484 2302287, 2302221 sales@oenindia.com
AUXILIARY RELAYS	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
BIMETAL RELAYS	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59
BIMETAL RELAYS	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447
BIMETAL RELAYS	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
BIMETAL RELAYS	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
CABLE GLANDS	ALLIED TRADERS & EXPORTERS	C-124 A, SECTOR-2, NOIDA -201 301, UTTAR PRADESH, INDIA	Mr. Vijay Mohan Sood +(91)-(120)-2525694 +(91)-(120)-3052594 +(91)-(11)-23287156 vijay_mohansood@yahoo.com

ITEM DESCRIPTION	VENDOR NAME	ADDRESS	PHONE
CABLE GLANDS	ARUP ENGG & FOUNDRY WORKS	391/119, PRINCE ANWAR SHAH ROAD, CALCUTTA-700068	033 2473 0850
CABLE GLANDS	BALIGA LIGHTING EQPT.PVT.LTD.	63A, CP RAMASWAMY ROAD, ALWARPET, P.B.No 6910, CHENNAI-600018	44-24995505, 22680990-4
CABLE GLANDS	COMMET BRASS PRODUCTS	NUTAN CHEMICAL COMPOUND, WALBHAT ROAD, GOREGAON, MUMBAI-400063	91-022-26852961/62/63 comet@vsnl.net
CABLE GLANDS	DOWELLS	M/S. DOWELLS ELECTRICALS 47/47A, SATGURU INDUSTRIAL ESTATE. OFF AAREY ROAD, GOREGOAN (EAST). MUMBAI 400 063.	CEO : Mr. Jayantibhai S. Patel TEL: 022-32504770./022-29270876/ 022-29270878.
CABLE GLANDS	ELECTROMAC INDUSTRIES	27/28AF NEW EMPIRE IND.ESTT., R.KRISHNA MANDIR RD.JB NGR ,ANDHERI(E),MUMBAI-400059	91-22-28324829 / 66919034 devang@electromacglands.com
CABLE GLANDS	INCAB	HARE STREET, KOLKATA, WEST BENGAL-700001	91-33-2480161/62/63/64 Fax : 91-33-2485766
CABLE GLANDS	Sunil & Co.	Kolkata	
CABLE GLANDS	Quality Precision	Kolkata	
CABLE GLANDS	Standard Metal Industries	Mumbai	
CABLE LUGS	DOWELLS	M/S. DOWELLS ELECTRICALS 47/47A, SATGURU INDUSTRIAL ESTATE. OFF AAREY ROAD, GOREGOAN (EAST). MUMBAI 400 063.	CEO : Mr. Jayantibhai S. Patel TEL: 022-32504770./022-29270876/ 022-29270878.
CABLE LUGS	UNIVERSAL MACHINES LTD.	4,B.B.D.BAG (EAST) 90,STEPHEN HOUSE,5TH FLR CALCUTTA-700001	033 2282 2540
CABLE LUGS	3D	Umbergaon	
CABLE LUGS	Chetna	Nasik	
DC CONTACTORS	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
DC CONTACTORS	BHEL (BHOPAL)	HEAVY ELECTRICAL PLANT	
DC CONTACTORS	ELECTROMAC INDUSTRIES	27/28AF NEW EMPIRE IND.ESTT., R.KRISHNA MANDIR RD.JB NGR ,ANDHERI(E),MUMBAI-400059	91-22-28324829 / 66919034 devang@electromacglands.com
DC CONTACTORS	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59
DC CONTACTORS	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
DC CONTACTORS	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
DC CONTACTORS	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447
CONTROL SWITCHES/ SELECTOR SWITCH	KAYCEE	KAYCEE INDUSTRIES LTD., C/O-CMS COMPUTERS LTD., 35A, REAR BLDG., KILOKARI, NEW DELHI-110014	Rajiv Sharma-9312004687
CONTROL SWITCHES/ SELECTOR SWITCH	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447
CONTROL SWITCHES/ SELECTOR SWITCH	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479000
CONTROL SWITCHES/ SELECTOR SWITCH	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
CONTROL SWITCHES/ SELECTOR SWITCH	M/s Shrenik & Co.	39A/3, PANCHRATNA INDUSTRIAL ESTATE, SARKHEJ-BAVLA ROAD, CHANGODAR, AHMEDABAD – 382 213	
CONTROL SWITCHES/ SELECTOR SWITCH	RECOM PVT. LTD.	M/S RECOM PVT. LTD., 16A, 2ND FLOOR A, WING RAJ INDUSTRIAL COMPLEX, MILITARY ROAD, MAROL ANDHERI ( EAST ), MUMBAI , MAHARASHTRA STATE : 400059	Mr. Chandrashekar Kamath (MD) : 09820249503
CONTROL TRANSFORMER/ WINDING HEATING TRANSFORMER	AUTOMATIC ELECTRIC LTD.	96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482

ITEM DESCRIPTION	VENDOR NAME	ADDRESS	PHONE
CONTROL TRANSFORMER/ WINDING HEATING TRANSFORMER	INDCOIL	PLOT NO. A- 150/ 151, 23RD U ROAD, WAGLE ESTATE, THANE WEST, CST RD, FRIENDS COLONY, HALLOW PUL, KURLA WEST, MUMBAI, MAHARASHTRA 400070	Phone:022 2583 8305
CONTROL TRANSFORMER/ WINDING HEATING TRANSFORMER	KAPPA ELECTRICALS	KAPPA ELECTRICALS, KAPPA CONSOLIDATED PVT. LTD., 14, CART TRACK ROAD, MADUVANKARAI, CHENNAI - 600 042, INDIA.	PHONE: +91 - 44 - 22454709, 22454516, 22450794, 22450795 FAX: +91 - 44 - 22351662, 22451693 E MAIL: mira@kappaelectricals.com sales@kappaelectricals.com
CONTROL TRANSFORMER/ WINDING HEATING TRANSFORMER	LOGICSTAT	B-160, INDUSTRIAL AREA, C BLOCK RD, OKHLA I, OKHLA INDUSTRIAL AREA, NEW DELHI, DL 110020	011 2681 0032
CONTROL TRANSFORMER/ WINDING HEATING TRANSFORMER	PRECISE ELECTRICALS	47A-49A,CHAKALA ROAD ANDHERI(E),MUMBAI 99 MUMBAI, MAHARASHTRA, INDIA PIN-400 099	022-8323402 / 022-8216433
CONTROL TRANSFORMER/ WINDING HEATING TRANSFORMER	UNILEC ENGINEERS PVT. LTD.	PLOT NO: R-247, T.T.C. INDUSTRIAL AREA, M.I.D.C , RABALE, NAVI MUMBAI- 400 701 INDIA	+91-22- 27607787 / 27607927 +91-22- 27607997
LT- CURRENT TRANSFORMER	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER- B, PLOT NO. 78, SECTOR 18, GURGAON- 122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
LT- CURRENT TRANSFORMER	AUTOMATIC ELECTRIC LTD.	96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482
LT- CURRENT TRANSFORMER	INDCOIL	PLOT NO. A- 150/ 151, 23RD U ROAD, WAGLE ESTATE, THANE WEST, CST RD, FRIENDS COLONY, HALLOW PUL, KURLA WEST, MUMBAI, MAHARASHTRA 400070	Phone:022 2583 8305
LT- CURRENT TRANSFORMER	KAPPA ELECTRICALS	KAPPA ELECTRICALS, KAPPA CONSOLIDATED PVT. LTD., SOUTHERN ELEKTRIKS 14, CART TRACK ROAD, MADUVANKARAI, CHENNAI - 600 042, INDIA.	PHONE: +91 - 44 - 22454709, 22454516, 22450794, 22450795 FAX: +91 - 44 - 22351662, 22451693 E MAIL: mira@kappaelectricals.com sales@kappaelectricals.com
LT- CURRENT TRANSFORMER	PRAGATI ELECTRICALS	280/3,II POKHRAN RD	5341779,5427041
LT- CURRENT TRANSFORMER	PRECISE ELECTRICALS	47A-49A,CHAKALA ROAD ANDHERI(E),MUMBAI 99 MUMBAI, MAHARASHTRA, INDIA PIN-400 099	022-8323402 / 022-8216433
LT- CURRENT TRANSFORMER	SILKAANS ELECT.MFG.CO.PVT.LTD	PLOT NO: R-247, T.T.C. INDUSTRIAL AREA, M.I.D.C , RABALE, NAVI MUMBAI- 400 701 INDIA	+91-22- 27607787 / 27607927 +91-22- 27607997
LT- CURRENT TRANSFORMER	PRAYOG ELECTRICALS PVT. LTD.	GROUND FLOOR, THAKORE INDUSTRIAL COMPUND, STATION ROAD, VIDYA VIHAR (W), NATHANI ROAD , OPP. AMIBIKA TEMPLE,MUMBAI Mumbai - 400086, Maharashtra, India	91-22-25164288/25133146 Mr. P. U. PATWARDHAN (MANAGING DIRECTOR)
LT- CURRENT TRANSFORMER	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI- 110020	011-3088 7520-29
LT- POTENTIAL TRANSFORMER	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER- B, PLOT NO. 78, SECTOR 18, GURGAON- 122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
LT- POTENTIAL TRANSFORMER	AUTOMATIC ELECTRIC LTD.	96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482
LT- POTENTIAL TRANSFORMER	INDCOIL	PLOT NO. A- 150/ 151, 23RD U ROAD, WAGLE ESTATE, THANE WEST, CST RD, FRIENDS COLONY, HALLOW PUL, KURLA WEST, MUMBAI, MAHARASHTRA 400070	Phone:022 2583 8305

ITEM DESCRIPTION	VENDOR NAME	ADDRESS	PHONE
LT- POTENTIAL TRANSFORMER	KAPPA ELECTRICALS	KAPPA ELECTRICALS, KAPPA CONSOLIDATED PVT. LTD., SOUTHERN ELECTRIKS 14, CART TRACK ROAD, MADUVANKARAI, CHENNAI - 600 042, INDIA.	PHONE: +91 - 44 - 22454709, 22454516, 22450794, 22450795 FAX: +91 - 44 - 22351662, 22451693 E MAIL: mira@kappaelectricals.com sales@kappaelectricals.com
LT- POTENTIAL TRANSFORMER	PRAGATI ELECTRICALS	280/3,II POKHRAN RD	5341779,5427041
LT- POTENTIAL TRANSFORMER	PRECISE ELECTRICALS	47A-49A,CHAKALA ROAD ANDHERI(E),MUMBAI 99 MUMBAI, MAHARASHTRA, INDIA PIN-400 099	022-8323402 / 022-8216433
LT- POTENTIAL TRANSFORMER	SILKAANS ELECT.MFG.CO.PVT.LTD	PLOT NO: R-247, T.T.C. INDUSTRIAL AREA, M.I.D.C , RABALE, NAVI MUMBAI- 400 701 INDIA	+91-22- 27607787 / 27607927 +91-22- 27607997
LT- POTENTIAL TRANSFORMER	PRAYOG ELECTRICALS PVT. LTD.	GROUND FLOOR, THAKORE INDUSTRIAL COMPUND, STATION ROAD, VIDYA VIHAR (W), NATHANI ROAD , OPP. AMIBIKA TEMPLE,MUMBAI Mumbai - 400086, Maharashtra, India	91-22-25164288/25133146 Mr. P. U. PATWARDHAN (MANAGING DIRECTOR)
DC SWITCH	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447
DC SWITCH	KAYCEE	KAYCEE INDUSTRIES LTD., C/O-CMS COMPUTERS LTD., 35A, REAR BLDG., KILOKARI, NEW DELHI-110014	Rajiv Sharma-9312004687
DC SWITCH	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER- B, PLOT NO. 78, SECTOR 18, GURGAON- 122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
HRC FUSES	INDO ASIAN	B-24, PHASE - II , NOIDA - 201305, U.P.	120-3042222
HRC FUSES	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447
HRC FUSES	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI- 110015	011-41419554/59
HRC FUSES	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI- 110020	011-3088 7520-29
HRC FUSES	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER- B, PLOT NO. 78, SECTOR 18, GURGAON- 122015, INDIA	0124-2842000, 9873424331 ;amit.bhadauria@siemens.com
HRC FUSES	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA- 121003	0129-2567580, 09871799449
HRC FUSES	SPACEAGE SWITCHGEARS LTD.	68 & 13-A INDUSTRIAL DEVELOPMENT COLONY, MEHRAULI ROAD GURGAON, HARYANA-122001	0124-2302711, 4085091
HRC FUSES	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
HRC FUSES	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000
HRC FUSES	ESSEN DEINKI	FLAT NO. 502, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060
INTERPOSING RELAY	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA- 121003	0129-2567580, 09871799449
INTERPOSING RELAY	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000
INTERPOSING RELAY	JYOTI LTD.	JYOTI LIMITED, E&CS DIVISION,3/15, BIDC, GORWA,VADODARA - 390 016, E-MAIL ID: ECS@JYOTI.COM	Ph. No.:+91-265-2281214 , Fax No.:+91-265-2281214
INTERPOSING RELAY	OEN INDIA LTD	29/1479, VYTILLA, COCHIN - 682 019 KERALA, INDIA	Phone : +91 484 2301132, 2303709 Fax : +91 484 2302287, 2302221 sales@oenindia.com
INTERPOSING RELAY	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER- B, PLOT NO. 78, SECTOR 18, GURGAON- 122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
INDICATING LAMPS	BCH	20/4, MATHURA ROAD, FARIDABAD, HARYANA- 121006	0129-4293000
INDICATING LAMPS	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI- 110020	6832259,6918834-37
INDICATING LAMPS	ESSEN DEINKI	FLAT NO. 502, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060
INDICATING LAMPS	VAISHNO(HOTLINE SWGR.& CONTROL)	G-19, SECTOR - 11, NOIDA - 201301, UTTAR PRADESH, INDIA	8377805157 9818338922

ITEM DESCRIPTION	VENDOR NAME	ADDRESS	PHONE
INDICATING LAMPS	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	9818338922
INDICATING LAMPS	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
INDICATING LAMPS	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
LIGHTING SWITCH , SOCKET & S/F UNIT	ELEXPRO ELECTRICALS PVT/ LTD.	C 1/27 & 37 GIDC KABILPORE NAVSARI-396424	02637-265140, Mr. Jssk kumar
LIGHTING SWITCH , SOCKET & S/F UNIT	ANCHOR KENWOOD ELECTRICAL	STEEL HOUSE, B WING, PLOT NO. 24, MAHAL INDUSTRIAL ESTATE, MAHAKALI CAVES ROAD, NEAR PAPER BOX, ANDHERI (E), MUMBAI, MAHARASHTRA.- 400093	022-30418888.
LIGHTING SWITCH , SOCKET & S/F UNIT	KAYCEE	KAYCEE INDUSTRIES LTD., C/O-CMS COMPUTERS LTD., 35A, REAR BLDG., KILOKARI, NEW DELHI-110014	Rajiv Sharma-9312004687
LIGHTING SWITCH , SOCKET & S/F UNIT	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59
LIGHTING SWITCH , SOCKET & S/F UNIT	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
LIGHTING SWITCH , SOCKET & S/F UNIT	INDO ASIAN	B-24, PHASE - II , NOIDA - 201305, U.P.	120-3042222
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	ASIATIC	A-58 NARAINA IND. AREA, PHASE-I , NEW DELHI 110028	011 - 25796330, 25796617
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	011 - 25793021
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	EVERGREEN ENGG. CO.	EVERGREEN ENGG COMPANY WORKS-5, PLOT NO. 9,10,11,12, SURVEY NO. 242, CHINCH PADA, VASAI EAST-401208	(0250) 6458250
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	TECKNIC CONTROLS	703, MADHAVA, BANDRA, KURLA COMPLEX, BANDRA EAST, MUMBAI, MAHARASHTRA 400051	022-42532507/00 022-24451648
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	EX-PROTECTA LIGHTING EQUIPMENT	305-306, GIDC ESTATE, VITHAL UDYOGNAGAR - 388121 DIST. ANAND, GUJARAT 388121 INDIA	02692-237823
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	BALIGA ELECTRICALS	63A,CP RAMASWAMY ROAD, PB NO 6910, CHENNAI-600018	44-24995505,22680990-4
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	ENPRO ENGG.	NO.995P, DIAMOND PLAZA, 2ND FLOOR, 12TH MAIN ROAD, ANNA NAGAR, CHENNAI-40	044 – 42611526 / 42170338 / 26262716 enproengg@enproengineering.com
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	STERLING SWGR CONTROL PVT.LTD.	P.O. BOX NO. 17023, SORAB HOUSE, 2ND FLOOR, 555, S.B. MARG, DADAR, MUMBAI - 400028, MAHARASHTRA, INDIA	91-22-24222297/24222298/242224236
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	ELEXPRO ELECTRICALS PVT/ LTD.	C 1/27 & 37 GIDC KABILPORE NAVSARI-396424	02637-265140, Mr. Jssk kumar
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	VAISHNO(HOTLINE SWGR & CONTROL)	G-19, SECTOR - 11, NOIDA - 201301, UTTAR PRADESH, INDIA	8377805157 9818338922
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	JASPER ENGINEERS PVT. LTD.	A-23, SECTOR - 8, NOIDA-201301	0120-4033520/533
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	KMG ATOZ SYSTEMS	C-49, SECTOR-81-NOIDA-201305	120-4207920, 08527897328
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	UNILEC ENGINEERS PVT. LTD.	BEHRAMPUR INDUSTRIAL AREA, BEGAMPUR KHATOLA ROAD, GURGAON-122001	0124-4030247,248, 4559700, 9911087173
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	BCH	20/4, MATHURA ROAD, FARIDABAD, HARYANA-121006	0129-4293000

ITEM DESCRIPTION	VENDOR NAME	ADDRESS	PHONE
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	CANDS	J/202, ANSA INDUSTRIAL ESTATE, SAKI VIHAR ROAD, SAKINAKA, ANDHERI (EAST), MUMBAI-72	022-28570858
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	TECKNIC CONTROLS	703, MADHAVA, BANDRA, KURLA COMPLEX, BANDRA EAST, MUMBAI, MAHARASHTRA 400051	022-42532507/00 022-24451648
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	UNITED ELECTRIC	97 UDYOG VIHAR PHASE-I, GURGAON 122015, HARYANA	124 4002970 72
LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	M/s Shrenik & Co.	39A/3, PANCHRATNA INDUSTRIAL ESTATE, SARKHEJ-BAVLA ROAD, CHANGODAR, AHMEDABAD – 382 213	
LOCAL PUSH BUTTON STATION (FLAME PROOF)			
MCB	MDS SWITCHGEAR LTD	314-317SHAH NAHAR ESTATE	011 - 25793021
MCB	INDO ASIAN	B-24, PHASE - II , NOIDA - 201305, U.P.	120-3042222
MCB	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
MCB	S&S POWER SWITCHGEAR LTD,	NEW NO. 67, OLD NO. 19, DR. RANGA ROAD, MYLAPORE, CHENNAI - 600004	044 - 24988056, 044 - 24988057, 044 - 24988058
PROTECTION - RELAYS (PNEUMATIC)	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
PROTECTION - RELAYS (PNEUMATIC)	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
PROTECTION - RELAYS (PNEUMATIC)	GE-MULTILINE, GE INDIA INDUSTRIAL PVT. LTD.	NO. 90- B, ELECTRONICS CITY, HOSUR ROAD, BENGALURU - 560016, KARNATAKA	(080) 41314617, 9945478935
PROTECTION - RELAYS (PNEUMATIC)	SCHWEITZER ENGG. LAB (SEL)	406, BHIKAJI CAMA BHAVAN, BHIKAJI CAMA PLACE, BHIKAJI CAMA PLACE, MOHAMMADPUR, RK PURAM, NEW DELHI, DL 110066	011 4152 7899
PROTECTION - RELAYS (PNEUMATIC)	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	011-3088 7520-29
PROTECTION - RELAYS (PNEUMATIC)	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000
PROTECTION - RELAYS (PNEUMATIC)	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	0129-2567580, 09871799449
PROTECTION - RELAYS (PNEUMATIC)	AVK-SEG & CONTROLS(I) LTD	C-60,NOIDA PHASE-II	6918834-37
TIMERS - ELECTRONIC	ESSEN DEINKI	FLAT NO. 502, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060
TRANSDUCERS	AUTOMATIC ELECTRIC LTD.	ADDRESS : 96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482
TRANSDUCERS	SOUTHERN TRANSDUCERS	INTERTECH B-83, FLATTED FACTORY COMPLEX, NEAR MODI MILLS, OKHLA, NEW DELHI-110020	Mr. Gurmohit Singh 011-41020365 / 9891402128
ENERGY METER ( ANALOG)	BHEL (EDN)	MYSORE ROAD,BANGALORE-560026	080-26998500
ENERGY METER ( ANALOG)	SIMCO ENGG. LTD	NO. 126, K ROAD, TIRUCHIRAPPALLI -620001, TAMIL NADU	Mr. Madaswamy Muthu +(91)-(431)-4046223 +(91)-(431)-4046210 +(91)-9786600915
ENERGY METER ( ANALOG)	RISHABH INST.PVT LTD	RISHABH INSTRUMENTS PVT. LTD. F-31, MIDC, SATPUR NASHIK - 422007 MAHARASHTRA INDIA	<a href="mailto:marketing@rishabh.co.in">marketing@rishabh.co.in</a> <a href="tel:91-253-2202202">91-253 2202202</a> / <a href="tel:91-253-2351064">203 Fax: 91 253 2351064</a>
ENERGY METER ( ANALOG)	AUTOMATIC ELECTRIC LTD.	96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482
ENERGY METER ( ANALOG)	CONZERVE SYSTEMS PVT. LTD.(SCHNEIDER)	87, 1ST FLOOR INDUSTRIAL DEVELOPMENT COLONY (IDC) MEHRAULI ROAD, UGURGAON 122001 HARYANA, INDIA.	4268899, 9910695701
ENERGY METER ( DIGITAL)	CONZERVE SYSTEMS PVT. LTD.(SCHNEIDER)	87, 1ST FLOOR INDUSTRIAL DEVELOPMENT COLONY (IDC) MEHRAULI ROAD, UGURGAON 122001 HARYANA, INDIA.	4268899, 9910695701
AMMETER	AUTOMATIC ELECTRIC LTD.	96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482

ITEM DESCRIPTION	VENDOR NAME	ADDRESS	PHONE
AMMETER	RISHABH INST.PVT LTD	RISHABH INSTRUMENTS PVT. LTD. F-31, MIDC, SATPUR NASHIK - 422007 MAHARASHTRA INDIA	<a href="mailto:marketing@rishabh.co.in">marketing@rishabh.co.in</a> 91-253 2202202/203 Fax: 91 253 2351064
VOLTMETER	AUTOMATIC ELECTRIC LTD.	96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482
VOLTMETER	RISHABH INST.PVT LTD	RISHABH INSTRUMENTS PVT. LTD. F-31, MIDC, SATPUR NASHIK - 422007 MAHARASHTRA INDIA	<a href="mailto:marketing@rishabh.co.in">marketing@rishabh.co.in</a> 91-253 2202202/203 Fax: 91 253 2351064
VOLTMETER	Yokogawa	Japan	
PROTECTION - RELAYS (NUMERICAL)	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER- B, PLOT NO. 78, SECTOR 18, GURGAON- 122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com
PROTECTION - RELAYS (NUMERICAL)	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400
PROTECTION - RELAYS (NUMERICAL)	GE-MULTILINE, GE INDIA INDUSTRIAL PVT. LTD.	NO. 90- B, ELECTRONICS CITY, HOSUR ROAD, BENGALURU - 560016, KARNATAKA	(080) 41314617, 9945478935
PROTECTION - RELAYS (NUMERICAL)	SCHWEITZER ENGG. LAB (SEL)	406, BHIKAJI CAMA BHAVAN, BHIKAJI CAMA PLACE, BHIKAJI CAMA PLACE, MOHAMMADPUR, RK PURAM, NEW DELHI, DL 110066	011 4152 7899
THERMOSTAT	AUTOMATION INSTRUMENTATION	-	-
ISOLATING SWITCH	ABB/C&S/SCHNEIDER/L&T/ SIEMENS	-	-
PANEL SPACE HEATER	CONTROL & SWITCHGEAR/EQUIVALENT	-	-
FIXED TERMINALS	CONNECTWELL/ELEMEX/ESS EN/PHOENIX	-	-

**Note: Make of equipment/ components is indicative. Make of equipment/ components shall be subject to customer approval after award of contract without any commercial or delivery implication.**



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VOLUME II B

SECTION C

1 X 800 MW KOTHAGUEDEM TPS

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**DATASHEET-A**

Sr. No.	PARAMETER	UNIT	VALUE
1.0	<b>Power Supply &amp; fault level details</b>		
1.1	Rated AC voltage & variation	V, %	415 V, 3Ph, 3 Wire Systems, (-) 15% to (+) 10%
1.2	Frequency & variation	Hz, %	50 Hz, +3% to -5%
1.3	Rated DC voltage & variation	V, %	220 V, 187 V to 242V
1.4	Fault current of 415V system	kA	50 kA for 1 sec.
1.5	Fault current of DC system limited upto (max)	KA	25 KA for 1 sec.
1.6	Type/ Capacity of battery	MIN	a) 4815 AH Lead-Acid Plante battery (THREE PARALLEL STRINGS OF 1605AH BATTERY i.e. 3 X 1605 AH) for Main Plant DC system indicated at Annexure-III (ONE LINE DIAGRAM FOR 220V DC SYSTEM FOR MAIN PLANT) b) 125AH Lead- Acid Plante battery for Raw Water PH DC system indicated at Annexure-V (ONE LINE DIAGRAM FOR 220V DC SYSTEM FOR RAW WATER PH)
2.0	<b>Charger current rating</b>		
2.1	Float charger	A	As per BOQ cum price schedule (Annexure-I)
2.2	Float-cum-boost charger	A	As per BOQ cum price schedule (Annexure-I)
2.3	Portable single cell boost charger	A	As per BOQ cum price schedule (Annexure-I)



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<b>3.0</b>	<b>Type of cooling</b>		
3.1	For chargers mentioned at BOQ cum price schedule (Annexure-I), Item Sl. No-1		Forced/ Natural air cooled
3.2	For chargers mentioned at BOQ cum price schedule (Annexure-I), Item Sl. No-2,3,4 & 5		Natural air cooled
4.0	<b>Ripple content of charger</b>		
4.1	RMS	%	
4.2	Peak to peak	%	± 1%
5.0	<b>Degree of Protection (DOP)</b>		
5.1	Rectifier transformer cubicle		IP-42
5.2	Control cubicle		IP-42
6.0	<b>Constructional features</b>		
6.1	Panel sheet thickness/ material	mm	2.0mm CRCA
6.2	Paint shade		Light grey shade (631 of IS-5) with two coats of Synthetic enamel paint.
6.3	Cable gland plate thickness/ material	mm	4 mm / Non-magnetic material
6.4	Gasket thickness/ material	mm	3 mm / Rubber
6.5	<p><b>CABLE SIZES FOR MAIN PLANT</b></p> <p>a) Cable size from FCB charger to DCDB  b) Cable size from Float charger to DCDB  b) Cable size from battery to Fuse Box  c) Cable size from Fuse Box to DCDB  d) Cable Size For FCB Charger AC Incomer  e) Cable Size For Float Charger AC Incomer</p> <p><b>CABLE SIZES RAW WATER PH</b></p> <p>a) Cable size from FCB charger to DCDB  b) Cable size from battery to Fuse Box  c) Cable size from Fuse Box to DCDB  d) Cable Size For FCB Charger AC Incomer</p>		<p>3X1CX400 sq.mm(cu)/Pole*  3X1CX400 sq.mm(cu)/Pole*  4X1CX400 sq.mm(cu)/Pole*  4X1CX400 sq.mm(cu)/Pole*  2X1Cx400 sq.mm(AL)/Pole*  1X1Cx400 sq.mm(AL)/Pole*</p> <p>1CX400 sq.mm(cu)/Pole*  1CX400 sq.mm(cu)/Pole*  1CX400 sq.mm(cu)/Pole*  1Cx400 sq.mm(AL)/Pole*</p>
7.0	<b>Type Tests</b>		



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7.1	Type tests to be conducted for this contract, despite availability of valid & acceptable test certificates	Yes/ No	YES, As per Section – C/Quality plan. Heat Run test to be conducted on all chargers (10 nos. chargers).
8.0	<b>EARTHING</b>		
8.1	Grounding terminal size/ no. for each charger		50X6 MM./ 2 nos.
8.2	Grounding terminal size/ no. for each fuse box		50X6 MM./ 2 nos.
8.3	Grounding terminal size/ no. for each discharge resistor		50X6 MM./ 2 nos.
9.0	<b>Mandatory Spares</b>		
9.1	Mandatory Spares to be quoted for this contract	Yes/ No	Yes
9.2	If yes, list of mandatory spares		Mentioned in Annexure-I (BOQ cum Price Schedule)
10	<b>E &amp; C Spares</b>		
10.1	E & C Spares to be quoted for this contract	Yes/ No	Yes
10.2	If yes, list of E & C Spares		Mentioned in Annexure-I (BOQ cum Price Schedule)
11.0	<b>Special tools &amp; tackles</b>		
11.1	Special tools & tackles to be quoted for this contract	Yes/ No	Yes
11.2	If yes, list of Special tools & tackles		Bidder to furnish the list.
12	<b>Battery Fuse Box</b>		Fuses as per Load Duty Cycle for both Positive and Negative Pole shall be provided. Also Construction shall be same as Charger Panel and Battery Fuse Box shall be wall-mounted type. Minimum rating of Battery Fuse Box shall be as indicated in the BOQ cum price schedule (Annexure-I).
13	<b>Discharge Resistor Panel</b>		a) Portable type battery discharge resistor panels shall be supplied with shunt suitable for 10 hrs. Discharge rate (C10 rate) as per battery capacities indicated in the BOQ cum price schedule (Annexure-I). b) Cooling of discharge resistor shall be air/fan cooled. c) Construction shall be same as



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		Charger panel. Handle and wheel arrangement shall be provided for easy movement. d) Control - Using rotary switches for step control of current against falling voltage with ON-OFF facility.
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**Notes**

- 1) BHEL will provide 3 PH-3 wire power Supply. Further distribution for single Phase shall be created by Bidder.
- 2) \*Min cable size and Nos. indicated. Actual cable size and number of runs shall be informed during detailed engineering.



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1 X 800 MW KOTHAGUDEM TPS

**DATA SHEET-B**

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**Data sheet-B to be submitted by bidders along with Technical offer with bidder's signature and company stamp.**

Sl No.	Charger	850A FCB Charger (BOQ Sl. No. 1)	570A Float Charger (BOQ Sl. No. 2)	285A Portable single cell boost charger (BOQ Sl. No. 3)	25A FCB Charger (BOQ Sl. No. 4)	25A Portable single cell boost charger (BOQ Sl. No. 5)
1	Type of cooling as per specification	Forced or Natural	Natural	Natural	Natural	Natural
2	Type of cooling offered by bidder	To be filled by bidder (Bidder to indicate the type of cooling - Forced or Natural offered by them.)	Natural	Natural	Natural	Natural
3	Dimension of Charger (Width X Depth X Height)	To be filled by bidder	To be filled by bidder	To be filled by bidder	To be filled by bidder	To be filled by bidder
4	In case Forced cooling offered, bidder to indicate the locations of FANS as per Sl. No. 4A, 4B & 4C below.	-----	FANS NOT APPLICABLE			
4A	Whether Fans used on rectifier heat sink. (Yes/ No)	To be filled by bidder				
4B	Whether Fans used on charger enclosure. (Yes/ No)	To be filled by bidder				
4C	Whether Fans used on any other location. (Yes/ No), <b>Bidder to also mention the location of Fan.</b>	To be filled by bidder				

**Note : Bidder to furnish the data where ever "To be filled by bidder" is indicated in above table.**



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**DATA SHEET-C**

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Sr. No.	PARAMETER	UNIT	VALUE
1.0	Manufacturer's Name		
2.0	Design ambient temperature		
3.0	Charger Rating & Type		
4.0	Charger rated output current:		
4.1	Trickle charging mode		
4.2	Boost charging mode		
5.0	Load limiter current setting range (Trickle mode)		
6.0	Automatic voltage regulator (Trickle mode)		
6.1	Type		
6.2	% Stabilization of the output DC voltage		
6.3	Voltage setting range		
6.4	Walk in time of Automatic Voltage Regulator		
6.5	Time taken to stabilize voltage for under shoot & overshoot		
7.0	Manual voltage regulator (Trickle mode)		
7.1	Type		
7.2	Voltage setting range		
8.0	Boost charging		
8.1	Current setting range		
8.2	Voltage limit setting range		
9.0	Rectifier assembly		
9.1	Type of semi-conductor material		
9.2	Rated direct current per cell (Average)		
9.3	SCR Rating Selected		
9.4	Heat sink for SCR		
9.5	Rated direct voltage		
9.6	Rated input voltage		
9.7	Type of connections of rectifier element		
9.8	Standard applicable		
9.9	Ripple content		



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1 X 800 MW KOTHAGUDEM TPS

**DATA SHEET-C**

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Sr. No.	PARAMETER	UNIT	VALUE
10.0	Rectifier transformer		
10.1	Type		
10.2	Rated KVA & % impedance		
10.3	Input line winding connection in vector representation		
10.4	Cell winding connection in vector representation		
10.5	1 min. power frequency withstand voltage (kV)		
10.6	Standard applicable		
11.0	Charger full load Efficiency at nominal input & output voltage & current		
12.0	Power factor at nominal input & output voltage & current		
13.0	Instrument		
13.1	Manufacturer		
13.2	Type		
13.3	AC voltmeter range		
13.4	DC voltmeter range		
13.5	DC Ammeter range		
13.6	Dial size		
13.7	Accuracy class as per IS		
14.0	Contactor		
14.1	Manufacturer		
14.2	Type		
14.3	Rated voltage		
14.4	Rated current		
14.5	No. of power contact		
14.6	No. type and rating of Aux. Contacts		
14.7	Operating coil voltage		
14.8	Drop-out voltage		
15.0	Thermal over load relay		
15.1	Manufacturer		



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Sr. No.	PARAMETER	UNIT	VALUE
15.2	Tripping current range		
15.3	Whether single phasing protection provided		
15.4	Standard applicable		
16.0	Air - break switches (both DC & AC side)		
16.1	Manufacturer		
16.2	Type		
16.3	Rated voltage		
16.4	Rated current		
16.5	Type & material of contacts		
16.6	Standard applicable		
17.0	Output fuse		
17.1	Manufacturer		
17.2	Type		
17.3	Rupturing capacity (both AC & DC)		
17.4	Standard applicable		
18.0	Painting		
18.1	Paint shade		
18.2	Painting process		
19.0	Degree of Protection (DOP)		
19.1	Rectifier transformer cubicle		
19.2	Control cubicle		
20.0	Earthing busbar size & material		
21.0	Charger dimension: (approx.) [ L x W x H ]		
22.0	Sheet thickness (mm) / material		
23.0	Cable gland plate thickness		
24.0	Gasket material		
25.0	Charger weight (Kg.)		



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### 1.0 INTRODUCTION

This specification covers the design, manufacture, assembly, testing, packing and despatch of Battery charger (Float/Boost) complete in all respects with all components, fittings and accessories for efficient and trouble-free operation. The charger shall be connected either with Ni-Cd or Lead-acid type battery. In this specification though erection & commissioning is not included in vendor's scope, the vendor shall still not absolved of his responsibility of establishing the correctness of equipment at site.

### 2.0 CODES AND STANDARDS

The equipment shall generally conform to IS. Unless otherwise specified, the latest revisions of codes/ standards specified in Annexure-I enclosed are applicable.

### 3.0 OPERATIONAL REQUIREMENTS

3.1 Under normal conditions, when the AC supply is healthy at the battery charger input terminals, the float charger shall feed the continuous DC loads, while the boost charger shall remain off. Over and above the continuous DC loads the float charger shall also supply the necessary charge to the battery, to keep the later in fully ready condition for being available during AC supply failure at charger terminals. Also some of the impulse loads of duration less than a minute for which the response of the charger is poor, shall be by the associated battery in the DC system. This impulse discharge, shall, however, be continuously replenished by the float charger, unless the discharge is of considerable magnitude, in the event of which the boost charger shall be deployed.

3.2 The float charger shall withstand momentary supply failure due to changeover on AC supply feeding bus and continue to operate on float mode satisfactorily on restoration of AC supply to charger.

3.3 The DC system shall be ungrounded and shall float with respect to be ground potential when healthy. An earth fault relay of approved type and make shall be provided for detection and annunciation of earth fault.

3.4 After the batteries are boost charged and operation is changed to float mode, the voltage impressed on the loads shall not exceed float charge voltage.

3.5 The charger shall be designed to operate at an ambient air temperature of 50°C. It will be located indoor but in a hot, humid and tropical atmosphere.

3.6 The voltage at load terminal will not exceed the limits of +10% and -15% of nominal system voltage for DC system.

### 4.0 BATTERY CHARGERS

4.1 The battery chargers shall be self regulating, natural air cooled, static type, composed of silicon controlled rectifiers (SCRs) connected in three phase full wave full control bridge circuit.



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- 4.2 Each charger circuit shall be provided with its own AC input voltmeter with voltmeter selector switch, DC voltmeter & ammeter, battery DC output ammeter & voltmeter, battery charging current ammeter, control switches, rectifiers, Auto/ Manual voltage regulators, load limiting device, etc. as required for the successful operation of the DC system.
- 4.3 The charger shall have auto voltage regulators to enable stepless, smooth and continuous voltage control. The chargers shall have the effective current limiting feature and smoothing filters on both input and output to minimise harmonics, radio frequency transients, electromagnetic transients, etc.
- 4.4 The battery chargers as well as their automatic regulators shall be of static type. The battery chargers shall be capable of continuous operation at the respective rated load in float charging mode i.e. trickle charging the associated DC batteries while supplying the DC loads.
- 4.5 The battery chargers shall have a selector switch for selecting the battery-charging mode i.e. float or boost charging.
- 4.6 The battery chargers shall be provided with facility for both automatic and manual control of output voltage and current. The selector switch will select the mode of output voltage/current control, whether automatic or manual. Necessary provisions shall be provided to avoid current/voltage surges of harmful magnitude/nature, which may arise during changeover from auto to manual mode or vice versa under normal operating condition.
- 4.7 Soft start feature shall be provided to build up the voltage to the set value slowly within 15 seconds. The chargers shall have load limiters, which shall cause, when the voltage control is in automatic mode, a gradual lowering of the output voltage when the DC load current exceeds the load limiter setting of the charger. The load limiter characteristic shall be such that any sustained overload or short circuit in DC system shall not damage the charger nor shall it cause blowing of any of the charger fuses. The charger shall not trip on overload or external short circuit. After clearance of fault, the charger voltage shall build-up automatically when working in automatic mode.
- 4.8 When on automatic control mode during float charging, the charger output voltage shall remain within  $\pm 1\%$  of the set value for AC input voltage variation of  $\pm 10\%$ , frequency variation of  $+3\%$  to  $-5\%$ , a combined voltage & frequency (absolute sum) variation of  $10\%$  and a continuous DC load variation from zero to full load. Uniform and stepless adjustment of voltage setting (in both auto/manual modes) shall be provided on the front of the charger panel covering the entire float charging output range specified. Stepless adjustment of the load limiter setting shall also be provided from  $80\%$  to  $100\%$  of the rated output current for float charging mode.
- 4.9 During boost charging, the battery chargers shall operate on constant current mode (when automatic regulator is in service). The boost charging current can be adjusted continuously over a range of  $50\%$  to  $100\%$  of the rated output current for boost charging mode. The charger output voltage shall automatically go on rising, when operating in boost mode, as the battery charges up. For limiting the output voltage of charger, a potentiometer shall be provided on the front of the panel, whereby it shall be possible to set the upper limit of this voltage anywhere in the output range specified for boost charging mode. All voltage and current setting potentiometers shall be vernier type.



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- 4.10 Energising the charger with fully charged battery connected plus 10% load shall not result in output voltage greater than 110% of voltage setting. The time taken to stabilise within specified limits shall be less than 15 seconds.
- 4.11 In case of float-cum-boost charger, manufacturer shall offer an arrangement in which the voltage setting device for float charging mode is also used as output voltage limit setting device for boost charging mode, and the load limiter of the float charging mode is also used as boost charging current setting device.
- 4.12 Suitable filter circuits shall be provided in all the chargers to limit the ripple content (peak to peak) in the output voltage to 1%, irrespective of the DC load fluctuation even when they are not connected to a battery.
- 4.13 The DC system shall be ungrounded and float with respect to ground potential when healthy. An earth fault relay shall be provided in DCDB for remote annunciation.

### 5.0 DESCRIPTION OF EQUIPMENT

#### 5.1 Rectifier assembly

Rectifier assembly shall be full wave bridge type and designed to meet the duty as required by the respective charger. The rectifier cells shall be provided with their own heat dissipation arrangement with natural air-cooling. The rectifier shall utilise diodes / thyristors and heat sinks to carry 200% of the load current continuously and the temperature of the heat sink shall not be permitted to exceed 85°C absolute, duly considering the maximum charger panel inside temperature. The successful bidder shall furnish calculations to show what maximum junction temperature will be and what the heat sink temperature will be when operating at 200% and 100% load current continuously duly considering the maximum surrounding air temperature for these devices inside the charger panel at air ambient temperature of 50°C outside the panel. Necessary surge protection devices and rectifier type fast acting HRC fuses shall be provided in each arm of the rectifier connections.

#### 5.2 Rectifier transformer and Chokes

The rectifier transformer & chokes shall be dry and air cooled (AN) type. The rating of the rectifier transformers & chokes shall correspond to the rating of the associated rectifier assembly. The rectifier transformers & chokes shall have class-F insulation with temperature rise limited to class-B insulation value.

#### 5.3 Blocking Diode

Blocking Diode shall be provided in the output circuit of each charger to prevent current flow from the DC battery into the charger.

#### 5.4 Voltage regulators

5.4.1 The float charger shall have both auto and manual voltage regulation arrangements. The voltage regulator shall have auto/manual option and be of static type. A selector switch for selection of the mode of voltage regulation shall be provided. AVR time constant shall not exceed 0.5.

5.4.2 The boost charger shall have auto/manual voltage regulation arrangement. The voltage adjustment shall be uniform and step less throughout the voltage variation range. The regulator



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shall be of static type. The boost charger shall be designed to charge the fully discharged battery to fully charged condition.

### 5.5 Printed Circuit Boards (PCB)

PCB shall be made of glass epoxy of 1.6 mm thick, fire resistant, bonded with 99.8% pure copper foil, free of wrinkles, blisters, scratches and pinholes. The contact surface of the edge connectors of PCBs shall be plated with hard gold to a minimum thickness of 5 microns. The component identification shall be printed on PCB by Silk screen method. All PCBs shall be tropicalised and masked.

### 5.6 Control and Selector Switches

The control and selector switches shall be of rotary stayput type with escutcheon plates showing functions and positions. The switches shall be of sturdy construction and suitable for mounting on panel front. The switches shall have shrouded live parts and sealed contacts against dust ingress. Auto/normal switch shall be of lockable type in either position. The contact ratings shall be at least the following:

- Make and carry continuously 10A
- Breaking current at 220V DC 0.5A (inductive)
- Breaking current at 240V AC 5.0A at 0.3 p.f.

### 5.7 Indicating Lamps

To indicate AC supply availability, three indicating lamps shall be provided. The indicating lamp shall be suitable for panel mounting, cluster type LED and capable of clear status indication under normal room illumination. The lamp covers shall be preferably screw type, unbreakable and moulded from heat resistant material.

### 5.8 Instruments

For all chargers, DC ammeter, DC voltmeter and AC voltmeter shall be provided in 96 mm<sup>2</sup> size with 1.5 accuracy class conforming to IS-1248. The instruments shall be flush mounted type, dust proof, moisture resistant and have easy accessible means for zero adjustment.

### 5.9 Relays

The relays shall be enclosed in flush or semi flush dust tight cases finished with dull black enamel paint. Relays shall have self-contained test facilities and provisions for removing relay mechanism for inspection and maintenance.

### 5.10 Transducers

Transducers shall be panel-mounting type and suitable for operating temperatures from 0 to 55°C. Transducer output shall be used for remote display at DDCMIS/ ECP. Transducers shall be provided in charger panel for DC battery voltage, charger output voltage and charger output current. The transducer shall have the following features:

- Input/ output with galvanic isolation
- Auxiliary voltage – 220V DC
- 4-20 mA independent dual output
- Accuracy class 0.5 or better
- Short circuit and over current protection

### 5.11 Contactors



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All battery chargers shall have an AC contactor on the input side. It shall be of air break type and suitable for continuous duty. The operating coil shall be rated for 415 V.

**5.12 Thermal overload relay**

A thermal overload relay with single phasing protection (using differential movement of bimetal strips) shall also be provided for the AC input, which will trip the contactor. The DC contactors shall be single/double pole air break type and suitable for continuous duty.

**5.13 Air break switches**

All chargers shall have AC input and DC output switches of air break, single throw, load break and fault make type. The contacts of the switches shall open and close with a snap action. The switches shall be rated for 120% of the maximum continuous load. The 'ON' and 'OFF' position of the switch shall be clearly indicated. The operating handle of the switches shall be fully insulated from circuit and shall be effectively earthed.

**5.14 Fuses**

Fuses shall be of HRC cartridge fuse link type. Fuses shall be mounted on fuse carriers, which are mounted on fuse base. Wherever, it is not possible to mount fuses on fuse carriers, fuses shall be directly mounted on plug-in type bases. In such cases one insulated fuse pulling handle shall be supplied for each charger. Kick-off fuses (trip fuses) with alarm contacts shall be provided for all DC fuses. The fuses shall be suitable for applicable fault level.

**5.15 Variable Metallic Resistors**

One set of variable metallic resistors and shunt suitable for carrying out discharge tests (5 hour discharge rate for Ni-Cd battery and 10 hour discharge rate for Lead Acid battery) on the batteries shall be supplied.

**5.16 Battery fuse box**

Battery fuse of adequate rating meeting the load duty cycle shall be supplied. Battery fuse box shall have suitable termination arrangement for terminating the cables informed during detailed engineering stage.

**5.17 Panel Construction**

The charger panels housing all the equipment shall be indoor, floor mounting, air natural cooled, self-supporting sheet metal enclosed cubicle type. The charger panel and its frame shall be fabricated from 2.0 mm cold rolled sheet steel and have folded type construction. The bidder shall also supply necessary base frames, anchor bolts and hardware. Removable undrilled gland plates of at least 3.0 mm thick sheet steel and lugs for all cables shall be provided. The lugs for cables shall be made of electrolytic tinned copper. The gland plate shall be of adequate size for accommodating requisite number of cable glands for power and control cables. The charger shall be tropicalised and vermin proof. Ventilation louvers shall be backed with fine brass wire mesh. All door and covers shall be fitted with synthetic rubber gaskets. The panels shall have hinged double leaf doors provided on front and backside for adequate access of charger terminals. All the charger cubicle doors shall be properly earthed. The panels shall comply with at least degree of protection IP-42. Incoming and outgoing cables shall enter from bottom. Suitable cable terminal board with copper cable lugs and double compression brass nickel-plated cable glands shall be provided in each panel for incoming and outgoing cables.

**5.18** Electronic equipments shall be of modular design consisting of plug-in modules in standard 19 inches metallic racks with metallic card guides. The card should be provided with proper handles.



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Card to card wiring shall be through mother board. Unplanned jumpering and track modifications shall not be allowed. Mechanical interlocks to prevent wrong insertion of cards shall be provided. Each card shall have its junction and test points identified. Maintenance aids such as extension printed wiring boards and jumper leads shall be provided.

5.19 The layout of charger components shall be such that their heat losses do not give rise to excessive temperature within the charger panel surface. Location of the electronic modules will be such that temperature rise of the location, in no case, shall exceed 10°C over ambient air temperature outside the charger.

5.20 All the charger panels shall be provided with an illuminating lamp, a 5 Amp socket and space heaters with thermostat. Toggle switches and fuses shall be provided separately for each of the above fittings. Space heaters "ON" indication shall be provided. Two separate grounding pads shall be provided for each panel.

### 5.21 Locking facility

Locking facility shall be provided as follows:

For locking float/boost selector switch in the float position only. This shall be used for having key mechanical interlock between float/boost selector switch and isolator in DCDB.

The charger enclosure door-locking requirement shall be met by the application of padlocks. Padlocking arrangement shall allow ready insertion of the padlock shackle but shall not permit excessive movement of the locked parts with the padlock in position.

### 5.22 Control wiring

Each panel shall be furnished completely factory wired upto power cable lugs and terminal blocks ready for external connections. The power wiring shall be carried out with 1.1kV grade, PVC insulated cables conforming to IS-1554 (Part-1). The control wiring shall be of 1.1kV grade, 1 core stranded copper wire with colour coded PVC insulation having identification ferrules at both terminal and device end for each wire. Wires shall conform to IS-694 and minimum size of the wire shall not be less than 2.5 mm<sup>2</sup>. The control wiring terminating at electronic card shall not be less than 1.0 mm<sup>2</sup>. The control terminal shall be suitable for connecting two wires with 2.5 mm<sup>2</sup> stranded copper conductors. All terminals shall be numbered for ease of connections and identification.

Power & control wiring within the panel shall be kept separate. Any terminal or metal work, which remains alive at greater than 415V, when panel door is opened, shall be fully protected by shrouding.

An air clearance of at least 10mm shall be maintained throughout all circuits, except low voltage electronic circuits, right upto the terminal lugs. Whenever this clearance is not available, the live parts shall be insulated or shrouded.

### 5.23 Terminal Blocks

Terminal blocks for all the chargers shall meet the following requirements:

- a) Terminal block shall be 1.1kV grade, minimum 10A rated, one piece moulded complete with insulating barrier, clip on type terminals, washers, nuts and identification strip etc. It shall be similar to Klippon type RSF with insulating material of melamine or equivalent. Marking on terminal strips shall correspond to the terminal numbering on wiring diagrams. Terminal



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blocks for CT & VT secondary leads shall be provided with links to facilitate testing, isolation, star/delta and earthing. Terminal blocks for CT secondary shall have the short-circuiting facility.

- b) At least 20% spare terminals for external connections shall be provided on each panel and these spare terminals shall be uniformly distributed on all terminal blocks.
- c) There shall be minimum clearance of 250mm between the terminal blocks and the cable gland plate and 150mm between two rows of terminal blocks.

### 5.24 Cable Lugs

Heavy duty bolt-on termination tinned copper lugs of compression type shall be used in the switchgear for power cable termination. The supply of tinned copper cable lugs for power cables forms part of the supply of equipment. Cable lugs shall comply with IS-8309.

### 5.25 Cable Glands

The supply of cable glands forms part of the supply of equipment. Cable glands shall conform to BS-6121. Cable glands shall be of double compression type.

### 5.26 Panel Earthing

Charger panels shall have fully rated GI ground bus with two ground terminals, one at each end of the panel. Each ground terminal shall have two bolt drillings with GI bolts and nuts suitable for connection to purchaser's ground conductor.

## 6.0 ANNUNCIATION SYSTEM

6.1 Visual indication shall be provided to indicate the operating conditions of the charger by the means of indicating lamps/LED or annunciation facia windows as per EEUA-45D, arranged on the top of the charger panels for following faults:

- a) AC supply failure
- b) Rectifier fuse failure
- c) Surge circuit fuse failure
- d) Filter fuse failure
- e) Load limiter operated
- f) Charger trip/over loaded
- g) Battery on boost
- h) DC system earth fault
- i) Battery fuse blown
- j) DC system under voltage

Potential free 'NO' contacts of all above conditions shall be provided for following remote alarms in the Unit Control Panel/ DDCMIS:

- k) Battery fuse fails
- l) Battery on boost
- m) Charger over load
- n) Charger trouble (this being a group alarm initiated by any of the faults of charger other than charger over load).



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6.2 Suitable potential free contacts for remote indication of above abnormal conditions shall be provided. Multiplication relays, if required, shall be included in the panel. Indications for charger input supply healthy, charger in FLOAT mode and charger in BOOST mode shall be provided.

**7.0 NAME PLATE AND MARKING**

The name plates shall be made of non-rusting metal / 3 ply Lamicoid and shall have black back ground with white engraved letters and secured by screws. These shall be provided near top edge on the front as well as on rear side of charger. Name plates with full and clear inscriptions shall also be provided on and inside the panels for identification of the various equipments.

**8.0 PAINTING**

After fabrication, all surfaces shall be cleaned and pre-treated as per IS:6005. Two coats of lead oxide primer (anti-corrosive) shall be applied after the pre-treatment. Two coats of powder painting with shade no. RAL-7032 or paint shade approved by customer shall be applied for complete panel. Thickness of paint shall be min. 40-50 microns. Protecting peelable compound shall be provided on outside finished surface to protect the painted surface during transportation and site handling.

**9.0 PERFORMANCE GUARANTEE**

The bidder shall guarantee that chargers offered shall meet the ratings and performance requirements stipulated for various equipments covered in this specification. If the equipment fails to meet the requirement, the supplier shall replace it with appropriate equipment free of cost without affecting the schedule.

**10.0 INSPECTION & TESTING**

10.1 The bidder shall confirm compliance to Quality plan enclosed with Section-C of specification. The Quality plan shall be subject to BHEL/ customer approval after award of contract without any commercial or delivery implication. Inspection shall be carried out as per BHEL/ customer approved Quality plan.

10.2 All equipments to be supplied shall be of type-tested quality. The bidder shall furnish all type test reports for BHEL/ customer approval. The Type tests should have been carried out within last five years on the equipment similar to those proposed to be supplied under this contract and the tests should have been either conducted at an independent laboratory or should have been witnessed by a client/ government agency. In absence of such type tests reports or in case such reports are not found to be meeting the specification/ standards requirements, vendor shall conduct all such type tests without any commercial/ delivery implication to BHEL according to the relevant standards and reports shall be submitted to the owner for approval. (Type test charges as per clause 10.10 shall not be applicable in such cases).

10.3 The details of Type Tests to be conducted shall be as per Data Sheet-A attachment-I enclosed with Section-C of specification.

10.4 The bidder shall furnish following Type Tests reports for each type & rating of battery charger:

- i) Temperature rise test at full load



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- ii) Temperature rise test for rectifier assembly at current specified in Data Sheet-A Section-C.
- iii) Insulation resistance test
- iv) High voltage (power frequency) test on power & control circuits except low voltage electronic circuit
- v) Ripple content test at no load, half and full load
- vi) Automatic voltage regulation operation test at specified AC supply variations at no load, half and full load
- vii) Load limiter operation test
- viii) Efficiency and power factor measurement
- ix) Input and output surge withstand capacity test. Surge voltage as per ANSI-C37.90a shall be applied for a period of not less than 2 seconds at the following points of the charger operating at 50°C at full load:
  - a) Across each AC input phases
  - b) Across AC input line to ground
  - c) Across DC output terminals
  - d) Across each DC output terminal to ground

The charger shall not exhibit any component damage and there shall be no deterioration in performance of the charger.

- x) Environmental Tests: Steady state performance tests (temperature rise test at full load & load limiter operation test) shall be carried out before & after the following tests.
  - a) Soak test: The electronic modules shall be subject to continuous operation for a minimum period of 72 hours. During last 48 hours, the ambient temperature shall be maintained at 50°C. The 48 hour test period shall be divided into 4 equal 12 hour segments. The input voltage during each 12 hours shall be nominal voltage for 11 hours followed by 110% of nominal voltage for 30 minutes, followed by 90% of nominal voltage for 30 minutes.
  - b) Degree of protection test

- xi) Complete physical examination

10.5 Rectifier transformers shall be subjected to following routine test:

- i) Temperature rise test
- ii) Insulation Resistance test
- iii) High voltage test (power frequency) test

10.6 Following routine tests are to be performed on all battery chargers:



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- i) Complete physical examination
- ii) Temperature rise test at full load
- iii) Insulation resistance test
- iv) High voltage (power frequency) test
- v) Ripple content test at no load, half and full load
- vi) AVR operation test at specified AC supply variation at no load, half and full load
- vii) Load limiter operation test
- viii) Checking of proper operation of annunciation system
- ix) Dynamic response test  
Overshoot / undershoot in output voltage of the charger corresponding to sudden change in load from 100% to 20% and from 20% to 100%.
- x) Burn in test shall be carried out on all electronic modules or panels with modules. During the test the panel / module shall be subjected to ambient temperature of 50°C for 48 hours in energised condition. The temperature rise inside the cubicle shall not exceed 10°C during the test.
- xi) Degree of protection test  
The charger shall be checked for gasket arrangement as per the drawings.

10.7 Following routine tests shall be carried out on annunciation system:

- i) Annunciation assembly and module shall be functionally tested as per EEUA-45D.
- ii) Burn in test as specified above in cl. No. 10.5 (x) above.

10.8 All material used for the construction of the equipment / items shall be new and shall be in accordance with the requirements of this specification. Materials utilised shall be those, which have established themselves for use in such applications.

10.9 All acceptance and routine tests as per relevant standards and specification, shall be carried out by the manufacturer. Charges for all these routine and acceptance tests for all the materials shall be deemed to be included in the bid price.

10.10 The bidder shall indicate cost of carrying out all the Type tests as specified in the specification. The charges for each of the Type tests shall be given separately in price schedule (Volume III) as optional. These prices will be applicable in case a type test is required to be conducted by purchaser despite availability of satisfactory type test report as per clause 10.2 above.

11.0 DOCUMENTATION

11.1 Documents to be submitted by the Bidder along with the bid:



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- 1) Clause wise deviation if any in the enclosed format.
  - 2) Out line drawings of charger, battery fuse box.
- 11.2 Over and above the documents mentioned in 11.1, the following documents are to be submitted after the award of the contract for purchaser's approval:
- 1) Brief write-up on the working of the system offered.
  - 2) Data sheet-C
  - 3) General arrangement drawing showing the battery charger and associated components.
  - 4) Wiring diagram.
  - 5) Quality plan.
  - 6) Transformers KVA and voltage rating calculation.
  - 7) Fault current calculation.
  - 8) Thyristor rating and fuse co-ordination calculation.
  - 9) Filter circuit calculation.
  - 10) AC power consumption in float mode & boost mode.
  - 11) List of make of major components.
  - 12) Test certificates as required/ type test procedures
  - 13) Installation, operation and maintenance manual for the battery charger, battery fuse and variable metallic resistor and shunt.
  - 14) Descriptive pamphlets, giving all information regarding the various components/equipments.
  - 15) Other relevant documents and data necessary for approval of drawings under this clause and for satisfactory operation and maintenance.
  - 16) Field quality plan. Bidder shall furnish field quality plan detailing out the specific quality control procedure covering receipt of material/equipment and handling at site, storage, erection, commissioning, post commissioning etc.

11.3 Instruction Manuals

Instruction manuals for the installation, operation and maintenance of battery charger, battery fuse and variable metallic resistor and shunt to be supplied at least two months before the date of despatch of equipment.

The installation and maintenance manual of battery charger, battery fuse and variable metallic resistor and shunt shall contain the following.

- A) General description giving type and rating of equipment.
- B) Technical data.
- C) Salient constructional details.
- D) Instruction to be followed on receipt at site.



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- E) Erection procedures and checks (handling at site, erection, pre-commissioning).
- F) Commissioning procedures and site tests.
- G) Routine, periodic and preventive inspection and maintenance procedures.
- H) Safety rules.
- J) Possible faults, their causes and remedies.
- K) Catalogues, literature and drawings.
- L) Outline dimension drawings showing constructional features, relevant cross sectional views and earthing details, operator oriented description of equipment and accessories.
- M) Operating procedures, maintenance procedures & precautions to be taken during operation and maintenance work.

### 12.0 SPARES

- 12.1 Bidder to furnish the E & C spares as per attachment-III Data Sheet-A enclosed with Section-C of specification.
- 12.2 Bidder to quote O&M spares for 3 years of normal operation as optional items.

### 13.0 TOOLS AND TACKLE

Tools & tackle, which are essential to facilitate assembly, adjustments, maintenance & dismantling of equipment shall be provided as part of equipment supplied. The above tools shall be supplied along with the initial consignment of equipment so as to be available prior to erection but may not be used for erection purposes.

### 14.0 AS-BUILT DRAWINGS

Though only supply of equipment is under bidder's scope, bidder may note that all as-built correction (as given by purchaser to vendor) shall have to be incorporated in the originals by the vendor and copies of the as-built corrected drawings / documents as per requirement shall be submitted by the vendor.

### 15.0 STATUTORY AND REGULATORY REQUIREMENTS

Statutory and regulatory requirements as per IE rule 1956 with amendment-3 rule 1986, rules Nos. 35, 42, 50 & 51 shall be adhered to.



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**ANNEXURE-IV**

**LIST OF APPLICABLE STANDARDS**

- |     |  |                 |
|-----|--|-----------------|
| 1.  | GUIDE FOR SURGE WITHSTAND CAPABILITY TESTS   | ANSI-C 37.90a   |
| 2.  | COLOURS FOR READY MIX PAINTS   | IS-5            |
| 3.  | PVC INSULATED CABLE FOR WORKING VOLTAGE 1100V  | IS-694          |
| 4.  | INDICATING ANALOGUE ELECTRICAL MEASURING INSTRUMENTS   | IS-1248         |
| 5.  | DOP FOR LV SWITCHGEAR AND CONTROL GEAR   | IS-13947 PART-1 |
| 6.  | SPECIFICATION FOR LV SWITCHGEAR AND CONTROL GEAR   | IS-13947        |
| 7.  | ELECTRICAL RELAYS FOR POWER SYSTEM PROTECTION  | IS-3231         |
| 8.  | APPLICATION GUIDE FOR ELECTRICAL RELAYS FOR AC SYSTEM  | IS-3842         |
| 9.  | MONO CRYSTALLINE SEMICONDUCTOR RECTIFIER CELLS & STACKS  | IS-3895         |
| 10. | MONO CRYSTALLINE SEMICONDUCTOR RECTIFIER ASSEMBLIES & EQUIPMENT  | IS-4540         |
| 11. | CODE OF PRACTICE FOR PHOSPHATING OF IRON & STEEL   | IS-6005         |
| 12. | SAFETY CODE FOR SEMICONDUCTOR RECTIFIER EQUIPMENT  | IS-6619         |
| 13. | CONTROL SWITCHES (SWITCHING DEVICES FOR CONTROL AND AUXILIARY CIRCUITS INCLUDING CONTACTOR RELAYS) FOR VOLTAGE UPTO 1000V AC OR 1200V DC | IS-6875         |
| 14. | ENVIRONMENTAL TESTING FOR ELECTRONIC & ELECTRICAL ITEMS  | IS-9000         |
| 15. | LV FUSE FOR VOLTAGES BELOW 1000V AC OR 1500V DC  | IS-13703        |
| 16. | PERFORMANCE REQUIREMENT FOR ALARM ANNUNCIATION SYSTEM  | EEUA-45D        |
| 17. | POWER TRANSFORMERS   | IS-2026         |
| 18. | INDIAN ELECTRICITY RULES & INDIAN ELECTRICITY ACTS   |                 |

**NOTE:** Equipment complying to other internationally accepted standards such as IEC, BS, VDE etc. will also be considered if they ensure performance and constructional features equivalent or superior to standards listed above. In such a case, the bidder shall clearly indicate the standards adopted, furnish a copy in English of the latest revision of the standards alongwith copy of all official amendments and revisions and shall clearly bring out the salient features for comparison.



QUALITY PLAN		CUSTOMER : TSGENCO		PROJECT TITLE : 1X800MW KOTHAGUDEM TPS		SPECIFICATION NO. : PE-TS-410-508-E002				
SHEET 2 OF 7		BIDDER :		STANDARD QP NO. : PE-QP-999-508-E003, REV. 0		SPECIFICATION TITLE: TECHNICAL SPECIFICATION FOR 220V DC BATTERY CHARGER				
VENDOR SYSTEM		220V DC SYSTEM		ITEM: BATTERY CHARGER		DOC. NO. :				
S/L NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9	P W V	11
2.8	Busbar	1) Dimensional checkup 2) Conductivity test 3) Surface Finish 4) Material Grade	Major	Physical	100%	BHEL appd drg/data sheet	BHEL appd drg/data sheet	IR	3 - 2.1	
			Major	Electrical	Sample/lot	-do-	-do-	IR	3 - 2.1	
			Major	Visual	100%	-do-	-do-	IR	2 - 2.1	
			Major	Verif. of TC	1/Lot	-do-	-do-	Mfr TC	2 - 2.1	
2.9	Annunciation facia (if applicable)	All routine test as per EEUA-45D	Major	Visual	100%	BHEL appd GA drg	BHEL appd GA drg	Mfr TC	2 - 1	
2.10	Visual Indications for charger status using LED(indicating lamps (if annunciation facia is not used)	Electronic card used for indication (refer Electronic card assembly & location at d. No.3.4,for checks	Major	Visual	100%	BHEL appd GA drg	BHEL appd GA drg	Mfr TC	2 - 1	
2.11	Rectifier Transformer	1) Rating 2) Dimensional check a) Overall size b) Mounting Details 3) Terminal Board 4) Polarity Test 5) IR Test 6) Routine Tests	Major	Visual	100%	BHEL appd Data sheet	BHEL appd Data sheet	IR	3 - 2.1	
			Major	Physical	100%	MFR's drg	MFR's drg	-do-	3 - 2.1	
			Major	Physical	100%	-do-	-do-	-do-	3 - 2.1	
			Major	Physical	100%	-do-	-do-	-do-	3 - 2.1	
			Major	Electrical	100%	-do-	-do-	-do-	3 - 2.1	
			Major	Electrical	100%	-do-	-do-	-do-	3 - 2.1	
		a) Voltage Ratio Test	Major	Electrical	100%	IEC 146	IEC 146	IR/ Mfr Tc	3 - 2.1	
		b) DC resistance Test	Major	Electrical	100%	-do-	-do-	-do-	3 - 2.1	
		c) No Load Test	Major	Electrical	100%	-do-	-do-	-do-	3 - 2.1	
		d) Measurement of Tap Voltages	Major	Electrical	100%	-do-	-do-	-do-	3 - 2.1	
		e) Measurement of Cu. Losses	Major	Electrical	100%	-do-	-do-	-do-	3 - 2.1	
		f) High voltage test	Major	Electrical	100%	-do-	-do-	-do-	3 - 2.1	
		g) Induced high voltage test	Major	Electrical	100%	-do-	-do-	-do-	3 - 2.1	
		h) Heat run Test	Major	Electrical	100%	-do-	-do-	-do-	3 - 2.1	Temp. rise limited to class A insulation value
2.12	Choke	1) Rating	Major	Physical	100%	BHEL appd Data sheet	BHEL appd Data sheet	IR	3 - 2.1	
		2) Dimensional check	Major	Physical	100%	MFR's drg	MFR's drg	-do-	3 - 2.1	
		a) Overall size	Major	Physical	100%	-do-	-do-	-do-	3 - 2.1	
		b) Mounting Details	Major	Physical	100%	-do-	-do-	-do-	3 - 2.1	
PARTICULARS										
BHEL										
NAME										
SIGNATURE										
DATE										
1 - BHEL/CUSTOMER		2 - VENDOR		3 - SUB- VENDOR		P - PERFORM		W - WITNESS		V - VERIFICATION
BIDDERS/VENDORS COMPANY SEAL										



QUALITY PLAN		CUSTOMER : TSGENCO		PROJECT TITLE : 1X800MW KOTHAGUDEM TPS		SPECIFICATION NO. : PE-TS-410-508-E002					
SHEET 4 OF 7		BIDDER/ VENDOR SYSTEM		STANDARD QP NO. : PE-QP-999-508-E003, REV. 0		SPECIFICATION TITLE: TECHNICAL SPECIFICATION FOR 220V DC BATTERY CHARGER					
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY	REMARKS		
1	2	3	4	5	6	7	8	9	10	11	
									P	W	V
3.2	Pre treatment of enclosure	1) Dimensional checks 2) Water rinsing 3) Derusting 4) Water rinsing 5) Phosphating 6) Water rinsing 7) Hot-Chromating 8) Sealing (if used)	Major Major Major Major Major Major Major	Physical Physical Physical Physical Physical Physical Physical	100% -do- -do- -do- -do- -do- -do-	IS 6005 / MFR's Std practice IS 6005 / MFR's Std practice -do- -do- -do- -do- -do- -do-	IPIR -do- -do- -do- -do- -do- -do- -do-	2 2 2 2 2 2 2 2	- - - - - - - -	1 1 1 1 1 1 1 1	
3.3	Powder Coating	1) Shade, Thickness & Finish 2) Adhesion check by cross hatch method	Major Major	Cross Hatch Visual	Random 100%	IS 6005 / MFR's Std practice -do-	-do- -do-	2 2	- -	1 1	
3.4	Electronic card assembly & location	1) Electronic cards fittings 2) Mechanical interlock 3) Correctness of electronic components 4) Jumpers/ track modification 5) Finish of electronic cards 6) Environmental check on cards to remove cards with infant mortal components	Major Major Major Major Major	Cross Hatch Visual Visual Visual Visual Visual	Random 100% 100% 100% 100% 100%	Electronic cards shall be modular fitted in standard 19" metal racks with guides To avoid wrong insertion of cards MFR's drg No unplanned jumpers / track modification MFR's drg MFR's std MFR's drg	-do- -do- -do- -do- -do- -do-	2 2 2 2 2 2	- - - - - -	1 1 1 1 1 1	
3.5	Assembly of components & modules	1) Transformer & choke 2) Mounting of components such as switches, rectifiers, stack fuses, meter & contactor 3) Minimum clearance between busbar 4) Electronic cards location inside the panels	Major Major Major Major	Visual Visual Physical Visual	100% 100% 100% 100%	MFR's drg -do- Relevant IS Approved drg.	-do- -do- Relevant IS Temp. rise of the location should not exceed 10°C over ambient during heat run	2 2 2 2	- - - -	1 1 1 1	
BHEL		PARTICULARS		BIDDER/VENDOR							
		NAME									
		SIGNATURE									
		DATE									
1 - BHEL/CUSTOMER		2 - VENDOR		3 - SUB- VENDOR		P - PERFORM		W - WITNESS		V - VERIFICATION	
						BIDDERS/VENDOR'S COMPANY SEAL					

QUALITY PLAN		CUSTOMER : TSGENCO		PROJECT TITLE : 1X800MW KOTHAGUDEM TPS		SPECIFICATION NO. : PE-TS-410-508-E002					
SHEET 5 OF 7		BIDDER :		STANDARD QP NO. : PE-QP-999-508-E003, REV. 0		SPECIFICATION TITLE: TECHNICAL SPECIFICATION FOR 220V DC BATTERY CHARGER					
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	VENDOR SYSTEM		ITEM: BATTERY CHARGER	ACCEPTANCE NORM	FORMAT OF RECORD	REMARKS			
			220V DC SYSTEM	EXTENT OF CHECK				AGENCY	P	W	V
3.6	Wiring	1. Bunching 2. Marking 3. Ferruling 4. Lugs crimping 5. Continuity 6. Identification labels	Visual Visual Visual Physical Electrical Visual	100% 100% 100% 100% 100% 100%	MFR's drg -do- -do- -do- -do- -do-	MFR's drg -do- -do- -do- -do- -do-	IPIR -do- -do- -do- -do- -do-	2 2 2 2 2 2	- - - - - -	1 1 1 1 1 1	
3.7	Finishing of Equipment	1. Proper pasting of gasket 2. Earthing busbar	Visual Physical	100% 100%	-do- -do-	-do- -do-	-do- -do-	2 2	- -	1 1	
<b>4.0 Final Inspection</b>											
4.1	Overall	1. Dimensional & sheet thickness 2. Gen arr. & B.O.M 3. Aesthetic Look, Straightness, skewness, Door alignment, Labels etc. 4. Provision of fitting arrangement 5. Proper earthing 6. Gasketing (Check with 1mm wire) 7. Gland plate arrangement 8. Mounting arrangement 9. Wiring quality 10. Paint shade, Adhesion & thickness check 11. Door Functioning 12. Mounting & Proper Fixing of all components 13. Smooth operation of all Switches PUSH Buttons etc. 14. Alarm & Protection	Physical Visual Visual Visual Visual Visual Visual Visual Visual Operation Visual Operation Elect	100% 100% 100% 100% 100% 100% 100% 100% 100% 100% 100% 100%	BHEL appd drawing & Data sheet -do- -do- -do- -do- -do- -do- -do- -do- IS-5(1994) SHADE CARD BHEL appd drawing & Data sheet -do- -do- BHEL appd drawing & Data sheet & other Relv IS	BHEL appd drawing & Data sheet -do- -do- -do- -do- -do- -do- -do- -do- -do- BHEL appd drawing & Data sheet & other Relv IS	IR -do- -do- -do- -do- -do- -do- -do- -do- -do- -do- -do- -do- Test Report	2 2 2 2 2 2 2 2 2 2 2 2 2 2	1 1 1 1 1 1 1 1 1 1 1 1 1	- - - - - - - - - - - - -	
<b>BHEL</b>											
PARTICULARS		BIDDERS/VENDOR									
NAME											
SIGNATURE											
DATE											
1 - BHEL/CUSTOMER		2 - VENDOR		3 - SUB- VENDOR		P - PERFORM		W - WITNESS		V - VERIFICATION	
LEGEND :		BIDDERS/VENDOR'S COMPANY SEAL									

QUALITY PLAN		CUSTOMER : TSGENCO		PROJECT TITLE : 1X800MW KOTHAGUDEM TPS		SPECIFICATION NO. : PE-TS-410-508-E002					
SHEET 6 OF 7		BIDDER / VENDOR SYSTEM		STANDARD QP NO. : PE-QP-999-508-E003, REV. 0		SPECIFICATION TITLE: TECHNICAL SPECIFICATION FOR 220V DC BATTERY CHARGER					
COMPONENT/OPERATION		VENDOR SYSTEM		ITEM: BATTERY CHARGER		DOC. NO. :					
SL. NO.	CHARACTERISTIC CHECK	TYPE/METHOD OF CHECK	EXTENT OF CHECK	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY					
1	2	3	4	5	6	7	8	9	10	11	
4.2	<b>Electrical Testing</b>	1) Burn in check at 50°C for 48 hrs in energised condition	Major	Electrical	100%	The panel / module shall be subjected to ambient temperature of 50°C for 48 hours in energised condition. The temperature rise inside the cubicle shall not exceed 10°C during the test.	The panel / module shall be subjected to ambient temperature of 50°C for 48 hours in energised condition. The temperature rise inside the cubicle shall not exceed 10°C during the test.	IR	2	1	Burn in test to be performed before offering for BHEL inspection
		2) AVR operation test with input voltage variation of +/- 10%, frequency variation and combined voltage-frequency variation.	Major	Electrical	100%						
		a) No Load				variation within ±1%	variation within ±1%	-do-	2	1	-
		b) Half Load				variation within ±1%	variation within ±1%	-do-	2	1	-
		c) Full Load				variation within ±1%	variation within ±1%	-do-	2	1	-
		3) Ripple test	Major	Electrical	100%						
		a) No Load				variation within ±1%	variation within ±1%	-do-	2	1	-
		b) Half Load				variation within ±1%	variation within ±1%	-do-	2	1	-
		c) Full Load				variation within ±1%	variation within ±1%	-do-	2	1	-
		4) Logic simulation/interlocks/General Operation Test	Major	Electrical	100%						
		a) Trickle / boost mode selector switch operation	Major	Electrical	100%	Functional	Functional	-do-	2	1	-
		b) Auto/ manual selector switch operation	Major	Electrical	100%	Functional	Functional	-do-	2	1	-
		c) Soft start feature check	Major	Electrical	100%	Functional	Functional	-do-	2	1	-
		d) Uniform step-less trickle mode voltage adjustment in auto / manual operation	Major	Electrical	100%	Functional	Functional	-do-	2	1	-
		e) Boost charge mode current adjustment from 50% to 100 % continuously	Major	Electrical	100%	Functional	Functional	-do-	2	1	-
		5) Control circuit & charger status indication test	Major	Electrical	100%	Functional	Functional	-do-	2	1	-
		6) Load Limiter Operation	Major	Electrical	100%	Voltage should not drop upto 100% load. Voltage should drop beyond 100% load	Voltage should not drop upto 100% load. Voltage should drop beyond 100% load	-do-	2	1	-
		7) Heat Run Test	Major	Electrical	100%	BHEL approved docs.	BHEL approved docs.	-do-	2	1	HEAT RUN TEST TO BE CONDUCTED ON ALL CHARGERS. (TOTAL 10 NOS. CHARGERS)
<b>BHEL</b>		<b>BIDDER/VENDOR</b>		<b>W - WITNESS</b>		<b>V - VERIFICATION</b>					
PARTICULARS		NAME		SIGNATURE		DATE					
1 - BHEL/CUSTOMER		2 - VENDOR		3 - SUB-VENDOR		P - PERFORM		BIDDERS/VENDOR'S COMPANY SEAL			

