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NOTICE INVITING TENDER

(Document No PS:MSX:NIT)

**TENDER NO.: BHEL/NR/SCT/VRMP/ELECTRICAL AND
C&I/1163**

**NAME OF WORK: ERECTION, TESTING, COMMISSIONING,
TRIAL RUN, PERFORMANCE GUARANTEE TEST RUN
(PGTR) AND HANDING OVER OF ELECTRICAL AND
CONTROL & INSTRUMENTATION PACKAGE OF 1 X 75 MW
HPCL VISAKH REFINERY MODERNISATION PROJECT
(VRMP), VISAKHAPATNAM, ANDHRA PRADESH.**

Bharat Heavy Electricals Limited



Ref: BHEL/NR/SCT/VRMP/ELECTRICAL AND C&I/1163

Date: 09/07/2019

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NOTICE INVITING E-TENDER (NIT)
BIDDER TO SUBMIT OFFERS ON PORTAL <https://bhel.abcprocure.com>

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To

Dear Sir/Madam

Sub : NOTICE INVITING E-TENDER

Sealed offers in two part bid system are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-I) for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

1. Salient Features of NIT

SL NO	ISSUE	DESCRIPTION
i	TENDER NUMBER	BHEL/NR/SCT/VRMP/ELECTRICAL AND C&I/1163
ii	Broad Scope of job	ERECTION, TESTING, COMMISSIONING, TRIAL RUN, PERFORMANCE GUARANTEE TEST RUN (PGTR) AND HANDING OVER OF ELECTRICAL AND CONTROL & INSTRUMENTATION PACKAGE 1 X 75 MW HPCL VISAKH REFINERY MODERNISATION PROJECT (VRMP), VISAKHAPATNAM, ANDHRA PRADESH
iii	DETAILS OF TENDER DOCUMENT	
a	Volume-IA	<i>Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc</i> Applicable
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i> Applicable
c	Volume-IC	<i>General Conditions of Contract (GCC)</i> Applicable
d	Volume-ID	<i>Forms and Procedures</i> Applicable
e	Volume-II	<i>Price Schedule (Absolute value).</i> Applicable
iv	ISSUE OF TENDER DOCUMENTS	From BHEL website (www.bhel.com) and https://bhel.abcprocure.com Tender documents will be available at website till due date of submission Applicable
v	DUE DATE & TIME OF OFFER SUBMISSION	Date : 22/07/2019 , Time : 1500 HRS Place : on https://bhel.abcprocure.com Applicable
vi	OPENING OF TENDER	At due date / time Date : 22/07/2019 , Time : 1530 HRS <i>Notes:</i> (1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day. (2) Bidder may depute representative to witness the opening of tender. However it being an e-tender it shall be opened online. Applicable

vii	EMD AMOUNT	Rs. 14,28,000/-	Applicable
viii	COST OF TENDER	Rs 2,000/-	Applicable
ix	LAST DATE FOR SEEKING CLARIFICATION	Five days before bid submission due date. Along with soft version also, addressing to contact address given below 1) Name: G.V. RAJA SEKHAR Designation: Sr. MANAGER Deptt: SCT Address: BHEL-PSNR, PLOT NO. 25, SECTOR – 16A, NOIDA - 201301 Phone: (Landline) 0120-2416232 Email : gvr@bhel.in 2) Name: CHITTARANJAN SWAIN Designation: MANAGER Deptt: SCT Address: BHEL-PSNR, PLOT NO. 25, SECTOR – 16A, NOIDA - 201301 Phone: (Landline) 0120 - 2416500 Email : cs@bhel.in	Applicable
x	SCHEDULE OF Pre Bid Discussion (PBD)		Not applicable.
xi	INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)	Please refer clause no.15a.	Applicable
xii	Latest updates	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) & portal https://bhel.abcpurchase.com and not in the newspapers. Bidders to keep themselves updated with all such information	
xiii	Tender submission	on portal https://bhel.abcpurchase.com	

2. The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, **Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**
3. Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Noida issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Noida, Sundays and second/ last Saturdays.

As this tender is an E-Tender and no paper bids will be accepted therefore the scanned copy of the Demand Draft or the Cash Receipt issued by BHEL PSNR should be uploaded in the E procurement portal. Hard Copy

of the demand draft should reach BHEL PSNR HQ Noida before the due date and time of bid submission. BHEL shall not be responsible for postal or any other delays in this regard.

4. Unless specifically stated otherwise, tender must be accompanied by the prescribed amount of Earnest Money Deposit (EMD) in the manner described in Clause no. 1.9 of General Conditions of Contract.

'One Time EMD' will not be considered for this tender. All the bidders who have 'One Time EMD' with BHEL and want to participate in this tender, would also submit the requisite amount of EMD as mentioned in Clause No. 1, Salient Features of NIT, Sl. No. (vii) above.

However, the One Time EMD can be adjusted against the EMD applicable against this tender on specific request of bidder.

For Electronic Fund Transfer the details are as below:-

a) **Name of the Beneficiary** -: Bharat Heavy Electricals Limited

b) **Bank Particulars**

- | | | |
|--------|--|---|
| i). | Bank Name :- | STATE BANK OF INDIA |
| ii). | Bank Telephone No.(with STD code):- | 011-23475566 |
| iii). | Branch Address:- | CAG II BRANCH, NEW DELHI
4 th & 5 th FLOOR, REDFORT CAPITAL,
PARASNATH TOWERS, BHAI VEER SINGH
MARG, GOLE MARKET, NEW DELHI-110001 |
| iv). | Bank Fax No. (with STD code) :- | 011-23475566 |
| v). | Branch Code :- | 17313 |
| vi). | 9 Digit MICR Code of the Bank Branch :- | 110002562 |
| vii). | Bank Account Number :- | 10813608647 |
| viii). | Bank Account Type :- | CASH CREDIT |
| ix). | 11 Digit IFSC Code of Beneficiary Branch:- | SBIN0017313 |

(Note:- In case of E-Tenders, no paper bids shall be accepted, therefore, the scanned copy of the Banker's Cheque/ Demand Draft/ Pay Order/ Details of payment made through Electronic Fund Transfer/ Fixed Deposit Receipt (FDR) / Bank Guarantee should be uploaded in the E-Procurement Portal and hard copy of the same should reach BHEL-PSNR HQ Noida before the due date and time of bid submission. BHEL shall not be responsible for postal or any other delays in this regard.)

5. **Procedure for Submission of Tenders**: This is an E-tender floated online through our E-Procurement Site <https://bhel.abcprocure.com>. The bidder should respond by submitting their offer online only in our e-Procurement platform at <https://bhel.abcprocure.com>. Offers are invited in two-parts only.

Documents Comprising the e-Tender

The tender shall be submitted online ONLY EXCEPT TENDER FEE & EMD (in physical form) as mentioned below:

a. Technical Tender (UN priced Tender)

All Technical details (eg. Eligibility Criteria requested (as mentioned below)) should be attached in e-tendering module, failing which the tender stands invalid & may be REJECTED. Bidders shall furnish the following information along with technical tender (preferably in pdf format):

- i. Tender Cost and Earnest money Deposit (EMD) furnished in accordance with NIT Clause 3.0 & 4.0.
- ii. Technical Bid (without indicating any prices).

b. Price Bid:

- i. Prices are to be quoted in the attached Price Bid format online on e-tender portal.
- ii. The price should be quoted for the accounting unit indicated in the e-tender document.

- iii. Note: It is the responsibility of tenderer to go through the Tender document to ensure furnishing all required documents in addition to above, if any. Any deviation would result in REJECTION of tender and would not be considered at a later stage at any cost by BHEL.
- iv. A person signing (manually or digitally) the tender form or any documents forming part of the contract on behalf of another shall be deemed to warrantee that he has authority to bind such other persons and if, on enquiry, it appears that the persons so signing had no authority to do so, the purchaser may, without prejudice to other civil and criminal remedies, cancel the contract and hold the signatory liable for all cost and damages.
- v. A tender, which does not fulfil any of the above requirements and/or gives evasive information/reply against any such requirement, shall be liable to be ignored and rejected.
- vi. In case offer is sent through hard copy/fax/telex/cable/electronically in place of e-tender, same shall not be considered.

DO NOT'S

Bidders are requested NOT to submit the hard copy of the Bid. In case offer is sent through hard copy/fax/telex/cable/electronically in place of e-tender, the same shall not be considered. **Also, uploading of the price bid in prequalification bid or technical bid may RESULT IN REJECTION of the tender.**

Digital Signing of e-Tender

Tenders shall be uploaded with all relevant PDF/zip format. The relevant tender documents should be uploaded by an authorized person having Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION digital signature certificate (DSC).

The Requirement:

1. A PC with Internet connectivity &
2. DSC (Digital Signature Certificate)(**Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION**)

BHEL has finalized the e-procurement service Provider:-

M/s AbcProcure, Ahmedabad

A-202/208, Wall Street-II, Opp. Orient Club, Nr. Gujarat College,

Ellis Bridge, Ahmedabad-380006

The contact details of the service provider are given below:

Name	Contact Nos.	e-mail ID	Role	Location
Swapnil Hamilton	+91 79 40270549	swapnil.h@eptl.in	Support Executive	HO – Ahmedabad
Hardik Oza	+91 79 40270560	Hardik.oza@eptl.in	Support Executive	HO – Ahmedabad
Ankur Bhatt	+91 79 40270590	ankur.bhatt@eptl.in	Support Executive	HO – Ahmedabad
Prashant Rajyaguru	+91 79 40270545 / 9016859416	prashant@eptl.in	Ast. Manager – Implementation & Support	HO – Ahmedabad
Dharam Rathod	+91 79 40270596 / 9374519754	dharam@eptl.in	Manager – Implementation & Support	HO – Ahmedabad
Pradip Parmar	+91 79 40270532 / 9328657215	pradip@eptl.in	Sr Manager – Implementation & Support	HO – Ahmedabad
Devang Patel	+91 79 40270576 / 99983 05442	devang@eptl.in	Sr Manager – Implementation & Support	HO – Ahmedabad

The process of utilizing e-procurement necessitates usage of **DSC (Digital Signature Certificate) (Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION)** and you are requested to procure the same immediately, if not presently available with you. Please note that only with DSC, you will be able to login the e-procurement secured site and take part in the tendering process.

1. The contact details of the DSC Certifying Authority as given below

1	GNFC	www.ncodesolutions.com
2	e-Mudhra	http://www.e-Mudhra.com
3	Safescrypt	www.safescrypt.com

Vendors are also requested to go through seller manual available on <https://bhel.abcpocure.com>.

6. **Not Used**

7. Deviation with respect to tender clauses and additional clauses/suggestions in Techno-commercial bid / Price bid shall NOT be considered by BHEL. Bidders are requested to positively comply with the same.

8. BHEL reserves the right to accept or reject any or all Offers without assigning any reasons thereof. BHEL also reserves the right to cancel the Tender wholly or partly without assigning any reason thereof. Also BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).

9. **Assessment of Capacity of Bidders:**

Bidder's capacity for executing the job under tender shall be assessed 'LOAD' wise and 'PERFORMANCE' wise as per the following:

- I. **LOAD**: Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The cut off month for reckoning 'Load' shall be the 3rd Month preceding the month corresponding to the 'latest date of bid submission', in the following manner -

(**Note**: For example, if latest bid submission is in Jan 2017, then the 'load' shall be calculated up to and inclusive of Oct 2016)

Total number of Packages in hand = Load (P)

Where 'P' is the sum of all unit wise identified packages (refer table-1) under execution with BHEL Regions as on the cut off month defined above, including packages yet to be commenced, excepting packages which are on Long Hold.

- II. **PERFORMANCE**: Here 'Monthly Performance' of the bidder for all the packages (under execution/ executed during the 'Period of Assessment' in all Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding and including the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the 3rd Month preceding the month corresponding to 'latest date of bid submission', in the following manner:

(**Note**: For example, if 'latest date of bid submission' is in Jan 2017, then the 'performance' shall be assessed for a 6 months' period up to and inclusive of Oct 2016 (i.e. from May 2016 to Oct 2016), for all the unit wise identified packages (refer Table -1))

- i). **Calculation of Overall 'Performance Rating' for 'Similar Package/Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment'**:

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

- a) $P_1, P_2, P_3, P_4, P_5, \dots, P_N$ etc. be the packages (under execution/ executed during the 'Period of Assessment' in all Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = P_T (i.e. $P_T = P_1 + P_2 + P_3 + P_4 + \dots + P_N$)
- b) Number of Months ' T_1 ' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package P_1 . Similarly

T_2 for package P_2 , T_3 for package P_3 , etc. for the tendered scope. Now calculate cumulative total months ' T_T ' for total similar Packages ' P_T ' for all Regions (i.e. $T_T = T_1 + T_2 + T_3 + T_4 + \dots T_N$)

- c) Sum ' S_1 ' of 'Monthly Performance Evaluation' Scores (S_{1-1} , S_{1-2} , S_{1-3} , S_{1-4} , S_{1-5} ... S_{1-T1}) for similar package P_1 , for the 'period of assessment' ' T_1 ' (i.e. $S_1 = S_{1-1} + S_{1-2} + S_{1-3} + S_{1-4} + S_{1-5} + \dots S_{1-T1}$). Similarly, S_2 for package P_2 for period T_2 , S_3 for package P_3 for period T_3 etc. for the tendered scope for all Regions. Now calculate cumulative sum ' S_T ' of 'Monthly Performance Evaluation' Scores for total similar Packages ' P_T ' for all Regions (i.e. ' S_T ' = $S_1 + S_2 + S_3 + S_4 + S_5 + \dots S_N$).
- d) **Overall Performance Rating ' R_{BHEL} ' for the Similar Package/Packages** (under execution/ executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL

$$= \frac{\text{Aggregate of Performance scores for all similar packages in all the Regions}}{\text{Aggregate of months for each of the similar packages for which performance should have been evaluated in all the Regions}}$$

$$= \frac{S_T}{T_T}$$

- e) Bidders to note that the risk of non-evaluation or non-availability of the 'Monthly Performance Evaluation' reports as per relevant formats is to be borne by the Bidder.

- f) Table showing methodology for calculating 'a', 'b' and 'c' above

Sl. No.	Item Description	Details for all Regions							Total
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)
1	Similar Packages for all Regions → (under execution/ executed during period of assessment)	P_1	P_2	P_3	P_4	P_5	...	P_N	Total No. of similar packages for all Regions = P_T i.e. Sum (Σ) of columns (iii) to (ix)
2	Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment' for corresponding Similar Packages (as in row 1)	T_1	T_2	T_3	T_4	T_5	...	T_N	Sum (Σ) of columns (iii) to (ix) = T_T
3	Monthly performance scores for the corresponding period (as in Row 2)	S_{1-1} , S_{1-2} , S_{1-3} , S_{1-4} , ... S_{1-T1}	S_{2-1} , S_{2-2} , S_{2-3} , S_{2-4} , ... S_{2-T2}	S_{3-1} , S_{3-2} , S_{3-3} , S_{3-4} , ... S_{3-T3}	S_{4-1} , S_{4-2} , S_{4-3} , S_{4-4} , ... S_{4-T4}	S_{5-1} , S_{5-2} , S_{5-3} , S_{5-4} , ... S_{5-T5}		S_{N-1} , S_{N-2} , S_{N-3} , S_{N-4} , ... S_{N-TN}	-----
4	Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3)	S_1	S_2	S_3	S_4	S_5	...	S_N	Sum (Σ) of columns (iii) to (ix) = S_T

- ii). Calculation of Overall 'Performance Rating' (R_{BHEL}) in case at least 6 evaluation scores for 'similar Package/Packages' for the tendered scope ARE NOT AVAILABLE, during the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for ALL the packages, divided by the total number of Package months for which evaluation should have been done. ' R_{BHEL} ' shall be calculated subject to availability of 'performance scores' for at least 6 'package months' in the order of precedence below:

- 'Period of Assessment' i.e. 6 months preceding and including the cut-off month
- 12 months preceding and including the cut-off month
- 24 months preceding and including the cut-off month

In case, R_{BHEL} cannot be calculated as above, then Bidder shall be treated as 'NEW VENDOR'. Further eligibility and qualification of this bidder shall be as per definition of 'NEW VENDOR' described in 'Explanatory Notes'.

- iii). Factor "L" assigned based on Overall Performance Rating (R_{BHEL}) at Power Sector Regions:

Sl. no.	Overall Performance Rating (R_{BHEL})	Corresponding value of 'L'
1	=60	NA
2	> 60 and $\leq$ 65	0.4
3	> 65 and $\leq$ 70	0.35
4	> 70 and $\leq$ 75	0.25
5	> 75 and < 80	0.2
6	$\geq$ 80	NA

III. 'Assessment of Capacity of Bidder':

'Assessment of Capacity of Bidder' is based on the Maximum number of packages for which a vendor is eligible, considering the performance scores of similar packages, as below:

Max number of packages $P_{Max} = (R_{BHEL} - 60)$ divided by corresponding value of 'L', i.e. $(R_{BHEL} - 60)/L$

Note:

- In case the value of P_{Max} results in a fraction, the value of P_{Max} is to be rounded off to next whole number
- For $R_{BHEL} = 60$, $P_{Max} = '1'$
- For $R_{BHEL} \geq 80$, there will be no upper limit on P_{Max}

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if $P \leq P_{Max}$
(Where P is calculated as per clause 'I' above)

Note: For the transition period of 1 year (i.e. for all the NITs floated between 11th May 2019 to 10th May 2020), in addition to above, 'Assessment of Capacity of Bidder' shall also be calculated considering 'performance scores' till 36 months as per Sl. no II ii).

Higher of the results obtained out of both shall be considered for 'Assessment of Capacity of Bidder'.

IV. Explanatory note:

- Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or C&I etc. at the individual level irrespective of rating of Plant and irrespective of whether the subject tender is a single package or as part of combined/composite packages. Normally Boiler, ESP, Piping, Turbine, Electrical, C&I, Civil, Structure etc. is considered individual level of package. For example, in case the tendered scope is a Boiler Vertical Package comprising of Boiler, ESP and Power Cycle Piping (i.e. the 'identified packages as per Table-1 below), the 'PERFORMANCE' part against sl.no. II above, needs to be evaluated considering all the identified packages (i.e. Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above.

ii). Identified Packages (Unit wise)

Table-1

Civil	Electrical and C&I	Mechanical
i). Enabling works ii). Pile and Pile Caps iii). Civil Works including foundations iv). Structural Steel Fabrication & Erection v). Chimney vi). Cooling Tower vii). Others (Civil)	i). Electrical ii). C&I iii). Others (Elect. and C&I)	i). Boiler & Aux (All types including CW Piping if applicable) ii). Power Cycle Piping/Critical Piping iii). ESP iv). LP Piping v). Steam Turbine Generator set & Aux vi). Gas Turbine Generator set & Aux vii). Hydro Turbine Generator set & Aux viii). Turbo Blower (including Steam Turbine) ix). Material Management x). Others (Mechanical)

- iii). Bidders who have not been evaluated for at least six package months in the last 24 months preceding and including the Cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions, shall be considered "NEW VENDOR".

A 'NEW VENDOR' shall be considered qualified subject to satisfying all other tender conditions.

A 'NEW VENDOR' if awarded a job (of package/packages identified under this clause) shall be tagged as "FIRST TIMER" on the date of first LOI/LOA from BHEL.

The "FIRST TIMER" tag shall remain till completion of all the contracts against which vendors has been tagged as First Timer or availability of 6 evaluation scores within last 24 months preceding and including the cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions.

A Bidder shall not be eligible for the next job as long as the Bidder is tagged as "FIRST TIMER" excepting for the Tenders which have been opened on or before the date of the bidder being tagged as 'FIRST TIMER'.

After removal of 'FIRST TIMER' tag, the Bidder shall be considered 'QUALIFIED' for the future tenders subject to satisfying all other tender conditions including 'Assessment of Capacity of Bidders'.

- iv). Consequent upon applying the criteria of 'Assessment of Capacity of Bidders' detailed above on all the bidders qualified against Technical and Financial Qualification criteria, if the number of qualified bidders reduces to less than four, then for further processing of the Tender, BHEL at its discretion reserves the right to also consider the bidders who are "not qualified" as per criteria of 'Assessment of Capacity of Bidders' and for this, procedure described in following three options shall be followed:
- All the bidders having Overall Performance Rating ('R_{BHEL}') ≥60 shall be considered qualified against criteria of 'Assessment of Capacity of Bidders'.
 - If even after using option "a", the number of qualified bidders remains less than four, then in addition to bidders considered as per option "a", "First timer" bidders having average of available performance scores ≥60 upto and including the Cut Off month shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.
 - If even after using option "a" and "b", the number of qualified bidders remains less than four, then in addition to bidders considered as per option "a" and "b", "First timer" bidders for whom no performance score is available in the system upto and including the Cut Off month, shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.

Note:- In case, the number of bidders qualified against Technical and Financial Qualification criteria itself is less than four, then all bidders (a)- having Overall Performance Rating ('R_{BHEL}') ≥60, (b)- "First timer" bidders having average of available performance scores ≥60 upto and including the Cut Off month, (c)- "First timer" bidders for whom no performance score is available in the system upto and

including the Cut Off month, shall be considered qualified against criteria of 'Assessment of Capacity of Bidders' for further processing of tender.

- v). 'Under execution' shall mean works in progress as per the following:
 - a. Up to execution of 90% of anticipated Contract Value in case of Civil, MM, Structural and Turbo Blower Packages
 - b. Up to Steam Blowing in case of Boiler/ESP/Piping Packages
 - c. Up to Synchronization in all Balance Packages

Note: BHEL at its discretion can extend (or reduce in exceptional cases in line with Contract conditions) the period defined against (a), (b) and (c) above, depending upon the balance scope of work to be completed.

- vi). Contractor shall provide the latest contact details i.e. mail-ID and Correspondence Address to SCT Department, so that same can be entered in the Contractor Performance Evaluation System, and in case of any change/discrepancy same shall be informed immediately. Login Details for viewing scores in Contractor Performance Evaluation System shall be provided to the Contractor by SCT Department.
- vii). Performance Evaluation for Activity Month shall be completed in Evaluation Month (i.e. month next to Activity Month) or in rare cases in Post Evaluation Month (i.e. month next to Evaluation Month) after approval from Competent Authority. In case scores are not acceptable, Contractor can submit Review Request to GM Site/ GM Project latest by 25th of Evaluation Month or 3 days after approval of score, whichever is later. However, acceptance/rejection of 'Review Request' solely depends on the discretion of GM Site/GM Project. After acceptance of Review Request, evaluation score shall be reviewed at site and the score after completion of review process shall be acceptable and binding on the contractor.
- viii). Project on Hold due to reasons not attributable to bidder -
 - a. **Short hold:** Evaluation shall not be applicable for this period, however Loading will be considered.
 - b. **Long hold:** Short hold for continuous six months and beyond or hold on account of Force Majeure shall be considered as Long Hold. Evaluation as well as Loading shall not be considered for this period.
- ix). Performance evaluation in CL 9 above is applicable to prime bidder and Consortium partner (or Technical tie up partner) for their respective scope of work.

- 10. Since the job shall be executed at site, bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage structure, wage rules, etc before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.
- 11. For any clarification on the tender document, the bidder may seek the same over e-procurement portal as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.
- 12. BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.
- 13. In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender

documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.

14. Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.
15. Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at Clause No. 1, Salient Features of NIT, Sl. No. (xi) above.**

15a **Integrity Pact (IP)**

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

SI	IEM	Address	Phone & Email
1.	Mrs. Pravin Tripathi, IA & AS (Retd.)	D-243, Anupam Gardens, Lane IB, Neb Sarai, Sainik Farms, New Delhi – 110 068	pravin.tripathi@gmail.com

- ii) The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, in case of two/ three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.
- iii) Please refer Section-8 of the IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEM(s). All correspondence with the IEMs shall be done through email only.

Note:

No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are as per **Clause No. 1, Salient Features of NIT, Sl. No. (ix) above.**

16. The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.
17. In case BHEL decides on a 'Public Opening', the date & time of opening of the PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorised representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders-
18. Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise
19. (a) BHEL reserves the right to go for Reverse Auction (RA) (Guidelines as available on www.bhel.com) instead of opening the sealed envelope price bid, submitted by the bidder. This will be decided after techno-commercial evaluation. Bidders to give their acceptance with the offer for participation in RA. Non-

acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA.

- (b) Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit 'Process compliance form' (to the designated service provider) as well as 'Online sealed bid' in the Reverse Auction. Non-submission of 'Process compliance form' or 'Online sealed bid' by the agreed bidder(s) will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).
 - (c) The bidders have to necessarily submit online sealed bid less than or equal to their envelope sealed price bid already submitted to BHEL along with the offer. **The envelope sealed price bid of successful L1 bidder in RA, if conducted, shall also be opened after RA and the order will be placed on lower of the two bids (RA closing price & envelope sealed price) thus obtained. The bidder having submitted this offer specifically agrees to this condition and undertakes to execute the contract on thus awarded rates.**
 - (d) If it is found that L1 bidder has quoted higher in online sealed bid in comparison to envelope sealed bid for any item(s), the bidder will be issued a warning letter to this effect. However, if the same bidder again defaults on this count in any subsequent tender in the unit, it will be considered as fraud and will invite action by BHEL as per extant guidelines for suspension of business dealings with suppliers/ contractors (as available on www.bhel.com).
 - (e) If reverse auction process is unsuccessful, sealed envelope price bids of all the techno-commercially qualified bidders shall be opened and the tender shall be processed accordingly. However, the envelope sealed bid(s) of techno-commercially acceptable bidder(s) who had agreed to participate in the RA and had failed to submit the online sealed bid shall not be opened.
20. On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.
21. In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.
22. The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.
23. **Consortium Bidding** (or Technical Tie up): shall be allowed only if specified in Pre-Qualifying Requirement (PQR) criteria, and in such a case the following shall be complied with:
- 23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement with a validity period of six months initially. In case the consortium is awarded the contract, then the Consortium Agreement between the Prime Bidder and Consortium Partner or partners shall be extended till contractual completion period including extension periods if any applicable.
 - 23.2 **'Stand-alone' bidder cannot become a 'Prime Bidder' or a 'Consortium bidder' or 'Technical Tie up bidder' in a consortium (or Technical Tie up) bidding.** Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into consortium agreement with other prime bidders. In case of non compliance, consortium bids of such Prime bidders will be rejected.
 - 23.3 Number of partners for a consortium Bidding (or Technical Tie up) shall be as specified in the PQR
 - 23.4 Prime Bidder shall be as specified in the Pre Qualification Requirement, else the bidder who has the major share of work

- 23.5 In order to be qualified for the tender, Prime Bidder and Consortium partner or partners shall satisfy (i) the Technical 'Pre Qualifying Requirements' specified for the respective package, (ii) "Assessment of Capacity of Bidder" as specified in clause 9.0
- 23.6 Prime Bidder shall comply with additional 'Technical' criteria of PQR as defined in 'Explanatory Notes for the PQR'
- 23.7 Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified
- 23.8 In case customer approval is required, then Prime Bidder and Consortium Partner or partners shall have to be individually approved by Customer for being considered for the tender.
- 23.9 Prime Bidder shall be responsible for the overall execution of the contract
- 23.10 In case of award of job, Performance shall be evaluated for Prime Bidder and Consortium Partner or partners for their respective scope of work(s) as per prescribed formats
- 23.11 In case the Consortium partner or partners back out, their SDs shall be encashed by BHEL. In such a case, other consortium partner or partners meeting the PQR have to be engaged by the Prime Bidder, and if not, the respective work will be withdrawn and executed on risk and cost basis of the Prime Bidder. The new consortium partner or partners shall submit fresh SDs as applicable.
- 23.12 In case the prime Bidder withdraws, the whole contract shall be considered cancelled and short closed.
- 23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of one work with a consortium partner under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'stand alone' bidder for similar works, subject to certification from BHEL about the active involvement of the Prime Bidder for satisfactory execution of the works.
- 23.14 The consortium partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 0.5% of the total contract value in addition to the SD to be submitted by the prime Bidder for the total contract value.
- 23.15 In case of a Technical Tie up, all the clauses applicable for the Consortium partner shall be applicable for the Technical Tie up partner also.
24. The bidder shall upload documents in support of possession of 'Qualifying Requirements' duly self-certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.
25. The bidder may have to produce original document for verification if so decided by BHEL.
26. It may please be noted that guidelines/rules in respect of Suspension of Business dealings', 'Vendor evaluation format', 'Quality, Safety & HSE guidelines', milestone/ completion certificate, etc may undergo change from time to time and the latest one shall be followed. The abridge version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' is available on www.bhel.com on "supplier registration page".
27. The offers of the bidders who are on the banned/ hold list as also the offer of the bidders, who engage the services of the banned/ hold firms, shall be rejected. The list of **banned/ hold firms** is available on BHEL web site www.bhel.com
- 27.1 Integrity commitment, performance of the contract and punitive action thereof:
- 27.1.1 **Commitment by BHEL:**

BHEL commits to take all measures necessary to prevent corruption in connection with the tender Process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity.

27.1.2 Commitment by Bidder/ Supplier/ Contractor:

- (i) The bidder/ supplier/ contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India.
- (ii) The bidder/ supplier/ contractor will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL.
- (iii) The bidder/ supplier/ contractor will perform/ execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business/ money/ reputation, to BHEL.

If any bidder/ supplier/ contractor during pre-tendering/ tendering/ post tendering/ award/ execution/ post-execution stage indulges in mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the prices or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, then, action may be taken against such bidder/ supplier/ contractor as per extent guidelines of the company available on www.bhel.com and / or under applicable legal provisions.

28. Not Applicable

29. 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.

30. Order of Precedence

In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:

- a. Amendments/Clarifications/Corrigenda/Errata etc issued in respect of the tender documents by BHEL
- b. Notice Inviting Tender (NIT)
- c. Price Bid
- d. Technical Conditions of Contract (TCC)—Volume-1A
- e. Special Conditions of Contract (SCC) —Volume-1B
- f. General Conditions of Contract (GCC) —Volume-1C
- g. Forms and Procedures —Volume-1D

for BHARAT HEAVY ELECTRICALS LTD

(SCT)

Enclosure:-

- (i) Annexure-1: Pre Qualifying criteria.
- (ii) Annexure-2: Check List.
- (iii) Annexure-3: Authorization of representative who will participate in the online Reverse Auction Process.
- (iv) Annexure-4: Integrity pact
- (v) Other Tender documents as per this NIT.

ANNEXURE - 1**PRE QUALIFYING REQUIREMENTS**

JOB	ERECTION, TESTING, COMMISSIONING, TRIAL RUN, PERFORMANCE GUARANTEE TEST RUN (PGTR) AND HANDING OVER OF ELECTRICAL AND CONTROL & INSTRUMENTATION PACKAGE 1 X 75 MW HPCL VISAKH REFINERY MODERNISATION PROJECT (VRMP), VISAKHAPATNAM, ANDHRA PRADESH
TENDER NO	BHEL/NR/SCT/VRMP/ELECTRICAL AND C&I/1163

SL. NO.	NAME AND DESCRIPTION OF PRE-QUALIFICATION CRITERIA	BIDDER'S CLAIM IN RESPECT OF FULFILLING THE PQR CRITERIA
A	Submission of Integrity Pact duly signed	Applicable
B	Assessment of Capacity of bidder to execute the work as per clause 9.0 of NIT	Applicable – by BHEL
C	<u>TECHNICAL:</u>	Applicable
C-1	Bidder should have executed similar work for any one of the following in the last seven years from latest date of bid submission: C-1.1. One work of value not less than Rs. 571.20 Lakhs. OR C-1.2. Two works each of value not less than Rs. 357.00 Lakhs. OR C-1.3. Three works each of value not less than Rs. 285.60 Lakhs.	
C-2	Bidder should have executed the following Electrical works in the last seven years from latest date of bid submission, consisting of: a) Power Transformers (at least 84 MVA rating) b) HT Bus ducts c) HT Switchgears d) HT cabling (minimum 3.3 KV)	Applicable
C-3	Bidder should have executed any one of the following in the last seven years from latest date of bid submission: C-3.1. Executed “C&I works for BTG/GT” OR “C&I works consisting of DCS/DDC/Station C&I” in one unit of ≥ 30 MW. OR C-3.2. Execution of one contract of C&I works consisting of DCS/DDC/Station C&I in any Industry with its executed value $\geq$ Rs. 60 Lakhs.	Applicable

D	<u>FINANCIAL:</u>	Applicable
D-1	<u>TURNOVER:</u> Bidders must have achieved an average annual financial turnover (Audited) of Rs. 214.20 Lakhs or more over last three Financial Years (FY) i.e. (2015-2016, 2016-2017, 2017-2018). Bidder shall submit the Audited Balance Sheet and Profit & Loss Account in support of this. In case audited financial statements have not been submitted for all the three years as indicated above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years. If financial statements are not required to be audited statutorily, then instead of audited financial statements, financial statements are required to be certified by Chartered Accountant.	
D-2	<u>NET WORTH:</u> Net worth (only in case of companies) of the bidder should be positive. Note: Net worth shall be calculated based on the latest Audited Accounts, as furnished for 'D-1' above. Net worth = Paid up share capital* + Reserves. (*: Share Capital or Partnership Capital or Proprietor Capital as the case may be).	Applicable
D-3	<u>PROFIT:</u> Bidder must have earned profit in any one of the three financial years as applicable in the last three financial years as furnished for 'D-1' above. Note: PROFIT shall be PBT earned during any one year of last three financial years as in 'D-1' above.	Applicable
D-4	Bidder must not be under Bankruptcy Code Proceedings (IBC) by NCLT or under Liquidation/ BIFR, which will render him ineligible for participation in this tender and shall submit undertaking to this effect.	Applicable
E	Approval of Customer	Applicable
F	Consortium Criteria	Applicable

Explanatory Notes for QR 'C':

1. For Sl. No. 'C-1', '**Similar Work**' means Electrical or C&I or "Electrical and C&I" works.
2. For Sl. No. 'C-2', '**Executed**' means "CHARGING" in respect of Power Transformers/ Bus Ducts/ "HT/LT Switchgears"/ "HT/LT Cabling".
3. For Sl. No. 'C-3', '**Executed**' means "SYNCHRONISATION" in case of power project and "WORK COMPLETION" of the value as defined in PQR" in case of industry.

4. For evaluation of PQR, the credentials of the bidder alone, and not that of the Group Company shall be considered.
5. Completion date for achievement of the technical criteria should be in the last 7 years ending on the 'latest date of Bid Submission' of Tender irrespective of date of the start of work.
6. Executed means the bidder should have achieved the technical criteria even if the Contract has not been completed or closed.
7. In case the Experience/PO/WO certificates enclosed by bidders do not have separate break up of prices for the E&C portion for Electrical and C&I works (i.e. the certificates enclosed are for composite order for supply and erection of Electrical and C&I and other works if any), then vale of Erection & Commissioning for the Electrical and C&I portion shall be considered as 15% of the price for supply & erection of Electrical and C&I.
8. (a). For Sl. No. 'C-2' and 'C-3' **consortium shall be permitted either for Electrical scope or for C&I scope** complying with QR specified for respective categories.
 (b). Bidder shall be considered as prime bidder and total number of partners including bidder shall not be more than two (2).
 (c). Prime Bidder alone shall necessarily comply with Sl. No. 'C-1' of Technical criteria.
 (d). All other conditions of consortium shall be read in conjunction with clause of no. 23 of NIT.
9. For criteria 'C-1' and 'C-3.2' above, actual executed value shall be considered. Value of work is to be updated with indices for "All India Avg. Consumer Price index for industrial workers" and "Monthly Whole Sale Price Index for All Commodities" with base month as per last month of work execution and indexed up to three (3) months prior to the month of latest due date of bid submission as per following formula-

$$P = \left\{ R + 0.425 \times R \times \frac{(X_N - X_0)}{X_0} + 0.425 \times R \times \frac{(Y_N - Y_0)}{Y_0} \right\}$$

Where

P = Updated value of work

R = Value of executed work

X_N = All India Avg. Consumer Price index for industrial workers for the month, three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).

X_0 = All India Avg. Consumer Price index for industrial workers for last month of work execution

Y_N = Monthly Whole Sale Price Index for All Commodities for the month, three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).

Y_0 = Monthly Whole Sale Price Index for All Commodities for last month of work execution

BIDDER SHALL SUBMIT ABOVE PRE-QUALIFICATION CRITERIA FORMAT, DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST EACH CRITERIA AND FURNISH RELEVANT DOCUMENT INCLUSIVE OF WORK ORDER AND WORK COMPLETION CERTIFICATE ETC IN THE RESPECTIVE ANNEXURES IN THEIR OFFER.

ANNEXURE - 2**CHECK LIST****NOTE: - Tenderers are required to fill in the following details and no column should be left blank**

1	Name of the Tenderer	
2	Address of the Tenderer	
3	Type of the Firm/ Company	
(i)	In case of Individual Tenderer	His / her full name, address and place & nature of business shall be furnished along with the offer.
(ii)	In case of Partnership Firm	The names of all the partners and their addresses, A copy of the partnership deed/instrument of partnership duly certified by the Notary Public shall be furnished along with the offer.
(iii)	In case of Companies	a) Date and place of registration including date of commencement certificate in case of Public Companies (certified copies of Memorandum and articles of Association are also to be furnished). b) Nature of business carried on by the Company and the provisions of the Memorandum relating thereof.
4.a	Details of Contact person for this Tender	Name : Mr/ Ms Designation: Telephone No: Mobile No: Email ID: Fax No:
4.b	Details of alternate Contact person for this Tender	Name : Mr/ Ms Designation: Telephone No: Mobile No: Email ID: Fax No:
5	EMD DETAILS	Mode of payment: Demand Draft/ NEFT/ RTGS/ OTHER Details of Transaction:
6	Validity of Offer	TO BE VALID FOR SIX MONTHS FROM DUE DATE
	DESCRIPTION	APPLICABILITY (BY BHEL)
7	Whether all pages of the Tender documents including annexures, appendices etc are read and understood	Applicable
8	Whether the format for compliance with PRE QUALIFICATION CRITERIA (ANNEXURE – 1) is understood and filled with proper supporting documents referenced in the specified format	Applicable
9	Audited Balance Sheet and profit & Loss Account for the last three years	Applicable
10	Copy of PAN Card	Applicable
11	Copy of GST registration	Applicable

SL. NO.	DESCRIPTION	APPLICABILITY (BY BHEL)	ENCLOSED BY BIDDER
12	Organization Chart of the tenderer's organization, including the names, addresses and contact information of the Directors/Partners shall be furnished along with the offer.	Applicable	YES / NO
13	Integrity Pact	Applicable	YES / NO
14	Offer forwarding letter / tender submission letter [Form No. F-01 (Rev 00)]	Applicable	YES / NO
15	Declaration by Authorised Signatory [Form No: F-02 (Rev 00)]	Applicable	YES / NO
16	Declaration by Authorised Signatory regarding Authenticity of submitted documents [Form No: F-02A (Rev 00)]	Applicable	YES / NO
17	No Deviation Certificate [Form No: F-03 (Rev 00)]	Applicable	YES / NO
18	Declaration confirming knowledge about Site Conditions [Form No: F-04 (Rev 00)]	Applicable	YES / NO
19	Declaration for relation in BHEL [Form No: F-05 (Rev 00)]	Applicable	YES / NO
20	Non-Disclosure Certificate [Form No: F-06 (Rev 00)]	Applicable	YES / NO
21	Bank Account Details for E-Payment [Form No: F-07 (Rev 00)]	Applicable	YES / NO
22	Format for seeking clarification [Form No: F-08 (Rev 00)]	Applicable	YES / NO
23	Capacity Evaluation of Bidder for current Tender [Form No: F-09 (Rev 00)]	Applicable	YES / NO
24	Power of Attorney for Submission of Tender/Signing Contract Agreement [Form No: F-25 (Rev 00)]	Applicable	YES / NO
25	Analysis of Unit rates [Form No: F-26 (Rev 00)]	Applicable	YES / NO
26	Tie Ups/Consortium Agreement are submitted as per format [Form No: F-22 (Rev 00)]	Applicable	YES / NO

NOTE: STRIKE OFF 'YES' OR 'NO', AS APPLICABLE. TENDER NOT ACCOMPANIED BY THE PRESCRIBED **ABOVE APPLICABLE DOCUMENTS** ARE LIABLE TO BE SUMMARILY REJECTED.

DATE :

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

ANNEXURE - 3**AUTHORIZATION OF REPRESENTATIVE WHO WILL PARTICIPATE IN THE ONLINE REVERSE AUCTION PROCESS;**

1	NAME & DESIGNATION OF OFFICIAL	
2	POSTAL ADDRESS (COMPLETE)	
3	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
4	FAX NO.	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

BHEL-IP

INTEGRITY PACT

Between

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

and

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

Preamble

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

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

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

Section 1- Commitments of the Principal

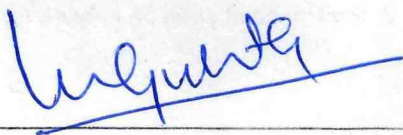
1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.



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

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
- 2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
- 2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- 2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- 2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and will await their decision in the matter.

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

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

Section 4 - Compensation for Damages

- 4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent Earnest Money Deposit/ Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to



demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 - Previous Transgression

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

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

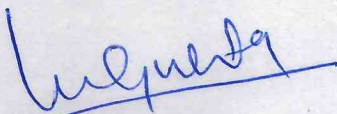
- 6.1 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors. In case of sub-contracting, the Principal contractor shall be responsible for the adoption of IP by his sub-contractors and shall continue to remain responsible for any default by his sub-contractors.
- 6.2 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

Section 7 - Criminal Charges against violating Bidders/ Contractors / Subcontractors

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

Section 8 - Independent External Monitor(s)

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



- 8.5 The role of IEMs is advisory, would not be legally binding and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.
- 8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process, the matter should be examined by the full panel of IEMs jointly as far as possible, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.
- 8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to CMD, BHEL, at the earliest. They may also send their report directly to the CVO and the Commission, in case of suspicion of serious irregularities requiring legal/ administrative action. IEMs will tender their advice on the complaints within 10 days as far as possible.
- 8.8 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.9 IEM should examine the process integrity, they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the organization should be looked into by the CVO of the concerned organisation.
- 8.10 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code/ Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
- 8.11 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.
- 8.12 The word 'Monitor' would include both singular and plural.

Section 9 - Pact Duration

- 9.1 This Pact shall be operative from the date IP is signed by both the parties till the final completion of contract for successful bidder and for all other bidders 6 months after the contract has been awarded. Issues like warranty / guarantee etc. should be outside the purview of IEMs.
- 9.2 If any claim is made/ lodged during currency of IP, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 - Other Provisions

- 10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.



BHEL-IP

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

For & On behalf of the Principal

(Office Seal)

Place-----

Date-----

For & On behalf of the Bidder/

Contractor

(Office Seal)

Witness:-----

(Name & Address) -----

Witness:-----

(Name & Address) -----

Signature

 **वी. के. गुप्ता / V. K. GUPTA**
अध्यक्ष महाप्रबंधक (उप संचिदा एवं क्रय)
Addl. General Manager (SCP)
भारत हेवी इलेक्ट्रिकल्स लिमिटेड, पावर सेक्टर-उत्तरी क्षेत्र
Bharat Heavy Electricals Ltd., Power Sector-Northern Region
प्लॉट सं.25, सेक्टर-16ए, नोएडा/Plot No.25, Sec.16A, Noida

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2012

TECHNICAL CONDITIONS OF CONTRACT (TCC)

(Document No PS:MSX:TCC)

BHARAT HEAVY ELECTRICALS LIMITED



TECHNICAL CONDITIONS OF CONTRACT (TCC)

TECHINICAL CONDITIONS OF CONTRACT (TCC)

“WORK OF ERECTION, TESTING, COMMISSIONING, TRIAL RUN, PERFORMANCE GUARANTEE TEST RUN (PGTR) AND HANDING OVER OF ELECTRICAL AND CONTROL & INSTRUMENTATION PACKAGE OF 1X75 MW HPCL VISAKH REFINERY MODERNISATION PROJECT (VRMP), VISHAKAPATNAM, ANDHRA PRADESH.”



**Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301 (INDIA)**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

THE TECHNICAL CONDITIONS OF CONTRACTS (TCC) ARE DEFINED AS:

SI No	DESCRIPTION	Chapter	PAGE NO.
	Contract specific details		
1	Project Information	Chapter-I	4
2	Scope of Works	Chapter-II	5-52
3	Facilities in the Scope of BHEL/Contractor	Chapter-III	53-58
4	T&Ps and MMEs to be deployed by Contractor	Chapter-IV	59-65
5	T&Ps and MMEs to be deployed by BHEL on sharing basis	Chapter-V	66
6	Time Schedule	Chapter-VI	67-69
7	Terms of Payment	Chapter-VII	70-75
8	Taxes and other Duties	Chapter-VIII	76-78
9	Important condition applicable to this Project	Chapter-IX	79-82
10	Rate Schedule	Chapter-X	83-108
11	TECHNICAL DETAILS & DRAWINGS	Chapter-XI	109-130
12	ANNEXURES TO THE CONTRACT	Chapter-XI	131

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter I: Project Information

Sl. No.	Title	Description
1.1	Owner	Hindustan Petroleum Corporation Limited.(HPCL)
1.2	Project Title	1X75 MW HPCL VISAKH REFINERY MODERNISATION PROJECT (VRMP)
1.3	Type of Project	Modernisation Project, Brown Field.
1.4	Location	Visakh Refinery, Visakhapatnam, Andhra Pradesh
1.5	Nearest road head	Visakhapatnam (15 Km), Nearest National Highway- NH5
1.6	Nearest Airport railway station	Nearest Airport Visakhapatnam (10 Km),
1.7	Nearest Railway station	Visakhapatnam (15 Km),
1.8	Ambient Temperature/ wind and Rainfall data	Maximum wind velocity is for cyclone prone region. Wind pressure shall be based on IS: 875 Ambient temperature – Maximum 45°C and minimum 12.5°C. Rainy Season- June, July during S/W monsoon. Also rain occurs in Nov. /Dec. at the time of N/E monsoon. Rainfall data for 1-hour period - 80 -100 mm Maximum Rainfall in 24-hour period - 293 mm Wind Velocity - Maximum 185 km/hr and minimum 1-5 km/hr.
1.9	Relative Humidity	Minimum 60% and Maximum 95%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.0	SCOPE OF WORK
2.1	BHEL has been awarded the work of : Project management, Process /Thermal / Hydraulic / mechanical design & engineering, procurement, manufacture /fabrication, testing, assembly, painting, packing & forwarding, transport, storage, erection, Site testing, Pre-commissioning and Commissioning of CPP Package of minimum 59.3 MW having GTG fuel as RLNG, Naphtha & HSD. The scope also includes site assembly, erection, site test, pre-commissioning, commissioning, performance guarantee, performance guarantee test run (PGTR) for complete package comprising of Gas Turbine Generator (GTG), Heat Recovery Steam Generator (HRSG), steam turbine Generator (STG), BOP packages, 66 kV Gas insulated switchboard, 33kV Gas insulated switchboard and 11 kV switchboard along with associated auxiliaries and accessories, 220/33 KV Transformers, 220/66 KV Transformers, civil, structural works, piping, insulation, electrical, instrumentations & control & all works etc. as required to complete the job in all respects.
2.2	Scope of these specifications cover complete work of handling, transportation of materials from Project storage yard / stores to erection site / place of erection , storage at erection site, preservation, watch and ward, dressing, chipping and leveling of foundations, cleaning , checking, testing, pre-assembly, erection, calibration, alignment, grouting, welding, DPT wherever required, preservative/ touch-up painting including supply of paints etc, plant earthing , Plant Illumination Work, including other activities required for erection, testing, commissioning, post commissioning, trial operations & handing over of all ELECTRICAL and C&I EQUIPMENT and items indicated in the rate schedule covered within the scope of these specifications for 1X75 MW HPCL VISAKH REFINERY of following system. 1. Oil Filled Power Transformers (GTG, STG, Other Aux Transformers). 2. 11 KV Segregated Phase Bus Duct 3. Isolated Phase Bus Duct 11 KV , GCB including SPVT & LAVT, GNAC 4. 11KV/0.415 KV Switch gear/PMCC/EPMCC. 5. Power cables (HT&LT) 6. Control Cables. 7. Junction boxes and Push button. 8. 110V,125V & 220V DC Battery System 9. Station Lighting 10. Dry type transformers. 11. 33 KV GIS System. 12. Starter panel/local starter boxes/power distribution boxes /marshalling boxes.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	13. Control & Relay Panels. 14. VFD system for VHP & VVHP pumps 15. 11 KV DG set 16. Digital Automatic Voltage Regulation and GRP System 17. Above ground earthing and lightening protection system in Main Plant and Auxiliary plant area (BOPs). 18. LT Bus Duct. 19. Structural Steel. 20. Cable Tray & accessories. 21. UPS System. 22. Inert Gas fire extinguisher and Fire detection and alarm System, PA system, CCTV system. 23. Soot Blower System. 24. DCS/PLC System and instrumentation system for C&I 25. Large Video Screen system 26. SFC for initial start of Gas Turbine 27. SCAP and HMI system 28. CCTV system 29. Other Misc. associated equipment
2.3	This contract scope broadly consists of following works as described below but not limited to following:
2.3.1	Taking delivery of the materials from the project storage yard /stores /sheds to erection site.
2.3.2	The BHEL material storage yard is located at BHEL HPVP (BHVP) Colony premises, Visakhapatnam and the erection site is at HPCL VRMP, Vishakhapatnam. The contractors' scope is receipt of material from BHEL store yard at HPVP, other place of storage at HPVP, HPCL site etc. and transportation of the material to erection site at HPCL refinery Visakhapatnam.
2.3.3	All the erection material is stored at BHEL HPVP Colony premises. The distance to be traversed for shifting of the material from BHVP stores to erection site is approx.10-12 km, as per the designated route and identified material entry/exit gates of BHVP and HPCL. In case, due to any issues encountered during shifting of material by BHEL/EIL/ HPCL/ local administration, it is possible that a new route/gate may be informed /decided to

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	the contractor which may require traversing of larger distances for shifting of material. Also, local administration for any reasons, may restrict the timing of material shifting from BHVP to HPCL plant. In all such cases, the contractor of this contract scope has to abide/adhere to all the guidelines/restriction/rules put in place for material transportation and has to shift the material at no extra cost to BHEL. The contractor has to plan his material shifting in a way that there is no delay in shifting of material and the E&C is carried out as per planned monthly/weekly/daily program.
2.3.4	At BHVP material yard/stores, the material will be loaded on the contractor's (bidder) trailer by BHEL MM contractor. A crane (40MT) with operator and manpower is in the scope of MM contractor for loading of the consignments at yard. For consignments beyond capacity of 40 MT crane unloaded in the store yard, the crane or loading arrangement has to be made by the contractor of this work scope at no extra cost to BHEL. The contractor of this scope will have to arrange the trailers of suitable capacity for transportation of the material, consignments of this contract scope from BHEL yard to Erection site. The contractor may also be required to assist the MM contractor, if any special tool/tackle for loading is required. For facilitating MM contractor in better management of material loading, the contractor shall have his material shifting manpower at the yard to support the MM contractor during loading. For unloading and erection at site, BHEL 135 MT crane will be made available.
2.3.5	M/s BHVP, Vizag is entrusted with the supply of HRSG for this site. Thus, it may be possible that vendor may have to collect some of the material directly from the BHVP stores etc. in such case the vendor will have to make similar arrangement for the same.
2.3.6	Also, ODC consignments of this package will directly be unloaded at site. Here all the arrangements have to be made by the contractor itself other than cranes as defined in chapter V of TCC.
2.3.7	For all material required to be erected in this contract scope, unloading of material at site is in the scope of this contract. Accordingly, all arrangements are to be made by the contractor.
2.3.8	Items stored outdoors shall be stored in such a way that item is at least six inches (6") above the ground. Motors, valves, electrical equipment, control equipment and instruments etc. shall be stored indoors in warehouse safe keeping, watch and ward at site.
2.3.9	Preservation, safe keeping, watch and ward of the material at site.
2.3.10	Pre-assembly, erection, alignment of various equipment's, machining and grouting.
2.3.11	Contractor shall calibrate, erect, commission all the equipment's, cabinets/panels, instruments and cabling etc. as per sequence prescribed by BHEL at site. The sequence of erection / commissioning methodology will be decided by the BHEL engineers depending upon the availability of materials/work fronts etc. No claims for extra payment from the contractor will be entertained on the grounds of deviation from

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	the methods of erection / commissioning adopted in erection / commissioning of similar jobs or for any reasons whatsoever.
2.3.12	Hydraulic testing, air/gas leak test, air tightness test, other pre commissioning tests as per approved quality plan/drawings/ documents
2.3.13	Insulation and finish painting including supply of paints etc.
2.3.14	The customer or their Consultant will depute their representative for checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works, without any cost implications to the BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL.
2.4	SITE VISIT
2.4.1	Contractor should visit site and acquire full knowledge and information about site conditions. The bidder must visit site, to acquaint themselves with the conditions prevailing at site and in and around the plant premises, together with all statutory, obligatory, mandatory requirements of various authorities before submission of bid.
2.5	DEWATERING
2.5.1	Contractor shall ensure at all times that the work area & approach/ access roads are free from accumulation of water, so that the materials are safe and the erection/ progress schedule are not affected. No separate claim in this regard shall be admitted by BHEL.
2.6	Contractor shall ensure the following:
2.6.1	Contractor has to maintain contact with local hospital having ambulance facility, scanning and other ultramodern medical facilities required during emergency.
2.6.2	Contractor has to ensure pre-employment medical check for all staff & workers.
2.6.3	Contractor has to ensure that adequate First Aid facilities with trained Male nurse are available at work site for emergency purpose. This emergency set-up should include, but not limited to, following- Male nurse (in shifts) Oxygen set up Breathing apparatus Eye wash facility Stretcher Trauma blanket Medicines.
2.6.4	Ambulance: Contractor against this contract is required to maintain an emergency vehicle/ ambulance arrangement on round the clock basis during work execution of this contract scope. Vendor may tie up with other BHEL vendors maintaining ambulance/emergency vehicle at site for the provision of round the clock ambulance/emergency vehicle availability at

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	site during work execution. Such arrangement shall be informed to BHEL in writing and shall have approval of BHEL and customer. The availability of the ambulance/emergency vehicle has to be in accordance with the site working schedule. As the project is having a very tight timeline, round the clock working is envisaged for achieving and meeting the targets. Thus round the clock availability of ambulance has to be ensured. If ambulance is not provided/ deployed/ arranged by the contractor, BHEL may hire ambulance at risk and cost of the contractor. In case customer insists BHEL to arrange ambulance then BHEL may also provide an ambulance on sharing basis with other contractors. This ambulance shall be made available to the contractors on chargeable basis. The charges shall be informed at the time of this provision and shall be shared among the contractors. Other conditions for maintaining ambulance, Male nurse shall be as per the HSE requirements of BHEL and EIL.
2.7	The contractor shall comply with following towards Social Accountability
2.7.1	The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged, the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.
2.7.2	The contractor shall not engage Forced/ Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976.
2.7.3	The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act, 1970.
2.7.4	The Contractor shall abide by UN convention w.r.t. Human Rights and shall be liable for Discrimination / Corporal punishment for failure in meeting with relevant requirements.
2.7.5	The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours.
2.7.6	The Contractor shall abide by the Statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.
2.7.7	The Contractor shall arrange potable drinking water to its employees & workers.
2.7.8	TRAINING OF WORK FORCE The contractor shall arrange induction safety training for all employees before assigning work. In addition, awareness programme, mock drill at regular intervals and daily tool box meetings shall be arranged. Monthly report of the above to be given to BHEL safety Officer as per prescribed BHEL formats. All the contractor's supervisory personnel and sufficient number of workers shall be trained for fire protection systems. Enough number of such trained personnel must be available during the tenure of contract. Contractor should nominate his supervisor to coordinate and implement the safety measures.
2.8	SITE ORGANISATION

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.8.1	The contractor shall provide adequate staffing in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL: 1. Overall planning, monitoring & control. 2. Quality control and quality assurance. 3. Materials management. 4. Safety, fire & security. 5. Industrial relations and fulfilment of labour laws and other statutory obligations.
2.8.2	The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL. The site organization shall be headed by a competent construction manager having sufficient authority to take decisions at site.
2.8.3	On award of contract, the contractor shall submit to BHEL site organization chart indicating the various levels of experts to be deployed on the job. BHEL reserves the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data have been approved by BHEL, will have to be posted at site and deviations in this regard will not generally be permitted.
2.8.4	The contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc prior to commencement of site activities in consultation with BHEL. These tools & tackles shall not be removed from site without written permission of BHEL
2.8.5	The organization chart for site should indicate the various levels of experts to be posted for supervision in the various fields in erection, commissioning etc as applicable. For proper supervision of the work, the contractor shall ensure providing one qualified supervisor against deployment of 15 workmen.
2.8.6	Contractor to ensure services of qualified and experienced Diploma / Degree Electrical/Instrumentation Engineer having experience in respective field in sufficient nos. as desired by site entirely for the commissioning activities from second month of mobilisation till contract completion. This shall be indicated separately in manpower deployment plan to be submitted by contractor. These Engineers shall be reporting directly to the BHEL Engineer for the main work. All Supervisors/ Engineers shall have to be supported individually by all independent groups comprising of workers like electrician, technicians and helpers etc. and required T & P and IMTE's.
2.9	ERECTION SCHEDULE
2.9.1	Contractor shall submit within 07 days of LOI date, detailed program (L2 schedule) of construction / erection / commissioning along with matching resources T&P Deployment and manpower deployment schedule for approval to Site In-Charge/Project Manager-Noida. L3 schedule shall be the working level document demonstrating contractor's ability and methods of completing the work within the key milestones identified in the

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	tender specification These program would be amplified showing start of erection and subsequent activities and shall form the basis for site execution and detailed monitoring, The three monthly rolling program with the first month's program being tentative based on the site conditions would be prepared based on these program. The Contractor shall also be involved along with the Customer/BHEL to tie up detailed resource mobilisation plan over the period of time of the contract matching with the performance targets.
2.9.2	The program would be jointly finalised by the site in-charge of the contractor with BHEL/Customer's project coordinator as well as the site planning representative.
2.9.3	Contractor shall submit daily work program based on above schedule. Deferment of above schedule is not acceptable. Contractor will adhere to schedule & augment resources to ensure completion as per schedule.
2.9.4	Bidder shall note that as the place of work is inside the plant and being manned by CISF or Security Forces of HPCL, all necessary system related to entry of men, vehicle, material, safety & security systems, work permit system etc. as applicable will have to be followed by the contractor. CONTRACTOR shall abide by all safety regulations of the plant. The work shall be carried out inside the plant as per safety practices enforced by HPCL's/ BHEL's safety section and instructions of Engineer-in-charge issued from time to time.
2.10	General Scope for Electrical and C&I works
2.10.1	It is not the intent to specify herein all details of material. Any item related to this work not covered, but necessary to complete the system will be deemed to have been included in the scope of the work.
2.10.2	All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor
2.10.3	Contractor shall erect all items/materials etc. as per sequence prescribed by BHEL at site. BHEL engineer depending upon the availability of materials/work fronts etc will decide the sequence of erection/commissioning methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the methods of erection/commissioning adopted in erection/commissioning of similar job or for any reasons whatsoever.
2.10.4	Site testing wherever required shall be carried out for all items/materials installed by the contractor to ensure proper installation and functioning in accordance with drawings, specifications and manufacturer's recommendations.
2.10.5	Contractor shall co-ordinate and will be responsible for satisfactory testing, pre-commissioning, commissioning, trial run and PG Test of the connected equipment under overall guidance of BHEL and shall locate any cause of malfunction and rectify the same for proper operation. Testing shall also include any additional tests, which the Engineer feels necessary because of site conditions and also to meet system specification.
2.10.6	The work shall be executed under the usual conditions without affecting power plant construction and in conjunction with other operations and contracting agencies at site. The contractor and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.10.7	Contractor shall have valid ELECTRICAL LICENSE to carry out the electrical works. All necessary certificates and licenses required to carry out this work from competent authority like CEA, State Electricity authority are to be arranged by the contractor expeditiously at his cost.
2.10.7.1	Contractor is responsible for getting Electrical Inspector/statutory authority's approval for all electrical installation covered in his scope. This also includes the Electrical equipment's that are erected by mechanical contractor for which commissioning assistance is to be provided by the Electrical contractor.
2.10.7.2	Contractor Electrical License for Extra High Voltage System installation work from State authorities.
2.10.7.3	Supervisory Competency Certificate to deal with Electrical High Voltage equipment's for their erection, testing & commissioning. During the execution of work minimum two persons should be posted at site that has valid Supervisory Competency Certificate.
2.10.7.4	The installation of all electrical equipment's shall be carried out only by persons holding valid certificates of Competency for the voltage classes as defined in this tender specification, issued by appropriate state or central Statutory Authority. Contractor shall submit the particulars of Licenses held by him.
2.10.7.5	The contractor has to arrange electrical license to work of the concerned state where the project being executed within a 6 weeks of mobilization at site for carrying out the works covered under this contract.
2.10.8	Contractor shall take delivery of item, materials, from the storage yard / stores/ sheds of BHEL / customer which are within plant premises after getting approval of engineer / customer in the prescribed indent forms of BHEL / customer. Contractor shall make arrangements for, safe custody, watch and ward of equipment after it has been issued to him till they are fully erected, tested and commissioned till the contract period and handed over to customer. The contractor shall note that items/materials shall be transported to erection site / assembly yard etc. by the prescribed route without disturbing and causing damage to other works in the most professional manner. All items, Hardware, etc. shall be stored in appropriate manner as per BHEL's instructions.
2.10.9	After completing all the works, contractor shall hand over all remaining extra materials with proper identification tags in packed condition to BHEL stores. In case of any use over actual design requirements, BHEL reserves the right to recover the cost of material used in excess or misused. Decision of BHEL engineer in this regard will be final and binding on the contractor.
2.10.9.1	The contractor shall ensure that all the packing materials and protection devices used for the various equipment's during transit and storage are removed before these equipment's are erected in position.
2.10.9.2	Overhauling, cleaning, revisioning, servicing of equipment's during erection and commissioning stages will be arranged by the contractor. All equipment's shall be preserved and protected before and after erection as per the advice of BHEL engineer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.10.10	Contractor shall retain all T&P/Testing instrument/Material handling instrument etc at site as per advice of BHEL engineer and same shall be taken out from site only after getting the clearances from engineer in charge
2.10.11	The contractor shall collect all scrap materials periodically from various levels of powerhouse, working area of the power station, auxiliary and piping around power station and collect the same at one place earmarked for the same. Loads of scraps are to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such, BHEL reserves the right to collect and remove the scrap at contractor's risk and cost, if there is any failure on the part of contractor in this respect. 1% value of each RA bill will be earmarked against compliance of the above, to be released only on satisfactory collection and deposit of scrap as stated above. In case of failure of contractor to comply with this requirement, BHEL will make suitable arrangement at contractor's risk and cost. In such case, any expenditure over and above the withheld 1% amount will also be recovered suitably from the RA bills of vendor.
2.10.12	Contractor at his cost shall arrange necessary security measures for adequate protection of his machinery, equipment, tools, materials etc. BHEL shall not be responsible for any loss or damage to the contractor's construction equipment and materials. The contractor may consult the Engineer-in-Charge on the arrangements made for general site security for protection of his machinery equipment tools etc.
2.10.13	Contractor shall ensure that his premises are always kept clean and tidy to the extent possible. Any untidiness noted on the part of the contractor shall be brought to the attention of the contractor's site representative who shall take immediate action to clean the surroundings to the satisfaction of the Engineer-in- Charge.
2.10.14	Contractor may have to execute work in such a place and condition where other agencies also will be under such circumstances.
2.10.15	Scope of work covered under this specification requires quality workmanship, engineering and construction management. The contractor shall ensure timely completion of work. The contractor shall have adequate tools, measuring instruments, calibrating equipment etc. in his possession. He shall also have adequate trained, qualified and experienced engineers, supervisory staff and skilled personnel. The manpower deployed by contractor shall match with above scope of works.
2.10.16	All the surplus, damaged, unused materials, package materials, containers, special transporting frames, etc. shall be returned to the BHEL stores / customer's stores by the contractor.
2.10.17	Any wrong erection shall be removed and re-erected promptly to comply with the design requirements to the satisfaction of Site Engineer and no compensation shall be payable in case fault of contractor.
2.10.18	BHEL will provide vendor's technical support for commissioning of various proprietary type special instruments/systems like Analysers etc. The contractor shall carry out the works as per instructions of BHEL/ Vendor Engineer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.10.19	Contractor shall ensure that all the documents provided to them like O&M Manuals, Manufactures Test Certificates, etc. for all instruments/equipment under calibration are stored properly and are easily accessible/produced.
2.10.20	Contractor shall calibrate all field instruments in workshop, before field installation.
2.10.21	Necessary calibration report shall be generated for each tag/instruments and approval of competent site personnel shall be taken before installation
2.10.22	All gauges shall be calibrated with reference to Master test gauge. Test Header etc. shall be arranged by contractor.
2.10.23	Smart type transmitters- Transmitter shall be calibrated with calibrator and it shall be verified by physical calibration using air or nitrogen. Calibrated information shall be stored in calibrator, for each tag.
2.10.24	Mass/ Vertex/turbine flow meters – Electronic calibration shall be carried out by connecting electrical signals to its electronics and 4-20mA output shall be verified with respect to calibration certificate provided by manufactures.
2.10.25	RTD/Thermocouple- It shall be calibrated by connecting the assembly in std. Bridge/signal source and output shall be verified at 5 points (0%-25%-50%-75%-100%) of measuring range with respect standard charts for that type of RTD/Thermocouple. These shall also be calibrated using Hot Bath equipment.
2.10.26	Contractor shall provide necessary assistance /co-operation to other vendors for system integration, as required.
2.10.27	The contractor shall carry out trial run of all motors including checking the direction of rotation in the uncoupled condition.
2.10.28	All electrical panels, motors, Bus ducts, Generator and such other devices shall be properly dried by heating to improve IR valve, before they are energized. Bearings, slip rings commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected.
2.10.29	If the contractor or his workmen shall break, deface injure or destroy any part of a building, road, Serbs, fenced enclosures, water pipes, cables, drains, electric or telephone posts or wires, trees, stored components or any other property or to any part of erected equipment etc., the contractor shall make the same good at his cost or in default the Engineer may cause the same to be made good by other workmen/agency or by other means and deduct the expense (of which the BHEL Engineer's decision is final) from any sum that may be then or at any time thereafter become due to the contractor or from his security deposit or any other money due.
2.10.30	All the equipment shall be handled very carefully to prevent any damage or loss. No untested wire ropes/ slings etc. shall be used for unloading / handling. The equipment shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the stores shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at site.
2.10.31	BHEL shall have lien on all T&Ps, IMTEs & other equipment of the Contractor brought to the site for the purpose of erection, testing and commissioning. BHEL shall continue to hold the lien on all such items throughout the period of Contract. No material

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	brought to the site shall be removed from the site by the Contractor and/or his Sub-contractors without the prior written approval of the Engineer.
2.11	Quantity indicated in the BOQ/ Rate Schedule is tentative only and based on engineering completed as on NIT date which is liable for variation. If any item or equipment not covered in the specification but requires to be erected/commissioned to complete the system, the same shall be carried out by the contractor. Equivalent unit rate for those item or equipment shall be considered wherever possible from the BOQ. Payment will be made as per actual quantum of job executed at the unit rate accepted by BHEL. The rates quoted by the contractor shall be uniform as far as possible for similar items appearing in rate schedule.
2.12	Detailed scope of the work will comprise but not limited to the following:
2.12.1	TRANSFORMERS
2.12.1.1	Different types of transformers like oil immersed type shall be supplied as Indicated below. Oil filled transformer will be Located adjacent to their respective location/Service building. POWER TRANSFORMERS 1. 210/33kV Transformer 100/80MVA, ONAN/ONAF with OLTC Qty-02 Dry WT-82 MT 2. 210/66kV, Transformer 100/80MVA ONAN/ONAF with OLTC Qty-02 3. 11/69 kV, 20MVA, ONAN ST Generator Transformer Qty-1 Dry WT-60 MT 4. 11/69 kV, 85/105MVA, ONAN/ONAF GT Generator Transformer Qty-1 Dry WT-80 MT 5. 66/11.5kV, 50/60MVA, ONAN/ONAF Utility Transformer with OLTC Qty-02 6. 66/11.5kV, 25/31.5MVA, ONAN/ONAF Aux. Transformer with OLTC Qty-2

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	Dry WT-53 MT SERVICE TRANSFORMERS 1.DISTRIBUTION TRF (11/0.433 kV, 1.6 MVA) Qty-06 2.NORMAL LIGHTING TRF (0.415/0.415 kV, 200 kVA) Qty-02 3.EMERGENCY LIGHTING TRF (0.415/0.415 kV, 50 kVA) Qty-02
2.12.1.2	Contractor shall transport the transformer tanks & accessories of transformers from BHEL stores/ Storage yard/place of unloading to respective foundation of unit.
2.12.1.3	The shifting operation may require dragging either on ground with suitable arrangement OR dragging after fixing of wheels on rail track. It may also require turning of transformer at suitable locations enroute to foundation. Contractor shall arrange wooden sleepers, winches, jacks, rails, crane, plates etc at his cost for this operation. However all loose accessories (other than Transformer Tank) shall have to be shifted from stores / storage yard.
2.12.1.4	The transformers shall be handled in such a manner so that no jerk is transferred to the core, winding and internals of the transformer.
2.12.1.5	Transformers are generally supplied in partly assembled condition either filled with oil up to the core level / winding level or gas filled. Accessories, like radiators, conservator tank, pipes, fittings, hardware, gaskets, buchholz relay, marshalling box, relief vent, valves, pumps, cooling fans, cables, bushings, radiator headers/fans, rollers, tap changer drive unit, cables of various sizes for interconnection from marshalling control box to field devices, bushing turrets and oil in 205/210 liters, barrels shall be supplied loose.
2.12.1.6	Cable trays (for transformer local cabling, if not supplied along with transformer) shall be issued separately by BHEL site and the installation charges is inclusive in rate schedule for Transformer and no extra charges shall be paid on this account
2.12.1.7	All the accessories should be thoroughly cleaned prior to installation and same shall be assembled/mounted as per OGA drawings.
2.12.1.8	Placement on plinth, alignment with respect to the foundation and lay out drawings.
2.12.1.9	Internal inspection to verify the intactness of core and winding, tap changer leads, off-load switch/on load tap changer, measurement of core and core bolt insulation.
2.12.1.10	Auxiliary Service transformers shall be bolted to the adopter panel/bus duct on the LT sides and the bus bars shall be connected together. The contractor shall carry out any modification required to match the bus bar or bus duct connection.
2.12.1.11	In case transformers are supplied partly oil filled/gas filled, after internal inspection, the transformer shall be kept under vacuum (for a period to be decided by site engineer) and treated oil to be filled up to required level.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.1.12	Each drums of oil to be tested for BDV. After getting BDV/ withstand value, this treated oil to be filled in the transformers and auxiliaries.
2.12.1.13	Contractor shall arrange filtering & storage tank of suitable capacity, internally sand blasted or approved method. Oil from drums to be transferred in storage tank and filtration to be carried out to achieve the required BDV/ withstand value. This treated oil to be filled in the transformers and auxiliaries. However, for low capacity transformer, a separate storage tank for filtration may not be required.
2.12.1.14	Drying out of transformer and filtration of oil in cooling bank, pipeline, diverter tank of tap changer etc. to be done with ultra-vacuum filtering machine of adequate capacity (760 mm HG). Drying out process shall be carried out round-the-clock and contractor shall deploy trained manpower for this purpose
2.12.1.15	During dry out process, contractor has to plot the curve for insulation resistance value/time/oil temperature. Hourly reading to be recorded till completion of the dry out.
2.12.1.16	The criteria for deciding completion of drying out shall be breakdown value of oil, PPM value of contaminants in oil, resistivity of oil, insulation resistance value and polarization index as per the approved FQP. All the test to be conducted as per the approved FQP.
2.12.1.17	Filter machine capacity if found to be inadequate, or in case of failure of an existing machine, alternative arrangement is required to be made to meet the required result and time schedule. It is to be particularly noted that that as per exigencies of site working, contractor will have to arrange more oil filtration machines as per site requirement.
2.12.1.18	Contractor shall discuss and finalize installation and testing activity procedure with BHEL/HPCL prior to starting the work.
2.12.1.19	In case of Transformers if any leakage / sweating is observed from field assembled / shop assembled gasket joints, valves, welded joints the same shall be attended by the contractor including draining of oil, refilling of oil & centrifuging if required at no extra cost to BHEL till handing over period. Sealing compound and any other consumable, if needed, shall be arranged by the contractor with in the quoted rates.
2.12.1.20	Tests are required to be conducted on Current Transformer, Potential Transformer & prior to / after installation. Contractor shall also carryout oil processing / filtration to achieve the desired results before charging and handing over of the entire system.
2.12.1.21	Contractor shall arrange required testing equipment for carrying out electrical test like voltage ratio, turn ratio, vector group, magnetic balance, winding resistance measurements, BDV value of oil, tan delta measurement of bushings & winding, insulation resistance, measurement of oil PPM, Acidity, Resistivity and Tan Delta and DGA test. The contractor shall arrange oil sample testing for PPM / resistivity or any other tests applicable for oil sample at approved testing laboratory/BHEL Bhopal at his own cost including all incidental expenses. Checking of Buchholz Relay, oil level indicator PRV, calibration of OTI, WTI etc.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.1.22	Till the start of erection of respective transformers, supplied oil / Gas filled, it will be contractor's responsibility to maintain the gas pressure and replace/ reactivate silica gel. Silica gel will be arranged by contractor within the accepted rates. However the N2 gas, if required, will be provided by BHEL free of cost & filling etc. will be arranged by the contractor with in the accepted rates for transformer erection & commissioning.
2.12.1.23	DGA analyses for power transformers oil Frequency of DGA test to be carried out as under. 1. Within 24 hours of charging/ operation. 2. Within one week of 1st charging or operation. 3. Within 1 month of 1st charging or operation. 4. Every 3 months. 5. Log book to be maintained all records of DGA test report. 6. Precautionary measure to be taken before taking oil sample.
2.12.1.24	NGR
2.12.1.24.1	The scope of erection includes minor civil works such as chipping / grouting of support structure, final painting etc. Note: Responsibility of contractors to obtain customer protocols with respect to Field quality plan
2.12.1.24.2	The neutral grounding resistor shall be inspected for any damage to the resistor grid & other components. The resistor shall be leveled & installed. All covers etc. shall be checked for tightness to ensure that the enclosure of the resistor is dust, vermin & weather proof. Earthing conductors shall be taken from the out end terminal of the resistor, for connection to earth electrodes & to the main grid. Check IR, operation of space heater, operation of motorized isolator, earth resistance shall be done before the commissioning. Termination of HT cables, GI Flat termination, High Voltage Testes control wiring checking & operational & functional check of all items & further commissioning and handing over to customer shall be part of contractor scope.
2.12.1.25	Final painting shall be carried out for all Transformers. The scope of final painting shall include supply of paints, thinner and other consumables as detailed in the painting clause. No separate rate shall be paid for painting.
2.12.1.25.1	Contractor shall arrange to paint/stick good quality danger boards where ever required. Required boards shall be arranged by contractor. Name of the equipment erected by the contractor shall be painted boldly as per the agreed colour scheme on the equipment.
2.12.2	11 KV SEGREGATED PHASE & 415 VOLT LT BUS DUCT
2.12.2.1	11 KV Segregated phase bus duct and 415 Volt Bus Duct (NSP) shall be supplied in loose shipping section along with hardware & other items. Each section shall be complete with AL alloy enclosure and conductor with epoxy bus support insulators arrangement. However other items such as silica gel breathers, inspection windows, rubber bellows, flexible & solid copper / aluminum connector, bi-metallic strips, GI pre-fabricated supporting structure, wall frame assembly, set of hardware etc shall be supplied loose. Galvanized iron earth bus shall be provided for enclosure continuity.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.2.2	Erection of Busduct Structures after Foundation checking and carrying out minor modification wherever required, erection of structures, Bus duct sections, and other loose items as per relevant drawings / documents, alignments and jointing by bolting of total Bus duct, fixing of Rubber Bellows, seal Off Bushings, wall frame assembly, Flexible & rigid Bus connections, erection of earth conductors,, cabling up to JB / Marshalling Box , checks on bus duct, Hi-pot of Bus duct, earthing of system with main earth conductor / riser.
2.12.2.3	All bolted joints shall have high tensile zinc plated steel hardware.
2.12.2.4	Each set of 415 Volt Bus Duct (NSP) is meant for interconnection from low voltage side of LT Auxiliary Transformer (11 / 0.433 KV) to MCC & switchgear board.
2.12.2.5	Bus duct consists of conductor made of aluminum alloy supported on post insulator and housed in aluminum sheet metal rectangular enclosure. The bus bar / enclosures are having bolted joints.
2.12.2.6	In the indoor portions, the bus duct shall be supported from floor / roof beams or steel inserts in upper floors. In the outdoor portions, they shall be supported from the ground, by means of steel structures, unless indicated otherwise in the specification drawings.
2.12.2.7	Bus duct assemblies, supporting structures shall be pre-fabricated and to be assembled as per layout drawing. Erection and testing requirement shall be as per the approved FQP of BHEL/HPCL.
2.12.2.8	Each set of bus duct shall be supported with supporting structure, which shall be fabricated from standard steel section and hot dip galvanized. All structure & bus duct assemble shall be erected as per drawings.
2.12.2.8.1	Fixing of wall bushings/wall frame assembly.
2.12.2.8.2	Providing earthing connections as per site conditions.
2.12.2.8.3	Grouting of bus duct and support structures and connecting to earth grid/earth pits as detailed in the relevant bus duct drawings.
2.12.2.8.4	Fixing of Space Heaters wiring from space Heaters terminal to junction box, taking through rigid/flexible conduit pipe, Fixing of flexible joints, seal off bushing, rubber bellows, conduit/GI pipes breather tapping etc.
2.12.2.9	Measurement of contact resistance of joints, bus bar loop resistance etc.
2.12.2.9.1	Millivolt drop test is to be carried out for all bolted joints.
2.12.2.10	Void
2.12.2.11	Void
2.12.2.12	Torque testing of Bolted Connections of bus duct.
2.12.2.13	The STG will be connected to the generator transformer through cable connection. For Generator neutral connection cable shall be provided.
2.12.2.14	High voltage test of bus duct is to be carried out as per the instruction of BHEL engineer. Contractor shall arrange necessary test equipment / instrument for conducting various electrical tests at his own cost.
2.12.2.15	ISOLATED PHASE BUS DUCT
2.12.2.15.1	Generator isolated bus duct is connected to low voltage side of three phase

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	generator transformer . The bus consists of cylindrical conductor made of aluminum alloy supported on post insulators. Flexible connections and expansions joints are provided at terminal and intermediate points to alleviate stress due to expansion and to arrest vibration. All the CTs will be mounted inside the bus duct.
2.12.2.15.2	Void
2.12.2.15.3	A totally enclosed GNAC is provided to connect the Generator neutral point. The GNAC cubicle houses neutral grounding transformer & resistors CTs and isolating link.
2.12.2.15.4	Bus duct enclosure /conductor is a continuous welded type conductor, enclosure, makeup pieces shunts pieces etc. have to be welded at site.
2.12.2.15.5	The scope of for Isolated Phase Bus Duct shall include Transportation of material from stores/ storage yard, preparatory work such as erection of supporting structure, placement of sub-assemblies / equipment's alignment, edge preparation of conductor / enclosure welding of conductor / enclosure, welding of shunt pieces & make up pieces, installation - of seal of bushing& wall frame assemblies, shorting links, earthing, copper flexible's, copper rubber bellows, testing and commissioning.
2.12.2.15.6	Pre-fabricated G.I. supporting members shall be supplied in loose condition and are to be erected as per lay out drawing. Foundation pockets and embedded plate inserts shall be provided as per lay out drawing (on floor for bottom support and on bottom of concrete slabs),contractor shall weld the supports on insert plate and shall carry out grouting including supply of grout material's after complete alignment/bolting of structural members. If any modification required in supporting structure due to site conditions, the same shall be carried out without any extra cost. All welded joints shall be applied cold galvanizing zinc paint. Supply of Paints, primers etc. are in the scope of the supplier, within the quoted rates.
2.12.2.15.7	During erection of bus duct/enclosure, makeup pieces and shunts, if an modifications needed to match the alignment shall be part of work and no extra payment shall be made.
2.12.2.15.8	All bolted joints and flanges shall be tightened with torque wrench to the approved torque. Wherever there are bolted joints the same shall be cleaned and a layer of anti-oxidation paints shall be applied. Necessary paints etc. to be arranged by contractor within the quoted rates.
2.12.2.15.9	Proper sequence shall be followed during erection to avoid any mismatch and alignment problem.
2.12.2.15.10	Prior to installation of bus duct assemblies in position, various components like conductor, insulator shall be inspected and cleaned and insulation resistance to be measured and recorded. If any insulator is found damaged, the same shall be replaced.
2.12.2.15.11	Electrical test on current transformers and potential transformers shall have to be carried out prior to installation & during pre-commissioning The tests are insulation resistance measurement, winding resistance, magnetization characteristic, ratio test water ingress and air leak test on assembled bus ducts.
2.12.2.15.12	Minor civil work such as chipping, levelling of foundation, providing pockets, drilling/enlargement of holes in structure, bus bar etc. Which are incidental to the erection of bus duct shall not be treated as extra.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.2.15.13	All miscellaneous items such as disconnecting links flexible's, shorting bars, hardwares, conduit for wiring, marshaling box, CTs and PTs wiring through conduit, earthing materials, bus bar fish plates etc. are part of bus duct installation. Hence separate breakup quantity is not given in BOQ.
2.12.2.15.14	Air tightness and water tightness test have to be carried out on completion of bus duct installation. In case of any leakages, contractor has to rectify and bring to the required level of air tightness/water tightness without any extra cost.
2.12.2.15.15	High voltage test of bus duct is to be carried out as per the instruction of BHEL engineer, Contractor shall arrange necessary test equipment / instrument for conducting various electrical tests at his own cost.
2.12.2.15.16	Contractor has to carry out final painting as per standard colour code recommended by BHEL. Paints and consumables shall be in contractor (scope).
2.12.2.15.17	On welding joints, DPT test is required to be conducted.
2.12.2.15.18	Contractor shall conduct 20 % radiography and 100% NDT test on welded joints.
2.12.2.15.19	One end of the enclosure to be earthed to the station earth at shunt location where all three-phase enclosure are shorted.
2.12.2.15.20	In case of bolted bus ducts, phase split covers, rubber bellows clamping earth straps to be connected to maintain the electrical continuity and in turn enclosure gets earthed at one point.
2.12.2.15.21	All other equipment such as CT chambers, junction boxes, etc. to be earthed at two points to the earth grid.
2.12.2.15.22	Maintaining the equipment after commissioning till taken over by customer.
2.12.3	11 KV HT SWITCHGEAR, 415 VOLT LT SWITCHGEAR
2.12.3.1	Erection of Panels after foundation checking and carrying out minor modification wherever required, Jointing of panels, inter panel wiring, bus bar & earth bar connections, mounting of loose supplied items, testing of complete panels, HV test of main and Control bus, testing & commissioning of breakers after scheme checking including testing / calibration of all instruments and relays.
2.12.3.2	Panels shall be delivered in different shipping sections. Necessary interconnection of bus bar, inter panel wiring, etc. shall be carried out as part of panel erection.
2.12.3.2.1	The contractor shall set each section of equipment on its foundation or supporting structures. The contractor shall fabricate bas frame and assemble equipment as required. Skilled craftsmen arranged by the contractor shall install all equipment with parallel, horizontal and vertical alignment.
2.12.3.3	Mechanical functional checking/ adjustment of individual breaker.
2.12.3.4	Measurement of Insulation resistance of individual breaker, complete switchgear board and combined insulation resistance of individual breaker with cable connected to drives.
2.12.3.5	Testing of Protection Relay, Thermal over relay, Power transducers, Energy/ Ammeters, Voltmeters, Power factor, frequency, tri-vector meters & metering etc. in static and dynamic condition relay.
2.12.3.6	Conducting test such as Insulation Resistance measurement, Ratio, polarity, Knee point Voltage test, Magnetization characteristic, winding resistance on CT and PT used in

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	switchboards.
2.12.3.7	Checking of electrical control & protection interlock of individual breaker and integration with other system.
2.12.3.8	Operation of all illumination, space heating circuits etc.
2.12.3.9	The commissioning of Switchgear shall also involve the trial runs and commissioning of all connected equipment like motors and Service Transformer. The contractor shall have to keep his people round the clock, if necessary during the trial runs and promptly take action for any repair, checks and rectification etc. Required in the equipment erected by him. (Separate rate shall be paid for commissioning of associated electrical drives as per BOM).
2.12.3.10	The contractor shall do touch up painting of switchgear panels wherever necessary. This includes supply of paint also.
2.12.3.11	BHEL shall provide vendors' supports for commissioning of proprietary type of microprocessor based instruments and protection relays which require software loading and programmer etc. However overall responsibility lies with the contractor and the contractor shall provide all support like manpower, standard T&P, Instruments etc. for calibration and commissioning of above proprietary type instruments.
2.12.3.12	Rubber mats for switchgear shall be supplied by BHEL, and these shall be laid, wherever required, by the contractor. Calibration of voltmeters, ammeters, power current & voltage transducers, TVM etc to be done before charging of system.
2.12.3.13	Provide assistance for checking the electrical operation of individual breakers from remote panels / MMI package (max DNA system).
2.12.3.14	LT Switch Boards consists of Air CKT Breakers, SFUs, relays, meters, contactors, CTs, PTs etc. with protection and metering scheme.
2.12.3.15	The contractor shall deploy sufficient number of HT cable jointers with supporting man-power for HT cable termination. Repairing or re-work of HT cable joint, if required after HV test, to be done by the contractor without any additional cost to BHEL.
2.12.3.16	The charged and commissioned equipment shall be maintained by the contractor till the same is taken over by Customer.
2.12.3.17	Any items like lamps, lens, fuse/relays/instruments missed/ damaged from the custody of the contractor shall be replaced by the contractor at his cost. However, in case the damage is not due to reasons attributable to the contractor, BHEL may arrange for free replacement. The decision of BHEL Engineer in charge in this regard will be final and binding.
2.12.4	CABLE TRAYS/CABLE DUCTS
2.12.4.1	Various types of sheet metal, galvanized cable tray, i.e. perforated, ladder type, sheet metal duct, solid bottom trays, pre-fabricated structural trays etc., will be supplied in standard lengths along with accessories and hardware viz; coupler plate, tray covers and tray clamps etc.
2.12.4.2	Erection of cable tray/cable duct shall include cutting, laying, jointing, fixing tee/reducers/ bends/clamps, fixing of tray covers, hardware, fabrication & welding of tray supports as per approved tray route layout etc. and painting of support structure before

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	painting.
2.12.4.3	Fabrication of bends/tee/ reducers from straight length of tray is within the scope of work and rate quoted shall be inclusive in unit rate (in running meter). All site welds of cable trays shall be painted with approved coat of primer (red lead/oil primer) and final coat of cold galvanizing/aluminum paint, which shall be arranged by the contractor.
2.12.4.4	In case structural cable trays, bends, tees, reducers etc., are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instances.
2.12.4.5	Anchor fasteners of approved make or approved by BHEL engineer shall be arranged by the contractor with in the quoted rate for installation works.
2.12.4.6	Cable trays/duct etc. may have to be routed underground in cable trench, overhead on structure, along the walls, floors etc.
2.12.4.7	Installation of tray/duct covers, wherever provided, will be done as a part of tray erection and no extra rates will be payable.
2.12.4.8	Branch trays of 50 mm or 100 mm size trays wherever required for laying one or two cables between the field instrument and the nearest Main tray will be erected by contractor.
2.12.4.9	All Sharp edges and Burr shall be removed from cable trays before cable laying.
2.12.4.10	Cable ducts supplied for the project are of GI and FRP type. FRP cable ducts shall be laid on the main pipe rack with SS nuts and bolts. Supply of accessories such as nuts and bolts for FRP ducts is in contractor scope only.
2.12.4.11	The cable trays shall be supported in general at a span of 1.5mtrs horizontally and at a distance of 1mtr vertically.
2.12.4.12	Cable Tray covers shall be provided for the top most cable trays and vertical trays. Further wherever trays crosses hydrocarbon lines, bottom covers shall be provided.
2.12.4.13	All the cable trays being supplied for the project are of length 3000 mm.
2.12.4.14	Cable ducts supplied for the project are of GI and FRP type. FRP cable ducts shall be laid on the main pipe rack with SS nuts and bolts. Accessories such as nuts and bolts for FRP ducts is contractor scope only.
2.12.4.15	Separate colored paint strips shall be applied at every 20mtrs and each end of cable tray & branch connection and when the trays changes its direction/elevation. Also sub-branch cable trays marking not required. 11kv/33kv/66kv : red strips equally spaced at 20 metres interval, , 2 inch width each 1.1kv power cables : yellow strips equally spaced at 20 metres interval, , 2 inch width each 1.1kv control cables : blue strips equally spaced at 20 metres interval, , 2 inch width each Instrumentation cables : green strips equally spaced at 20 metres interval, , 2 inch width each

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.5	CABLE LAYING - (POWER/CONTROL / INSTRUMENTATION SHIELDED/ UNSHIELDED CABLES / PLUG-IN CABLES / Coaxial / UTP / STP / DATA HIGHWAY, ARMoured / UN-ARMoured, SINGLE / MULTI-CORE, PVC / HR PVC / FRLS / TEFLON / XLP INSULATION, Optical fibre)
2.12.5.1	Cable laying includes cutting to the required length, laying in overhead cable racks / underground cable trenches, pipes, flexible conduits, dressing/clamping in tray, drilling of holes in gland plates in panels and junction box, glanding, splicing, dressing of spliced wire inside the panel and JB's, providing printed ferrules (ferrule printing machines to be provided by contractor for printing necessary cross ferruling details) / PVC numerical / alphabetical ferrules (where printed ferrules not possible at all) machine engraved ferrules sleeve/ferrule, termination by using crimp type copper tinned/aluminum lugs, insulated/un- insulated, crimp and soldered termination, plug-in connections with insert type crimping, providing identification cable tags of PVC/aluminum at both the ends and at appropriate interval (Approximately 30meters) throughout the route length, continuity checking, insulation resistance checking. Contractor to arrange adequate numbers of his own ferrule printing machines.
2.12.5.2	Entry to the panels, JB's may be at top, side or bottom. All cable are required be supported and clamped near to the panel.
2.12.5.3	PVC cable ties, PVC ferrules, PVC button and tapes, cable identification tag of PVC/metal as per site requirement, clamping and dressing material such as suitable cable ties/ clamps etc. with hardware, PVC sleeves etc. Shall be supplied by contractor within the quoted rate for cable laying. Only Cable Lugs & Glands Shall Be Issued By BHEL As Free Issue Item.
2.12.5.4	All care should be taken to avoid abrasion, tension, twisting, kinking and stretching of cables during installation.
2.12.5.5	Cable shielding – all signal cables are supplied with bare shielded copper wire/with braided wire shield. Generally, shield wire is kept isolated at instrument/field device end and continuity is maintained through JB's and earthed at panel end only. While terminating the shield wire in either panel or JB's, PVC sleeves are to be used to avoid two-point earthing.
2.12.5.6	Wherever cables run through ducts, conduits, valves, etc., they shall be sealed using fire/weather proof compound. In addition to this, cable entry in panels, MCCs, instruments, electrical actuators etc., are also required to be sealed. The required material for doing so shall be included by contractor in the cabling.
2.12.5.7	All cable entry openings shall be properly sealed to prevent water seepage from outside trenches/conduits into the building. The required materials for doing so shall be included by Agency in the cable laying prices.
2.12.5.8	Contractor shall carefully plan the cutting schedule of each cable drum in consultation with BHEL site engineer such that wastages are minimized. Recovery will be made in case the wastages are exceeding the wastage allowances fixed in this contract.
2.12.5.9	Directly buried cables shall be laid on and covered with sand/riddle with mud protected by brick barriers at sides and pre-cast concrete slabs on top. Location of buried cables shall be indicated clearly by cable marker, made of galvanized from interval of 30 meters

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	and at every change of direction.
2.12.5.10	All cables shall be provided with minimum of 2mm thick aluminium sheets as cable identification tags indicating cable designation in accordance with the cable schedule. The cable tags shall be provided at the ends, every 30mtrs and when the cable changes its direction/elevation. The tags shall be of aluminium with the number punched on it and securely attached to the cable by not less than two turns of 16 SWG GI wire.
2.12.5.11	All the cables shall be clamped to the cable trays/support structure with the help of clamps. All power cables shall be clamped individually and control cables shall be clamped in groups of 3 or 4 cables. Clamps for multicore cables shall be fabricated out of 25x3 mm aluminium flats. Single core power cables shall be laid in trefoil formation and suitably clamped with 25mm wide 8 SWG aluminium strips.
2.12.5.12	Cable trenches in plant shall be sand filled. Also RCC cover of cable trenches shall be sealed with PCC by CONTRACTOR.
2.12.5.13	Cost of cable laying as per BOQ Cum Rate Schedule shall include the cost of Nylon / PVC ties & Aluminium strip required for dressing / clamping.
2.12.5.14	Single core cables shall be laid in Trefoil configuration, trefoil clamp erection in single core trefoil configuration cable at an interval not exceeding 3 meters. HV single core cables shall be provided with screen bonding scheme.
2.12.5.15	Cables for different voltage grades shall be laid in independent cable trays. Separate cable trays shall be provided for control cables.
2.12.5.16	Conduits shall be thoroughly cleaned before pulling in the cable.
2.12.5.17	While laying cables, existing cable tray covers and false flooring may require to be removed and re-fixed. The same has to be done at no extra cost to BHEL.
2.12.6	CABLE TERMINATION
2.12.6.1	The Cost Of Cable Laying As Per BOQ Cum Rate Schedule Shall Also Include The Cost Of Termination With Suitable Crimping Type Lugs & Ferrules.
2.12.6.2	Only Cable Lugs & Glands Shall Be Issued By BHEL as Free Issue Item. Drilling of holes in gland plates of control panels, JB's etc as per requirement shall also be part of cabling at no extra cost to BHEL.
2.12.6.3	The contractor shall carry out insulation testing, simulation testing etc. as per the instructions of Engineer at site.
2.12.6.4	Screen of signal cables shall run in insulated sleeve (to be arranged by contractor at no extra cost) and shall be terminated as per the instructions of the BHEL Engineer.
2.12.6.5	Name plates/Tag plates with tying/fixing material for cable's both end and at 30 meters intervals per run of cable as required.
2.12.6.6	Each control cable core entering panel / Junction box shall be neatly dressed and served with Nylon cord to keep it in position at the terminal block.
2.12.6.7	All cable entry points shall be sealed and made vermin and dust proof. Unused opening, if any shall be effectively closed with proper material.
2.12.6.8	The location of cable Joint if any shall be clearly indicated with cable marks with an additional inscription "Cable Joint".

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.6.9	Termination Of 66 KV, 33 KV, 11 KV HT Cables Only Shall Be Measured And Paid Separately As Per Quoted / Accepted Rate Of Respective Item Of BOQ CUM Rate Schedule.
2.12.6.10	For Cables Other Than 66 KV, 33 KV, 11 KV HT Cables, The Cost Of Cable Laying As Per BOQ Cum Rate Schedule Shall Also Include The Cost Of Termination With Suitable Crimping Type Lugs Including Supply Of Ferrules (for cross / direct ferruling as per BHEL instructions). Only Cable Lugs & Glands Shall Be Issued By BHEL As Free Issue Item. Drilling of holes in gland plates of HT / LT switchgear, transformer, control panels, JB's etc as per requirement shall also be part of cabling at no extra cost to BHEL.
2.12.6.11	The contractor shall provide Tools/ equipment required for the connections and termination of cable wherever necessary.
2.12.6.12	Re-termination if required during testing/ commissioning shall be carried out without additional cost.
2.12.6.13	Scope of termination shall include supply of insulating sleeves. The sleeves shall be fire resistant and long enough to over pass conductor insulation.
2.12.6.14	Only printed ferrules should be used and contractor shall arrange necessary ferrules printer.
2.12.7	JUNCTION BOXES/PUSH BUTTON STATION
2.12.7.1	Different type of Electrical /Control Junction boxes/Push button boxes shall be supplied. The scope of installation of Junction boxes/Push button boxes shall be as follows:
2.12.7.2	Unit rate quoted for erection of junction boxes/push button boxes shall include providing necessary supports, drilling of bottom gland plates for cable glands as required, painting the tag No of JB or fixing a separate tag plate as required on junction boxes/push button boxes, minor chipping, grouting as required for mounting the JB's/PB and supply of all bolts and nuts (Fasteners) including grouting bolts as required for mounting the junction box/push button.
2.12.7.3	Fabrication and fixing of supports shall be on tonnage basis.
2.12.7.4	Contractor shall close all unused holes on the gland plates using suitable material in consultation with Site Engineer at free of cost.
2.12.7.5	All bolts and nuts (Fasteners) required for mounting the junction box shall be arranged by the contractor.
2.12.7.6	Painting of JB supports/push button station shall be in erection agency scope. Painting procedure as per main piping specification.
2.12.7.7	CONTRACTOR shall include painting and marking of all buses, individual incomers, all outgoing feeders etc. with details such as tag no., feeder rating, sending end source reference etc. for all switchboards.
2.12.7.8	It is CONTRACTOR's responsibility to identify and supply the safety equipment such as hand gloves, apron, eye shields, danger boards, first aid box.
2.12.8	SCOPE OF WORK FOR BATTERY/BATTERY CHARGERS/UPS

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.8.1	Lump sum rate shall be quoted for Erection and commissioning of Battery & Battery charger. No additional payment shall be made for any variation in the number of cells. The rate quoted for erection of battery will include the following works:
2.12.8.2	Checking of battery charger panel & Calibration of all indicating and measuring instruments.
2.12.8.3	Collecting the batteries and all the accessories like cable connectors, inter cell connectors, equalizing connectors, rack insulators, fuse box, loop cables etc. from stores and assembling on the racks and fixing all loose supplied items as per drawings,
2.12.8.4	Filling the individual cells with Acid/alkali – if applicable.
2.12.8.5	After soaking period, charging and discharging cycles of battery banks to be done and repetition may be required as per capacity test result.
2.12.8.6	Arranging manpower in shift during battery charging and discharging cycles that may be carried out round the clock as per the code of practice, and conducting other routine tests as per IS under the supervision of BHEL Engineer/HPCL.
2.12.8.7	Modifications or changes if any for the loose supplied items or any minor changes in wiring.
2.12.8.8	Arranging necessary tools, T&P, Testing equipment, required for erection and commissioning of the battery Erection of battery after assembly of battery stands, inter-connection of batteries and first charging; Capacity testing using dummy load and subsequent recharging (in case of failure of capacity test, the charging Discharging cycle is to be repeated) Dummy load test of chargers includes arrangement of dummy load and temporary connection in absence of regular power supply.
2.12.8.9	Contractor shall provide skilled manpower for periodic maintenance after the battery are fully charged for the activities such as checking of electrolyte level, specific gravity, topping up with distilled water and cleaning till the set is handed over to customer and record of the same shall be maintained and submitted before handing over of the system.
2.12.9	STATION LIGHTING
2.12.9.1	The illumination of various indoor and outdoor areas in the main plant & offsite area shall be provided as described here.
2.12.9.2	Normal AC lighting ,DC Lighting and Emergency Lighting
2.12.9.3	System shall include distribution boards, normal/ emergency lighting panels, lighting fixtures, junction boxes, receptacles, switch boards, lighting pole, conduits, LED Luminaires, cables and wires, earthing material etc. The system shall cover all interior and exterior lighting such as area lighting etc.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.9.4	Erection of lighting panels, light poles, fittings and other suitable fixtures required for light fittings, conducting, cabling and wiring as per drawing, testing of wiring and circuit checking, energizing of system forms part of erection job. All conduits, lighting fittings / panels and accessories required for lighting work shall be supplied by BHEL free of cost. The quoted rates for light fittings shall include fabrication / erection of required supporting structures and control-gear of respective fitting. The quoted rates for lighting poles shall include all civil work including supply of cement etc. The quoted rate for conduiting required for light fittings shall also include fixing of conduit accessories like bends, tees, 3 / 4 way JB's etc. and the laying of PVC wires in respective conduit as per circuits shown in drawing. No extra payment shall be paid for wiring in conduits and fabrication / erection of supporting structure of light fitting.
2.12.9.5	Supply & erection of consumable like conduit accessories & fittings, conduit boxes, saddles, clamps, flexible conduit, junction boxes, fixing hardware's, anchors, wedges, nuts & bolts, concrete inserts, materials required for mounting the fixtures, consumable and other incidental materials required to complete the installation testing & commissioning of complete lighting system for successful operation, & to the satisfaction of purchaser/ customer. Supply scope of these items shall form part of the installation rates quoted for the item. Minor civil works Plumbing/Grouting/Foundation required to complete the lighting installation are covered under the scope of this contract and form part of the item installation cost and are not payable separately.
2.12.9.6	All tools & tackles, ladders, testing equipment etc. required for erection, testing & commissioning of complete lighting system are to be arranged by the Contractors.
2.12.9.7	The erection work shall conform to latest applicable Indian standards, codes and practices, Electricity rules, fire insurance regulations and safety regulations of the locality where the equipment will be installed. All apparatus, wiring and connections shall be designed so as to minimize risk of fire or any damage which will be caused in the event of fire. Contractor to furnish the installation drawings of all equipment for purchaser's approval
2.12.9.8	The contractor shall be responsible if any parts of lighting fixtures, LDBs, LPs are lost or damaged and lamps are broken during installation. All damage and thefts shall be made good by the contractor till the installation is handed over to the customer.
2.12.9.9	The contractor shall note that for any change in the location of lighting panels, lighting fixtures, switch boxes/receptacles, no extra charges will be paid so long as the modifications are indicated to the contractor before commencement of the work on that particular equipment or circuit.
2.12.9.10	The contractor shall have a separate cleaning gang to clean all equipment under erection as well as the work area and the project site at regular intervals to the satisfaction of Engineer-in-charge. In case this is not done, the purchaser will have the right to carry out the cleaning operation and any expenditure incurred in this regard will be recovered from the contractor's account.
2.12.9.11	After installation of lighting fixtures/receptacles, panel number and circuit number shall be painted on them at a suitable place.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.9.12	To distinguish emergency AC fixtures from normal AC fixtures, red painted circular mark of 1 cm dia. shall be provided on emergency fixtures.
2.12.9.13	Lighting distribution board ,Lighting Panels & Lighting Poles
2.12.9.13.1	Lighting DB's consisting of lighting transformer etc, shall be mounted on floor and LP's shall be mounted on the walls/columns/steel structures at the locations indicated in the drawings.
2.12.9.13.2	Suitable Space provision for LDB mounting on floor would be made by the purchaser. The contractor will supply necessary foundation bolts and do the grouting to fix up the LDBs.
2.12.9.13.3	LPs shall be installed by fastening to studs of not less than 12 mm dia. which will be suitably grouted/welded to the wall/column by the contractor. All the required accessories including studs for the erection of the panel shall be supplied by the contractor.
2.12.9.13.4	All the necessary civil works including foundations etc. as well as structural works required for installation of these poles shall be in Erection Agency's scope.
2.12.9.14	Lighting control Switch Boxes & Receptacle Boxes.
2.12.9.14.1	The locations of switch/receptacle boxes will be approximately as shown in the drawings. The exact location shall be finalized by the contractor in consultation with the engineer-in-Charge.
2.12.9.14.2	All switch/receptacle boxes in offices and control room shall be flush mounted in the wall. In other areas they shall be mounted on wall or column.
2.12.10	CONTROL PANELS(DDCMICS based/C&I /DCS panel/PLC panels) and CONTROL & RELAY PANELS(GRP/GCPs, DCDBs, DAVR PANEL, DG Set 11 KV ,33 KV GIS System,VFDsystem for BFP Motors etc.)
2.12.10.1	Panels to be install are microprocessor based on Distributed Digital control, monitoring & information system (DDCMICS) control panel, Remote Input output panels (RIO) etc. supplied in suit of either one/two/three or loose shipping sections with integral base frame or loose base frame. These panels may have to be installed as stand-alone or in-group consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.
2.12.10.2	Installation of panel shall include fixing of base frame, levelling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubical interconnection hardware, interconnection of bus bar/bus bar jointing, wiring interconnection, welding and grouting of panels and base frames, mounting of panel canopy wherever supplied as part of panel, drilling of gland plates, sealing of panels/ cable entries. Where the base frame is not supplied as part of panel supply, the contractor shall fabricate the base frame from structural items at site. Payment for such fabrication will be effected on measured quantity at the rate applicable for structural steel fabrication and installation. Proper sealing of all the holes and cable entries (even if the cable has been laid by others) in the panel is in the contractor's scope
2.12.10.3	Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. This shall be a part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc. Panels have to be erected at different locations and elevation in, LT & HT switchgear room, unit

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	control room etc.
2.12.10.3.1	Panel and instruments once erected in position should be properly protected using necessary care to prevent ingress of dust/moisture. This will have to be periodically cleaned and surroundings have to be kept tidy.
2.12.10.3.2	Wherever the panels to be mounted on cable trenches, channel supports have to be provided across the cable trench over which the base frame of panel shall be mounted. For such work, structural steel fabrication, installation rates shall be applicable.
2.12.10.4	The contractor shall set each section of equipment on its foundation or supporting structures. The contractor shall assemble equipment as required. Skilled craftsmen arranged by the contractor shall install all equipment with parallel, horizontal and vertical alignment.
2.12.10.5	Normally the panels shall be supplied with complete Relays / Instruments and other Components mounted and wired. However, any minor modifications like dismantling of the existing Relays / Instruments / Components and mounting of new Relays /instruments / components and rewiring to suit operating conditions, will be carried out without any extra cost. Similarly if any Relays/ Instruments/component supplied as loose for safety transit, same shall be mounted and wired as per site requirement at free of cost as part of scope of the job.
2.12.10.6	All T&P, Material handling equipment including cranes and Relay Testing / HV Testing / Calibration equipment / Instruments shall be arranged by contractor. Three phase secondary injection kit required for calibration of relays shall be arranged by the contractor. The contractor shall carry out testing and commissioning works using their own testing equipment's and Testing Engineers under the supervision of BHEL Engineer.
2.12.10.7	All the panels and JB's shall be electrically earthed to the nearest earth grid by means of GI wire/Flats as per the instructions of BHEL engineer. Preparation of electronic earth pit and connection to the panels as per the approved drawings is in scope of the work.
2.12.10.8	The brief scope of work under is defined as below, but not limited to the following. Contractor shall discuss & finalize testing procedure with BHEL Engineer In-Charge for the test to be conducted on Generator Control & Relay Panel testing. Drawing & documents shall be provided by BHEL at the time of testing. BHEL decision in this regard shall be final and binding on the contractor. The contractor shall prepare all erection / commissioning log sheets and protocols / test certificates as per field quality plan, get is signed by the concerned BHEL/customer engineer and submit the same to BHEL engineer as per his instruction.
2.12.10.8.1	Integrated Electrical testing/commissioning of Generator Control and Protection Relay Panels & associated equipment, etc. shall involve various activities like relay testing/setting, simulation checks, testing of energy meters, on/off line functional checks on integrated system.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.10.8.2	Relay Testing in static condition for Generator, Transformers, and associated system by secondary current injection at different current and recording the time duration.
2.12.10.8.3	Testing and checking of control and protection interlock scheme in static condition and simulation of protection device contact from internal and external devices of all electrical panels.
2.12.10.8.4	Measurement of Insulations, Winding Resistance, Polarization Index of winding of Generator & associated equipment/ system, DC resistance test & Impedance test on rotor, Brushless excitation system at the time of rotor insertion as well as during pre-commissioning stage / commissioning stage/ post commissioning stage.
2.12.10.8.5	Relay setting and checking the stability of protection relays in static and dynamic condition during the OCC (Open Circuit Characteristic) & SCC (Short Circuit Characteristic).
2.12.10.9	Charged and commissioned equipment shall be maintained by the contractor till the same is taken over by M/s HPCL.
2.12.10.10	Any items like lamps, lens, fuse / relays / instruments missed from the custody if the contractor shall be replaced by the contractor at free of cost.
2.12.10.11	Contractor shall close unused opening at the panel bottom plate with suitable material in consultation with Site Engineer at free of cost.
2.12.10.12	If any removal / Re-fixing of contactors / relays becomes necessary for the completion of the system, the same shall be done by the contractor at free of cost.
2.12.10.13	Scope of work shall also cover drilling of bottom gland plates for cable entry as required.
2.12.10.14	Contractor shall calibrate and commission all switchgear / panel mounted instruments, protection relays, transducers, Recorders, Indicators, energy meters etc.
2.12.10.15	Unit rate shall also include Testing, Calibration and adjustment of relays, electronic cards and instruments, transducers mounted on the panels.
2.12.10.16	If panels are supplied with monitor, printers, furniture, controller etc. or any loose items or equipment's, the erection of above shall be part of respective panel. No separate rate shall be payable for loose supplied items unless specifically given in the BOM.
2.12.10.17	System comprises of DAVR Panel which is connected by Input cable from DAVR to PMG, DAVR to Main Exciter DAVR to axis coil, Mounting of Local Instrument Enclosure, Winding resistance & IR value of PMG, Main Exciter, Q axis coil, Diode wheel Checking healthiness of diodes /Fuses, Commissioning of stroboscope, Exciter Heater / Blowers Rotor earth fault brush checking/setting, Lighting inside exciter enclosure, Flap actuator commissioning (if provided). Any other work inside exciter enclosure, Mounting of loose components supplied for Brushless exciter system, Dummy load test of DAVR Checking from Control desk & Field related inputs/ outputs to commission the excitation system fully operational.
2.12.10.17.1	AVR(STG) Size:2.86x1.25x3 M Qty-1 No AVR(GTG) Size:4.3x1.25x2.3 M Qty-1 No

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.10.18	Erection and Commissioning of VFD system for VVHP BFP motor and VHP Feed water pump motor.
2.12.10.18.1	Details of VFD Panels 1.Size:5.1x2.9x1.1(LXHxD) M Weight of Panel-6500Kg with dry type transformer 2250 KVA. Qty-2 Nos 2.Size:5.1x2.9x1.1(LXHxD) M Weight of Panel-5000Kg with dry type transformer 1250 KVA. Qty-2 Nos 3.Breaker Panel(approx. dim.4.2x2.4x2.7,M w.t 7.5 MT) Qty-4 Nos
2.12.10.19	SYNCHRONISATION, CONTROL AND ANNUNCIATION PANEL (SCAP) 7&Synch Trolley
2.12.10.19.1	Hard wired control, metering and annunciation shall be provided on SCAP. SCAP shall be located in CPP control room. SCAP shall be mosaic panel type. Also one no synchronization Trolley. SCAP Panel Size(LXBXH): 1.2 x 1 x 2.4 M Weight per panel=500 Kg
2.12.10.19.2	SCAP shall carry out the control, monitoring and annunciation functions for the following electrical equipment's : Gas Turbine Generator + Generator Transformer Steam Turbine Generator + Generator Transformer 220kV GIS 33kV GIS 220/66kV Grid Transformer 220/33kV Grid Transformer 11kV Utility Switch Board 11kV Auxiliary Switchboard 11kV Emergency Switchboard Diesel Generator sets
2.12.10.20	UPS (120 KVA + 2x100% Ni Cd battery)System
2.12.10.20.1	110V UPS shall be dual redundant with bypass (2x100% Ni Cd battery)
2.12.10.20.2	UPS RATING 120 KVA
2.12.10.21	Complete Electrical work of Emergency Diesel generator (02 No) set having rating 10MW
2.12.10.21.1	DG Set(2x5.5 MW) 11KV
2.12.10.21.2	The scope of works covers electrical and control system erection and commissioning of following auxiliaries of DG set. Battery Charger and Battery Bank, 11 KV Switchgear (VCB Panel), Auxiliary MCC, PLC Panel, NGR Panel, Earthing pits, Generator control & Protection panel (MRP and Syn.), Cable trays(ladder /perforated) HT Cable end termination HT Cable 1CX630 Sq mm 11KV LT cable1CX630 Sq mm 415 V Control and signal cabling

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.10.21.3	Prior to start of installation of the electrical equipment, contractor shall verify that equipment & complete materials have been received. Handling, shifting to required site location, installation, testing & commissioning of all electrical equipment shall be done by contractor with utmost care. Manufacturer's instructions & the requirements given in their technical manuals shall be strictly adhered. The HT DG building wherein the equipment shall be installed shall be kept clean, dry & free from all debris. When handling the equipment, care shall be taken for correct lifting arrangements, no parts shall be subjected to undue strains or sudden stresses which could cause damage to the equipment.
2.12.10.21.4	The equipment shall be placed on respective foundation or supports levelled and aligned with precision measuring instruments, checked for proper clearance between moving and stationary parts wherever applicable. Grouting of equipment shall be performed as per recommendation by manufacturer/BHEL. Grouting materials to be arranged by contractor and procedure as recommended shall be followed.
2.12.10.21.5	The contractor should clean site and equipment daily during erection & till the handing over of the project.
2.12.10.22	33kV GIS Package+Sub station automation system with complete erection and commissioning.
2.12.10.22.1	33kV GIS Package+Sub station automation system (Total 18 Panel for 1 board) Total Weight-36 MT GIS Panel Size:16X2.19X2.7 M GIS DB Size:11.8X1.25X2.43 M
2.12.10.22.2	33 kV, 2500A, 40 kA for 1 second, single busbar Gas insulated switchgear (GIS) complete with plugs/sockets for cable terminations, CTs, protection relays and differential relays.
2.12.10.22.3	Modification in existing Swgr-200/270 required as per BHEL instruction.
2.12.10.23	Erection and commissioning of Turbine control Panel (Mark VI-e).
2.12.10.24	Erection and commissioning of STATIC FREQUENCY CONVERTER (SFC) for Gas Turbine.
2.12.10.25	Erection and commissioning of SWAS Analyzer panel (Dry panel, Wet panel +chiller). WET Panel(LXBXH) -3.3X0.8X2.1 M DRY Panel(LXBXH) -2.4X0.8X2.2 M Chiller Unit(LXBXH)-1.5X1X1.6 M
2.12.10.26	Erection and Commissioning of CCTV System. CCTV system complete installation, cable laying, utility connection, commissioning including supply of mounting accessories.
2.12.10.27	Erection and Commissioning of Plant communication system.
2.12.10.28	Erection and Commissioning of Emergency lube oil pump motor.
2.12.10.29	Erection and Commissioning of inert gas Extinguishing system (FK-5-1-12).
2.12.10.29.1	Consumables like rawl plugs, screws, check nuts, nuts & bolts, saddles, saddle bars, cable (nylon) ties, washers, cable tags (strips), etc. which are not covered in the list but required for successful completion of above erection activity shall be considered in Erection agency.
2.12.10.29.2	Erection activities like cutting/ threading/welding etc. of conduit/pipe/ISMC/ISA shall be carried out at site as per requirement for installation of DG system and auxiliaries.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.10.29.3	Surface preparation and base coat of primer shall be carried and final painting shall be done after completion of structural steel erection.
2.12.11	SCOPE OF WORK FOR FIELD INSTRUMENTS
2.12.11.1	The type of instruments to be erected and commissioned shall be as detailed below:
2.12.11.2	All types of transmitters like temperature, pressure, flow, level, electronic transmitters etc. Local mounted pressure gauges, DP gauges, thermocouples, RTDs, temperature gauges, temperature switches, pressure switches, DP switches, flow switches and limit switches and flow indicator level switches etc.
2.12.11.3	SAMPLE HANDLING SYSTEM / ANALYZER SYSTEM: Includes installation of main analyzer panel, analyzer, probes, sensors and other accessories like sample gas cylinders, mechanical / electrical interconnections (including SS Tubing & Electrical heat Tracing, wherever required) between various components, energizing, testing & commissioning.
2.12.11.4	Air filter regulators, purge meters/rotameters.
2.12.11.5	Panels / Control desk mounted Instruments like indicators, recorder, console and electronic modules etc.
2.12.11.6	Pneumatic operated control valves, trip valves, solenoid valves, and electrically operated valves.
2.12.11.7	Special instruments like vibration sensors, Gas analyzer, PC based instruments, etc.
2.12.11.8	Prior to installation, all the local & remote Instruments, thermocouples/RTDs, etc. shall be calibrated. Similarly, limit switches, flow switches, level switches, solenoid valves, air filter regulator, purge meters, etc. shall be checked for proper operation.
2.12.11.9	scope of work for each instrument shall include calibration, installation, loop checking, commissioning and troubleshooting until satisfactory performance as per operational and system requirement and maintenance till the end of contract period or trial operation whichever is earlier.
2.12.11.10	In case any instrument requires recalibration to achieve the expected performance, the same shall be carried out at no extra cost. If any re-calibration or replacement of instruments and rechecking of cable termination is found necessary during commissioning, the same shall be done at free of cost.
2.12.11.11	If any instrument is to be relocated for satisfactory performance, the same shall be carried out by the contractor.
2.12.11.12	Fabrication and installation of racks and supports for instruments, wherever required, shall be carried out by the contractor. Steel materials required for fabrication shall be supplied by BHEL.
2.12.11.13	Scope shall also include marking Tag numbers on the instruments or racks, either by paint or a separate tag plate as per BHEL Engineer's directive.
2.12.11.14	For field mounted instruments, pre-fabricated canopies shall be provided by BHEL. Mounting of canopies shall be done by the contractor as part of scope.
2.12.11.15	scope of work for pressure/differential pressure transmitters, gauges, switches, shall include fixing the instruments on the racks / supports along with manifolds, and associated fittings and clamps.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.11.16	scope of work for Temperature transmitters, I/P converters, Air filter/Air lock off valves, Purge meters, Rotameters, position transmitter, probes etc shall include fixing the instruments on the racks / supports along with associated fittings and clamps.
2.12.11.17	Scope of work for control room mounted instruments shall cover mounting of instruments on panels / desk wiring, minor grinding on the cut out of panels for proper fixing.
2.12.11.18	Scope of work for erection and checking of thermocouple, RTD etc. shall include cleaning of thermo wells stubs threads using tap sets, fixing of thermo wells, seal welding of thermo well, wherever required as per BHEL directive of site engineers.
2.12.11.19	Scope of work for temperature switches, gauges shall include providing suitable support for capillary type temperature Gauges/switches besides the works covered above for RTD & T/C.
2.12.11.20	Scope of work for erection and commissioning of float type Level switches includes fixing of switches on float chambers and fixing of float chambers on stand pipe, any minor modification required to match Float chamber with tapping point, providing supports wherever required etc.
2.12.11.21	Scope of work for electronic type switches/transmitters includes fixing of Electrode standpipe, Electrodes, Electronic unit, any minor modification required to match Float chamber/ Electrode standpipe with tapping point, integration of all loose supplied items etc.
2.12.11.21	Scope of work for special instruments like, Flue Gas/Oxygen/Mercury analyzers, etc. shall include installation of all loose items which are not explicitly mentioned, but comes as part of the system, integration of total system and commissioning. The quantities of loose supplied items are approximate only. No extra payment will be applicable for any variation in quantity or for any additional items supplied as part of equipment's. For Special Instruments like, Analyzers, DCS/PLC vendor support shall be provided by BHEL for commissioning. The contractor shall provide necessary assistance for commissioning activities.
2.12.11.23	All instruments are generally covered in the BOM. However, if any instruments not covered, but requires being erected/commissioned, same shall be carried out by the contractor.
2.12.11.24	In case of Instruments that are mounted and supplied along with main equipment, the contractor shall carry out removal, calibration, re-fixing and commissioning of same, as per requirement.
2.12.11.25	Field instruments such as transmitters, gauges etc. shall be grouped and mounted on a rack. This rack along with the supply of angles and channels will have to be fabricated and painted at site by Contractor as per the space available. The exact grouping and rack details will be mutually worked out during the execution stage and the Contractor will carry out the same at no additional cost implications.
2.12.11.26	ELECTRONIC WATER LEVEL INDICATOR SYSTEM: EWLI includes fixing of electrodes, local and remote indicator panel / display units and interconnection of these by cables. Erection of all other equipment's / panels/ display units forming EWLI system shall be included in the quoted rate per system.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.11.27	CALIBRATION OF CONTROL VALVES: The work also includes minor rectification / alterations in tubing, servicing of accessories, setting of limit switches, calibration of Actuators and position feedback transmitters.
2.12.11.28	DETECTORS / VIBRATION, SPEED & OTHER TURBOVISORY PICK UP: Blue matching with the assembly fixtures / main equipment surface, trial fixing, fixing by drilling / tapping, final doweling. Moreover some detectors may have piggy-backs signal detectors mounted on them as such these forms part of detectors assembly. The integral cables of the above shall be routed & dressed properly up to their JB / Proximeter. Erection of proximitors, proximator housings / JB required for respective pick up and calibration / commissioning of pickups will be included in quoted / accepted item rate of respective pickup.
2.12.11.29	COMPUTERS / PLC BASED EQUIPMENTS: All computer related items / equipment like CRT, monitors, printers, keyboards, pre-fabricated connecting leads etc. shall be installed in control room and control desk as per direction of BHEL Engineer. Cost of PC set (including printer, monitor, UPS, interconnecting leads etc.) installation as per BOQ Cum Rate Schedule shall also include the cost of installation / placement off furniture (to be issued by BHEL as free issue item) as per requirement /instruction of BHEL Engineer. However, any assistance required for testing / commissioning have to be provided by the contractor within the quoted price. Hardware found defective during testing / commissioning and till handing over to Customer, have to be removed for repair / replacement and reinstalled within the quoted rates.
2.12.12	RIGID & FLEXIBLE CONDUITS/ Lighting wires
2.12.12.1	Cables shall normally be laid on cable trays. However, in case of shorter routes where trays are not possible, suitable GI pipe/flexible conduits shall be used.
2.12.12.2	Scope of works for flexible conduit includes drilling of the holes on the plates, fixing of the end connectors, providing suitable supports and fixing tag marks wherever specified as required by BHEL. The supply of suitable clamps, fasteners and tag plates are in contractor's scope.
2.12.12.3	Fixing end connectors shall be part of scope of flexible conduit laying.
2.12.12.4	Conduit shall run along wall, floor, ceiling, on steel structures, embedded in wall, floor, for ceiling, in accordance with relevant layout drawings. The contractor shall closely co-ordinate his work with the civil contractor. Exposed conduits shall be run in straight lines parallel to building columns, beams and walls. Unnecessary bends and crossings shall be avoided to present a neat appearance. In the office area as specified conduits shall be embedded along the entire run. It is the responsibility of the contractor to co-ordinate with the civil contractor of these buildings. Conduits supports shall be provided at an interval of 750 mm for horizontal runs and 1000 mm vertical runs.
2.12.12.5	Conduits shall be kept, wherever possible, at least 300 mm away from hot pipes, heating devices etc.
2.12.12.6	Conduits shall be securely terminated at LPs/junction boxes or lighting fixtures by proper fastening with a lock put on inside and outside. The number of conduits terminating at LP's shall not exceed the permissible number considering the glanding area of lighting panel. Conduit terminations shall be made water & vermin proof.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.12.7	The entire metallic conduit system, whether embedded or exposed, shall be electrically continuous and thoroughly grounded where slip joints used, suitable bending shall be provided around the joint to ensure a continuous ground circuit.
2.12.12.8	Conduits and fittings shall be properly protected during construction period against mechanical injury. Conduit ends shall be plugged or capped to prevent entry of foreign material.
2.12.12.9	After installation, the conduits shall be thoroughly cleaned by compressed air before pulling in the wire.
2.12.12.10	Lighting wires
2.12.12.10.1	Lighting wires from lighting panels to junction boxes and junction boxes to lighting fixtures, switch boxes and receptacle boxes shall run in conduits (Rigid/flexible).
2.12.12.10.2	All wires in a conduit shall be drawn simultaneously. No subsequent drawing is permissible.
2.12.12.10.3	Wires shall not be pulled through more than two equivalent 90 deg. bends in a single conduit run. Wherever required, suitable conduit junction boxes/pull boxes shall be provided. All types of wiring, concealed or unconcealed shall be capable of easy inspection.
2.12.12.10.4	Receptacles and lighting circuits shall be fed from different circuits. The switch controlling these circuits shall be on the live side (phase wire) of the circuits.
2.12.12.10.5	A.C. normal, A.C. emergency and D.C. emergency system wiring shall run throughout in separate conduits.
2.12.12.10.6	Wiring shall be spliced only at junction boxes. Maximum two wires shall be connected at each terminal.
2.12.12.10.7	All lighting wires shall be crimped using suitable type of solderless, crimping, tinned fork type copper lugs. Cost of the lugs shall be included in the erection price of wire.
2.12.13	SCOPE OF WORK FOR IMPULSE PIPES
2.12.13.1	Fabrication and erection of channel / angle / slotted angle supports, cleaning impulse pipe with wire brush and compressed air, edge preparation, cold bending, laying to the required slopes, clamping, welding of isolation / drain valves and fittings by butt / socket welding / swoze lock joints. Servicing of valves, connecting with the process end and to the instruments DPT test, Hydraulic testing the impulse lines at pressure same as mother pipe hydro test pressure, and painting the lines as per requirement of BHEL engineer. The impulse line may have to be cleaned chemically for removing grease / rusting. Proper tagging of valves and impulse lines on both ends shall be done for proper identification. No extra charges will be claimed by contractor for any modification carried out after laying of Impulse / draft pipe lines due to site requirement in general.
2.12.13.2	All weld joint in piping ,fittings of this contract scope shall be subject to NDT (DP Test+ Hydro Test+ Radiography(digital or conventional as per requirement) as per FQP, Drawing documents and technical specification.
2.12.13.2.1	Void
2.12.13.3	The impulse line shall be supported at regular interval of 1500 mm-2000mm with U bolts / angles etc.
2.12.13.4	The pipe routing after first root valve, supporting, welding, any special test required as

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	per piping welding/ erection procedure etc. & connecting to instrument shall be in contractor scope.
2.12.13.4	Impulse pipe routing after first root valve, supporting, welding, any special test required as per piping welding/ erection procedure etc. & connecting to instrument shall be in contractor scope.
2.12.13.5	All the impulse lines are subject to hydro test at pressure same as mother pipe hydro test pressure.
2.12.13.6	Qualification of welders prior to start of welding of Impulse pipe.
2.12.13.7	The all non- Stainless steel impulse lines & fittings for instrumentation connection shall be painted as per client's specification. Surface preparation Primer coating etc. as required shall be in contractor's scope.
2.12.13.8	Painting shall also be applied for impulse line structure, supports, running channels etc.
2.12.13.9	Scope of supply of painting material, execution tools/ devices etc. shall be in contractor scope.
2.12.13.10	The method of painting, color, quality shall be identical to main mother pipe.
2.12.14	SCOPE OF WORK FOR COPPER/ SS TUBES
2.12.14.1	Fabrication and erection of single angle supports / tray supports for single multi run tube. Laying tubes in the angles / trays from the panel to the equipment, instrument to instrument, air supply line to drive / instrument, air line connections, clamping properly as per standard ferruling and termination at both ends. This includes all fittings and needle valves, stop valves etc. also. Proper tagging of valves and pneumatic tubes on both ends shall be done for proper identification. No extra charges will be claimed by contractor for any modification carried out after laying of pneumatic tubes / draft pipe lines due to site requirement in general.
2.12.15	SCOPE OF WORK FOR ELECTRIC & PNEUMATIC ACTUATORS
2.12.15.1	Pneumatic actuators shall be calibrated at site.
2.12.15.2	For calibration of any Pneumatic Actuator at field, temporary air supply, if required, shall be arranged by the contractor.
2.12.15.3	All calibration instruments required for calibration of actuators shall be arranged by the contractor.
2.12.15.4	For all electrical actuators of the valves, functioning, setting and performance of limit switches/torque switches of various positions shall be checked before and after installation of the actuators. The position transmitters for inching applications shall also be calibrated.
2.12.16	SCOPE OF WORK FOR FIRE DETECTION & ALARM SYSTEM/Integrated Fire Alarm System
2.12.16.1	Analogue addressable type Fire Alarm System consisting of Multi sensor type detectors, Linear Heat Sensing Cable (LHSC) detector, cabling, junction boxes, instrumentation, Fire Alarm cum control panels, repeater panels, etc. for various areas/equipment as detailed

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	out below:-
2.12.16.2	a) All MCC / switch gear room / GIS Room/Control room /DG Shed /SWAS room shall be provided with Multisensor type detectors. b) All Cable Galleries shall be provided with Linear Heat Sensing Cable detectors. c) All cable galleries shall be provided with Multisensor type detector.
2.12.16.3	The complete Fire Detection and Protection Systems shall be as per the guidelines/ codes/standards / rules of TAC/ NFPA / IS: 3034 / OISD etc. and all the systems, equipment's and installation shall be got approved from TAC accredited professional(s)- India. Customer M/s HPCL will make arrangement of TAC approved agency for accreditation of work. The contractor has to facilitate TAC for getting approval. As per TAC any modification or re erection of any item should be done and same should be carried by contractor with in quoted rates. There is no extra payment will be paid. However contractor is responsible for availing the TAC approval for Fire Detection system in total (for fire protection another agency of BHEL will be responsible, however contractor shall coordinate with mechanical agency for the Certification). Contractor also responsible for getting any necessary approval from regulatory and statutory body of TAC if any needed. Obtaining the all reports from concerned statutory departments is the responsibility of the contractor. All these activities should be carried within the quoted rates.
2.12.16.4	It signifies a comprehensive fire alarm system comprising all the distributed fire alarm panels (DGFAP, ZFAP, repeater panels etc) having integration with CFAP for fire/ fault monitoring of total plant/ buildings. It provides audio/ visual alarm building/plant-wide having provisions for connectivity with telephone exchange and public address system. It shall provide interfaces with fire protection system and other systems like pressurization systems, air conditioning, clean agent system, water spray system, Fire & Gas detection system etc. via potential free contacts.
2.12.16.5	Data Gathering Cum Fire Alarm Panel (DGFAP) DGFAP shall have serial port for communication to data highway. It should be possible to Communicate all the information to CFAP/ FA system work station located with fire marshal. The protocol of communication shall preferably be open protocol.
2.12.16.6	Central Fire Alarm Panel CFAP shall receive inputs from automatic and manual fire alarm devices and supply power to detection, notification and communication devices. Fire and fault annunciation for each Zone or group of zones at ZFAP shall be repeated at CFAP.
2.12.16.7	Interphase of the fire alarm system for GTGs & STGs with HPCL Fire Alarm system done by contractor. Including laying, termination ,of all cables ,trays,trenches,supports etc.
2.12.17	FIRE PROOF SEALING/Fire retardant coating
2.12.17.1	Fire Proof Sealing. Scope includes application of fire proof sealing material for below panels, at walls, floors opening and wherever applicable.
2.12.17.2	Fire proof shall be done on cable ducts and FRP cable trays using flexible ceramic fiber blanket system (in compliance to OISD STD 164).
2.12.17.3	Preparation &Application procedure for MORTAR SEAL (Fire Barrier) given Below
	Preparation

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.17.3.1	25 Kgs. Of Mortar Seal when mixed with 16 litres of water will result in about 36 litres of ready to apply Mortar.
2.12.17.3.2	No special surface preparation is necessary. However dusting / removal of any oil substance is recommended.
2.12.17.3.3	In case of wall openings, normally only one side of the opening is to be shuttered by using plywood or any other suitable material. However in the case of larger openings, shuttering on the application side will facilitate a more rapid pace of work. The shuttering on the application side shall be moved up with the level of the mortar. In the case of floor openings, only the underside needs to be shuttered. Mortar is filled from the top and leveled out, with a trowel.
2.12.17.3.4	The mixed mortar is then applied like normal cement concrete, taking care to fill all the crevices and spaces between the cables. The exposed surface can be trowelled to form a very smooth surface.
2.12.17.3.5	The mortar thus installed shall be cured for 5 to 6 days with water.
2.12.17.4	Application
2.12.17.4.1	Sealing of bottom of all panels (as visible in cellar, if you stand and look up).
2.12.17.4.2	Sealing of wall/floor cut-outs, after cables are laid/passed through.
2.12.17.4.3	Sealing of cable entry into cellar/any other building, normally when cable passes through the conduits into a building from outdoor trench, Both ends of conduits are required to be sealed by using this material.
2.12.17.4.4	Sealing of all sides of future floor cut-outs covered with chequered plates.
2.12.17.5	Preparation & Application procedure Cable Coating Compound Preparation
2.12.17.5.1	Stir the paint drum for about 5 minutes with wooden or steel rod to make it uniform. Transfer the required quantity of paint into small bucket.
2.12.17.5.2	Clean the dirt on cables with dry cloth which are to be coated.
2.12.17.5.3	Define application area by applying removable tape on both ends of the cable
2.12.17.5.4	Start applying the paint on cables with paint brush. After completion, let it dry.
2.12.17.5.5	Every coat has to be dried for 3-4 hrs. in case of indoor application and 2-3 hrs. in case of outdoor application. After complete drying of each coat, next coat must be applied.
2.12.17.5.6	Repeat the step 4 till you get the thickness of 1.5mm to 2mm. To achieve this thickness total coats required are 4.
2.12.17.5.7	Remove all the tapes on cable ends after applying 4th coat & leave it for drying.
2.12.17.5.8	After complete drying of 4th coat, measure the thickness by vernier caliper.
2.12.17.5.9	Apply additional 5th coat if desired thickness is not achieved after applying 4th coat.
2.12.17.5.10	Please note that 1.5 to 2mm thickness has to be achieved in complete four coats applied by trained/skilled labors. We recommend minimum this thickness has to be achieved for best performance of the product. Additional coat is advised if this thickness is not achieved

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.17.6	Application
2.12.17.6.1	Normally applied on both ends of power cables (3 meters at load end & 3 meters at source i.e.HT/LT switch board end).
2.12.18	STRUCTURAL FABRICATION AND INSTALLATION (INSTRUMENT/ JUNCTION BOX FRAME/ PANEL BASE FRAME / CABLE TRAY & MISC STRUCTURES FABRICATION)
2.12.18.1	Structural steel material like MS angles, channels, beams, flats, plates etc. shall be supplied in running meter and the same shall be used for misc. fabrication if required and the same shall be used for fabrication of panel base frame, cable tray supports, Canopies for instruments/panels/ drives/JB's/Push Buttons etc. Instrument/Junction box frames, Impulse Pipe/Instrument Air Pipe supports and instruments etc.
2.12.18.2	This shall include cutting to size, contouring of ends for connections if required, welding, grinding of excess weld deposits/burrs, drilling of holes for mounting of device/instrument, installation at location, levelling, alignment, providing bracings and painting etc. No gas cut holes will be permitted.
2.12.18.3	All the fabricated supports/frames for instruments, trays, pipes, electrical equipment's, etc., shall be painted after thoroughly cleaned by wire brush, scrapping or any other method as per requirement of BHEL/HPCL. Paints and other associated items are in the scope of the contractor.
2.12.18.4	Frame installation at site may involve mounting either on concrete floor by grouting / using anchor fasteners or on steel structure by welding etc. All consumables including anchor fasteners shall be arranged by the contractor. Where required, as part of work, concrete floors may have to be chipped out to reinforcement depth for anchoring the frames. Wherever grouting is required, BHEL shall arrange the grouting through their civil agency however the contractor shall coordinate with the civil agency.
2.12.18.5	In case, structural cable trays, bends, tees, reducers etc., are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instances.
2.12.18.6	In certain packages, members of frames/rack for mounting of junction boxes/instruments may be supplied readymade. These have to be assembled prior to installation. The installation rate as quoted shall include assembly of the frames.
2.12.18.7	Gas cutting of tray/impulse pipe support and holes in frame is not permitted. only hacksaw cutting/ drilled hole shall be permitted.
2.12.18.8	Hardware for erection (Like Nuts, Bolts and Washers, etc.) where ever is required shall be in the scope of the contractor.
2.12.18.9	These materials are supplied for site to make supports for cable trays (in the buried RCC trenches, Overhead tray arrangement on pipe racks and Cable Tray arrangement in Cellars & other arrangements as applicable for the project. Also these are required for making of frames for PB stations and junction boxes as per the project requirements.
2.12.19	SCOPE OF ABOVE GROUND EARTHING,LIGHTENING PROTECTION & EARTH PIT
2.12.19.1	Earthing work mainly involves laying and tack welding of conductors on columns / beams at every one meter interval and bolted connections with equipment at least at two points. Low hydrogen content electrodes shall be used for welding. All the above ground

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	welded joints shall be coated with two coats of red oxide primer and two coats of enamel paints.
2.12.19.2	Earthing scope also covers, earthing of all cable trays, metallic frames of all current carrying equipment, supporting structures adjacent to current carrying conductors, Transformer, Bus ducts, HT/LT panels, control panels, motors, JB, push button boxes etc. as required.
2.12.19.3	Drawings of main earth grid to be provided by others would be made available to the contractor to enable them to carry out rest of the earthing system work.
2.12.19.4	Different type of earthing materials shall be supplied by BHEL and the contractor shall lay and connect the earthing materials as per site requirement.
2.12.19.5	The connection between earthing pads/ terminal to the earth grid shall be made short and direct and shall be free from kinks and splices.
2.12.19.6	Scope of works for Lightning Protection system includes installation of vertical air terminations, Horizontal conductors, vertical risers, down conductors, test links, earth electrodes, supply of saddles & clamps, minor civil works etc.
2.12.19.7	Scope of work also include the formation of earth pit. Earth pits shall be treated with salt and charcoal as per IS:3043 or as per approved procedure of BHEL/HPCL.
2.12.19.8	All junction boxes, receptacles, switch boxes, lighting fixtures, conduit etc. shall be earthed in compliance with the provision of I.E. rules and applicable Indian Standard amended up to date.
2.12.19.9	The earth resistance values for electrical system shall be demonstrated at site in presence of Engineer-in-charge. In case additional electrodes are required to meet the requirement, same shall be provided.
2.12.19.10	The plant earthing system will be designed as per the requirement of IEEE - 80 & IEEE-142, IS – 3043, Indian Electricity Rules and CBIP Guidelines.
2.12.19.11	At specified intervals. Separate grid shall be provided for Electronic Grounding.
2.12.19.12	The buildings will be provided with horizontal air terminations on roof top, down conductors, test links and earth connections as per IS 2309. Lightning protection conductors located on the top of the buildings/structures will be connected to the plant ground grid with galvanized mild steel down conductors. Dedicated earth riser (separate from equipment earthing) shall be provided for each down comer conductor for lightning protection through test link located one meter above ground.
2.12.19.13	Treated Earth Pits: Preparation of Treated earth pit includes Supply of all items (except the electrode rod 3 M Long /Pipe 3 M Long with funnel) including charcoal; salt, civil chamber with cover is in the scope of the contractor. The contractor shall also connect this pit to the earth grid (by other agency) at nominal distances of 5 to 10 meters by 40 mm rods, which are also in the scope of the contractor. Electronic earth pit resistance should be less than 0.5 Ohm & electrical earth pit resistance should be less than 1.0 ohm.
2.12.20	Unit control desk and components

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.20.1	Unit control desk will be supplied in a single shipping section for erection at site. Console Inserts shall be supplied either mounted on console grid or supplied loose. Also, the items (indicators, pushbuttons, etc.) of the console insert may be supplied mounted in the console insert or may be supplied loose. The lump sum rates quoted for console inserts should take the above into consideration. No separate payment will be done for the erection of individual components of console inserts. However, for the other items like recorders, indicators, etc., unit rate shall be applicable. Alarm facia on the control desk may be supplied mounted or loose. Mounting these, if required, will not attract any extra payments. The commissioning of these will constitute a part of the panel commissioning from where the alarm is driven.
2.12.20.2	Wherever control desk / panel is not supplied by BHEL or is in customer scope of supply and installation, loose item supplied by BHEL if any, shall have to be mounted by the contracto .
2.12.20.3	Console/console tiles shall have plug-in/screwed/soldering/crimp snap-on, connection. Interconnecting cable between console and process control panel shall be either of pre-fabricated plug-in cable or plugs are required to be made at site with crimp insertion type of pins. BHEL shall provide plugs and any special lugs at free of cost. However, other ordinary lugs required for the work shall be arranged by contractor.
2.12.20.4	Generally, 0.5 sq.mm multi pair shielded cables are envisaged for console cabling. Cable may have to be terminated at different console tiles, spliced wire of individual cable need to be routed through PVC sleeves up to the plug end of the tiles.
2.12.21	WELDING
2.12.21.1	Installation of equipment involves good quality welding, NDE checks etc.
2.12.21.2	Welder deployed for aluminum welding shall have experienced and approved by BHEL and BHEL's Customer after due qualification process/testing.
2.12.21.3	Welding of all structural steel & aluminum shall be done only by the qualified and approved welders.
2.12.21.4	All the welders shall be tested and approved by BHEL engineer/ Customer's quality engineer before they are actually engaged on work though they may possess IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason.
2.12.21.5	The welded surface shall be cleaned of slag and painted with primer paint to prevent corrosion. For this paint will be supplied by the contractor.
2.12.21.6	Welding electrodes have to be stored in enclosures having temperature and humidity control arrangement. This enclosure shall meet BHEL specifications.
2.12.21.7	Certain types of coated welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the coated welding electrodes have to be carried in portable ovens.
2.12.22	MEASUREMENTS & WASTAGE & CUTTING ALLOWANCES

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.22.1	For all payment purposes, measurement shall be made on the basis of the actual execution of work in line with drawings/documents/site requirements. Physical measurements shall be made by the contractor in the presence of the Engineer. Measurement for cable, impulse pipes/tubes, GI pipe, conduits, flexible conduits, trays etc. shall be made on the basis of length actually laid.		
2.12.22.2	All the surplus, scrap and serviceable materials, out of the quantity issued to the contractor shall be returned to BHEL in good condition and as directed by the engineer.		
2.12.22.3	All materials returned to stores should carry aluminum tag indicating the size and type. Cables more than 15 meters length is termed as serviceable material and shall be returned size wise and category wise to the owner's stores/yard. Cable of serviceable length being returned to the stores in drums shall have their free ends sealed and the balance lengths on the drum(s) shall be noted and certified by the Engineer-in-charge. This shall be applicable only for the purpose of accounting the cables issued for installation.		
2.12.22.4	While carrying out material reconciliation with contractor, all the above points will be taken into account. All serviceable material returned by the contractor shall be deducted from the quantities issued for the respective sizes and categories and the balance quantity (ies) will be taken as the net quantity (ies) issued to the contractor. Material reconciliation shall be done and allowable scrap quantity calculated as per wastage allowance percentage specified above. Any scrap/wastage generated by the contractor in excess of the allowable percentage shall be charged at the rates decided by the Engineer whose decision shall be final and binding on the contractor.		
2.12.22.5	For all site-fabricated steel items such as supports, racks, frame, Canopy etc. physical measurement shall be made and then converted to tonnage. For steel material supplied to the contractor, all scrap shall be returned to BHEL stores with due accounting.		
2.12.22.6	Every month the contractor shall submit an account for all the materials issued to him by BHEL in the standard Performa prescribed for this purpose by the site in charge.		
2.12.22.7	The erection contractor shall make every effort to minimize wastage during erection work. Cutting and wastage allowance shall be computed on length, weight of material actually used, measured and accepted. In any case, the wastage shall not exceed the following limits.		
	S.N o.	Item	% Wastage on issued Qty.
	1.	Each iron/steel section	2
	2.	Each size of control / shielded cable	2
	3.	Each size of power cables	1
	4.	Impulse pipe/tubes/GI pipes/copper tube	1
	5.	Earth Flat	2
	6.	Cable Tray	2
2.12.22.8	If the actual wastage is more than the specified figure, then equivalent price of the excess portion will be deducted from the contractor's bill.		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.22.9	Cable take off from drums shall be planned strategically such that jointing in the run of cables and wastage are avoided. For this purpose the exact route length between various equipment/panels as per the cable schedule shall be measured and the route length recorded before laying of the cables. Depending upon the route length and the type of cable required for various destinations, the cable drums shall be suitably selected for cable laying. Any jointing shall have to be approved by BHEL engineer. All the cut pieces/bits of cables, which are not used, shall be returned to the purchaser for accounting towards wastage. The cables damaged by the contractor shall have to be replaced by the contractor at his own cost.
2.12.23	FINAL PAINTING
2.12.23.1	All exposed metal parts of the equipment's covered within the scope of this contract after installations are to be painted. Mostly the equipment / components installed are with one coat each of primer paint and synthetic enamel / heat resistant/epoxy based paint. However, due to aging, the same may have got deteriorated for peeled off. The surfaces are to be thoroughly cleaned of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping, and any other method as per requirement of BHEL. The same will be inspected and approved by the BHEL/HPCL engineer before painting.
2.12.23.2	After applying the primer paints all structure / equipment / items, shall be finish painted with synthetic enamel / heat resistant/epoxy based paint or as per approved painting procedure of BHEL/HPCL. In case proper finish is not obtained in two coats, the contractor shall apply additional coat (s) till proper finish is achieved. After completion of painting all bright spots shall be cleaned to the satisfaction of Engineer.
2.12.23.3	Finish coat paint, No. of coat and DFT shall be as indicated in the painting specification will be issued during execution / relevant BHEL document/customer's specifications.
2.12.23.4	Certain equipment like control panels, valves etc. shall require spray painting. The contractor shall make arrangements of the required equipment for spray painting. Spray painting at the job site shall be permitted only at times and locations approved by Engineer.
2.12.23.5	All the fabricated frames, racks, supports, panel base frame etc. wherever applicable shall be painted with two coats of primer and followed by two coats of paint as specified earlier herein. In case of G I Structure, The cold galvanizing paint to be applied as touch up where ever needed. This is to be done as per instruction of BHEL engineer.
2.12.23.6	Contractor at no extra cost to BHEL shall supply all paints, primers, tools and other consumables including scaffolding materials required for finish painting. Paint is to be BHEL/HPCL approved make only and painting should be as per colour scheme and quality approved / specified by BHEL/HPCL. Valid Test Certificate for the paint so supplied shall be made available before use of the same on work. No paint whose shelf life has expired should be used for painting.
2.12.23.7	The contractor may be required to fill up dents / marks by applying putty before final painting of equipment. All materials and arrangements have to be made within quoted lump sum price/rates.
2.12.23.8	Colour Banding, Legend and Identification Marking, Direction marking etc. shall be in scope of the contractor and as per approved procedure BHEL/HPCL. Letter writing shall

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

	be done in Hindi / English or in both languages. The painters have to undergo test and only qualified painters will be allowed to work.
2.12.23.9	The painters have to undergo test on a mock plate of size 1m*1m and only qualified painters will be allowed to work. The contractor shall ensure availability of.
2.12.23.9.1	SSPC Visual standards to assess degree of cleanliness of surfaces to be painted.
2.12.23.10	All paints should be stored in well-ventilated store. The painters and other personnel deployed should use proper protective equipment to avoid inhalation of fumes.
2.12.23.11	Touch-up painting of LT MCC \ Control Panels or any other equipment /devices wherever necessary.
2.12.23.12	Primer shall be compatible with the final coat paint schedule.
2.12.23.13	Full (Spray) painting of transformers, bus ducts with two coats of paint as per Specification
2.12.24	ELECTRICAL HOIST
2.12.24.1	Electrically operated hoist of capacity varying from 2 MT to 40 MT are provided for maintenance purpose for fans, GIS area and other areas in HRSG,GTG and STG. Mechanical erections of hoist components such as runway beams, hoist carriage, drive unit, etc. shall be done by other agency. The scope of work covered in this tender specification for erection & commissioning is installation of DSL system and associated accessories. The scope of work for the contract in this package is as under:
2.12.24.2	TEE IRON TYPE DSL SYSTEM :-It consist of tee iron guide for cable trolley and associated supporting structural members, trailing cable, cable guide trolley, dog chain, switch fuse unit, limit switch etc.
2.12.24.3	TAUT WIRE TYPE DSL SYSTEM :-It consist of end bracket, Galvanized wire rope, turn buckle/ straining bolt, real insulator,/cable guide trolley ,cable, switch fuse unit, rope clamps, leather bands, dog chain, limit switch etc. DSL system shall have to be erected at higher elevation. Contractor shall take all safety measures while carrying out the work.
2.12.24.4	Installation of tee iron & other structural steel member, unit rate for fabrication & installation shall be applicable and other items unit rate shall be paid, however cable dressing, fixing of leather bands, rope clamps and any incidental work such making approaches for executing the work, scaffolding etc. shall be part of work.
2.12.24.5	Commissioning & testing of electrical hoists shall include panel wiring check, IR measurement, functional check, over load relay testing, trial run, providing assistance during load test, replacement of component if required etc. However, preparatory work for load test and arrangement of load etc. shall be done by other agency.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.24.6	It shall be the responsibility of the contractor to carry out preliminary tests like checking connections, meggering etc for LT motors commissioning, as a part of contract. These motors will generally be erected by other agencies. No separate rates are envisaged.
2.12.25	TESTING, PRE-COMMISSIONING, COMMISSIONING, AND POST-COMMISSIONING
2.12.25.1	Site testing shall be required for all equipment installed by the contractor to ensure proper installation, setting, connection and functioning in accordance with drawings, specifications and manufacturer's recommendations as per the approved commissioning procedure / quality plans of BHEL/HPCL. These would include, the following but not limited to : Electrical testing of HT/LT Motors, Testing and charging of bus ducts, Testing and Charging of HT & LT Switchgears/ control panels Checking of control loops Testing and Charging of transformers, Testing and Charging of 33 KV GIS system, Testing and charging of Battery/Battery charger and UPS system, Testing and commissioning of Electrical /pneumatic/motor operated actuators Testing and charging cables in the scope Testing and commissioning of DC Motors, Testing and commissioning of field instruments Testing and commissioning of DAVR/SCAP/GRP system, Testing and commissioning of Generator circuit Breaker, Testing and commissioning of Turbine control Panel, Testing and commissioning of Station lighting, Testing and commissioning of Inert gas Extinguishing system, Testing and commissioning of DG sets, Trial run of pumps/VFD Motors/FD Fan/SCC&OCC of Generators, synchronization/Auto synchronization of Generators and HT/LT Breakers, Testing of fire detection system, PA system, CCTV, etc. as instructed by BHEL using their own consumables, labour and scaffoldings etc. Specific omission of any test which is required for the successfully commissioning of the system does not absolve the contractor of its responsibilities of performing of that test.
2.12.25.2	All required tests indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests /activities may not have been listed in these specifications but contractor shall conduct the tests as per the approved commissioning procedure.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.25.3	All the tests may have to be repeated till all the equipment satisfy the requirement /obligation of BHEL at various stages.
2.12.25.4	The contractor shall perform various activities during pre-commissioning, integrated testing, post-commissioning stages of equipment covered under this tender specification. It is responsibility of contractor to arranged tools & plants, test equipment's, experienced engineers and technicians. Contractor shall earmark separate manpower for respective commissioning areas and they shall not be disturbed /diverted for other work. The contractor's commissioning group shall work as per the instruction of BHEL Engineer and they shall coordinate day-to-day activity with other agency and BHEL/ Customer. The testing activity may have to be repeated till satisfactory results are obtained and also to satisfy the requirement of Customer / statutory Authority.
2.12.25.4.1	The mobilization of these commissioning groups shall be such that planned activities are taken up in time and also completed as per schedule and work undertaken round the clock if required. It is responsibility of contractor to discuss on day to day / weekly / monthly basis the requirement of manpower, consumables, tools & tackles / testing equipment's with BHEL Engineers and arrange for the same. If at any time the requisite manpower, consumables, testing equipment's etc. are not arranged then BHEL shall make alternative arrangements and necessary recoveries with overhead cost will be made from the running bills.
2.12.25.4.2	The contractor shall simultaneously start testing & commissioning activities for equipment's to match the milestone activities of the project.
2.12.25.4.3	During the commissioning activities and carrying out various tests, if any of temporarily work such mounting of test equipment's / cabling etc. are required the contractor shall carry out such work without any extra cost. The same shall be removed after completion of the activity.
2.12.25.5	It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractors finally accepted rates should be inclusive of all these factors also.
2.12.25.6	Prior to commissioning and after commissioning, protocols have to be made with BHEL/ customer. The formats shall be given by BHEL and have to be printed by the contractor in adequate numbers.
2.12.25.7	Any rework/rectification/modification is required to be done because of contractor's faulty erection, which is noticed during pre-commissioning/commissioning stage, the same has to be rectified by the contractor at his cost. During commissioning, if any improvement rework / rectification /modification due to design improvement / requirement is involved, the same shall be carried out promptly and expeditiously. Claims if any, for such works from the contractor shall be governed by clauses covered elsewhere.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.25.8	During this period though the BHEL's/ client's staff will also be associated in the work, the contractor's responsibility will be to arrange for the complete requirement of supervision, consumables, labour, T&P and IMTEs required till such time the commissioned units are taken over by the BHEL's customer.
2.12.25.9	All testing activities shall be carried out as per relevant standard, code of practice, manufacturer's instructions and BHEL norms. The contractor shall follow the checklist of BHEL prior to taking up testing & commissioning activities and the activities shall be carried out in accordance with the checklist. All the above shall be witnessed by BHEL engineer and the reports signed jointly
2.12.25.10	Attending the punch points post commissioning and resolve the deficiency for handing over the unit to customer M/s HPCL.
2.12.25.11	The contractor shall co-ordinate with BHEL and other contractor's during the main plant commissioning to ensure successful commissioning of total plant.
2.12.25.12	The pre-commissioning activities of the main power plant will start with energizing of start-up power supply systems followed by trial run of various drives. Commissioning operations shall continue till trial operation of the unit. The contractor shall simultaneously start checking cables erected by him to match with the various milestone activities /commissioning programme of the project. All these works need specialised testing engineers, supervisors including electricians in each area to coordinate with BHEL Engineers and other agencies round the clock to match with commissioning schedule of unit. Contractor shall earmark separate manpower for various commissioning activities. The manpower shall not be disturbed or diverted for erection work.
2.12.25.13	All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications. Specialized test equipment, if any, shall be provided by BHEL/ its client free of hire charges. However contractor has to take proper care of the equipment issued to him.
2.12.25.14	All the tests at various stages shall be repeated till all the equipment satisfy the requirement of BHEL / Customer. Any rectifications required shall have to be done / redone by the contractor at his cost.
2.12.25.15	Checking/verification of binary/analogue input and output signal from field and panel and upto recording/indicating instrument/HMI monitors.
2.12.25.16	Observing and checking the performance of the various devices on load/process variation. Any deficiencies/defect noticed during the variable load conditions, the same should be attended properly.
2.12.25.17	Checking the interlock, protection and alarm for various processes by simulation of field devices/process changes.
2.12.25.18	Motor IR value measurement, bearing/winding RTD checking, drying out of motor, providing assistance for trial run of motor which includes monitoring temperature rise winding/bearing during trial run.
2.12.25.19	Observe the proper functioning of sub-group/sub-loop control.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.25.20	It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.
2.12.25.21	It shall be specifically noted that the contractor and employees of the contractor may have to work round the clock during the pre-commissioning, commissioning and post-commissioning period along with BHEL Engineers/customer officials. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including engineers/supervisors.
2.12.25.22	After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part commissioning assistance till handing over of sets to customer.
2.12.26	Flue gas analyzer
2.12.26.1	Oxygen Analyzers
2.12.26.1.1	The system consists of Zirconia probes, electronic units Panel for mounting electronic unit, purging and calibration gas arrangements, etc. The probes are meant for direct mounting on duct / chimney, etc., at suitable elevation. Commissioning support will be provided by vendor.
2.12.26.2	NOX, SOX, CO analyzers
2.12.26.2.1	NOX, SOX, CO analyzers system consists of extraction type sampling probes and shall be mounted on the chimney at a considerable height. This will also consist of other accessories like gas extraction sampling pumps, sampling tubing, electrical heat tracer, insulation, test gas cylinders, purge air compressors, etc. Commissioning support will be provided by vendor.
2.12.26.3	Opacity Monitor
2.12.26.3.1	This consists of transmitters, receivers, Local electronic units and housing, air blower and associated hoses / pipes, JBs and cables. Commissioning support will be provided by vendor.
2.12.27	PLANT COMMUNICATION AND TELEPHONE SYSTEM
2.12.27.1	installation, testing and commissioning of Public address and EPABX system, junction boxes, installation materials in the following including structural supports etc. – A) Substation buildings SS-93 & SS-94, DG room B) CPP Control Room.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

2.12.27.2	The plant communication system quantities for CPP unit, SS-93, SS-94, control room are as follows – a) FCS rack – 1 no. b) Desk top call station – 6 nos. c) Field call station with weatherproof loudspeakers 25W (FCS + Ext loudspeaker) – 15 nos. d) Flame proof Field call station with flameproof loudspeakers 25W (Ex FCS + FLP Loudspeaker) – 10 nos. e) Flame proof Beacon – 4 no. f) Weather proof beacon – 6 no's g) Weather proof Loudspeaker (25W) – 20 nos. h) Flame proof Loudspeaker (25W) – 10 nos. i) Indoor box type speakers (6W) – 6 nos.							
2.12.27.3	Erection and commissioning of adequate no's of telephone points in each building & other outdoor areas. a) Substation buildings SS-93 & SS-94, DG Room b) CPP Control Room							
2.12.27.4	Complete erection of telephone system ISBL (Inside Battery Limit) by BHEL. Coordination, assistance and interface support for testing and commissioning of telephone system ISBL (Inside Battery Limit) shall be provided by site to HPCL/EIL.							
2.12.27.5	installation, testing and commissioning of LAN UPS system, UPS power supply wiring for each LAN nodes/sockets & LAN Ether switches, supply & installation of wires, cables, conduits, sockets etc. for distributing LAN UPS supply.							
2.12.28	<u>PG Test Assistance</u>							
2.12.28.1	In case PG test is to be conducted, laying of impulse pipes, cables, etc. and installation of instrument tapping points shall be done by the contractor. Payments will be made as per item rates of comparable similar or identical items in the rate schedule. Such temporary installations shall have to be dismantled and returned to BHEL Stores, after the completion of PG Test for which no separate payment is admissible.							
2.12.29	Insurance: HPCL has taken comprehensive MCE (marine cum erection) Insurance Policy for total project supply & services including balance of plant package covering transit risks & loss, destruction or damage during handling at site, storage, civil works, erection, testing and commissioning up to trial operation completion of each unit including theft, sabotage, fire, lightning and other natural calamities. The insured amount under the Erection All Risk Cover Insurance shall be for full replacement value. The above cover for the material to be erected under this contract scope shall be subject to deductibles on account of excess, which shall be borne by the CONTRACTOR of this work scope and shall be as follows: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">1</td><td style="width: 45%;">Normal Period/Policy excess</td><td style="width: 50%;">5% of Claim amount subject to minimum Rs.50,00,000/-</td></tr> <tr> <td style="text-align: center;">2</td><td>Fire/Explosion excess</td><td>10% of Claim amount subject to minimum Rs. 1,50,00,000/-</td></tr> </table>		1	Normal Period/Policy excess	5% of Claim amount subject to minimum Rs.50,00,000/-	2	Fire/Explosion excess	10% of Claim amount subject to minimum Rs. 1,50,00,000/-
1	Normal Period/Policy excess	5% of Claim amount subject to minimum Rs.50,00,000/-						
2	Fire/Explosion excess	10% of Claim amount subject to minimum Rs. 1,50,00,000/-						

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter II: Scope of Work

3	Theft & Burglary excess	5% of Claim amount subject to minimum Rs.50,00,000/-
5	Testing Period excess	10% of Claim amount subject to minimum Rs. 1,50,00,000/-
6	AOG claims	10% of Claim amount subject to minimum Rs.1,50,00,000/-
7	Third Party Liability	Rs. 25,00,000 each occurrence

The Excess shall be applicable per event per insured.

In case the damage/loss/theft of materials are attributable to negligence/failure in discharging the duties and obligations by the bidder, the expenses incurred for repair/ replacement of such components by BHEL shall be recovered from the contractor as:

If the expenses are less than the Normal Excess (Deductible Franchise as detailed above), the total expenses/loss to BHEL on replacement/repair shall be recovered from the contractor.

For other cases, where the expenses are more than the excess amount, the expenses incurred for repair/replacement of such components in excess of the amount realized from the underwriters, including the Normal Excess (Deductible Franchise) shall be recovered from the contractor.

Contractor shall at his own cost and expense also obtain suitable insurance policies to cover Workmen Compensation for all his employees, vehicles, and all his tools, tackles, construction equipment etc. as per extant rules.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter III: FACILITIES IN THE SCOPE OF BHEL/CONTRACTOR

3.0	FACILITIES IN THE SCOPE OF BHEL/CONTRACTOR			
S.No.	Description	Scope /to be taken care by		Remarks/ Conditions
		BHEL	Contractor	
3.1	ESTABLISHMENT			
3.1.1	FOR CONSTRUCTION PURPOSE			
A.	Open space for office in HPCL Project site Premises	YES		Limited space (free of charge).As and where made available by BHEL for placement of Porta Cabin.
B.	Open space for office outside Project site		YES	Vendor has to hire/ lease a office, outside plant for its operations at his cost.
3.1.2	FOR LABOUR COLONY			
A	Open space		YES	Contractor have to make their own arrangement
3.2	ELECTRICITY			
3.2.1	Electricity for construction purposes (Chargeable)			
3.2.1.1	Single point source		YES	Contractor will have to arrange for DG sets of adequate capacity for meeting its Power requirement. All the provisions as per HPCL/EIL requirement for setting up of DG sets and further distributions of power are to be adhered.
3.2.1.1.1	Single point source by BHEL	YES		If available, BHEL may supply excess power or single point source on chargeable basis as per the prevailing rates of power provided by HPCL (Rs. 12 per KW hour)or as decided by BHEL in case the same is provided from BHEL DG sets. This provision will only be exercised in case of availability with BHEL. BHEL is not liable to provide any power.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter III: FACILITIES IN THE SCOPE OF BHEL/CONTRACTOR

3.2.1.2	Further distribution for the work to be done which include supply of materials & execution		YES	HPCL/EIL guidelines to be adhered to for such works inside refinery
3.2.2	Electricity for the office, stores, canteen etc. of the bidder which include:		YES	
3.2.2.1	Distribution from single point including supply of materials & service		YES	HPCL/EIL guidelines to be adhered to for such works inside refinery
3.2.2.2	Supply, Installation & connection of material of energy meter including operation & maintenance		YES	HPCL/EIL guidelines to be adhered to for such works inside refinery
3.2.2.3	Duties & deposits including statutory clearances for above		YES	
3.2.2.4	Demobilization of the facilities after completion of works		YES	
3.2.2.5	Electricity for living accommodation of the bidder's Staff, engineers, supervisors etc. on the above Lines		YES	Contractor has to make its own arrangement.
3.3	WATER SUPPLY			
3.3.1	FOR CONSTRUCTION			
3.3.1.1	Making the water available at single point		YES	Contractor will have to make his own arrangements for supply of water for construction. All pumping installations, piping connections, storage facility are to be carried out by the Contractor at his own cost.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter III: FACILITIES IN THE SCOPE OF BHEL/CONTRACTOR

3.3.1.2	Further distribution as per the requirement of work including supply of materials & execution		YES	
	Potable water for the workers at site		YES	To be arranged by Contractor
3.3.2	FOR LABOUR COLONY			
3.3.2.1	Making the water available at single point		YES	Contractor has to make its own arrangement
3.4.0	LIGHTING			
3.4.1	For construction work 1. At site office 2. At construction site/area		YES	Related HPCL/EIL instruction and norms to be followed
3.4.2	1. At office cum fabrication yard cum storage area outside plant premises.		YES	
3.4.3	Providing the necessary consumables like bulbs, tube lights, Switches, etc. for maintaining the lighting system		YES	
3.5	Communications facilities for site operations of the bidder			
3.5.1	Telephone/mobile, fax, internet, email etc.		YES	Contractor shall visit site and accordingly arrange for suitable communication devices as permitted inside HPCL Visakh Refinery
3.6	ERECTION FACILITIES			
3.6.1	Providing erection drawings for all the Equipment's covered under this scope	YES		
3.6.2	Drawings for construction method	YES	YES	In consultation with BHEL
3.6.3	As-built-drawings-where ever deviations observed & executed and also based on Decisions taken at site.		YES	Changes are to be marked in drawing & handover to BHEL on completion of work.
3.6.4	Shipping lists etc. for reference & planning the activities	YES		In consultation with BHEL

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter III: FACILITIES IN THE SCOPE OF BHEL/CONTRACTOR

3.6.5	Preparation of site erection schedules/ procedures and other input requirements		YES	Contractor to submit erection schedule based on L3 schedule/ customer milestone dates.
3.6.6	Review of performance & revision of site erection schedules in order to achieve the end dates & commitments	YES	YES	Contractor to revise erection schedule based on review of progress and customer milestone requirements.
3.6.7	Weekly erection schedule		YES	In consultation with BHEL
3.6.8	Daily erection/work plan		YES	In consultation with BHEL
3.6.9	Preparation of facilities for preassembly		YES	Preassemblies to be done in their own pre-fab yard.
Notes:				
3.7	BHEL will not Provide Construction Power. Contractor has to make arrangement of adequate Diesel Generator for which no separate payment shall be made by BHEL In case, construction power is provided by customer, 415V construction Power shall be provided at one point within 100 metres from the erection site on chargeable basis. Bidder has to make his own distribution arrangement to draw electricity. BHEL shall not be responsible for any inconvenience or delay caused due to any interruption of power supply / variation in voltage level and no compensation for delay in work can be claimed by the contractor due to such non-supply on the grounds of idle labour, machinery or any other grounds. The bidder will have to procure & install adequate area illumination system during construction right from start of his work. This system will include temporary pole lighting, portable lighting towers with sufficient DG back-up for area lighting at different working areas for execution of the work & safety of workmen within the quoted rate. The illumination should be such that minimum illumination requirement as specified in specification or as per refinery/EIL working standard shall be maintained. Contractor will have to get the illumination verified with the Lux- meter.			
3.8	The Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him.			
3.9	Provision of distribution lines of both electrical power and water from the central points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities and HPCL/EIL guidelines for such work in the refinery shall be taken care by the contractor. Supply of all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Copper / Brass clamps, copper conductor, change over switches pipes etc. at his own cost. If any failure is caused in supply of the			

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter III: FACILITIES IN THE SCOPE OF BHEL/CONTRACTOR

	power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets. The energy meter to be installed by the contractor & shall be tested and certified by State Electricity Board or any other agency approved by the HPCL/EIL at his cost.
3.10	The contractor while drawing construction power supply from Distribution Board should strictly adhere to following points.
3.10.1	All electrical installations should be as per Indian Electricity rules.
3.10.2	All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.
3.10.3	Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.
3.10.4	All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.
3.10.5	Contractor has to make their own earthing arrangement for their equipment / DB earthing.
3.10.6	All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.
3.10.7	Contractor should use "MCCB" and "ELCB" either on incoming or outgoing connections to the DBs.
3.10.8	Contractor should ensure that all the CBs / TPNs/ Fuses/ MCCB / ELCB cables etc. should be of adequate rating/ capacity.
3.10.9	For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected/ proposed loads.
3.10.10	ELCB will be tested once in a week or as directed by BHEL/HPCL/EIL by actually simulating the earth leakage for all installations and the same shall be recorded in the logbook to be maintained by the contractor.
3.10.10.1	The CONTRACTOR shall ensure that the Electrical equipment installed by him are such that an average power factor does not fall below 0.90 at his premises. In case power factor falls below 0.90 in any month, contractor will reimburse to the BHEL/HPCL at the penal rate determined by the M/s HPCL for all units consumed during the month.
3.10.10.2	In case, power is supplied by the OWNER/ BHEL to the CONTRACTOR ; it shall be entirely at the risk of the CONTRACTOR as to the continuity and regularity of supply, maintenance of voltage and adequacy of load and frequency without any warranty by or liability of the OWNER in respect there of and without entitlement to the CONTRACTOR for any compensation, damages, extension of time or otherwise on ground of grid disturbances, discontinuance, fluctuation of voltage or inadequacy of load or frequency or any other cause whatsoever.
3.10.10.3	All electrical installation shall be as per the safety guidelines for working in refineries and as per M/s EIL/ HPCL guidelines for such work. No deviation in this regard shall be acceptable.
3.10.10.4	In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter III: FACILITIES IN THE SCOPE OF BHEL/CONTRACTOR

3.10.11	On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled and debris shall be removed, as per instructions of BHEL, by the contractor at his cost. In the event of his failure to do so, the Engineer will get it done and expenses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in this regard shall be final.
3.10.12	Site Workshop/Calibration/testing shop by Contractor.
3.10.12.1	The Workshop cum fabrication yard to be set up by the Contractor outside the factory premises shall be of sufficient space, with adequate weather protection. The workshop shall consist of general fabrication shop, machining shop, lathe etc., wherever applicable/required.
3.10.12.2	The size and arrangement of the machines, calibration/testing shop shall be got approved from Engineer-in-charge.
	This facility can be developed on the plot for prefabrication cum storage.
3.10.13	WATER
3.10.13.1	No water is available inside the plant. Contractor has to bring construction & drinking water required for their work from outside. BHEL shall not be responsible for any inconvenience or delay caused due to any interruption of water supply. Contractor may make standby arrangement for water for which no separate payment shall be made by BHEL.
3.10.13.2	Contractor will have to arrange for storage of water to meet the day-to-day requirement. Bidder will ensure adequate supply of construction water to meet the requirement.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter IV: T&Ps and MMEs to be deployed by Contractor

4.0	T&P DEPLOYED BY CONTRACTOR		
S.No.	EQUIPMENT	Capacity	Qty.
1*	Trailer along with pulling unit	20T	APR
	* 1. The scope of shifting of material from BHEL yard (at BHVP Colony), BHVP plant or any other place of storage in HPCL site to place of erection is in the scope of Contractor. 2. Contractor has to arrange for the trailer for the material stored at above places. The crane for loading shall be in the scope of BHEL MM vendor.		
2.	Hydra Crane 1. Following type of Hydra cranes of reqd. capacity shall be used. For ex. Ace make Mobile Cranes such as F-160, FX-210, SX-150, Escorts make F-15, F-20. 2. Similar type of cranes of any make may be deployed by vendor but of minimum 20 MT capacity. 3. Rear mounted Cabins type pick n carry hydras are not allowed inside plant premises.	14T/20T	APR
3.	Hydraulic jacks	APR	APR
4.	Copper tube bender and cutter sizes 6mm, 8mm, 1/2", 1/4"	APR	APR
5.	TRANSFORMER OIL PURIFICATION PLANT WITH VACUUM PUMP FOR EVACUATION OF TRANSFORMER ALONGWITH ACCESSORIES & HOSES. A) CAPACITY 750/1000/6000 LTR. PER HOUR	APR	APR
6.	TRANSFORMER OIL BDV TEST KIT 0-100 KV WITH 2.5MM AIR GAP.	APR	APR
7.	Welding sets with accessories and ovens for welding electrodes backing and holding	APR	APR
8.	Pipe bending machine – 2" size	APR	APR
9.	Dye sets for threading upto 2" pipe.	APR	APR
10.	Tap sets for both BSP and NPT threads upto 1" each	APR	APR
11.	Crimping tools up to all size of cables under scope of work	APR	APR

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter IV: T&Ps and MMEs to be deployed by Contractor

12.	Hydraulic crimping tool	APR	APR
13.	Vacuum Cleaner (Industrial)	APR	APR
14.	Grinding Machine	APR	APR
15.	Drilling Machines	APR	APR
16.	Electric Winches	APR	APR
17.	Phase sequence indicator	APR	APR
18.	Digital Multimeters 3½ digit of reputed make	APR	APR
19.	Digital, 6 ½, 41/2 digit Motwane/HIL/Fluke	APR	APR
20.	Analog multimeters	APR	APR
21.	250V/1000V rated Hand operated megger	APR	APR
22.	Digital Megger up to 5 KV	APR	APR
23.	Vernier calipers	APR	APR
24.	Earth resistance tester	APR	APR
25.	HV TEST KIT AC, 0 –60 KV & DC, 0- 100 KV PREFERREDLY WITH DRY TYPE TRANSFORMER	APR	APR
26.	Micro ohmmeter	APR	APR
27.	CLAMP METER AC 5/10,25/60/300 ,Amp Range ,of reputed make	APR	APR
28.	CLAMP METER DC 30/60/300 A	APR	APR
29.	Stop watch	APR	APR
30.	CAPACITANCE & TAN DELTA TEST KIT 12 KV	APR	APR
31.	Torque wrench(12-60 Nm,50-225 Nm)	APR	APR
32.	Ferrule printing machine	APR	APR
33.	Dial gauges	APR	APR
34.	Dead Weight Tester rated 400 Kg/cm2 with weights & test gauge facility	APR	APR
35.	Oil temperature bath suitable to calibrate the instruments range 0-300 deg. C with standard temp. gauges & thermostatic control	APR	APR
36.	Standard gauges 12" dial size make	APR	APR

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter IV: T&Ps and MMEs to be deployed by Contractor

37.	A) 0-1 kg/cm ² pressure gauge(vacuum gauge) B) 0 – 5 or 6 kg/cm ² pressure gauge C) 0 – 10 kg/cm ² – do – D) 0 – 25 kg/cm ² – do – E) 0 – 60 kg/cm ² – do – F) 0 – 100 kg/cm ² –do – G) 0 – 250 kg/cm ² – do – H) 0 – 600 kg/cm ² – do – I) 0.2 to 1 kg -- do --	APR	APR
38.	Manometers (+/-) 1000 mm water column With hand bulb for lab and small manometers for field purpose.	APR	APR
39.	Manometer (+/-) 500mm mercury column with hand bulb for lab and small manometer for field purpose.	APR	APR
40.	Inclined manometer (+/-) 300 mm water column	APR	APR
41.	Portable air compressor with drier and regulator rated for 7 to 10 kg/cm ²	APR	APR
42.	Vacuum pump	APR	APR
43.	Standard milliamps / millivolts source of reputed make. Range 0to 50 ma and 0 to 100 mv	APR	APR
44.	DC power supply 0-50 VDC, 5 A make “Aplab” or equivalent (variable source)	APR	APR
45.	Single phase variac 250 V, 28 amp	APR	APR
46.	3 phase variac rating 15 amps	APR	APR
47.	Glass thermometer 0-120 deg. C, 0-200 deg.c and 0-600 deg.c	APR	APR
48.	PRIMARY INJECTION KIT UPTO 5000 AMPS WITH PAIR OF LEADS & CLAMPS FOR TESTING CTS	APR	APR
49.	SECONDARY INJECTION KIT WITH INTEGRAL TIMER FOR RELAY TESTING WITH CABLES LEADS & BANANA PLUGS SELECTIVE RANGE 5 AMPS & 1 AMPS RANGE (FOR RELAY TESTING)	APR	APR
50.	DC shunt 400 amp 75 mv	APR	APR
51.	Digital Tachometer non-contact type 0 to 4000 rpm	APR	APR
52.	Decade resistance box	APR	APR
53.	Oil specific gravity and PPM measuring equipment	APR	APR

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter IV: T&Ps and MMEs to be deployed by Contractor

54.	Dew point measurement instrument	APR	APR
55.	Oscilloscope 100 MHZ	APR	APR
56.	Electric blower	APR	APR
57.	Equipment and consumables for LPI/MPI test on impulse pipes	APR	APR
58.	Three phase distribution board with complete setup for drawl & distribution of construction power	APR	APR
59.	Electric cables for drawl & distribution of construction power, Cable for welding machines	APR	APR
60.	Dewatering pump	APR	APR
61.	METERS FOR TIME MEASUREMENT OF BREAKER OPENING & CLOSING TIME	APR	APR
62.	TRANSFORMER TURNS RATIO TEST KIT	APR	APR
63.	FREQUENCY SOURCE 45 TO 55 HZ WITH 110V	APR	APR
64.	3 PHASE SHIFTER	APR	APR
65.	PHANTOM LOAD TEST KIT	APR	APR
66.	POLARITY TEST KIT	APR	APR
67.	TEMPERATURE GUN DIGITAL TYPE	APR	APR
68.	CRM KIT	APR	APR
69.	TELETALK 2 WIRE SYSTEM/MOBILE SYSTEM	APR	APR
70.	CONTAINER FOR TRANSFORMER OIL SAMPLING	APR	APR
71.	MEASURING INSTRUMENTS LIKE MICROMETRES AND CALIPERS	APR	APR
72.	TIG/MIG WELDING SET	APR	APR
73.	MECHANICAL TOOL KIT FOR FITTERS	APR	APR
74.	ELECTRICIAN TOOL KIT	APR	APR
75.	FIRE EXTINGUISHERS	APR	APR
76.	SAFETY BELTS AND SAFETY HELMETS	APR	APR

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter IV: T&Ps and MMEs to be deployed by Contractor

77.	HYDRAULIC JACKS 250T CAPACITY/100T	APR	APR
78.	CABLE ROLLERS	APR	APR
79.	SHEARING MACHINE	APR	APR
80.	TARPOLIN (FIRE PROOF)	APR	APR
Other than the aforesaid, one computer, printer and other necessary peripherals will have to be maintained by the contractor in his site office.			
NOTES:			
4.1	The above list specifies only major T&P/MMD (may not be complete) to be deployed by the contractor for this package This list is only indicative and neither exhaustive nor limiting. All the tools and plants required for this scope of work, except the tools & plants provided by BHEL are to be arranged by contractor within the quoted rates. The list is suggestive in nature. Any additional T&P required to be arranged by the contractor has to be done by the contractor within the quoted rates. In case the progress of work suffers due to non-deployment of above T&Ps, whenever and wherever required, BHEL will deploy required T&P's at the risk and cost of the vendor.		
4.2	"APR" is defined as :- Contractor has to deploy T&P AS PER REQUIREMENT of BHEL site as decided by BHEL Engineer In-charge. The capacity, quantity, duration of deployment shall be decided by Package In-charge as per site requirement in view of the front availability and monthly erection program. Decision of BHEL Engineer In-charge in this regard shall be final and binding on the contractor.		
4.3	If any one of T&P(excluding major T&P i.e. from 1 to 2) mentioned above is not needed for proper execution of scope of work, no recovery from contractor shall be applicable for non-deployment of the T&P, provided contractor has not utilized BHEL free issued T&P for completing such work.		
4.4	Any additional item required in addition to above mentioned T&P for proper execution of scope of work, contractor has to arrange such T&P within quoted rate on the instruction of BHEL in writing in a reasonable period within two weeks from the written instruction from BHEL.		
4.5	In case deployment of T&P w.r.t requirement/schedule, is delayed or deployed for a shorter period or abnormal down time of T&P or ii) in case T&P w.r.t requirement was not deployed by the contractor as per instruction of BHEL and BHEL had to deploy either its own T&P or iii.)BHEL had to deploy the T&P from outside agency, then recovery shall be done from the contractor as under: In case the contractor does not deploy or delays deployment or major T&P with reference to schedule specified or T&P deployed is out of service for continuous more than 5 days, BHEL will recover non-refundable penalty per day in the following manner- In respect of each hydra Crane 20MT- @ Rs. 3500/- per day In respect of each trailer 20 MT - @ Rs. 2500/- per day For the daily recovery rate for other T&P/IMTEs. BHEL Engineer decision shall be final and binding on the contractor		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter IV: T&Ps and MMEs to be deployed by Contractor

4.5.1	In case BHEL had to deploy its own T&P, hire charges of T&P applicable for outside agencies as per extant guidelines for "Hire Charges on issue of Capital Tools & Plants" shall be recovered.
4.5.2	In case BHEL had to deploy the T&P from outside agency, actual hiring cost plus applicable overheads shall be recovered
4.6	All the tools and tackles/measuring instruments shall be duly tested/calibrated and valid certificate to that effect should be submitted to BHEL site in-charge before the start of work.
4.7	Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer within the contract price. The contractor will also have alternate arrangements for such MME so that work does not suffer when the particular instrument is sent for calibration. If any MMEs not found fit for use, BHEL shall have the right to stop the use of such item. It will be necessary for the contractor to deploy proper item. Any readings taken by the defective instrument will be recalled and repeat the readings taken by that instrument with a proper one. In case he fails to do so, BHEL may deploy MMEs and retake the readings at contractor's cost.
4.8	T&P's mentioned above shall be specifically deploy as per the respective packages. However, as per work requirement and availability of T&Ps the inter use in Material Handling and Mechanical works may be permitted as per the instruction of the BHEL Engineer.
4.9	If the work related to T & Ps mentioned above is completed then, BHEL can release that T & P during contract period / extended period if any. However, written permission shall be taken by contractor from BHEL construction Manager for releasing the T&P.
4.10	Any loss / damage to any part of BHEL T&Ps and MMEs shall be to the contractor's account and any expenditure on these accounts by BHEL will be recovered from the contractor's bill in case the contractor fails to make good the loss.
4.11	It shall be responsibility of the contractor to take delivery of T&Ps and MMEs from stores or place of use by other contractor at project site, transport the same to site and return the same to BHEL store / place as intimated by Engineer in project site in good working conditions after use.
4.12	This above list is only indicative and neither exhaustive nor limiting. Quantities indicated above are only the minimum required. Contractor shall deploy all necessary T&P to meet the schedules & as prescribed by BHEL engineer and required for completion of work.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter IV: T&Ps and MMEs to be deployed by Contractor

The following materials/consumables are to be arranged by the contractor as part of the contractual scope.

S/N	Description
1	Welding electrodes for welding AS/CS/SS pipe and other welding from BHEL approved vendors only
2	Filler wire for argon welding
3	Argon, oxygen and acetylene gas
4	Provision for temporary scaffoldings.
5	GI “U” clamps with nuts and washers for impulse and GI pipe clamping.
6	Round aluminium tags (30mm dia x 3mm thick)
7	Teflon tape and insulation tape.
8	Hold tight / bitumen tape for GI pipe coupling.
9	Required paints and primer from BHEL approved vendors only.
10	Solder wire (60/40)
11	Protocol/calibration report sheets as per BHEL format.
12	Panel/JB sealing compound material (for cable entry from bottom/top of panel).
13	PVC cable tie, aluminium strip and hardware for clamping of cables, copper tube, and temperature gauge capillary.
14	Copper lugs upto 4 sqmm, PVC sleeve of different size, PVC button & tape
15	Ferrules (PVC) and suitable for ferrule printing.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter V: T&Ps and MMEs to be deployed by BHEL

5.0	LIST OF T&P BEING PROVIDED BY BHEL ON FREE OF HIRE CHARGES AND ON SHARING BASIS		
Sl. No.	Equipm ent	Qty.	Remarks
1	CRAWLER CRANE 135MT	1 No	Free issue and on sharing basis depending on availability
NOTES:			
5.1	Cl.4.2.2.16.c of SCC shall read as- a. For BHEL's cranes 75 MT & above:- Day-today upkeep and running maintenance like filling topping up of lubricants, changing filters, etc. including repair of self-starter, batteries and dynamo of these cranes shall be excluded from the scope of the contractor. b. For BHEL's cranes below 75 MT capacity:- Day-today upkeep and running maintenance like filling topping up of lubricants, changing filters, etc. including repair of self-starter, batteries and dynamo of these cranes shall be responsibility of the contractor. If on checking it is found that the same is not followed, BHEL shall exercise its right to get the job/works done at the risk and cost of the contractor. Common for above Sl. No. (a) & (b):- In case of breakdown of crane, contractor shall provide the necessary manpower for maintenance of the BHEL owned crane to maintenance agency (deployed by BHEL), failing to do so BHEL will get the job done at the risk and cost of contractor. BHEL may also provide cranes through crane hiring agencies in which case the day-to-day upkeep and running maintenance shall also be excluded from scope of contractor. The contractor shall arrange fuel for the operation of hired & BHEL owned cranes also.		
5.2	Cl.4.2.2.16 e. of SCC shall be read as- a. For BHEL's cranes 75 MT & above:- The operator, helper & maintenance personal (Engineer/Technician/OEM) for BHEL's cranes 75 MT & above capacity being provided by BHEL free of cost. Further fuel for operation of all BHEL cranes shall be provided by contractor without any extra cost. b. For BHEL's cranes below 75 MT capacity:- The operators for BHEL's cranes 75 MT below capacity shall be provided by the contractor free of cost. These operators should possess valid license for heavy vehicle. Further fuel for operation of all BHEL cranes shall be provided by contractor without any extra cost.		
5.3	The Cranes at Sl No. 1 will be provided as per requirement and availability at the sole discretion of the BHEL Engineer.		
5.4	The contractor shall make necessary arrangement like laying of special sleeper beds, assembly & dismantling of heavy lift attachment, boom, jib etc. for movement and operation of crane.		
5.5	Any other special T&P if supplied by the manufacturer and available with the customer will also be provided to the contractor free of hire charges as and when made available. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition. However low height jack may not be made available and will have to be arranged for by the contractor.		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VI: TIME SCHEDULE

6.0	TIME SCHEDULE	
6.1	The contractor is required to commence the work within 15 days from the date of issue of letter of intent (LOI) unless BHEL decides to fix any other later date. However, the actual date of start of work, to fix up the zero date of the contract, will be certified by BHEL Engineer after adequate mobilization of manpower and T&Ps(as required for finalisation of Zero date) by the contractor.	
6.2	Entire work as detailed in the tender specifications shall be completed within 12 months from the Zero date as per programme / milestones indicated by BHEL Engineer. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time.	
6.3	Entire work shall be carried out in accordance with the broad schedule for Electrical & C&I furnished below, within the stipulated completion period. This schedule will undergo review on regular basis by HPCL/EIL and BHEL. Based on achieved progress vis-à-vis project requirement, contractor shall be provided with the revised Erection schedule by BHEL/ HPCL. The contractor will have to submit a program for E&C to meet the revised project schedule and accordingly augment his manpower/T&P at no extra cost to BHEL.	
6.4	Schedule of Work	
	Milestone	Schedule
6.4.1	Start of work	Zero Date
6.4.2	Charging Readiness of HT Switch Gear (M1)	5 th Month
6.4.3	GT Commissioning & Synchronization	7 th Month
6.4.4	GAS IN HRSG/Alkali Boil out of HRSG(M2)	8 th Month
6.4.5	STG#1 Synchronization	9 th month
6.4.6	Trial Operation	10 th Month
6.4.7	Liquidation of Pending Points	11 th Month
6.4.8	Completion of all facilities	12 th Month
6.5	Provision of Penalty in case of slippage of Intermediate Milestones:	
6.5.1	M1& M2 are the intermediate LD milestone. Milestones LD shall be applicable if the delay in achieving the milestone is solely attributable to the contractor.	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VI: TIME SCHEDULE

6.5.2	In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones
6.5.3	In case delay in achieving M1 Milestone is solely attributable to the contractor, 0.5% per week of executable contract value*, limited to maximum 2% of executable contract value, will be withheld.
6.5.4	In case delay in achieving M2 Milestone is solely attributable to the contractor, 0.5% per week of executable contract value*, limited to maximum 3% of executable contract value will be withheld.
6.5.5	Amount already withheld, if any against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 Milestone.
6.6.6	Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment (corresponding RA Bill) and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.
6.6.7	Final deduction towards LD (if applicable), on account of delay attributable to contractor shall be based on final delay analysis on completion/ closure of contract. Withheld amount, if any due to slippage of identified intermediate milestone(s) shall be adjusted against LD or released as the case may be.
6.6.8	In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted into recovery
6.6.9	* Executable Contract Value - Value of work for which inputs/ fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.
6.7	Contractor shall plan their work in such a manner so as to meet the above project schedule, in consultation with BHEL/ customer. To achieve the above schedule contractor shall work in the all the available fronts concurrently and be prepared for working in the shift operation as per the instruction of BHEL Engineer. All formalities regarding permissions/gate passes for shift working are to be applied in time in line with HPCL/EIL requirements.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VI: TIME SCHEDULE

6.8	Completion of facilities shall be completed in all respects only when on successful erection, trial run of individual equipment's and successful commissioning, trial operation, attending punch points ,handing over of the GTG &STG unit's to the customer.
6.9	The work under the scope of this contract shall be deemed to have been completed in all respects only when so certified by BHEL. The decision of BHEL shall be final and binding on the contractor.
6.10	If the completion of work as detailed in the scope of work gets delayed beyond the contract/ completion period, the contractor shall request for an extension of the contract and BHEL at its discretion may grant time extension for the contract as per GCC clause 2.11
6.11	Commencement of performance guarantee- The commencement of guarantee period for workmanship shall start from the date of trial operation acceptance of facilities/handing over of the Unit to the customer. Other conditions for the guarantee period shall be as per clause no.2.24 (Performance Guarantee for Workmanship) of General Conditions of Contract.
6.12	The Contract period shall be 12 months from the start of work. Erection, Testing, Calibration and Commissioning of permanent equipment's required for completion of system shall be completed within the time schedule given above. BHEL, owing to its commitment to their customer, may ask contractor to compress the total completion schedule by up to 15%. This will result in advancement of various milestones. Contractor shall plan his activities and mobilize additional resources accordingly to the satisfaction of BHEL engineer within the quoted rates.
6.13	Material Re-conciliation The contractor shall do material re-conciliation periodically.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VII: Terms of Payment

7.0	TERMS OF PAYMENT	
7.1	The ‘Engineer’ will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.	
7.2	Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing and detailed billing breakup shall be approved by BHEL before raising invoices.	
7.2.1	The payments are subject to any deduction, which BHEL may be authorized to make under the Contract. Payments shall be released within 30 days of receipt of Bill complete in all respects	
7.3	Contractor on certificate of the Engineer at site shall be entitled for progressive and milestone payment as explained here under.	
TERMS OF PAYMENT FOR ELECTRICAL WORKS		
Sl. No.	Activity / Work Description	% of unit rate
7.4	PRO RATA PAYMENTS (85%)	
7.4.1	Oil Filled Transformers(Generator,Station,UAT, Station Service etc)	
1	Placement on foundation and alignment	25%
2	Erection of associated auxiliaries/assemblies, oil filling, etc	25%
3	Dry out including oil filtration	15%
4	Pre commissioning checks	10%
5	Testing, Charging & Final Painting	10%
	Total	85%
7.4.2	Cable tray and accessories	
1	Fabrication and fixing / welding / bolting in position	60%
2	Earthing of cable trays	10%
3	Tagging of cable trays (including touch up painting & cable tray numbering on sides)	8%
4	Covering of trays where ever envisaged	7%
	Total =	85%
7.4.3	Cable laying including earthing wires	
1	Laying of cables/Wires	45%
2	Glanding, Termination (except HT Terminations)	15%
3	Testing and charging of cables	10%
4	Dressing and clamping of cables	15%
	Total =	85%
7.4.4	Junction box/Push button station (local)	
1	Erection including fixing of terminal blocks where ever applicable	75%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VII: Terms of Payment

2	Name plate fixing where ever applicable and labelling (inside and outside)	10%
	Total =	85%
7.4.5	DG sets /Switch Gears / MCC / PCC / Distribution Boards / Marshalling Box/ Starter Units / Electrical Hoists/ Panels /Cubicles / Desks / UPS / Batteries / Chargers / Miscellaneous Equipment's/ VFD/LA assy/NGT/NGR/SP/Etc	
1	Placement, Alignment and coupling / interconnection where ever applicable, erection of associated accessories etc	50%
2	Pre commissioning checks and tests	10%
3	Charging, Loop testing and commissioning	15%
4	System commissioning	10%
	Total =	85%
7.4.6	LT / HT Bus Ducts	
1	Pre assembly of Bus Ducts and accessories, erection, alignment, bolting/welding etc complete with supporting structure	50%
2	Pre commissioning checks	20%
3	Testing, Charging and Final Painting(as applicable)	15%
	Total =	85%
7.4.7	Earthing/Lightning protection strips, Earthing pits	
1	Fabrication, erection, alignment, welding/bolting of earthing/lightning protection strips; earth pits completion	60%
2	Testing/commissioning	25%
	Total =	85%
7.4.8	Misc. Structural steel including cable tray supports, Canopies etc, Conduits, pipes etc	
1	Fabrication/Pre assembly	45%
2	Erection, Alignment, welding/bolting and if applicable chipping/grouting/painting	40%
	Total =	85%
7.4.9	Testing/Commissioning of Equipment (like motors, actuators, ESP trfr, misc equipments, etc) erected by other agencies	
1	Local testing	40%
2	Remote testing, Loop testing, and commissioning	40%
3	System commissioning	5%
	Total =	85%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VII: Terms of Payment

7.4.10	Other items	
7.4.10.1	Rubber mats/ Display Boards/Miscellaneous items/etc : on installation	85%
7.4.10.2	Specialized Commissioning Services - on pro rata basis.	85%
7.4.10.3	Civil Works - Prorata on completion of actual work.	85%
7.4.10.4	Termination, HT Termination, Straight through jointing etc : on pro rata basis	85%
TERMS OF PAYMENT FOR C&I WORKS		
7.4.11	Instrumentation Panels / Cubicles / Desks / Racks / Enclosures / Monitors / Computers / Computer peripherals / PLCs / UPS / Batteries	
1	Erection and alignment	50%
2	Fixing of loose items/instruments where ever applicable	5%
3	Pre commissioning checks, Charging of panel and Loop testing etc	15%
4	System commissioning	15%
	Total =	85%
7.4.12	Conduits/impulse pipe/tubes	
1	Fabrication, Laying and Erection	50%
2	Leak Test/Hydraulic Test (where ever applicable, otherwise clubbed with next activity)	20%
3	Dressing, clamping, tagging and painting where ever applicable	8%
4	Testing & commissioning of associated equipment/system	7%
	Total =	85%
7.4.13	Miscellaneous Structural steel including frames for Panels/ Racks/Instruments, supports for cable tray/pipes/tubes, Canopies etc	
1	Fabrication, Erection, Alignment , Welding/bolting and where ever applicable chipping/grouting/painting	65%
2	Erection of associated Items/Equipments/Systems as applicable	20%
	Total =	85%
7.4.14	Instruments/Devices including Sensors/ Cells/ Probes etc	
1	Calibration/Testing/Pre erection checks	30%
2	Erection/Placement and fixing of loose items/accessories	30%
3	Pre commissioning checks/loop testing/Simulation testing as required	10%
4	Remote/local commissioning as required	15%
	Total =	85%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VII: Terms of Payment

7.4.15	Commissioning and Testing activities for Equipments erected by other agencies, like control valves, on/off valves, electrical/ pneumatic valves, actuators, solenoid valves, valves, limit switches, ERV controllers, power cylinders, Pressure & Temperature Guages / Transmitters etc	
1	Removal & refixing/ fixing loose supplied components, including tubing/hose, regulators, etc	30%
2	Calibration / Local testing - commissioning readiness	30%
3	Local Commissioning & Loop Testing as required	10%
4	System Commissioning or Remote Commissioning as required	15%
	Total =	85%
7.4.16	Cable tray and accessories	
1	Fabrication and fixing / welding / bolting in position	60%
2	Earthing of cable trays	15%
3	Tagging of cable trays (painting cable tray numbers on sides)	5%
4	Covering of trays where ever envisaged	5%
	Total =	85%
7.4.17	Cable laying (Power Cables)	
1	Laying of cables	45%
2	Glanding, Termination and tagging of cables	15%
3	Dressing and clamping of cables	10%
4	Testing and charging of cables	15%
7.4.18	Cable laying (Control and Signal Cables)	
1	Laying of cables	45%
2	Glanding, Termination and tagging of cables	15%
3	Dressing and clamping of cables	10%
4	Shielding of cables	5%
5	Testing and charging of cables	10%
	Total =	85%
7.4.19	Junction box/Push button station (local)	
1	Erection including fixing of terminal blocks where ever applicable	75%
2	Name plate fixing where ever applicable, labelling (both inside and outside) and commissioning of connected equipment.	10%
	Total =	85%
7.4.20	Power Cylinders	
1	Erection and alignment of power cylinders	30%
2	Fixing of loose items and commissioning readiness	30%
3	Loop Checking, calibration and local commissioning	20%

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VII: Terms of Payment

4	System/Remote commissioning as required	5%
	Total =	85%
7.4.21	Miscellaneous items (items not covered under above heads)	
1	Erection	50%
2	Alignment	10%
3	Testing	15%
4	Completion	10%
	Total =	85%

7.4.22	STAGE/MILESTONE PAYMENTS (15%)	
1.	Gas In / Boiler Light-Up	1%
2.	ABO	1%
3.	Steam Blowing	0%
4.	Safety Valve Floating	1%
5.	Oil Flushing (TG)	0%
6.	Barring Gear (TG)	0%
7.	Rolling and Synchronisation (GTG)	1%
8.	Rolling and Synchronisation (STG)	1%
9.	Full Load (GTG)	1%
	Full Load (STG)	1%
10.	Trial Operation of Unit	3%
11.	Painting	0%
12.	Area cleaning, temporary structures cutting/removal and return of scrap	1%
13.	Punch List points/pending points liquidation	1%
14.	Submission of 'As Built Drawings'	1%
15.	Material Reconciliation	1%
16.	Completion of Contractual Obligation	1%
	Total	15%
7.5	Notes:	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VII: Terms of Payment

7.5.1	If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site in-charge, at his discretion, after recording reasons for exercising such option, can split and release payment up to 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone/ commissioning activity.
7.5.2	In line with GCC clause 2.23.1 .v to facilitate part payment, BHEL Site Engineer at his discretion may further split the contracted rates/percentages to suit site conditions, cash flow requirements according to the progress of work.
7.5.3	Retention amount as per GCC clause 2.22.1.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VIII: TAXES AND DUTIES

TAXES AND DUTIES:

8.1.1	Price quoted should be inclusive of all applicable Taxes/charges but Excluding GST and BOCW cess. The Contractor shall pay all other taxes, fees, royalty, commission etc. which may be levied on the contractor in executing the contract. In case BHEL is forced to pay any of such taxes, it shall be recovered from Contactor's bills or otherwise as deemed fit. GST Shall be payable extra as per following :
8.1.2	Contractor/Vendor has to issue invoice indicating HSN/SAC code, Description, Value, Rate, applicable tax and other particulars in compliance with the provisions of relevant GST Act and Rules made thereunder. With the implementation of e way bill provisions, contractor shall comply with same as applicable.
8.1.3	Vendor has to submit GST compliant invoice within seven days from the due date of invoice as per GST Law. In case of delay, BHEL reserves the right of denial of GST payment if there occurs any hardship to BHEL in claiming the input thereof. In case of goods, vendor has to provide scan copy of invoice & GR/LR/RR to BHEL before movement of goods starts. Special care should be taken in case of month end transactions.
8.1.4	GST amount claimed in the invoice shall be released on fulfilment of all the following conditions by the Contractor : - a. Supply of goods and/or services have been received by BHEL. b. Original Tax Invoice has been submitted to BHEL. c. Respective invoice has appeared in BHEL's GSTR - 2A for the month corresponding to the month of invoice. Alternatively, BG of appropriate value may be furnished which shall be valid at least one month beyond the due date of confirmation of relevant payment of GST on GSTN portal or sufficient security is available to adjust the financial impact in case of any default by the contractor.
8.1.5	TDS under GST law as applicable shall be deducted.
8.1.6	Contractor shall be solely responsible for discharging his GST liability according to the provisions of GST Law and BHEL will not entertain any claim of GST/interest/penalty or any other liability on account of failure of contractor in complying the provisions of GST Law or discharging the GST liability in a manner laid down thereunder
8.1.7	In case declaration of any invoice is delayed by the vendor in his GST return or any invoice is subsequently amended/altered/deleted on GSTN portal which results in any adverse financial implication on BHEL, the financial impact thereof including interest/penalty shall be recovered from the Contactor's due payment.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VIII: TAXES AND DUTIES

8.1.8	Any denial of input credit to BHEL or arising of any tax liability on BHEL due to non-compliance of GST Law by the Contractor in any manner, will be recovered along with liability on account of interest and penalty (if any) from the payments due to the Contactor.
8.1.9	The admissibility of GST, taxes and duties referred in this chapter or elsewhere in the contract is limited to direct transactions between BHEL & its Contractor. BHEL is not responsible for any liability that may arise due to any transaction beyond the direct transaction between BHEL & its Contractor.
8.1.10	<u>Variation in Taxes & Duties:</u> Any upward variation in GST shall be considered for reimbursement provided supply of goods and services are made within schedule date stipulated in the contract or approved extended schedule for the reason solely attributable to BHEL. However downward variation shall be subject to adjustment as per actual GST applicability. In case the Government imposes any new levy/tax on the output service/goods after price bid opening, the same shall be reimbursed by BHEL at actual. The reimbursement under this clause is restricted to the direct transaction between BHEL and its contractor only and within the contractual delivery period only. In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer but before opening of the price Bid, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of price bid. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.
8.1.11	<u>Modalities of Tax Incidence on BHEL:</u> Where GST law permits more than one option or methodology for discharging liability of tax/ levy/ duty; the contractor shall approach BHEL before choosing any option to discharge his tax liability. BHEL shall have the right to direct the contractor to adopt the appropriate option considering the amount of tax liability on BHEL as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the contractor for discharging the obligation of BHEL in respect of the tax liability to the contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter VIII: TAXES AND DUTIES

8.2	<u>BUILDING & OTHER CONSTRUCTION WORKERS WELFARE CESS:</u> BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998.
8.2.1	In case Building & Other Construction Workers welfare Cess is applicable, the applicable cess will be paid extra at actual against the documentary proof of submission of BOCW to relevant authority.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter IX: Important condition applicable to this Project

9.0	<u>Important milestones and their definitions which are applicable during this contract execution</u>
9.1	These are as per terms of contract between BHEL and HPCL, but for the work of this contract scope, BHEL contractor shall be responsible for executing/assist in executing/compliance of the same:
9.2	Pre-commissioning activities will include but will not be limited to the following: These are general specs for pre-commissioning and contractor responsibility shall be to execute works corresponding to this contract scope.
9.2.1	Supplying safety appliances & suitable PPEs to all workers.
9.2.2	Supply & Installation of barricading tape.
9.2.3	Electrical pre-commissioning including proper earthing, pre-commissioning checks done on cable continuity checks, electrical panels, MCCs, switch gears, motors, transformers etc.
9.2.4	CONTRACTOR to coordinate and confirm compliance regarding completion of all, mechanical, Instruments and Electrical installation work.
9.3	DECLARING READY FOR COMMISSIONING
9.3.1	The unit shall be considered "Ready for Commissioning" (FORMAT-IV) when all the facilities have been completed along with their auxiliaries and support facilities in every respect including charging of lubes, chemicals, preparation of solution, last minute modifications, if any, as recommended by HPCL/EIL. All temporary structures, scaffolding etc. used for carrying out pre-commissioning activities shall be removed, all the blinds shall be placed into position as per P&IDs
9.3.2	Once the Unit has been declared "Ready for Commissioning", the Contractor shall not carry out any erection related work including hot work without prior permission of the BHEL/EIL.
9.4	COMMISSIONING
9.4.1	Commissioning of the Unit will be carried out by Contractor once mechanical completion is over successfully, all pre- commissioning activities are carried out and system is ready for commissioning under necessary guidance and overseeing of HPCL/EIL. Representative from process designer will provide necessary co-ordination during start up and related technical clarifications shall be furnished by them.
9.4.2	Contractor will provide necessary assistance during commissioning of the unit.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter IX: Important condition applicable to this Project

9.4.3	The Unit shall be considered to be commissioned successfully once all the system with instrumentation / control systems and support systems have been on uninterrupted stable operation for not less than 72 hours. Any interruption of duration up to 30 minutes during the commissioning run of 72 hrs shall be ignored. However for interruptions greater than 30 minutes, the commissioning run period shall be extended by the time equal to the interruption plus the time taken to stabilize the Unit back to the normal operating conditions. Whether the 72 hours operation has been successful or not, shall be decided by the HPCL/EIL based on the observations recorded during 72 hours. The countdown for 72 hours operation shall start only after Unit has been on stable operation with all controls and safety system in normal operation for a period of not less than 48 hours.
9.4.4	The CONTRACTOR shall also be required to provide on the job training to OWNER's operation personnel by associating them in all the day to day pre-commissioning, commissioning, maintenance activities and UNIT operations.
9.4.5	After successful commissioning of the process Unit same shall be handed over to the HPCL for operation. In case of any constraint in achieving the above process parameters in the Unit by the CONTRACTOR, the same shall be communicated by the CONTRACTOR to the BHEL/HPCL/EIL in writing. This will be reviewed jointly by HPCL/EIL to arrive at a decision on whether the constraint is on account of reasons attributable to the CONTRACTOR or not. The action in either case will be according to the relevant provisions / provided elsewhere in the contract.
9.5	OTHER REQUIREMENTS
9.5.1	The Contractor shall also provide 'No Smoking' boards & Do's and Dont's, boards for other designated instructions in unit areas.
9.5.2	Contractor shall also ensure implementation of all recommendations arising out of audits viz. internal pre-commissioning audit and audit by statutory bodies like PESO, OISD etc., as and when required.
9.5.3	Before start-up of unit, safety audit shall be conducted by Owner/PMC. All such check lists/ deficiency report generated by safety audit team shall be liquidated by the Contractor. The safety audit shall cover aspects such as floor opening, trip hazards, bump hazards, electrical safety concerns, mechanical safety concerns etc.
9.6	HOUSE KEEPING
9.6.1	Provide continuous clean-up of the construction and operational area.
9.6.2	Remove excess materials, temporary facilities and scaffolding and pick-up trash.
9.6.3	Perform washing for further clean-up as required.
9.7	FINAL INSPECTION BEFORE START OF COMMISSIONING

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter IX: Important condition applicable to this Project

9.7.1	Record of liquidation of checklist point, test record etc. shall be submitted by the Contractor to OWNER/PMC. Any deficiency/ changes required in the offered system shall to be Liquidated by the Contractor.
9.7.2	It shall be the Contractor's responsibility to repair any damage to the system occurred during storage, installation, pre-commissioning and commissioning stage.
9.8	UTILITIES REQUIREMENT
	All the utilities like air, cooling water, raw water, DM water, steam, power, instrument air etc. shall be provided by client for pre-commissioning and commissioning. However, temporary piping/ fittings required to be done for drawing these utilities shall be in the scope of Contractor.
9.9	<u>Health, Safety And Environment (HSE) Management / Safety Norms to be followed during execution of work</u> In addition to the, OISD Guidelines-192, OISD Guideline-207, EIL specifications on Health, Safety and Environment (HSE) Management and OWNER prescribed work permit system and job safety analysis procedure shall be followed before under taking any work inside OWNER's premises. Considering the above, the CONTRACTOR shall establish, document and maintain an effective Health, Safety and Environment (HSE) management system.
9.9.1	The guidelines released by the Oil Industry Safety Directorate (OISD), Govt. of India, Ministry of Petroleum & Natural Gas has to be adhered to during execution of the work of this contract scope at project site. OISD - GDN 192 and OISD- Guidelines -207 may be downloaded from the ministry/directorate website for reference. The same may also be obtained from BHEL PSNR HQ or site during execution.
9.9.2	A Health, safety and Environment (HSE) Plan for HPCL Visakhapatnam site dated 19.05.2018 (Doc no.: HSEP:PSER 14-HPCLBHEL REV: 02) has been approved at site. This document shall be followed by BHEL and its sub-contractors at HPCL-Visakhapatnam site. This shall be read along with HSE plan of EIL, OISD standard-192 & 207. In case of any conflict of clauses, the more stringent one shall apply. The copy of this document shall be provided at the start of execution of the contract.
9.9.3	The Contractor shall follow OWNER's safety practices during execution of pre-commissioning / commissioning works. Contractor is required to maintain and follow all safety practices equivalent or better than those being practiced by OWNER for the complex during pre-commissioning and commissioning
9.9.4	Necessary Hot/ cold work permit shall be obtained to carryout jobs once declared mechanically completed. (Refer OISD-STD-105, work Permit System).

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter IX: Important condition applicable to this Project

9.9.5	The documents mentioned above in this head whether annexed or referred will be considered integral part of this contract.
9.9.6	Any penalties imposed on BHEL by EIL/HPCL, due to lapses on part of the contractor of this work scope, shall be deducted from the running bill of this contractor. These penalties shall be in addition to the penalties imposed by BHEL for such lapses
9.9.7	Guidelines for settlement of claims for compensation on accidents applicable to BHEL. (Document shall be annexed)
9.10	SPECIFIC INCLUSIONS
9.10.1	Consumables/items to be provided by BHEL free of charge
9.10.1.1	Metallic Cable glands Steel for fabrication Lugs beyond 4 sq.mm size
9.10.2	Consumables/items to be arranged by Bidder
9.10.2.1	Cable ferruling numbers and characters Name plates/Tag plates with tying/fixing material for cable's at both end & field instruments Cable Markers
9.10.3	SPECIFIC EXCLUSIONS
9.10.3.1	The following are specific exclusions from the scope of work/ specification:-
9.10.3.2	Erection of dampers, valves, electrical actuators, pneumatic actuators (However, SADC power cylinder installation will be in the scope of the contractor, if applicable)..
9.10.3.3	Erection of HT/LT motors (except those specified herein)
9.10.3.4	Generator Erection
9.10.3.5	Attachment welding of thermocouple pads for tube metal temperature measurement and fixing of thermowells in the pipelines.
9.10.3.6	Erection of flow nozzles.
9.10.3.7	Erection of electro hydraulic actuators.
	Note: The aforesaid exclusions should not be construed as exhaustive. They are meant for general guideline. BHEL reserves the right to include or exclude any item which is required for completing the job as per rates indicated in rate schedule. Contractor should carry out all such jobs as per the instructions of BHEL engineer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

BOQ CUM RATE SCHEDULE						
Name of Work: WORK OF ERECTION, TESTING, COMMISSIONING, TRIAL RUN, PERFORMANCE GUARANTEE TEST RUN (PGTR) AND HANDING OVER OF ELECTRICAL AND CONTROL & INSTRUMENTATION PACKAGE OF 1X75 MW HPCL VISAKH REFINERY MODERNISATION PROJECT (VRMP), VISHAKAPATNAM, ANDHRA PRADESH						
SI No.	DESCRIPTION OF ITEM	UOM	QTY	Factor	Rate per Qty= Factor X Quoted Value(A)/ 10000 (Rounded off to eight place after decimal)	Amount= Rate per UOM* Qty
1	Transformers					
1.1	Transportation up to foundation, Assembly, Testing & commissioning of Three Phase , 220/33kV, 100/80MVA ONAN/ONAF Dry WT-82 MT	Nos.	2	107.69861947		
1.2	Transportation up to foundation, Assembly, Testing & commissioning of Three Phase 220/66kV, Transformer 100/80MVA ONAN/ONAF with OLTC	Nos.	2	107.69861947		
1.3	Transportation up to foundation, Assembly, Testing & commissioning of Three Phase 11/69 kV, 20MVA, ONAN ST Generator Transformer Dry WT-60 MT	Nos.	1	60.04348237		
1.4	Transportation up to foundation, Assembly, Testing & commissioning of Three Phase 11/69 kV, 85/105MVA, ONAN/ONAF GT Generator Transformer Dry WT-80 MT	Nos.	1	109.58540175		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

1.5	Transportation up to foundation, Assembly, Testing & commissioning of Three Phase 66/11.5kV, 50/60MVA, ONAN/ONAF Utility Transformer with OLTC Dry WT-53 MT	Nos.	2	91.78843283		
1.6	Transportation up to foundation, Assembly, Testing & commissioning of Three Phase 66/11.5kV, 25/31.5MVA, ONAN/ONAF Aux. Transformer with OLTC Dry WT-40 MT	Nos.	2	60.04348237		
1.7	2000KVAR@11KV Capacitor Bank Set i.e.series reactor,RVT,Steel Structure,Capacitor Unit,Lightning Arrester 7x2x2 M(Outdoor) 3 MT Each Set	SET	4	6.34981594		
1.8	APFC panels for capacitors SIZE: 4X1.25X2.4 M 2.5 MT Per Panel	SET	4	13.36186191		
1.9	NGR (11.5/ $\sqrt{3}$ kV, 600/60A, 10s)R.-10.58 $\pm$ 10% Ω SIZE:1.25X1.55X2.0 1.05MT Per Panel	Nos.	4	3.19076176		
1.10	DISTRIBUTION TRF (11/0.433 kV, 1.6 MVA) Dry WT-7.6 MT	Nos.	6	24.09817249		
1.11	NORMAL LIGHTING TRF (0.415/0.415 kV, 200 kVA) Total WT-1.4 MT	Nos.	2	3.95902048		
1.12	EMERGENCY LIGHTING TRF (0.415/0.415 kV, 50 kVA) Total WT-0.8 MT	Nos.	2	2.32013732		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

2	Gas-insulated switchgear					
2.1	33kV GIS Package + Sub station automation system (Total 18 Panel for 1 board)Total Weight-36 MT SIZE:16X2.19X2.7	SET	1	42.01830060		
3	11 KV HT SWITCHGEAR					
3.1	3 no, 11kV Sw. Boards (Total of 105 Panels for 3 boards) Total Weight-158 MT SIZE(LXBXH):0.8x2.6x2.7	SET	1	160.66777604		
4	BUS DUCTS					
4.1	SEGREGATED PHASE BUS DUCT					
4.1.1	3500A, 11kV, 50HZ, 40KA / 1SEC, CR Enclosure, TP, Phase Segregated Bus Duct along with all accessories & auxiliaries 3500 Amps SPBD Detail. Enclosure- 1500x500mm, 3.15tk Conductor Cross section – 2X152.4 box type, 8.1tk Total Length of busduct – 32mtrs (approx.) Total weight – 4.8 MT (approx.)	SET	2	31.40047086		
4.1.2	2000A, 11kV, 50HZ, 40KA / 1SEC, CR Enclosure, TP, Phase Segregated Bus Duct along with all accessories & auxiliaries 2000 Amps SPBD Detail Enclosure cross section – 1350X450mm,3.15tk Conductor Cross section – 2X101.6 box type, 6.68tk Total Length of busduct – 22mtrs (approx.) Total weight – 3 MT (approx.)	SET	2	31.40047086		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

4.1.3	4000A, 415V, 50HZ, 50KA / 1SEC, CR Enclosure, TPN, non Phase Segregated Bus Duct(For PMCC & EPMCC Incomer1 &2) - length 2m EACH	Nos.	36	4.34910417		
4.2	Isolated Phase Bus Duct For GTG 11KV,5000 A along with all suport and structures	SET	1	149.53456441		
5	LT SWITCHGEAR					
5.1	415 V, PMCC-1(PC-9431) 4000 Amp SIZE: 17X1.75X2.43 M	Nos.	1	20.39261424		
5.2	415 V, PMCC-2(PC-9432) 4000 Amp SIZE: 18X1.75X2.43 M	Nos.	1	20.39261424		
5.3	415V BOP MCC-1(MC-9441) 800 Amp SIZE: 19X1.25X2.43 M	Nos.	1	13.08388037		
5.4	415V BOP MCC-2(MC-9442) 800 Amp SIZE: 26.6X1.25X2.43 M	Nos.	1	13.08388037		
5.5	415V AC & VENT MCC-1(MC-9444) 1250Amp SIZE: 28.6X1.25X2.43 M	Nos.	1	10.41264226		
5.6	415 V EPMCC (EPC-9433) 4000 Amp SIZE: 22X1.75X2.43 M	Nos.	1	20.39261424		
5.7	415 V GT MCC (MC-9445) 1200 Amp SIZE: 20X1.25X2.43 M	Nos.	1	23.05284078		
5.8	415 V GT HRSG MCC(MC-9443) 800 Amp SIZE: 23.8X1.25X2.43 M	Nos.	1	13.29799320		
5.9	415 V GT STG MCC(MC-9446) 800 Amp SIZE: 15X1.25X2.43 M	Nos.	1	10.73745714		
5.10	415V ASB 800 AmpSIZE: 23.8X1.25X2.43 M	Nos.	1	13.29799320		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

5.11	415V MLDB (LB-9452) 400 Amp	Nos.	1	5.31407863		
5.12	ACEldb (ELB-9453) 63 Amp	Nos.	1	4.06670363		
5.13	220V,STATION DC ELDB 63 Amp	Nos.	1	4.06670363		
5.14	110 V DCDB(For Motor Load)-1 400 Amp	Nos.	1	5.31407863		
5.15	110 V DCDB(For Control Load)-2 400 Amp	Nos.	1	5.31407863		
5.16	125 V GT DCDB-1 600 Amp	Nos.	1	7.63401465		
5.17	125 V GT DCDB-2 600 Amp	Nos.	1	7.63401465		
5.18	220 V DC CHARGER (Single/double front,2 set 220 V DC Battery bank(171 No of cells,90 Ah) ,2 set Wall mounted junction Box,1 set and one coomon cell buster)	Nos.	1	21.26236428		
5.19	110 V DC CHARGER, 2 set Battery bank(86 No of cells) ,2 set Wall mounted junction Box,1 set and one coomon cell buster)	Set	3	7.19219860		
5.20	125 V GT CHARGER(MAIN)-1(Single/double front,1 set 125 V DC Battery bank 1216AH(98 No Cell) 1 set Wall mounted junction Box,1 set and one coomon cell buster)	Nos.	2	7.19219860		
5.21	125 V GT CHARGER(EOP)-2(Single/double front,1 set 125 V DC Battery bank 940 AH(98 No Cell) 1 set Wall mounted junction Box,1 set and one coomon cell buster)	Nos.	1	7.19219860		
5.22	WMDB 32 Amp	Nos.	6	0.81819475		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

5.23	WMDB 100 Amp	Nos.	2	0.81819475		
5.24	WMDB 150Amp	Nos.	3	0.81819475		
5.25	WMDB 250Amp	Nos.	1	0.81819475		
5.26	110 V Main DCDB-1250 Amp	Nos.	1	9.09199660		
6	VFD FOR BFP,s					
6.1	Transportation for store/store yard to erection site,Erection, Assembly,Testing and commissioning of Variable Frequency Drive OF BFP Motor (approx. dim.5.1.x2.9x1.1,w.t 6.5 MT),VFD Panel & Dry Transformer,Control Panel	Nos.	4	18.82445721		
6.2	Breaker Panel(approx. dim.4.2.x2.4x2.7,w.t 7.5 MT),(4 set,20 Panels)	Nos.	4	2.90891203		
6.3	2250 KVA & 1250 KVA Dry Transformer Panel(2.44x2.38x1.1)	Nos.	4	15.23677514		
7	Panels(Mark Vle,LCI,GRP,SCAP,DAVR)					
7.1	Gas Turbine Control Panel+Auxiliary Panel+HMI Panel(Mark Vle)	Nos.	1	12.10234804		
7.2	Load Commutated Inverter (LCI/CSF),SFC Size: 9 x 2.5x 2.9 M; 15 MT	Set	1	24.81040267		
7.3	SCAP Panel Size(LXBXH):1.2 X 1.0 X 2.3 M	Nos.	22	3.65094032		
7.4	Generator Relay Panel with associated loose supplied items such as Laptop 1 no, PC,Printer, UPS, interconnecting cables, RJ45 cables etc. No. of Panels: 5 Nos. supplied in suitable shipping sections.	set	2	13.24659043		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

7.5	Digital AVR consisting of 2 No. Regulation cubicle, 1 Nos. Thyristor cubicle, 1 No. Field suppression cubicle, and associated loose supplied items monitor, key board including laying & termination of loose supplied power & control cables for DAVR system. AVR(STG) Size: 2.86x1.25x3 AVR(GTG) Size: 4.3x1.25x2.3	set	2	23.54539120		
7.6	DCS System for CPP Package & BOP PLC + HRSG BMS PLC + STGPLC SYSTEMS consisting of (located at Rack room & operator room) I/O & System Panels					
7.6.1	DCS Panels					
7.6.1.1	System / Network panels with Single suit each Size(LXBXH): 0.8X0.8X2.1 M	Nos.	25	1.22828531		
7.6.1.2	Marshalling panels single suit each double door Size(LXBXH): 1.2X0.8X2.1 M	Nos.	48	1.22828531		
7.6.1.3	ACDB Panels Size(LXBXH): 1.2X0.8X2.1 M	Nos.	2	1.22828531		
7.6.2	STG Control Panel(CJJ01, CJJ02, CJJ03) Size(LXWXH): 2.25X0.8X2.06 M	Nos.	1	3.15283677		
7.6.3	Engineer Work Station/Operator Station/Max Storian Station/ECS HMI and printers	set	60	0.93798965		
7.6.4	VMS For auxiliaries(BFP, Fan etc.) consisting of panel, Vibration sensors, Barckets, HMI & Printers	set	3	7.36341106		
7.6.5	VMS For Gas Turbine Including its HMI & Printers	set	1	11.01784890		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

7.6.6	TSI for Steam Turbine including its HMI & printers	Nos.	1	3.71304397		
7.6.7	Inert Gas PanelSize(LXBXH):1.2X0.8X2.4 M	Nos.	1	3.15283677		
7.6.8	GT UV Monitoring panel Size(LXBXH):0.8X0.8X2.4M	Nos.	1	1.13689838		
7.6.9	UV Leak Monitoring Panel Size(LXBXH):0.8X0.8X2.4M	Nos.	1	1.13689838		
7.6.10	HC/NAPTHA Leak Monitoring Panel Size(LXBXH):0.8X0.8X2.4M	Nos.	1	1.13689838		
7.6.11	ECS RTU ,Data Concentrator &DI/DO Panels Size:0.8X0.8X2.4M	Nos.	33	1.13689838		
8	EQUIPMENT EARTHING / LIGHTNING PROTECTION SYSTEM					
8.1	65mm dia Pipe Electrodes,3M long GI	Nos.	150	1.43548490		
8.2	75 x 10mm GI Strips	Mtr.	9000	0.01404956		
8.3	50 x 6 mm GI Strip	Mtr.	3000	0.00979691		
8.4	35 x 6mm GI Strips	Mtr.	2000	0.00747275		
8.5	25X6mm GI strip	Mtr.	2000	0.00712026		
8.6	25X3mmGI strip	Mtr.	2000	0.00712026		
8.7	8SWG GI wire ,solid	Mtr.	40000	0.00131939		
8.8	16SWG GI wire , solid	Mtr.	2000	0.00218338		
8.9	3/8" Dia GI fine wire rope.	Mtr.	2000	0.00125009		
8.10	5/8" Dia GI fine wire rope.	Mtr.	2000	0.00125009		
8.11	Copper Pipe Electrodes	Mtr.	0			
8.12	Vertical Air Termination Rod	Mtr.	30	0.03001799		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

8.13	Earth Pits					
8.13.1	65 mm Dia,3000 mm long GI Pipe electrod in Treated Earth Pit(Electrical) for Neutral earthing as per IS: 3043 with concrete slab cover	Nos.	82	1.07734283		
8.13.2	65 mm Dia,3000 mm long GI Pipe electrod Directly Driven Ground for Body Earthing as per IS: 3043 with concrete slab cover	Nos.	40	1.07734283		
8.13.3	65 mm Dia,3000 mm long GI Pipe electrod in Treated Earth Pit(Electronic) as per IS: 3043 with concrete slab cover	Nos.	26	1.07734283		
9	PLANT ILLUMINATION SYSTEM					
9.1	Surface mounted Bulkhead Fixture Suitable for 10W LED/60W GLS Lamp &220V DC supply	Nos.	160	0.00263565		
9.2	Industrial DC 45W LED / 60W GLS Well Glass fixture suitable for 220V DC Supply	Nos.	45	0.03891464		
9.3	Flame proof DC 45W LED Well Glass fixture suitable for 220V DC Supply & hazardous area Gas Group IIA & IIB and Zone 1 &2.	Nos.	20	0.03891464		
9.4	Surface mounted 15W LED Bulkhead Fixture	Nos.	35	0.03116272		
9.5	Industrial type general purpose LED Batten type fixture of either batten with 2 nos. 16-22W (approx) LED tube lamp or linear batten of 40W (Approx).	Nos.	420	0.07755129		
9.6	600x 600mm Recess mounted decorative 33-36W(Approx) LED fixture with high efficiency low glare optics.	Nos.	550	0.22046462		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

9.7	Flame proof LED Well Glass fixture (35-45WApprox) suitable for hazardous area Gas Group IIA & IIB and Zone 1 &2.	Nos.	150	0.03891464		
9.8	Flame proof LED Well Glass fixture (35-45WApprox) suitable for hazardous area Gas Group IIC and Zone 1 &2.	Nos.	40	0.03891464		
9.9	Industrial LED Well Glass fixture (35-45W appr).	Nos.	500	0.01178292		
9.10	Industrial LED Midium bay Fixture (90-100 watt approx)	Nos.	70	0.12393985		
9.11	Industrial LED high bay Fixture (170-180 watt approx)	Nos.	50	0.08545825		
9.12	LED street lighting fixture (60W approx)	Nos.	70	0.01565888		
9.13	LED Flood lighting Fixture (90 watt approx)	Nos.	85	0.08607067		
9.14	LED Flood lighting Fixture (180-200 watt approx)	Nos.	15	0.11097150		
9.15	11meter ERW Steel tubular Floodlight pole (410 SP-54)	Nos.	8	0.89784872		
9.16	7.5M ERW steel tubular Street light pole (410 SP-8)	Nos.	22	0.85697026		
9.17	4.75m GI pole with marshalling box.	Nos.	50	0.65817191		
9.18	2 meter GI pole	Nos.	260	0.32383783		
9.19	1200mm long 150 deg bend (50NB) pipe with 2 nos suitable clamp	Mtr	60	0.00883719		
9.20	3000mm long 25mm GI conduit (conduit bent,conduit coupler etc)	Mtr	24900	0.00461475		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

9.21	Saddle with saddle bar suitable for 25mm dia conduit	Nos.	50000	0.00155038		
9.22	GI Conduit branching JB for 25mm GI conduit	Nos.	2100	0.02077515		
9.23	GS stripped Flexible PVC conduit (20mm dia)	Mtr	2800	0.00383825		
9.24	GS stripped Flexible PVC conduit (25mm dia)	Mtr	5000	0.00497651		
9.25	3000mm long 25mm PVC conduit	Mtr	600	0.00468946		
9.26	PVC Conduit branching JB for 25mm PVC conduit	Nos.	150	0.02077515		
9.27	3000mm long 50NB GI conduit	Mtr	75	0.00571536		
9.28	3000mm long 50NB PVC conduit	Mtr	45	0.00474859		
9.29	3000mm long 20mm GI conduit	Mtr	1200	0.00383825		
9.30	Galvanised steel chain	Mtr	6000	0.00527131		
9.31	Spring loaded ball socket suitable for GI conduit branching round JB	Nos.	1000	0.00077519		
9.32	Cable clamps suitable for 3Cx2.5sqmm Cu. Armoured Cable with base and hardware (Stainless steel, SS304)	Nos.	20000	0.00031008		
9.33	GI conduit Branching Round JB with 3nos.terminal block suitable for 4sqmm.	Nos.	1000	0.05178283		
9.34	4 way 250x200x120mm rectangular sheet steel weather proof JB (IP65) with two nos. Cable entry suitable for 4Cx25sqmm Al. armoured Cable and two nos suitable for 3Cx2.5 sqmm. Cu. armoured cable along with DC Cable glands,	Nos.	60	0.10689041		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

9.35	4 way 200x150x100mm rectangular sheet steel weather proof JB (IP65) with four nos. Cable entry suitable for 3Cx2.5 sqmm. Cu. armoured cable along with DC Cable glands	Nos.	1000	0.10689041		
9.36	Flame proof Cast light alloy JB (250x200x120mm) suitable for Gas group IIA & IIB and Zone-1 &2. JB Shall have Cable entries 2nos. suitable for 4Cx25sqmm Al. armoured Cable and 2nos. nos suitable for 3Cx2.5 sqmm. Cu. armoured cable along with FLP DC Cable glands	Nos.	20	0.10689041		
9.37	Flame proof Cast light alloy JB (200x150x100mm) suitable for Gas group IIA & IIB and Zone-1 &2. JB Shall have Cable entries 4nos. suitable for 3Cx2.5 sqmm. Cu. armoured cable along with FLP DC Cable glands	Nos.	270	0.10689041		
9.38	FSB3- Flush mounted swbd with 3nos 6A piano type switch (modular type)	Nos.	2	0.07497147		
9.39	FSB2- Flush mounted swbd with 2nos 6A piano type switch (modular type)	Nos.	35	0.10398031		
9.40	SSB3- Surface mounted swbd with 3nos 6A piano type switch (modular type)	Nos.	10	0.07497147		
9.41	SSB2- Surface mounted swbd with 2nos 6A piano type switch (modular type)	Nos.	20	0.07497147		
9.42	Domestic type 6/16A receptacle with 16A switch (Flush mounted modular)	Nos.	60	0.05760769		
9.43	Domestic type 6/16A receptacle with 16A switch (Surface mounted type, modular)	Nos.	45	0.05760769		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

9.44	Industrial metal clad type 1Ph, 20A Socket with 20A MCB switch & Plug (Indoor type).	Nos.	60	0.09394470		
9.45	Industrial metal clad type 1Ph, 20A Socket with 20A MCB switch & Plug, weather proof (IP55) Outdoor type with external canopy.	Nos.	25	0.09394470		
9.46	Flameproof 1ph, 20A Socket with interlocked rotary switch & Plug suitable for Gas group IIA & IIB and Zone 1 &2.	Nos.	12	0.09394470		
9.47	Industrial metal clad type 3Ph, 63A (5pin) receptacle with interlocked rotary switch & Plug (Indoor type).	Nos.	25	0.09920117		
9.48	Industrial metal clad type 3Ph, 63A (5pin) receptacle with interlocked rotary switch & Plug, weather proof (IP55) outdoor type with external canopy.	Nos.	25	0.09920117		
9.49	Flameproof 3ph, 63A (5pin) Receptacle with interlocked rotary switch & Plug suitable for Gas group IIA & IIB and Zone 1 &2.	Nos.	3	0.09920117		
9.50	240V to 24V Portable Transformer module with inbuilt Transformer and 24V socket and supplied with Flame proof hand lamp. Hand lamp shall be suitable Gas group IIA & IIB and Zone 1&2.	Nos.	4	0.15867324		
9.51	6 way AC Indoor Lighting Panel with 63A TPN MCB at incomer and 20A SPN MCB & 30mA ELCB at outgoing.	Nos.	22	0.24751715		
9.52	12 way AC Indoor Lighting Panel with 63A TPN MCB at incomer and 20A SPN MCB 30mA ELCB at outgoing.	Nos.	21	0.26946352		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

9.53	18 way AC Indoor Lighting Panel with 63A TPN MCB at incomer and 20A SPN MCB 30mA ELCB at outgoing.	Nos.	3	0.31537242		
9.54	6 way DC Indoor Lighting Panel with 32A DP MCB at incomer and 10A DP MCB at outgoing.	Nos.	12	0.24751715		
9.55	6 way AC outdoor Lighting Panel with 63A TPN MCB at incomer and 20A SPN MCB 30mA ELCB at outgoing.	Nos.	3	0.24968769		
9.56	12 way AC outdoor Lighting Panel with 63A TPN MCB at incomer and 20A SPN MCB 30mA ELCB at outgoing.	Nos.	5	0.27153070		
9.57	18 way AC outdoor Lighting Panel with 63A TPN MCB at incomer and 20A SPN MCB 30mA ELCB at outgoing.	Nos.	2	0.31537242		
9.58	6 way DC outdoor Lighting Panel with 32A DP MCB at incomer and 10A DP MCB at outgoing. Panel shall have IP55 protection and shall be supplied with external canopy.	Nos.	3	0.24968769		
10	HT POWER CABLES LAYING,DRESSING & CLAMPING 33kV (E) Armoured, Copper Conductor XLPE insulated FRLS outer-sheathed cable.					
10.1	HT Power cable 11KV(UE) 1CX630 Al Arm XLPE	Mtr.	10000	0.02031618		
10.2	HT Power cable 11KV(UE) 3CX185 Al Arm XLPE Cable	Mtr.	4000	0.02066766		
10.3	HT Power cable 33KV(E) 1CX630 Cu Arm XLPE Cable	Mtr.	20000	0.02751053		
11	LT POWER CABLES LAYING,DRESSING & CLAMPING					

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

	1.1kV ,Armoured, Al Conductor ,PVC insulated FRLS outer-sheathed					
11.1	LT Power cable : 3CX25 Al XLPE	Mtr.	3600	0.00225977		
11.2	LT Power cable : 3CX35 Al XLPE	Mtr.	480	0.00243188		
11.3	LT Power cable : 3CX50 Al XLPE	Mtr.	400	0.00302674		
11.4	LT Power cable : 3CX95 Al XLPE	Mtr.	800	0.00368324		
11.5	LT Power cable : 3CX240 Al XLPE	Mtr.	4600	0.00750925		
11.6	LT Power cable : 3CX300 Al XLPE	Mtr.	2400	0.00750925		
11.7	LT Power cable : 4CX25 Al XLPE	Mtr.	7000	0.00273518		
11.8	LT Power cable : 4CX35 Al XLPE used for illumination also	Mtr.	35000	0.00278918		
11.9	5CX2.5COPPER PVC/FRLSPVC ARMouredCABLE	Mtr.	10000	0.00159872		
11.10	LT Power cable : 3.5CX70 Al XLPE	Mtr.	2000	0.00598752		
11.11	LT Power cable : 3.5CX185 Al XLPE	Mtr.	900	0.00665232		
11.12	LT Power cable : 3.5CX240 Al XLPE	Mtr.	1800	0.00614772		
11.13	LT Power cable : 3.5CX300 Al XLPE	Mtr.	4500	0.01004232		
11.14	LT Power cable : 1CX630 Al XLPE	Mtr.	20000	0.02031618		
12	1.1kV ,Armoured / Un-Armoured, Cu. Conductor ,PVC insulated FRLS outer-sheathed					

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

12.1	1Cx 1.5 Sqmm Cu. Multi starnd PVC Flexible wire (Red)	Mtr.	20000	0.00027942		
12.2	1Cx 1.5 Sqmm Cu. Multi starnd PVC Flexible wire (Yellow)	Mtr.	10000	0.00027942		
12.3	1Cx 1.5 Sqmm Cu. Multi starnd PVC Flexible wire (Blue)	Mtr.	10000	0.00027942		
12.4	1Cx 1.5 Sqmm Cu. Multi starnd PVC Flexible wire (Black)	Mtr.	40000	0.00027942		
12.5	1Cx 1.5 Sqmm Cu. Multi starnd PVC Flexible wire (Green)	Mtr.	40000	0.00027942		
12.6	1Cx 4 Sqmm Cu. Multi starnd PVC Flexible wire (Red)	Mtr.	3000	0.00027942		
12.7	1Cx 4 Sqmm Cu. Multi starnd PVC Flexible wire (Yellow)	Mtr.	3000	0.00027942		
12.8	1Cx 4 Sqmm Cu. Multi starnd PVC Flexible wire (Blue)	Mtr.	3000	0.00027942		
12.9	1Cx 4 Sqmm Cu. Multi starnd PVC Flexible wire (Black)	Mtr.	9000	0.00027942		
12.10	1Cx 4 Sqmm Cu. Multi starnd PVC Flexible wire (Green)	Mtr.	9000	0.00027942		
12.11	3CX4 Cu XLPE	Mtr.	13000	0.00208311		
12.12	3CX6 Cu XLPE	Mtr.	6400	0.00233681		
12.13	3CX10 Cu XLPE	Mtr.	5100	0.00233681		
12.14	4CX4 Cu XLPE	Mtr.	35000	0.00154468		
12.15	4CX6 Cu XLPE	Mtr.	5000	0.00198322		
12.16	4CX10 Cu XLPE	Mtr.	20000	0.00166403		
12.17	3CX2.5 Cu XLPE used for illumination also	Mtr.	100000	0.00179574		
12.18	1CX120 Cu XLPE	Mtr.	1600	0.00292184		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: **RATE SCHEDULE**

12.19	1CX300 Cu XLPE	Mtr.	320	0.00532938		
12.20	1CX630 Cu XLPE	Mtr.	6500	0.00677986		
12.21	1Cx10 Cu XLPE Unarm for earthing	Mtr.	3000	0.00150766		
12.22	1Cx150 Cu XLPE Unarm for earthing	Mtr.	1500	0.00437491		
12.23	1Cx25 Cu XLPE Unarm for earthing	Mtr.	1500	0.00171696		
12.24	1Cx35 Cu XLPE Unarm for earthing	Mtr.	1500	0.00215120		
13	CONTROL/SIGNAL/ CABLES LAYING,DRESSING & CLAMPING					
13.1	2 Pair X2.5 sq.mm Cu XLPE	Mtr.	17200	0.00169417		
13.2	3 Pair X2.5 sq.mm Cu XLPE	Mtr.	14600	0.00159872		
13.3	4 Pair X2.5 sq.mm Cu XLPE	Mtr.	32600	0.00165040		
13.4	5 Pair X2.5 sq.mm Cu XLPE	Mtr.	37800	0.00187502		
13.5	10CX2.5COPPER PVC/FRLSPVC ARMOURED CABLE	Mtr.	5000	0.00187502		
13.6	6 Pair X2.5 sq.mm Cu XLPE	Mtr.	11400	0.00208511		
13.7	8 Pair X2.5 sq.mm Cu XLPE	Mtr.	2100	0.00245181		
13.8	10 Pair X2.5 sq.mm Cu XLPE	Mtr.	42200	0.00249255		
13.9	12 Pair X2.5 sq.mm Cu XLPE	Mtr.	13000	0.00249255		
14	CABLE TRAYS ERECTION INCLUDING SUPPORT & COVERS FABRICATION WITH CABLE TRAY ACCESSORIES					
14.1	Ladder type cable tray, W=600mm.	Mtr.	10440	0.01393835		
14.2	Ladder type cable tray, W=300mm	Mtr.	6120	0.01085272		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

14.3	600mm (W) Perforated type FRP cable tray(With or Without Cover) including all accessories	Mtr.	2880	0.01612449		
14.4	300mm(W) Perforated type FRP cable tray(With or Without Cover) including all accessories	Mtr.	9360	0.01445360		
14.5	150mm (W) Perforated type FRP cable tray(With or Without Cover) including all accessories	Mtr.	8280	0.01159274		
14.6	50mm(W) Perforated type FRP cable tray(With or Without Cover) including all accessories	Mtr.	8280	0.00861275		
14.7	Ladder type cable tray, W=750mm.	Mtr.	5000	0.01443862		
14.8	150mm (W) Perforated type cable tray.	Nos.	3000	0.00992916		
14.9	50mm(W) Perforated type cable tray	Nos.	2400	0.00861275		
15	INSTALLATION & FABRICATION OF STRUCTURE STEEL					
15.1	ISMC 100 Structural steel channel	MT	100	2.65987999		
15.2	ISA 50X50X6 Angles	MT	75	2.65987999		
16	FIRE SEALING & FIRE PROOFING					
16.1	Fire Break Coatings for HT/LT Power Cables	Sq. Mtr.	500	0.06347003		
16.2	Fire proof materials required for sealing of cable entry thru conduits/trenches.	Sq. Mtr.	300	0.12016933		
16.3	Insulating Mat 3 mm thick (Electrical Insulating Mats)	Nos.	5	0.12024783		
16.4	Insulating Mat 2.5 mm thick (Electrical Insulating Mats)	Nos.	34	0.12024783		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

16.5	Insulating Mat 2mm thick(Electrical Insulating Mats)	Nos.	80	0.12024783		
17	MIS SYSTEM					
17.1	Plant communication system	Nos.	1	67.24201786		
17.2	CCTV System					
17.2.1	CCTV Cameras	Nos.	8	0.22620723		
17.2.2	CCTV Junction Box	Nos.	2	0.14044735		
17.2.3	CCTV Controller	Nos.	1	0.51253960		
17.2.4	CCTV PC,UPS etc	Nos.	2	0.51253960		
17.2.5	CCTV Panel	Nos.	1	1.22021401		
17.3	Fire Detection, Protection and Alarm System					
17.3.1	Fire Alarm Panels (with Optical fibre card) - Approx. size :: in mm 1000 x 600 x 300 (H x W X D)	Nos.	1	0.51248695		
17.3.2	Multisensor Detectors	Nos.	430	0.04792214		
17.3.3	Cables(2P x 1.5 sq.mm)	Mtr.	8000	0.00137495		
17.3.4	Cables(2P x 2.5 sq.mm)	Mtr.	6000	0.00137495		
17.3.5	Cables(1T x 1.5 sq.mm)	Mtr.	600	0.00147831		
17.3.6	Cables(8T x 1.5 sq.mm)	Mtr.	800	0.00196350		
17.3.7	Cables(10T x 1.5 sq.mm)	Mtr.	1500	0.00196350		
17.3.8	Junction Box	Nos.	4	0.12740257		
17.3.9	Manual Call Points(Indoor)	Nos.	40	0.04792214		
17.3.10	Hooter cum Strobe	No.'s	20	0.04792214		
17.3.11	Modules	No.'s	40	0.04792214		
17.3.12	Response Indicators	No.'s	100	0.03864279		
17.3.13	Exit Sign (Back-Lit)	No.'s	20	0.04485592		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

17.3.14	Gas Release Panel with Ni-Cad batteries	No.'s	1	1.16721942		
17.3.15	Gas Loss Indication Panel	No.'s	1	1.16721942		
18	Instrumentation					
18.1	PIPE (SM LS), SA 106 Gr. B - 21.3 X 4.78 mm	Mtr.	900	0.02536239		
18.2	PIPE (SM LS), SS 316L 21.3 X 3.73 mm	Mtr.	240	0.01962267		
18.3	PIPE (SM LS), SA 335 Gr. P22/P91- 21.3 X 4.78 mm	Mtr.	900	0.01822627		
18.4	TUBE (SM LS)- 1/ 2" x 1.65M M THK	Mtr.	300	0.01684238		
18.5	TUBE (SM LS)- 6mm OD X 1 mm THK	Mtr.	700	0.01430144		
19	Instrument Installation materials –Prefabricated Hook Up					
19.1	Pressure Gauge & Pressure Transmitter-CS Material	Nos.	300	0.08993688		
19.2	Pressure Gauge & Pressure Transmitter-SS Material	Nos.	100	0.08993688		
19.3	Differential Pressure Transmitter-CS Material	Nos.	48	0.08993688		
19.4	Differential Pressure Transmitter-SS Material	Nos.	15	0.08993688		
19.5	Flow Elements	Nos.	30	0.17221161		
19.6	Mass Flow Meter	Nos.	5	0.16447427		
19.7	Level Gauges	Nos.	18	0.15288289		
19.8	Level Transmitter(Guided wave Radar)	Nos.	30	0.23930644		
19.9	Rotameter	Nos.	2	0.07984815		
19.10	Pressure Gauge	Nos.	250	0.09435019		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

19.11	Pressure Gauge-Diaphragm Seal	Nos.	40	0.09435019		
19.12	Differential pressure Gauge	Nos.	15	0.09435019		
19.13	Pressure Transmitters (HART)	Nos.	250	0.08471272		
19.14	Remote seal Pressure Transmitter	Nos.	40	0.09188419		
19.15	Differential Pressure Transmitter	Nos.	85	0.09188419		
19.16	Remote Seal Differential Transmitter	Nos.	12	0.09188419		
19.17	Temperature Element (RTD & T/C) with flange Thermowell	Nos.	200	0.09555200		
19.18	Temperature Gauges with flange Thermowell	Nos.	150	0.08563579		
19.19	Temperature Transmitters (HART)	Nos.	200	0.12142495		
19.20	Junction Box	Nos.	200	0.15242793		
19.21	Structural steel for C&I and BOP	MT	8	2.65987999		
19.22	Gauge boards on equipment skids(Rte as per Per LGB)	lot	1	0.81010671		
19.23	LVS(Large Video Screen)	set	2	2.95939207		
20	Instrumentation Signal Cables					
20.1	1P x 1.5 mm2, IS, OS	Mtr.	60000	0.00122332		
20.2	2P x 1.5 mm2,IS, I&OS	Mtr.	40000	0.00143004		
20.3	6P x 1.5 mm2, N-IS, I&OS	Mtr.	192600	0.00169097		
20.4	12P x 1.5 mm2, IS, I&OS	Mtr.	131600	0.00292389		
20.5	2T x 1.5 mm2, IS	Mtr.	6000	0.00174022		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: **RATE SCHEDULE**

20.6	8T x 1.5 mm2, N-IS, I&OS	Mtr.	8000	0.00196350		
20.7	1P x 16 AWG, T/C N-IS	Mtr.	2000	0.00137495		
21	SWAS					
21.1	SWAS Analyser panel(Dry Panel) & SWAS Analyser panel(Wet panels +chiller)	set	1	11.06836591		
22	HT/LT Motor Commissioning					
22.1	Testing and commissioning of HT motors including dryout	Nos.	5	1.14944614		
22.2	Testing and commissioning of 415 V LT motors including dry out.	Nos.	200	0.17128088		
23	Control Valves	Nos.	62	0.15033829		
24	TERMINATION & JOINTING KIT					
24.1	HT Termination Kit	Nos.	350	0.72550029		
24.2	HT Jointing Kit	Nos.	10	0.72550029		
25	Dosing System	Nos.	2	1.11879825		
26	DC MOTOR STARTER PANEL					
26.1	DC Starter Cubicles for STG EOP 15 KW 110 VDC Rated Current-160A	Nos.	1	1.94227390		
26.2	Starter Cabinet / Resistance box for DC Scanner air Fan 5.5 KW 110VDC Rated Current-60A	Nos.	1	1.70431906		
26.3	DC Starter Cubicles for GT EOP 30 KW 125 VDC Rated Current-290 A Starting Current-750 A	Nos.	2	1.94227390		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

27	Generator Circuit Breaker (GCB) 11 KV, 3 pole, SF6 Size: 4.8 x 2.9x 2.6 M6 MT approx	Nos.	1	13.48902954		
28	ERECTION AND COMMISSIONING OF UPS WITH ACDB AND BATTERY					
28.1	UPS(120 KVA),ACDB for UPS system,2x100%+NICD Battery for UPS	Set	1	48.10170488		
29	Lub Oil Purification Equipment Panel	Set	2	0.81482644		
30	CONSOLE Panel	Set	16	2.62529575		
31	OPERATOR DESKS	Set	2	5.86741754		
32	Flue Gas Analyser	Set	1	8.15271995		
33	Electronic Water Level Indicator(EWLI)	Set	2	2.04292025		
34	Flame scanner head assembly	Set	32	0.31983269		
34.1	IFM Ignitor assembly	Set	8	0.36468626		
35	Soot Blowers	Nos.	42	0.14662305		
36	Generator Instrument cabinet	Nos.	1	3.43716013		
37	CABLE TRAYS ERECTION INCLUDING SUPPORT & COVERS FABRICATION WITH CABLE TRAY ACCESSORIES IN C&I SCOPE					
37.1	600MM(W) PERFORATED GRP CABLE TRAY&CPS	Nos.	750	0.01612449		
37.2	300MM(W) PERFORATED GRP CABLE TRAY&CPS	Nos.	1590	0.01445360		
37.3	150MM(W) PERFORATED GRP CABLE TRAY&CPS	Nos.	810	0.01159274		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

37.4	50MM(W) PERFORATED GRP CABLE TRAY&CPS	Nos.	4200	0.00861275		
37.5	Cable Ducts (1200x400 mm) JOINING PLATE/TEES/ELBOW/REDUCE R DUCTS will be supplied loose. The Same needs to be erected.	Mtr.	450	0.18325315		
37.6	Cable Ducts (400x200 mm) JOINING PLATE/TEES/ELBOW/REDUCE R DUCTS will be supplied loose. The Same needs to be erected.	Mtr.	350	0.17622474		
38	DG SET Electrical Jobs					
38.1	HT Cable 1CX630 Sq mm 11KV	Mtr.	1500	0.01689590		
38.2	LT cable1CX630 Sq mm 415 V	Mtr.	3000	0.00717235		
38.3	Control cabling					
38.3.1	3CX4 sq mm	Mtr.	2800	0.00208311		
38.3.2	3CX10 sq mm	Mtr.	500	0.00233681		
38.3.3	4CX2.5 sq mm	Mtr.	3000	0.00169417		
38.3.4	7CX2.5 sq mm	Mtr.	500	0.00165040		
38.3.5	12CX2.5 sq mm	Mtr.	1000	0.00208511		
38.3.6	24CX1.5 sq mm	Mtr.	600	0.00249255		
38.3.7	2P x 1.5 sq mm	Mtr.	1500	0.00137495		
38.3.8	2T x 1.5 sq mm	Mtr.	500	0.00147831		

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter X: RATE SCHEDULE

38.3.9	8T x 1.5 sq mm	Mtr.	500	0.00196350		
38.4	HT Cable end termination	Nos.	60	0.72550029		
38.5	Cable trays(ladder /perforted)					
38.5.1	1000/750 mm (W)	Mtr.	200	0.01523800		
38.5.2	600/450mm	Mtr.	450	0.01523800		
38.5.3	250/150mm	Mtr.	400	0.01181578		
38.5.4	Pr/Temp gauges/transmitters/L Swithes	Nos.	70	0.08563579		
38.5.5	Electrical Panels					
38.5.5.1	Generator control & Protection panel (MRP and Syn.)	Nos.	1	2.76218040		
38.5.5.2	Battery Charger and Battery.	Nos.	1	4.18135628		
38.5.5.3	AMF Breaker & Synchronization control Panel	Nos.	4	2.67908902		
38.5.5.4	Auxiliary MCC	Nos.	10	2.90192730		
38.5.5.5	PLC Panel	Nos.	3	2.98682138		
38.5.5.6	NGR	Nos.	2	2.24789900		
38.5.5.7	Aviation Obstruction Lamp For Chimney With Cable Junction Box	Set	1	1.36430668		
38.5.5.8	Lightning Arrester for Chimney	Set	1	1.36430668		
39	Trefoil Clamps For Single Core Cables	Nos.	3600	0.02429970		

Note

1	Bidder's quoted price above shall be complete in all respect for the full scope defined in specification and in accordance with all terms & conditions of tender.
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TECHNICAL CONDITIONS OF CONTRACT (TCC)

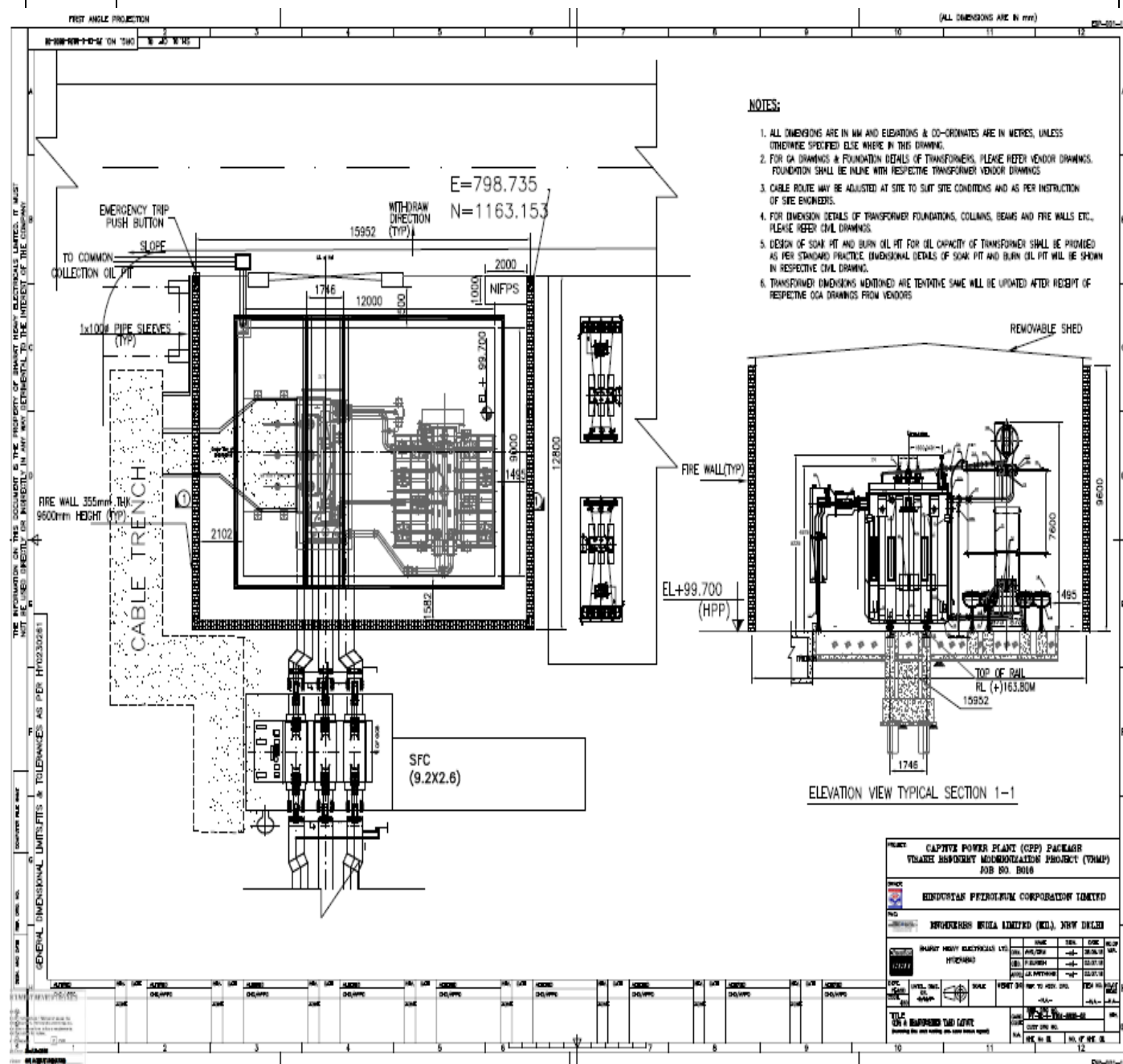
Chapter X: **RATE SCHEDULE**

2	Contractor shall fully understand description and Specifications of items mentioned in BOQ Cum Rate Schedule.
3	Conditional price bids with any deviation / clarification etc. are liable to be rejected. No cutting / erasing / over writing shall be done.
4	Quantities mentioned in BOQ Cum Rate Schedule are approximate only and liable for variation on either side depending upon site / design requirement. The tentative contract value (CV) of entire scope of work shall be calculated as per finally quoted / accepted rates & the Quantities indicated in BOQ cum Rate Schedule.
5	Contractor's total quoted price as per BOQ Cum Rate Schedule will be taken as tentative only. The contractor undertakes to execute actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually executed at site and payments will also be regulated for the same.
6	In case of any mis-match in rate and amount on price discrepancy, the same will be dealt as per clause no. 1.4 of GCC.
7	Taxes (GST) shall be payable extra as per relevant clauses in Technical Conditions of Contract.

Chapter XI: TECHNICAL DETAILS & DRAWINGS

NOTES:

1. ALL DIMENSIONS ARE IN MM AND ELEVATIONS & CO-ORDINATES ARE IN METRES, UNLESS OTHERWISE SPECIFIED ELSE WHERE IN THIS DRAWING.
2. FOR GA DRAWINGS & FOUNDATION DETAILS OF TRANSFORMERS, PLEASE REFER VENDOR DRAWINGS. FOUNDATION SHALL BE INLINE WITH RESPECTIVE TRANSFORMER VENDOR DRAWINGS
3. CABLE ROUTE MAY BE ADJUSTED AT SITE TO SUIT SITE CONDITIONS AND AS PER INSTRUCTION OF SITE ENGINEERS.
4. FOR DIMENSION DETAILS OF TRANSFORMER FOUNDATIONS, COLUMNS, BEAMS AND FIRE WALLS ETC., PLEASE REFER CIVIL DRAWINGS.
5. DESIGN OF SOAK PIT AND BURN OIL PIT FOR OIL CAPACITY OF TRANSFORMER SHALL BE PROVIDED AS PER STANDARD PRACTICE. DIMENSIONAL DETAILS OF SOAK PIT AND BURN OIL PIT WILL BE SHOWN IN RESPECTIVE CIVIL DRAWING.
6. TRANSFORMER DIMENSIONS MENTIONED ARE TENTATIVE SAME WILL BE UPDATED AFTER RECEIPT OF RESPECTIVE JOA DRAWINGS FROM VENDORS.



TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS



भारत हेवी इलेक्ट्रिकल्स लिमिटेड
BHARAT HEAVY ELECTRICALS LIMITED JHANSI

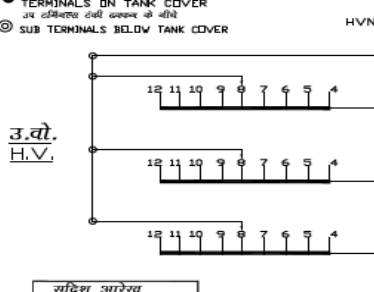
जनित्र परिणामित्र

भारतीय मानक 2026-1977 के अनुसार
TO INDIAN STANDARD 2026-1977

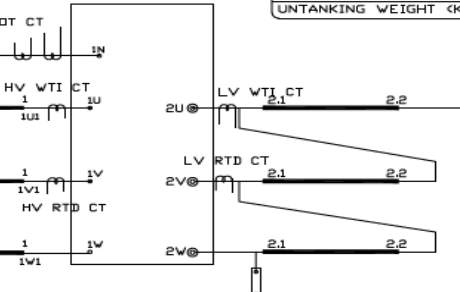
GENERATOR TRANSFORMER

संकेत TYPE OF COOLING: ONAF, ONAN RATING HV (M.V.A.): 105, 85 RATING LV (M.V.A.): 105, 85 NO LOAD VOLTAGE H.V. (KV): 69 NO LOAD VOLTAGE LV (KV): 11 LINE CURRENT HV (AMPS.): 878.57, 711.23 LINE CURRENT LV (AMPS.): 5511.07, 4461.34 TEMPERATURE RISE OL (°C): 45, 45 TEMPERATURE RISE WINDING (°C): 50, 50 CUSTOMER: M/S. HPCL, VIZAG	कनेक्शन PHASE: 3 FREQUENCY (Hz): 50 CONNECTION SYMBOL: YNd11 IMPEDANCE VOLT% HV-LV: 12.50±10% TOL INSULATION LEVEL H.V.: 325 KVP, 140 KV rms LV: 75 KVP, 28 KV rms H.V. NEUTRAL: 325 KVP, 140 KV rms	विशिष्ट संकेत ELEC. SPEC. No.: 627138 S.NO.: 2048422 YEAR OF MANUFACTURE: 2019 DIAGRAM DRAWING NO.: 24571950060 D.G.A. DRAWING NO.: 14570050090 CORE & WINDING (Kg): 62000 APPROX WEIGHT OF OIL (Kg): 35600 APPROX TOTAL WEIGHT (Kg): 132000 APPROX OIL QUANTITY (Litres): 40000 APPROX TRANSPORT WEIGHT (Kg): 76000 APPROX UNTANKING WEIGHT (Kg): 8000 APPROX
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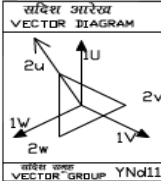
उ.वो. H.V.



नि.वो. L.V.



सदिश आरेख VECTOR DIAGRAM



सदिश समूह VECTOR GROUP YNd11

TAPPING RANGE +10% TO -10% IN 8 EQUAL STEPS OF 2.5% EACH.
TAPPING PROVIDED ON HV FOR HV VARIATION
(OFF-CIRCUIT TYPE TAP SWITCH)

स्विच स्थिति SWITCH POSITION	जोइन्ट लीड्स JOINTED LEADS	उच्च वोल्ट H.V. TERMINALS 1U, 1V, 1W	निम्न वोल्ट L.V. TERMINALS 2U, 2V, 2W	संयोजक प्रतिशत % IMPEDANCE HV-LV
1	(Z - 12)	75.900	798.70	
2	(Z - 11)	74.175	817.28	
3	(Z - 10)	72.450	836.73	
4	(Z - 9)	70.725	857.14	
5	(Z - 8)	69.000	878.57	
6	(Z - 7)	67.275	901.10	
7	(Z - 6)	65.550	924.81	
8	(Z - 5)	63.825	949.81	
9	(Z - 4)	62.100	976.19	

C.T.	RATIO	KNEE POINT VOLTAGE KVP	I _{ex} @ VK/2	RESISTANCE	BURDEN	ACCURACY CLASS
HV WTI/RTC CT	976.28 / 260	---	---	---	7.5 VA	±5
LV WTI/RTD CT	5511 / 8.88	---	---	---	7.5 VA	±5
HVN PROT CT-1	1250/1	>13Rct + 31V	<30	---	---	PS
HVN PROT CT-2	600/1	---	---	---	15 VA	PS10

निर्देशिका:- 1. ऊपर की तालिका में मुख्य भार वोल्टता दिखाई गई है। 2. परिणामित्र के उपर्युक्त वर्तमान स्थान वर्तमान नहीं दिखाए गए हैं।
 3. सभी जोड़ और कनेक्शन के साथ पूर्ण कनेक्शन के लिए उपयुक्त है।
 4. कनेक्शन तालिका परिणामित्र तालिका में दी गई है। तालिका में दी गई कनेक्शन तालिका को ध्यान से देखें।

NOTES:- 1) THE ABOVE TABLE GIVES VOLTAGE AT NO LOAD.
 2) THE RELATIVE TERMINAL POSITIONS ON TRANSFORMER ARE APPROXIMATELY AS SHOWN.
 3) THE TANK IS SUITABLE FOR FULL VACUUM WITH CORE AND WINDING INSIDE.
 4) CONNECTION OF C.T.S TERMINAL BOARD & EARTHING CONNECTION BETWEEN CORE, END FRAME & TANK SHOULD BE REMOVED BEFORE LIFTING THE COVER.

भारत में निर्मित

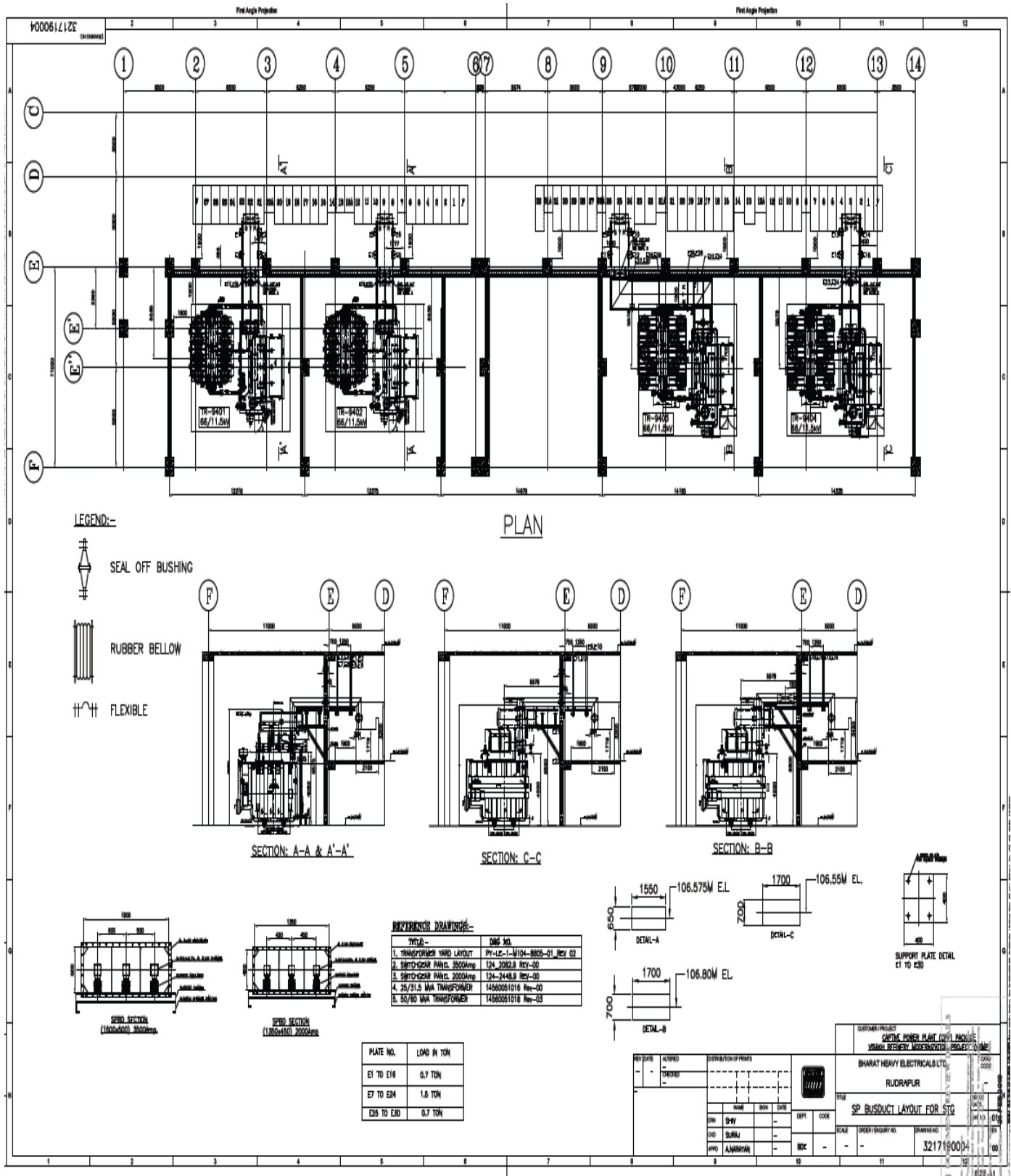
MADE IN INDIA

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS

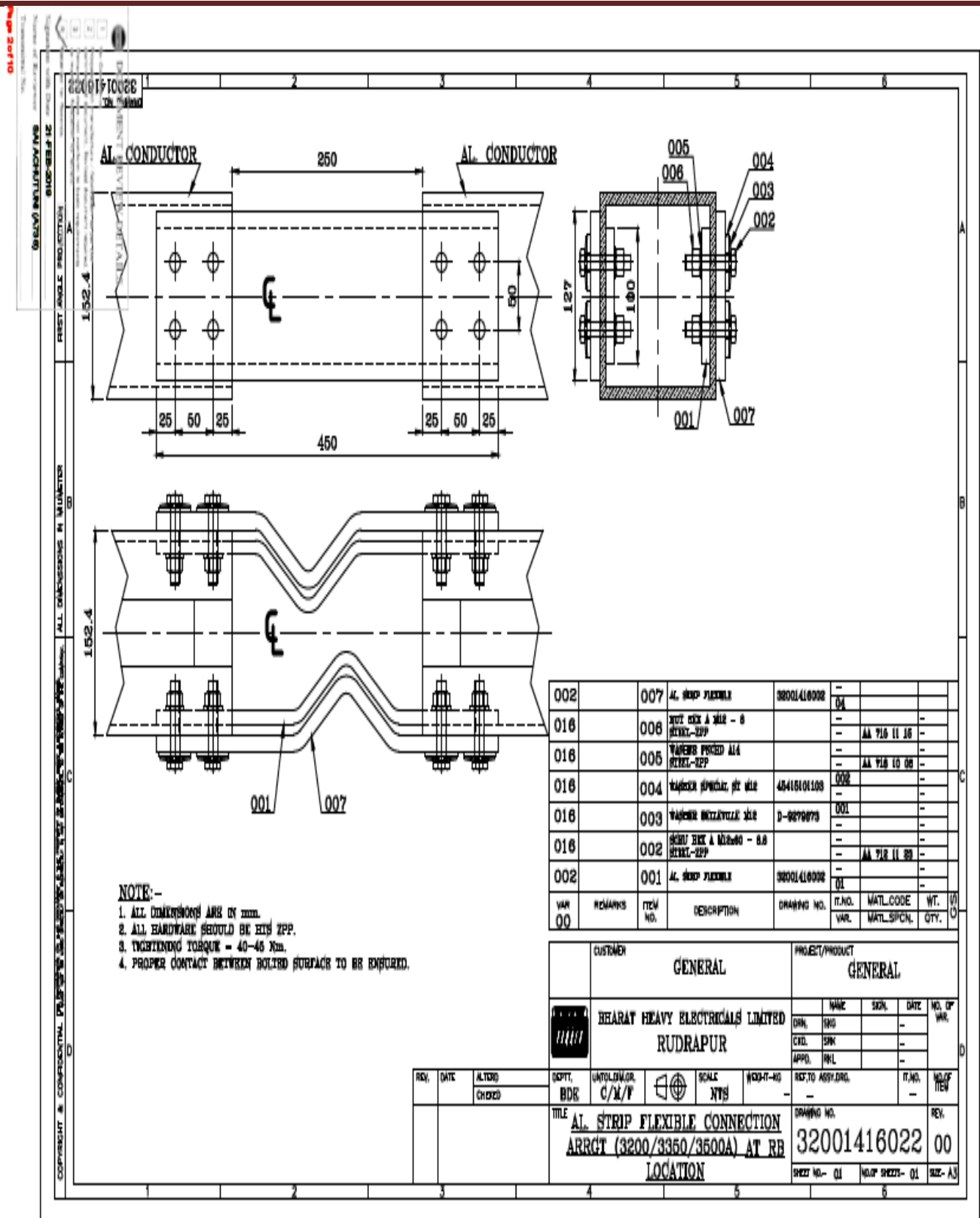
11.2

11 KV SEGREGATED PHASE BUS DUCTS Qty-4 Set

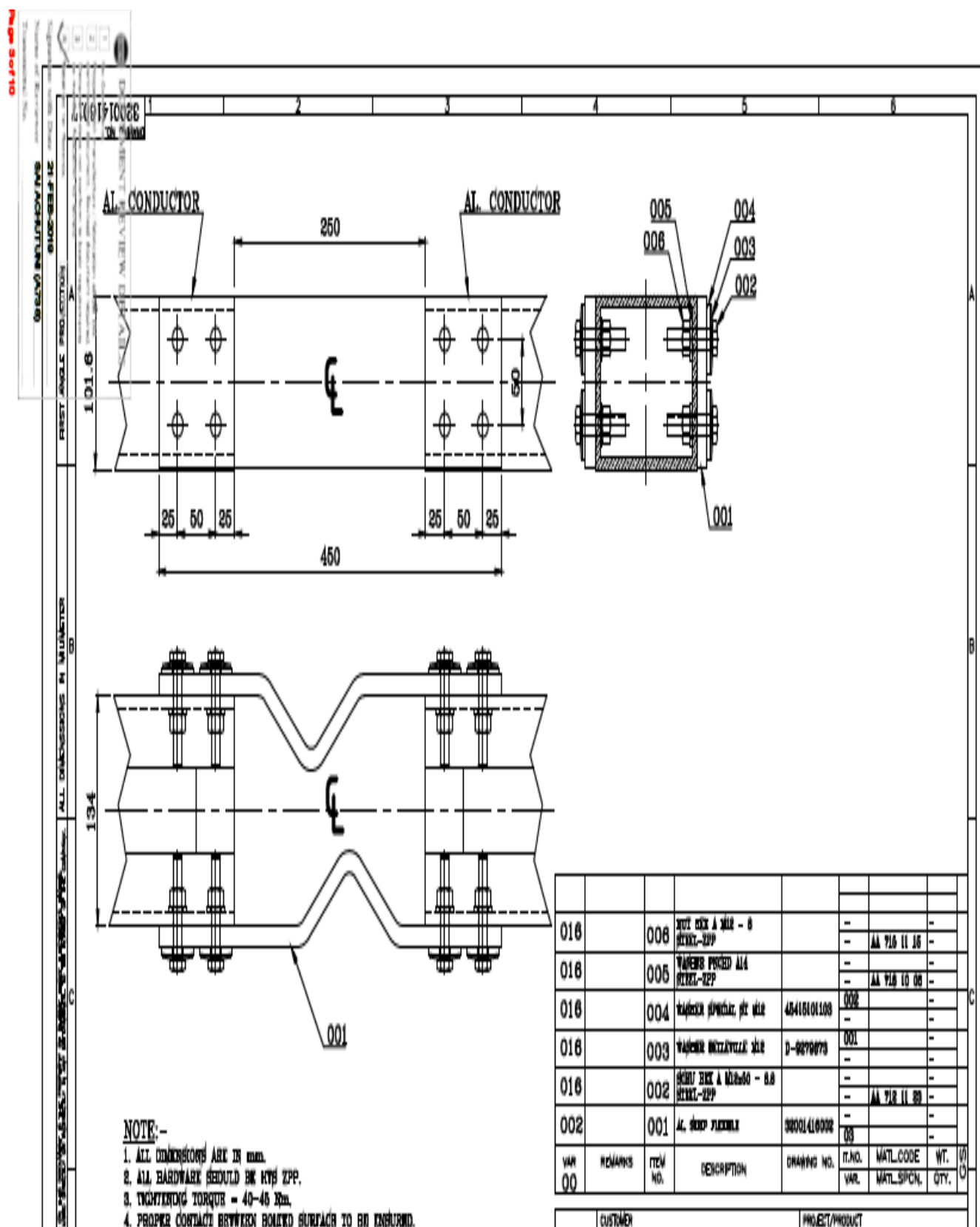


TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS



Chapter XI: TECHNICAL DETAILS & DRAWINGS



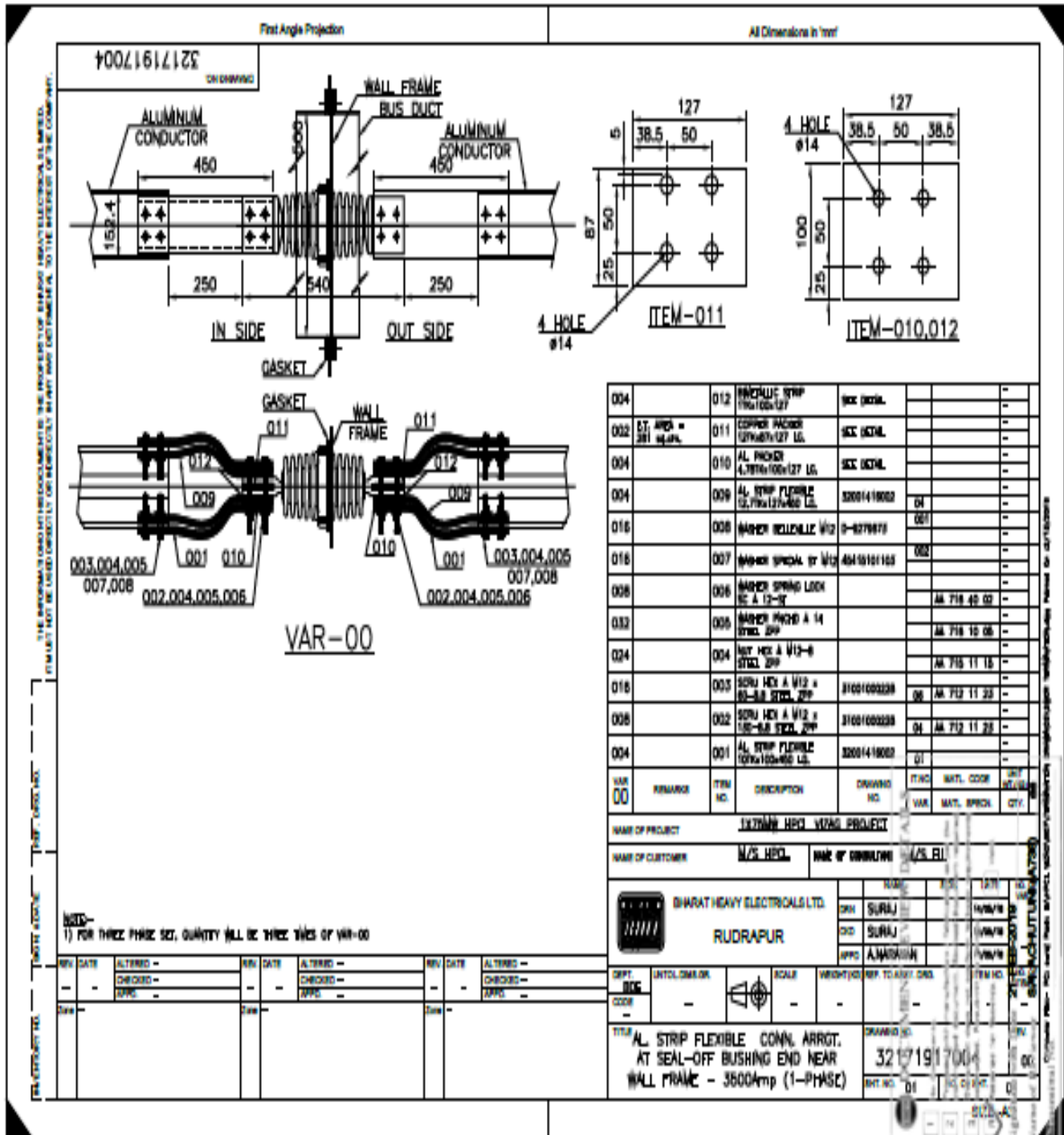
TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS

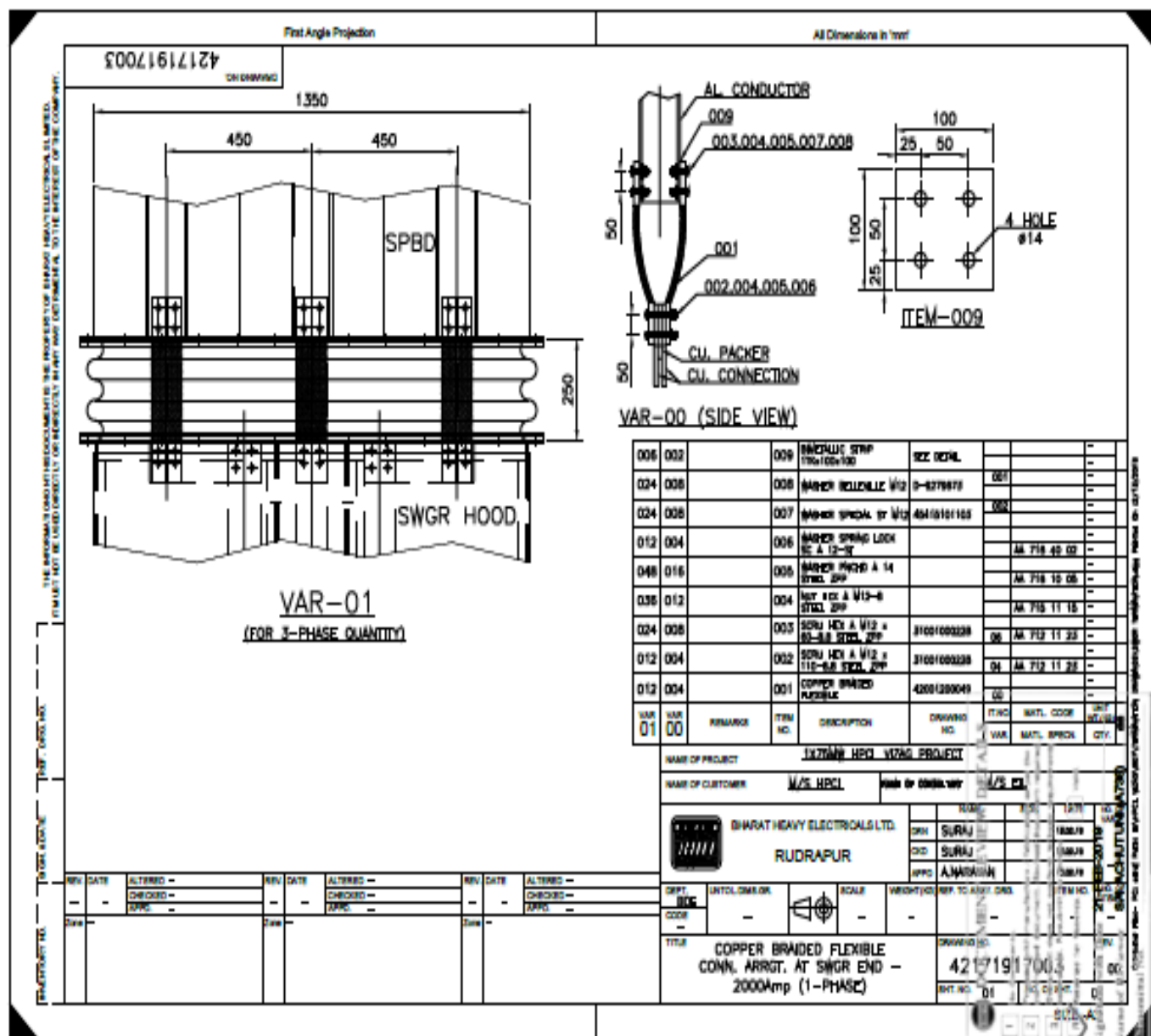
REV.	DATE	ALTERED	REV.	DATE	ALTERED	NOTE:-			
		CHECKED			CHECKED	FOR FASTENING ARRGT. SPBN DNG. NO. 41140900200.			
001			009			FINAL QTY BUSHING			
016	SPBN LOOPS		008			SCREW HEX A M12 x 50-8.8 STEEL			
024	SPBN LOOPS		007			NUT HEX A M12-8			
024	SPBN LOOPS		006			WASHER BRILLVILLE M12	D-9279873	001	
024	SPBN LOOPS		005			WASHER SPECIAL M12	45415101103	002	
024	SPBN LOOPS		004			WASHER PILED A 12-PT			
008	SPBN LOOPS		003			SCREW HEX A M12 x 90-8.8 STEEL			
004	SPBN LOOPS		002			BOMETALIC STRIP 170x100x100			
004	SPBN LOOPS		001			AL. STRIP FLEXIBLE	32001416002	03	
VAR 00	REMARKS	ITEM NO.	DESCRIPTION		DRAWING NO.	IT.NO.	MATL.CODE	WT.	QTY
						VAR.	MATL.SPCN.		
CUSTOMER						PROJECT/PRODUCT			
M/S HPCL VIZAG						1x75MW HPCL VIZAG PROJECT			
BHARAT HEAVY ELECTRICALS LIMITED RUDRAPUR									
REVIEW DETAILS									
DEPT.	UNTD.M.GR.	SCALE	WEIGHT-KG			NAME	SGN.	DATE	NO. OF VAR.
D&E	C/M/E	N.T.S.	-			DRN.	SRINAT		
						CHKD.	SRINAT		
						APPD.	AJAYAN		
TITLE						REF. TO ASSY.DRG.		IT.NO.	NO. OF ITEM
AL. STRIP FLEXIBLE CONN. ARRGT. (SPBN) (AT SEAL-OFF BUSHING END) FOR 2000A									
SIGNATURE (A730)						DRAWING NO.		REV.	
						42171910009		00	
						SHEET NO.- 01		NO. OF SHEETS- 01	
								SIZE- A4	

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS



Chapter XI: TECHNICAL DETAILS & DRAWINGS



TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS

REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED
002	SENT LOOSE	009	BONETALIC BOND		
004	SENT LOOSE	008	SCREW BSK A M12 x 100-B.B		
004	SENT LOOSE	007	WASHER SPRING LOCK SC A		
012	SENT LOOSE	006	SCREW BSK A M12-B		
008	SENT LOOSE	005	WASHER BELLVILLE M12	D-9279673	001
008	SENT LOOSE	004	WASHER SPECIAL HT M12	45415101103	002
016	SENT LOOSE	003	WASHER PADDED A 14		
008	SENT LOOSE	002	SCREW BSK A M12 x 80-B.B		
004	SENT LOOSE	001	COPPER BRAIDED FLEXIBLE	42001200043	00
VAR 00	REMARKS	ITEM NO.	DESCRIPTION	DRAWING NO.	ITEM NO. MATL CODE WT. US C
CUSTOMER			PROJECT/PRODUCT		
M/s HPCL			1X75MW HPCL VIZAG		
BHARAT HEAVY ELECTRICALS LIMITED			NAME		
RUDRAPUR			SIGN.		
REVIEW DETAILS			DATE		
DRN. SUBRAJ			04/10/18		
CHKD. SUBRAJ			04/10/18		
APPD. A.KABAYAN			04/10/18		
REF. TO ASSY.DWG.			ITEM NO.		
DRAWING NO.			REV.		
42171970001			00		
SHEET NO.- 01			NO. OF SHEETS- 01		
SIZE- A4					

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS

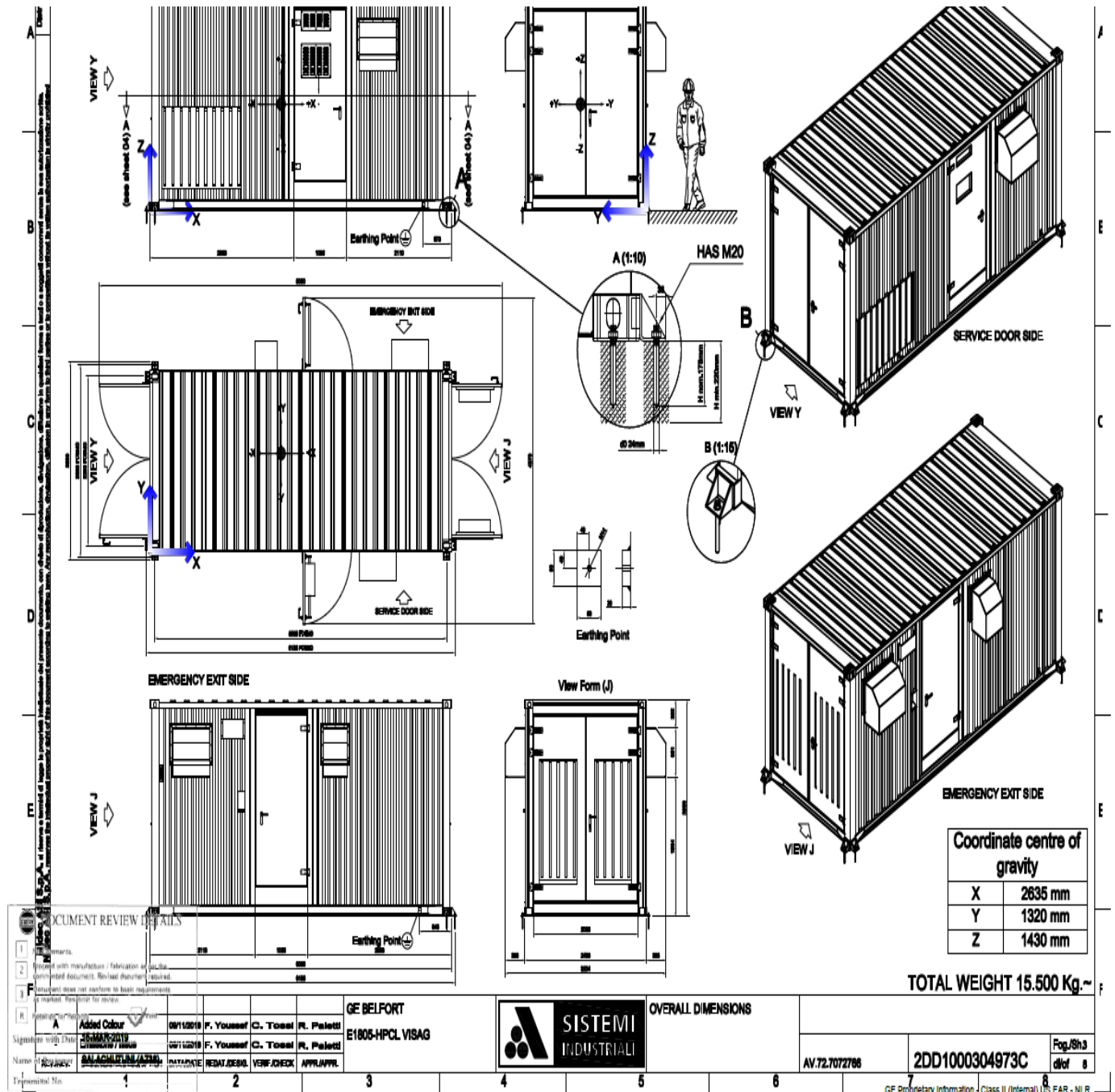
11.3

Static Frequency Converter

Size: 9 x 2.5x 2.9 M;

15 MT

Qty- 1 Set

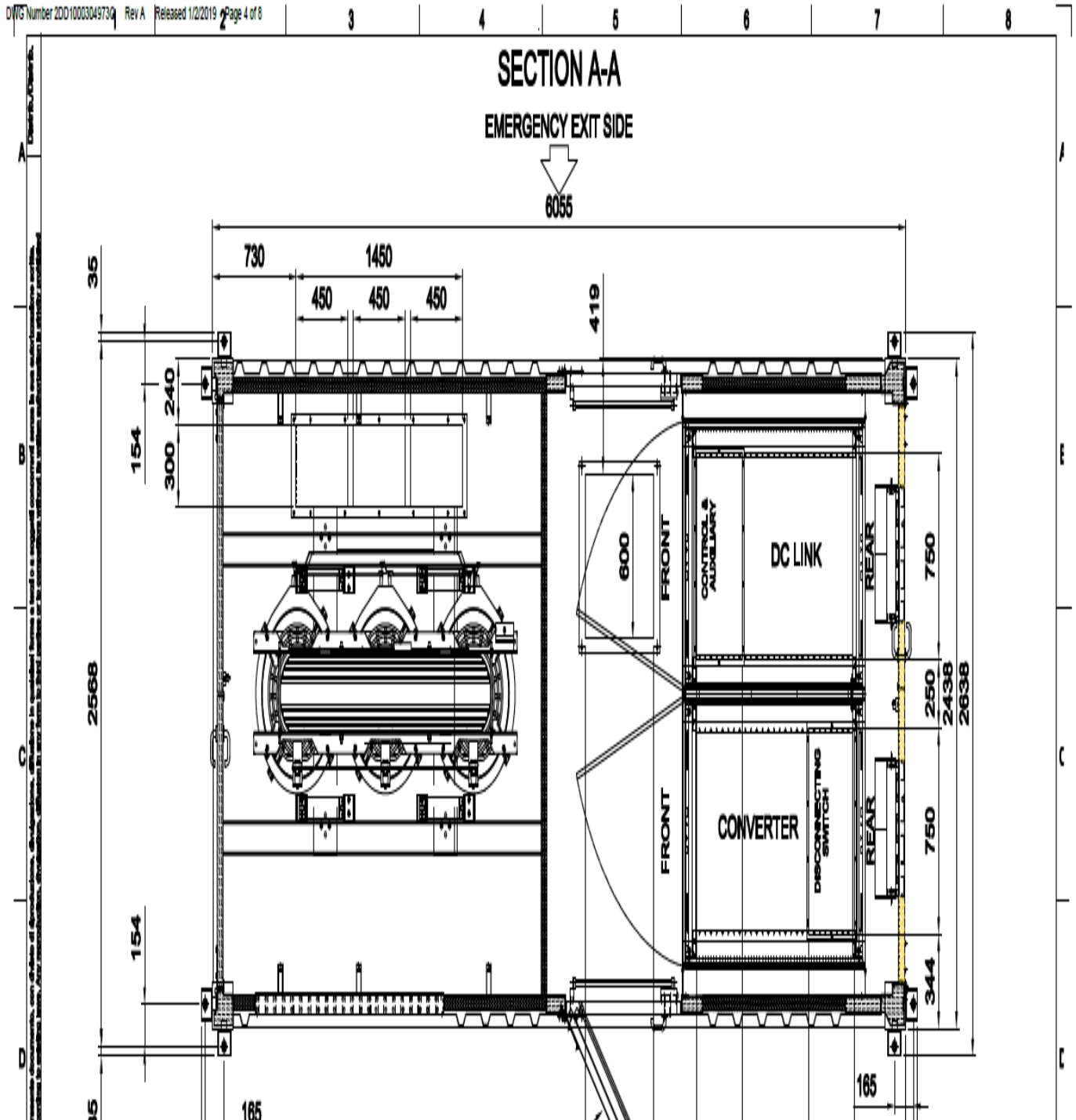


Page 4 of 10

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS

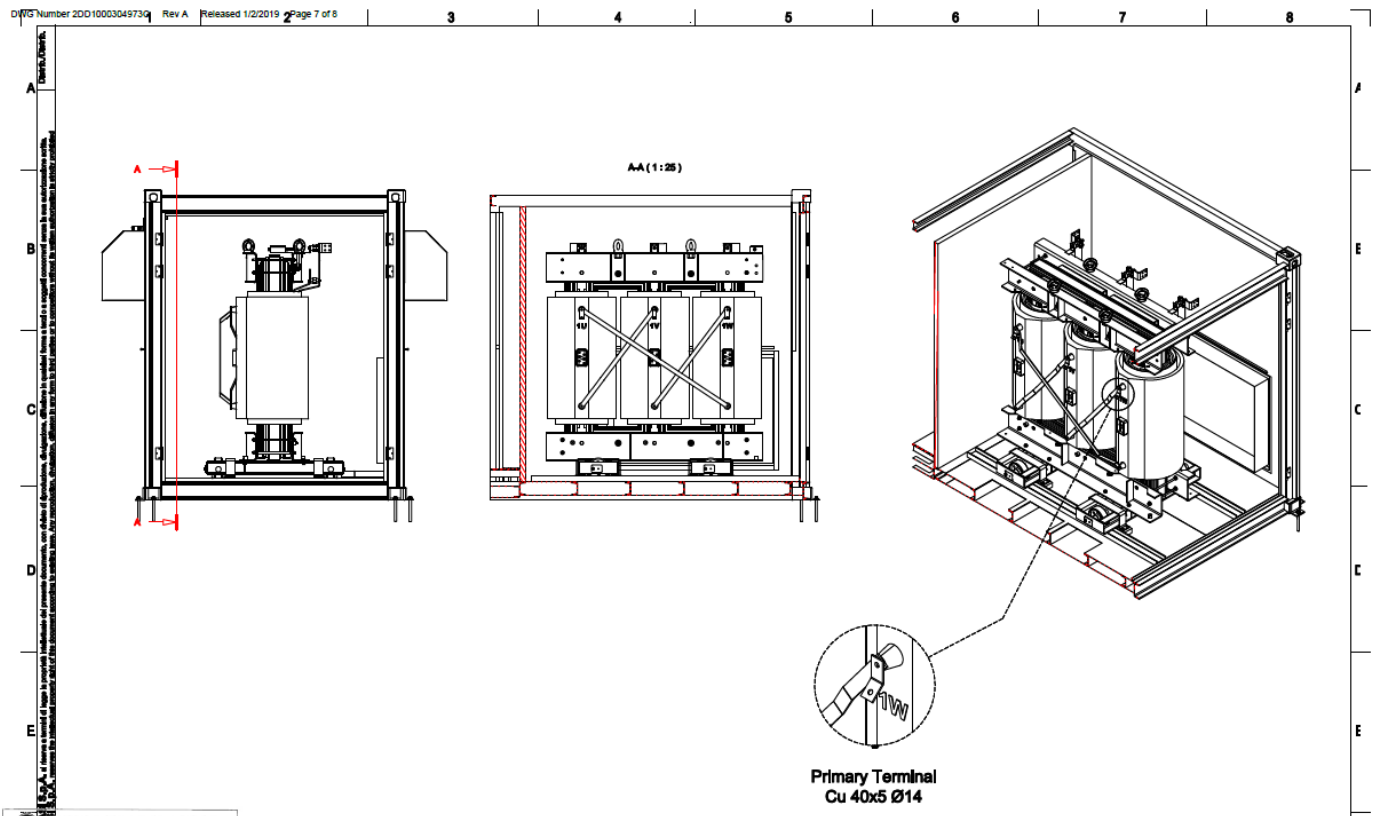
DWG Number 20010003049730 Rev A Released 1/2/2019 Page 4 of 8



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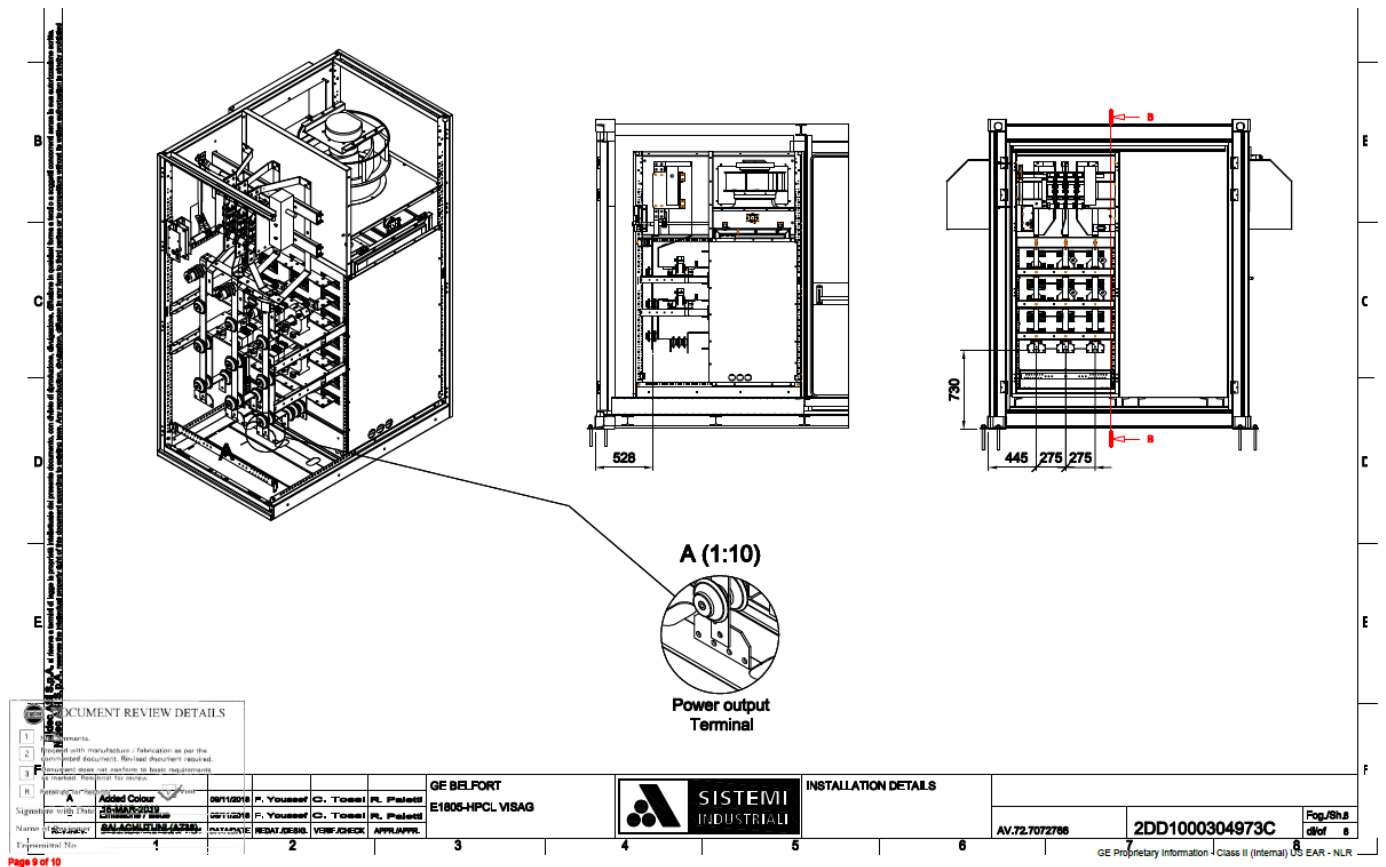
TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS



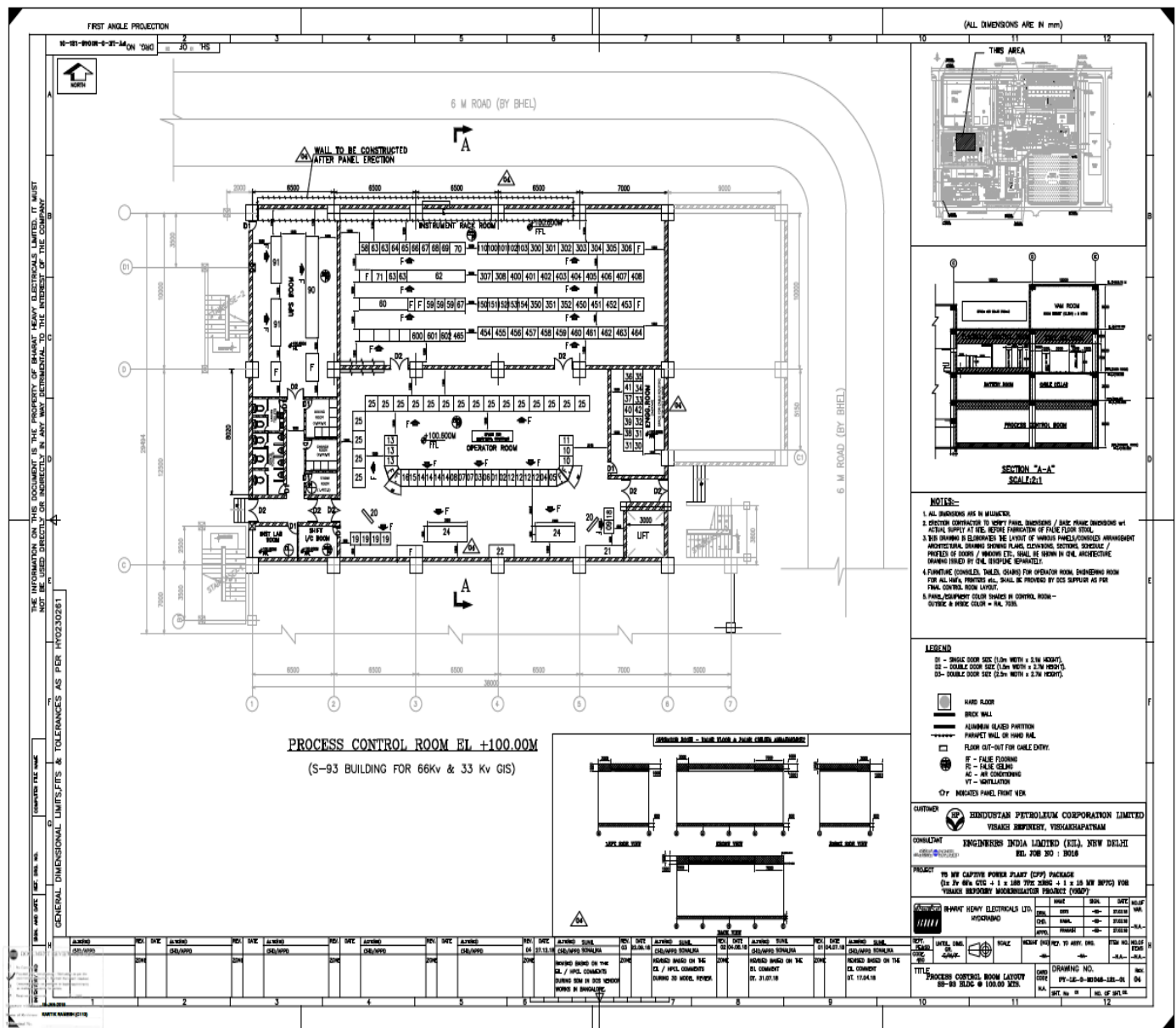
TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS



Chapter XI: TECHNICAL DETAILS & DRAWINGS

11.4	Main Control Room OGA
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Chapter XI: TECHNICAL DETAILS & DRAWINGS

(ALL DIMENSIONS ARE IN mm)

TABLE-1 OPERATOR CONSOLE ROOM

S/N.	DESCRIPTION	QTY	PANEL DIMENSION (WxD) in mm / ft	WIRE PANEL DIM (WxD) in mm / ft	SCOPE	WEIGHT (kg)
01	STD OPERATOR CONSOLE	1 N/O	600X1000X720	TIME TP-NO TP	WEL-FEAGD	20
02	HSS OPERATOR CONSOLE	1 N/O	600X1000X720	WEL-TP-NO TP	WEL-FEAGD	20
03	COMMON FACILITIES OPERATOR CONSOLE	1 N/O	600X1000X720	WEL-TP-NO TP	WEL-FEAGD	20
04	IMS OPERATOR CONSOLE	1 N/O	600X1000X720	WEL TP	WEL-FEAGD	20
05	GANT SCREEN OPERATOR CONSOLE	1 N/O	600X1000X720	TIME TP	WEL-FEAGD	20
06	STD SUPERVISOR CONSOLE	1 N/O	600X1000X720	TIME TP	WEL-HPTF	20
07	STD OPERATOR CONSOLE	2 N/O	600X1000X720	TIME TP-NO TP	WEL-HPTF	20
08	IT HISTORIAN CONSOLE	1 N/O	600X1000X720	WEL TP	WEL-HPTF	20
09	STD CSC PANEL	1 N/O	800X800X240	RUM MONIED	WEL-HPTF	100
10	WARD WARED CONSOLE (2 N/O)	1 SET	600X1000X720	RUM MONIED	WEL-FEAGD	100
11	HSS HYDROREP CONSOLE (2 N/O)	1 N/O	600X1000X720	RUM MONIED	WEL-WHP	120
12	DIETING HSS CONSOLE - H/H	4 N/O	600X1000X720	TIME TP	HPCL	20
13	DIETING HSS HMC'S (3 N/O)	1 SET	600X1000X720	TIME TP	HPCL	20
14	DIETING HSS OPERATING CONSOLE	4 N/O	600X1000X720	TIME TP	HPCL	20
15	DIETING STD SIS NM	1 N/O	600X1000X720	TIME TP	HPCL	20
16	DIETING STD HISTORIAN	1 N/O	600X1000X720	TIME TP	HPCL	20
17	ALERT	1 N/O	600X1000X720	TIME TP	HPCL	20
18	DIETING HSS ALARM PANEL	1 N/O	800X200X100	RUM MONIED	HPCL	200
19	DIETING STD PANEL	4 N/O	800X800X240	RUM MONIED	HPCL	200
20	CITY MONITOR	2 N/O	800X800X240	SEA MONING TYP	HPCL	10
21	DIETING PRINTERS	5 N/O	300X100X200	TIME TP	HPCL	30
22	PRINTERS OF SIS / PLS	3 N/O	200X100X200	TIME TP	WEL-FEAGD	30
23	INTENTIONALLY DELETED ROW					
24	GANT SCREEN 1 & 2	1 N/O	3100 X 985	RUM MONIED	WEL-FEAGD	60
25	SOP PANELS	20 N/O	1200X1000X160	RUM MONIED	WEL-FEAGD	200

TABLE-2 ENGINEERING ROOM

SNo.	DESCRIPTION	QTY NO	PANEL DIMENSION mm / inch	BASE FRAME INCH	SCOPE	WEIGHT kg/lbs	Ref.DWG.NO./REV.
30	DCS END STATION	1	800x750	WALL TP. INDUOR MISC	SHL-PEAKS	20	
31	PLC DCS STATION	2	800x750	WALL TP. INDUOR MISC	SHL-PEAKS	20	
32	PLC SE STATION	1	800x750	WALL TP. INDUOR MISC	SHL-PEAKS	20	
33	HMS ASSET MANAGEMENT STATION	1	800x750	WALL TP. INDUOR MISC	SHL-PEAKS	20	
34	DCS UIN STATION	1	800x750	WALL TP. INDUOR MISC	SHL-PEAKS	20	
35	DOCUMENTATION NODE STATION	1	800x750	WALL TP. INDUOR MISC	SHL-PEAKS	20	
36	OPC SERVER STATION (HMI)	1	800x750	WALL TP. INDUOR MISC	SHL-PEAKS	20	
37	WORK-IN DCS STATION	1	800x750	WALL TP. INDUOR MISC	SHL-GEN	20	
38	WORK-IN DCS STATION	1	800x750	WALL TP. INDUOR MISC	SHL-GEN	20	
39	EXTING. CRT ENGINEERING STATION	1	800x750	WALL TP. INDUOR MISC	SHL-GEN	20	
40	EXTING. CRT ENGINEERING STATION	1	800x750	WALL TP. INDUOR MISC	HPCL	20	
41	OTC HISTORIC PRINTER	1	800x750	WALL TP. INDUOR MISC	SHL-GEN	30	
42	PRINTER	1	800x750	WALL TP. INDUOR MISC	SHL-PEAKS	30	

TABLE-3 INSTRUMENT RACK ROOM

Sl#	DESCRIPTION	QTY (kg)	PAUL DICKSON QTY / price / unit	BASE FRAME DIA. (mm)/mm/pc	SCOPE	WEIGHT (kg/pc)	Ref./BOM/REV No.
100	03 SYSTEM CABINET - HISS	1	BOGAM 1 BOGAM 1 21250A	7037670	Y00000M	425kg/pc	11.00C Net/ISSB-07-01-00
101	03 SYSTEM CABINET - SHIP/PERMY	1	BOGAM 1 BOGAM 1 21250A	7037670	Y00000M	425kg/pc	11.00C Net/ISSB-07-01-00
102	03 SYSTEM CABINET - HISS	1	BOGAM 1 BOGAM 1 21250A	7037670	Y00000M	425kg/pc	11.00C Net/ISSB-07-01-00
103	03 SYSTEM CABINET - SHIP/PERMY	1	BOGAM 1 BOGAM 1 21250A	7037670	Y00000M	425kg/pc	11.00C Net/ISSB-07-01-00
104	03 SYSTEM CABINET - HISS	1	BOGAM 1 BOGAM 1 21250A	7037670	Y00000M	425kg/pc	11.00C Net/ISSB-07-01-00
105	03 SYSTEM CABINET - SHIP/PERMY	1	BOGAM 1 BOGAM 1 21250A	7037670	Y00000M	425kg/pc	11.00C Net/ISSB-07-01-00
110	10 PERSONAL CABINET - COMMON	1	BOGAM 1 BOGAM 1 21250A	7037670	Y00000M	425kg/pc	11.00C Net/ISSB-07-01-00
600	11 4 X 11 1/2 X 11 1/2 TIE ROD - CMMG	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	425kg/pc	11.00C Net/ISSB-07-01-00
601	120K 1/2 X 11 1/2 X 11 1/2 TIE ROD - CMMG	1	BOGAM 1 BOGAM 1 21250A	7037670	Y00000M	425kg/pc	11.00C Net/ISSB-07-01-00
300	03 ANALOG WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
301	03 ANALOG WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
302	03 ANALOG WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
303	03 ANALOG WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
304	03 ANALOG WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
305	03 ANALOG WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
306	03 ANALOG WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
307	03 ANALOG WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
308	03 ANALOG WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
309	03 ANALOG WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
400	03 DIGITAL WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
401	03 DIGITAL WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
402	03 DIGITAL WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
403	03 DIGITAL WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
404	03 DIGITAL WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
405	03 DIGITAL WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
406	03 DIGITAL WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
407	03 DIGITAL WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00
408	03 DIGITAL WIRELESS CABINET - HISS	1	12000M 1 BOGAM 1 21250A	7003119	Y00000M	475kg/pc	11.00C Net/ISSB-07-01-00

S/N.	DESCRIPTION	QTY (N/A)	PANEL DIMENSION (INCHES) (N/A)	BASE FRAME DIM. (INCHES) (N/A)	SCOPE	WEIGHT (LBS) (N/A)	Ref. Drawing No. REV. No.
438	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
439	530 DENTAL IMPLANTING CABINET - HSSG	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	425	1L 500 Rev 1/180201-07-TL
451	530 DENTAL IMPLANTING CABINET - HSSG	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	425	1L 500 Rev 1/180201-07-TL
452	530 DENTAL IMPLANTING CABINET - STD	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	425	1L 500 Rev 1/180201-07-TL
453	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	425	1L 500 Rev 1/180201-07-TL
154	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	425	1L 500 Rev 1/180201-07-TL
802	110 X 6 IN UPS BY EPC FIBER CABLE - COMBO	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
330	530 ANALOG IMPLANTING CABINET - HSSG	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
351	530 ANALOG IMPLANTING CABINET - STD	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
352	530 ANALOG IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
430	530 DENTAL IMPLANTING CABINET - HSSG	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
431	530 DENTAL IMPLANTING CABINET - HSSG	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
432	530 DENTAL IMPLANTING CABINET - HSSG	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
433	530 DENTAL IMPLANTING CABINET - HSSG	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
434	530 DENTAL IMPLANTING CABINET - HSSG	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
435	530 DENTAL IMPLANTING CABINET - HSSG	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
436	530 DENTAL IMPLANTING CABINET - STD	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
437	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
438	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
439	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
440	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
441	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
442	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
443	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
444	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
445	530 DENTAL IMPLANTING CABINET - BOP	1	1200W X 800M X 2125D	700X1199	YOKOGAWA	475 (approx)	1L 500 Rev 1/180201-07-TL
530	STD TURBINE CONTROL PANEL	1	1200Wx800x2400	1150X750	DEL-TECH	500	
530	BOP GAS PANELS	3	800x400x450	750X750	DEL-TECH	500	
60	DIAPHRAGM CONTROL PANELS	1	3650x750x2100	3110X2000X700	DEL-TECH	2400	△
61	PA SYSTEM PANEL (DELTA)	1	800x600x450		HPL		
62	WARR-100 PANEL	1	800x600x450	595X750	DEL-TECH	500	
63	WARR-100 NETWORK PANELS	2	800x600x450	750X750	DEL-TECH	500	
64	SDN SERVER PANEL	1	800x600x450	750X750	DEL-TECH	500	
65	SDN SWITCHING SW. MONITORING PANEL	1	800x600x450	750X750	DEL-TECH	500	
66	IN LOW MONITORING PANEL	1	800x600x450	750X750	DEL-TECH	500	
67	OT INDC CONTROL PANEL	1	800x600x450	750X750	DEL-TECH	500	
68	OT IN MONITORING PANEL	1	800x600x450	750X750	DEL-TECH	500	
69	OT AUXILIARY PANEL	1	800x600x450	750X750	DEL-TECH	500	
70	OTCY SYSTEM PANEL	1	1200Wx800x2400	750X750	HPL	500	
71	INERT GAS PANEL	1	1200Wx800x2400	3000X750	DEL-TECH	1600	

TABLE-4 UPS ROOM

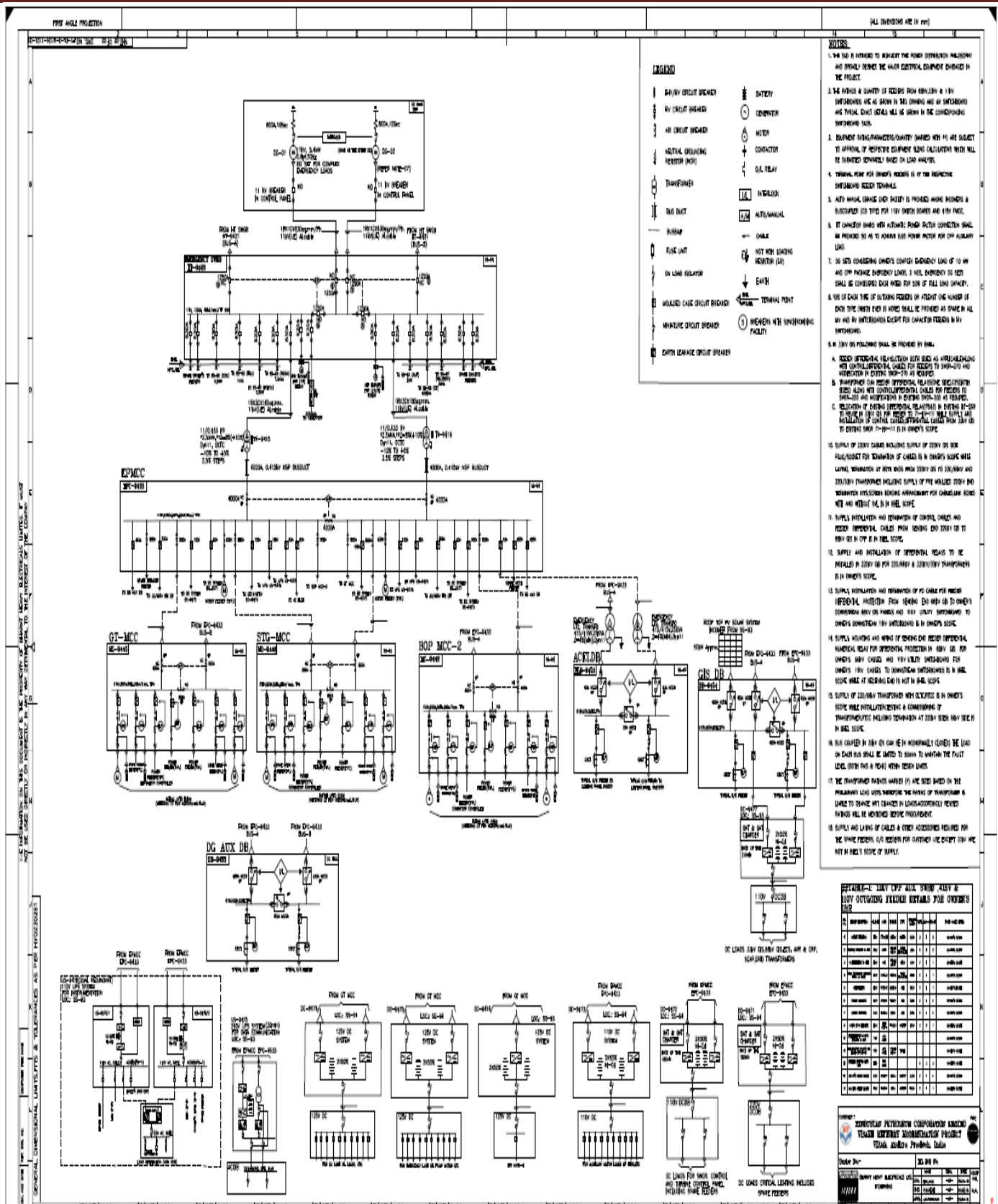
SNo.	DESCRIPTION	QTY (No.)	DIMENSIONS (Width) in mm / yard	BASE FRAME DIA. (Width) in mm / yard	SCOPE	WEIGHT (Kg./mm)	Ref.DWG.No./REV No.
90	PLANT UPS SYSTEM	1	6500x1000x2340	5950x950	IRE-EN	2000	
91	UPS ACB-1	1	3000x800x2000	2950x750	IRE-EN	900	
92	UPS ACB-2	1	3000x800x2000	2950x750	IRE-EN	900	

CUSTOMER		 HINDUSTAN PETROLEUM CORPORATION LIMITED VISHAKHAPUR, VISAKHAPATNAM									
CONSULTANT		ENGINEERS INDIA LIMITED (EIL), NEW DELHI REG. NO. 30 / 1974									
PROJECT		TO BE SUPPLIED POWER PLANT (CWP) PACKAGE (1x 2x 50 MW STEAM & 1x 300 TPD LUBRIC & 1x 10 MW NITRO) "VISHAKHAPUR MODIFICATION PROJECT" (CWP)									
 BARHAT HEAVY ELECTRICALS LTD. VARANASI		MAKE MODEL SIZE QTY		TYPE NO. OF QTY		DATE NO. QTY		REF. NO. QTY		REMARKS NO. QTY	
ITEM NO. QTY		DATE NO. QTY		TYPE NO. QTY		DATE NO. QTY		REF. NO. QTY		REMARKS NO. QTY	
TITLE		DRAWING NO. 11-0-01-01-04-01-04 CONTROL ROOM LAYOUT									

Single Line Diagram of Power Ckt



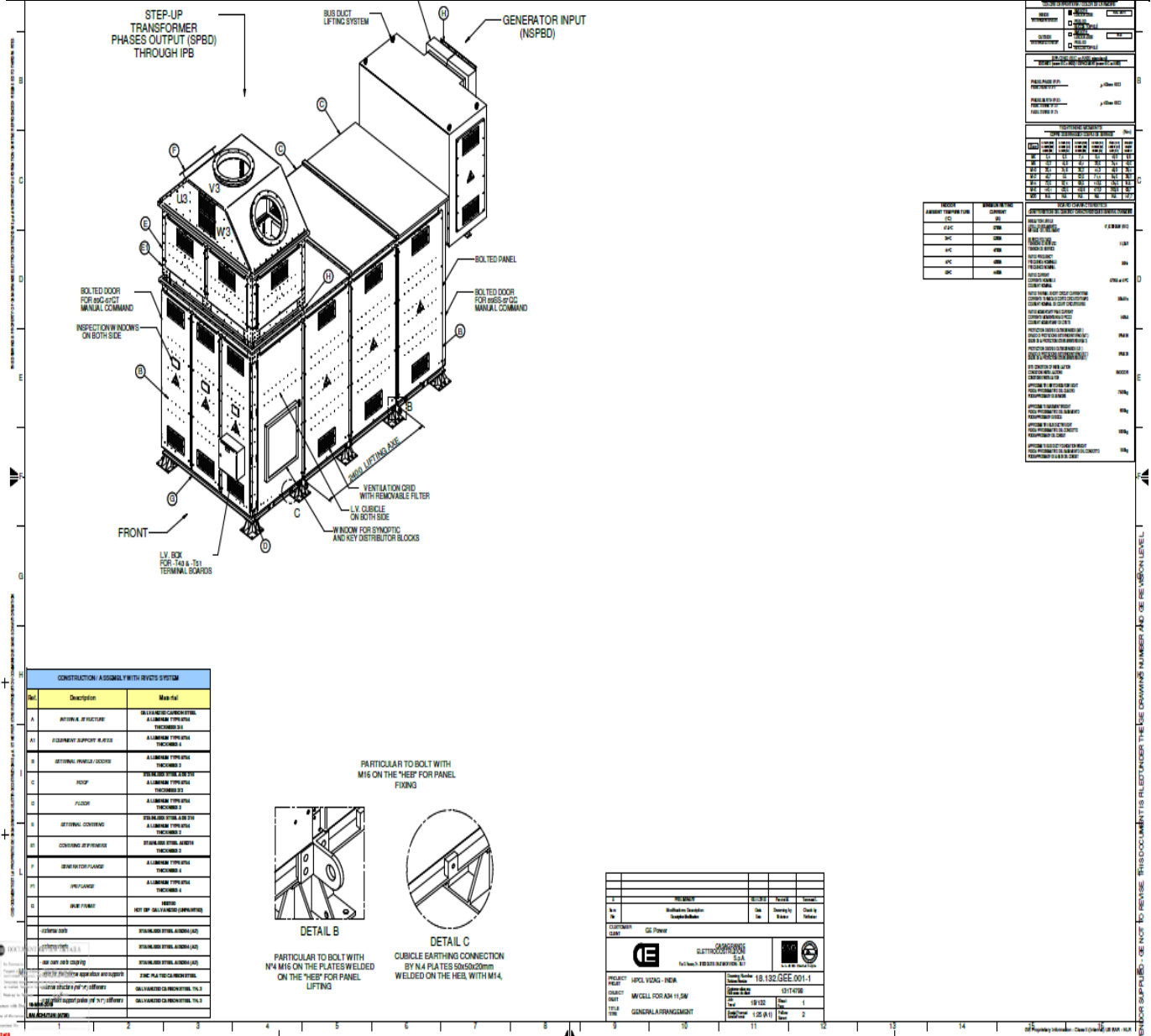
Chapter XI: TECHNICAL DETAILS & DRAWINGS



TECHNICAL CONDITIONS OF CONTRACT (TCC)

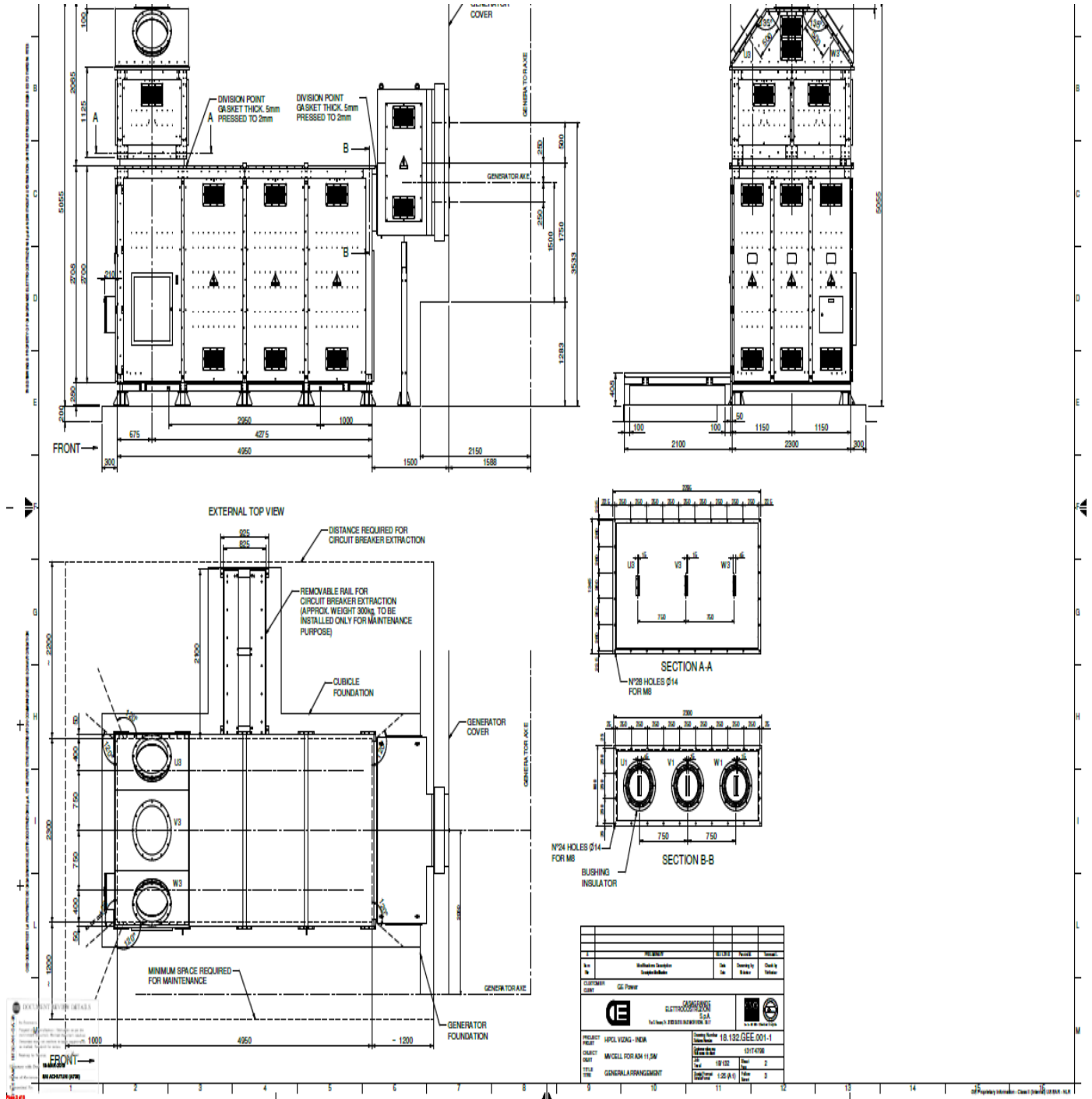
Chapter XI: TECHNICAL DETAILS & DRAWINGS

11.6 MV Cell Equipment's Arrangements (GCB) 11 KV, 3 pole, SF6 Size: 4.8 x 2.9x 2.6 M 6 MT approx Qty-1



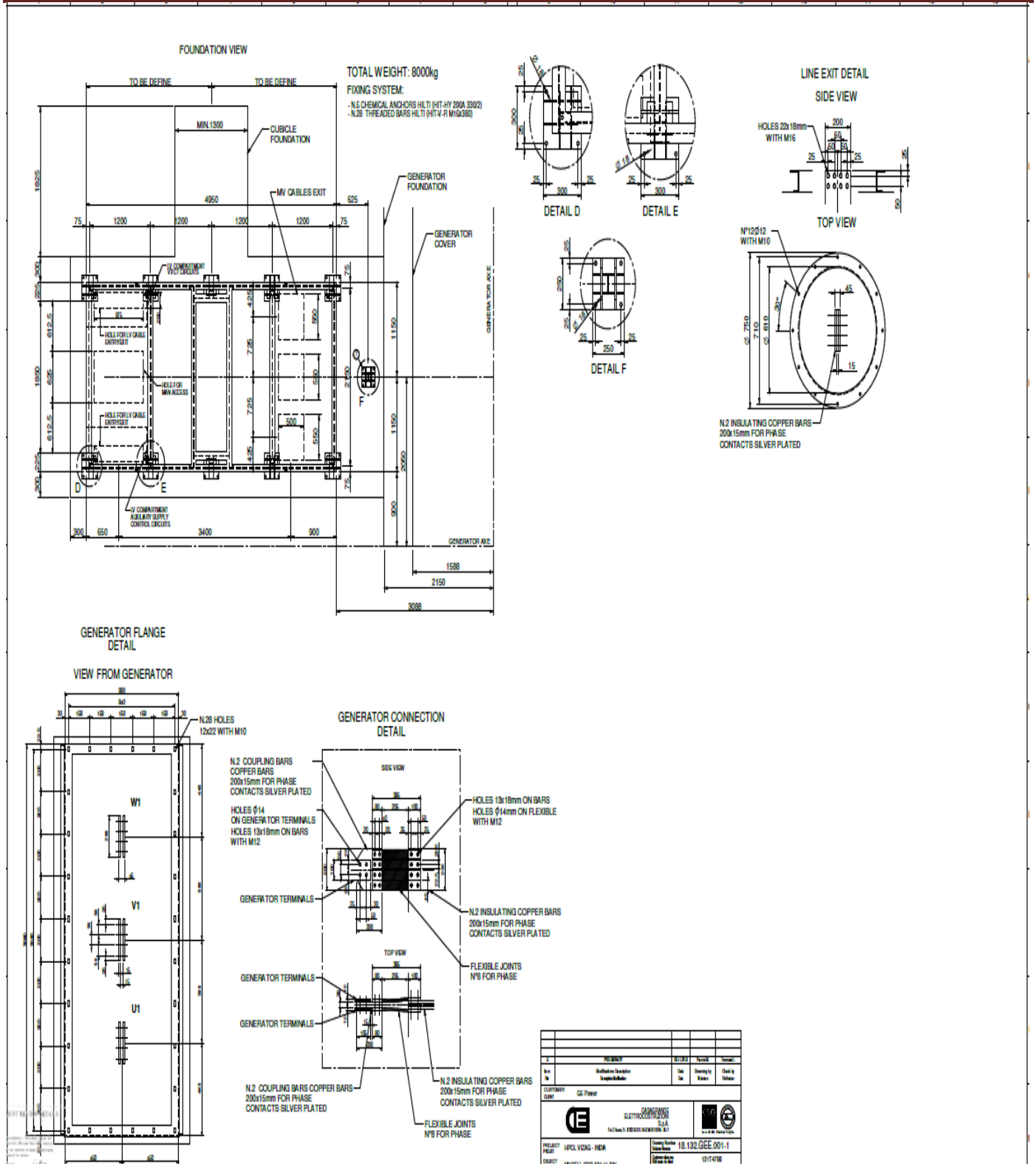
TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS



TECHNICAL CONDITIONS OF CONTRACT (TCC)

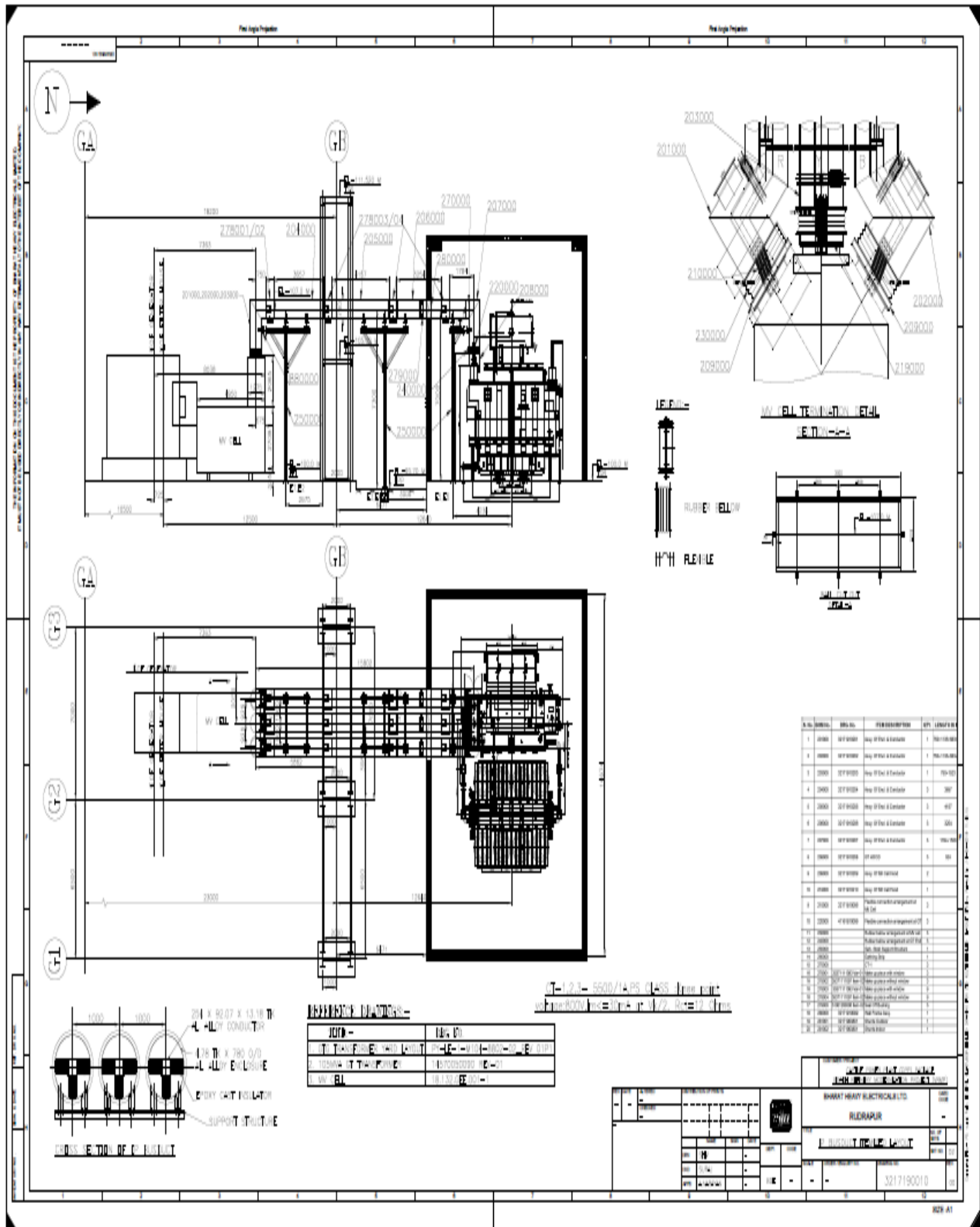
Chapter XI: TECHNICAL DETAILS & DRAWINGS



TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XI: TECHNICAL DETAILS & DRAWINGS

11.7 IP Bus Duct OGA



TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter XII: Annexures to the Contract

12	Annexure-I: Following documents are attached annexures. These documents forms integral part of this contract and all works/penalties/permits/approvals at site related to HSE shall be in line with the guidelines of these documents. In case of any conflict between clauses the documents referred below, the more stringent one shall apply.
12.1	OISD GUIDELINES-192, OISD GUIDELINE-207- These guidelines are released by the Oil Industry Safety Directorate (OISD), Govt. of India, Ministry of Petroleum & Natural Gas. These are to be adhered to during execution of the work of this contract scope at project site. OISD - GDN 192 and OISD- Guidelines -207 may be downloaded from the ministry/directorate website for reference. These documents are annexed as Annexure – I
12.2	Annexure-II: HSE) Plan for HPCL Visakhapatnam site dated 19.05.2018 (Doc no.: HSEP:PSER 14-HPCLBHEL REV: 02) This document is Annexure -II
12.3	Annexure-III: Guidelines for settlement of claims for compensation on accidents applicable to BHEL. This document is as Annexure -III
12.4	Annexure-IV Penalty List of M/s EIL, applicable for this contract. This document is annexed as Annexure -IV
12.5	Annexure-V Colour coding for Painting in the CPP. The contract specification of Customer are attached. Contractor will have to follow these guideline for its scope of work under the contract. This document is annexed as Annexure -V
12.6	OISD-STD-105, Work Permit System. This document to be made available at site during execution.