



बामर लॉरी एंड क. लिमिटेड

(भारत सरकार का एक उधम)

BALMER LAWRIE & CO. LTD.

(A Government of India Enterprise)

Multi-Modal Logistics Hub (MMLH)

SBU – Logistics

**30-15-154/4F2, 5th Floor, GKP Heavenue,
Dabagardens Main Road, Visakhapatnam - 530020**

TENDER DOCUMENT

for

**Design, Supply, Erection, Testing and Commissioning of
Refrigeration System for Temperature Controlled Warehouse
for**

Multi-Modal Logistics Hub at Visakhapatnam, Andhra Pradesh

Tender No. MMLH / TCW/REF/ PT / 16

Date: 13.01.2017

Due Date: 03.02.2017, 16:00 Hrs

PART – I (UNPRICED)

TENDERER'S CHECKLIST POINTS (Tenderer must fill in the table below appropriately):

Sl. No.	Check list points	Bidder's /Submission	Confirmation (Yes / No)
<u>PQ Criteria</u>			
1	Demand Draft for Tender Fees of Rs 5,000/-		
2	Demand Draft or Bank Guarantee for Earnest Money Deposit of Rs 2,50,000/-		
3	Attested/Notarized copy of valid NSIC certificate or "Micro and Small" industry certificate (In case of "Micro & Small" industries)		
4	Audited Annual Reports for Last 3 financial years ending 31 st March, 2016		
4.1	Turnover in FY 2013-14	
	Turnover in FY 2014-15	
	Turnover in FY 2015-16	
5	Work Orders with detailed Schedule of Work/BOQ and Completion Certificates for similar work as per required pre-qualification criteria		
6	Original Solvency certificate of 200 Lakh value (not older than 6 months)		
7	PAN		
8	TIN / VAT Registration		
9	Provident Fund Registration		
10	Service Tax Registration		
11	Excise Registration		
12	ESI Registration (If Applicable)		
13	IT Return for Last Three Financial Years ending March 16		
14	HSE Compliance as per Appendix-A & B under Special Conditions of Contract		
15	Original Power of Attorney of the Signatory signing the tender document duly notarized		
<u>Other Conditions</u>			
16	List of Work Executed for the past 7 years as per Attachment –VI under General Conditions of Contract		
17	List of Work in Progress as per Attachment –VII under General Conditions of Contract		
18	Confirmation on Time of Completion of job within 6 months (4 months for Supply, 2 month for Erection)		

19	Project Implementation Schedule for Design, Supply, Erection, Testing and Commissioning of Refrigeration System	
20	Confirmation on inclusion of Building Labour Welfare Cess in the quoted price	
21	Stamped and Signed Tender Document along with addendum/corrigendum	
22	Confirmation of ' NO DEVIATION' from Tender	
23	Confirmation of Bid Validity of 120 days	
24	Whether the tenderer is a relative of any of the Directors of Balmer Lawrie & Co. Ltd. If the tenderer is a firm, is any of BL's Directors or any of their relatives partners in the tenderer's firm. If the tenderer is a company registered under company's Act, 1956, whether any of BL's Directors is a member of Director of the company.	

Hard copies (2 sets in hard bound/spiral bound- 1 original +1 photocopy with Index/Table of Contents, page nos) of the above confirmatory documents (UNPRICED BID ONLY) must be sent before or on due date of submission of online tenders failing which the bid may be rejected.

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Tender No. MMLH /TCW/REF/ PT/16**1.0 TENDER INVITATION**

Balmer Lawrie & Co. Ltd.(BL) invite ONLINE BIDS from experienced, competent and resourceful contractors with sound technical and financial capabilities for **Design, Supply, Erection, Testing and Commissioning of Refrigeration System of Temperature Controlled Warehouse for Proposed Multi-modal Logistics Hub at Visakhapatnam, Andhra Pradesh** being set up by Visakhapatnam Port Logistics Park Limited (VPLPL), a Joint Venture Company between Balmer Lawrie & Co Ltd and Visakhapatnam Port Trust in India and having its registered office at 21, Netaji Subhas Road, Kolkata - 700 001.

The prospective bidders must note that Balmer Lawrie & Co. Ltd. is involved only to the extent of tendering & finalization of the order. The order on the successful bidder would be placed by Visakhapatnam Port Logistics Park Limited, having its registered office at 21, Netaji Subhas Road, Kolkata -700001 and Correspondence address at 30-15-154/4F2, 5th Floor, GKP Heavenuue, Dabagardens Main Road, Visakhapatnam - 530020, India, Tel: + 91 891 2564933.

2.0 SCOPE OF WORK

The tender covers Design, Supply, Erection, Testing and Commissioning of Ammonia based Refrigeration System as mentioned in Schedule of Work, Technical Specification, Drawings, General Conditions of Contract and Special Conditions of Contract.

2 (Two) separate orders will be placed on successful tenderer for Supply and Erection. Separate Order for Plant Operation and Maintenance will be placed after completion of the project.

3.0 COMPLETION PERIOD

Time is the essence of the contract. The time schedule for completion shall be as follows:-

- 3.1 Design, Manufacturing and Delivery of all equipment/materials for refrigeration system: **4 (Four) months** from the date of placement of order/ LOI.
- 3.2 Erection, Testing & Commissioning of the refrigeration system: **Two (2) months** from the date of handing over of site.

4.0 TENDER FEE

Tender fee of **Rs 5,000/- (Rupees Five Thousand Only)**, which is non-refundable, by means of a demand draft drawn in favour of Balmer Lawrie & Co. Ltd on any Scheduled Bank payable at par at Kolkata should be submitted by the tenderer along with the un-priced part (Part-I) of the tender.

5.0 EARNEST MONEY DEPOSIT

- 5.1 Unpriced Part of the Bid should be accompanied by a Demand Draft or Bank Guarantee of **Rs 2,50,000.00 (Rupees Two Lakh Fifty Thousand Only)** towards Earnest Money Deposit (EMD) executed by any scheduled bank drawn in favour of M/s Balmer Lawrie & Co. Ltd. payable at Kolkata as per format enclosed. EMD submitted by way of Bank Guarantee should be valid for a minimum period of **150 days** after the due date of tender submission.
- 5.2 EMD and Tender fee are exempted for bidders registered under NSIC or coming under the definition of Micro and Small Industries and holding valid registration certificates covering the tendered

items/services. However, attested/Notarized copy of valid NSIC certificate or "Micro and Small" industry certificate must be submitted along with the tender. The certificate must cover the scope/supply/services for which the Tender is invited.

- 5.3 For the successful bidder, the EMD will be refunded only after they submit the necessary Security Deposit against the work order placed on them.
- 5.4 For the unsuccessful bidders, the EMD will be refunded only after the successful bidder has accepted the Purchase order and the acknowledgment of the same has been received by BL.
- 5.5 EMD is liable to forfeiture in the event of:
- a) Withdrawal of offers during validity period of the offer
 - b) Non acceptance of orders by the bidder within the stipulated time after placement of order.
 - c) Any unilateral revision made by the bidder during the validity period of the offer.
 - d) Non submission of Security Deposit.
 - e) Bidders submitting false/fabricated/bogus documents in support of their credentials

6.0 PRE-QUALIFICATION CRITERIA

The prospective tenderers shall fulfill the following pre-qualification criterion -

6.1 Tender Fee, EMD or NSIC/MSME Registration Certificate

Submission of Tender Fee & EMD or Original Notarized Copy of valid NSIC/MSME Certificate along with the Unpriced Bid as mentioned above. Tender Fee & EMD in original shall reach to our office on or before the due date of submission of offer failing which bid will be rejected.

6.2 Turnover Criteria

Average annual turnover of the tenderer shall be minimum of **Rs 300 Lakhs** during last 3 (three) financial years ending 31st March, 2016. Audited Annual Reports for Last 3 financial years ending 31st March, 2016 shall be submitted in support of that.

6.3 Past experience

- 6.3.1 Original Equipment Manufacturer (OEMs) or their authorized representatives only are eligible to bid against the Tender. Authorization in Original by OEM should be submitted along with bid by their authorized representative. The Tenderer shall have their own or authorized Service Center to provide service support.
- 6.3.2 The tenderer should have successfully supplied and installed at least 1 (one) ammonia based refrigeration system of 400 KW installed capacity for any Temperature Controlled Warehouse with minimum temperature of -10 Deg C.
- 6.3.3 The tenderer shall execute design, supply, erection, testing and commissioning of **ammonia based refrigeration system** for following minimum values during past 7 (Seven) years ending last day of month previous to the one in which tenders are invited:-.

- a. 3 jobs each of value not less than **Rs 200 Lakhs** or
- b. 2 jobs each of value not less than **Rs 250 Lakhs** or
- c. 1 job of value not less than **Rs 400 Lakhs**

Copy of work orders and satisfactory completion certificates from the owner or from their consultant should be enclosed as supportive documents. In the event the consultant issued completion certificate on owners' behalf for a particular job, copy of order issued by the owner to the consultant shall also require to be furnished.

6.4 Solvency Certificate

The tenderer must submit along with the unpriced Bid **Original Solvency Certificate** for **Rs 200 Lakhs** from any Scheduled Bank not older than 6 (six) months from the date of opening of bid. Solvency Certificate addressed to third party will not be accepted.

6.5 PAN, VAT Registration, Excise, ESI & PF Registration

Tenderers are required to submit attested photocopies of PAN, TIN, Excise, Sales Tax Registration, ESI (if applicable), Service Tax registration and Provident Fund registration along with Un-priced part of their offer, failing which their offer may be liable to be rejected.

6.6 Income Tax Return

Tenderers are required to submit Income Tax Return for Last 3 financial years ending March 2016.

6.7 Compliance with HSE Standards

Tenderers are required to comply HSE standards as mentioned in **Appendix – A & Appendix – B** of this tender document. Compliance of HSE shall be considered as one of the pre-qualification criteria of the bidder.

6.8 Power of Attorney

The Power of Attorney or authorisation letter or any other document consisting of adequate proof of the ability of the signatory to bind the bidder, in original, when the Power of Attorney or authorisation or any other document is issued relating to the specific tender of Balmer Lawrie & Co. Ltd only. However, a notarized true copy of the 'Power of Attorney' shall also be accepted in lieu of the original, if the Power of Attorney is a general "Power of Attorney". But photocopy of such notarized true copy shall not be accepted.

7.0 PRE- BID QUERIES

To understand the scope of work and to get clarifications on the queries, if any, tenderers are requested to send communication to **Mr. Sk Abu Jafor/ Mr. Dhritiman Nandi (Landline no. 08912564933, e-mail : jafor.a@balmerlawrie.com, nandi.d@balmerlawrie.com)**. However, the prospective bidders are requested to follow our website for clarifications / updates.

8.0 TENDER DOCUMENTS

Tender Documents comprises two parts viz. Part-I (Un-priced) and Part-II (Priced).

The Un-priced Part consists of Notice Inviting Tender, General & Special Conditions of Contract, and Technical Specification & Drawings. The Priced Part consists of Priced Schedule.

Bidders are requested to download the tender document and read all the terms and conditions mentioned therein and seek clarification, if any, from **Sk Abu Jafor/Sri Dhritiman Nandi**.

9.0 TENDER SUBMISSION

The intending bidders shall be deemed to have visited the site and familiarise thoroughly with the prevailing site conditions before submission of the tender. Non familiarity with the site conditions and non visit to site will not be considered reason either for extra claim or for not carrying out the work in strict conformity with the drawing, specification and time schedule.

The bidder would be required to register on the e-procurement site <https://balmerlawrie.eproc.in> and submit their bids online.

For registration and online bid submission tenderer may contact the following officials at the HELP DESK of M/s C1 India on browsing to the website <https://balmerlawrie.eproc.in> during business hours (10:00 a.m. to 06:30 p.m.) from Monday to Friday (Excluding holidays of the Company):

Name	Email IDs	Contact Nos
Ritabrata Chakraborty	ritabrata.chakraborty@c1india.com	+91-86979 10411
Tuhin Ghosh	tuhin.ghosh@c1india.com	+91-8981165071
Tirtha Das	tirtha.das@c1india.com	+91-9163254290
Ujjal Mitra	ujjal.mitra@c1india.com	+91-77026 69806
Rajesh Kumar	rajesh.kumar@c1india.com	+91-96504 65143

The tenderer shall authenticate the bid with his Digital Certificate for submitting the bid electronically on e-procurement platform and the bids not authenticated by digital certificate of the tenderer will not be accepted on the e-procurement platform. All the tenderers who do not have digital certificates need to obtain Digital Certificate **(with both Signing and Encryption Components)**. They may contact help desk of M/s C1 India.

The tenderer shall invariably furnish the original Demand Draft in case of Tender fee and Demand Draft /BG for EMD and other relevant documents to the tender inviting authority so as to reach on or before the due date and time of the Tender either personally or through courier or by post and the receipt of the same within the stipulated time shall be the responsibility of tenderer. The Company shall not take any responsibility for any delay or non-receipt. **If any of the documents furnished by the tenderer is found to be false/fabricated/bogus, the tenderer is liable for black listing, forfeiture of the EMD, cancellation of work and criminal prosecution.** The tenderer is requested to get a confirmed acknowledgement from the Tender Inviting Authority as a proof of hardcopies submission to avoid any discrepancy.

The bidders found defaulting in submission of hard copies of original Demand Draft in case of Tender fees and Demand Draft / BG for EMD and other documents to the Tender Inviting Authority on or before the stipulated time in the Tender will not be permitted to participate in the Tender.

The bidder is requested to download the tender document and read all the terms and conditions mentioned therein and seek clarification if in doubt from **Sk Abu Jafor/Sri Dhritiman Nandi**.

The bidder must keep track of the Addendum / Corrigendum / Amendment, if any, issued by the Tender Inviting Authority by visiting the Company's website (www.balmerlawrie.com) and e-procurement site (<https://balmerlawrie.eproc.in>) from time to time. No separate newspaper advertisement shall be published for such Addendum / Corrigendum / Amendment etc. The Company shall not be responsible for any claims/problems arising out of this.

The tenderer should complete all the processes and steps required for bid submission. The successful bid submission can be ascertained once acknowledgement is given by the system through bid submission number after completing all the process and steps. **M/s C1 India is not responsible for incomplete bid submission by bidders.** Tenderers may also note that the incomplete bids will not be saved by the system and are not available for the Tender Inviting Authority for processing. Tenderers are advised to upload their documents and price bid well in time to avoid last minute rush on the server or complications in uploading.

Neither the Company (Balmer Lawrie & Co. Ltd.) nor the service provider (M/s C1 India) is responsible for any failure or non-submission of bids due to failure of internet or other connectivity problems or system problems of bidder or reasons thereof.

10. ADDRESS FOR SUBMISSION OF HARD COPIES OF THE TENDER (UNPRICED : PART-I)

The hardcopies (**2 sets in hardbound/spiral bound/box file, 1 Original + 1 Photocopy**) as explained above and also defined in clause no. 3.05 of GCC under sealed envelope should reach our office located at 30-15-154 / 4F2, 5th Floor, GKP Heavenuue, Dabagarden Main Road, Visakhapatnam 530020. Loose papers/documents shall be avoided. The bid document shall have Index/Table of Contents with page nos for ease of identification. The Bidders who are submitting the Bids in person are requested to drop the same in our tender box located at the entrance of 5th floor at the above address during business hours (between 9.30 am and 6.30 pm). The price bid in pdf format shall be downloaded from the website, bidders to fill in their rates & amounts on hard copy, stamp, sign, scan and upload the same. **Hard copy of price bid shall not be submitted.**

Any hardcopy of unpriced bid submitted to any other office of Balmer Lawrie other than above mentioned address shall not be considered under any circumstances.

11.0 SUPPLY OF MATERIAL

All materials required for the work shall be supplied by the contractor.

12.0 TAXES & DUTIES

Rates shall be inclusive of all taxes & duties e.g. WCT, CESS (Building & other construction workers' Act, 1996), levies, royalty, Octroi etc. as applicable. However, Excise Duty, CST / VAT and Service Tax shall be quoted separately as per format given in the schedule of work.

13.0 NON-CONFORMANCE

Tenders not conforming to the above mentioned requirements are liable to be rejected.

14.0 VALIDITY OF OFFER

Tendered shall keep their offer valid for a period of **120 days** from the date of opening of Unpriced bid.

15.0 QUANTITY VARIATION

The quantity as mentioned in the BOQ/Schedule of Work is indicative and a quantity tolerance of **+/- 10%** is expected, the prices should be firm to accommodate this variation.

16.0 RATES AND OTHER ENTRIES

- (a) The tenderer should quote for all items in the Schedule of Work. The rates should be expressed in English both in figures and words. Where discrepancy exists between the two, the rates expressed in words will prevail. Similarly if there is any discrepancy between unit rate and total amount, the unit rate will prevail.
- (b) The rates should be quoted in the same units as mentioned in the tender schedule of quantities.
- (c) All entries in the tender documents should be in ink / type. Corrections if any should be attested by full signature of the tenderer.
- (d) Every page of the tender document including annexures / enclosures shall be stamped and signed by the tenderer or his authorized representative thereby indicating that each and every page has been read and the points noted.

17.0 LANGUAGE OF BIDS

The Bid prepared by the bidder, all documents attached to and/or relating to the bid and all correspondence exchanged by the Bidder and BL shall be written in English language only. Any printed literature furnished by the bidder may be written in any other language provided that this literature is accompanied by an authenticated English translation, in which case, for purpose of interpreting the Bid, the English translation shall govern.

18.0 LATE BIDS

Bids received after the due date shall not be accepted under any circumstances, bidders are requested to send their bids considering the holidays. Office of Balmer Lawrie is closed on Sunday and holidays as per the company policy.

19.0 BID REJECTION CRITERIA

A bid may be rejected

- 19.1 If the bidder fails to send the EMD and Tender Fee amount along with the Unpriced Bid within the due date.
- 19.2 If the bidder does not meet the pre-qualification / technical criteria and /or non-submission of documents specified. Bids of those bidders who are not meeting the pre-qualification criteria will not be considered for further techno-commercial evaluation.
- 19.3 The deviations from the terms mentioned in the document is likely to affect in any way the scope, quality and performance of the work.
- 19.4 If a conflict of interest between the bidder and the company is detected at any stage.
- 19.5 If the bidders fails to produce all the original documents/credentials, photo copy of which has been submitted along with bid.

19.6 BL/VPLPL reserves the right to verify the particulars furnished by the bidder independently and to obtain feedback from clients/ other concerned agencies. Falsification/suppression of information shall lead to disqualification of the bidder / cancellation of contract even after award of work during the contract.

However, BL/VPLPL reserves the right to accept or reject any tender either in part or in full without assigning any reason whatsoever.

20.0 FIRM PRICE

The price should be firm and irrevocable and not subject to any change till the validity of the contract period.

21.0 OPENING OF BIDS

The bids will be opened online only in E-procurement portal <https://balmerlawrie.eproc.in>.

22.0 DEVIATIONS

It is expected that bidders will submit their bid strictly based on the terms and conditions and specifications contained in the bidding documents and will not stipulate any deviations. Should it, however, become unavoidable, deviations (in the form of Deviation Sheet) should be submitted along with the Bid.

23.0 RIGHT TO ACCEPT OR REJECT TENDER

The bidders qualifying as per Pre-Qualification Criteria will be qualified for opening of their price bids and qualified bidder based on over all L-1 value for Price Bid shall be considered as successful bidder. In the event of receipt of lowest price from more than one (1) bidders, fresh price bids shall be invited from the lowest bidders only to determine final lowest bidder for placement of order.

24.0 CONTACT DETAILS

For any Technical clarifications / queries Tenderers are requested to contact **Sk Abu Jafor/ Dhritiman Nandi** (Landline no. 08912564933, e-mail: jafor.a@balmerlawrie.com, nandi.d@balmerlawrie.com) (from 10.00AM to 06.00PM Monday – Friday and Saturday 10.00 AM 3.30 PM).

For **Balmer Lawrie & Co. Ltd.**

SANJEEV RAJAURIA
PROJECT HEAD (MMLH)

GENERAL CONDITIONS OF CONTRACT

Article I DEFINITIONS

Article II INTERPRETATION OF GENERAL CONDITIONS OF CONTRACT

- 2.00 General
- 2.01 Discrepancy in Tender Document
- 2.02 Headings / Titles
- 2.03 Singular and Plural

Article III GENERAL INSTRUCTIONS TO TENDERERS

- 3.01 Non-transferability of Tender Documents
- 3.02 Tenderers responsibility to collect all required data
- 3.03 Complete & Competitive Offer
- 3.04 Submission of tender
- 3.05 Details to be submitted along with the tender
- 3.06 Rates and other entries
- 3.07 Right to accept or reject tender
- 3.08 Contract agreement
- 3.09 Earnest Money
- 3.10 Security deposit
- 3.11 Validity of offer
- 3.12 Time for completion of work

Article IV GENERAL INFORMATION

- 4.01 Site information, climatic condition etc.
- 4.02 Construction water
- 4.03 Construction power
- 4.04 Accommodation for labour & supervisory staff
- 4.05 Deployment of Workmen
- 4.06 Contractor's field office, godown and stores
- 4.07 Temporary roads and drains
- 4.08 Issuing Gate Pass

Article V GENERAL OBLIGATION AND PERFORMANCE OF WORK

- 5.01 Execution of work
- 5.02 Co-ordination and inspection of work
- 5.03 General conditions for construction and erection work
- 5.04 Work in Monsoon & Summer
- 5.05 Drawing to be supplied by the Owner
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- 5.07 Setting out work
- 5.08 Reports & Records
- 5.09 Issue of materials
- 5.10 Storage
- 5.11 Audit
- 5.12 Damage to Property

- 5.13 Articles of value found
- 5.14 Discrepancies between instructions
- 5.15 Liquidated Damage
- 5.16 Force Majeure
- 5.17 Period of liability
- 5.18 Right of owner to terminate the contract
- 5.19 Sub-letting of work
- 5.20 Patents and royalties
- 5.21 Performance guarantee & warranty
- 5.22 Contractor's responsibility with other agencies
- 5.23 Arbitration

Article VI INSPECTION, CERTIFICATION AND PAYMENT

- 6.01 Inspection & testing
- 6.02 Schedule of rates and payments
- 6.03 Procedure for measurement/billing of work in progress
- 6.04 Secured Advance
- 6.05 Notice of claim for additional payment
- 6.06 Completion certificate
- 6.07 Final Certificate
- 6.08 Certificate and payments on evidence of completion

Article VII RULES, REGULATIONS & INSURANCE COVERAGE

- 7.01 Observance of rules/acts in force
- 7.02 Taxes, duties, octroi & other statutory payments
- 7.03 Labour Laws
- 7.04 Implementation of Apprentice Act 1964
- 7.05 Insurance

Article VIII SAFETY CODES & PRACTICES

- 8.01 General
- 8.02 First aid and Industrial injuries
- 8.03 General Rules
- 8.04 Contractors barricades
- 8.05 Safety equipment
- 8.06 Hoisting equipment
- 8.07 Electrical equipment

ATTACHMENTS

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II	BG Verification Check List	2
Ila	BG for Earnest Money Deposit	2
III	BG against Performance	2
IV	BG for Security Deposit	2
V	Information about Tenderer	1
VI	Details of Experience	1
VII	Concurrent Commitment	1
VIII	Indemnity Bond	3

ARTICLE – I**DEFINITIONS**

- 1.00 The following expressions hereunder and elsewhere in the contract documents used shall have the following meanings hereunder respectively assigned to them except where the context otherwise requires:
- 1.01 The "Owner / "Employer" shall mean Visakhapatnam Port Logistics Park Limited (VPLPL)., a Joint Venture Company between Balmer Lawrie & Co Ltd and Visakhapatnam Port Trust in India and having its registered office at 21, Netaji Subhas Road, Kolkata - 700 001 and shall include its successors and assigns.
- 1.02 "Tenderers" or "Bidders" shall mean such parties who have been issued Tender Document by the Owner and those parties who have submitted these offers to the Owner in response to the Tender Document issued to them.
- 1.03 "Tender Document" shall mean the Tender Documents comprising Part I (Un-priced Bid) –Notice inviting tender, General Conditions of contract, Special Conditions of Contract, Technical Specification, Schedule of Quantities, Drawings / Sketches, Data Sheets, Addenda / Corrigenda to the tender document issued by the Owner, Form of Tender and Part II (Priced Bid) - Price Schedule.
- 1.04 The "Contractor / Successful tenderer/ The supplier " shall mean the tenderer selected by the Owner for the performance of the work and shall include the successors and Owner permitted assigns of the Contractor.
- 1.05 The "Sub-contractor" shall mean any person or firm or company (other than the Contractor) to whom any part of work has been entrusted by the Contractor with the written consent of the Engineer-in-Charge, and the legal representatives, Successors and permitted assigns of such person, firm or company.
- 1.06 **The "Project" shall mean Design, Supply, Erection, Testing and Commissioning of Refrigeration System of Temperature Controlled Warehouse for Proposed Multi-modal Logistics Hub at Visakhapatnam, Andhra Pradesh**
- 1.07 The "Project Manager" shall mean the Officer nominated by Owner to co-ordinate and supervise all the activities connected with the implementation of project on their behalf. "Project Manager" may at his discretion depute Owner's officers to co-ordinate / supervise the work of Contractor / Consultants at site.
- 1.08 The "Engineer-in-Charge" shall mean the Engineer/Agency authorised by the Owner for the purpose of the Contract for overall supervision and co-ordination of site activity and certification of billing.
- 1.09 The "Project Management Consultant" shall mean M/s. Aarvee Associates, Architects, Engineers & Consultants Pvt Ltd, having its registered office at Ravula Residency, Srinagar Colony main Road, Hyderabad – 82.

- 1.10 "Site" shall mean all such land, waters and other places on, under, in or through which the works for the Project are to be performed under the Contract.
- 1.11 The "Site Engineer" shall mean the Engineer(s) for the time being deputed by the Engineer-in-Charge as Site Engineer for the work to be performed by the Contractor at any and/or all job sites and to co-ordinate all activities of all parties at site.
- 1.12 "Inspecting Authority" means Third Party Inspection Agency (TPIA) as specified by the Owner/Consultant or Owner's authorised representative or Consultant's representative.
- 1.13 The "Work" and "Scope of Work" shall mean the totality of the work by expression or implication envisaged in the contract and shall include all material, equipment and labour required for or relative or incidental to or in connection with the commencement, performance or completion of any work and/or for incorporation in the work.
- 1.14 The "Works" shall mean the product(s) of the work and shall include all extras, additions, alterations or substitution as required for the purpose of the contract.
- 1.15 The "Works Contract" or "Contract" shall mean the totality of the agreements between the parties as derived from the Contract Documents for the entire work.
- 1.16 The "Contract Documents" shall mean collectively Tender Documents and the Contract Documents as laid out in the Owner's Standard Contract Format which is based on the General & Special Conditions of Contract.
- 1.17 The "Specification(s)" shall mean the various specifications as set out in the specifications forming part of the tender documents and as referred to and derived from the contract and any order(s) or instruction(s) thereunder, and the absence of any specifications as aforesaid covering any particular work or part of portion thereof, shall mean the relevant Indian Standard Institution Specifications for or relative to the particular work or part thereof, and in the absence of any Indian Standard Institution Specifications covering the relative work or part or portion thereof, shall mean the standards or specifications of any other country applied in India as a matter of standard engineering practice and approved in writing by the Engineer-in-Charge or Site Engineer with or without modifications.
- 1.18 "Order" and "Instruction" shall respectively mean any written Order or Instruction given by the Engineer-in-Charge or Site Engineer within the scope of their respective powers in terms of the Contract and shall include alteration / variation order to effect additions to or deletion from and / or alteration in the work detailed in the contract.
- 1.19 "Plans" and "Drawings" shall mean maps, plans, drawings, sketches, tracings and prints forming part of the tender documents and any details or working drawings, amendments and/or modifications thereof approved in writing by the Engineer-in-Charge, Site Engineer or any agency notified by the Engineer-in-Charge to the Contractor for the purpose and shall include any other drawings or plans in connection with the work as may from time to time be furnished by or approved in writing by the Engineer-in-Charge or Site Engineer or any other agency nominated by the Engineer-in-Charge on his behalf in connection with the work.

- 1.20 "Temporary Work" / "Enabling Work" shall mean all such works which are required in or about the execution, completion or maintenance of the work and if not provided for specifically in the Schedule of rates shall be deemed to be done by the Contractor at his own cost in fulfilment of the contract.
- 1.21 "Constructional Plant" shall mean all such Plant & Machineries, appliances, aids or things of whatsoever nature other than materials intended to form part of the permanent works which are required in or about the execution, completion for maintenance of temporary and permanent work.
- 1.22 "Completion Certificate" shall mean the Certificate to be issued by the Engineer-in-Charge after the work has been completed to his satisfaction.
- 1.23 "The Final Certificate" in relation to the work shall mean the certificate to be issued after the period of liability is over by the Owner regarding satisfactory compliance of various provisions of the contract by the contractor.
- 1.24 "Period of Liability" or "Defect Liability Period" refers to the specified period from the date of completion of the entire work as indicated in the completion certificate up to the date of issue of Final Certificate during which the contractor is responsible for rectifying all defects "free of cost" to the satisfaction of Owner.
- 1.25 "Schedule of Rates"/ "Schedule of Quantities" shall mean the schedule of rates incorporated in the contract and shall also include supply rates for labour, material etc. as well as payments for all such work determined in accordance with the contract conditions.
- 1.26 "Running Account Bill" shall mean a Bill for the payment of "On Account" to the Contractor.
- 1.27 "Agreed Variation" shall mean the statement of Agreed Variation annexed to the Acceptance of Tender or a further Amendment to the Contract forming part thereof.
- 1.28 "Acceptance of Tender" shall mean the Acceptance of Tender issued by the Owner to the Contractor.
- 1.29 The "Total Contract Value" means the value of original work order issued and duly accepted by the Contractor. The remuneration due to the Contractor in terms of the Contract on successful completion of the work shall mean the value of job actually executed by the Contractor within the original time schedule or within the approved extended time.
- 1.30 "Written Notice" or "Notice" in writing shall mean all hand written, typed / printed /e_mail form sent (unless delivered personally) or proved to have been received by registered post to the last known address / private / business or registered office, of the contractor and shall be deemed to have been received in the ordinary course of post it would have been delivered.
- 1.31 "Letter of Intent" shall mean intimation by a letter to the successful tenderer that the tender has been accepted in accordance with the provisions contained therein.
- 1.32 "Progress Schedule" shall mean the time schedule of Progress of Work.
- 1.33 The "Alteration Order or Variation Order" means Order given in writing by the Owner to effect additions to or deletions from and alterations in the work.

- 1.34 "Measurement book(s) / Sheet(s)" shall mean the register preserved by the Engineer-in-Charge, where all measurements taken at site are neatly recorded by the Engineer-in-Charge or his authorised representative and signed in token of acceptance by the Contractor or his authorised representative.

ARTICLE - II

INTERPRETATION OF GENERAL CONDITIONS OF CONTRACT

2.00 GENERAL

The following general conditions shall be read in conjunction with the other conditions of contract, special conditions of contract, Technical Specifications etc. and shall be considered as an extension and not in limitation of the obligations of the Contractor. In case of discrepancy, if any, between these conditions the precedence shall be as stated elsewhere in the special conditions of contract.

2.01 DISCREPANCY IN TENDER DOCUMENT

Should there be any discrepancy, inconsistency, error or omission in the Tender Documents, the Tenderer shall bring it to the notice of the Owner / Engineer-in-Charge for necessary clarification / action. In the event such matters are referred to later the decision of the Owner / Engineer-in-Charge directing the manner in which the work is to be carried out shall be final & conclusive and the contractor shall carry out work in accordance with this decision.

2.02 HEADINGS / TITLES

All headings & Titles/Notices to the clauses, specifications /drawings are solely for the purpose of indicative reference and not as summary of the contents and thus shall not be deemed to be part of the clauses of the contract.

2.03 SINGULAR AND PLURAL

Unless otherwise stated or repugnant to the context the singular shall include plural and vice-versa.

ARTICLE - III

GENERAL INSTRUCTIONS TO TENDERERS

3.01 NON-TRANSFERABILITY OF TENDER DOCUMENTS

Tender documents shall remain the property of the Owner and if obtained by one intending tenderer, shall not be utilisable by another without the consent of the Owner.

3.02 TENDERERS RESPONSIBILITY TO COLLECT ALL REQUIRED DATA

- (i) The tenderer should study all tender documents, carefully, understand the condition / drawing / specification etc. before quoting. If there are any doubts about tender conditions he should obtain clarification from **Sk Abu Jafor/Sri Dhritiman Nandi** (from 10.00 a.m. to 06.00 PM Monday – Friday and Saturday till 3.30 PM). This shall not be the justification for late submission or extension,

compensating date or time to the tender. All tender documents shall govern the contract, shall form part of the contract and shall be binding during the execution till completion of work.

- (ii) The tenderer should visit the site and acquaint himself with the site conditions, all factors which are likely to be relevant for the works, availability and rates for various things including construction materials as per specification, shelter for staff etc. since these are to be provided / arranged by the tenderer (unless otherwise specified) at his own cost. In any case it will be deemed that tenderer as done so and no claim whatsoever will be entertained on the plea of ignorance of any factor or difficulties involved in fulfilling the tender conditions.
- (iii) Under no circumstances, Tenders may be withdrawn or modified after it's submission to the Owner. Negligence on the part of the Tenderer in preparing his tender confers no right for withdrawal or modification of his tender after the tender has been opened.

3.03 COMPLETE & COMPETITIVE OFFER

- (i) Tenderers are required to make the lowest offer for the work as per the enclosed specification and details available therein. The estimated quantities given in the schedule of Quantities are approximate. As the work progresses, it is possible that there are variations & omission of items.
- (ii) The rates quoted should be inclusive of all materials, labour, incidental expenses, equipment, Tools / Tackles, Transportation of materials and Labour, Taxes & Duties, Excise, CESS, Customs, Octroi Duty, Sales Tax, VAT service tax etc. All materials are to be supplied by the Tenderer unless otherwise stated.
- (iii) Incomplete / Conditional tender quotation or those received late and / or not conforming to the terms and conditions in the tender documents will be liable to get rejected.
- (iv) It is in the Tenderer's interest to adhere to the Owner's tender conditions, specifications and Tender Schedule. However, if the tenderer considers it unavoidable, deviations should be clearly spelt out with reference to tender conditions. Owner reserves the right to determine / evaluate financial implication of such deviations without any reference to the tenderer or at his discretion consider such tenders liable for disqualification.
- (v) After "Un-priced" bids are evaluated, tenderers whose bids are found acceptable may be invited for discussions for exchange of clarifications, if any, required. At that stage, depending on the merits of the case, opportunity may be given to amend the "Priced" bids already received along with the un-priced bids, but not opened until then. Such amendments or revisions would need to be submitted in similar sealed envelopes generally not later than 7 days after the date of such discussions. Tenders indicating counter proposals or deviations are liable to be rejected.
- (vi) Tenderers are expected to quote rate for each item after careful analysis of cost involved for the performance of the completed item considering all Specifications and conditions of Contract. This will avoid loss of profit or gain in case of curtailment or change of Specification for any item. In case it is noticed that the rates quoted by the Tenderer for any item are unusually high or unusually low it will be sufficient cause for the rejection of the Tender unless the Owner is convinced about the reasonableness of the rates on scrutiny of the analysis for such rate to be furnished by the Tenderer on demand.

3.04 SUBMISSION OF TENDER

The mode of tender submission shall be strictly as defined in the Notice Inviting Tender.

3.05 DETAILS TO BE SUBMITTED ALONG WITH THE TENDER

The tenderer shall submit the following along with the following:

- (i) Hard copy **(1 set original and 1 set photocopy, total 2 sets)** of Un-priced Tender Document duly filled in, stamped and signed by the Tenderer as prescribed in different clauses of Tender documents. **No hard copy of priced bid shall be submitted.**
- (ii) Stipulated Tender Fee & Earnest Money Deposit
- (iii) The Power of Attorney or authorisation letter or any other document consisting of adequate proof of the ability of the signatory to bind the bidder, in original, when the Power of Attorney or authorisation or any other document is issued relating to the specific tender of Balmer Lawrie & Co. Ltd only. However, a notarized true copy of the 'Power of Attorney' shall also be accepted in lieu of the original, if the Power of Attorney is a general "Power of Attorney". But photocopy of such notarized true copy shall not be accepted.
- (iv) Details in proforma wherever prescribed regarding the following:
 - a) Similar work done in past seven years by the tenderer.
 - b) Work in progress and booked along with details of original schedule of completion progress status, likely completion etc.
 - c) Documents demonstrating ownership of manufacturing facility with list of plant/equipment.
 - e) Solvency certificate, Income Tax Returns for the last 3 years, Sales Tax / VAT / Service Tax/PF, ESI (if applicable), Annual Reports for the last 3 years, etc.
 - g) Any other documents required in terms of this tender.

3.06 RATES AND OTHER ENTRIES

- (i) The tenderer should quote for all items in the Schedule of Rates. The rate should be expressed in English both in figures and words. Where discrepancy exists between the two, the rates expressed in words will prevail. Similarly if there is any discrepancy between unit rate and total amount, the unit rate will prevail.
- (ii) The rates should be quoted in the same units as mentioned in the tender schedule of quantities.
- (iii) All entries in the tender documents should be in ink / typed Corrections if any should be attested by full signature of the tenderer.
- (iv) Every page of the tender document including annexure / enclosures shall be stamped and signed by the tenderer or his authorised representative thereby indicating that each and every page has been read and the points noted.

3.07 RIGHT TO ACCEPT OR REJECT TENDER

The Owner reserves the right to accept or reject any or every tender without assigning any reason whatsoever / or to negotiate with the tenderer(s) in the manner the Owner considers suitable. The work may be split up amongst two or more tenderers if considered expedient.

3.08 CONTRACT AGREEMENT

The successful tenderer shall within **15 days** of the Owner's communication to him of the Acceptance of the Tender, execute formal agreement with the Owner in the proforma attached to the Tender Document.

In the event of failure on the part of the successful Tenderer to sign the agreement within the stipulated time period, the Earnest Money Deposit will be forfeited and the Acceptance of the Tender shall be considered as cancelled.

3.09 EARNEST MONEY DEPOSIT

- (i) The Tenderer shall be required to submit an Earnest Money of **specified value as mentioned in NIT** along with the un-priced part of the tender and the same shall be returned to the unsuccessful tenderers after acceptance of order by the successful tenderer. Earnest money of successful bidder shall be released after submission of initial security deposit by them

The permissible forms of deposit are:

- a) Bank draft drawn in favour of Balmer Lawrie & Co. Ltd. on a Kolkata branch of any Scheduled Bank
- b) Bank Guarantee executed by any Scheduled Bank as per proforma enclosed and shall be valid for a minimum period of **150 days** after the due date of tender submission.
- (ii) If the successful tenderer is unable to accept or execute orders when placed upon him or fails to deposit the Initial Security Deposit or withdraws / revises his quoted prices and quantities offered, within the validity period of the tender or after placement of the Order / Letter of Acceptance, the his Earnest Money Deposit shall be forfeited.
- (iii) No interest is payable against Earnest Money Deposit.

3.10 SECURITY DEPOSIT

- (i) On acceptance of the Bid, Contractor shall within **fifteen (15) days**, deposit with Owner an initial Security Deposit of 2% of the Contract value and the same shall be in any of the following:
- a) Bank draft drawn on a Kolkata Branch of any Schedule Bank in favour of Balmer Lawrie & Co Ltd.
 - b) Bank Guarantee executed by any Scheduled Bank as per proforma enclosed and shall be valid at least 60 days after completion of work.

- (ii) If Contractor fails to provide the Security Deposit within the period specified, such failure will constitute a breach of the Contract and Owner shall be entitled to award the Work elsewhere at Contractor's risk and cost. The EMD of the bidder to whom Contract was awarded shall be forfeited.
- (iii) No interest shall be payable against Security Deposit.
- (iv) As and by way of additional security, from every progress bill of Contractor, Security Deposit in the form of Retention Money (interest free) at the rate of 10% of the Gross value of such bill as determined before payment shall be retained by the Owner. At any point of time such deduction shall not exceed 10% of executed value. Owner can permit Contractor to replace the Security Deposit / Retention Money so retained by Bank Guarantee at his discretion after successful completion of the work.
- (v) Wherever the Security Deposit / Retention Money is furnished by Contractor in any form other than in cash or Demand Draft, Contractor shall be entirely responsible to keep such form of security deposit enforceable by extending the validity thereof before one month of date of expiry and keep them enforceable, until released by Owner after the Defect Liability Period.
- (vi) The Security Deposit / Retention Money shall remain at the entire disposal of Owner as a security for satisfactory execution and completion of the Work(s). Owner shall be at liberty to deduct and appropriate from the Security Deposit / Retention Money such damages (liquidated or otherwise) and other dues and recoveries from Contractor under this Contract and the amount by which Security Deposit / Retention Money is reduced by such appropriations, will be made by further deductions from Contractor's subsequent bills to that extent as to make up the Security Deposit / Retention Money.
- (vii) Notwithstanding anything to contrary, in as much as the Security Deposit is to be in cash with Owner, Owner shall be entitled to enforce any of the approved forms of Security Deposit furnished by Contractor at any time and realise cash thereof irrespective of whether or not Contractor disputes such right. However, if Contractor obtains the extension of the time limit, if any, for the enforceability of such form of Security Deposit and intimates Owner of such extension within one month before expiry, Owner may not enforce such form of Security Deposit, unless it has otherwise become enforceable.
- (viii) On due and satisfactory performance of all the obligations of Contractor under this Contract including completion of work in all respects, carrying out the obligations of Contractor during Defect Liability Period, Retention Money shall be released by Owner subject to recoveries, deductions and retentions therefrom as provided under the Contract.

3.11 VALIDITY OF OFFER

The validity of the tender shall be 120 days from the date of opening of Un-priced tender or any date later than it that may be proposed by the Owner and agreed to by the tenderer. During this period, tenderer shall not be entitled to modify, revoke or cancel his tender without the consent of Owner in writing. In case of successful tenderer only, validity shall be until the work is completed to the satisfaction of the Owner and so certified in writing by the Owner or their accredited representative.

3.12 TIME FOR COMPLETION OF WORK

Time is the essence of the contract. The tenderer shall submit their plan to complete the whole work according to the overall time allowed for the execution of work as given in the Tender Documents and

NIT. The allowed time for completion of the work as per the NIT includes contract agreement signing and mobilisation of manpower and equipment at site.

- 3.12.1 The contractor shall complete in all respects in accordance with the Contract, the entire work within the time specified in the Time Schedule.
- 3.12.2 It is the contractor's responsibility to prepare and submit to the Owner / EIC, a Progress Schedule the dates of progress as fixed by the Engineer in Charge being final and binding upon the contractor except as herein otherwise expressed provided and shall then be the Approved Progress Schedule.
- 3.12.3 The application for extension of time made by the Contractor to the Engineer in Charge should contain full details of
- a. The activity for the Progress Schedule affected.
 - b. The bottlenecks or obstructions perceived/ experienced, and the reasons therefor,
 - c. Extension required/ necessitated on account of b above
 - d. Extension required/ necessitated on account of reasons attributable to the Owner,
 - e. Extension required/ necessitated on account of force majeure reasons, and
 - f. The total extension of time if any required/ necessitated for completion, taking the above into account and after eliminating all overlaps.
- 3.12.4 The opinion/ decision of the Engineer in Charge in this behalf and as to the extension of time necessary shall.
- 3.12.5 The term "Force Majeure" as employed in this contract shall mean wars declared or undeclared or revolutions, civil wars, tidal waves, fires, major floods, earthquakes, epidemics, quarantine restrictions and freight embargoes and transporters strikes affecting the country as a whole.

4.0 GENERAL INFORMATION

4.01 Site Information, Climatic Condition Etc.

The details relating to above are given separately to the best of Owners knowledge. The tenderer shall be deemed to have satisfied themselves regarding site condition, access, communication facilities, local conditions, climatic conditions including wind, monsoon period, rainfall, temperatures etc. and shall be deemed to have included the impact of these factors within their quoted rates.

Contractor should visit the site and familiarise themselves thoroughly before submitting the tender. For the purpose the contractors are required to contact **Sk Abu Jafor /Sri Dhritiman Nandi**.

4.02 Construction Water

The contractor has to make his own arrangement for both construction water and drinking water. The Owner does not undertake to supply water to the contractor. The contractor shall not dig any wells on owners land without specific permission on writing from Engineer-in-Charge of Owner. Ground water in and around the project site is contaminate and is not suitable for construction purpose.

All temporary arrangements for distribution of construction water shall be removed forthwith after completion of the work or if there is any hindrance caused to the other works, the contractor will re-route or remove the temporary lines at his own cost in a manner so as to continue his (contractor's) work in an uninterrupted manner.

4.03 Construction Power

The contractor has to make his own arrangement for construction power.

All temporary arrangements for distribution of construction power shall be removed forthwith after completion of the work or if there is any hindrance caused to the other works, the contractor will re-route or remove the temporary lines at his own cost in a manner so as to continue his (contractor's) work in an uninterrupted manner.

4.04 Accommodation for Labour & Supervisory Staff

The Contractor shall make his own arrangements for accommodation of his labour and supervisory personnel. No accommodation for labour & supervisory staff shall be provided within the site premises.

4.05 Deployment of Workmen

The workers of the contractor must require proper identification and permission; otherwise they will not be allowed to enter the premises. Necessary assistance in this regard may please be obtained from local administration department.

4.06 Contractor's Field Office, Godown and Workshop

Owner will at his own discretion and convenience and for the duration of the execution of the work make available near the Site, land for construction of Contractor's field office, godowns, stores, workshops and assembly yard required for the execution of the Contract. The Contractor shall at his own cost construct all temporary buildings and provide suitable water supply and sanitary arrangement approved by the Engineer-in-Charge.

4.07 Temporary Roads & Drains

Contractor shall provide service road/roads for movement of materials as per direction of Engineer-in-Charge. Contractor shall also maintain these service roads in safe and fit conditions at his own cost. He shall however have no authority to prevent use of such roads by Owner and other bonafide contractors working at site. Contractor shall also construct temporary drain as may be required while construction.

4.08 Issuing Gate Pass

The contractor will have to submit the details of the persons to be employed at site (before starting of the work) in a specified format along with photocopy of valid photo identity card based on which gate pass will be issued for each person. Before issue of gate pass, the contractor shall ensure for PPE, health check-up & safety induction training of the persons to be deployed at site. No person will be allowed to work without valid gate pass. The contractor shall surrender to the Pass Issuing authority all the gate passes issued for a particular job after completion of the job.

5.0 GENERAL OBLIGATION AND PERFORMANCE OF WORK

5.01 Execution of Work

All the work shall be executed in strict conformity with the provisions of the Contract Document and with such explanatory detailed Drawings, Specifications and Instructions as may be furnished from time to time to the Contractor by the Engineer-in-Charge, whether mentioned in the Contract or not. The Contractor shall be responsible for ensuring that Work throughout are executed in the most substantial proper and workmanlike manner with the quality of material and workmanship in strict accordance with the Specifications and to the entire satisfaction of the Engineer-in-Charge.

5.02 Co-ordination and Inspection of Work

- (i) The co-ordination and inspection of the day-to-day Work under the Contract shall be the responsibility of the Engineer-in-Charge but this will not detract the contractor's full responsibility. The written instructions regarding any particular work will normally be passed by the Engineer-in-Charge or his Authorised Representative. A work order book will be maintained by the Contractor for each sector in which the aforesaid written instructions will be entered. These will be signed by the Contractor or his authorised representative by way of acknowledgement within Twelve (12) hours. The pages in the work order book shall be machine numbered.
- (ii) The Engineer-in-Charge will have full power and authority to inspect the Work at any time wherever in progress either on the Site or at the Contractor's Premises / Workshops wherever situated, Premises / Workshops of any person, firm or corporation where work in connection with the Contract may be in hand or where materials are being or are to be supplied, and Contractor shall afford or procure for the Engineer-in-Charge, every facility and assistance to carry out such inspection. Contractor shall, at all time during the usual working hours and all other times at which reasonable notice of the intention of the Engineer-in-Charge or his representative to visit the Work shall have been given to Contractor, either himself be present to receive orders and instructions, or have a responsible agent duly accredited in writing present for the purpose.

5.03 General Conditions for Construction Work

- (i) The working time is forty eight (48) hours per week per person. Overtime of work is permitted in cases of need and the Contractor will compensate the same. Shift working at two (2) or three shifts per day will become necessary and the contractor should take this aspect into consideration for formulating his rates for quotation. No extra claims will be entertained by the Owner on this account.
- (ii) For carrying out work on Sundays, and Holidays, the Contractor will approach the Engineer-in-Charge or representative and obtain prior permission in writing.
- (iii) The Contractor must arrange for the placement of workers in such a way that the delayed completion of the Work or any part thereof for any reason whatsoever will not affect their proper employment. The Owner will not entertain any claim for idle labour payment whatsoever.
- (iv) The Contractor shall submit to the Owner reports at regular intervals regarding the state and progress of work. The details and proforma of the report will mutually be agreed after the award of Contract.

- (v) The Contractor shall arrange for required number of competent Engineer Supervisor to be present at site at all times during the progress of the work, who shall be duly authorised to take instructions and execute them on his behalf.

5.04 Work in Monsoon & Summer

The completion of the work may entail working in the monsoon also. The Contractor must maintain a minimum labour force as may be required for the Work and plan and execute the construction and erection according to the prescribed schedule. No extra payment will be considered for such work in monsoon. During monsoon and other period, it shall be the responsibility of the Contractor to keep the construction work site free from water at his own cost.

Adequate precautions have to be taken while working in summer. The working hours for the workers may be rescheduled so as to avoid work during heat hours in the noon. Effective arrangements for supply of sufficient cold drinking water shall be made available and maintained at suitable points conveniently located for use by all workers employed and the water points be legibly marked as "DRINKING WATER". Rest room/Shed to be provided wherever & must be functionally for taking tiffin's/meals and rest by the workers. Oral re-hydration solution should be supplied to all workers during heat hours.

5.05 Drawing to be Supplied by the Owner

- (i) Where drawings are attached with Tender, these shall be for the general guidance of the Contractor to enable him to visualise the type of Work contemplated and Scope of Work involved. The Contractor will be deemed to have studied the Drawings and formed an idea about the work involved.
- (ii) Detailed working drawings on the basis of which actual execution of work is to proceed, shall be prepared by the contractor and same shall be approved by the Owner. Contractor shall be deemed to have gone through the Drawings supplied to him thoroughly and carefully and in conjunction with all other connected drawings and bring to the notice of the Engineer-in-Charge, discrepancies if any, therein before actually carrying out the work.
- (iii) Copies of all detailed working drawing relating to Work shall be kept at the Contractor's office at the Site and shall be made available to the Engineer-in-Charge at any time during the Contract. The drawings and other documents issued by the Owner shall be returned to the Owner on completion of the Work.

5.06 Drawings to be Supplied by the Contractor

- (i) Where drawings/Data are to be furnished by the Contractor, they shall be as enumerated in the special conditions of the Contract, and shall be furnished within the specified time.
- (ii) Where approval of Drawings for Manufacture/Construction/ Fabrication has been specified, it shall be Contractor's responsibility to have these drawings prepared as per the directions of Engineer-in-Charge and got approved before proceeding with Manufacture/Construction/Fabrication as the case may be. Any changes that may have become necessary in these drawings during the execution of work shall have to be carried out by the Contractor to the satisfaction of Engineer-in-Charge at no extra cost. All final drawings shall bear certification stamp as duly signed by the Engineer-in-Charge.

5.07 Setting out Work

- (i) Contractor shall establish and clearly mark a reference base line at the site and will establish bench marks at regular interval and other points, lines, elevations, etc. as he may require for the proper execution of the work from reference pillars indicated by Engineer-in-Charge
- (ii) Contractor shall be responsible for the true and proper setting out of the works and for the correctness of the positions, levels, dimensions and alignments of all the parts of the works and for the provisions of all necessary instruments, appliances and labour in connection therewith. If at any time during the progress of the works, any error appears or arises in the position, levels, dimensions or alignments of any part of the works, Contractor, on being required to do so by Engineer-in-Charge, shall, at his own expense, rectify such error to the satisfaction of Engineer-in-Charge unless such error is based on incorrect data supplied in writing by Engineer-in-Charge / Owner. The checking of any setting out or any line or level by Engineer-in-Charge shall not in any way relieve Contractor of his responsibility for the correctness thereof and Contractor shall carefully protect and preserve all the bench marks, side rails, pegs and other things used in setting out of the work.

5.08 Reports and Records

- (i) Within fifteen (15) days of the Award, Contractor shall submit to Engineer-in-Charge the detailed programme, the content and form of which shall be satisfactory to Engineer-in-Charge showing the order to procedure and method in which he proposes to carry out the work and the time limit and sequence of carrying out the work and shall, whenever required by Engineer-in-Charge, furnish for his information particulars in writing of Contractor's arrangements for the carrying out of the work and of constructional plant and temporary works which contractor intends to supply, use or construct as the case may be. The approval by Engineer-in-Charge of such programme or the furnishing of such particulars shall not relieve Contractor of any of his duties or responsibilities under this Contract.
- (ii) Contractor shall submit to Engineer-in-Charge by the fifth (5th) day of each month for each part of his work under this Contract and in summary.
 - a) A month by month forecast and a historical record up to completion of his requirements and actual use of:
 - Manpower by craft, type and position or other description.
 - Materials and supplies including quantity on hand and delivery status.
 - Construction equipment and plant furnished by Contractor.
 - b) A month by month forecast up to completion of the amount of Work done and the amount remaining to be completed and all historical record of the Work performed.
 - c) Such other reports as Engineer-in-Charge may from time to time specify.

5.09 Issue of Materials

- (i) All materials required for the work shall be supplied by the contractor. Payment shall be made against finished items of work as specified in the schedule.

- (ii) All material, as required to complete the work in all respects according to the contract rates shall be inclusive of all freights, sales tax and other taxes, duties, royalties, loading, unloading, transporting, handling and storage charges etc.
- (iii) Contractor shall bear all incidental charges for the storage and safe custody of materials at Site.
- (iv) Contractor shall construct suitable godowns at Site for storing his own materials, safe against damage by rain, dampness, fire, theft etc. He shall also employ necessary watch and ward establishment for the purpose.
- (v) It shall be the responsibility of Contractor to arrange in time all materials required for Work. If, however, in the opinion of the Engineer-in-Charge the execution of Work is likely to be delayed due to Contractor's inability to make arrangements for supply of materials which normally he has to arrange for, the Engineer-in-Charge shall have the right at his own discretion to issue such materials if available with Owner or procure the materials from the market or elsewhere and Contractor will be bound to take such materials at the rates decided by the Engineer-in-Charge. This, however, does not in any way absolve Contractor from his responsibility of making arrangements for the supply of such materials in part or in full should such a situation occur nor shall this constitute reason for the delay in the execution of Work.
- (vi) In the event of Materials / Equipment supplied by Owner, the same shall not be utilised for other purpose(s) than issued for.

5.10 Storage

Contractor shall provide or cause to be provided all storage yards, transit sheds and warehouses necessary for the performance of his work at locations approved by Engineer-in- Charge. Material supplies, equipment and plant stored by Contractor shall be effectively protected against pilferage and against damage by the elements. Contractor shall adopt all procedures, maintain all personnel and keep all records so that, at all times Contractor can account for

- Stores receipt
- Storage locations
- Inventories
- Disbursements
- Final destinations of all stored items received for Contractor's Work on the Project or any portion thereof.

5.11 Audit

- (i) Contractor's accounts, related to the Project or any portion thereof, shall be available for audit by designated representatives of Owner at all reasonable times.
- (ii) Such representatives shall at all times be afforded proper facilities for inspection of Contractor's accounts and shall have access to Contractor's premises, work and materials, records, ledgers and vouchers of every description pertaining to Contractor's performance of this Agreement.

5.12 Damage to Property

- (i) Contractor shall be responsible for making good to the satisfaction of Owner any loss of and any damage to all structures and properties belonging to Owner or being executed or procured or being procured by Owner/Owner or of other Agencies within the premises of all Work of Owner/Owner if such loss or damage is due to fault and / or the negligence or wilful acts or omission of Contractor, his employees, agents, representatives or Sub-Contractors.
- (ii) Contractor shall indemnify and keeps Owner harmless of all claims for damage to property other than Owner's property arising under or by reason of this agreement if such claims result from the fault and/or negligence or wilful acts or omissions of Contractor, his employees, agents, representative or Sub-Contractors.

5.13 Articles of Value Found

All gold, silver and other minerals of any description and all precious stones, coin, treasure, relics-antiquities and other similar things which shall be found in, under or upon Site, shall be the property of Owner and Contractor shall duly preserve the same to the satisfaction of the Engineer-in-Charge and shall from time to time deliver the same to such person or persons indicated by Owner.

5.14 Discrepancies between Instructions

Should any discrepancy occur between the various instructions furnished to Contractor, his agents or staff or any doubt arise as to the meaning of any such instructions or should there be any misunderstanding between Contractor's staff and the Engineer-in-Charge's staff, Contractor shall refer the matter immediately in writing to the Engineer-in-Charge whose decision thereon shall be final and conclusive and no claim for losses alleged to have been caused by such discrepancies between instructions, doubts, or misunderstanding shall in any event be admissible.

5.15 Liquidated Damage

- (i) If the contractor is unable to complete the jobs specified in the scope of work within the period specified in NIT, it may request owner for extension of the time with unconditionally agreeing for payment of LD. Upon receipt of such a request, owner may at its discretion extend the period of completion and shall recover from the contractor's running account bill, as an ascertained and agreed Liquidated Damages, a sum equivalent to 0.5% of contract value for each week of delay or part thereof. The LD shall be limited to 10% of the total contract value.

The parties agree that the sum specified above is not a penalty but a genuine pre-estimate of the loss/damage which will be suffered by the owner on account of delay/ breach on the part of the CONTRACTOR and the said amount will be payable to the Owner without proof of actual loss or damage caused by such delay/breach by the Owner.

- (ii) Notwithstanding what is stated in Clause above, the Owner shall have the right to employ any other agency to complete the remaining work at the risk and cost of the Contractor, in the event of his failing to complete the work within the stipulated time or in the even progress of Contractor's work is behind schedule, as judged by the engineer-in-charge.

- (iii) Then the Engineer-in-Charge upon receiving necessary approval from competent Authority may in writing make a fair and reasonable extension of time for completion of the works as per provision of clause no. 3.12, provided further that the Contractor shall constantly use his best endeavour to the satisfaction of the Engineer-in-Charge to proceed with the works. Nothing herein shall prejudice the rights of the Contractor under clause herein above.
- (iv) The contractor may seek time extension for delay or anticipated delay as per clause no. 3.12.5 for reasons not attributable to them and in such case time extension may be given without imposition of LD.

5.16 Force Majeure

Any delay in or failure of the performance of either party hereto shall not constitute default hereunder or give rise to any claims for damages, if any, to the extent such delays failure of performance is caused by occurrences such as Acts of God or the public enemy expropriation or confiscation of facilities by Government Authorities, compliance with any order or request of any Governmental Authorities, was fires, floods, riots or illegal strikes. Refer clause no 3.12 in this regard.

5.17 Period of Liability

- (i) Contractor shall be responsible for maintaining the quality of the awarded Work for a period of Twelve (12) months from the date of issue of completion certificate without any extra cost. Any damage or defect that may arise or lie undiscovered at the time of issue of completion certificate, connected in any way with the Equipment or materials supplied by him or in the workmanship shall be rectified or replaced by Contractor at his own expense as deemed necessary by the Engineer-in-Charge or in default, the Engineer-in-Charge may cause the same to be made good by other workmen and deduct expenses (of which the certificate of Engineer-in-Charge shall be final) from any sums that may be then or at any time thereafter, become due to Contractor or from his Security Deposit, or the proceeds of sale thereof, or of a sufficient portion thereof.
- (ii) If Contractor feels that any variation in work or in quality of materials or proportions would be beneficial or necessary to fulfil guarantees called for, he shall bring this to the notice of the Engineer-in-Charge in writing.
- (iii) From the commencement of completion of Work, Contractor shall take full responsibility for the care for Work including all temporary work and in case any damages, loss or injury shall happen to Work or to any part thereof or to any temporary work from any cause whatsoever, shall at his own cost repair and make good the same so that at completion Work shall be in good order and in conformity, in every respects, with the requirements of Contract and the Engineer-in-Charge's instructions.
- (iv) If at any time, before Work is taken over, the Engineer-in-Charge shall: -
 - a) Decide that any work done or materials used by Contractor or any Sub-Contractor is defective or not in accordance with Contract, or that Work or any portion thereof are defective, or do not fulfil the requirements of Contract (all such materials being hereinafter, called 'Defects' in this clause), and as soon as reasonably practicable gives to Contractor notice in writing of the said decision, specifying particulars of the defects alleged to exist or to have occurred, then Contractor shall at his own expenses and with all speed make good the defects so specified.

In the case Contractor shall fail to do so, Owner may take, at the cost of Contractor, such steps as may in all circumstances, be reasonable to make good such defects. The expenditure so incurred by Owner will be recovered from the amount due to Contractor. The decision of the Engineer-in-Charge with regard to the amount to be recovered from Contractor will be final and binding on Contractor.

As soon as Work have been completed in accordance with Contract (except in minor respects that do not effect their use for the purpose for which they are intended and except for maintenance thereof provided in the General Conditions of the Contract) and have passed the tests on completion, the Engineer-in-Charge shall issue a certificate (hereinafter called Completion Certificate) in which he shall certify the date on which Work have been so completed and have passed the said tests and Owner shall be deemed to have taken over Work on the date so certified. If Work has been divided into various groups in Contract, Owner shall be entitled to take over any group or groups before the other or others and thereupon the Engineer-in-Charge shall issue a Completion Certificate which will, however, be for such group or groups so taken over only.

- b) In order that Contractor could obtain a completion Certificate he shall make good, with all possible speed any defect arising from the defective materials supplied by Contractor or workmanship or any act or omission of Contract that may have been noticed or developed, after the Work or group of Works has been taken over, the period allowed for carrying out such Work will be normally one (1) month. If any defect be not remedied within a reasonable time. Owner may proceed to do Work at Contractor's risk and expense and deduct from the Final Bill such amount as may be decided by Owner.

If by reason of any default on the part of Contractor a completion Certificate has not been issued in respect of every portion of Work within one (1) month after the date fixed by Contract for the completion of Work, Owner shall be at liberty to use Work or any portion thereof in respect of which a Completion Certificate has been issued, provided that Work of the portion thereof so used as aforesaid shall be afforded reasonable opportunity for completing these Work for the issue of Completion Certificate.

5.18 Right of Owner to Terminate the Contract

- (i) If the Contractor being an individual or a firm commits any 'Act of Insolvency' or shall be adjudged as insolvent or being an Incorporated Company shall have an order for compulsory winding up made against it, or pass an effective resolution for winding up voluntarily or subject to the supervision of the Court or shall be unable to carry out and fulfil the contract and to give security therefore, is so required by the Engineer-in-Charge.

Or if the Contractor (whether an individual, firm or incorporated company) shall suffer execution to be issued.

Or shall suffer any payment under this Contract to be attached by or on behalf of any of the creditors of the contractor.

Or shall assign or charge, encumber or sublet this contract without the consent in writing of the Engineer-in-Charge first obtained.

Or shall charge or encumber this contract or any payments due or which may become due to the Contractor thereunder.

Or if the Engineer-in-Charge shall certify in writing to the Owner that the Contractor -

- a) has abandoned the Contract or
- b) has failed to commence the works, or has without any lawful excuse under these conditions, suspended the progress of the works for 7 days after receiving from the Engineer-in-Charge written notice to proceed or
- c) has failed to proceed with the works with such due diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon or
- d) has failed to remove materials from the site or to pull down and replace work for seven days after receiving materials or work were condemned and rejected by the Engineer-in-Charge under these conditions or
- e) has used sub-standard or inferior material or materials not conforming to the specifications or has employed inferior workmanship in carrying out the works or part thereof or has not exercised due diligence in execution of the said work, or
- f) has neglected or failed persistently to observe and perform all or any of the acts, deeds, matters or things by this Contract to be observed and performed by the Contractor requiring the Contractor to observe or perform the same, or
- g) has to the detriment of good workmanship or in defiance of the Engineer-in-Charge's instructions to the contrary, sub-let or sub-contracted any part of the contract, or
- h) has failed to comply with the Engineer-in-Charge's instructions, or
- i) has in the opinion of the Engineer-in-Charge committed any breach of this Contract, then and in any of the said cases the Owner with the written consent of the Engineer-in-Charge may notwithstanding any previous waiver, after giving seven day's notice in writing to the Contractor terminate the Contract, but without hereby affecting the right of the Owner of the powers of the Engineer-in-Charge or the obligations and liabilities of the Contractor in respect of work, the contract shall continue enforce as fully as if the contract has not been so determined and the obligations of the contractor in respect of work subsequently executed shall continue as if the works subsequently executed has been executed by or on behalf of the Contractor. And further, the Owner by its agents or servants shall be titled forthwith to enter upon and take possession of the works and all plants, tools, scaffoldings, sheds, machinery, steam and other power implements, machinery equipment and materials lying upon the site or the adjoining lands or roads and use the same as its own property and to employ the same by means of its own servants and workmen in carrying on and completing the work or by employing any other contractor and the Contractor shall not in any way interrupt or do any act, matter or things to prevent, intimidate or hinder such other contractor or other person or persons employed for completing and finishing or using the materials and plant for the work. When the works shall be completed or as soon thereafter as convenient, the Engineer-in-Charge shall give a notice in writing to the Contractor to remove his surplus materials and plant and should the Contractor fail to do so within the period of 7 days after receipt thereof by him, the Owner shall sell the same either by public auction or a private sale and shall be given credit to the contractor for the amount realised. The Engineer-in-Charge shall thereafter ascertain and certify in writing under this hand what (if anything) shall be due or payable to or by the owner, the expense or loss which the owner shall have been put to in procuring the works to be completed and the amount, if any, owing to the contractor and the amount which shall be so certified,

shall thereupon be paid by the owner to the Contractor or by the Contractor to the Owner, as the case may be and the Certificate of the Engineer-in-Charge shall be final and conclusive and binding on the parties hereto. In the event of termination under this Clause, the Owner shall not be bound by any provision of this Contract to make any further payment to the Contractor until the said works are completed.

- (j) Owner shall, at any time, be entitled to determine and terminate the Contract, if in the opinion of the Owner the cessation of the Work becomes necessary owing to paucity of funds or for any other cause whatsoever, in which case the cost of approved materials at the Site at current market rates as verified and approved by Engineer-in-Charge and of the value of the Work done to date by the Contractor shall be paid for in full at the specified in the Contract. A notice in writing from the Owner to the Contractor of such determination and termination and the reason therefore shall be the conclusive proof of the fact that the Contract has been so determined and terminated by the Owner.
- (k) Should the Contract be determined under sub-clause of this clause and the Contractor claims payment to compensate expenditure incurred by him in the expectation of completing the Work, the Owner shall consider and admit such claim as are deemed fair and reasonable and are supported by the vouchers to the satisfaction of the Engineer-in-Charge. The Owner's decision on the necessity and propriety of such expenditure shall be final and conclusive and binding on the Contractor.

5.19 Sub-Letting Of Work

- (i) No part of the Contract nor any share or interest therein shall in any manner or degree be transferred, assigned or sublet by the Contractor directly or indirectly to any person, firm, or corporation whatsoever except as provided for in the succeeding sub-clause, without the consent in writing, of the Owner.
- (ii) The Owner may give written consent to sub-contract for the execution of any part of the Work at the Site, being entered into by the Contractor provided each individual sub-contract is submitted to the Engineer-in-Charge before being entered into and is approved by him.
- (iii) Notwithstanding any sub-letting with such approval as aforesaid and notwithstanding that the Engineer-in-Charge shall have received copies of any sub-contracts, the Contractor shall be and shall remain solely responsible for the quality and proper and expeditious execution of the WORK and the performance of all the conditions of the Contract in all respects as if such sub-letting or sub-contracting had not taken place, and as if such Work had been done directly by the Contractor.
- (iv) If any Sub-Contractor engaged upon the Work at the Site executes any Work which in the opinion of the Engineer-in-Charge is not in accordance with the Contract Document, the Owner may by written notice to the Contractor request him to terminate such contract and the Contractor upon the receipt of such notice shall terminate such sub-contract and dismiss the Sub-Contractors and the latter shall forthwith leave the Work failing which the Owner shall have the right to remove such sub-contractors from the Site.
- (v) No action taken by the Owner under the clause shall relieve the Contractor of any of his liabilities under the Contract or give rise to any right to compensation, extension of time or otherwise.

5.20 Patents and Royalties

Contractor, if licensed under any patent covering, Equipment, Machinery, Materials or compositions of matter to be used or supplied or methods and process to be practiced or employed in the performance of this Contract, agrees to pay all royalties and license fees which may be due with respect thereto. If any Equipment, Machinery, Materials, Composition matters, to be used or supplied or methods and process to be practiced or employed in the performance of this Contract, is covered by a patent under which the Contractor is not licensed then the Contractor before supplying or using the Equipment, Machinery, Materials, compositions method or processes shall obtain such licenses, and pay such royalties and license fees as may be necessary for performance of the Contract. In the event the Contractor fails to pay any such royalty or obtain any such license any suit for infringement of such patents which is brought against the Contractor or the Owner as a result of such failure will be defended by the Contractor at his own expense and the Contractor will pay any damages and costs awarded in such suit.

5.21 Performance Guarantee & Warranty

(i) Performance Guarantee:

- a) The contractor shall guarantee that the material of construction and workmanship of work done and any fittings designed / manufactured / supplied by him are as specified in the tender schedule and wherever there is nothing specifically mentioned shall correspond to the best available grade and quality as required for the application.
- b) The contractor shall also guarantee that the work done and any fittings designed, manufactured, supplied, erected shall be as per prevailing relevant standard, codes and statutory practices / stipulations.
- c) The contractor shall guarantee the work done and any fittings designed, manufactured, supplied, erected and tested by him against defective materials, poor workmanship, improper design, operation inadequacies & problems and failure from normal usage, for a period of 12 (twelve) calendar months after final acceptance of the work by the Owner.

(ii) Warranty:

The Contractor will repair and/or replace all defective parts, components / fittings, accessories etc. which shall be notified to him in writing within the Defect Liability Period provided that such defective parts, components, fittings, accessories etc. are promptly rectified and replaced by him free of cost. The contractor will provide similar warranty on the parts, components, fittings, accessories etc. repaired and/or replaced.

5.22 Contractor's Responsibility with Other Agencies

Without repugnance to any other condition, it shall be the responsibility of the Contractor to work in close co-operation and co-ordinate the other contractors and other Agencies or their authorised representatives if any working at the site in providing the necessary grooves, recesses, cuts and opening etc., in walls, slabs, beams and columns etc. and making good the same to the desired finish as per Specifications where required. For at the above said requirements, the Contractor before starting up the works shall in consultation with other contractors and other Agencies or their authorised representatives if any prepare and put up a joint scheme to the Engineer-in-Charge and get the approval. The Engineer-in-Charge, before communicating his approval to

the scheme, with any required modifications, shall get the final agreement of all the Agencies, which shall be binding. No claim shall be entertained on account of the above.

5.23 Arbitration

Any dispute or difference arising under this Contract shall be referred for adjudication at Kolkata to a sole arbitrator to be appointed by the Chairman & Managing Director, Balmer Lawrie & Co. Ltd and the provisions of Arbitration Act, 1996 including any statutory modifications or enactment thereof shall apply to the Arbitration proceedings. The fees of the arbitrator, if any, shall be paid equally by both the parties. The award shall be a speaking award stating reason therefor and is final & binding on the parties. The proceeding shall be conducted in English language and courts at Kolkata will have exclusive jurisdiction to settle any dispute arising out of this contract.

6.0 INSPECTION, CERTIFICATION AND PAYMENT

6.01 Inspection & Testing

- (i) All materials required for the execution of the work should conform to the standard specification and approved by the Engineer-in-Charge before actually put to use. Commencement of work without prior approval shall be entirely at the risk and cost of the Contractor. No delay due to non-availability of the Materials, tools, equipment etc. will be entertained by the Owner. In the case of certain Machinery / Equipment, the Engineer-in-Charge may inspect the item for approval, before they are brought to site.
- (ii) The Owner shall be entitled at all times at the risk of the Contractor to inspect and / or test by themselves or through any independent person(s) or agency (ies) appointed by the owner and/or to direct the contractor to inspect and/or test all material(s), items and components whatsoever supplied or proposed for supply, for incorporation in the work inclusive, during the course of manufacture or fabrication by the Contractor and/or at the Contractors work or otherwise, such materials or items or components. The inspection and/or test shall be conducted at the expense of the Contractor and if conducted by the Contractor may be directed by the Owner to be conducted by agency (ies) nominated by Owner and/or in the presence of witness (ess) nominated by the Owner.
- (iii) The Contractor shall furnish to the Engineer-in-Charge for approval when requested or as required by the specification or other contract documents, adequate samples of material intended for incorporation in the works. Such samples to be submitted before the work are commenced permitting sufficient time for tests, examination(s) thereto by the Engineer-in-Charge. All materials furnished and incorporated in the work shall conform to the sample(s) in all respects.
- (iv) The Engineer-in-Charge shall be entitled to reject at any time any defective materials, item or components, (including special manufactured or fabricated items or components) supplied by the Contractor for incorporation in the works.
- (v) The Contractor shall at all times ensure highest standard of workmanship, relating to the work to the satisfaction of the Engineer-in-Charge. The Engineer-in-Charge shall have the power to inspect the work as also to test or instruct the contractor to test the works or any structure, material or component thereto at the risk and cost of the Contractor, either by the Contractor or by any agency(ies) nominated by the Engineer-in-Charge or Site Engineer on his behalf.

- (vi) The Contractor shall provide all facilities, instruments material / labour and accommodation required for testing the works (including checking the set time out of work) and shall provide Engineer-in-Charge all assistance necessary to conduct the test whenever and wherever required.
- (vii) The Engineer-in-Charge on inspection or test be not satisfied with the quality or workmanship of any work, structure, material, component (decision of the Engineer-in-Charge being final in this behalf), the Contractor shall re-perform, replace, re-install and / or re-erect as the case may be such work, structure material or component, as no such rejected work, structure, material, item or component shall be re-used without the prior permission of Engineer-in-Charge.
- (viii) Notwithstanding any provided in the foregoing clauses hereto and notwithstanding the Engineer-in-Charge/ or his representative has inspected tested and/or approved any particular work, structure, material or component, such inspection, test or approval shall not absolve the Contractor of his full responsibilities under the contract inclusive or relative to the specification, performance guarantee. The said inspection and test procedure being intended basically for satisfaction of the Owner / prima-facie erection and/or material and equipment supplied for incorporation in the work is in order.
- (ix) On no account shall the Contractor proceed with the concreting or other work in foundations and superstructure by covering up or otherwise placing beyond reach of inspection or measurement any work before necessary inspection, entries are filled in the Site Inspection Register by the Engineer-in-Charge or his authorised representative. Should the contractor do so the same shall be uncovered at the contractor's risk and expense for carrying out the inspection and measurement.
- (x) If any tests are required to be carried out in connection with the work or materials or workmanship not supplied by the Contractor, such tests shall be carried out by the Contractor as per the instructions of Engineer-in-Charge and cost of such tests shall be reimbursed by the Owner.

6.02 Schedule of Rates and Payments

- (i) The price to be paid by Owner to Contractor for the work to be done and for the performance of all the obligations undertaken by Contractor under Contract shall be ascertained by the application of the respective Schedule of Rates (there of application but not of limitation, with the succeeding sub-clause of this clause) and payment to be made accordingly for the work actually executed and approved by the Engineer-in-Charge. The sum so ascertained shall (excepting only as and to the extent expressly provided herein) constitute the sole and inclusive remuneration of Contractor under Contract and no further or other payment whatsoever shall be or become due or payable to the Contractor under Contract.
- (ii) The prices/rates quoted by Contractor shall remain firm till the issue of final certificate and shall not be subject to escalation. Schedule of Rates shall be deemed to include and cover all costs, expenses and liabilities of every description and all risks of every kind to be taken in executing, completing and handing over Work to Owner by Contractor. Contractor shall be deemed to have known the nature, scope, magnitude and the extent of Work and materials required though Contract Document may not fully and precisely furnish them. He shall make such provision in the Schedule of Rates as he may consider necessary to cover the cost of such items of Work and materials as may be reasonable and necessary to complete the Work. The opinion of the Engineer-in-Charge as to the items of work which are necessary and reasonable for completion of Work shall be final and binding on Contractor, although the same may not be shown on or described specifically in Contract Document.

Generality of this present provision shall not be deemed to cut down or limit in any way Contractor's obligation under the Contract, because in certain cases it may and in other cases it may not be expressly stated that Contractor shall do or perform a work or supply articles or perform, services at his own cost or without additional payment or without extra charge or work to the same effect or that it may be stated or not stated that the same are included in and covered by the Schedule of Rates.

- (iii) Without in any way limited the provisions of the preceding sub-clause the Schedule of Rates shall be deemed to include and cover the cost of all Constructional Plant and Equipment, Temporary Work (except as provided for herein), Pumps, Materials, Labour, Insurance, Fuel, Stores, and Appliances to be supplied by Contractor and all other matters in connection with each item in the Schedule of Rates and the execution of Work or any portion thereof finished, complete in every respect and maintained as shown described in the Contract Document or as may be ordered in writing during the continuance of Contract.
- (iv) Unless specifically mentioned otherwise in the contract, all payments shall be made against finished items of work only as defined and included in the schedule of rates. However, Engineer-in-Charge may grant part payment, in certain cases, against partially completed work at his own discretion after proper checking and measurement of the portion of the work completed by the contractor. All such payment shall be regarded merely as an advance payment against the amounts due to the contractor in terms of the contract and any such payment shall not be regarded as an acceptance of any work paid for.
- (v) No exemption or reduction of Customs Duties, Excise Duties, Sales Tax, service tax, VAT, cess, quay or any port dues, Royalties, transport charges, stamp duties or Government or Local Body or Municipal Taxes or Duties, Taxes or Charges (from or of any other body), whatsoever, will be granted or obtained, all of which expenses shall be deemed to be included in and covered by the Schedule of Rates. Contractor shall also obtain and pay for all permits, or other privileges necessary to complete work.
- (vi) For Work under Unit Rate Basis, no alteration will be allowed in the Schedule of Rates by reason of Work or any part of them being modified, altered, extended, diminished or omitted. The Schedule of Rates are fully inclusive rates which have been fixed by Contractor and agreed to by Owner and cannot be altered.
- (vii) No Escalation on account of any increase in price index in the price of materials, imposition of sales tax or other tax etc. or imposition of levies etc. will be payable. No price escalation shall be applicable even during the extended period.

6.03 Procedure for Measurement / Billing of Work in Progress

- (i) All measurement shall be in metric system. All the Work in progress will be jointly measured by the representative of the Engineer-in-Charge and Contractor's authorised agent progressively. Such measurement will be got recorded in the Measurement Book /Sheet by the Engineer-in-Charge or his authorised representative and signed in token of acceptance by Contractor or his authorised representative.
- (ii) For the purpose of taking joint measurement Contractor's representative shall be bound to be present whenever required by the Engineer-in-Charge. If, however, he absents for any reason whatsoever the measurements will be taken by the Engineer-in-Charge or his representative and this will be deemed to be correct and binding on Contractor.

- (iii) The mode of measurement shall be in accordance with Indian Standard Specifications as laid down unless otherwise specified to the contrary.
- (iv) All measurements shall be neatly written on the measurement books / sheets. Each set of measurements, shall commence with entries stating:
 - a) Full name of work as given in estimate
 - b) Situation of work
 - c) Name of Contractor
 - d) Date of agreement entered into with Contractor
 - e) Date of Commencement of Work
 - f) Date of completion of work
 - g) Date of measurement

At the end of measurements, dated signature and designation of the person, who recorded the measurements, shall be made.

- (v) All pages of measurement sheets shall be machine numbered. All receipts and issues of measurement sheets shall be recorded in a register. The eventual return of all measurement sheets shall be recorded and carefully preserved by the Engineer-in-Charge.
- (vi) Contractor will submit a Bill in approved proforma in quadruplicate to the Engineer-in-Charge of Work giving abstract and detailed measurements for the various items executed during a month, before the expiry of the first week of the succeeding month. The Engineer-in-Charge shall take or cause to be taken the requisite measurements for the purpose of having the same verified and the claim, as far as admissible.

Engineer-in-Charge shall review such bills and shall either:

- a) Approve such bills and certify the same for payment; or
- b) Approve part of the bill(s) and certify that part for payment, request further clarifications / revisions from Contractor as to the balance and upon receipt of satisfactory clarification / revisions from Contractor, certify the balance for payment; or
- c) Reject the entire bill subject to further clarification / revisions from Contractor, upon receipt by Engineer-in-Charge of satisfactory clarification / revisions to such rejected bill, Engineer-in-Charge shall approve and certify the clarified / revised bill for payment.

6.04 Secured Advance

No secured advance is payable.

6.05 Notice of Claim for Additional Payment

Should Contractor consider that he is entitled to any extra payment or compensation or to make any claims whatsoever in respect of Work he shall forthwith give notice in writing to the Engineer-in-Charge that he claims extra payment and/or compensation. Such notice shall be given to the Engineer-in-Charge within ten (10) days from the ordering of any Work or happening of any event upon which Contractor bases such claims and such notice shall contain full particulars of the nature of such claim with full details and amount claimed. Failure on the

part of Contractor to put forward any claim with necessary particulars as above within the time above specified shall be an absolute waiver thereof. No omission by Owner to reject any such claim and no delay in dealing therewith shall be waiver by Owner of any rights in respect thereof.

6.06 Completion Certificate

- (i) When Contractor fulfils his obligation under clauses he shall be eligible to apply for Completion Certificate. Contractor may apply for separate Completion Certificate in respect of each such portion of Work by submitting the completion Documents along with such application for Completion Certificate.

The Engineer-in-Charge shall normally issue to Contractor the Completion Certificate within one(1) month after receiving an application therefore from Contractor after verifying from the completion documents and satisfying himself that work has been completed in accordance with and as set out in the construction and erection drawings, and the Contract Document and rectification of defects if any.

Contractor, after obtaining the Completion Certificate, is eligible to present the Final Bill for Work executed by him under the terms of Contract.

- (ii) Within one (1) month of completion of work in all respects, Contractor shall be furnished with a certificate by the Engineer-in-Charge, of such completion, but no certificate shall be given nor shall work be deemed to have been executed until all scaffolding, surplus materials and rubbish is cleared off Site completely nor until work shall have been measured by the Engineer-in-Charge whose measurement shall be binding and conclusive. Work will not be considered as complete and taken over by Owner, until all the temporary works, constructed, are removed and the worksite cleaned to the satisfaction of the Engineer-in-Charge.

If Contractor shall fail to comply with the requirements of this clause on or before the date fixed for the completion of Work, Engineer-in-Charge may at the expenses of Contractor remove such scaffolding, surplus materials and rubbish and dispose of the same as he thinks fit and clean off such dirt as aforesaid, and Contractor shall forthwith pay the amount of all expenses so incurred and shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realised by the sale thereof.

- (iii) For the purpose of clause, the following Documents will be deemed to form the completion Documents:
- (a) The technical documents according to which Work was carried out.
 - (b) Three (3) sets of Construction Drawings showing therein the modification and corrections made during the course of execution signed by the Engineer-in-Charge.
 - (c) Completion Certificate for 'embedded' and 'covered' up Work.
 - (d) Certificates of final levels as set out of various work.
 - (e) Material appropriation Statement for the materials issued by Owner for Work and list of surplus materials returned to Owner's store duly supported by necessary Documents. Contractor should also submit the necessary documents before taking out their own materials/equipment from the site. No material/equipment can be taken out from site without prior approval of Engineer-in-Charge.

6.07 Final Certificate

Upon expiry of the period of liability and subject to the Engineer-in-Charge being satisfied that work have been duly maintained by Contractor, during such period as hereinbefore mentioned and that Contract has in all respect duly made up any subsidence and performed all his obligations under Contract, the Engineer-in-Charge shall (without prejudice to the rights of Owner to retain the provisions of relevant clause hereof) otherwise give a certificate herein referred to as the final certificate to that effect and Contractor shall not be considered to have fulfilled the whole of his obligations until Final Certificate shall have been given by the Engineer-in-Charge notwithstanding any previous entry upon Work and taking possession, working or using of the same or any part thereof by Owner. Contractor shall provide Owner with a certified satisfactory to both that all privileges, liens, claims, obligations and liabilities against or chargeable to the Owner have been fully paid, satisfied and released and that Contractor has no claim(s) against Owner.

6.08 Certificate and Payments on Evidence of Completion

Except the final certificates no other certificate or payments against a certificate or on general account shall be taken to be an admission by Owner of the due performance of Contract or any part thereof or occupancy or validity of any claim by Contractor.

7.0 RULES, REGULATIONS & INSURANCE COVERAGE

7.01 Observance of Rules/ Acts in Force

- (i) The successful tenderer and his man shall abide by all rules/regulations in force at a location and the laws, by-laws and statutes of Government / Semi-Government and other local authorities such as requirements / liability under enactments, Contract Labour Act etc. and the Company shall stand indemnified against by claims on these scores.
- (ii) The Contractor shall conform to the provisions of Acts, rules, orders or notifications of any Governments, Municipal or local authority for the time being in force affecting the work undertaken by him and will give all necessary notices to and obtain requisite sanction and permits of and from the Municipal and any other authority in respect of the said work or the materials to be used there at and generally will comply with the building and other regulations of such authorities and will keep the Company indemnified against all claims, penalties and losses that may be incurred by it by reason of any breach by the Contractor of any statutes by-laws, rules, regulations, notifications etc.
- (iii) The Contractor and sub-contractor(s) of the Contractor shall obtain authority (ies) designated in this behalf under any applicable laws, rule or regulation (including) but not limited to Contract Labour (in so far as applicable) any and all such license(s) consent(s), registration(s) and/or other authorisation(s) as shall from time to time be or become necessary for or relative to the execution of the work or any part or portion thereof or the storage or supply or any material(s) or otherwise in connection with the performance of the contract and shall at all times observe and ensure due observance by the sub-contractors, servants and agents of all terms and conditions of the said license(s) consent(s) regulation(s) and other authorisation(s) and laws, rules and regulations applicable thereto.
- (iv) The Contractor undertakes to ensure due and complete compliance with all laws, regulations, rules, etc., applicable to the workmen employed or whose services are otherwise availed of by the Contractor, whether in connection with the construction work at the site or otherwise. The Owner shall have the

right to inspect the records maintained by the contractor, Contractor shall whenever required by the Owner, produce such records and as and when the Owner may call upon the Contractor, ascertain whether or not the requirements of all such laws, regulations, rules etc. coming to light whether as a result of such inspection or otherwise, the Owner shall have the right to require the contractor to effect such compliance within such time, as the Owner may prescribe in that behalf and in the event of the Contractor failing to effect such compliance within the time prescribed by the Owner, then the Owner shall without prejudice to his other rights, be entitled to withhold from the amount payable to the workmen under any such laws, regulations or rules and to make payment thereof to the workmen. The Owner shall also have in that event the right to terminate the contract with immediate effect and to exercise powers reserved to the Owner under the contract as a result of termination.

7.02 Taxes, Duties, Octroi & Other Statutory Payments

Contractor agrees to and does hereby accept full and exclusive liability for the payment of any and all taxes, duties, Octroi, CESS, VAT, service tax etc. now or hereafter imposed, increased, or modified and all the sales taxes, duties, octroi, CESS, VAT, service tax etc. now enforce and hereafter increased, imposed or modified from time to time in respect of Work and materials and all contributions and taxes for unemployment compensation insurance and old age pensions or annuities now or hereafter imposed by any Central or State Governmental Authorities which are imposed with respect to or covered by the wages, salaries, or other compensations paid to the persons employed by Contractor and Contractor shall be responsible for compliance with obligations and restrictions imposed by the Labour Law or another law affecting employer employee relationship and Contractor further agrees to comply, and to secure the compliance of all Sub-contractors, with applicable Central, State Municipal and local laws and regulations and requirements of any Central, State or Local Employment Agency or authority, Contractor further agrees to defend, indemnify and hold harmless from any liability or penalty which may be imposed by the Central, State or Local authorities by reason of any violation by contractor or Sub-contractor of such laws, regulations or requirements and also from all claims, suits or proceedings that may be brought against Owner arising under, growing out of, or by reason of work provided for by this Contract, by third parties, or by / central or State Government Authority or any administrative subdivision thereof.

7.03 Labour Laws

- (i) No Labour below the age of eighteen (18) years shall be employed on Work. In case female workers are engaged, requisite provisions shall be made as per the statute.
- (ii) Contractor shall not pay less than what is provided under law to labourers engaged by him on Work.
- (iii) Contractor shall at his expense comply with all labour laws and keep Owner indemnified in respect thereof.
- (iv) In addition to above, rules and regulations as contained in Contract Labour (Regulation and Abolition) Act, 1970 will also be applicable for this contract. For the purpose of registration as per the above Act, Contractor may contact Owner for further details.

- (v) Contractor shall secure full safety of the workers / employees engaged by him in the Site premises and shall take at his own cost, insurances and such other safety regulations for the said purpose.
- (vi) Contractor shall submit the filled-up **Statutory Compliance Check List** as per the specified format to the owner on monthly basis. All the registers with regards to statutory compliance must be maintained at site.

7.04 Implementation of Apprentices Act 1964

Contractor shall comply with the provisions of the Apprentices Act, 1964 and the Rules and orders issued there under from time to time. If he fails to do so, his failure will be a breach of Contract and the Engineer-in-Charge may, at his discretion, cancel Contract. Contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provision of the Act.

7.05 Insurance

Contractor shall at his own expense carry out and maintain insurance with reputable companies to the satisfaction of the Owner as follows:

(i) **Workmen's Compensation and Employees' Liability Insurance:**

Insurance shall effect for all contractors' employees engaged in the performance of this Contract. If any of the work is sublet, after necessary approval by the Owner, the contractor shall require the Sub-contractor to provide Workmen's Compensation and Employees' Liability Insurance for the Sub-contractor's employees, if such employees are not covered under the Contractor's Insurance.

(ii) **Contractors All Risk Insurance:**

Contractor shall take out an All Risk Insurance policy in the Joint names of the Owner and the Contractor (owner as the first beneficiary) including third party liability, against loss or damage from any cause covering the work executed to the estimated current contract value together with the material for incorporation in the work. Such insurance shall be in such a manner that Owner and the Contractor are covered from the date of commencement of work.

The contractor shall indemnify the Owner against all losses and claims in respect of injuries or damage to any person, including any employee of the Owner, material or physical damage to any property whatsoever including that of the owner arising out of the execution of the works or in the carrying out of the contract, and shall insure against his liability with an insurer until the completion of this contract in terms approved by the owner. Whenever required, the contractor shall produce the insurance policy and the current premium receipts to the Owner.

In addition to what it is stipulated above the successful contractor shall execute **Indemnity Bond (as per Attachment –VIII)** to indemnify and hold harmless the Owner for complying with the provision of the following:

- i) Provident Fund Act for P.F. Scheme for labourers engaged by the Contractor / Subcontractors.
- ii) Interstate Migrant Workmen ("Regulation of Employment and Conditions of Services) Act - 1979.
- iii) Minimum Wages Act - 1948.

- iv) Equal Remuneration Act - 1976.
- v) Workman's Compensation Act - 1923.
- vi) Contract Labour (Regulation & Abolition) Act – 1970
- vii) The Building & Other Construction Works (Regulation of employment & Conditions of Service) Act 1996.

8.0 SAFETY CODES & PRACTICES

8.01 General

The Contractor shall adhere to safe construction practice and guard against hazardous and unsafe working conditions and shall comply with Owner's safety rules as set forth herein.

8.02 First Aid and Industrial Injuries

Contractor shall maintain first aid facilities for its employees and those of its sub-contractors -

- (i) Contractor shall make outside arrangements for ambulance or suitable service and for the treatment of industrial injuries. Names of those providing these services shall be furnished to Engineer-in-Charge prior to start of construction, and their telephone numbers shall prominently be posted in Contractor's field office.
- (ii) All critical industrial injuries shall be reported promptly to Engineer-in-Charge, and a copy of Contractor's report covering each personal injury requiring the attention of a physician shall be furnished to Owner.

8.03 General Rules

Carrying/Striking of matches, lighters and smokers inside the hazardous areas is strictly prohibited. Violations of "No SMOKING" rules will be discharged immediately. Within the operation area, no hot work shall be permitted without valid gas/safety/fire permits issued by Owner.

8.04 Contractors Barricades

- (i) Contractor shall erect and maintain barricades required in connection with his operations to guard or protect:
 - a) Excavations
 - b) Hoisting Areas
 - c) Areas adjudged by Contractor or Owner's inspectors.
 - d) Owner's existing property liable to damage by contractor's operations, in the opinion of Engineer-in-Charge.
- (ii) Contractor's employees and those of its sub-contractors shall become acquainted with Owner's barricading practice and shall respect the provisions thereof.
- (iii) Barricades and hazardous areas shall be marked by red falser lanterns at nights.

8.05 Safety Equipment

- (i) All necessary personal safety equipment as considered adequate by the Engineer-in-Charge should be made available for the use to the persons employed at the site and maintained in a condition suitable for immediate use, and the Contractor should take adequate steps to ensure proper use of equipment by those concerned.
- (ii) Workers engaged in white washing and mixing or stacking of cement bags or any materials, which are injurious to the eyes, shall be provided with protective goggles.
- (iii) Those engaged in welding and cutting works shall be provided with protective face & eye-shields, hand gloves etc.
- (iv) To ensure that workers use Personnel Protective equipment like safety helmet, safety shoes, gloves etc.
- (v) (When workers are employed in sewers and manholes, which are in use, the Contractor shall ensure that the manhole covers are opened and are ventilated at least for an hour before the workers are allowed to get into the manholes, and manholes, so opened, shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accidents to the public.
- (v) The Contractor shall not employ men below the age of 18 years and women on the work of painting or products containing lead in any form. Wherever men above the age of 18 years are employed on the work of lead painting, the following precautions should be taken.
 - a) No paint containing lead product shall be used, except in the form of paste or ready-made paint.
 - b) Suitable facemasks shall be supplied for use by the workers when paint is applied in the form of spray on a surface having lead paint dry, rubbed and scrapped.
- (vi) Hot work should be carried out only in the areas earmarked for the purpose after required safety precautions have been taken and only after obtaining written permission from the Engineer-in-Charge. Any provision required to be made e.g. windscreens of G.I sheets etc. to make the area safe for hot work, will be made by the successful tenderer at his own cost.

8.06 Hoisting Equipment

- (i) Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following standards or conditions.
 - a) These shall be of good mechanical construction, sound materials, adequate strength and free from patent defect and shall be kept in good condition and in good working order.
 - b) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding, winch or indicating signals to the operator.
- (ii) In case of Owner's machine, the safe working load shall be notified by the Engineer-in-Charge. As regards Contractor's machines, the Contractor shall notify the safe working load of the machine to the

Engineer-in-Charge, whenever he brings any machinery to site of work and get it verified by the Engineer-in-Charge, concerned.

8.07 Electrical Equipment

Motors, Gear Transmission, Electric Wiring and other dangerous parts of hoisting appliances shall be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce to the minimum the risk of accidental descent of the load; adequate precautions shall be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations, which are already energised, insulating mats, wearing apparel, such as gloves and boots as may be necessary shall be provided.

ATTACHMENT - I

CONTRACT AGREEMENT

ARTICLES OF AGREEMENT FOR THE WORK OF

made this day of between Messers / Mr

hereinafter called the "Contractor" (which term shall unless excluded by or repugnant to the context include its successors and permitted assigns) of the one part and Visakhapatnam Port Logistics Park Ltd.; having its registered office at 21, Netaji Subhas Road, Kolkata - 700 001, India hereinafter called the "Owner" which term shall unless excluded by or repugnant to the context include its successors and permitted assigns) of the other part.

WHEREAS

(A) Owner being desirous of having provided and executed Work mentioned, enumerated or referred to in the Tender Document including anyone or all of the documents such as Notice Inviting Tender / Letter Inviting Tender, General Conditions of Contract, Special Conditions of Contract, Specifications, Safety codes, Drawings, Plans, Time Schedule, Letter of Acceptance of Tender, Agreed Variations, other documents has called for Tender.

(B) Contractor has inspected Site and surroundings of Work specified in the Tender Document and satisfied itself/himself by careful examination before submitting its/his tender as to the nature of the surface strata, soil, sub-soil and ground, the form and nature of Site and local conditions, the quantities, nature and magnitude of Work, availability of labour and materials necessary for the execution of Work, the means has of access to Site, the supply of power and water thereto and the accommodation it/he may require and has made local and independent enquiries and obtained complete information as to the matters and things referred to, or implied in the Tender Document or having any connection therewith, and has considered the nature and extent of all probable and possible situations, delays, hindrances or interferences to or with the execution and completion of Work, to be carried out under Contract, and has examined and considered all other matters, condition and things and probable and possible contingencies, and generally all matters incidental thereto and ancillary thereof affecting the execution and completion of Work and which might have influenced it/him in making its/his Tender.

(C) The Notice Inviting Tender / Letter Inviting Tender, Tender Document, General Conditions of Contract, Special Conditions of Contract, Specifications, Letter of Acceptance of Tender, Schedule of Rates and other documents which, together with this agreement, constitute the terms and conditions under which the Contractor shall perform the works, are listed in the Appendix to the Agreement and they shall form part of this Agreement. For purpose of this Agreement, the expression 'Contract' shall also include any modifications, alterations, variations in the specifications by way of additions and deletion thereto, written instructions, directions etc. issued by the Owner from time to time.

AND WHEREAS

Owner accepted the Tender of Contractor for the provision and the execution of Work at the rates stated in the schedule of rates and finally approved by Owner upon the terms and subject to the conditions of contract.

Now this Agreement Witnessed and it is hereby agreed and declared as follows:

(1) In consideration of the payment to be made to Contractor for Work to be executed by him/it, Contractor hereby covenants with Owner that Contractor shall and will duly provide, execute and complete Work and shall

do and perform all other acts and things in Contract mentioned or described or which are to be implied there from or may be reasonably necessary for completion of Work and at the said times and in the manner and subject to the terms and conditions or stipulations mentioned in Contract.

(2) In consideration of the due provision, execution and completion of work, Owner does hereby agree with Contractor that Owner will pay to Contractor the respective amounts for the work actually done by him and approved by Owner at the Scheduled Rate and such other sum payable to Contractor under provision of Contract such payment to be made at such time and in such manner as provided for in Contract.

AND

(3) In consideration of the award of the work, Contractor does hereby agree to pay such sums as may be due to Owner for the services rendered by Owner to Contractor such as power supply, water supply and others as set forth in Contract and such other sums as may become payable to Owner towards the controlled items of consumable materials or towards loss, damage to the Owner's Equipment, materials, construction plant and machinery, such payments to be made at such time and in such manner as is provided in Contract.

It is specifically and distinctly understood and agreed between Owner and Contractor that Contractor shall have no right, title or interest in the Site made available by Owner executed on Site by Contractor or in the goods, articles, materials, etc. brought on Site (Unless the same specifically belongs to Contractor) and Contractor shall not have or deemed to have any lien whatsoever charge for unpaid bills nor will be entitled to assume or retain possession or control of Site or structures and Owner shall have an absolute and unfettered right to take full possession of the Site and to remove the Contractor, their servants, agents and materials belonging to Contractor and lying on Site.

Contractor shall be allowed to enter upon Site for execution of work only as a licensee simpliciter and shall not have any claim, right, title or interest in Site or the structures erected thereon equipment, plant and machinery installed, and Owner shall be entitled to terminate such license at any time without assigning any reason.

The Equipment, plant and machinery, materials including sand, gravel, stone, loose, earth, rock etc., dug up or excavated from Site shall unless otherwise expressly agreed under this Contract, exclusively belong to Owner and Contractor shall have no right to claim over the same and such excavations and materials should be disposed of on account of owner according to the instructions in writing issued from time to time by the Engineer-in-Charge.

Contractor shall affect the payment of wages to its / his labours directly without the intervention of any intermediary and no amount by way of commission or otherwise shall be deducted or recovered from the wages of workmen.

The parties hereto hereby agree to submit to the jurisdiction of the courts situated at Kolkata for the purpose of actions and proceedings arising out of contract and the court at Kolkata_only will have the jurisdiction to hear and decide such actions and proceedings.

The contractor shall take adequate insurance cover at his/its properties etc. used in the work against all risks and the Owner shall not in any way be liable for the damages or loss caused to such properties etc., due to whatever causes.

Wrongful appropriation, or proven attempt of wrong appropriation, of materials belonging to the Owner or to any other Contractor working within the Site premises, or commission of any other criminal act by the Contractor, or his agents, or employees or workers shall be deemed to be a breach of contract on the part of the Contractor,

and the Owner shall, in addition to the remedies available under the Agreement, be entitled to terminate the Contract forthwith at the risk and cost of the Contractor.

Terms and conditions, if any, stipulated by the Contractor while submitting his tender, or otherwise, shall be applicable only to the extent such terms and conditions are specifically accepted by the Owner in writing.

In witness whereof the parties have executed these presents on the day and the year first above written.

Signed and Delivered for

Signed and Delivered for

and on behalf of

and on behalf of

OWNER

CONTRACTOR

In presence of Two Witnesses

1. -----

1. -----

2. -----

2. -----

Appendix referred to in Clause 'C' of the Agreement

Dated:

Item No.	Description of Documents
1.	Tender Document for the work of "-----" marked: Attachment - I, which contains, inter alias
a)	Tender Notice dated ----- for the work of "-----", and
b)	Special Conditions of Contract.
2.	General Conditions of Contract, marked: ----- Attachment - II: and ----- -----
3.	Letter of Acceptance vide No. ----- dated ----- marked: Attachment - III, along with Tender Schedule "-----" which is marked: Annexure - I to Letter of Acceptance No.----- dated ----- -----

ATTACHMENT – II

BANK GUARANTEE VERIFICATION CHECK LIST**CHECK LIST****YES****NO**

I. Does bank guarantee compare verbatim with standard
Balmer Lawrie & Co Ltd proforma for BG

II. a. Has the executing officer of the BG indicated his name,
designation & power of attorney No./ Signing Power No.
etc. on BG

b. Is each page of BG duly signed/initialled by the executant
& last page is signed with full particulars as required in
the Balmer Lawrie's standard proforma of BG & under
the seal of the Bank.

c. Does the last page of the BG carry the signature of two
witnesses along side the signature of the
executing Bank Manager

III. a. Does the non judicial stamp paper for BG purchase in the
name of BG issuing Bank

b. Is the BG on non-judicial Stamp paper of value
Rs. 100/- (Rupees One Hundred only)

d. Is the date of sale of non-judicial stamp paper shown on the
BG and the stamp paper is issued not more than six months
prior to date of execution of BG

IV. a. Are the factual details such as bid specifications No.,
LOI No., Contract price etc. correct.

b.	Whether over-writing/ cutting, if any on the BG authenticated under signature and seal of executant	_____	_____
V. a.	Is the amount of BG in line with contract provisions/agreement/tender	_____	_____
b.	Is the validity of BG in line with contract provisions/agreement/tender	_____	_____
VI.	Covering letter from bank enclosed with the BG	_____	_____
VII.	BG shall be from a Nationalised/ Scheduled Bank only	_____	_____

ATTACHMENT - IIa

PROFORMA OF BANK GUARANTEE FOR EARNEST MONEY DEPOSIT

(ON NON-JUDICIAL PAPER OF APPROPRIATE VALUE)

To

Balmer Lawrie & Co. Ltd.

21, Netaji Subhas Road

Kolkata – 700 001

Whereas (Name of the bidder) (hereinafter called “the Bidder”) has submitted its bid for the (purpose) (hereinafter called “the Bid”) against Tender reference No. dated M/S. BALMER LAWRIE & CO. LTD., 21 Netaji Subhas Road, Kolkata – 700 001.

The conditions of Tender provide that the Bidder shall pay a sum of Rs..... (Rupees only) (hereinafter called “the said amount”) as full Earnest Money Deposit in the forms therein mentioned. The forms of payment of Earnest Money Deposit include guarantee to be executed by a Scheduled Bank.

The said (name and address of the Bidder) have approached us and at their request and in consideration of the premises we, (Name of the Bank) having our office at (address of the Bank) have agreed to give such guarantee as herein after mentioned.

Know All Men by these presents, we, (name of the Bank) of (address of the Bank) having our office, inter alia, at (hereinafter called “the Bank”) are bound unto BALMER LAWRIE & CO. LTD..... (address) (hereinafter called “the Purchaser”) in the sum of Rs. (Rupees only) for which payment will truly be made to the Purchaser, the Bank binds itself, its successors and assigns by these presents this day of

THE CONDITIONS of this obligation are :

1. If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the bid form; or
2. If the Bidder, having been notified of the acceptance of its bid by the Purchaser during the period of bid validity;
 - i) fails or refuses to execute the Contract Form if required; or
 - ii) fails or refuses to furnish the Performance Security, in accordance with the instructions to Bidders.

We undertake to pay the Purchaser up to the said amount upon receipt of its first written demand, without the Purchaser having to substantiate their demand, provided that in their demand the Purchaser shall mention that the amount claimed by them is due owing to the occurrence of one or both of the two conditions

This guarantee will remain in force upto (date of expiry) including the days after the period of the bid validity, and any demand in respect thereof should reach the Bank not later than the above date.

Notwithstanding anything contained herein :

- i) Our liability under the Bank Guarantee shall not exceed Rs. (Rupees only)
- ii) This Bank Guarantee shall be valid upto
- iii) We are liable to pay the guaranteed amount or pay part thereof under this Bank Guarantee only if you serve upon us a written claim or demand on or before (last date of validity)

We, (name of the Bank) undertake not to revoke this guarantee during its currency except with your previous consent in writing.

We have power to issue this guarantee in your favour under our Memorandum and Articles of Association and the undersigned has full power to do and execute this Guarantee under the Power of Attorney dated day of granted to him by the Bank.

Your faithfully,

(Specimen Signature)

ATTACHMENT - III

BANK GUARANTEE AGAINST PERFORMANCE

(ON NON-JUDICIAL PAPER OF APPROPRIATE VALUE)

Letter of Guarantee No.

Dated : the day of

THE GUARANTEE is executed at Kolkata on the _____ day of _____ by _____ (set out full name and address of the Bank) (hereinafter referred to as "the Bank" which expression shall unless expressly executed or repugnant to the context or meaning thereof mean and include its successors and assigns).

WHEREAS Visakhapatnam Port Logistics Park Limited. (local address), an existing company within the meaning of the Companies Act, 1956 and having its Registered Office at 21, Netaji Subhas Road, Kolkata – 700 001 (hereinafter referred to as “the Company”) issued a Tender being No. dated (hereinafter referred to as “the said Tender”) for (set out purpose of the job) and pursuant thereto Messrs/ Mr.(set out full name and address of the Contractor) (hereinafter referred to as “the Contractor” which term or expression wherever the context so requires shall mean and include the partner or partners of the Contractor for the time being/his/its heirs, executors, administrators, successors and assigns) (delete which are not applicable) has accepted the said Tender and field its quotation.

AND WHEREAS the quotation of the Contractor had been accepted by the Company and in pursuance thereof an Order being No..... dated (hereinafter referred to as "the said Order") has been placed by the Company on the Contractor for (set out purpose of the job).

AND WHEREAS under the terms of the said Order the Contractor is required to furnish the Company at their/his/its own costs and expenses a Bank Guarantee for Rs.....(Rupees only) as performance guarantee for the fulfilment of the terms and conditions of the said Tender and to do execute and perform the obligations of the Contractor under the Agreement dated the day of (hereinafter referred to as “the Agreement”) entered into by and between the Company of the one part and the Contractor of the other part, the terms of the said Tender and the terms contained in the said Order which expression shall include all amendments and/or modifications/or variation thereto.

AND WHEREAS the Contractor had agreed to provide to the Company a Bank Guarantee as security for the due performance of their/his/its obligations truly and faithfully as hereinbefore mentioned.

NOW THIS GUARANTEE WITNESSETH as follows :

1. In consideration of the aforesaid premises at the request of the Contractor, we
(set out the full name of the Bank) the Bankers of the Contractor shall perform fully and faithfully their/his/its
contractual obligations under the Agreement dated the day of entered into by and
between the Company of the one part and the Contractor of the other part, the terms and conditions of the said
Tender and the said Order

2. We, (set out full name of the Bank) do hereby undertake to pay to the Company without any deduction whatsoever a sum not exceeding Rs..... (Rupees only) without any protest, demur or proof or condition on receipt of a written demand from the Company stating that the amount claimed is due by way of loss and damage caused to or would be caused to or suffered by the Company due to bad workmanship or by reason of breach of any of the terms and conditions of the Agreement, the said Tender and the said Order hereinbefore mentioned.

3. The Guarantee is issued as security against due performance of the obligations of the Contractor or under the Agreement aforesaid and the said Tender and the said Order hereinbefore mentioned and subject to the conditions that our liabilities under this Guarantee is limited to a maximum sum of Rs..... (Rupees only) or the amount of loss or damage suffered or to be suffered by the Company in its opinion at any period of time, whichever is lower.

4. We, (set out full name of the Bank) further agree that the undertaking herein contained shall remain in full force for a period of months from the date of the satisfactory execution of the Contract.

5. This Guarantee shall not be affected by any amendment or change in the Agreement or change in the constitution of the Bank and/or the Company and/or the Contractor.

6. We (set out full name of the Bank) undertake not to revoke this Agreement during its currency except with the previous consent of the Company in writing.

7. All claim under this Guarantee must be presented to us within the time stipulated after which date the Company's claim/right under this Guarantee shall be forfeited and we, (set out full name of the Bank) shall be released and discharged from all liabilities hereunder.

8. This instrument shall be returned upon its expiry or settlement of claim(s) if any, thereunder.

9. Notwithstanding anything contained hereinbefore our total liabilities under this Guarantee shall not exceed a sum of Rs..... (Rupees only) and unless a demand or claim in writing under this Guarantee reaches us on or before the date of (last date of claim) and if no claim is received by us by that date all rights and claims of the Company under this Guarantee shall be forfeited and we, (set out full name of the Bank) shall be released and discharged of all our liabilities under this Guarantee thereafter.

10. We have power to issue this guarantee in your favour under our Memorandum and Articles of Association and the undersigned has full power to execute this Guarantee under Power of Attorney dated the day of granted to him by the Bank.

Place :

Date :

ATTACHMENT – IV**PROFORMA OF BANK GUARANTEE FOR SECURITY DEPOSIT**

Visakhapatnam Port Logistics Park Limited.

21, Netaji Subhas Road

Kolkata – 700 001

Dear Sir,

That Messrs/Mr.(set out full name and address and constitution of the Contractor) (hereinafter referred to as "the Contractor") filed their/his/its quotation against your Tender being Tender No. dated (hereinafter referred as "the said Tender") for the work (set out the purpose of the job) and in pursuance thereto an Order being No. dated (hereinafter to as "the Order") was issued by you to the Contractor.

The conditions of the said Tender, inter alia, requires that the Contractor shall pay a sum of Rs..... only) as full security deposit (hereinafter referred to as "the security deposit") in the form therein mentioned. The form of payment of security deposit includes a guarantee to be executed by a Scheduled Bank.

The said Messrs/Mr. (set out full name of the Contractor) have/has approached us and at their/his/its request and in consideration of the premises We (set out full name of the Bank) having our office, inter alia at (state the address of the Bank) have agreed to give such guarantee in the manner following :

1. We, (set out full name of the Bank), hereby undertake with you if default is made by Messrs/Mr. (set out full name of the Contractor) in performing any of the terms and conditions of the Tender and/or in payment of the security deposit or any other or in payment of money payable to you. We, (set out full name of the Bank) shall merely on demand from you without demur or protest shall pay you the said amount of Rs..... (Rupees only) or such portion thereof not exceeding the said sum as you may demand from time to time.

2. We, (set out full name of the Bank), further agree with you that you hereunder to adopt any mode for realisation of your dues from the Contractor and/or to vary any of the Terms and Conditions of your Contract with the said Messrs/Mr. (set out full name of the Contractor), or to extend time of performance by Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by you against Contractor and to forbear or enforce any of the terms and conditions relating to the Contract and we, (set out full name of the Bank) shall not be relieved from our liability by reason of any such variation, or any indulgence to be given by you to the Contractor or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so releasing us.

3. Your right to recover the said sum of Rs..... (Rupees only) from us in the manner aforesaid will not be affected or suspended by reason of the fact that any dispute or disputes is/are pending before any Officer, tribunal, court or any other authority or authorities.

4. The guarantee herein contained shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the said Messrs/Mr. (set out the full name of the Contractors), but shall in all respect, and for all purposes be binding and operative until payment of all the money due to you in respect of such liabilities is paid,

5. Our liability under this guarantee is restricted to Rs. (Rupees only).

6. Our guarantee shall remain in force and effect until (set out the date of expiry) and unless a claim or demand in writing is made against us under this guarantee before the expiry of six months from the aforesaid date i.e. (set out last date of Claim period), the said Guarantee all your rights under this guarantee shall be forfeited and we, (set out full name of the Bank) shall be relieved and discharged from all liabilities thereunder.

7. We , (set out full name of the Bank) undertake not to revoke this Guarantee during its currency except with your previous consent in writing.

8. We, (set out full name of the Bank) have power to issue this Guarantee in your favour under our Memorandum and Articles of Association and the undersigned has full power to execute/sign this Guarantee under the Power of the Attorney dated the day of granted by the Bank.

Yours faithfully,

Dated : (Place)

.....

(Signature of Officer on

.....(Date)

behalf of)

(Set out name of the Bank)

ATTACHMENT - V**INFORMATION ABOUT TENDERER****A. IN CASE OF INDIVIDUAL**

- (i) Name of Business: His age and Father's name:
- (ii) Whether his business is registered:
- (iii) Date of commencement of business:
- (iv) Whether he pays Income Tax over Rs. 10,000/- per year:

B. IN CASE OF PARTNERSHIP

- (i) Name of Partners:
- (ii) Whether the partnership is registered:
- (iii) Date of establishment of firm:
- (iv) If each of the partners of the firm pays Income Tax over Rs. 10,000/- a year and if not which of them pays the same:
- (v) Copies of partnership deed, if any:

C. IN CASE OF COMPANY LIMITED BY SHARES OR**COMPANY LIMITED BY GUARANTEE**

- (i) Amount of paid up Capital:
- (ii) Names of Directors:
- (iii) Date of Registration of Company:
- (iv) Copies of the last two (2) years balance sheet of the company:
- (v) Certified copies of Memorandum and Articles of Association of Company:

(SIGNATURE OF TENDERER)

ATTACHMENT - VI**DETAILS OF EXPERIENCE**

Tenderer shall give information of similar Works done during past seven (7) years strictly as per the proforma given below.

Sl.No.	Full particulars of similar work carried out by the Contractor	Value of Contract	Completion time as stated in Tender (Months)	Actual Completion time (Months) with date of commencement of work	Year of completion	Name & Postal address of Client with Telex / Telephone No.
1	2	3	4	5	6	7

Certified that the above information is correct.

SIGNATURE OF TENDERER

ATTACHMENT - VII**CONCURRENT COMMITMENTS**

Tenderer shall give information about his present commitments as per proforma.

S. No.	Full Postal Address of Client & Name of Officer-in-Charge with Telex/ Telephone No	Description of the Work	Value of Contract	Date of commencement of Work	Scheduled completion period (months)	% age completion as on date	Expected date of completion	Remark if any

Certified that the above information is correct.

SIGNATURE

OF

TENDERER

ATTACHEMENT VIII

INDEMNITY BOND (To be executed on Non Judicial Stamp Paper)

Date: _____

THIS DEED OF INDEMNITY made at M/s _____ having their Registered Office at _____ (hereinafter referred to as "Contractor" which expression shall unless it be repugnant to the context or meaning thereof, be deemed to mean and include their respective heirs, assigns, successors, executors and/or administrators) of the ONE PART in favour of Visakhapatnam Port Logistics Park Limited, a Company Registered under Indian Companies Act, VII of 1913, having its Registered Office at 21, Netaji Subhas Road , Kolkata-700001,(India) (hereinafter referred to as the "Company", which expression shall unless it be repugnant to the context or meaning thereof be deemed to mean and include its successors, administrators and assigns) of the OTHER PART.

WHEREAS the Company has awarded to the Contractor, a contract for the _____ in _____ project (hereinafter called the "Contract");

AND WHEREAS it is one of the conditions of the Contract that the Contractor shall comply with all the provisions of the Labour & Industrial Laws, as may be applicable from time to time for the discharge and completion of the said contract by the Contractor including but not limited to the observance and compliance of The Contract Labour(R & A) Act,1970,Child Labour (Prohibition and Regulation) Act 1986, The Employees Provident Funds & Miscellaneous Provisions Act, 1952, Industrial Disputes Act, 1947, Minimum Wages Act, 1948, Payment of Bonus Act, 1965, Payment of Gratuity Act, 1972, Payment of Wages Act, 1936, Workmen's Compensation Act, 1923 The Maternity Benefit Act, 1961; Inter State Migrant Workmen(RECS) ,1979 and The Employee's Deposit Linked Insurance Scheme, 1976, and other Labour Laws (hereinafter referred as the 'Laws').

And whereas to safeguard the Company from any kind of claim and / or demand in the event of failure in observance or non-compliance of any such laws by the Contractor, the said Contractor is executing this Deed of Indemnity.

NOW THIS DEED WITNESSETH AS UNDER:

1. THAT in the event of any liability arising out of failure to observe or non-compliance of any such 'Laws' by the Contractor in discharge of the said contract, the contractor shall bear all the resultant whatsoever liability(ies), if any arising out thereof and that the Company shall not be liable for any such liability(ies). The Contractor indemnifies and keeps harmless the Company at all times from and against any and all such liabilities, costs, damages, claims, penalties, interest, expenses, losses, demands, fines, legal liability ,causes of action, injury to persons, etc which may be suffered, incurred, undergone and / or sustained by the Company including the costs and expenses that may be incurred in defending any such liability(ies) claim(s), proceeding(s) etc. that may be made or taken or arise on the same by any person, body, authority, government, judicial / quasi-judicial authority due to the failure or non-compliance of any such laws and rules there under (including any amendments in acts, laws, statutes & rules there under) of whatsoever kind and nature arising out of or in any way connected with, whether or not such acts or omissions are actual or alleged, active or passive with regard to the discharge of the said contract.
2. In addition to that mentioned in the above para that coverage to all workmen under all extant social security schemes like Provident Fund, ESIC, WC, Labour Welfare Fund or any other payments of any nature incidental by extant laws, bylaws, statutes etc. enforceable at the place of work of the "Company" be provided by the "Contractor" without fail and agreed by the "Contractor". Hence the Registrations/ Codes etc under which such compliance is required shall be of the "Contractor" and not the "Company".
3. Further that in the event of any nature of nonpayment or non-compliance in payment of dues for which Company may incur a liability to pay for any non-complying act shall empower company to recover and pay from Contractor by way of deductions retention, bills or due payments.
4. This indemnity shall be in accordance with the laws of India and any dispute between the parties as regards the contract of indemnity shall be settled in accordance with the provisions of Indian Arbitration and Conciliation Act, 1996, including the method and manner of appointment of the Arbitrators. The place of Arbitration shall be at Kolkata and the Courts of Kolkata shall have the proper jurisdiction.

IN WITNESS WHEREOF, the said Contractor has hereunto set their hand the day and year first herein above written.

SIGNED SEALED AND DELIVERED by the within named "CONTRACTOR")

(Authorized Signatory)

Rubber Stamp of Firm/Company

Name:

Designation:

In presence of

Witness

Name & Address of Witness

Signature

1.

2.

SPECIAL CONDITIONS OF CONTRACT

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1.00 GENERAL

- 1.01 Special conditions of contract shall be read in conjunction with the General Conditions of Contract, Specifications of work, Drawings and any other document forming part of this contract wherever the contract so requires.
- 1.02 Notwithstanding the sub-division of the document into three separate sections, every part of each shall be deemed to be supplementary of every other part and shall be read with and into the contract as far as it may be practicable to do so.
- 1.03 Where any portion of the General Conditions of Contract is repugnant to or at variance with any provision of the Special Conditions of Contract, then unless different intention appears, the provision of the Special Conditions of Contract shall be deemed to over-ride the provisions of the General Conditions of Contract only to the extent of such repugnancy or variations in the Special Conditions of Contract are not possible of being reconciled with the provisions of General Conditions of Contract.
- 1.04 Whenever it is mentioned in the specifications that the contractor shall perform certain work or provide certain facilities, it is understood that the contractor shall do so at his own cost.
- 1.05 The materials, design and workmanship shall satisfy the relevant Indian Standards, the job specifications contained herein and codes referred to. Where the job specifications stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied. In the absence of any standards/specifications / code(s) of practice for any part of the work covered in this tender, the instructions/directions of Engineer-in-Charge will be binding on the contractor.
- 1.06 In case of contradictions between Indian Standards, specifications, General Conditions of Contract, Special conditions of Contract, drawings, Schedule of Rates, the following shall be the order of precedence: -
- a) Detailed Letter of Intent along with statement of agreed variations and its enclosures.
 - b) Fax no., e_mail address, mobile no. of Intent.
 - c) Special Conditions of Contract
 - d) Drawings
 - e) General Conditions of Contract & its Annexure.
 - f) Indian Standards / Technical Specifications.
 - g) Schedule of quantities and rates.
- 1.07 Any approval which is required to be obtained from any agency of the Government (whether Central or local) for the timely completion of the work envisaged in this tender document shall be the responsibility of the successful tenderer. As any delay in obtaining these approvals may result in delay in completion of the job leading to imposition of LD as per the terms of the tender, the successful bidder is required to work closely with the PMC of the Project for processing and obtaining any approval that is required in time.

2.00 LOCATION OF SITE

The Location of site is at Visakhapatnam near Muladaga Village and adjacent to Mindi Railway Sidings of Visakhapatnam Port Trust. The site is about 4.0 km away from Sheela Nagar Junction at

NH-5 and 8 km from Airport. The nearest land mark is Visakhapatnam Port Mindi railway siding. Please refer the Vicinity Plan of MMLH Site enclosed herewith as Exhibit –I.

3.00 DRAWINGS VIS-A-VIS SCHEDULE OF WORK

All drawings herein enclosed are for the purpose of furnishing basic information to the tenderers so as to enable them to quote their price. Upon receiving order, contractor shall design and prepare all working drawings and get approval from the Engineer. However, such approval does not relieve the contractor from his responsibility of correctness and safety of the work. Contractor shall remain responsible to submit the design and drawings for obtaining necessary approval from the statutory bodies.

4.00 SCRAP AND SERVICEABLE MATERIAL

Scrap materials and wastage will not be accepted back by the Owner and shall be considered as a property of the contractor. The Contractor shall take away all such materials, wastage and remove them from the site to the satisfaction of the Engineer-in-Charge.

5.00 TESTS & TEST PROCEDURES FOR MATERIALS SUPPLIED BY CONTRACTOR

Contractor shall submit quality assurance plan mentioning frequency of testing to the owner for their review and approval. Only on approved QAP work shall be executed.

It is necessary to test the materials supplied by the Contractor to ensure that they conform to relevant clauses in the technical specification. All materials of Contractor shall be inspected and passed by the Engineer-in-Charge from time to time at the source of supplies, for which inspection facilities shall be provided by the Contractor.

Notwithstanding inspection at sources, the Engineer-in-Charge shall have the right to reject any material brought to Site, which does not conform to the specification, without being liable for any compensation whatsoever.

6.00 MEASUREMENT & BILLING OF WORK

Mode of Measurement:

Mode of measurement will generally be in accordance with the stipulation made in technical specifications.

All measurements shall be in the metric system and shall be taken in accordance with the procedure set forth in the Schedule of quantities, Specifications and other contract documents.

All measurements shall be taken jointly by the Engineer-in-Charge or his representative on the one hand and the Contractor or his representative on the other hand.

Measurement sheet shall be prepared by the contractor and measurement shall be signed and dated on each page of the Measurement sheet by the Contractor / Contractor's representative and Engineer-in-Charge or his representative.

Contractor will submit a Bill in approved proforma in duplicate to the Engineer-in-Charge giving abstract and detailed measurement for the various items executed during a month, before the expiry of the first week of the succeeding month. The Engineer-in-Charge shall take or cause to be taken

for the requisite measurements for the purpose of having the same verified, if possible, before the expiry of ten (10) days from presentation of the bill.

7.00 ON ACCOUNT PAYMENTS

- 7.01 All on account payments shall be subjected to deduction therefrom of all dues to the Owner, advance, retention money and other money deductible within the provisions of this contract and as per Section 194-C of Income Tax Act, or any other Law, Rule or Regulation for the time being in force along with the recovery towards the adjustment of secured advance if any.
- 7.02 All lawful payments as provided under ESI Act (if applicable), Workmen's Compensation Act, PF Act etc. not made by the Contractor / Sub-contractor, Owner reserves the right to deduct from the Contractor's bills and remitted to the concerned Authority / Department or Body on Contractor's /Sub-contractor's behalf until sufficient proof is furnished by the Contractor / Sub-Contractor to the contrary.
- 7.03 All "On Account" Payments shall be regarded merely as an advance payment against the amounts due to the Contractor in terms of the contract and any such payments shall not be regarded as an acceptance or completion of any works paid for.
- 7.05 The payment against running accounts bills will be made as per 'Terms of Payment' within Fifteen (15) days from the date of receipt of bill in the accounts department duly certified by Engineer-in-Charge.

8.00 TERMS OF PAYMENT

No advance shall be paid.

8.01 SUPPLY

- a) **80% on pro rata basis against** supply of materials upon receiving of materials/equipment at site in good condition and duly inspected and certified by the Engineer-in-Charge.
- b) **10% against** completion of installation upon verification and certification by the Engineer-in-Charge.
- c) **10% against** successful commissioning upon verification and certification by the Engineer-in-Charge.

8.02 ERECTION

- a) **90% against** completion of installation after verification and certification by the Engineer-in-charge.
- b) **10% against** successful commissioning upon verification and certification by the Engineer-in-Charge.

- 8.03 RETENTION AMOUNT FOR SUPPLY & ERECTION:** On each running account bill 10% of basic bill value will be withheld as retention money. The Supplier shall, within fifteen (15) days, submit to the Owner Initial Security Deposit equivalent to 2% of the total contract value. During payment of monthly running account bills, the initial security deposit will be adjusted first against 'Retention Money', but in no case total retention including initial security deposit shall exceed 10% of the executed value of work at any stage. The retention money will be released after completion and acceptance of work against issue of Bank Guarantee of the equal amount for defect liability and

performance maintenance period, which shall be twelve (12) months from the date of completion of job or eighteen (18) months from the date of site delivery, whichever is earlier. Performance Bank Guarantee shall be issued by any Nationalized /Scheduled Bank on basic value of material supplied and shall remain valid for above guarantee period.

8.04 PLANT OPERATION & MAINTENANCE

Payment would be made after completion of the service, once in **every quarter**.

9.00 SCHEDULE OF RATES

All the items of work mentioned in the Schedule of Rates and covered by the Contract shall be carried out as per the Drawings, Specifications and directions of Engineer-in-Charge and shall include all labour, materials, tools, plants, tackle, testing, if any, with Contractor's testing appliance etc. required to complete the work.

10.00 EXTRA ITEMS OF WORK

During the course of execution of the work, should the contractor come across items of work which are not covered under the Schedule of Rate or not included therein, the Contractor shall draw the attention of the Owner / Engineer-in-Charge to the same and such items of work shall be treated as extra only with the prior approval of Engineer-in-Charge in writing. Contractor shall submit a quotation along with the rate analysis for approval of EIC for such accepted extra items before he commences work or purchases the materials in connection with such items.

For extra items, rates shall be derived from similar item rates included in the schedule of work. Where there is no such similar item available in the schedule, rate shall be analysed as follows:

Rate for extra item = Cost of material (a) + cost of labour inclusive of all necessary tools, tackles, equipment, machinery and consumable (b) required to carry out the work + 15% of (a+b) towards profit and overhead + taxes, duties etc. as applicable.

11.00 STRICT ADHERENCE TO SPECIFICATION & CTE INSPECTION

The entire work shall require to be carried out strictly as per specifications, quality assurance plan, drawing etc. intended in the tender backed up with proper test report, manufacturers' test certificates etc. The Chief Technical Examiner of Central Vigilance Commission may inspect the work during the course of execution and also during the defect liability period. The contractor has to maintain all documents in acceptable form duly reviewed and approved by the Engineer-in-Charge for any such/ similar inspection.

EXHIBIT-1-VICINITY PLAN OF MMLH SITE



EXIHIBIT -2-BANK DETAILS FOR SUBMISSION OF BANK GUARATEE

Name of the Bank : Indusind Bank

Bank account no. No : 650001891093

Swift Code : NDBINBBCAP.

MICR Code : 700234002.

IFSC Code : INDB0000015.

Branch Address : IndusInd Bank Limited,
Savitri Towers, 3A, Upper Wood Street,
Kolkata – 700 017.

HSE COMPLIANCE

IN RESPECT OF HSE REQUIREMENTS, CONTRACTORS ARE REQUIRED TO FULFIL THE FOLLOWING**Appendix-A****Pre-Qualification Questionnaire for Contractor****Guidelines for Completion of Questionnaire**

- The potential bidder is to ensure that the answers provided are focussed against the activities indicated in the pre-tender document.
- The information is supplied in the same format and sequence in which they appear in the questionnaire. A minimum of 12 has to be obtained in the HSE pre-qualification questionnaire.
- Failure to supply information that accurately and fully covers the material requested may result in an individual Contractor failing to meet minimum expectations and therefore being disqualified.
- Contractor shall provide information that is authentic and documentary evidence.
- Even after getting pre-qualified, if it comes to the notice that non-authentic documents are provided, the Contractor may be disqualified and if any Contract is in place, it may be terminated immediately.
- BL shall have right to audit Contractors records to verify the authenticity of the documents, during any phase of the Contract.

Questionnaire for HSE Pre-Qualifications of contractors:

Contractor Details	
Company Name	
Contact Person for HSE	
Name	
Telephone Number	
E-Mail Address	

	Question	Response		Evidence Required at bidding Stage	Weightage if complied
		Yes	No		
1	Do you have a signed and dated HSE Policy?			Attach HSE Policy	1
2	Do you confirm that you will comply with HSE Policy as per Appendix in as much as it is applicable to your scope of work?			None	1
3	Do you have a Health and Safety System certified by an accredited body to a recognized standard?			Provide Current	3

	Question	Response		Evidence Required at bidding Stage	Weightage if complied
		Yes	No		
	(Eg : OHSAS 18001)			Certificate	
4	Do you have an Environmental Management System Certified by an accredited body to a recognized standard? (Eg : ISO 14001)			Provide Current Certificate	3
5	Have you identified, documented and maintained your Health and Safety risk assessment of your activities?			None	3
6	Have you identified, documented and maintained your Environmental Impact Assessment of your activities?			None	3
7	If you use subcontractors, will you assess them in terms of HSE?			None	2
8	Have you produced project/contract HSE plans for recently completed work?			None	2
9	Is HSE Covered in your company's organization chart?			Provide Current Org Chart.	2
10	Have HSE roles and responsibilities been defined in your company?			None	2
11	Have your employees received documented HSE training appropriate to the task they will undertake?			None	2
12	Do you identify and monitor compliance with HSE Legislation?			None	2
13	Do you carry out regular medical examination for your employees?			None	1
14	Is your company free from any charges or notices served by the regulatory authorities in relation to HSE in the last 3 years?			None	1
15	Do you have any procedure of reporting HSE Incident and investigation?			None	2

	Please provide your accident data for the current year and the last 2 calendar years Note: this must include the data of any contractors working for your organization.	Current Year	Current Year -1	Current Year -2	Period Average (Three years average)
16	Number of Fatalities				
17	Number of Environmental Incidents reported to Pollution Control Board				
18	Number of accidents with 2 or more days lost time.(LTI)				
19	Man Days Lost				
20	Total Hours Worked				

I confirm that the above information is correct and that further evidence to support this will be provided to BL on request.

Name	Position	Company	Date	Signature

Appendix-B

HSE REQUIREMENTS BY CONTRACTORS (To be a part of contract documents)

1.0 Housekeeping

Contractors shall ensure that their work area is kept clean tidy and free from debris. The work areas must be cleaned on a daily basis. Any disposal of waste shall be done by the Contractor.

All equipment, materials and vehicles shall be stored in an orderly manner. Access to emergency equipment, exits, telephones, safety showers, eye washes, fire extinguishers, pull boxes, fire hoses, etc. shall not be blocked or disturbed.

2.0 Confined Space

Before commencing Work in a confined space the Contractor must obtain from Owner a Permit to Work, the Permit to Work will define the requirements to be followed.

As minimum Contractors must ensure the following:

- 2.1 Confined spaces are kept identified and marked by a sign near the entrance(s).
- 2.2 Adequate ventilation is provided
- 2.3 Adequate emergency provisions are in place

2.4 Appropriate air monitoring is performed to ensure oxygen is above 20%.

2.5 Persons are provided with Confined Space training.

2.6 All necessary equipment and support personnel required to enter a Confined Space is provided.

3.0 Tools, Equipment and Machinery

The Contractor must ensure that all tools & equipment provided for use during the Work is:

- suitable for its intended use;
- safe for use, maintained in a safe condition and where necessary inspected to ensure this remains the case (any inspection must be carried out by a competent person and records shall be available);
- Used only by people who have received adequate information, instruction and training to use the tool or equipment.
- Provided with Earth leakage circuit breaker (ELCBs) at all times when using electric power cords. Use of electrical tape for temporary repairs is prohibited.

4.0 Working at Height

Any Work undertaken where there is a risk of fall and injury is considered to be working at height.

For any Contractor Personnel working at height, Contractors shall provide fall prevention whenever possible and fall protection only when fall prevention is not practicable. Before commencing Work in a height the Contractor must obtain from Owner a Permit to Work, the Permit to Work will define the requirements to be followed. Supervisor must be present at all point of time, to ensure no deviation occur during the course of work.

Fall Prevention System

Fall prevention systems (e.g. fixed guardrails, scaffolds, elevated work platforms) must provide protection for areas with open sides, including exposed floor openings.

Fall Protection Systems

Where fall protection systems are used then the Contractor must ensure the following is applied:

- i) Only approved full body harness and two shock-absorbing lanyards are used,
- ii) Prior establishment of a rescue plan for the immediate rescue of an employee in the event they experience a fall while using the system,
- iii) Anchorage points must be at waist level or higher; and capable of supporting at least the attached weight,
- iv) Lifeline systems must be approved by Owner before use.
- v) Use of ISI marked industrial helmet at all point of time.

5.0 Scaffolding

All scaffolds shall subject to a documented inspection by a competent person and clearly marked prior to use. The footings or anchorage for scaffolds shall be sound, rigid and capable of carrying the maximum intended load without settling or displacement. All scaffolding materials should be of MS tubular type.

Guardrails and toe-boards shall be installed on all open sides and ends of scaffold platforms. Scaffolds shall be provided with an access ladder or equivalent safe access. Contractor Personnel shall not climb or work from scaffold handrails, mid-rails or brace members.

6.0 Stairways and Ladders

Ladders should only be used for light duty, short-term work or access in line with the below and the Site Requirements.

- i) Fabricated ladders are prohibited.
- ii) Ladders will be secured to keep them from shifting, slipping, being knocked or blown over.
- iii) Ladders will never be tied to facility services piping, conduits, or ventilation ducting.
- iv) Ladders will be lowered and securely stored at the end of each workday.
- v) Ladders shall be maintained free of oil, grease and other slipping hazards
- vi) Ladders will be visually inspected by a competent person and approved for use before being put into service. Each user shall inspect ladders visually before using.
- vii) Ladders with structural defects shall be tagged "Do Not Use," immediately taken out of service, and removed from the Site by the end of the day.

7.0 Lifting Operations

7.1 Cranes and Hoisting Equipment

Contractors shall operate and maintain cranes and hoisting equipment in accordance with manufacturer's specifications and legal requirements.

Only Contractor Personnel trained in the use of cranes and hoists are permitted to use them.

7.2 Lifting Equipment and Accessories

All lifting equipment / accessories e.g., slings, chains, webbing, chain blocks, winches, jacks etc shall be indicated with their safe working load have an identification number visible on the unit and be inspected and tested in accordance with legal requirements.

Damaged equipment / accessories and equipment shall be tagged "out of use" and immediately removed from Site.

8.0 Lockout Tag out (“LOTO”)

Prior to performing work on machines or equipment, the Contractor shall ensure that it is familiar with LOTO and Permit to Work procedures and that all of its affected Contractor Personnel receive the necessary training.

9.0 Barricades

Floor openings, stairwells, platforms and walkways, and trenching where a person can fall any distance shall be adequately barricaded and where necessary, well lit. Where there is a risk of injury from a fall then rigid barriers must be used.

Barricades must also be used to prevent personnel entering an area where risk of injury is high e.g., during overhead work activity or electrical testing etc. Such barricading must provide clear visual warning.

10.0 Compressed Gas Cylinders

Gas cylinder shall be securely stored and transported, and identified and used in line with the local requirements. Hose lines shall be inspected and tested for leaks in line with local requirements. Flash Back arrestor to be used to prevent any explosion due to back fire.

11.0 Electrical Safety

Prior to undertaking any work on live electrical equipment the Contractor must obtain a Permit to Work from Owner. Where ever possible live work should be avoided. Any control measures highlighted shall be implemented prior to work commencing.

The below measures will be taken:

- i) Work practices must protect against direct or indirect body contact by means of tools or materials and be suitable for work conditions and the exposed voltage level.
- ii) Energized panels will be closed after normal working hours and whenever they are unattended. Temporary wiring will be de-energized when not in use.
- iii) Only qualified electrical Contractor Personnel may enter substations and/or transformer and only after being specifically authorized by Owner.

12.0 Hot Works

A Permit to Work must be obtained from Owner prior to any hot works (welding, grinding, open flame work). Suitable fire extinguishing equipment shall be immediately available. Objects to be welded, cut or heated shall be moved to a designated safe location, or, if they cannot be readily moved, all movable fire hazards in the vicinity shall be taken to a safe place. Personnel working around or below the hot works shall be protected from falling or flying objects.

Prior to the use of temporary propane or resistance heating devices approval must be obtained from Owner.

13.0 Trenching, Excavating, Drilling and Concreting

A Permit to Work must be obtained from Owner and all underground lines, equipment and electrical cables shall be identified and located prior to beginning the work. The Contractor shall assign a competent Contractor Personnel to all trenching and excavation work.

Safe means of access and egress shall be located in trench excavations. Daily inspections shall be conducted by a competent Contractor Personnel for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems or other hazardous conditions.

Physical barriers shall be placed around or over trenches and excavations. Flashing light barriers shall be provided at night.

14.0 Environmental Requirements

14.1 Waste Management

The Contractor is responsible to remove any waste generated by the work being done on the Site. The Contractor must dispose of the waste in line with the relevant local legislative requirements. The waste disposal route shall be documented and made available for Owner to review at any time and may be subject to BL's prior approval.

Wastes (includes rinse from washing of equipment, PPE, tools, etc) are not to be poured into sinks, drains, toilets, or storm sewers, or onto the ground. Solid or liquid wastes that are hazardous or regulated in any way are not to be disposed of in general site waste receptacles.

14.2 Spills

The Contractor is responsible for the provision of adequate spill kits/protection and the clean up and disposal costs arising from such spills.

14.3 Emissions

The Contractor shall identify and quantify any emission sources associated with the Works. The control measures associated with these emission shall be subject to the approval of Owner. Emissions include but are not limited to noise, dust, fumes, vapours.

TECHNICAL SPECIFICATION

BASIS OF DESIGN

Basis Of design																		
SI No	Room Number	Room Name / Item Description	L, m	W, m	H, m	L, m	W, m	H, m	Floor Area in sft	Room Voulme in CFT	NHB Volume	Insulation Type	Insulation Thickness	Insulation Thickness	Ambient/surroundin	Door size	Door Type	Automation
		Frozen Cold Store	External			Internal												
1	EF2	Exim Frozen Cold Store 1	17.59	8.1	11.4	17.29	7.8	10.95	1451	52111	434	PIR	150	150	42	2.2 X 4.5	Sliding	YES
2	EF3	Exim Frozen Cold Store 2	17.59	8.1	11.4	17.29	7.8	10.95	1451	52111	434	PIR	150	150	42	2.2 X 4.5	Sliding	YES
3	EF4	Exim Frozen Cold Store 3	17.59	8.1	11.4	17.29	7.8	10.95	1451	52111	434	PIR	150	150	42	2.2 X 4.5	Sliding	YES
4	DF5	Domestic Frozen Cold Store 1	17.59	8.1	11.4	17.29	7.8	10.95	1451	52111	434	PIR	150	150	42	2.2 X 4.5	Sliding	YES
5	DF6	Domestic Frozen Cold Store 2	17.59	8.1	11.4	17.29	7.8	10.95	1451	52111	434	PIR	150	150	42	2.2 X 4.5	Sliding	YES
6	DF7	Domestic Frozen Cold Store 3	17.59	8.1	11.4	17.29	7.8	10.95	1451	52111	434	PIR	150	150	42	2.2 X 4.5	Sliding	YES
7	DF8	Domestic Frozen Cold Store 4	17.59	8.1	11.4	17.29	7.8	10.95	1451	52111	434	PIR	150	150	42	2.2 X 4.5	Sliding	YES
8	DF9	Domestic Frozen Cold Store 5	17.59	8.1	11.4	17.29	7.8	10.95	1451	52111	434	PIR	150	150	42	2.2 X 4.5	Sliding	YES
9	DF10	Domestic Frozen Cold Store 6	23.582	8.1	11.4	23.282	7.8	10.95	1954	70170	585	PIR	150	150	42	2.2 X 4.5	Sliding	YES
		Convertible Cold Store																
10	EF5	Exim Convertible Cold store 1	23.59	8.1	11.4	23.29	7.8	10.95	1954	70194	585	PIR	150	150	42	2.2 X 4.5	Sliding	YES
11	DF4	Domestic Convertible Cold store 1	17.59	8.1	11.4	17.29	7.8	10.95	1451	52111	434	PIR	150	150	42	2.2 X 4.5	Sliding	YES
		Chilled Cold Store																
12	EF1	Exim Chilled Cold Store 1	23.582	8.1	11.4	23.282	7.8	10.95	1954	70170	585	PIR	150	150	42	2.2 X 4.5	Sliding	YES
13	DF1	Domestic Chilled Cold Store 1	23.582	8.1	11.4	23.282	7.8	10.95	1954	70170	585	PIR	150	150	42	2.2 X 4.5	Sliding	YES
14	DF2	Domestic Chilled cold store 2	17.59	8.1	11.4	17.29	7.8	10.95	1451	52111	434	PIR	150	150	42	2.2 X 4.5	Sliding	YES
15	DF3	Domestic Chilled cold store 3	17.59	8.1	11.4	17.29	7.8	10.95	1451	52111	434	PIR	150	150	42	2.2 X 4.5	Sliding	YES
18	SA	Sorting Area	16.16	6.08	6.3	16	6	6	1033	20326	169	PIR	80	80	42	2.4 x 2.5	Sliding	YES
		Ante Room							23775									
16	EA	Exim Ante Room	24	6.08	6.3	23.7	6	6	1530	30107	251	PIR	80	150	42	2.5 X 3	Over head	YES
17	DA	Domestic Ante Room	63.55	6.08	6.3	63.25	6	6	4083	80350	670	PIR	80	150	42	2.5 X 3	Over head	YES

Basis Of design																
Sl No	Room Number	Room Name / Item Description	Door Qty	Room Storage Temp, Deg C min	Room Storage Temp, deg C Max	Humidity, RH% (approx)	Occupancy, nos	Machinery, W Including MHE and Fans	Product	Room Capacity in MT	Product Loading(turnover) Kgs/day. Basic	Product entry temperature, °C	Product Final Temperature, °C	Pull down time hrs	No of Running hr of compressor	Calculated Refrigeration Load, kW
		Frozen Cold Store														
1	EF2	Exim Frozen Cold Store 1	1	-18	-22	NA	1	10000	Misc	232	23200	-10	-20	18	20	35.16
2	EF3	Exim Frozen Cold Store 2	1	-18	-22	NA	1	10000	Misc	232	23200	-10	-20	18	20	35.16
3	EF4	Exim Frozen Cold Store 3	1	-18	-22	NA	1	10000	Misc	232	23200	-10	-20	18	20	35.16
4	DF5	Domestic Frozen Cold Store 1	1	-18	-22	NA	1	10000	Misc	232	23200	-10	-20	18	20	35.16
5	DF6	Domestic Frozen Cold Store 2	1	-18	-22	NA	1	10000	Misc	232	23200	-10	-20	18	20	35.16
6	DF7	Domestic Frozen Cold Store 3	1	-18	-22	NA	1	10000	Misc	232	23200	-10	-20	18	20	35.16
7	DF8	Domestic Frozen Cold Store 4	1	-18	-22	NA	1	10000	Misc	232	23200	-10	-20	18	20	35.16
8	DF9	Domestic Frozen Cold Store 5	1	-18	-22	NA	1	10000	Misc	232	23200	-10	-20	18	20	35.16
9	DF10	Domestic Frozen Cold Store 6	1	-18	-22	NA	1	10000	Misc	292	29200	-10	-20	18	20	39.75
		Convertible Cold Store														321.03
10	EF5	Exim Convertible Cold store 1	1	-18	-22	NA	1	10000	Misc	292	29200	-10	-20	18	20	39.75
11	DF4	Domestic Convertible Cold store 1	1	-18	-22	NA	1	10000	Misc	232	23200	-10	-20	18	20	35.16
		Chilled Cold Store														74.91
12	EF1	Exim Chilled Cold Store 1	1	0	5	80	1	10000	Misc	219	21900	10	4	18	20	40.84
13	DF1	Domestic Chilled Cold Store 1	1	0	5	80	1	10000	Misc	219	21900	10	4	18	20	40.84
14	DF2	Domestic Chilled cold store 2	1	0	5	80	1	10000	Misc	174	17400	25	4	18	20	60.83
15	DF3	Domestic Chilled cold store 3	1	0	5	80	1	10000	Misc	174	17400	10	4	18	20	44.37
18	SA	Sorting Area	2	2	6	NA	10	2000	Misc	20	10000	25	20	18	20	20.6
		Ante Room														
16	EA	Exim Ante Room	2	2	8	NA	12	4000	Misc		20000	25	20	18	20	25.0
17	DA	Domestic Ante Room	2	2	8	NA	15	4000	Misc		20000	25	20	18	20	60.3
																292.77

No of IDU/ACU in each Cold Store (chiller / Freezer) -1 no., No of IDU/ACU in Exim Ante Room – 2 nos, No of IDU/ACU in Domestic Ante Room – 3 nos

Technical Specification and Scope of Work

A) General Details :

Site Location : Visakhapatnam, Andhra Pradesh

Ambient Temperature : 45 Deg C

Type of Refrigerant : Ammonia/ NH3

B) Technical details /Design Information

The refrigeration system for cold stores shall basically comprise the following –

- i) Screw Ammonia Compressor, condenser and high pressure receiver, low pressure receiver, ammonia liquid pumps, Air Cooling Units (ACU)/ Indoor Cooling Unit (IDCU), Evaporative Condenser, Oil Cooler, Oil Separator and Economiser.
- ii) Other Accessories, Piping, Valves, pumps and Fittings and Electricals and controls and PLC automation with internet accessibility and Data logging for each room etc.

1. Freezer Room

- a) Freezer Room to be maintained at “-18 Deg C to -22 Deg C”
- b) Tentative Room dimension (Refer Tender Drawing and Basis of Design.)
- c) No of Rooms – 11
- d) 150 mm PIR Panels for wall and Ceiling
- e) 120 mm PUF Slab is considered for floor
- f) Evaporating Temp minus 28 Deg C and Condensing temp 40 Deg C
- g) ACU should have fan ring heater.
- h) ACU should be with at least 2 fans with Air-throw of at least 30 m and 27000CMH
- i) ACU should be with SS304 Coils and Aluminum Fins having minimum 7 mm spacing
- j) Defrost should be Hot Gas for coil for cold room ACU.
- k) Drain Pan should have electric heater defrost
- l) Each Room should have Digital Temperature Controller placed near the door with 2 inch display with RS 485 port to be connected to central monitoring and data logging system
- m) Drawing for electrical panels should be submitted
- n) Compressor type – Twin Screw Open Type Screw Compressor
- o) No of Compressor –4 Nos. Each 33%, (3 nos working + 1 nos standby)
- p) Total cooling load – 396 KW (Refer Annexure 1 – Basis of Design)
- q) Each Compressor to have minimum capacity 132 kW
- r) Economiser should be provided with each compressor
- s) Freezer Room no EF5 and DF4 should be able to work as chiller room with 0 Deg C as room temperature , when needed.**
- t) Refrigeration System Type -Pump feed Ammonia system

2. Chiller Room

- a) Chiller Room to be maintained at 0 Deg C to 4 Deg C
- b) Sorting Room and Ante room to be maintained at 2 to 8 Deg C
- c) Tentative Room dimension (Refer Tender Drawing and Basis of Design.)
- d) No of Chill Rooms – 4 Nos

- e) Sorting Area- 1 no.
 - f) Ante Room – 2 Nos.
 - g) 150 mm PIR Panels for wall and Ceiling
 - h) 100 mm PUF Slab is considered for floor
 - i) Ante Room 80 mm PUF panel For Ceiling and 100 mm PUF Slab for Floor
 - j) Evaporating Temp minus 6 Deg C and Condensing temp 40 Deg C
 - k) ACU should be with SS304 Coils and Aluminum Fins having 4 mm spacing
 - l) ACU should be with at least 2 fans with Air-throw of at least 30 m and 27000CMH for chill rooms
 - m) ACU for Ante room should be suitably designed.(2 nos) One each on corridors as shown in drawing
 - n) Defrost should be Hot Gas for coil for cold room ACU
 - o) Drawing for electrical panels should be submitted
 - p) Humidifier to maintain the RH of 90% should be provided along with Rh Controller all rooms
 - q) Humidifier should be pump based system with humidifier nozzles running at center of the room.
 - r) RO water quantity required for humidifier should be mentioned in the technical bid
 - s) Each Room should have Digital Temperature and RH Controller placed near the door with 2 inch display with RS 485 port to be connected to central monitoring and data logging system
 - t) Compressor type – Twin Screw Open Type Screw Compressor
 - u) No of Compressor – 2 nos (1 working and 1 standby)
 - v) Each Compressor to have minimum capacity 368 kW.
 - w) Total cooling load – 368 kW (Refer – Basis of Design)
 - x) Refrigeration System Type -Pump feed Ammonia system
3. Each compressor set shall have the necessities safety devices and accessories as mentioned below as standard accessories
- a) Suction and discharge line stop valves
 - b) Suction line check valves.
 - c) Suction scale trap with strainer.
 - d) Horizontal oil separator with coalescer filter.
 - e) Bye-pass arrangement
 - f) Oil level switch in oil reservoir
 - g) Electric heater with thermostat in oil separator
 - h) Full lube oil system with oil pump.
 - i) Dual Oil filters of 15 microns
 - j) Step less automatic capacity control system (Range: 100% to 10%)
 - k) Unloaded starting
 - l) Dual Safety Valve
 - m) PLC control panel. The panel shall indicate relevant suction, discharge pressures and temperatures along with compressor loading and interlocks.
 - n) Compressor motor coupling and guard
 - o) TEFC squirrel cage induction LT motor suitable on 415 volts, 3 phase, 50 Hz for the above compressor
 - p) VFD Starter for the above motor
 - q) Economiser of suitable capacity
 - r) horizontal shell and tube water-cooled oil cooler fitted with inlet /outlet connections, valves and fittings.

Each Oil Cooler comprises of the following:

- a. Inlet Sight Glass 1 no.
 - b. Water Flow. 1 no.
4. Compressors to be placed at ground level with vertical difference more than 10 m from Evaporator and horizontal distance as shown in the drawing for the plant room. The piping to be considered from plant room to individual air cooling units as lumpsum.
5. **Low Pressure Receiver:** The low pressure receiver of suitable capacity fabricated of MS shell and dished ends of suitable thickness. The vessel shall be designed as per ASME Sec VIII with spot radiography and fabricated of IS2002/ SA516 plates. Necessary inlet, outlet nozzles shall be provided with suitable flange for operating pressure rating. Vessel shall be provided with dual safety relief valve, pressure gauge, reflex type level gauge, vent and oil pot with drain valve. Vessel shall be sized suitably to separation of ammonia liquid and vapour at full capacity at minus 30 deg C. Vessel should be hydro tested at 15 kg/sq. cm pressure. Following controls for the liquid circulation system should be provided
 - a. Liquid line solenoid valve
 - b. Liquid level controller
 - c. Differential Pressure switch
 - d. Frost free gauge glass
6. **Ammonia Liquid Pumps:** The ammonia liquid pumps to feed at rate of 4X re-circulation of liquid ammonia at evaporating temperatures of minus 30 degree C for cold store evaporators. The pump shall be canned or mechanical seal type or with SS304/ suitable material for continuous trouble free operation. It should be suitable for pressure variation and even small flow of ammonia liquid. The pump system to have the following parts,
 - a. Counter flanges for all connections
 - b. Stop valves
 - c. Strainer having suitable meshed filter (cleanable type)
 - d. Non return valve cum stop valve on discharge side
 - e. Pressure gauge on discharge side of 6in size dial
 - f. Mechanical seal
 - g. Bearings (pump and motor ends)
 - h. Impellers
 - i. Couplings
 - j. Low and high flow nozzle and return arrangement
 - k. A provision on the discharge side should be provided to evacuate the pump with a pressure gauge.
 - l. Pump headers and suction connection is such way to avoid vortex formation at all operating conditions.
7. **Gas & Liquid Cooler:** The gas and liquid cooler of suitable size. Vessel shall be designed as per ASME Sec VIII with spot radiography and fabricated of IS2002/ SA516 plates. Necessary inlet, outlet nozzles shall be provided with suitable flange for operating pressure rating. Vessel shall be provided with dual safety relief valve, pressure gauge, reflex type level gauge, vent and oil pot with drain valve. Vessel shall be sized suitably to sub cool liquid and separation of ammonia liquid and vapour at full capacity at minus 10deg C. Vessel should be hydro tested at 24 kg/sq. cm pressure.

8. **Evaporators:** Flooded over feed Evaporators fabricated of GI powder coated casing and SS304 tubes with Aluminum fins with spacing as indicated above with heavy duty motor suitable for continuous operation with 415V 3Ph supply. Evaporators to be complete with hot gas defrost in coil with electric fan ring heaters and electric heater in tray and pipe for freezer rooms. Suitable control system like hand expansion valve, strainer, liquid line solenoid valve with necessary piping and hanging support from PEB shed/structure and fitting to be provided.
9. **Oil Separator:** Shall be of suitable capacity for separating oil from the discharge gas at high pressure and temperature. It should have float assembly at the bottom with drain with valve.
10. **High Pressure Receiver:** The receiver shall be size to hold full liquid during pump down of system with 20% buffer gas volume. Vessel shall be designed as per ASME Sec VIII with spot radiography and fabricated of IS2002/ SA516 plates. Necessary inlet, outlet nozzles shall be provided with suitable flange for operating pressure rating. Vessel shall be provided with dual safety relief valve, pressure gauge, reflex type level gauge, vent and oil pot with drain valve. Vessel should be hydro tested at 24 kg/sq. cm pressure.
11. **Evaporative Condenser:** Of suitable capacity for heat rejection with all compressors running Minus 28C and condensing at 40 DegC. Wet bulb temperature for Vizag Plus 2 deg must be considered for the design. Condenser shall be with Galvanized Steel coil with blow through centrifugal fans, water spray pump, sump, drift eliminator, water level float. Necessary water inlet, drain nozzles shall be provided.
12. The Condensing coil will be fabricated of MS Hot dip galvanized. All casing & cold water basin shall be made of Heavy gauge Stainless Steel Panels. Water spray arrangement will be GI 'B' class water spray header and nozzles of synthetic material designed for heavy duty application. Eliminators of efficient design made of GI or PVC fill shall be incorporated in the fan section. The unit casing shall have removable panels from SS sheet and the structural steel shall be hot dip galvanized. The casing shall be designed for leak proof operation. No of condenser should be two.
13. **Piping and valves:** Inter connecting ammonia pipe of MS C class confirming to IS1239 for sizes up to 6in and IS3589 for 8in and above of suitable thickness. Socket welded Pipe fittings with suitable size socket welded Ammonia valves, Strainer, Hand expansion valve and fittings etc. with complete liquid line assembly to be included.

Line valves will be "Y" type or Angle type Globe.

The valves should have following features

- i. full port opening
- ii. compact design
- iii. Body should be of carbon steel / Seamless pipe
- iv. Provision of Gland packing replacement under pressure.
- v. valve spindle should be of SS410
- vi. Provision for back seat arrangement.
- vii. Replaceable Teflon valve seat.
- viii. Non-Rotating Valve disc thus increasing seat life.
- ix. Provision of direct welding of valve body to pipe line reducing number of joints

GI 'B' class pipes, pipe fittings and valves to circulate water through compressor jacket and to splash the water on top of condensers based on the assumption that condensers shall be placed at a distance of not more than 10M from the machine room.

14. PUF section Insulation materials for low temperature suction line, sub cooled line, inter-cooler suction and where the operating temperature is below 18C. Vessels shall be insulated with suitable thickness of PUF insulation. Insulation shall be complete with surface preparation, bitumen and duly complete with 22G / 24G Al. cladded and necessary screws and hardware.

15. Electrical panel of free standing type cubical construction fabricated of MS powder coated of suitable sheet thickness to enclose starter Y/D for compressor motor, starter for evaporators, condenser fan, pumps. Panel to have IP 52 rating with RAL 7035 Colour and have required control and should comply with local Statutory Acts, Rules, Standards And Safety Codes. Main incoming supply 415 V / 3 PH/ 50 hz will be provided in the plant room to the electrical panel.

The switch board shall be indoor, floor mounted, self-supporting, front open able, cubical type made up of vertical panels arrangement to form a continuous line up of uniform height. Front door and cable alleys cover shall be hinged type & bus bar alley shall be bolted type. Switchboard shall be extensible at both the ends by addition of vertical section. Aluminium bus bar of suitable rating shall be provided.

The Panel shall be complete with bus-bar, Incoming & Outgoing Feeder, current transformer, switch fuse unit, set of starters, and overload relay, ammeters, volt meter & Push buttons. MCC panel shall be with spare (Empty cubicals) feeders considering future load of One More compressor for 3 nos frozen room and ACU's .

- Motors of 12kW shall be suitable for Y/D starting
- Compressor motor to have start to start to delay and per hour start counter with limit setting
- For detail general specification of electrical system shall be followed.

16. PLC panel for Chiller and frozen chamber with necessary pressure transmitters to measure SP, DP, OP of various compressors, pumps and temperature transmitters to monitor the temperatures at Inlet Outlet temperatures of condenser, Chiller , frozen room and other area.

17. MS stand and structure to support equipment in scope of supply.

18. Pipe support (wherever required including hanging of ACU) fabricated of suitable size MS Channels and angels with anti-rust paint.

19. GI Cable trays of suitable width with necessary MS support with anti-rust paint.

20. Thermosyphon-cooled system for cooling of oil of oil separator shall be considered. Additional cooling tower for Compressor head cooling (if required must be considered in the scope of work without any extra cost)

21. 4 Point Automatic Air Purger

22. Ammonia leak detection system with sensors at the cold room & machine rooms.

23. Alarm for all cold room with emergency push buttons.

C) Common specification and requirement:

1. All pressure vessels after pressure test shall be drained, dried and coated with anti-rust primer followed by two coats of paint of approved shade.
2. Evaporative Condenser to be placed on the roof with vertical difference more than 6 m from compressor.
3. Refrigeration piping to be taken above the Cold Chambers at about +11.5 mtr height from FFL and evaporator will be hung at 10 m below the PIR panel ceiling and plant room is at FFL. Adequate care shall be taken to avoid dropping of water from the piping on the insulation panel.
4. Piping corridor along with maintenance platform shall be planned/deigned during detail engineering to facilitate ease of maintenance, cleaning etc. Approach/Stair required to reach piping corridor shall be clearly specified in the layout.
5. Drain piping to be insulated and heated for freezer room and with U trap out side the cold and should be terminated near the plant room, (pipes running above the ante room from all cold room to outside near plant room area).
6. All components supplied shall be suitable to operate with Ammonia refrigerant at the required operating temperatures.
7. Supplier to coat with anti-rust paint / coating on all support and structures to avoid rusting.
8. Heat load provided are for reference and the supplier to verify the heat load and quote as suitable to ensure performance and temperature in the cold rooms as per basis of design. Supplier shall be responsible for the performance and smooth / trouble running of system supplied.
9. Indoor unit casing Colour approval to be taken from Customer (RAL 9002/ RAL 9003/ RAL 9010)
10. Pressure test, radiography test, material test Certificates shall be submitted for record.
11. Guaranteed Power Consumption details on peak load and average load to be submitted along with Coefficient Of Performance for the system quoted
12. WEB based central control and monitoring system should be provided for the refrigeration system. The system shall compactable with PC and latest version software.
13. Control system to have following features as monitoring of opening / closing of doors (recording hours, numbers of opening), Compressor on/off status, run hours recording, evaporator fan status, defrost status etc., shall be display with plant layout mimic on the PC screen.
14. Supplier to quote for Spares as motor for evaporator fan, condenser fan & motor, pump, fan ring heaters, solenoid valve coils, room controller any other critical system spare as per Schedule of Work.

15. Supplier to included first charge of Refrigerant gas and top up during trial run and up to **6 month** of system running.
16. Supplier to included first charge of oil and top up during trial run and up to **6 month** of system running.
17. The supplier / contractor is responsible for obtaining necessary import licence, payment of duties and securing release of the imported materials from the Indian Customs.
18. The proposal to be submitted along with the following documents without which the same will be rejected.
 - a. Basics of system design and write up of Plant operation.
 - b. BOQ with price break- up showing all taxes and duties.
 - c. P&I drawing
 - d. Electrical power consumption and connected Load details

The entire system shall be guaranteed for trouble free operation for a period of **12 months** from the date of commissioning. During that period, any replacement or maintenance of any system component, spares etc are the responsibility of the supplier. The same shall be supplied and carried out free of charge. In case of loss of gas or oil due to leakages from pipes, components or equipment the same shall be supplied free of charge during guarantee period.

19. Tenderer shall impart necessary training to Owner's personnel for operation and maintenance of the plant. No separate charge shall be payable by the Owner for the purpose.
20. Skilled Operator for running the plant for **1 (one) years** should be quoted.
21. Water supply will be provided at single point to evaporator condenser and in the ante room area for humidifiers
22. The following drawings must be submitted for approval and shall be submitted prior to start of the work.
 - a. System P & ID
 - b. General layout of all equipment
 - c. Piping, cable tray routing and supporting details.
 - d. Standard Piping
 - e. Installation drawing of all equipment.
 - f. Power wiring diagram, with recommended cable size.
 - g. Control wiring diagram with scheme for communication.
 - h. Field wiring diagram
 - i. Electrical Panel wiring diagram.
 - j. GA drawing for control panel.
 - k. Any other drawings necessary for the project.

23. **Computer Display and Printer:** Computer Configuration i5 processor, 4GB RAM, 1TB hard disk, 18.5" or higher TFT Monitor with Windows 10 and vendor's required software preinstalled. Necessary Officejet printer compatible with the installed software and SCADA software for both Chiller chamber & Frozen Chamber PLC Panel.

- 24. Power Backup /Ups with 2 Hrs Backup:** The above specifications are indicative of owner minimum requirement. Bidder may submit their proposal for specific product(s), in 2 (two) bid system.

D) LIST OF APPROVED MAKE

Sl. No	Equipment/Item	Approved Make
1	Screw Compressor	Kirloskar / Frick / Superfreeze /Bitzer/JCI//MYCOM
2	Motor	Siemens / Crompton / KEC
3	VFD	Danfoss / Schnider/ ABB/ Siemens/Allen Bradley/Yaskawa
4	ACU	Guntner / GEA/ LUBE / Alfa Laval "Helpman" Brand
5	Pump	KBL / Grundfoss
6	Evaporative condenser	Star cooler / EVAPCO / BAC/DESCA/ Frick
7	Refrigeration Control	Danfoss Room controller and Computerised Data Logger with PLC control – Carel / Dixel /Danfoss/Honeywell/Allen Bradly
8	Canned NH3 pumpset	Hydrodyne
9	Valves	Danfoss / Dhiren
10	Electric motor	CGL/ KEC/ Siemens/ Bharat Bijlee / Kirloskar / ABB
11	Switch Fuse Units/MCCB	L& T / Siemens
12	Control fuses	L& T / Siemens
13	Terminals	Elmex/Connectwell
14	Cable lugs	Dowells/ Connectwell
15	Cable glands	Comet/ Electromeg/Flexpro
16	ERW/ HFIW Steel pipes black as per IS : 1239	TATA / Jindal / MSL
17	Centrifugal pumpset	Grundfoss / KSB
18	LT Cables / Wires	CCI/ Gloster/ Polycab/Havells/ Finolex/ Mescab/RR/RPG
19	LT Panel Components	L&T/ Schneider/Legrand/Siemens/ABB
20	Lighting / Power DBs	Legrand / Siemens
21	Meters	AE/IMP/MECO/Rishab/L&T/Secure/ /Jayco/Siemens/Conserv
22	CT/PT	Jyoti / C&S/ Kappa /L&T /Pragati/ Precise

23	Switch/Receptacle	Panasonic / Northwest / Havells / Clipsal/MK
24	Termination Kit	Raychem / M-sea
25	Conduit Pipe	EGA / Clipsal / National / ELPRO
26	DOL / SD – starters / Aux. contactors / Timers	L& T / Siemens
27	Change-over relays	OEN / PLA
28	PB / Indication lamps (LED type)	Teknik / L& T / Siemens
29	Selector switches	Kaycee / Salzer
30	Cooling Tower	Paharpur/Advanced
31	Desktop Computer	DELL/ HP
32	Printer	HP/ RICOH
33	Uninterrupted Power Supply	MICROTEC or any approved make.

For make and rating of any other major electrical item not mentioned above, contractor to take prior approval from Engineer-in-Charge before procurement of the same.

GENERAL SPECIFICATION OF ELECTRICAL WORK

CONTENTS

Article – I	SPECIFICATION FOR MCC, LPBS
Article – II	SPECIFICATION FOR MOTOR
Article – III	SPECIFICATION FOR CABLES
Article - IV	SPECIFICATION FOR ELECTRICAL ERECTION

Article – I Specification for MCC, LPBS

1.0.0 INTENT OF SPECIFICATION

This specification is intended to cover the design, engineering, manufacture, assembly, testing at manufacturer's works, packing, supply & delivery, including transportation and transit insurance, complete with all auxiliaries and accessories for efficient and trouble-free operation in a manner acceptable to Owner. Scope of the Bidders shall also include preliminary relay setting and furnishing of relay coordination calculation.

The scope of work shall also include, at the option of the Owner, the supervision of erection, testing, commissioning and putting into successful commercial operation of all equipment furnished under this specification.

In the event of any discrepancy with listed documents, the stipulation of this specification shall govern.

1.1 Codes and Standards

1.1.1 All equipment and materials shall be designed, manufactured and tested in accordance with the latest applicable Indian Standards and IEC except where modified and/or supplemented by this specification.

1.1.2 The electrical installation shall meet the requirements of Indian Electricity Rules as amended upto date and relevant Code of Practice. In addition, other rules and regulations applicable to the work shall be followed.

The following codes and standards shall be strictly followed in the manufacturing of the Power and Motor Control Centre (PMCC) / MCC / Panel boards.

IS 8623 (Part 1): for type	Low Voltage switchgear and control gear assemblies: Part 1 Requirements tested and partially type tested assemblies
IS 13947 (Part 1):	Low Voltage switchgear and control gear assemblies: (Part 1) General rules (Superseding IS 2147 and IS 4237).
IS 13947 (Part 1): Contactors	Specification for Low Voltage switchgear and control gear : (Part 4) and motor starters, sec 1 Electromechanical contactors and motor starters (Superseding IS 2959 and IS 8544 (all parts))

Equipment and material conforming to any other standard which ensures equal or better quality may be accepted. In such case, copies of the English version of the standard adopted shall be submitted along with the bid.

2.0.0 SCOPE OF WORK

2.1.0 Scope of Supply

Type, rating and connections of the equipment listed below are detailed in the Annexures and drawings to this specification subsection. The equipment shall be offered in strict compliance with the same.

2.1.1 The work involves timely procurement and transportation to site in properly packed condition of all equipment, materials & miscellaneous items required to complete the project.

The quantities indicated in the bill of materials are tentative and may vary as may be found necessary during detail engineering/execution of the contract.

The equipment and material shall include but not limited to the following:

2.1.2 415V PMCC, MCC, Local Start Stop Push Button Stations:

- I. Refrigeration MCC : Floor mounted, double front type, bottom cable entry, top busbar, compartmentalized, IP-42, Indoor type, non-drawout type. This Panel include modules as specified herein and as detailed in the Scope of Work, Technical Specification and Schedule of Work.
One MCC-LPB-PLC Selector Switch shall be provided in each outgoing Motor Feeders to control the motor.

All outgoing feeders on MCC shall have digital multifunction meter (ammeter – KW meter – KWh meter).

- MFM of the Main incoming feeder shall have the facility to display all three line currents L1, L2, L3 in the same screen.

- II Non - Flameproof Local Start Stop Push Button Stations: LPBs shall have start push buttons and lockable mushroom headed red coloured stop push button with push to stop & Lock and key to release type. If shown in the SLD / Schematic, for bi-directional motor feeders, one no. Forward / Reverse Motor Direction Selector Switch shall be provided in LPB.

All motor feeders of 5KW and above shall have VFD. VFDs / Soft Starters shall be mounted in the MCC itself.

For motor feeders below 5KW rating DOL starter modules shall be provided in the MCC.

The Panel modules shall be wired following schematic diagram of incomer and outgoing feeders attached to this specification.

2.1.4 All motors shall have local start stop push button stations near drive motor units.

2.1.5 Base channel frame of all PCC / PMCC / MCC / DB along with necessary mounting hardware for complete installation at site.

2.1.6 Set of accessories as detailed below (for Panels with Switchgear module) :

- i) Breaker Lifting & Handling Truck : One (1) no. with each Switchboard
- ii) Device for slow Closing & opening of breaker : One (1) with each breaker
- iii) Breaker Racking In/Out Handle : One (1) no. with each breaker

2.1.7 All relevant drawings, data and instruction manuals.

3.0.0 DESIGN CRITERIA

The PMCC, MCC and Auxiliary Panel boards shall be used to provide power supply in the plant. All the equipment will be located in a hot, humid and tropical atmosphere.

Duty involves direct-on-line / star-delta starting of large induction motors and also under certain emergency conditions manual transfer of loads from one source of supply to other.

For DOL starts motor starting current varies from 6 to 8 times full load current with maximum of 3 starts per hour. For Star-Delta starts motor starting current varies from 2.0 to 2.5 times full load current with maximum of 3 starts per hour.

Equipment ratings and quantities are detailed in the enclosed drawings and annexure. Equipment shall be furnished in strict accordance with the same.

For continuous operation at specified ratings, temperature rise of the various equipment/ components shall be limited to the permissible values stipulated in the relevant standards and/or this specification.

All equipment and components thereof shall be capable of withstanding the mechanical forces and thermal stresses of the short circuit current listed in the annexure without any damage or deterioration of material.

Circuit Breaker shall not produce any harmful over voltage during switching off induction motors. If required, surge protective devices shall be included in the scope of supply to limit over voltage.

Design and selection of all components shall be made liberally with a good margin of safety factors and these shall be subject to Owner's approval.

Derating factors employed for each component along with their basis shall be clearly stated in the bid.

The Busbars of PMCCs / MCCs shall be sized to carry continuously the associated transformer secondary current plus a 20% margin. Busbars of MCC / DB shall be sized to carry continuously the total running load of the board plus a 20% margin.

All busbars shall be capable of withstanding the mechanical forces and thermal stresses due to maximum short circuit current.

In case of Transformer Incomer and DG incomer of Main PMCC, the incomer shall be protected by fixed execution four pole ACB having microprocessor based over load, short circuit, instantaneous and earth fault releases.

Control of all ACB shall be done through 220V AC from control transformer output.

All ACBs used for incomer, bus coupler & outgoing feeder of PMCC shall be electrically operated.

4.0.0 SPECIFIC REQUIREMENTS

4.1.0 CONSTRUCTION

PMCC / MCC Panel and DBs shall be indoor, metal-clad, floor mounting, air insulated and modular in construction. The design construction shall be such as to allow extension at either end.

Enclosure of the Indoor boards shall be dust and splash proof, conforming to degree of protection IP-42. Minimum thickness of sheet metal used shall be 2 mm.

Outdoor Feeder Pillar Box Panels shall be outdoor type, pedestal mounted, air insulated and modular in construction. Enclosure of the boards shall be confirming to degree of protection IP-65 weather proof with canopy.

The PMCC/MCC /DB shall comprise a continuous line up of single/multi tier cubicles. The installations of circuit breaker however shall be limited to the bottom two tiers only. All PMCC Panel/DBs shall be front wired & front connected.

The design shall be fully compartmentalised with metal/insulating partitions between compartments. The working height shall be limited within 300 mm to 1800 mm from floor level. For breaker panel the working height shall be limited within 450 mm to 1800 mm from floor level.

Each Breaker module and control module shall be housed in a separate cubicle, complete with an individual front access door having sufficient opening with concealed type hinges. Each vertical section of single front panels shall have a removable back cover. All doors and covers shall be gasketed with neoprene gasket.

PMCC /MCC cubicle shall be so sized as to permit closing of the front access door when the breaker is pulled out to ISOLATED position.

For PMCC/MCC all switches, lamps and indicating instruments shall be flush mounted on the respective cubicle door whereas relays and other auxiliary devices may be mounted on a separate cubicle.

For PMCC/MCC/DB shall have a full height vertical cable chamber with cable supports shall be provided in each section to facilitate unit wiring. The chamber shall be liberally sized to accommodate all cables and shall have removable cover at the front for access.

Full height vertical busbar chamber shall be provided alongside each vertical panel to facilitate maintenance access from the front.

For PMCC/MCC Panel/DB shall have a horizontal wire way extending the entire length shall be provided at the top of each panel for inter panel wire.

Incomer/Tie shall be provided at the two ends of the panel line-up and Bus section, if specified, shall be provided at the middle of the line-up. Lifting lugs shall be provided for each individual shipping section.

Switchboards shall be supplied with base frames made out of structural steel sections along with all necessary mounting hardware required for bolting/welding base frames to the foundation.

After isolation of power and control circuits connections, it shall be possible to safely carry out maintenance in a compartment with the busbar and adjacent circuit in live condition. Necessary shrouding arrangement shall be provided for this purpose over the cable terminations located in cable alley.

The minimum clearance in air between phases and between phases and earth for the entire run of horizontal and vertical busbars shall be 25 mm. For all other components, the clearance between two live parts, a live part and an earthed part and isolating distance shall be at least ten (10) mm throughout. Wherever it is not possible to maintain these clearances, insulation shall be provided by sleeving or barriers. However, for horizontal and vertical busbars the clearance specified above should be maintained even when the busbars are sleeved or insulated. All connections from busbars up to fuses shall be fully shrouded to minimise the risk of phase to phase and phase to earth shorts.

Wherever two compartments are provided in the same vertical section, insulating barriers and shrouds shall be provided in the rear cable compartment to avoid accidental touch with the live parts of one circuit when working on the other circuit.

4.2.0 Bus and Bus Taps

The main buses and bus connections for PMCC/MCC Panel and DBs shall be of high conductivity aluminium/aluminium alloy or copper as specified in Appendices. These shall be sized for specified current ratings with maximum temperature limited to 85°C (i.e. 45°C rise over 40°C ambient).

All bus connections shall be silver plated. Adequate contact pressure shall be ensured by means of two bolt connection with plain and spring washers and lock nuts. Bimetallic connector shall be furnished for connection between dissimilar metals.

Busbars shall be supported and braced to withstand the stresses due to maximum short circuit current and also to take care of any thermal expansion.

Busbar compartments shall be completely enclosed for separately running horizontal and vertical busbars.

Minimum current rating for vertical Busbars shall not be less than 200A.

Busbars and connections shall be fully insulated for working voltage with adequate phase/ground clearances. Insulating sleeves for busbars and shrouds for joints shall be provided.

Bus insulators shall be, non-hygroscopic flame-retardant, track resistant, high strength, sheet molded compound or equivalent polyester fibre glass moulded type. Separate support shall be provided for each phase and neutral bus bar.

Bolted disconnect links shall be provided for all incoming and outgoing feeders for isolation of neutral, if necessary.

Busbars shall be colour coded for easy identification and so located that the sequence R - Y - B shall be from left to right, top to bottom or front to rear when viewed from the front of the assembly.

4.3.0 Air Circuit Breaker

Circuit breaker shall be three pole/ four pole, single throw, air break type with stored energy, trip free mechanism and shunt trip and shall conform to latest IEC specification.

Circuit breakers of identical rating shall be physically and electrically inter-changeable.

All Circuit breakers shall have motor wound spring charged mechanism and it shall be possible to convert the circuit breaker from motorized operated to manually operated and vice-versa. Spring charging action shall take place automatically after each breaker closing operation. One open close-open operation of the circuit breaker shall be possible after failure of power supply to the motor.

Each circuit breaker shall be provided with adjustable type thermal over load, time delayed short circuit, instantaneous short circuit and earth fault releases. The ACB shall have time delayed under voltage release. Overload and short circuit settings shall be adjustable type.

Each breaker shall be provided with an emergency manual trip, mechanical ON-OFF indicator mechanism, charge / discharge indicator.

The Circuit Breakers shall have mechanical contact wear indication facility.

The Circuit Breakers shall have facility to fit accessories viz. safety shutters, door interlock, castle key interlock, etc. as and when required.

PMCC / MCC Circuit Breakers shall have minimum short circuit breaking capacity Icu of 50KA rms and breaking capacity Ics shall be 100% of Icu.

The Circuit Breakers shall have no derating upto 50°C service temperature. In case, the Circuit Breaker needs derating, the manufacturer shall declare the derated current carrying capacity at 50°C service temperature.

Control & Indication for Circuit Breaker

The circuit breaker shall be wired up for local operation. Each breaker cubicle shall be equipped with following:

- a) Two (2) heavy duty, oil tight, push buttons for TRIP & CLOSE.
- b) Three (3) indicating lights on front of compartment :

Breaker open & Spring charged	-	GREEN
Breaker closed	-	RED
Breaker Tripped / Trip circuit unhealthy	-	AMBER

Push button shall be Heavy Duty, Oil Tight and Push-to-Actuate type with integral escutcheon plate marked with its function.

Each push button shall have minimum two (2) NO and two (2) NC contacts rated 10A at 110V AC and 5A at 220V AC.

Lamps shall be clustered type LED module pilot lights in thermoplastic enclosure with polycarbonate lens and diffuser. LED shall be protected by in-built fuse with surge suppressor and leakage voltage glow protection. Lamp and lens shall be replaceable from front.

4.4.0 Moduled Case Circuit Breakers (MCCB)

MCCB shall be three pole / four pole, single throw, air break fixed type front execution type having trip free mechanism with quick make & quick break type contacts. Each MCCB shall be provided with electromagnetic inbuilt releases.

The MCCBs shall have in-built thermal overload and short circuit release and these elements shall be provided in such a manner as to prevent single phasing in the event of fault, occurring on any of the phases. Overload and short circuit settings shall be adjustable type.

Each MCCB shall have current limiting feature.

MCCBs of identical rating shall be physically and electrically interchangeable.

MCCB shall be provided with 2 NO and 2 NC electrically separate auxiliary contacts.

MCCB used for 22KW & above motor rating shall have additional E/F release protection.

The MCCBs shall be fitted with remote extended rotary handle for operating it from outside when door is in closed condition.

Minimum interrupting capacity of the MCCBs shall be 25 KA for 1 sec.at 415 V AC.

4.5.0 PMCC / MCC Control Modules

Drawout type control module if any (for breakers) shall have self-aligning power/control disconnects. All disconnects shall be silver plated to ensure good contacts.

The design shall be such as to permit easy withdrawal/reinsertion of the unit with guide rails to ensure correct alignment without any trouble.

Control Module shall house the control components for a circuit such as switch, fuse, contactors, relays, push buttons, lamps etc. as detailed in the bill of materials. Only the push button actuator, lens of indicating lamps and transparent window for meters shall be mounted on module door such that when the module is withdrawn the cubicle door shall provide specified IP-54 protection class in closed position.

The equipment layout shall provide sufficient working space in between the components and subject to Owner's approval.

Various module/compartiment sizes shall be multiple of one basic unit to facilitate modifications at site. Suitable provision for this purpose should also be incorporated in the vertical busbars.

Drawout type control module shall have two distinct positions as below :

Service

Test

Drawout type control modules of same size and type shall be electrically and physically interchangeable.

Minimum clearance of 25.4 mm between phases and 19 mm between phase and ground shall normally be maintained for bare connection unless otherwise required.

4.6.0 Air Break Switches

Switches shall be triple/double pole, air break and designed for duties as specified in this specification.

Motor duty switches shall be capable of safely making and breaking the locked rotor current of the associated motor circuit. Circuit breaker shall be provided for rating 800A and above.

The switch shall have a quick-make, quick-break mechanism operated by a suitable external handle, complete with position indicator. This handle shall have provision for padlocking in 'ON' and 'OFF' position. The Switches shall be fitted with remote extended rotary handle for operating it from outside when door is in closed condition. The compartment door shall be interlocked mechanically with the switch such that the door cannot be opened unless the switch is in OFF position. Means shall be provided for releasing this interlock at any time. Switches shall be capable of withstanding the let through fault current of back-up fuses or circuit breakers.

Wherever two incoming switches and one bus-section switch are specified, these switches shall be mechanically/key interlocked to ensure that only two out of the three can be closed at a time.

All incoming and outgoing feeders shall be provided with bolted disconnect link for isolation of neutral, if necessary.

4.7.0 Fuses

Fuses shall be HRC, preferably link type-with a minimum interrupting Capacity equal to the short circuit current of the system. It shall be drawout type.

Fuses shall be furnished complete with fuse bases and fittings of such design as to permit easy and safe replacement of fuse element. Visible indication shall be provided on blowing of the fuse.

Motor fuse characteristics and ratings shall be chosen to ride over starting period without blowing. The fuse on incoming feeder, if specified, shall be chosen to provide discrimination with outgoing motor/feeder fuses.

4.8.0 A. C. Starter

4.8.1 Contactor

The contactors shall be three poles, air break type designed for duty Class-III Category-AC3 for unidirectional drives and AC-4 for bi-directional / inching drives with non-bouncing silver / silver alloy contacts.

Each contactor shall be provided with two (2) normally open and two (2) normally closed auxiliary contacts rated 10A at 110V AC.

Reversing contacts shall be electrically and mechanically interlocked.

All contactors shall be provided with delayed dropout feature. These contactors shall not dropout on power failure / voltage dip / transient faults, if the voltage is restored within 3 seconds.

Contactor shall comply with the requirement of the IEC 60947-4-1 in respect of the co-ordination of the characteristics of contactor, overload relay and MCCB / Fuse. Type of co-ordination shall be type-2 Heavy Duty type with 36KA suitable for 415V, 36KA system.

4.8.2 Thermal Overload

Thermal overload relays shall be three element, positive acting, ambient temperature compensated with adjustable settings.

Single phasing preventer shall be provided, as an inbuilt feature of thermal overload.

Single phasing preventer shall not be too sensitive to negative sequence current and shall be adequately stable during motor starting, normal voltage unbalance etc.

Relays shall have provision for selection of Auto or Manual mode of resetting with one changeover contact. Resetting of relays shall be possible with compartment door closed. Colour of the resetting button shall be BLACK.

Relays may be direct acting or C. T. operated, depending on current rating. C.T.s shall be included in the scope of supply.

Relays for fan motor having long starting time shall be provided with saturable core CTs.

Overload relays shall be fitted with extension chords so that it can be reset from the panel door when it is closed.

4.8.3 DOL / Star-Delta Starter modules

All DOL and Star Delta Starter modules (which are not directly placed in the MCC itself) shall have sheet steel enclosures of 2 mm thickness with front glass cover. They shall be wall mounted type and will be generally mounted near the drive motor. These starter units shall be complete with thermal over

load relays and single phase preventer. The ratings of thermal overload shall be selected by the contractor depending upon the motor rating.

4.8.4 MPCB

All MPCBs shall feature Over current protection, short circuit protection, phase loss protection, high breaking capacity, adjustable thermal magnetic trip settings.

All MPCBs shall be fitted with 2NO + 2NC auxiliary contacts. External operating handle shall be provided to operate the MPCB without opening the Panel door. The MPCB shall have door interlock function and OFF lock function.

4.9.0 Control and Indication

The following Control & Indications shall be considered for following feeders in PCC / PMCC / MCC / DB:

- | | |
|--------------------|---|
| A. Motor feeder | i) MCC-LPB-PLC selection
ii) Start / Stop Operation
iii) ON / OFF / Auto Trip Indication. |
| B. Outgoing feeder | i) ON / OFF / Auto Trip Indication. |

Lamps shall be clustered type LED module pilot lights in thermoplastic enclosure with polycarbonate lens and diffuser. LED shall be protected by in-built fuse with surge suppressor and leakage voltage glow protection. Lamp and lens shall be replaceable from front.

4.10.0 Capacitor Control (Deleted)

4.11.0 Current Transformers

Current Transformers shall be cast resin type having insulation class- 'B'. All secondary connections shall be brought out to terminal blocks.

Accuracy class of the current transformers shall be :

- i) Class 5P20 for Relaying
- ii) Class 0.5, ISF < 5 for Metering

Current transformer shall be liberally designed and shall be capable of withstanding the system fault level. Also, CT shall be designed to withstand open circuit secondary with primary rated load current for a short duration.

CT wirings shall be colour coded and polarity marking shall be available at panel TB. Secondary terminals shall be provided with protective covers.

Separate shorting links shall be provided at the terminal block for shorting and grounding CT secondary terminals inside panel.

VA burden of the CTs shall be adequate (15VA minimum) for connection to remote transducers for Owner's DCS. Also, additional terminal blocks etc. as may be required shall be provided in panels.

4.12.0 Voltage Transformer

Voltage transformers shall be cast-resin type having insulation class- 'B' with copper winding and shall have an accuracy class of 0.5. Voltage transformer mounted on breaker carriage is not acceptable. Voltage rating for the transformer shall be 1.2 continuous and 1.5 for 30 secs.

High voltage windings of voltage transformer shall be protected by current limiting MPCB. The voltage transformer and MPCB shall be completely disconnected and visibly grounded in fully drawout position.

Low voltage MCB, sized to prevent overload, shall be installed in all ungrounded secondary leads. MCBs shall be suitably located to permit easy replacement while the PMCC / MCC is energized.

VA burden shall be adequate for connection to remote transducers for Owner's DCS. Also additional terminal blocks etc., as may be required, shall be provided in panels.

4.13.0 Relays

I. General- A

All relays & timers in the protection circuit shall be flush mounted with connection from inside. They shall have transparent, dust tight covers, removable from the front. They shall have built-in testing facilities. Except small auxiliary relays and timers all relays shall be drawout type.

Relays shall be rated for operation on 1A secondary current and 110V secondary voltage to be decided by the bidder. Number and rating of relay contacts shall suit the job requirements.

The Bidder shall furnish, install & co-ordinate all relays to suit the requirements of protection, interlock and bus transfer schemes as broadly indicated in the annexures and drawings.

It shall be the responsibility of the Bidder to fully co-ordinate the overload and short circuit tripping of the circuit breakers with the upstream and downstream circuit breakers / motor starters to provide satisfactory discrimination.

All setting devices shall be accessible after removing the front cover. No relay shall be mounted on the rear side of PMCC / MCC panel.

All relay coils and their auxiliary contacts (including un-enabled relays in Composite Numerical Relays, if any), including spare contacts will be wired up to the terminal blocks of respective panels for wiring to DCS & SCADA and for future use.

Parameterization and loading and downloading of data shall be possible from local HMI and as well as from DCS / SCADA.

All numerical relays shall have front communication port for parameterization, loading and downloading of data thru' Laptop.

All numerical relays and multi-functional meters shall be hooked up and connected with HMI thru' Fiber Optic cable.

II. General- B

All protective relays shall be of numerical microprocessor based multifunctional type having communication facility.

All relays shall conform to the requirements of IEC: 60255 standards.

The Contractor shall ensure availability of spare parts and maintenance support for the equipment for at least 15 years from the date of supply.

Any foreign relay manufacturer through his Indian partner or subsidiary company in India shall provide application, testing, commissioning and other necessary support for minimum 15 years. They shall also maintain adequate inventory of each type of relay or spares to meet the requirement arising during project execution and plant operation.

III. Technical Requirement

a) Auxiliary Power Supply

Unless otherwise specified, relay shall be suitable to accept both AC / DC supplies with range 110V to 240V with tolerance of $\pm 20\%$. The auxiliary power supply shall preferably be site selectable requiring no additional hardware.

b) Basic Requirement and Constructional Requirement

Relays shall be suitable for flush mounting on the front with connections from the rear. The enclosure shall be dust tight having degree of protection minimum as IP: 5X.

Relay shall have draw out feature with plug in type PCB for easy replacement. In case of fixed type relay, the terminals shall be easily accessible for testing and commissioning.

Relay shall have self-diagnostic feature with indication of relay failure on relay front. However, while diagnostic circuit runs, it must not interfere in the main protective relay circuit and allow working of main protective circuit continuously. Relay faults (self diagnostic) shall be communicated and annunciated to HMI.

Design of the relay shall be such that it must operate selectively and with proper discrimination. It must be immune to any kind of electromagnetic interference. The Contractor to submit all related type test reports for the offered model along with the offer.

c) Display & Indication

All numerical relays shall have keypad / keys to allow relay settings from relay front. In addition, relay shall have front port for downloading / uploading of relay settings from the PC / Laptop. All hand-reset relays shall have reset button on the relay front. Relay to be self or hand reset shall be software selectable.

All relays shall have LED / LCD display for settings, status, faults and events. LCD display shall be backlit and temperature compensated up to 65°C for contrast and legibility.

As a minimum, the relay shall have LED indicating lamps for fault trip, relay healthy / unhealthy and control supply on.

The relay shall have at least 6 programmable LEDs on relay front.

d) Software Security

Relay shall be provided with password protection against unauthorized write access. However, viewing of metering data, settings, and status and event data as read only parameters should be without password protection.

e) Disturbance, Event Recording & Data Storage

Status, disturbance data and events shall be stored in non-volatile memory or memory backed up by battery. It should be possible to store minimum 50 events with date and time stamp, last 5 fault records

and last disturbance record. When auxiliary power fails, it should be possible to see the latest state of display when power is restored. Also, in case of power supply failure lock out status of the relay should be stored and kept in memory to allow the working of interlock logic properly on restoration of the supply.

f) Trip Circuit Supervision & Lock out function

Relay shall have built in lockout function. Lock out feature shall be self reset or hand reset and shall be software selectable.

Relay shall have built in trip circuit supervision function.

g) Input / Output Interface, Filters and Galvanic Isolation

Relay shall have at least 4 NO contacts each shall separately be programmable for either hand reset or self-reset. The contact rating shall be minimum 5A at 220V AC / DC.

Relay shall be made immune to capacitance effect due to long length cables.

All IOs shall have galvanic isolation. Analog inputs shall be protected against switching surges, harmonics etc.

h) Serial Communication

Relay shall have RS485 or FO (Fiber Optic) port for serial communication.

All relays should be able to communicate with DCS system. Data shall be available at the DCS on request.

Protocol adapted for communication to DCS should facilitate easy interface with world wide used open protocol like Modbus or IEC 103 protocols.

It shall be also possible for Relay Parameterization as well Downloading of Disturbance Records from PC. Necessary software to be provided for this purpose. Communication protocol shall be selected from relay to PC to provide all information.

4.14.0 Meters

Indicating instruments (96 x 96 mm) shall be switchboard type, with 240 deg. scale, anti-glare glass and accuracy class $\pm 2\%$ full scale. Each meter shall have zero adjuster on the front.

Digital Multifunction Meters shall be provided in all incoming and outgoing feeders at MCC - as indicated in the SLD, schematics. Local Push Button Station Ammeters shall be analogue type.

Multifunction meter shall be provided in drawout cases with built in test facilities. Alternatively, they may have test block to facilitate testing of meter without disturbing CT or VT secondary connections. If mentioned, these meters shall have communication output for interfacing with DCS. Multifunctional Meter shall be provided in all ACB incomers and feeders.

Meter selector switches shall have four stay put position with adequate number of contacts for three phase 4-wire systems. These shall have oval handle. Ammeter selector switches shall have make before break type contacts to prevent open circuiting of CT secondary and shall be of through type.

The contact ratings shall be at least the following :

- i) Make and carry continuously 10A.
- ii) Breaking current at 220V DC 1A (Inductive).
- iii) Breaking current at 110V AC, 5A at 0.3 pf lagging.

AC Meters shall generally be rated for 1A secondary current and 110V secondary voltage.

4.15.0 Secondary Wiring

The PMCC / MCC shall be fully wired at the factory to ensure proper functioning of control, protection, transfer and interlocking schemes.

MCBs / Fuse and links shall be provided to permit individual circuit isolation from bus wires without disturbing other circuits. All spare contacts of relays, switches and other devices shall be wired up to terminal blocks.

Wiring shall be done with flexible, 650V grade, PVC insulated switchboard wires with stranded copper conductors of 2.5 Sq.mm for current carrying circuits and 1.5 Sq.mm for voltage & control circuits.

Each wire shall be ferruled by plastic tube with indelible ink print at both end having terminal block no, terminal numbers, destination no. as per approved wiring diagram.

Wire termination shall be made with crimping type connectors with insulating sleeves. Wire shall not be spliced between terminals. RYBN colour wires shall be used for CT & PT wiring.

4.16.0 Terminal Blocks

650V grade, multi way terminal block complete with mounting channel, binding screws and washers for wire connections and marking strip for circuit identification shall be provided for terminating the panel wiring. Terminals shall be stud type, suitable for terminating 2 nos. 2.5 mm² stranded copper conductor and provided with acrylic insulating cover. Terminals for C.T. secondary leads shall have provision for shorting and grounding.

Not more than two wires shall be connected to any terminal. Spare terminals equal in number to 20% active terminals shall be furnished. Separate terminal blocks shall be used for AC/ DC wiring termination.

Terminal blocks shall be located to allow easy access. Wiring shall be so arranged that individual wires of an external cable can be connected to consecutive terminals.

Terminal blocks used for interface with DCS via terminal cabinet shall be suitable sized to facilitate proper termination of interconnecting cables.

4.17.0 Cable Termination

All PMCC / MCC / DB shall be designed for cable entry from bottom unless otherwise specified in this specification. Sufficient space shall be provided for ease of termination and connection.

Power cables shall be XLPE insulated, PVC inner sheathed, armoured, PVC FRLS overall sheathed with stranded Copper / Aluminium conductor.

Control cables shall be PVC insulated, armoured, overall PVC sheathed with 2.5sqmm stranded copper conductor for DCS interface.

All provisions and accessories shall be furnished for termination and connection of cables, including removable gland plates, cable supports, crimp type tinned copper lugs, brass double compression glands with tapered washer (power cables only) and terminal blocks.

Gland plates shall be minimum 3 mm thick. The gland plate and supporting arrangement for single core power cables shall be of Aluminium. Sufficient space shall be provided between the power cable termination and gland plate.

4.18.0 Bus Duct Connection

Busduct connections, when specified on drawings / annexures shall be furnished alongwith transition panel, if required. Busduct connections shall be from the top /sidewall of the incomer panel of the PMCC / MCC.

All connecting bus work shall have the same continuous rating as associated PMCC/MCC bus and shall be fully braced for the listed short circuit current.

All provisions such as matching flange at both Transformer end & Switchgear end and other accessories required for proper connection to Busduct as shown in the drawings and mentioned elsewhere in the specification shall also be supplied

4.19.0 Ground Bus

A ground bus, made of copper, rated to carry maximum fault current, shall extend full length of the panel.

The ground bus shall be provided with two bolt drilling with cadmium coated bolts and nuts at each end to receive 50 x 6 mm GS flat. Necessary bi-metallic connectors (if required) shall be supplied.

Each stationary unit shall be connected directly to the ground bus. The frame of each circuit breaker and drawout VT unit shall be grounded through heavy multiple contacts at all times except when the primary disconnecting devices are separated by a safe distance.

Wherever the schematic diagrams indicate a definite ground, a single wire for each circuit thus grounded shall be run independently to the ground bus and connected thereto.

CT & VT secondary neutrals shall be earthed through removable links so that earth of one circuit may be removed without disturbing others.

All hinged doors shall be earthed through flexible copper braid.

4.20.0 Nameplates

Nameplates of approved design shall be furnished at each cubicle and at each instrument and device mounted on or inside the cubicle. The materials shall be lamicaid or approved equal, 3 mm thick with white letter on black background. The nameplate shall be held with self-tapping screws. Nameplate size shall be minimum 20 x 75 mm for instrument / devices and 40 x 150 mm for panels. Caution notice in English and Local language on suitable metal plate shall be affixed both at the front and back of each vertical panel.

4.21.0 Space Heaters and Plug Sockets

Each vertical section shall be provided with thermostat controlled space heater and 5A, 3-pin plug socket.

In addition, motor feeder (rated 37 KW and above) cubicle shall be wired-up for feeding the motor space heater through suitably rated breaker auxiliary NC contact and / or contactor.

Appropriate lighting equipment and fixtures rated for 230V AC shall be provided in each panel for adequate internal lighting of the panel.

Cubicle heater, motor heater, socket and lamp circuit shall be provided with individual DP MCB unit.

4.22.0 A.C./D.C. Power Supply for Control and Service

Panel and Motor Space Heaters shall be fed from separate AC auxiliary busbars running throughout the switchboard. All the panel and motor space heaters shall be fed from these busbars through single pole MCB and neutral link and / or as mentioned in the drawing.

Necessary 415V AC and 240V AC power supplies as required for control and service, shall be tapped from the incoming side of the PMCC / MCC.

Isolating switch fuse units/MCCB (AC circuit only) shall be provided at each PMCC for the incoming supplies, 4 pole, single throw for A.C and 2 pole, double throw for D.C.

Bus bars of adequate capacity shall be provided to distribute the incoming supplies to different cubicles. MCCB (AC circuit only)/Isolating switch-fuse units shall be provided at each cubicle for AC/DC supplies.

AC load shall be so distributed as to present balance loading on three-phase supply system.

Complete design of the control bus system as per requirement of the control voltages of the Main PMCC shall be developed by the bidder and submitted for approval.

4.23.0 Variable Frequency Drive (VFD)

Variable frequency drives shall be provided to control speed and voltage of the driven motor.

The VFD s shall be Heavy Duty Industrial type. The speed and voltage shall be programmable using application control programming tool.

VFD shall also provide soft start and soft stop control for motors. The VFD Control Panel / MCC Module shall be compact and shall include built in bypass contactor to eliminate heat dissipation during run.

If indicated in the Bill of Materials / SLD, the VFDs shall be mounted in separate standalone Panel units to be supplied in the package.

All control and indication should be provided on the Standalone Panel / MCC Module separately apart from the same controls provided in the VFD / Soft Starter itself so that the plant operator need not access the VFD/Soft Starter itself while operating the plant.

VFDs shall also be suitable for receiving commands from PLC / DCS and shall be capable for sending necessary indications / signals to PLC / DCS. The wiring necessary for PLC Control shall be wired up to the Standalone Panel terminal block.

In the MCC / standalone panel of VFD following controls shall be provided :

- i) Start Push Button; Stop Push Button with press to lock-key to release feature;
- ii) Full Speed / Half Speed two position selector switch;
- iii) Potentiometric smooth step less speed changing knob;

- iv) digital voltmeter; digital ammeter;
- v) digital motor speed (rpm) indicating meter;
- vi) Forward / Reverse motor rotation selector switch.

Apart from that one Local Start /Stop (lockable type) Push Button Station along with digital ammeter shall be supplied matching with the VFD Terminals to control the driven equipment from local.

4.24.0 Soft Starter

Soft Starter shall provide soft start and soft stop control for motors. The Soft Starter Control Panel / MCC Module shall be compact and shall include built in bypass contactor to eliminate heat dissipation during run.

The Soft Starters shall be Heavy Duty Industrial type. Soft Starter shall have the facility for forwarding – reversing control of bidirectional motors.

Soft Starters of rating 11KW and above shall be suitable for heavy duty loads with more inertia which require starting current up to 4.5 times full load current for around 30 seconds.

It shall have local start, stop, reset push buttons.

The starting features of the starter shall be : i) constant current and ii) constant ramp type.

The protection available in the starter shall be : i) Instantaneous over current, ii) bypass overload, iii) motor overload, iv) phase imbalance, v) wrong phase sequence, vi) excess start time, vi) supply fault, vi) shorted SCR.

Soft Starter shall also be suitable for receiving commands from PLC / DCS and shall be capable for sending necessary indications / signals to PLC / DCS. The wiring necessary for PLC Control shall be wired up to the Panel terminal block.

All control and indication should be provided on the Standalone Panel / MCC Module separately apart from the same controls provided in the Soft Starter itself so that the plant operator need not access the Soft Starter itself while operating the plant.

If indicated in the Bill of Materials / SLD, the VFDs shall be mounted in separate standalone Panel units to be supplied in the package.

In the MCC / standalone panel of Soft Starter following controls shall be provided :

- i) Start Push Button; Stop Push Button with press to lock-key to release feature;
- ii) digital voltmeter; digital ammeter;
- iii) digital motor speed (rpm) indicating meter;
- v) Forward / Reverse motor rotation selector switch.

Apart from that one Local Start /Stop (lockable type) Push Button Station along with digital ammeter shall be supplied matching with the Soft Starter Terminals to control the driven equipment from local.

4.25.0 On Load Change Over Switch

On Load change over switches shall be four pole; three position; advance neutral connection type; with 2NO + 2 NC auxiliary contacts.

4.26.0 Tropical Protection

All equipment, accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects & corrosion.

Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent the entrance of insects.

4.27.0 Painting

The panels shall be thoroughly cleaned by chemical agent (7- tank process) as required to produce a smooth clean surface free of scales, grease and rust. After cleaning, the surfaces shall be given a phosphate coating followed by 2 coats of high quality primer and stoved after each coat. The paint shall be carefully selected to withstand tropical heat, rain etc. The paint shall not scale off or crinkle or removed by abrasion due to normal handling. Sufficient quantity of touch up paint shall be furnished for application after installation at site.

4.28.0 Accessories

The following accessories shall be furnished along with the PMCC / MCC :

- i) Breaker lifting and handling truck (if required)
- ii) Device for slow opening and closing of breaker (if required)
- iii) Test cabinet with coupling cables for testing the breaker in drawout position (if required)
- iv) Breaker racking in/out handle (if required)
- v) Fuse puller

5.0.0 TESTS

All equipment shall be completely assembled, wired, adjusted and tested at the factory as per relevant standards.

5.1.0 ROUTINE TEST

The tests shall include but not necessarily limited to the following :

Operation under simulated service condition to ensure accuracy of wiring, correctness of scheme and proper function of the equipment. All wiring and current carrying part shall be given appropriate High Voltage Test. Primary currents and voltage shall be applied to all instrument transformers. Routine test shall be carried out on all equipment, such as circuit breakers, switches, fuses, meters etc.

5.2.0 TYPE TEST

The certificate of following tests on panels having similar design shall be furnished along with the offer :

Temperature rise Test
Short circuit Test

5.3.0 TEST WITNESS

All factory test shall be performed in presence of TPI agency / Owner's representatives, as desired by the Owner. The Contractor shall give at least fifteen (15) days advance notice of the date when tests are to be carried out.

5.4.0 Test Certificates

Certified reports of all the tests carried out at the works shall be furnished in three (3) copies for approval of the Owner. The equipment shall be dispatched from works only after receipt of Owner's written approval of the test reports.

Type test certificate of each equipment and bought out items, if so desired by the Owner, shall be furnished. Otherwise the equipment shall have to be type tested, free of charge, to prove the design.

6.0.0 Special Tools & Tackles

A set of special tools & tackles, which are necessary or convenient for erection, commissioning, maintenance and overhauling of the equipment shall be supplied without any extra cost.

The tools shall be shipped in separate containers, clearly marked with the name of the equipment for which they are intended.

7.0.0 Spares

The bidder shall submit a list of recommended spare parts for three (3) years satisfactory & trouble free operation.

8.0.0 Drawings, data & manuals

Drawings, Data & Manuals shall be submitted in triplicate with the bid and in quantities and procedures as specified in General Conditions of Contract and/or elsewhere in this specification for approval and subsequent distribution after the issue of Letter of Intent.

8.1.0 To be submitted with the Bid

1. Single Line Diagrams, GA/Schematic Drawings, Bill of Materials
2. Typical foundation plan
3. Typical breaker control schematic, motor control schematic

8.2.0 To be submitted for Approval & Distribution by the Contractor

- a) Outline dimensional drawing for the MCCs showing general arrangement, space requirements and busduct / cable entry points
- b) Cross-section with parts list
- c) Detailed Calculation for busbar sizing
- d) Foundation plan & loading
- e) Duly filled up technical data sheet
- f) Single line diagram & Control schematics
- g) Wiring diagrams
- h) Consolidated bill of materials
- i) Routine Test certificate

8.3.0 Instruction Manuals of Switchgear & Individual Equipment.

The manual shall clearly indicate the installation method, check-up and tests to be carried out before commissioning of the equipment.

The Bidder may note that the drawings, data and manuals listed herein, are minimum requirements only. The Bidder shall ensure that the other necessary write-ups, curves etc.

ANNEXURE-A

RATINGS & REQUIREMENTS

	(a)	PMCC / MCC / DBs		
5.10	General			
	Type		:	Metal-clad, fixed type
	Service		:	Indoor
	Enclosure		:	IP-42
5.11	System			
	Voltage		:	415 Volt \pm 10%
	Phase		:	3
	Frequency		:	50 Hz \pm 5 %
	Combined voltage & frequency Variation		:	10% absolute
	System		:	Solidly grounded
5.12	Rated Current at 40 Deg.C			
	Bus bar		:	As per Load List / SLD
	Circuit breaker		:	As per Load List / SLD
	Switches		:	As per Load List / SLD
5.13	Short Circuit Rating			
	Interrupting		:	35 KA
	Short Time for 1 Second		:	35 KA
1.5	Insulation Level		:	2.5 KV for 1 min.
1.6	A.C./D.C. Power Supply			
	Control Voltage for Circuit Breaker		:	110V, 1 Ø, 50 Hz \pm 5% A.C.
	Control Voltage for MCC Modules		:	240V, 1 Ø, 50 Hz \pm 5% A.C.
	Service Voltage		:	240V \pm 10%, 1 Ø, 50 Hz \pm 5% A.C.
2.0	CIRCUIT BREAKER (Motor spring charging type)			

2.1	Duty Cycle	:	0-3' -CO-3' -CO
2.0	Breaking Current		
	A.C. Symmetrical	:	50 KA
	A.C. Asymmetrical	:	50 KA
2.3	Making Current	:	2.1 x 36 KA Peak
2.4	Auxiliary Voltage		
	Closing	:	110V A.C. (85 - 110%)
	Tripping	:	110V A.C (70 - 110%)
3.0	Contractor Duty drives and AC4 for bi-directional and inching	:	Class III Category AC3 for unidirectional duty drives.
4.0	Switch Duty		
	Motor Feeder	:	AC23
	Other Feeder	:	AC22

ARTICLE – II SPECIFICATION OF INDUCTION MOTORS**1.0.0 MOTORS**

- 1.1.0 All drive motors required for the system shall be included under the scope of the Contractor as specified in the Scope Of Work.
- 1.2.0 Motors shall be suitable for the voltage ratings indicated in the Data Sheet and shall conform to the following Motors provided shall have adequate performance characteristics such as starting torque, pull out torque, etc. and rating for meeting the driving and starting duty of the driven equipment.
- 1.3.0 All Motors shall be **Energy Efficient Motors confirming to Eff Level 1 / IE 2 standards of IEEMA : 19-2000; IS 12615; IS-325; IS-1231, IS-1271, IEC 34.**
- 1.4.0 All motors shall be suitable for variable speed operation with speed controlled by VFD or, Soft Starter.
- 1.5.0 Unless otherwise specified in Data Sheet, all motors shall be squirrel cage induction type with insulation class F with temperature rise limited to Class B and totally enclosed Fan Cooled type.
- 1.6.0 Motors shall be provided with 240 V anti-condensation heaters, if so specified in data sheet and shall be wired upto separate terminal box with cable glands suitable for the cables sizes specified in Data Sheet.
- 1.7.0 Motors shall be provided with FLP type (if mentioned specifically in the Schedule of Work) terminal boxes (where in all six winding ends are brought), cable glands etc. suitable for the type and sizes of cables. In addition the motor shall have the largest terminal box possible in the frame size.
- 1.8.0 All motors are envisaged to be started on DOL unless otherwise specified in the Data Sheet.
- 1.9.0 All motors shall be suitable for number of starts specified in the Data Sheet.
- 1.10.0 Motor frame sizes shall be in accordance with IEC recommendations.
- 1.11.0 For unidirectional motors, the direction of rotation shall be clearly marked on the body of motor.
- 1.12.0 Motors shall have a starting time, which is less than hot locked rotor withstand time of motor by at least two seconds at the rated conditions of voltage and frequency specified with driven machine coupled.
- 1.13.0 Motors shall be suitable for starting at 80% of the rated voltage against torque speed characteristics of the driven equipment.
- 1.14.0 The terminal box of MV motors shall be capable of withstanding the calculated fault level in terms of the let through energy of combination starter unit at the place of installation.
- 1.15.0 An inedible warning inscription shall be provided on the motor to indicate that switching of anti-condensation heater supply shall also be ensured before carrying out any work on the motor.

MOTOR DATA SHEET

Sl. No.	MOTORS	SPECIFICATIONS
1.0	Motor Type (clause 1.1.0)	Foot mounted, Squirrel Cage induction motor (EFF-1/ IE2) type as per IS : 12615; Continuous duty (S1) type, TEFC type; Suitable for temperature class T4
2.0	KW range and voltage ratings of motors at 45 Deg C ambient (clause 1.2.0)	As specified in the Scope of Work / As required
	Motors of rating up to and including 149 kW	415 V \pm 10% ; 50 Hz \pm 5% ; 3 phase AC; 1450 rpm;
3.0	Class of Insulation (clause 1.5.0)	Class F with temperature rise limited to Class B
4.0	Degree of protection (clause 1.5.0)	TEFC type Enclosure confirming to protection IP 55.
6.0	Air Condensation Heaters (clause 1.6.0)	Required for motors of rating 37 kW & above
7.0	Method of starting (clause 1.8.0)	Direct On Line.
8.0	No. of starts (clause 1.9.0)	
	a) No. of consecutive cold starts	3
	b) No. of consecutive hot starts	2
	c) No. of equally spaced starts / hr.	4

TECHNICAL PARTICULARS OF MOTOR
(To be filled up and submitted by the selected Tenderer)

SI No.	MOTORS	TECHNICAL PARTICULARS
1.0	Make / Type of Motor	
2.0	Motor Rating	
3.0	Speed in RPM (Syn.)	
4.0	Frame Size	
5.0	Class of Insulation	
6.0	Enclosure, Degree of Protection & Type of cooling	
7.0	Direction of Rotation	
8.0	Full Load Current (Amps)	
9.0	Starting Current (%FLC)	
10.0	Slip (percentage) at Full Load	
11.0	Efficiency (%) and Power Factor	
	a) At Full Load b) At $\frac{3}{4}$ Load c) At $\frac{1}{2}$ Load	
12.0	Locked rotor withstand time	
	a) Hot (seconds) b) Cold (seconds)	
13.0	Starting Time of Motor on DOL with driven equipment coupled	
	a) At 100% Voltage b) At 80% Voltage	
14.0	Minimum Voltage required for starting with the equipment and corresponding starting time	
15.0	Allowable no. of starts with driven equipment coupled	
	a) consecutive cold starts b) consecutive hot starts c) equally spaced starts /hr	
16.0	Guaranteed Temperature rise under worst conditions of voltage and frequency	
17.0	Speed vs. Torque curve	
18.0	Current vs. Time curve	
19.0	Current vs. Speed curve	
20.0	Thermal withstand characteristics (hot and cold)	
21.0	Start withstand time	
	a) Hot (seconds) b) Cold (seconds)	
22.0	Margin between starting time and locked Rotor withstand time hot	
23.0	CMRS certificate (for Flame Proof Motors)	
24.0	Bearings	
	a) Drive end bearing No. & type b) Non-drive end bearing no. & type c) Make of bearings	
25.0	Lubricant	
	a) Make b) Type c) Lubrication Schedule of Motor	
26.0	Weight of Motor	

SPECIFICATION FOR CABLES

1.0.0 GENERAL REQUIREMENT

The cables will be used for connection of power, control and instrumentation circuits of the auxiliary electrical systems.

Cables are to be suitable for transmission of signals and measuring values, which require protection against disturbances caused by stray fields.

Cables will be generally laid in ladder type trays or, drawn through rigid steel conduits. For interplant connection cables may be directly buried in ground

The insulation and sheath materials shall be resistant to oil, acid and alkali and shall be tough enough to withstand mechanical stresses during handling.

For continuous operation at specified rating, maximum conductor temperature shall be limited to permissible value as per relevant standard and / or this specification.

The outer sheath have flame retardant low smoke (FRLS) characteristics shall meet the requirements of additional tests specified for that purpose.

Armouring shall be single round wire of galvanised steel for multi core cables and aluminium for single core cables.

Core identification for multicore cables shall be provided by colour coding.

Multicore control cables shall generally have commissioning spare cores in accordance with the following chart when used for control and indication, interlock and annunciation purpose:

<u>Conductors Required</u>	<u>Cables</u>
1 or 2	1-3/C
3 or 4	1-5/C
5 or 6	1-7/C
7 or 8	1-9/C
9 or 10	1-12/C
11, 12 or 13	1-16/C
14 to 18	1-20/C
Above 19 core	2 or more of above cables

The spare cores of control cables shall be earthed.

2.0.0 SPECIFIC REQUIREMENT

2.1.0 HV Power Cable

The HV Power cable shall be designed, manufactured and tested in accordance with IS: 7098, IS: 8130, IS: 5831, IS: 3975. The cable shall be 11 KV (E) grade, 90 Deg.C rating heavy duty XLPE power cable.

Conductor : Stranded and compacted electrical conductor grade. Aluminium of grade H2 and class 2 for all sizes.

Insulation : Extruded cross-linked polyethylene.

Core Identification : By coloured strips applied on cores or by numbers.

Inner Sheath: PVC Taping conforming to type ST2 for three core cables. Single core cables shall have no inner sheath.

Armour : Galvanised single round steel wire / strip armour for three core cables. Non-magnetic hard-drawn aluminium single round wire conforming to H4 grade for single core cable.

Overall sheath: Extruded PVC compound conforming to ST2.

2.2.0 LV Power Cable

The LT Power cable shall be designed, manufactured and tested in accordance with IS: 7098, IS: 8130, IS: 5831, IS: 3975. The cable shall be 1.1KV grade, 90 Deg.C rating heavy duty XLPE power cable.

Conductor : Stranded and compacted electrical conductor grade. Aluminium of grade H2 and class 2 for all sizes.

Insulation : Extruded cross-linked polyethylene.

Core Identification : By coloured strips applied on cores or by numbers.

Inner Sheath: PVC Taping conforming to type ST2 for three core cables. Single core cables shall have no inner sheath.

Armour : Galvanised single round steel wire / strip armour for three core cables. Non-magnetic hard-drawn aluminium single round wire conforming to H4 grade for single core cable.

Overall sheath: Extruded PVC compound conforming to ST2.

2.3.0 LV Control Cable

The LT control cable shall be designed, manufactured and tested in accordance with IS: 1554, IS: 8130, IS: 5831, IS: 3975. The cable shall be 1100 V grade, 70 Deg.C rating ordinary PVC control cable.

Conductor : Stranded, non-compacted and circular, class 2 high conductivity untinned annealed copper.

Insulation : Extruded PVC Compound conforming to type A.

Inner Sheath: PVC Taping conforming to type ST1 for three core cables. Single core cables shall have no inner sheath.

Armour : Galvanised single round steel wire armour for three core cables. Non-magnetic hard-drawn aluminium single round wire conforming to H4 grade for single core cable.

Overall sheath: Extruded PVC compound conforming to ST1.

2.4.0 Drum Length & Tolerance

Where cables are supplied in wooden drums, each containing minimum 500 meters length of cable, the allowable tolerance on individual drum length is $\pm 5\%$ & allowable tolerance of $\pm 2.5\%$ on overall length of single size and type. Owner may accept non-standard lengths at his own discretion.

2.5.0 Cable Identification

Cable identification shall be provided by embossing on the outer sheath the following:

- j) Manufacturer's name or trademark
- ii) Voltage grade
- iii) Year of manufacture
- iv) Type of insulation, e.g. HR85 for HRPVC etc.
- v) Type of outer sheath e.g. FRLS etc.
- vi) ISI mark
- vii) Owner's identification e.g. IOCL etc.

2.6.0 Guarantee

- i) The supplier shall guarantee for smooth and trouble free operation of all cables at rated capacity for eighteen (18) months from the date of supply or twelve (12) months from date of commissioning, whichever is earlier.
- ii) In the event of any failure or sub-standard performance, the supplier shall take immediate action to replace the defective cables at the purchaser's premises at free of cost.

3.0.0 TESTS

a) Types Tests

Type test certificates for type tests, as stipulated in Indian Standard carried out on cable of identical type and rating shall be furnished by the Tenderer along with his offer.

b) Shop Tests

The cables shall be subject to shop tests in accordance with relevant standards to prove the design and general qualities of the cables as below:-

- i) Routine test on each drum of cables.
- ii) Acceptance tests on drums chosen at random for acceptance of the lot.
- lii) Type tests on each type of cable, inclusive of measurement of armour D.C. resistance of power cables.

c) Additional Tests

To prove the FRLS characteristics for FRLS cables, each type of cable shall also be subject to the following additional type tests at works:-

- i) Oxygen index test as per ASTM D 2863. Minimum value of oxygen index shall be 30.
- ii) Flammability tests on finished cable as per requirement of IEEE-383, IEC 332-3, Category-C and Swedish standard SS 4241475 clause F3.

- iii) Smoke generation by outer sheath under fire as per ASTM D 2843. The cable shall meet the requirement of light transmission of minimum 40% after the test. The minimum value of temperature index shall be 250 Deg.C.
- iv) Acid gas generation by outer sheath under fire as per IEC-754-1 and the maximum acid gas generation shall be less than 20% by weight.

d) Test Witness

Tests shall be witnessed jointly by Owner's and Contractor's representatives at the manufacturer's premises. The Contractor shall give at least thirty (30) days advance notice of the test when the tests are to be carried out.

e) Test Certificates

Certified reports of all the tests carried out at the works shall be furnished in three (3) copies for approval of Owner.

Test reports shall be completed with all details and shall also contain IS specified limit values, wherever applicable, to facilitate review.

The cables shall be dispatched from works only after receipt of Owner's written approval of the test reports.

4.0.0 DRAWINGS, DATA AND MANUALS

Drawings, Data and Manuals shall be submitted in triplicate with the bid and in quantities and procedures as specified in General Conditions of Contract and/or elsewhere in this specification for approval and subsequent distribution after the issue of Letter of Intent.

a) To be submitted with the Bid :

- i) Manufacturer's catalogs giving cable construction details and characteristics.
- ii) Cable current ratings for different types of installation, inclusive of derating factors for ambient temperature, grouping, etc.
- iii) Write-up on Manufacturer's recommended method of splicing, jointing, termination, etc. of the cables.
- iv) Type test report on H.V. power cable.
- v) Technical data sheet of cables

b) To be furnished for approval and distribution :

- i) Confirmed cable data.
- ii) Type test certificates.
- iii) Shop test reports.

SPECIFICATION FOR ELECTRICAL ERECTION**1.0.0 SCOPE OF WORK****1.1.0 Scope of Supply**

The work involves timely procurement and transportation to site in properly packed condition of all materials and miscellaneous items required to complete the erection work. The quantum of each item shall be as indicated elsewhere in this document.

These materials and miscellaneous items shall include but will not be limited to the followings:

Pre fabricated cable trays and supports painted with two coats of primer followed by two coats of epoxy-based paints of approved shade. However, steel section shall supplied by the Owner.

Galvanised steel rigid/flexible conduits and accessories, ferrules, lugs, glands, terminal blocks, galvanised sheet steel / Aluminium junction boxes, cubicle fixing clamps, nuts & bolts etc. as required.

Cable termination and jointing kits as necessary.

GI wires and galvanised steel flats as required for grounding.

Fire seals for cable penetration and fire retardant coating.

The scope of supply shall include but will not be limited to all necessary erection materials, consumables and sundry items to complete the installation for satisfactory and trouble free operation. Any material or, accessory, which may not have been specifically mentioned but which is usual and / or necessary shall be supplied free of cost to the Purchaser.

All materials and accessories to be supplied by the Bidder shall be brand new ones of reputed make.

Data sheets and Technical leaflets on each piece of material.

1.2.0 Scope of Services

The work includes but is not limited to the followings :

1.2.1 Supply of all labour (skilled, semi-skilled and unskilled), supervisory and administrative personnel, all erection tools including crane, trailer, trucks, filter machine, vacuum pump, welding machine, testing equipment as mentioned elsewhere in this specification etc.

1.2.2 Broadly the work shall include receipt and unloading from transporters vehicle, storage and safe custody at the Contractor/Owner's store, transportation from Contractor/Owner's store to erection site, unpacking and carrying out inspection, erection as per drawings/Owner's instructions, providing assistance to the Owner for testing and commissioning of all electrical equipment and accessories related to the plant.

1.2.3 The items of cabling and grounding work shall be performed with respect to the following equipment/materials.

Power, Control, instrument and special cables to be laid on cable trays/laid directly buried in ground/laid in embedded conduits as per the respective cable tray layout drawings and cable schedule.

Entire cable tray and cable shaft arrangements inside and outside Plant.

Supply, erection and painting of cable trays, cable shaft, supports, brackets and accessories.

Excavation of earth, providing sand both below and above cables, placing protective concrete slabs, back filling, compaction, providing cable route markers and joint markers, removal of excess earth to a location allocated by owner and pumping out of accumulated water within excavation.

For fixing of cable tray in concrete, insert plates will be provided in most of the places. In the event of non-availability of insert plates. The same shall be fabricated and fixed to concrete by "HILTE" gun by the Contractor for further fixing and rouging of cable trays.

Grounding of all equipment, cable tray and cabling system to be installed by Contractor.

Filling of sand in trenches in specified areas shown in the drawing.

Providing assistance to the Owner while Testing & Commissioning of H.T./L.T. Motors installed by others (at the option of the Owner).

1.2.4 The Bidder shall also carry out the following services which shall include but will not be limited to :

- a) Receipt and unloading the equipment/cable from transporters vehicle.
- b) Storage and safe custody of equipment at the Contractor/Owner's store or, under protective custody of the Contractor with all weather protection and requisite watch at the erection site.
- c) Safe transportation of the equipment and materials from Contractor/Owner's store up to the site of erection and of the excess materials back to the Owner's store.
- d) Opening of Packing Cases and inspecting the equipment and materials at site and reporting damages, if any observed immediately after opening, to the Owner.
- e) Proper storing arrangement at Plant Site with suitable enclosure for weather protection.
- f) Repair of all minor damages such as removal of paint, loosening of components of the assembly etc.
- g) Taking delivery of cables and other materials from the Owner's stores (if any) and safe transportation up to the place of erection.
- h) Reconciliation of cables and other free issue items whenever desired by the Owner.
- i) Returning to Owner's stores unused material after final reconciliation on completion of the job.
- j) Dewatering of cable trenches and excavations for laying of buried cables.
- k) Installations of temporary light for installation and commissioning of equipment.
- l) Assemblies, Erection and complete Installation.
- m) Checking of foundation/inserts with reference to the erection drawings and their rectification. If necessary.
- n) Necessary co-ordination between work done by other contractors(if any).
- o) Final check-up, testing and commissioning in presence of Owner's representative.

- p) Obtaining approval of electrical inspector.
- q) Trial run for seven (7) days, rectification of defects, if any and adjustments as necessary.
- r) Re rolling of cables on new drums if so required by the Engineer.
- s) Obtaining Engineer's approval and Owner's written acceptance of satisfactory performance.
- t) Handing over of installation for commercial operations.
- u) If the contractor fails to carry out any of the above-mentioned work within the due time, the owner will have full liberty to get the work carried out by any other agency and the actual cost will be deducted from the contractor.

1.2.5 Field modification carried out shall be marked-up in red on one (1) set of erection drawings.

1.2.6 Submission of "AS BUILT" drawings in three hard copies and two soft copy in CD. Drawings should be done using AUTOCAD 2004.

1.3.0 Key Information

The Contractor shall be given reasonable space (Open land) depending upon the availability of same for Storage/Fabrication within 0.5KM of the site to construct stores, shed etc. A small place for office may be given to him at site for office work subject to availability of Space. The Contractor shall have to construct his own office building/storage shed.

The Contractor should mobilise the resources at site considering the project schedule after considering the period required by him for establishing site office, shed etc. so as to enable him to start the work accordingly.

The Contractor should also plan to erect trays, supports, cable laying etc. to commission the plant as per project schedule.

The date of handing-over to the Purchaser shall be considered as the date of completion of all work at site duly certified by the Purchaser and the date on which the Contractor vacates the site after clearing all the temporary installations done by him for the execution of contract.

The Contractor shall have to re-arrange from time to time the schedule of work if needed so as to give priorities to work as informed by the Purchaser in the interest of the whole project.

2.0.0 GENERAL REQUIREMENTS

Codes and Standards

All equipment and materials shall be designed, manufactured and tested in accordance with the latest applicable Indian Standards (IS) except where modified and/or supplemented by this specification.

Equipment and materials conforming to any other standard which ensures equal or better quality may be accepted. In such case, copies of the English version of the standard adopted shall be submitted along with the bid.

The electrical installation shall meet the requirements of Indian Electricity Rules as amended upto date and relevant IS Codes of Practice. In addition, other rules or regulations applicable to the work shall be followed. In case of any discrepancy, the more restrictive rule shall be binding.

3.0.0 DESIGN CRITERIA

Electrical equipment will be used for power supply for both normal and emergency operation of generating unit.

As such all erection work of those equipment shall be carried out in a neat and efficient way so as not to impair their normal functioning in any way.

The pre-commissioning checks as well as commissioning of different equipment shall be carried out as per guidance of actual manufacturer's supervisor, if available at site or as per written instructions in Erection manuals. In case of any site related problem in commissioning activities, contractor shall seek advice of owner's Engineers.

Erection of cabling work shall be carried out in such a way as to provide a reliable and assured electric power supply system to all electrical loads.

Erection of grounding system similarly shall ensure an effective and efficient system for quick dissipation of short circuit current to grounding system in case of faults in H.V./L.V. systems thereby ensuring personnel safety and reducing risk of damages to important equipment.

Entire erection of grounding work shall be carried out in such a way as to be capable of withstanding the intended services of carrying full short circuit level currents to ground mat without any damage/deformation.

Erection of cabling work shall be executed keeping in view all necessities and requirements of fire fighting codes for the Plant.

Suitable embedded steel inserts shall be kept on wall/floor/ceiling surfaces for welding of cable tray brackets. The Contractor shall carefully examine those inserts and if necessary shall provide extra anchoring in order to make the cable tray system withstand horizontal/vertical accelerations due to seismic forces for indoor trays and also wind load for outdoor trays in addition to normal cable loadings of the trays.

The assistance to testing and commissioning of HV/LV motors shall be provided as per the directives of the Motor Manufacturer.

4.0.0 SPECIFIC REQUIREMENT - SUPPLY

Equipment and materials furnished shall be complete and operative in all details.

Equipment and material shall comply with description, rating, type and size as detailed in this specification, drawings and annexure.

All accessories, fittings, supports, anchor bolts etc. which form part of the equipment or which are necessary for safe and satisfactory installation and operation of the equipment shall be furnished.

After the treatment of steel surface damaged during transit, sufficient quantity of anti-corrosive paint shall be applied and subsequently finished with two coats of final paint of approved shade.

Cable Trays & Cable Tray Supports

Cable trays shall be pre fabricated in line with drawings / technical details enclosed with this specification.

Fabricated trays and supports shall be free from all burrs and sharp cutting edges. Trays and supports shall be made free of scale, grease, rust and welding slags. Supports shall be provided with two coats high quality primer and two coats of epoxy based paint.

Conduits and Accessories

Conduits shall be of rigid steel, hot-dip galvanised, furnished in standard length of 3 metres and threaded at both ends.

Conduit diameter up to and including 25mm size shall be of 16 SWG and conduits above 25 mm diameter shall be of 14 SWG. Minimum diameter of conduits shall be 19mm.

Each price of conduit shall be straight, free from blister and other defects, internal surface shall be of smooth finish and covered with capped bushings at both ends.

Flexible conduits shall be made with bright, cold rolled, annealed and electro-galvanised mild steel strips coated internally with epoxy or steel wire reinforced PVC.

Junction Boxes

Junction boxes shall be of 16 SWG sheet or of cast iron and shall be hot dip galvanised, out-door type, dust and damp proof, generally conforming to IP-55.

Junction boxes shall be complete with gasketed inspection cover, conduit knock out/threaded hub and terminal blocks.

Junction boxes for outdoor use shall be weather proof IPW-55 and those for hazardous locations shall be flame-proof type.

Junction boxes shall be of two types viz one suitable for control wiring and the other with terminals for power cable terminations. Junction boxes for power cable terminations shall have minimum nine (9) nos. of terminals.

The junction boxes shall have the following identifiable markings :

1. Circuit nos. on top by white stenciled paint at site.
2. Circuit nos. with ferrules (inside) as per approved drawings.
3. Danger sign in case of 415 V circuit.

Terminals

Multi way terminal blocks of approved type, complete with screws, nuts, washers and marking strips shall be furnished for connection of incoming/outgoing wires.

Each control cable terminal shall be suitable for connection of 2 nos. 2.5 sq. mm. stranded copper conductors without any damage to the conductor or looseness of conductors.

Cable Termination & Jointing Kits

The Bidder shall supply cable termination and jointing kits for HV. Power Cables, L.V. Power and Control Cables along with all accessories (if necessary).

The cable termination kits of HV. cable and straight through joints including necessary boxes, if any, shall be preferably of RAYCHEM make using either heat shrinkable/prefab push-fit type kits. Cable end

terminations on H.V. Electrical equipment shall be suitable for Indoor & Outdoor uses, as the case may be.

The Bidder, in some cases, may have to carry out modification work/provide extension chamber for Motor cable end boxes in order to make them suitable for termination of cable with termination kit being supplied under this specification. The Contractor shall carry out the necessary modification work with the approval of Engineer at site.

For the cable termination and straight through joints for both L.V. Power and control cables, supply of items of jointing kit such as necessary boxes, if any, sealing compounds, ferrules, tapes, lugs, glands shall preferably of reputable make such as Raychem/M-Seal/3 M or equal.

Supply of straight through ferrules shall be included in the supply of straight through jointing kits for both HV and LV cables.

Cable Glands

Cable glands shall preferably be tinned brass gland, double compression type complete with necessary armour clamp and tapered washer etc. Cable glands shall match with the sizes of different HV/LV Control cables.

Cable Lugs

Cable lugs and straight through ferrules shall preferably be tinned copper/aluminum suitable for termination of different cross-sections of HV/LV/Control cables. Lugs for power cables shall be compression type whereas lugs for Control/Instrumentation/Signaling cables shall be crimping type. Supply of lugs for end termination of control cables shall be included in the end termination charges.

Cable Opening Sealing Compound

Sealing compound shall have adequate fire protection rating and shall be fire seal type or approved equivalent suitable for sealing both vertical & horizontal cable penetrations. The sealing compound in conjunction with mineral wool shall form effective fire seals and thickness of coating shall be at least 2 mm. The sealing compound shall have special property to allow for thermal expansion of cables both under normal and short circuit conditions.

Cable Clamps

Cable clamps fabricated out of 25mm x 3mm aluminum strips sheathed in PVC or preferably self locking type cable clamps/ties of nylon/FRP material of requisite lengths shall be used for clamping of multi core control cable and multi core HV/LV power cables.

Trefoil cable clamps (Nylon/FRP) suitable for single core HV/LV cables of size 630/500/185 Sq. mm. shall be used for clamping in trefoil formation at intervals of 1500 mm for horizontal tray and 900 mm for vertical tray. Necessary cable clamping hardware shall also be supplied for fixing the same to the cable trays.

Grounding Wires and Galvanised Steel Flats

Specified quantity of 8 SWG GF ground wire and galvanised steel flats shall be supplied.

5.0.0 SPECIFIC REQUIREMENTS - SERVICES

5.1.0 Responsibility of Erection

The Contractor shall be fully and finally responsible for proper erection, safe and satisfactory operation of plant and equipment under his scope of work to the entire satisfaction of the Engineer.

The work shall be executed in accordance with the directions, instructions, drawings and specifications which shall be supplied to the Contractor by the Engineer from time to time.

If in the opinion of the Contractor any work is insufficiently specified or require modification, the Contractor shall refer the same in writing to the Engineer and obtain his instruction/approval before proceeding with the work.

If the Contractor fails to refer such instances, any excuse for the faulty erection, poor workmanship or delay in completion shall not be entertained.

Equipment and material which are wrongly installed shall be remolded an re-installed to comply with the design requirement at the Contractor's expense, to the satisfaction of the Engineer.

5.2.0 Supervision

The Engineer shall have the overall responsibility for coordination of Contractor's work and his direction shall be final.

Such direction and supervision however shall not relieve the Contractor of his responsibility of correctness and quality of workmanship and of other obligation under the contract.

5.3.0 Drawings

Drawings and schedules enclosed with this specification are for general guidance of the Bidder to assess the type and volume of work involved.

These drawings and schedules will be revised to suit the actual requirement in related systems. Additional drawings and schedules will also be furnished to Contractor if/when necessary.

Such revisions, corrections, additions to drawings and schedules shall not be considered to change the scope of work.

The Contractor shall mark in red on one (1) set of drawings all deviations/alterations, not shown on drawings but carried out at field. After completion of work the Contractor shall furnish a set of "As Built" drawings to the Owner as specified elsewhere.

5.4.0 Methods and Workmanship

All work shall be installed in a first class, near workmanlike manner by mechanics / electricians skilled in the trade involved. The Erection work shall be supervised by competent supervisors holding relevant supervisory license for the Government. All details on installation shall be electrically and mechanically correct.

The installation shall be carried out in such a manner as to preserve access to other equipment installed.

5.5.0 Protection of Work

The Contractor shall effectively protect his work, equipment and materials under his custody from theft, damage or tampering.

Finished work where required shall be suitably covered to keep it clean and free from defacement or injury.

For protection of his work Contractor shall provide fencing and lighting arrangement, connect up space heaters and provide heating arrangement as necessary or directed by the Engineer.

Contractor shall be held responsible for any loss or damage to equipment and material issued to him until the same is taken over by the Owner according to contract. The Contractor shall have to make good all losses/damages to material when in the contractor's custody until taken over formally by the Owner.

The Contractor shall insure all his workmen against accidental injury/death. The contractor shall also take out insurance policies which would cover the risk of losses/damage of his tools and tackles and Owner's material/equipment while in his custody.

5.6.0 Safety Measures

All safety rules and codes as, applicable to work shall be followed without exception.

All safety appliance and protective devices including belts, hand gloves, aprons, helmets, shields, goggles etc. shall be provided by the Contractor for his personnel.

The Contractor shall provide guards and prominently display caution notices if access to any equipment/area is considered unsafe and hazardous.

5.7.0 Consumables and Hardware

The Contractor shall furnish all erection materials, hardware and consumables required to complete the installation. The materials shall include but will not be limited to the following :

- a) Consumables : Welding rods & gas, oil and grease, anti-oxide grease, cleaning fluids, paints, electrical tape, soldering materials etc.
- b) Hardware : Bolts, nuts, washers, screws, brackets, supports, clamps, hangers, saddles, cleats, sills, shims etc.

Supply of cement, sand, stone etc, required for the execution of the contract shall be the responsibility of the Contractor.

5.8.0 Erection Tools and Tackle

The Contractor shall provide all tools, tackle, implements, mobile equipment such as crane, trailers, scaffoldings, ladders, etc. which are required for transportation, handling and erection of the plant and equipment.

Special erection tools, if any, furnished by the manufacturer along with the equipment may be used by the Contractor. Such tools shall be returned in good conditions to the Owner on completion of work.

Owner's tools and equipment may be made available on payment of charges if and when available. The contractor should be prepared to make his own arrangement for crane.

5.9.0 Testing Equipment

- a) Power operated Megger of 5,000 V and 1,000 V grade for Insulation testing.

- b) Hand operated megger of 1,000 V grade for Insulation testing.
- c) Hand driven earth resistance Megger of range 0-1/3/30 ohms.
- d) Tong testers of suitable ranges.
- e) High potential test set suitable for 660V and 400V systems.
- f) Contact Resistance measuring set for Micro-ohms.
- g) Torque Wrench.
- h) Current Transformer Primary injection set.
- i) Relay testing and checking bench.
- j) Multimeter, test lamp, buzzer, spirit level, db-meter, different gauges etc.

Other testing equipment as required will be arranged by the Owner. Alternatively, the contractor may be asked to provide the same at a mutually agreed rate.

Installation

Installation work shall be carried out in accordance with good engineering practices and also manufacturer's instructions/recommendations where the same are available.

Equipment shall be installed in a neat workmanlike manner so that it is level, plumb, square and properly aligned and oriented.

Equipment will be furnished in a dis-assembled condition as received at site. The contractor shall assemble all these parts, mount and wire-up loose equipment, fittings and accessories and complete with all connections.

Equipment will be generally supplied with necessary floor/support steel, holding down bolts, nuts anchors etc. In case of non-supply of these items with the equipment, following procedure shall be followed :

Arrange for floor/support steel as necessary and fabricate and install them.

Contractor shall furnish and install all bolts, nuts, screws and anchors as required to complete the installation.

Any internal wiring of the equipment which has been left incomplete because of shipping split or which requires minor modifications shall be carried out by the Contractor.

5.10.0 Motor Testing and Commissioning

Motors shall be erected by the Mechanical Erection Contractor. The Electrical Contractor shall generally test and commission the motors. The insulation of the motors shall be tested by 500/1000 V megger and a value of 1 M-ohm shall be considered satisfactory. If the IR value is less, drying up of winding shall be carried out by placing heater/ lamps around and inside the case of the motor. The mechanical and electrical check shall be done as per relevant Indian Standard. Motors shall be started after de-coupling from the equipment. No load current, starting current shall be recorded and IR value shall be

noted after motor has run for 4 hours. After no-load run checking of performance of motor and direction of rotation, the motor shall be coupled to load and shall be run on no load.

5.11.0 LV Switchgear, Control Panels, MCCs, Distribution Boards, VFDs, Soft Starters

Switchgear, Control Panels, motor control centers, distribution boards, etc, will be split up in sections for ease of transportation and handling. All breakers, busbars, relays, meters and control switches will be supplied loose to be mounted and connected at site as per the relevant drawings which shall be supplied to the Contractor for necessary mounting, wiring and connection work at site.

All alignment, leveling, grouting, anchoring, tack welding, adjustments and oil conditioning shall be carried out in accordance with manufacturer's instructions and/or as directed by the Engineer.

All connections in the switchgear, control boards, distribution boards, etc. shall be completed, checked and adjusted to ensure safety and satisfactory operation of the equipment.

In some cases, some modifications may have to be carried out at site in the wiring of a equipment to meet the requirements of the desired control scheme and the contractor shall have to do same at no extra cost.

5.12.0 Cable installation work shall consist of

- a) For laying on trays/racks and vertical cable shafts :
 - i) Erection of cable trays/racks, supports, hangers.
 - ii) Laying of cables, dressing, clamping and fixing of cable tags including supply of tags.
- b) For laying in ground :
 - i) Excavation of earth upto 1000 mm for power & control cable and 600 mm for lighting cable only.
 - ii) Providing riddle earth of 150 mm depth.
 - iii) Laying of cables, fixing of cable tags, dressing of cables, covering with 150 mm of riddle earth and placing protective concrete slab/tiles to be provided by the owner.
 - iv) Back filling of earth, compaction and removal of excess earth, installation of cable route and joint markers.
 - v) The cable route marker shall be placed at a distance of 30 mtrs. in case of straight run and at every bend of cable route.
 - vi) The supply of cable tags, route and joint markers as well as pumping out of accumulated water within excavation are included in scope of the Contractor.
- c) For laying in conduit/GI pipes/hume pipes :
 - i) Installation of conduits/pipes with accessories wherever required.
 - ii) Laying of cables in conduit/pipes, fixing of conduit tags including supply of tags.
- d) For laying on surface :

- i) Laying of cables on surface of walls/beams/soffit/structures including supply of saddles, cleats, cable tags as required to complete the erection.
 - ii) Fixing of lugs including crimping.
 - iii) Termination and connection using termination kits wherever required including splicing, soldering, taping, compound filling, putting ferrules etc. as required for the complete job including supply of consumable materials such as ferrules, soldering materials, electrical tape, compound/resin etc.
- e) Straight through cable jointing inclusive of supply of consumables as required.
- f) Fire sealing of openings and anti fire propagation compound coating.
- g) Filling of sand in trenches in specified areas shown in the drawing.
- h) In licensed area all lugs shall be flameproof type.

5.13.0 Cable Trays

The Contractor shall supply and install all prefabricated cable trays, racks, risers, shafts and supports.

Overhead cable trays in outdoor areas, cable trays either inside concrete trenches or inside buildings and racks inside cable shafts shall be aligned and leveled properly. All tray runs shall be installed parallel to the trench/building walls and floors except otherwise noted in the drawings.

Embedded steel inserts in wall/floor/ceiling surfaces shall be provided. The Contractor shall have to secure rack/tray supports by welding to those inserts or other available building steel surface. Outdoor trays shall be installed by welding on the steel/concrete structures with inserts.

In case of non-availability of embedded steel inserts in certain tray routes, the Contractor shall have to secure the supports on wall/floor/ceiling surfaces by suitable anchoring system having adequate load bearing capability.

As far as practicable, cable trays shall be supported from one side only in order to facilitate installation and maintenance of cables from the other side.

The cable trays shall be supported in general at a span of 1.5 metres horizontally and at a distance of 1.0 meter vertically.

Sufficient spacing of not less than 250 mm shall be provided between trays and maintained to permit adequate access, for installing and maintaining the cables.

5.14.0 Cable and Conduits

The Contractor shall install, terminate and connect up all cable and conduits as per drawings and cable schedules.

The drawings shall be strictly followed except where obvious interference occurs. In such cases, the routing shall be changed as directed and/or approved by the Engineer.

Approximate lengths of cable and conduit will be given in the cable schedule for guidance only. Before commencement of work the Contractor shall take actual measurements and prepare his own cable cutting schedule to reduce wastage to a minimum. The cable cutting schedule will have to be approved by the Engineer.

The Contractor shall also maintain and submit when requested, a record of cable insulation value when from store, after laying, before and after termination / jointing.

5.15.0 Conduit and Accessories

Conduit/pipes shall be used only in short lengths in certain areas where required and/or as directed by the Engineer.

The Contractor shall furnish all conduits complete with accessories as required such as tees, bends, adapters, locknut, bush, pull boxes, straps, brackets etc.

Exposed conduits shall be run in straight lines parallel to column, wall or beam and supported at a distance not exceeding 500mm.

Embedded conduits shall be coated with an asphalt base compound to be supplied by contractor and anchored securely in position to preclude movement.

Conduits shall be installed in such a manner as to avoid unnecessary bending and crossing and also entrapment of moisture.

Conduit connection to general purpose enclosure shall be made with double lock nuts and bushing. Conduit connection to equipment where movement may occur or which may be disconnected for servicing shall be made with flexible conduit.

Conduit ends shall be plugged or capped at all times during erection so as to prevent entry of foreign materials.

Conduit and duct runs shall be thoroughly cleaned before pulling in the cables.

Except for inside an enclosure wherever the cable enters or leaves the conduit, the conduit end shall be sealed by suitable sealing compound, having fire withstand capability.

5.16.0 Cable - Storage and Handling

Cable drums shall be stored on hard and well drained surface so that they may not sink. In so case shall the drum be stored on the flat, i.e., with flange horizontal.

Rolling of drums shall be avoided as far as practicable, for short distance, the drums may be rolled provided they are rolled slowly and in proper direction as marked on the drum.

In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cable.

For unreeling the cable, the drum shall be mounted on jacks or on cable wheel. The spindle shall be strong enough to carry the weight without bending.

The drum shall be rolled on the spindle slowly so that the cable should come out over the drum and not below the drum.

While laying cable, cable rollers shall be used at an interval of 200 m. The cables shall be pushed over the roller by a gang of people positioned in between rollers over a suitable distance.

Cable shall not be pulled from the end without having intermediate pushing arrangement. Bending radius of the cable during installation shall not be less than what is specified by the manufacturer.

Where cables are cut from the drums the ends of the cables at the drums shall be properly sealed. Whenever necessary the cable shall be re-rolled on drums as advised by Engineer of Owner. Cost of the same are deemed to be included in the quoted rates. Unused/empty drums are to be returned to the owner in good condition.

5.17.0 Cable Laying

Cable shall generally be installed in ladder type site fabricated trays except for some short run in rigid/flexible conduit for protection or crossings.

Cables laid on trays and risers shall be neatly dressed and clamped at an interval of 1500mm and 900 mm for horizontal and vertical cable runs.

Clamps for multi core cables shall be fabricated out of 25 x 3 mm PVC sheathed aluminum flats. All power cables shall be clamped individually and control cables shall be clamped in groups of three or four cables.

All single core power cables shall be laid in tri-foil formation and suitably clamped with nylon/fiber glass molded pieces of appropriate quality and sizes.

Prior to laying of cables inside both indoor and outdoor trenches, the Contractor shall properly clean inside those trenches.

In outdoor areas, buried cables shall be laid and covered with riddled earth and protected from damage by precast slab at top.

When buried cables cross road/railway track, additional protection shall be provided in the form of hume/galvanised iron pipes of adequate strength.

For power cables exceeding 100 metres an underground cable loop of diameter 2.5 metres shall be provided near each terminating ends.

The power and control cables shall be laid with a provision of extra length at one end. The exact length shall be confirmed by the Owner/Consultant's site engineer before laying.

After completion of installation of cables on trays inside concrete trenches, the portion of the trench located in the vicinity of oil filled transformers/areas shown in the drawings shall be filled up with sand.

Proper cable supporting arrangement with necessary clamps shall be installed by the bidder to hold the cables entering the equipment e.g. switchboards/transformers and the like from cable trays.

After completion of installation and prior to connection, all power cables shall be subjected to a high potential test. All necessary assistance to testing shall be provided by the contractor.

5.18.0 Cable Tags and Markers

Each cable and conduit run shall be tagged with numbers that appear in the cable and conduit schedules. Cables and conduits shall be tagged at their entrance, every 30.0M and exit from any equipment, junction box.

The tags shall be of aluminum (minimum 2 mm thick) with the number punched on it and securely attached to the cable by not less than two turns of 16 SWG G.I. wire. Alternatively, PVC/Nylon tags with embossed cable number secured to the cable with PVC/Nylon bands may be used.

Routing of cables laid directly under ground shall be indicated clearly by cable marker of galvanised iron.

The location of cable joints, if any, shall be clearly indicated with cable marker with an additional inscription "cable-joint".

The Contractor shall furnish and install all tags and markers stated above.

For buried cable, the marker shall project 150 mm above ground and shall be spaced at an interval of 30 meters and at every change of direction.

5.19.0 Cable Termination and Connection

The termination and connection of cables shall be done strictly in accordance with manufacturer's instruction, drawings and/or as directed by the Engineer.

The work shall include all clamping, fitting, fixing, soldering, tapping, compound filling, cable jointing, crimping, shorting and grounding as required for the complete job. All equipment required for all such operations shall be of Contractor's procurement under this specification.

Furnishing of all consumable materials such as soldering material, electrical tape, sealing material as well as cable jointing kits shall be included in the offer.

Cable joint kits for all cables shall be supplied by Contractor under this specification. Responsibility for proper terminating shall lie on the Contractor, Guarantee for termination shall also have to be given by Contractor.

The equipment will be generally provided with blank bottom plates for cable/conduit entry and cable end box for power cables.

The Contractor shall perform all drilling, cutting on the blank plate and any minor modification work required to complete the job, Gas cutting will not be allowed.

If the cable end box or terminal enclosure provided on the equipment is found unsuitable and requires major modification, the same shall be carried out by the Contractor at the discretion of Engineer.

Control cable cores entering control panel/switchgear/MCC etc. shall be neatly bunched and served with PVC perforated tape to keep it in position at the terminal block. Alternatively, the neatly bunched control cable cores may be secured by Nylon self-locking cable securing bands.

The Contractor shall put ferrules on all control cable cores in all junction boxes and at all terminations. The ferrules shall carry terminal numbers as per drawings. All ferrules shall be coloured, plastic and interlocked type.

Spare cores shall be similarly ferruled, crimped with lug and taped on the ends. Spare cores shall be ferruled with individual cable number.

Termination and connection shall be carried out in such a manner as to avoid strain on the terminals.

All cable entry Points shall be properly sealed and made vermin and dust proof. Unusual opening, if any, shall be effectively closed. Sealing work shall be carried out with approved sealing compound having fire withstand capability for at least three hours.

Power and control cables near their terminations at cable end box/marshalling box of transformers may require to be supported by clamping arrangement. The Contractor shall fabricate all such supports and provide clamps as required to complete the job.

5.20.0 Cable Joints

Cables shall be installed without joints as far as practicable.

If however jointing becomes necessary, it shall be made only by qualified cable jointer and strictly in accordance with manufacturer's recommendation.

Jointing rates shall be inclusive of supply of splicing materials, jointing compound, tape, connectors etc., if not covered within supply price of jointing kits.

5.21.0 Junction Box

The Contractor shall install junction boxes wherever required for power/control cables at suitable as per direction of engineer.

5.22.0 Fire seal and anti-flame propagation compound coating.

In order to prevent fire propagation through cable penetration of wall/floor/ceiling as well as through cable shaft openings, after laying, dressing and clamping of cables, all the openings shall be properly sealed by using pieces of mineral wool butted to one another and spraying with out fire propagation liquid. Also the cable runs both before and after fire seals shall be suitably sprayed with anti fire propagation compound at least for 1 M length on each side.

Except for inside an enclosure, wherever cables enter or leave conduits, the conduit end shall be sealed by suitable sealing compound having fire withstand capability.

5.23.0 Grounding of Electrical System

The Contractor is to carry out the grounding of the entire electrical installation under the scope of this specification as directed by the Owner's representative. MV Swgr., Transformer, MCCs, all drive motors, junction boxes, joint boxes, switch boards, lighting fixtures, receptacles, conduits, cable, armours etc. and all non-current carrying metallic parts shall be earthed at two separate points. The equipment grounding shall be carried out by GI flat / wire of specified sizes and the same shall be connected to the risers of plant earth mat. In any case, the earth resistance of the grounding system shall be less than 1 ohm.

The method adopted for system earthing as well as equipment earthing shall be in accordance with the Indian Standards Rules and Regulations of Practice for earthing.

The main ground grid shall be buried in earth at a minimum depth of 600 mm. below finished grade level unless stated otherwise. The size of the ground grid conductor shall be bare 50 x 6 mm GI flat and are connected to ground electrodes.

Earth grid for normal electrical earthing, earth grid for earthing, earth grid for lightning protection and earth grid for electronic equipment earthing shall be all isolated and independent from each other.

All risers from the ground grid shall be 50 x 6 mm GI flat and shall be projected 300 mm above grade level / concrete floor level unless otherwise shown.

All ground conductor connections shall be made by electric arc welding unless otherwise specified. Ground connections shall be made from nearest available plant ground grid risers. All ground conductors above ground shall be painted black for easy identification.

In case of site fabricated cable tray/ladder, the runner angles shall be used as ground conductors and shall be made electrically continuous. Such grounding continuity work on runner angles of cable tray is to be included in erection price of cable trays/racks. Cable screens and armours shall be bonded to earthing system. Also metal pipes and conduits carrying cables shall be bonded and effectively earthed.

In office buildings, laboratories etc. where concealed wiring is adopted, flats or wires for earthing shall be run along the pipes carrying lighting cables. In case where the earth conductors are to be taken through embedded pipe carrying cables, the same shall comprise aluminium conductor insulated cables of green colour for easy identification.

The earthing shall be done by GI Flat or, GI wire of sizes as laid down in earthing drawings and the same shall be connected to the risers of main earth grid.

The minimum size of galvanized MS flat earthing leads for various equipment shall generally be as given below unless a higher size is required from the view point of higher available fault current :

<u>Equipment</u>	<u>Size of GS Flat/Wire</u>	
Cable Tray	1 x 50 x 6 mm	1 no (continuous run)
Emergency trip Push Button/ Receptacle / Ventilation Fan/LPBs	16 SWG wire (twisted pair)	2 nos.
PMCC/DCDB	1 x 25 x 6 mm	2 nos.

5.24.0 Lightning Protection System

The method adopted for protection of buildings and allied structures against lightning shall be in accordance with relevant Indian standard.

Generally the plant building shall be adequately earthed to ensure free conducting path for lightning stroke.

5.25.0 Painting

The Contractor shall paint steel fabrications at site with two (2) coats of primer and two (2) coats of battleship gray epoxy-based paint.

All damaged parts shall be cleaned and coated with two (2) coats red oxide primer paint followed by a finishing coat of approved colour.

All damaged galvanised surfaces shall be coated with cold galvanising paint (minimum thickness 1 mm).

All equipment after erection shall be touched-up where required with coats of finishing paint.

All primer & paint including touch-up paints shall be supplied by the Bidder.

5.26.0 Excavation and Back Filling

The Contractor shall perform all excavation and backfilling as required for buried cable and ground connections.

Excavation shall be performed upto the required depth. Such sheeting and shoring shall be done as may be necessary for protection of the work.

The Contractor shall make use his own arrangements for pumping out any water that may be accumulated in the excavation.

All excavation shall be backfilled to the original level with good consolidation.

5.27.0 Steel Fabrication

All racks, supports, hangers and brackets wherever necessary shall be fabricated by the Contractor. Necessary steel shall be supplied by the Contractor.

Steel for fabrication shall be straightened and cleaned of rust and grease. All fabrication shall be free of sharp edge.

The Contractor shall maintain a register showing account of receipt of steel in the work and records shall be kept to the satisfaction of the Owner.

For the purpose of certification and accounting the theoretical weights on the basis of relevant Indian Standards will be binding.

5.28.0 Cleaning up of Work Site

The Contractor shall, from time to time, remove all rubbish resulting from execution of his work. No material shall be stored or placed on passage or drive ways.

Upon completion of work the Contractor shall remove all rubbish, tools, scaffoldings, temporary structures and surplus materials etc. to leave the premises clean and fit for use.

5.29.0 Inspection & Testing

On completion of erection works, the Contractor shall request the Engineer for inspection and tests with minimum fourteen (14) days advance notice.

The Engineer shall arrange for joint inspection of the installation for completeness and correctness of the work. Any defect pointed out during such inspection shall be promptly rectified by the Contractor.

The installation shall be then tested and commissioned in presence of the Engineer and put on trial run for stipulated contract period.

All rectification, repair of adjustment work found necessary during inspection, testing, commissioned and trial run shall be carried out by the Contractor without any extra cost.

5.30.0 Commissioning the Trial Run

Following successful inspection and testing, the equipment shall be commissioned and put on trial run along with the main plant in a manner mutually agreed upon based on the commissioning schedule of main plant.

The contractor shall assist the purchaser in commissioning and trial run with men and material as required and/or as directed by the Engineer.

5.31.0 Taking over of Installation

On successful testing, commissioning and trial run, the Contractor shall request Engineer in writing for taking over the installation.

The Engineer, on receipt of the request, shall arrange to take over the installation either wholly or in part as the case may be after a final inspection.

Till such taking over, the responsibility of the whole installation against theft or damage of any kind shall remain with the Contractor. In the event of any theft/damage to the plant prior to the complete taking over of the installation the contractor shall arrange to lodge necessary F.I.R. with the local police authorities and provide all necessary help to the owner such that the owner may raise suitable claims from its underwriters.

5.32.0 Guarantee

In the installation if any trouble arises due to the use of defective or faulty material and/or bad workmanship within a period of 12 months from the date of taking over, the Contractor shall guarantee to replace or repair the defective part or parts at site to the entire satisfaction of the Engineer free of charge.

6.0.0 TESTS**8.1.0 Site Tests**

All site tests on erected equipments will be carried out. The contractor shall provide suitable manpower for conducting all tests on equipments erected by them.

Through testing and meggering of all cables, wires and equipment to prove the same are free from ground and short circuit fault after erection and installation at site.

Rectification or, replacement of cable and/or, equipment, if any ground or short circuit is found.

All power cables after installation and prior to connection shall be subjected to High-Potential tests. Also the insulation resistance values shall be measured both before and after Hi-pot test for comparison. The leakage current shall also be measured during the Hi-pot test at site.

All equipment shall be demonstrated to operate in accordance with the requirements of this specification.

All equipment shall be subjected to High Potential test.

All protective relays shall be checked for correctness of operations.

All current transformers shall be subjected to Primary Injection test.

Pre-commissioning tests of transformers and other equipment shall include but will not be limited to all necessary tests as per relevant standards for satisfactory operation of the same.

8.2.0 Test Witness

All tests shall be performed in presence of Owner's representatives, if so desired by the Owner.

The Contractor shall give at least fourteen (14) days advance notice of shop tests and seven (7) days advance notice of site tests.

Certified copies of all tests carried out at works and at site shall be furnished in three (3) copies for approval of the Owner.

The equipment and accessories shall be dispatched from works only after receipts of Owner's written approval of shop test reports.

Type test certificate on any equipment and accessories if so desired by the Owner, shall be furnished. Otherwise the equipment and accessories shall have to be type tested, free of charge, to prove the design.

7.0.0 SPECIAL TOOLS & TACKLES

A set of special tools & tackles supplied by different manufacturers of Equipment which are necessary or convenient for erection, commissioning, maintenance and overhauling of the equipment may be made available to the Contractor at the discretion of Engineer.

8.0.0 DRAWINGS, DATA AND MANUALS

Drawings, data and manuals shall be submitted in triplicate with the bid and in quantities and procedures as specified in the General Conditions of Contract and/or elsewhere in this specification for approval and subsequent distribution after the issue of Letter of Intent.

8.1.0 To be submitted with the Bid

Make, type and catalogue number of different electrical items and accessories along with technical leaflets, data sheets etc.

Typical General arrangement drawings showing constructional features, fixing arrangement of pre-fabricated cable trays.

Bill of Materials for cable trays and accessories, conduits and accessories.

8.2.0 To be submitted for Approval and Distribution

Make, type and catalog number of cable termination kits, joints and accessories.
Detail dimensional drawings showing constructional features, grounding, fixing arrangement etc.

Bill of Materials for Pre-fabricated cable tray and accessories, Conducts and accessories.

Dimensional G.A. drawings and data sheets for different equipment and items supplied under this specification.

Note: The Specification mentioned above (from Article-I to Article IV) is generalised. It shall be considered wherever applicable for Refrigeration system.

TECHNICAL SCHEDULE

Sl. No.	Description	Unit	Qty	MAKE	MODEL	Capacities/ Technical Details
1.0	FREEZER					
1.1	Screw Compressor with motor (energy efficient type), Variable Frequency Drive Starter arrangement for Freezer application: Capacity 132 KW @ -28 Deg C Saturated Suction Temperature (SST) and 40 Deg C Saturated Discharge Temperature (SDT) along with standard accessories.	Set	4			
1.2	Gas and liquid cooler	Nos	1			
1.3	High Pressure receiver with all controls	Nos	1			
1.4	Low Pressure receiver with all controls	Nos	1			
1.5	Oil Separator	Nos	4			
1.6	Air Cooling Unit (ACU) for freezer -39.75 KW	Set	2			
1.7	Air Cooling Unit for freezer -35.16 KW	Set	9			
1.8	Valves and fittings for ACU	Nos	11			
1.9	Evaporative type induced draft counter flow design ammonia condenser	Nos	1			
1.10	Ammonia liquid Pumps	Set	3			
1.11	Condenser pump	Nos	2			
1.12	Interconnecting pipes (Cast Iron/Mild Steel/ GI as required). Bidders need to assess the piping length based on the enclosed layout which will be finalised during detail engineering.	Lot	1			
1.13	Necessary Insulation of suitable thickness wherever required viz. for the accumulators, suction line with PUF section insulation material and finished with 24 G aluminum cladding.	Lot	1			
1.14	Refrigerated Auto air purge system	Set	1			
1.15	PLC Panel along with wiring and cabling	Set	1			
1.16	Cooling tower with pump , connecting pumps and other standard accessories for compressor head cooling (if required)	Set	1			

Sl. No.	Description	Unit	Qty	MAKE	MODEL	Capacities/ Technical Details
1.17	Danfoss & Parker make Hot gas defrosting controls with necessary piping & fittings	set	11			
1.18	Thermosyphon-cooled system for cooling of oil	Set	4			
2.0	CHILLER					
2.1	Screw Compressor with motor (energy efficient type) and Variable Frequency Drive Starter arrangement for Chiller application: Capacity 368 KW @ -6 Deg C SST and 40 Deg C SDT along with standard accessories	Set	2			
2.2	High Pressure receiver with all controls	Nos	1			
2.3	Low Pressure receiver with all controls	Nos	1			
2.4	Oil Separator	Nos	2			
2.5	Air Cooling Unit for Chiller -60.83 KW	Set	1			
2.6	Air Cooling Unit for Chiller -40.84 KW	Set	3			
2.7	Air Cooling Unit for Sorting Room and Ante Room -20.6 KW	Set	4			
2.8	Air Cooling Unit for Ante Room -12.5 KW	Set	2			
2.9	Valves and fittings for ACU	Set	10			
2.10	Evaporative Condenser	Nos	1			
2.11	Ammonia liquid Pumps	Nos	2			
2.12	Condenser pump	Nos	2			
2.13	Interconnecting pipes (Cast Iron/Mild Steel/ GI as required). Bidders need to assess the piping length based on the enclosed layout which will be finalised during detail engineering.	Lot	1			
2.14	Necessary Insulation of suitable thickness wherever required viz. for the accumulators, suction line with PUF section insulation material and finished with 24 G aluminum cladding.	Lot	1			
2.15	Refrigerated Auto air purge system	Set	1			

Sl. No.	Description	Unit	Qty	MAKE	MODEL	Capacities/ Technical Details
2.16	PLC panel along with wiring and cabling	Lot	1			
2.17	Pressure pump based Humidifier with Digital controller and RS 485 port	Nos	1			
2.18	Thermosyphon-cooled system for cooling of oil	Set	2			
3.0	OTHERS					
3.1	Aluminium armored conductors for power cable & copper control cables & wiring with necessary cable tray for all the electrical equipment's complete with cable glands and junction boxes as per scope of work & Technical Specification.	Lot	1			
3.2	Main MCC with approved make of components as per technical specifications for the entire plant with all necessary feeders for future provisions and spares. Spare feeders would be complete in all respect. However only cubicles would be provided for the feeders for the future provisions viz. 1 no. compressor feeder & ACU feeders of required numbers.	Lot	1			
3.3	All local/remote start stop push buttons for the drives to be installed at present.	Lot	1			
3.4	Approved make Desktop Computer with UPS, printer etc. and SCADA software for Chiller chamber & Frozen Chamber PLC Panel.	Lot	1			
3.5	Supply, fabrication & erection of Structural steel work as per good engineering practices for all required services for the installation of all the plant & equipment (including piping work, hanging of ACU etc.)	Lot	1			
3.6	Temperature controller with RS 485 Port	Set	10			
3.7	Alarm for man in trap inside the cold room	Nos	10			
3.8	Ammonia leak sensor and alarm	Lot	1			
3.9	Central Monitoring System	Lot	1			
4.0	Drain pipes (insulated and heat for freezer) Running from Cold Room and terminating near plant room	Lot	1			

Sl. No.	Description	Unit	Qty	MAKE	MODEL	Capacities/ Technical Details
4.0	SPARES/CONSUMABLES/FIRST FILL					
4.1	Supply of Spares					
4.1.1	Compressor motor – Freezer	Nos	1			
4.1.2	Compressor motor – Chiller	Nos	1			
4.1.3	ACU motor – Freezer	Nos	1			
4.1.4	ACU motor – Chiller	Nos	1			
4.1.5	Ammonia Pump	Nos	1			
4.1.6	Condenser pump	Nos	1			
4.1.7	Condenser fan motor	Nos	1			
4.1.8	Temperature controller	Nos	1			
4.1.9	Electrical contactor (1 nos each for all the types provided in the control panels)	Lot	1			
4.1.10	Ammonia Gas cylinder	Nos	5			
4.1.11	Compressor oil	Lts	500			
4.2	First Charge of Ammonia gas, Oil, lubricant including top up during trial run for the complete refrigeration system	LS	1			
4.3	Consumables for running the plant for 6 months	LS	1			
5.0	PLANT OPERATION & MAINTENANCE					
5.1	Plant Operation cost in three shift basis with minimum two trained operators for 12 months	Month	12			
5.2	Comprehensive Annual Maintenance Contract excluding the cost of spares and consumables to ensure smooth running and minimum downtime of the plant. The period would be effected after expiry of 1(one) year performance guarantee period.	Year	5			

TENDER DRAWING

- 1) Drawing No. AA / Rly / 1691/ BL&CL/ PEB-TCW, REV 0- GA AND DETAILS OF PROPOSED TCW
- 2) DRG. NO. AA / Rly / 1691 / BL&CL / POW CKT - VFD STR; POWER CKT FOR VFD STARTER, SHEET 1 of 1
- 3) DRG. NO. AA / Rly / 1691 / BL&CL / CONT CKT - VFD STR; CONTROL CKT FOR VFD STARTER, SHEET 1 of 1
- 4) DRG. NO. AA / Rly / 1691 / BL&CL / POW & CONT. CKT – GOF, POWER & CONT. CKT FOR GENERAL OUTGOING FEEDER, SHEET 1 of 1
- 5) DRG. NO. AA / Rly / 1691 / BL&CL / POW. CKT-UDDS, POWER CKT FOR UNI-DIRECTIONAL DOL STARTER, SHEET 1 of 1
- 6) DRG. NO. AA / Rly / 1691 / BL&CL / CONT. CKT-UDDS, CONTROL CKT FOR UNI-DIRECTIONAL DOL STARTER , SHEET 1 of 1
- 7) DRG. NO. AA / Rly / 1691 / BL&CL / CONT. CKT - UD MPCB STR; CONTROL CKT FOR UNI-DIRECTIONAL MPCB STARTER



बामर लॉरी एंड क. लिमिटेड

(भारत सरकार का एक उधम)

BALMER LAWRIE & CO. LTD.

(A Government of India Enterprise)

Multi-Modal Logistics Hub (MMLH)

SBU – Logistics

**30-15-154/4F2, 5th Floor, GKP Heavenu,
Dabagardens Main Road, Visakhapatnam - 530020**

TENDER DOCUMENT

for

**Design, Supply, Erection, Testing and Commissioning of
Refrigeration System for Temperature Controlled Warehouse
for**

Multi-Modal Logistics Hub at Visakhapatnam, Andhra Pradesh

Tender No. MMLH/TCW/REF/ PT / 16

Date: 13.01.2017

Due Date: 03.02.2017, 16:00 Hrs

PART – II (PRICED)

- 1.0 Details of the items under this Schedule shall be read in conjunction with the corresponding Specifications, Drawings and other Tender Documents.
- 2.0 The work shall be carried out as per approved drawings, Specifications and the description of the items in this Schedule and/or Engineer's instructions. Drawings enclosed with these documents are only for providing some preliminary of the work involved.
- 3.0 Items of work provided in this Schedule but not covered in the Specifications shall be executed strictly as per instructions of the Engineer-In-Charge.
- 4.0 Unless specifically mentioned otherwise in the Contract, the Tenderer shall quote for the finished items and shall provide for the complete cost towards power, fuel, tools, tackles, equipment, Constructional Plant, Temporary Work, labour, materials, levies, taxes, transport, layout, repairs, rectification, maintenance till handing over, supervisions, colonies, shops, establishments, services, temporary roads, revenue expenses, contingencies, overheads, profits and all incidental items not specifically mentioned but reasonably implied and necessary to complete the work according to the contract.
- 5.0 The Quantities of the various items mentioned in the Schedule of Items are approximate and may vary or may be deleted altogether. The Contractor, in his own interest, should get an indication of the probable extent of the work to be executed under any particular item in this Schedule before undertaking any preliminary and enabling work or purchasing bought out components related to the work.
- 6.0 Rates shall be quoted both in figures and in words in clear legible writing. No over writing is allowed. All scoring and cancellations should be countersigned by the Tenderer. In case of illegibility, the rates written in word will be considered final. All entries shall be in English language.
- 7.0 Engineer's decision shall be final and binding on the Contractor regarding clarification of items in this Schedule with respect to the other sections of the Contract.
- 8.0 For extra items, rates shall be derived from similar item rates included in the schedule of work. Where there is no such similar item available in the schedule, rate shall be analyzed as follows:

Rate for extra item = Cost of material (a) + cost of labour inclusive of all necessary tools, tackles, equipment, machinery and consumable (b) required to carry out the work + 15% of (a+b) towards profit and overhead + taxes, duties etc. as applicable.

SCHEDULE OF WORK

Tender Details: Design, Manufacturing, Supply, Installation, Testing and Commissioning of Refrigeration System for Temperature Controlled Warehouse of Multi Modal Logistics Hub at Visakhapatnam, Andhra Pradesh.

Tender No. MMLH /TCW /REF / PT /16 dated 13/01/2017

Sl. No.	Description	Unit	Qty	SUPPLY (A)								ERECTION (B)				A + B
				Basic Rate (Rs)	Basic Amount (Rs)	P&F (Rs)	Excise Duty (Rs)	CST/ VAT (Rs)	Freight (Rs)	Transit Insurance (Rs)	Total Amount (Rs)	Basic Erection Rate (Rs)	Erection Amount (Rs)	Service Tax (Rs)	Total Amount (Rs)	Total Amount (Supply + Erection) (Rs)
1.0	FREEZER															
1.1	Screw Compressor with motor (energy efficient type), Variable Frequency Drive Starter arrangement for Freezer application: Capacity 132 KW @ -28 Deg C Saturated Suction Temperature (SST) and 40 Deg C Saturated Discharge Temperature (SDT) along with standard accessories.	Set	4													
1.2	Gas and liquid cooler	Nos	1													
1.3	High Pressure receiver with all controls	Nos	1													
1.4	Low Pressure receiver with all controls	Nos	1													
1.5	Oil Separator	Nos	4													
1.6	Air Cooling Unit (ACU) for freezer -39.75 KW	Set	2													
1.7	Air Cooling Unit for freezer -35.16 KW	Set	9													
1.8	Valves and fittings for ACU	Nos	11													
1.9	Evaporative type induced draft counter flow design ammonia condenser	Nos	1													
1.10	Ammonia liquid Pumps	Set	3													
1.11	Condenser pump	Nos	2													

PLEASE DO NOT QUOTE HERE

				SUPPLY (A)								ERECTION (B)				A + B
Sl. No.	Description	Unit	Qty	Basic Rate (Rs)	Basic Amount (Rs)	P&F (Rs)	Excise Duty (Rs)	CST/ VAT (Rs)	Freight (Rs)	Transit Insurance (Rs)	Total Amount (Rs)	Basic Erection Rate (Rs)	Erection Amount (Rs)	Service Tax (Rs)	Total Amount (Rs)	Total Amount (Supply + Erection) (Rs)
1.12	Interconnecting pipes (Cast Iron/Mild Steel/ GI as required). Bidders need to assess the piping length based on the enclosed layout which will be finalised during detail engineering.	Lot	1													
1.13	Necessary Insulation of suitable thickness wherever required viz. for the accumulators, suction line with PUF section insulation material and finished with 24 G aluminum cladding.	Lot	1													
1.14	Refrigerated Auto air purge system	Set	1													
1.15	PLC Panel along with wiring and cabling	Set	1													
1.16	Cooling tower with pump , connecting pumps and other standard accessories for compressor head cooling (if required)	Set	1													
1.17	Danfoss & Parker make Hot gas defrosting controls with necessary piping & fittings	set	11													
1.18	Thermosyphon-cooled system for cooling of oil	Set	4													
2.0	CHILLER															
2.1	Screw Compressor with motor (energy efficient type) and Variable Frequency Drive Starter arrangement for Chiller application: Capacity 368 KW @ -6 Deg C SST and 40 Deg C SDT along with standard accessories	Set	2													
2.2	High Pressure receiver with all controls	Nos	1													
2.3	Low Pressure receiver with all controls	Nos	1													
2.4	Oil Separator	Nos	2													

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Sl. No.	Description	Unit	Qty	SUPPLY (A)								ERECTION (B)				A + B
				Basic Rate (Rs)	Basic Amount (Rs)	P&F (Rs)	Excise Duty (Rs)	CST/ VAT (Rs)	Freight (Rs)	Transit Insurance (Rs)	Total Amount (Rs)	Basic Erection Rate (Rs)	Erection Amount (Rs)	Service Tax (Rs)	Total Amount (Rs)	Total Amount (Supply + Erection) (Rs)
2.5	Air Cooling Unit for Chiller -60.83 KW	Set	1													
2.6	Air Cooling Unit for Chiller -40.84 KW	Set	3													
2.7	Air Cooling Unit for Sorting Room and Ante Room -20.6 KW	Set	4													
2.8	Air Cooling Unit for AnteRoom -12.5 KW	Set	2													
2.9	Valves and fittings for ACU	Set	10													
2.10	Evaporative Condenser	Nos	1													
2.11	Ammonia liquid Pumps	Nos	2													
2.12	Condenser pump	Nos	2													
2.13	Interconnecting pipes (Cast Iron/Mild Steel/ GI as required). Bidders need to assess the piping length based on the enclosed layout which will be finalised during detail engineering.	Lot	1													
2.14	Necessary Insulation of suitable thickness wherever required viz. for the accumulators, suction line with PUF section insulation material and finished with 24 G aluminum cladding.	Lot	1													
2.15	Refrigerated Auto air purge system	Set	1													
2.16	PLC panel along with wiring and cabling	Lot	1													
2.17	Pressure pump based Humidifier with Digital controller and RS 485 port	Nos	1													
2.18	Thermosyphon-cooled system for cooling of oil	Set	2													

PLEASE DO NOT QUOTE HERE

Sl. No.	Description	Unit	Qty	SUPPLY (A)								ERECTION (B)				A + B
				Basic Rate (Rs)	Basic Amount (Rs)	P&F (Rs)	Excise Duty (Rs)	CST/ VAT (Rs)	Freight (Rs)	Transit Insurance (Rs)	Total Amount (Rs)	Basic Erection Rate (Rs)	Erection Amount (Rs)	Service Tax (Rs)	Total Amount (Rs)	Total Amount (Supply + Erection) (Rs)
3.0	OTHERS															
3.1	Aluminium armored conductors for power cable & copper control cables & wiring with necessary cable tray for all the electrical equipment's complete with cable glands and junction boxes as per scope of work & Technical Specification.	Lot	1													
3.2	Main MCC with approved make of components as per technical specifications for the entire plant with all necessary feeders for future provisions and spares. Spare feeders would be complete in all respect. However only cubicles would be provided for the feeders for the future provisions viz. 1 no. compressor feeder & ACU feeders of required numbers.	Lot	1													
3.3	All local/remote start stop push buttons for the drives to be installed at present.	Lot	1													
3.4	Approved make Desktop Computer with UPS, printer etc. and SCADA software for Chiller chamber & Frozen Chamber PLC Panel.	Lot	1													
3.5	Supply, fabrication & erection of Structural steel work as per good engineering practices for all required services for the installation of all the plant & equipment (including piping work, hanging of ACU etc.)	Lot	1													
3.6	Temperature controller with RS 485 Port	Set	10													
3.7	Alarm for man in trap inside the cold room	Nos	10													
3.8	Ammonia leak sensor and alarm	Lot	1													
3.9	Central Monitoring System	Lot	1													

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				SUPPLY (A)								ERECTION (B)				A + B
Sl. No.	Description	Unit	Qty	Basic Rate (Rs)	Basic Amount (Rs)	P&F (Rs)	Excise Duty (Rs)	CST/ VAT (Rs)	Freight (Rs)	Transit Insurance (Rs)	Total Amount (Rs)	Basic Erection Rate (Rs)	Erection Amount (Rs)	Service Tax (Rs)	Total Amount (Rs)	Total Amount (Supply + Erection) (Rs)
4.0	Drain pipes (insulated and heat for freezer) Running from Cold Room and terminating near plant room	Lot	1													
4.0	SPARES/CONSUMABLES/FIRST FILL															
4.1	Supply of Spares															
4.1.1	Compressor motor – Freezer	Nos	1													
4.1.2	Compressor motor – Chiller	Nos	1													
4.1.3	ACU motor – Freezer	Nos	1													
4.1.4	ACU motor – Chiller	Nos	1													
4.1.5	Ammonia Pump	Nos	1													
4.1.6	Condenser pump	Nos	1													
4.1.7	Condenser fan motor	Nos	1													
4.1.8	Temperature controller	Nos	1													
4.1.9	Electrical contactor (1 nos each for all the types provided in the control panels)	Lot	1													
4.1.10	Ammonia Gas cylinder	Nos	5													
4.1.11	Compressor oil	Lts	500													
4.2	First Charge of Ammonia gas, Oil, lubricant including top up during trial run for the complete refrigeration system	LS	1													
4.3	Consumables for running the plant for 6 months	LS	1													

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				SUPPLY (A)								ERECTION (B)				A + B
Sl. No.	Description	Unit	Qty	Basic Rate (Rs)	Basic Amount (Rs)	P&F (Rs)	Excise Duty (Rs)	CST/ VAT (Rs)	Freight (Rs)	Transit Insurance (Rs)	Total Amount (Rs)	Basic Erection Rate (Rs)	Erection Amount (Rs)	Service Tax (Rs)	Total Amount (Rs)	Total Amount (Supply + Erection) (Rs)
5.0	PLANT OPERATION & MAINTENANCE															
5.1	Plant Operation cost in three shift basis with minimum two trained operators for 12 months	Month	12				PLEASE DO NOT QUOTE HERE									
5.2	Comprehensive Annual Maintenance Contract excluding the cost of spares and consumables to ensure smooth running and minimum downtime of the plant. The period would be effected after expiry of 1(one) year performance guarantee period.	Year	5													
	GRAND TOTAL															