बैंक ऑफ़ बड़ौदा
Bank of Baroda
विजया VIJAYA
देना DENA

निविदा

TENDER FOR PROPOSED INTERIOR FURNISHING, ELECTRICAL, AIR CONDITIONING AND ALLIED WORKS AT MMO BUILDING, HORNIMAN CIRCLE, FORT, MUMBAI – 400 001.

बैंक ऑफ बड़ौदा
सुविधाएं प्रबंधन विभाग,
पहला मंविल, बड़ौदा कॉपोरेट सेंटर,
C-26, G-BLOCK, BANDRA KURLA COMPLEX,
BANDRA (EAST), MUMBAI-400051

INDEX

I- IMPORTANT INFORMATION

[A] Important Dates:

S No.	Particulars	Timeline
1	Tender Issuance Date	**09.02.2023**
2	Tender Coordinator Name, Contact details (Bank)	Mr Manajit Behura Sr Manager (Civil) Contact No. – 022 6698 5073 em.bcc@bankofbaroda.co.in Mr A K Shukla, Chief Manager (Civil) Contact No. – 022 6698 5101 em.bcc@bankofbaroda.co.in
3	Last Date of written request for clarifications before the Pre-bid Meeting	**17.02.2023**
4	Online Pre–bid Meeting & Venue details	Pre bid meeting will be held Online in presence of project architect and Bank's Engineer on **20.02.2023 at 11.00 AM**. Bidder to submit maximum two participant's names, contact numbers, designations and e-mail IDs on em.bcc@bankofbaroda.com at least two days prior to pre bid meeting so that the bidder can be added in meeting. All queries must be submitted vide mail prior two days of pre bid meeting so that the queries can be replies at site as well as on website. Bidders must visit the site prior pre bid meeting to ascertain the site condition and accordingly submit the queries. Bidder representative will have to click the Bank provided link to join the On-Line Pre Bid Meeting. .
5	Last Date of Submission of Online Tender (Closing Date)	**15:00** Hrs on 02.03.2023 Mode: Online URL: : https://www.tenderwizard.com/BOB

6	Eligibility Cum Technical Bid Opening Date (Online)	**15:30** Hrs on 02.03.2023 Mode: Online URL: https://www.tenderwizard.com/BOB 1. The meeting will be held online through Bank's Online Meeting Platform (i.e. Microsoft Teams). 2. Bidders are requested to send bid submission confirmation with their email address for attending online bid opening meeting on em.bcc@bankofbaroda.com id after Tender submission time is over. (**Mandatory**). If any mail of submission of tender is not received, then the bidder will not be added in online opening.
7	Commercial Bid	The commercial bids of only those Bidders who qualify in both eligibility and technical evaluation will be opened. The date for opening of the commercial bid would be communicated separately to the technically eligible Bidders.
8	Application Money	NIL
9	Earnest Money Deposit	**Rs 2 Lacs.**
10	Minimum requirement for Online Tender- response submission	1. Computer / Laptop (Notebook) with internet connection 2. Operating system - Windows 7 or above 3. Digital certificate (DC) - Class II or III, Signing + Encryption. (DC to be organizational type if bidder is participating on behalf of an organization) 4. Web Browsers: Internet Explorer 9.0 (32-bit Browser only) & above
11	Mode of bid submission & online portal's URL	Mode: Online URL: https://www.tenderwizard.com/BOB
12	Support details of Online Portal facilitator	ITI Limited, Tenderwizard Helpdesk Team Email: eprocurebob@etenderwizard.com Phone: +91-11-49424365 For more details, check under contact us at home page of e-procurement portal https://www.tenderwizard.com/BOB

Confidentiality:

II- Notice Inviting Tender

M/s. _____

_____

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TENDER FOR PROPOSED INTERIOR FURNISHING, ELECTRICAL, AIR CONDITIONING AND ALLIED WORKS AT MMO BUILDING, HORNIMAN CIRCLE, FORT, MUMBAI – 400 001.

Bank of Baroda Invites Tender from experienced contractors for **"PROPOSED INTERIOR FURNISHING, ELECTRICAL, AIR CONDITIONING AND ALLIED WORKS AT MMO BUILDING, HORNIMAN CIRCLE, FORT, MUMBAI – 400 001.**
"

Tender form has to be downloaded from the Bank's website www.bankofbaroda.com (tender section). Application form available on website alone needs to be used. Tender forms will be available on the bank's website from 09.02.2023 to 02.03.2023 up to **3:00 p.m**.

Tender shall be submitted ONLINE only. No physical for of tender will be accepted.

Contractors desirous to apply for said work shall fulfill the following:

Sr. No.	**Name of Work**	**Estimated cost in Rs. (approx.)**
1.	INTERIOR FURNISHING, ELECTRICAL, AIR CONDITIONING AND ALLIED WORKS AT MMO BUILDING, HORNIMAN CIRCLE, FORT, MUMBAI – 400 001.	Rs 200 Lacs

Minimum pre-qualifying/short listing criterion:

1. They should have completed similar jobs* in last 7 {seven) years (as 31.01.2023) as per the following criteria (Proforma enclosed) :

   a) **One** similar completed work costing not less than Rs 160 Lacs

   OR

   a) **Two** similar completed works, each costing not less than Rs 100 Lacs.

   OR

   b) **Three** similar completed works, each costing not less than Rs. 80 Lacs

(*similar jobs include Interior furnishing works in commercial buildings for Govt Sector and Large Private Sector Organization).

2. Average annual financial turnover of the firm during last 3 years, ending 31st March, 2022 should be at least Rs 60 Lacs (supported with Audited Balance Sheets).

EMD : Interest free **Earnest Money Deposit** (EMD) amounting to 2,00,000 /- (Rupees Two Lacs only). The EMD shall be accepted in demand draft in favour of Bank of Baroda, payable at Mumbai. The Bidder may alternatively transfer the said EMD amount to the following Account
Bidder shall submit Earnest Money Deposit (EMD) amount online through NEFT/RTGS on the details below:

Bank: BANK OF BARODA
Branch: Bandra East
IFSC: BARB0BANEAS ('0' is Zero) (Fifth Letter)
Account Type: OD
Account No.: 29040400000418

Under no circumstances, Earnest Money Deposit will be accepted in the form of fixed deposit receipt/DD/Banker's cheque or Insurance guarantee or Cheque.

Please note that firms/agencies claiming exemption from submission of EMD under any statutory authority/law (eg . NSIC, MSE (Micro and Small Enterprises only) ,KVIC etc.) shall be required to submit necessary documents viz. valid registration certificate etc. to the satisfaction of the Bank. Such firms shall ensure to submit copy of valid Registration Certificate duly signed and stamped in place of receipt of NEFT/RTGS If the such company found L-1 and back out subsequently, then Company shall be delisted / debarred from Bank of Baroda for minimum three year.

Validity of offer shall be 120 days from the date of opening of Price Bid. Bank may extend the validity of tender with consent of bidders.

The Bank does not bind itself to accept the lowest or any tender and reserves the right to accept or reject any or all tenders either in whole or in part, without assigning any reasons whatsoever.

No conditional offer will be entertained. Conditional offers shall be summarily rejected. Disputes, if any, will be subject to Mumbai jurisdiction only.

Tender documents downloaded from Bank's website shall only be accepted.

In case of any clarification you may please contact following officials:

Mr. Manajit Behura Senior Manager (Civil) – 022-6698 5073
Mr. Ashwini Kumar Shukla., Chief Manager (Civil) – 022-66985101

Bank has engaged M/s. Pratap Kashalkar & Associates (Architect) for providing architectural consultancy services for the project. Contact details of the Architect office is as under:

Name- Vikram Pratap Kashalkar – Mob - 7208428727 Name- Daxhta D. Vaidya - Mob – 9619011184
Email- pratap.kashalkar@rediffmail.com

Bidders desirous of visiting the site can do so by contacting the Architect vide official mail from 09.02.2023 to17.02.2023 Between **11:00 a.m to 03:00 p.m** . Bank's official/Architect shall be present at site on the said date. No further requests for site visit shall be entertained after this date.

Seal and Sign of Bidder

III- IMPORTANT INSTRUCTIONS FOR E-PROCUREMENT

B.1	**Important instructions for E-Tender**
	• This is an online tender event of Bank of Baroda. • Bidders are requested to read the terms & conditions of this RFP before submitting their online tenders. • Bidders who do not comply with the conditions with proper/necessary documentary proof (wherever required) will not qualify in the Tender process for opening of Commercial bid. • **The intending bidders are required to submit their offer electronically through E-Tendering portal. No physical tender is acceptable by Bank.** • **Online (Part I - Technical Bid) and (Part II - Price Bid) will be done through** URL : https://www.tenderwizard.com/BOB
B.2	**General Instructions to Vendors - E Tendering**
	• To view the Tender Document along with this Notice and its supporting documents, kindly visit following e-Tendering website of Bank of Baroda: **www.tenderwizard.com/BOB** • The bidders participating first time for e-tendering on Bank of Baroda e-tendering portal will have to complete the Online Registration Process on the e-tendering portal. A link for enrolment of new bidders has been provided on the above link. All bidders interested in participating in the online e-tendering process are required to procure Class III Digital Signatures e-Token having -02- certificates inside it, one for Signing/Verification purpose and another for Encryption/Decryption purpose. The bid should be prepared & submitted online using the bidder's authorized Class III Digital Signature (Individual certificate is allowed for proprietorship firms) Digital e- Token.
	Tenderwizard Help Desk • If any assistance is required regarding e-tendering (registration / upload / download / Bid Preparation / Bid Submission) please contact Tenderwizard Help Desk as per following: **Helpdesk Contact No. : +91 11-49424365** **Email – eprocurebob@etenderwizard.com** Primary Contact Number • Mr. Krunal Mahajan :

	+91-8800907637 • Alternate ContactNumbers • Mr. Sandeep Gautam : +91-8800496478 Mr. Kamal Mishra : +91-8800115821 • Contact No. for other activities • Registration Help Desk : +91-11-49424365 (Kindly put "REGISTRATION/PROFILE UPDATE" in the subject line of the email to eprocurebob@etenderwizard.com) • e-procurement queries : +91-11-49424365 (Kindly put "E-PROCUREMENT QUERIES" in the subject line of the email to eprocurebob@etenderwizard.com) Note: please note support team will be contacting through email and whenever required through phone call as well. Depending on nature of assistance support team will contact on the priority basis. It will be very convenient for bidder to schedule their online demo in advance with support team to avoid last minute rush.
	Downloading of Tender Document The tender document is uploaded / released on Bank of Baroda e-tendering portal link as mentioned above. Tender document and supporting documents may be downloaded from same link. Subsequently, bid has to be prepared and submitted ONLINE ONLY as per the schedule given in Notice Details. The Tender document will be available online only. Tender document will not be sold / issued manually.
	Preparation & Submission of Bids The bids (Pre-Qualification, Eligibility, Technical as well as Commercial) shall have to be prepared and subsequently submitted online only. Bids not submitted "ONLINE" or by any other mean shall be summarily rejected. No other form of submission shall be permitted.
	Do's and Don'ts for Bidder i. Registration process for new Bidders should be completed within first week of release of tender. ii. The e-procurement portal is open for upload of documents from the start of the bid submission date. Hence bidders are advised to start the process of upload of bid documents well in advance. iii. Bidders have to prepare for submission of their bid documents online well in advance as iv. The encrypt/upload process of soft copy of the bid documents large in number to e-procurement portal may take longer time depending upon bidder's infrastructure and connectivity. v. To avoid last minute rush & technical difficulties faced by bidders in uploading/submission of bids, bidders are required to start the uploading of all the documents required -01- week in advance for timely online submission of bid. vi. Bidders to initiate uploading of few primary documents during the start of the tender submission and any request for help/support required for uploading the documents / understanding the system should be taken up with e-procurement service provider well in advance. vii. Bidders should not raise request for extension of time on the last day of submission due

	to non-submission of their bids on time as Bank will not be in a position to provide any support at the last minute as the portal is managed by e-procurement service provider. viii. Bidder should not raise request for offline submission or late submission since ONLINE submission is accepted only. ix. Partly or incomplete submission of bids by the bidders will not be processed and will be summarily rejected.
	Guidelines to Bidders for Electronic Tendering System **Pre-requisites to participate in the Tenders** Registration of bidders on e-procurement portal of Bank of Baroda: The bidders unregistered on e-procurement portal of Bank of Baroda and interested in participating in the e-tendering process shall be required to enroll/register on the e-procurement portal. To enroll, bidders have to generate User ID and password on www.tenderwizard.com/BOB. The bidders may obtain the necessary information on the process of registration/enrollment either from Helpdesk Support Team: +91-11-49424365 or may download Vendor Help Manuals available under "Help Manuals/ Latest Circulars/ Formats" on home page of e-procurement portal i.e. www.tenderwizard.com/BOB.
	Preparation of Bid & Guidelines for Digital Certificate The Bid Data that is prepared online is required to be signed & encrypted and the hash value of the Bid Data is required to be signed electronically using a Class III Digital Certificate. This is required to maintain the security of the Bid Data and also to establish the identity of the Bidder transacting on the System. This Digital Certificate should be having Two Pair (1. Sign Verification 2. Encryption/ Decryption). Encryption Certificate is used to encrypt the data / information and Signing Certificate to sign the hash value during the Online Submission of Tender stage. The Digital Certificates are issued by an approved Certifying Authority authorized by the Controller of Certifying Aut h orities of Government of India through their Authorized Representatives upon receipt of documents required to obtain a Digital Certificate. Bid data / information for a particular Tender must be submitted only using the Digital Certificate. In case, during the process of preparing and submitting a bid for a particular tender, the bidder loses his / her Digital Signature Certificate (i.e. due to virus attack, hardware problem, operating system problem), he / she may not be able to submit the Bid online. Hence, the bidders are advised to store his / her Digital Certificate securely and if possible, keep a backup at safe place under adequate security to be used in case of need. In case of online tendering, if the Digital Certificate issued to an authorized user of a partnership firm is used for signing and submitting a bid, it will be considered equivalent to a no objection certificate / power of attorney to that user to submit the bid on behalf of the Partnership Firm. The Partnership Firm has to authorize a specific individual via an authorization certificate signed by a partner of the firm (and in case the applicant is a partner, another partner in the same form is required to authorize) to use the digital certificate as per Indian Information Technology Act, 2000. Unless the Digital Certificate is revoked, it will be assumed to represent adequate authority of the Authority User to bid on behalf of the Firm for the Tenders processed on the Electronic Tender Management System of Bank of Baroda as per Indian Information Technology Act, 2000. The Digital Signature of this Authorized User will be binding on the Firm. It shall be the responsibility of Partners of the Firm to inform the Certifying Authority or Sub Certifying Authority, if the Authorized User changes, and apply for a fresh Digital Signature Certificate.

	The procedure for application of a Digital Signature Certificate will remain the same for the new Authorized User. The same procedure holds true for the Authorized Users in a Private / Public Limited Company. In this case, the Authorization Certificate will have to be signed by the Director of the Company or the Reporting Authority of the Applicant. The bidder should Ensure while procuring new digital certificate that they procure a pair of certificates (two certificates) one for the purpose of Digital Signature, Non-Repudiation and another for Key Encipherment.
	Recommended Hardware and Internet Connectivity To operate on the Electronic Tendering System, the bidders are recommended to use Computer System with at least 2 GB of RAM and broadband connectivity with minimum 1 Mbps bandwidth. However, Computer Systems with latest i3 / i5 Intel Processors and Broadband/4G connection is recommended for better performance. • ***Operating System Requirement*** Windows 7 & above • **Browser Requirement (anyone from following)** Microsoft Internet Explorer (IE) version 11 and above Mozilla Firefox - Latest version Google Chrome - Latest version • ***Browser settings*** 1. Disable the 'Popup Blocker' in the browser under Tools. Make sure this is in 'Turn Off' mode. 2. Add the e-procurement domain name in the 'Compatibility View' list of your browser Turn off the 'SmartScreen Filter' in the browser. • ***Supported File Types*** 1. General Documents such as DOC, XLS, JPG, BMP, GIF, PNG, PDF, ZIP formats are allowed 2. Files with .EXE, .PSD extensions are not allowed 3. File size not to exceed 5 MB per attachment 4. All uploaded files should be virus free and error free • ***Minimum System Configuration*** 1. CPU speed of 2.0 GHz 2. USB Ports 3. 2 GB of System Memory (RAM) 4. Anti-virus software should be enabled and updated regularly • ***Requirement of utility software*** 1. Java Run Time Engine (JRE – 1.8.0) or higher. 2. Microsoft Office 2003 with MS Word and MS Excel 3. Adobe Acrobat Reader, PKI Installation Driver for Digital Signature ***Steps to participate in the e-Tenders*** Online viewing of Detailed Notice Inviting Tenders The bidders can view the Detailed

	Tender Notice along with the Time Schedule (Key Dates) for all the Live Tenders released by Bank of Baroda on the home page of bank's e-Tendering Portal on www.tenderwizard.com/BOB. ➢ Download of Tender Documents The Pre-qualification / Main Bidding Documents are available for free downloading. However, to participate in the online tender, the bidder must pay application money via NEFT/RTGS mode & submit the details in the e-procurement portal. ➢ Online Submission of Tender Submission of bids will be preceded by Online Submission of Tender with digitally signed Bid Hashes (Seals) within the Tender Time Schedule (Key dates) published in the Detailed Notice Inviting Tender. The Bid Data is to be prepared in the templates provided by the Tendering Authority of BOB. The templates may be either form based, extensible tables and / or upload-able documents. In the form-based type of templates and extensible table type of templates, the bidders are required to enter the data and encrypt the data/documents using the Digital Certificate / Encryption Tool wherever applicable. ➢ Close for Bidding After the expiry of the cut-off time of Online Submission of Tender stage to be completed by the Bidders has lapsed, the Tender will be closed by the Tender Authority. ➢ Online Final Confirmation After submitting all the documents bidders need to click on "Final Submission" tab. System will give pop up "You have successfully completed your submission" that assures submission completion. ➢ Short listing of Bidders for Commercial Bidding Process The Tendering Authority will first open the Technical Bid documents of all Bidders and after scrutinizing these documents will shortlist the Bidders who are eligible for Commercial Bidding Process. The short-listed Bidders will be intimated by email. ➢ Opening of the Commercial Bids The Bidders may remain present in the office of the Tender Opening Authority at the time of opening of Commercial Bids. However, the results of the Commercial Bids i.e. TCO of all bidders shall be made available on the bank's e-procurement portal after the completion of opening process. ➢ Tender Schedule (Key Dates) The bidders are strictly advised to follow the Dates and Times as indicated in the Time Schedule in the detailed tender Notice for the Tender. All the online activities are time tracked and the electronic Tendering System enforces time-locks that ensure that no activity or transaction can take place outside the Start and End Dates and time of the stage as defined in the Tender Schedule.
	Important Points: The Bid hash values are digitally signed using valid Class – III Digital Certificate issued by any Certifying Authority. The bidders are required to obtain Digital Certificate well in advance a. The bidder may modify bids before the deadline for Online Submission of Tender as per Time Schedule mentioned in the Tender documents. b. This stage will be applicable during both Pre-bid / Pre-qualification and Financial Bidding Processes.
	Steps by step detailed Vendor Manual are available on homepage under Support section related to activities like Java Settings, Registration, Login Process, Tender Participation, Bid Download, upload & Submission, Corrigendum/Addendum, Clarifications, Re- submissions

	etc. on e-procurement portal i.e. www.tenderwizard.com/BOB **Note: Bank and ITI Limited shall not be liable & responsible in any manner whatsoever for any failure to access & bid on the e-tender platform due to loss of internet connectivity, electricity failure, virus attack, problems with the PC, any other unforeseen circumstances etc. before or during the event. Bidders are advised to ensure system availability and prepare their bid well before time to avoid last minute rush. Bidders can fix a call with support team members in case guidance is required by calling on helpdesk number.**

IV- MANDATORY INFORMATION FOR PRE-QUALIFICATION

ANNEXURE A

Mandatory information required for Prequalification of the bidder

(To be furnished in online application)

Important:

1. Attach copies of the supporting documents.
2. Please use additional sheets if required.

1	a) Name of the applicant / organization b) Address of the Registered Office c) Address of office at Mumbai. (With Phone Nos, Fax Nos & Email ID & Contact Person)	To be filled in e –tender. Address proof to be attached in e –tender.
2	Year of establishment	Proof to be attached in e-tender.
3	Type of the organization (Whether sole proprietorship, Partnership, Private Ltd. or Ltd. Co. etc.) (Enclose certified copies of documents as evidence)	Proof to be attached in e-tender.
4	Name & qualification of the Proprietor / Partners / Directors of the Organization / Firm a) b) c) Enclose certified copies of document as evidence.	Proof to be attached in e-tender.
5	Details of registration – Whether Partnership firm, Company, etc. Name of Registering Authority, Date and Registration number. Enclose certified copies of document as evidence	Proof to be attached in e-tender.
6	Whether registered with Government / Semi – Government / Municipal Authorities of any other Public Organization and if so, in which class and since when? (Enclose certified copies of document as evidence)	Proof to be attached in e-tender.
7	a. No. of years of experience in the field and details of work in any other field. b. Whether ISO certified, furnish the	Proof to be attached in e-tender.

	details.	
8	Area of business activities other than construction, if any, and place of business.	Proof to be attached in e-tender.
9	Registration of firm under Shop & Establishment Act 1948	Proof to be attached in e-tender.
10	Address of Mumbai office through which the proposed work of the Bank will be handled and the Name & Designation of officer-in-charge**.**	Proof to be attached in e-tender.
11	(a) Yearly turnover of the organization during last 3 years (year wise) (Avg. turnover of last 3 years should not be less than Rs 60 Lacs) and furnish audited balance sheet and Profit & Loss A/c (Audited) for the last –3- years. (b) Average turnover in 2019-2020,2020-2021 and 2021-2022	Proof to be attached in e-tender.(certified by CA)
12	Name & Address of Bankers (Solvency certificate of value Rs 50 Lacs from a Scheduled Bank to be enclosed for indicating satisfactory financial capacity of the organization)(not older than 6 months)	Proof to be attached in e-tender.
13	Enclose copy of latest income tax clearance certificate.	Proof to be attached in e-tender.
14	PAN No.	Proof to be attached in e-tender.
15	Details of registration for GST	Proof to be attached in e-tender.
16	Detailed description and value of works done (Proforma-1) and works on hand (Proforma-2) (For last 7 years Only) (work completion certificate issued by respective organization)	Proof to be attached in e-tender.
17	Details of Key Personnel Permanently employed (Proforma –3)	Proof to be attached in e-tender.
18	Other infrastructural information to be used/ referred for this project (Proforma-4) List of available plants, machineries equipments etc.	
19	Furnish the names of –3- responsible persons along with their designation, address, Tel.No. etc., for whose organization, you have completed the above mentioned jobs and who will be in a position to certify about the performance of your organization.	To be filled in e-tender. (work completion Certificate issued by Organization).

20	Whether any Civil Suit / litigation arisen in contracts executed / being executed during the last 10 years. If yes, please furnish the name of the project, employer, Nature of work, Contract value, work order and brief details of litigation. Give name of court, place, and status of pending litigation.	Undertaking to be attached in e-tender.
21	Information relating to whether any litigation is pending before any Arbitrator for adjudication of any litigation or else any litigation was disposed off during the last ten years by an arbitrator. If so, the details of such litigation are required to be submitted.	Undertaking to be attached in e-tender.
22	Have you been ever disqualified or levied penalty by the bank in past for non fulfillment of the contractual obligations. If yes, please provide details.	Undertaking to be attached in e-tender.

NOTE: Attach extra documents if required. Avoid attaching irrelevant documents which has no link with the desired documents.

(Please enclose this information in PART I (Technical Bid) of the Bid. Bid of agencies who are not furnishing above information will be summarily rejected).

PROFORMA – 1

LIST OF PROJECTS EXECUTED BY THE ORGANISATION DURING THE LAST 7 YEARS*

Sl No	Name of work/ project with address.	Name & full postal address of the owner. Specify	Contract Amount (Rs.)	Stipulated time of completion (Years)	Actual time of completion (years)	Any other relevant information. Actual amount of the Project, if increased, give reasons.	Enclose client's certificate for satisfactory completion.
1	2	3	4	5	6	7	8

***(Minimum Value Work done not less than Rs. 80 lacs)**

Notes:

1. Information has to be filled up specifically in this format. Please do not write remark "As indicated in Brochure".
2. Date shall be reckoned from the date of advertisement of the notice in news papers.
3. For certificates, the issuing authority shall not be less than an Executive In charge.

I/We confirm that to the best of our knowledge this information is authentic and accept that any deliberate concealment will amount to disqualification by the Bank at any stage

PLACE :MUMBAI

DATE : __/__/ SIGNATURE OF BIDDER & Co's seal

PERFORMA -2

Sl No	Name of work/ project with address.	Name & full postal address of the owner. Specify	Contract Amount (Rs.)	Stipulated time of completion (Years)	Present Status	Any relevant information
1	2	3	4	5	6	7

Performa-3

Details of key personnel

Si No	**Particulars**	**Name and Designation**	**Age**	**Qualification**	**Experience**	**Nature of work**	**Date from which with org**	**Name of projects handled having value more than Rs 80 Lacs**

I/We confirm that to the best of our knowledge this information is authentic and accept that any deliberate concealment will amount to disqualification by the Bank at any stage

PLACE :MUMBAI

DATE : __/__/ SIGNATURE OF BIDDER & Co's seal

V - FORM OF TENDER

To

General Manager-FM&COA
Bank of Baroda,
Baroda Corporate Centre,
C-26, G-Block,
Bandra Kurla Complex,
Bandra East,
Mumbai-400051

Dear Sirs,

Re: TENDER FOR PROPOSED INTERIOR FURNISHING, ELECTRICAL, AIR CONDITIONING AND ALLIED WORKS AT MMO BUILDING, HORNIMAN CIRCLE, FORT, MUMBAI – 400 001.

I having visited the site, examined the plans/ specifications and schedule of quantities, and satisfying ourselves as to various conditions stated, I/we hereby offer to execute the above works at the respective rates which I/we have quoted for the items in the Schedule of Quantities.

I/ we enclose copy of proof for online payment for **Rs 2 Lacs** towards Earnest Money deposit for the execution of the works at my/ our tendered rates, together with any variations at later stage, should the work be awarded to me/ us.

In the event of this tender being accepted, I/we agree to enter into and execute the necessary contract required by you. I/ We do hereby bind myself/ourselves to forfeit the aforesaid deposit of **Rs 2 Lacs** in the event of our refusal or delay in signing the Contract Agreement. I/we further agree to execute and complete the work within the time frame stipulated in the tender documents.

I/we agree to pay GST, and all or any other tax/ duties, Central/ State,transportation, Duties, all Royalties and all other applicable taxes prevailing and be levied from time to time on such items for which the same are livable and the rates quoted by me/us are inclusive of the same. I agree to pay the value of stamp duty (as per state govt. guidelines) on which the Agreements will be executed

I/we understand that you are not bound to accept the lowest tender or bound to assign any reasons for rejecting our tender. I/we further understand that Bank of Baroda may award Contracts to more than one Contractor and that I/ we shall make no claims whatsoever if Bank of Baroda accept only a part of my/ our tender. We unconditionally agree to Bank of Baroda's preconditions as stipulated in the tender documents.

Looking to the prevailing Pandemic Corona, I shall follow all guidelines issued by Government/Society and ensure regular Sanitization, Social Distancing, Wearing Mask etc. during the course of Work.

Bank reserves the right to terminate our contract and forfeit the Earnest money deposit paid by us in additions to recovery of all the dues to the Bank from the payment receivable by us. Further we may also be barred from tendering in future for the Bank and its subsidiaries.

I/we enclose herewith the completed tender documents duly signed in duplicate.

Yours truly,

[To be signed by the Authorized Representative of Tenderer holding Power of Attorney]

Place:

Date

1) The Bidder declares that no previous transgressions occurred in the last three years with any other Company in any country conforming to the anti-corruption approach or with any Public Sector Enterprise in India that could justify his exclusion from the tender process.

2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as per the procedure mentioned in "Guidelines on Banning of business dealings".

Equal treatment of all Bidders / Subcontractors

1) In case of Sub-contracting, the Principal Contractor (Bidder) shall take the responsibility of the adoption of Integrity Pact by the Sub-contractor.

2) The BOB will enter into agreements with identical conditions as this one with all Bidders.

3) The BOB will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Criminal charges against violating Bidder(s)/ Subcontractor(s)

If the BOB obtains knowledge of conduct of a Bidder or Subcontractor, or of an employee or a representative or an associate of a Bidder or Subcontractor which constitutes corruption, or if the BOB has substantive suspicion in this regard, the BOB will inform the same to the Chief Vigilance Officer.

VI- Independent External Monitor

1) The BOB has appointed Independent External Monitors (hereinafter referred to as Monitors) for this Pact in consultation with the Central Vigilance Commission. Name**: Shri. Harishwar Dayal (email id: dayalagra@gmail.com)** appointed competent and credible Independent External Monitor for this Pact after approval by Central Vigilance Commission. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

2) The Monitor is not subject to instructions by the representatives of the parties and performs his/ her functions neutrally and independently. The Monitor would have access to all Contract documents, whenever required. It will be obligatory for him / her to treat the information and documents of the Bidders as confidential.

3) The Bidder(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the BOB including that provided by the Bidder. The Bidder will also grant the Monitor, upon his/ her request and demonstration of a valid interest, unrestricted and unconditional access to their project documentation. The same is applicable to Sub-contractors.

4) The Monitor is under contractual obligation to treat the information and documents of the Bidder(s) / Sub-contractor(s) with confidentiality. The Monitor has also signed 'Non-Disclosure of Confidential Information '. In case of any conflict of interest arising during the selection period or at a later date, the IEM shall inform BOB and recuse himself / herself from that case.

5) The BOB will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the BOB and the Bidder. The parties offer to the Monitor the option to participate in such meetings.

6) As soon as the Monitor notices, or believes to notice, a violation of this agreement, he/ she will so inform the Management of the BOB and request the Management to discontinue or take corrective action, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

7) The Monitor will submit a written report to the BOB officials within 15 days from the date of reference or intimation to him by the BOB and, should the occasion arise, submit proposals for correcting problematic situations.

8) If the Monitor has reported to the BOB , a substantiated suspicion of an offence under relevant IPC/ PC Act, and the BOB has not, within the reasonable time taken visible action to proceed against such offence or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner.

9) The word 'Monitor' would include both singular and plural.

Facilitation of Investigation

In case of any allegation of violation of any provisions of this Pact or payment of commission, the BUYER or its agencies shall be entitled to examine all the documents including the Books of Accounts of the BIDDER and the BIDDER shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.

Pact Duration

This Pact begins when both parties have legally signed it. It expires for the selected Bidder till the contract period, and for all other Bidders 6 months after the contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings. If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged / determined by BOB .

Other provisions

1. This agreement is subject to Indian Law. Place of performance and jurisdiction is the Corporate Office of the BOB, i.e. Mumbai.
2. Changes and supplements as well as termination notices need to be made in writing.
3. If the Bidder is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
4. Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
5. Issues like scope of work, Warranty / Guarantee etc. shall be outside the purview of IEMs.
6. In the event of any contradiction between the Integrity Pact and tender/ RFQ/ tender documents and its Annexure, the Clause in the Integrity Pact will prevail.

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

(Office Seal)

Place: _____ Date: _____

Witness 1: Witness 2:

(Name & Address) (Name&Address)

_____ _____

VII- INFORMATION AND INSTRUCTIONS TO TENDERERS

Scope of Work :

1.1 The brief description of work to be carried out and its scope are given in the General Condition of Contract and the **"Special Conditions of Contract"** of these documents.

2. Site Inspection and Information :

2.1 The tenderer must obtain for himself on his own responsibility and at his own expenses all the information which may be necessary for the purpose of making a tender and for entering into a contract and must examine the Drawings, inspect the site of the work and acquaint himself with all the information about all the local conditions, means of access to the work, nature of the work and all matters pertaining thereto.

2.2 Access to the Site will be given during the Tender period by appointment on application to the:

The General Manager & Head
Facilities Management & COA
Baroda Corporate Centre,
C-26,G Block, BKC,
Bandra-East ,Mumbai 400051

The tenderer shall ascertain the location, size and condition of the areas available for his use as working areas and all other information affecting this Tender.

2.3 The Employer will not be responsible and will not reimburse any expenses which may be incurred or losses to person or property suffered by any Tenderer in connection with visits to and examination of the site and in the preparation of his tender for submission.

2.4 The tenderers should note that information, if any, as regards to the site and local conditions, as contained in these tender documents has been given merely to assist the tenderers and is not deemed to be complete.

2.5 The tenderers should note and bear in mind that the Employer shall bear no responsibility for the lack of acquaintance of the site and other conditions or any information relating thereto, on their part. The consequences of the lack of any knowledge, as aforesaid, on the part of the tenderers shall be at their risk and cost and no charges or claims whatsoever consequent upon the lack of any information, knowledge or understanding shall be entertained or payable by the Employer either during tender stage or during the construction period.

3. **Rates & Discrepancies etc.:**

3.1 The contractor shall quote the rate after careful examination Tender documents & drawings.

3.2 The tenderers shall quote the rates both in figures and words. If some discrepancies found between the rates quoted in figures and words, the following procedure shall be adopted for checking and arithmetic calculation:

i) When there is difference between the rates in figures and words, the rates, which correspond to the amount worked out by the tenderer, shall be taken as correct.

ii) When the rates quoted by the tenderer in figures and words tally but amount is incorrect, the rate quoted by the tenderer in words shall be taken as correct.

iii) When it is not possible to ascertain the correct rate by either of the above methods, the rates quoted in words shall be taken as correct.

iv) All erasures and alterations made while filling the tender must be attested by initials of the tenderer. Overwriting of figures is not permitted and failure to comply with either of these conditions will render the tender void at the Employer's option. No advice of any change in rate or conditions after opening of the tender will be entertained.

v) **In case the contractor has not quoted both rate and amount for any items, then the maximum of the quotes for that item by other bidders shall be taken for assessing the value of his tender. Further, in case he is awarded the work, the rate for the said item shall be payable as per the lowest rate quoted by other bidders.**

vi) The rate quoted shall be inclusive of all material, labour, profit, tools and tackles, lead and lift, transportation, cutting etc complete including all applicable taxes, duties, cess, excise, octroi, LBT, GST, WCT etc.

3.3 The Contractor shall not be entitled to any compensation for any loss suffered by him on account of delays, in commencing or executing the work, whatever the cause of delays may be, including delays arising out of modifications to the work entrusted to him or in any sub-contract connected therewith or delays in awarding contracts for other trades of the project or in commencement of completion of such works or in procuring Government controlled or other building materials or in obtaining water and power connections for construction purposes or for any claim in respect thereof. The Employer does not accept liability for any sum towards loss of overheads & profits of the contractor besides the accepted amount, subject to such variations as are provided for herein or as deemed fit to Employer. However, necessary time extension will be allowed if the delay is not attributable to contractor.

3.4 The Tenderers shall before tendering carefully examine the Tender Documents including these Information's & Instructions to Tenderers, General Conditions of Contract, Special Conditions of Contract, General Particulars & Requirements to Specifications, Detailed Specification, Drawings and other matters referred to therein, the Schedules and the Bill of Quantities and if there should be or appear to be any ambiguity in / or discrepancy between any of these documents or between figured and measured dimensions and other aspects upon the Drawings, he shall immediately refer the matter to the Employer / Architect **for clarification before submission of Tender. However, in case of any discrepancies between Drawings, Specifications and B.O.Q. items, B.O.Q. item shall supersede the others for quoting of rates.**

4.0 **Forms & Documents:**

i) The tenderer must use only the forms issued by the Employer to fill the rates.

ii) The Tender Form and the documents attached to it shall not be detached one from the other, and no alteration or mutilation (other than filling in all the blank spaces) shall be made in any of the documents attached hereto.

iii) All documents of the tender are to be read in conjunction with each other and rates quoted by the tenderer shall take this aspect into consideration.

5.0 **Signing of Documents:**

i) Each page of the tender documents should be signed by the person or persons submitting the tender in token of his / their having acquainted himself / themselves with the General Conditions of Contract, Specifications, Special Conditions, etc., as laid down. Any tender with any of the documents not signed will likely be rejected.

ii) The tender submitted on behalf of a firm shall be signed by all the partners of the firm or by a person who has the necessary authority on behalf of the firm to enter into the proposed contract. Otherwise, the tender may be rejected by the Employer

iii) Tender shall contain full address, Telephone Nos., Fax No. for serving notices / addendums required to be served to the Tenderer in connection with the Tender.

iv) Power of Attorney in the name of person(s) who has / have signed the tender document.

6.0 **The Tender shall accompany the following information and documents:**

a) A construction programme in the form of Bar chart showing the sequence of operation together with the estimated time for major activities.

b) Full details of any special methodology or technique the Tenderer proposes to use for the construction or for any other purpose.

c) List of Proposed Technical man-power including their qualification & experience.

d) List of proposed specialized contractors / associate if any, along with their credentials in respect to the trades of works together with their address.

e) Information regarding any changes from the previous submission made by the Tenderer for prequalification in respect of following aspects

- Details of Business & Technical Organization

- Financial resources

f) The Tenderers shall attach to their tender a copy, duly authenticated by a notary, of the documents containing the constitution of the consortium, company or firm by which the Tender is submitted so as to indicate by what persons and in what manner a contract may be entered by the consortium, company or firm and what persons would be directly responsible for the due performance of the Contract and can give valid receipt on behalf of the consortium, company or firm.

g) List of the equipment, formwork and staging to be erected / installed / deployed at the site for timely completion of the works.

7.0 **Earnest Money**

No Tender will be considered as responsive which is not accompanied by a sum of **Rs. 2,00,000.00 (Rupees Two Lacs only)** as Earnest Money Deposit (EMD) in the form of Demand Draft / Pay Order / Bank Transfer/BC drawn in favour of BOB from a Nationalised /scheduled bank. In the event of the Tenderer withdrawing his Tender before the expiry of 90 days from the date fixed for receiving the Tenders or such other extended dates as agreed to or if the tender is accepted, the Contractor fails to pay the security deposit as stipulated/or if he fails to commence the work within stipulated time, the Earnest Money will be forfeited. The Demand Draft/Pay order submitted against the Earnest Money Deposit will be returned without any interest to the unsuccessful Tenderers within **180 days** after the date fixed for receiving tenders. **The Tender without EMD will be summarily being rejected.**

8.0 Initial Security Deposit;

The successful bidder(s) shall be responsible to deposit Initial security deposit @ 2% of the Total Contract Value including EMD at our office by way of demand draft/RTGS/NEFT in favour of Bank of Baroda, payable at Mumbai within 15 days from the date of letter of intent (LOI)/Purchase order. Thus, the contractor has to submit the difference amount only after adjusting EMD.

Retention Money (RM): Apart from the EMD & Initial Security Deposit to be deposited by the successful bidder as aforesaid, additional Retention Money shall be deducted @8% value of each interim running bills, provided that the total Security Deposit i.e. the Initial Security Deposit amount + the Retention amount shall together not exceed 5% of the Contract price as determined after considering all variations as approved. 50% of the total security deposit will refunded to the contractor on completion subject to the following: • Issue of Virtual Completion Certificate by the Architect/Bank. • Contractor's removal of his materials, equipment, labour force, temporary sheds / stores etc. from the site Balance 50% shall be released within 15 days of completion of Defect Liability Period. Bank Guarantee in lieu of Security Deposit is also acceptable.

Performance Bank Guarantee: The selected bidder has to provide an unconditional and irrevocable Performance Bank Guarantee of 3% of the contract value from a Scheduled Bank in India towards due performance of the contract in accordance with the specifications, terms and conditions of Tender document, within 15 days from the date of letter of intent (LOI)/Purchase order. The Performance Bank Guarantee shall be kept valid three months, beyond the defect liability period (i.e. total for 15 months). However, same shall be amended if any during the course of time.

10.0 The Tenderer (whether or not he submits a tender) shall treat the details of the documents as secret and confidential. In case a tenderer does not submit his tender, he shall return the blank tender documents & drawings.

11.0 **Examinations & Evaluation of Tenders :**

Employer will examine each Tender to satisfy whether – i) has been properly signed, ii) is accompanied by required security and documents and their correctness. A substantially responsive Tender is one, which conforms to all terms, condition and specifications of Tender Documents without material deviation or reservation. The Tender Evaluation will be as under :-

i) The Tender which does not fulfill the submission of documents as specified in Sl. No. – 6 of Information & Instruction to Tenderers or elsewhere in the Tender document will be treated as unqualified and will be rejected.

ii) The Tenders whose documents are found in order and satisfactory as stated above will be treated as responsive Tenders and the Price Bid of responsive Tenders will only be opened.

During evaluation employer may ask for any clarification or documents including breakdown of unit rates to the tenderer but no change in the price or substance of the bid will be sought.

12.0 **Award of Contract:**

Subject to **Clause no. 13** herein below Employer will award the contract to the Bidder whose bid has been determined to be substantially responsive and whose offer has been found lowest (L-1) after arithmetical checking.

13.0 The Employer does not bind himself to accept, the lowest or any tender and reserves to itself the right to accept or reject any or all the tenders, either in whole or in part, without assigning any reasons for doing so. The Employer also has the right to re-invite the tender at his sole discretion.

14.0 Throughout all the documents the term 'Bid' and 'Tender' and their derivatives like Bidders, Tenderer are synonymous.

VIII- ARTICLES OF AGREEMENT

(On Non-Judicial stamp paper of required value as per stamp act and stamp duty as per Agreement value)

ARTICLE OF AGREEMENT made on this ..... day of _____ Two Thousand Twenty Three BETWEEN the Bank of Baroda, …….. hereinafter called "Employer" (which expression shall include its successors and assigns wherever the context or meaning shall so require or permit) of the one part and

_____

_____

_____ hereinafter called the "Contractor" (which expression shall include its successors and assigns wherever the context or meaning shall so require or permit) of the other part.

WHEREAS the Employer is desirous of carrying out **PROPOSED INTERIOR FURNISHING, ELECTRICAL, AIR CONDITIONING AND ALLIED WORKS AT MMO BUILDING, HORNIMAN CIRCLE, FORT, MUMBAI – 400 001.**

AND WHEREAS the Contractor has agreed to execute upon and subject to the conditions set forth herein and to the conditions set forth in the special conditions and in the Bill of Quantities and Conditions of Contract (all of which are collectively hereinafter referred to as "The said terms & conditions") the works, shown upon the said drawings and or described in the said specifications and included in the said bill of quantities at the respective rates therein set forth amounting to the sum as therein arrived at or such other sum as shall become payable there under (herein after referred to as the said "Contract Value").

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the said Contract Value to be paid at the times and in the manner set forth in the said terms & conditions, the contractor shall upon and subject to the said terms & conditions execute and complete the works shown on the said drawings, and described in the specifications and / or bill of quantities.

2. The Employer shall pay the contractor The Said Contract Value or such other sum as shall become payable at times and in the manner specified in the said terms & conditions.

3. The said terms & conditions and Appendices thereto shall be read and construed as forming part of this Agreement and the parties hereto shall respectively abide by submit themselves to the said terms & conditions and perform the agreements on their part respectively in the said terms & conditions contained.

4. This Contract is neither a fixed Lump sum Contract nor a Piece Work Contract but is a Contract to carry out the work in respect of the entire work as defined in the contract documents to be paid for according to actual measured quantities at the rates contained in the bill of quantities or as provided in the said Contract documents.

5. The Contractor shall afford every reasonable facility for the carrying out of all works relating to Interior Decoration Works comprising Interior finishing and furniture work in the manner laid down in the said terms & conditions.

6. The Employer reserves to itself the right of altering the Drawings and nature of the work by adding to or omitting any items of work or having portions of the same carried out without prejudice to this Contract.

7. Time shall be considered as the essence of this Contract and the Contractor hereby agrees to commence the work within 7th day of the date of issue of Acceptance letter or the date of handing over of site whichever is later as provided for in the said terms & conditions to complete the entire work within 75 days subject nevertheless to the provisions for extension of time.

8. All payments by the Employer under this contract will be made at Baroda Corporate Centre, BKC, Mumbai.

9. All disputes arising out of or in any way connected with this agreement shall be deemed to have arisen at Mumbai and only courts in Mumbai shall have jurisdiction to determine the same.

10. That the several parts of this Contract have been read by the Contractor and fully understood by the Contractor. The Contractor shall not be entitled for the payment for the quantities beyond the tendered quantities unless ordered for by specific written instructions from the engineer.

IN WITNESS WHEREOF THE Employer and the Contractor have set their respective hands to these presents and two duplicates hereof the day and year first hereinabove written. (If the contractor is a partnership or an individual).

IN WITNESS WHEREOF the Employer has set its hands to these presents through its duly authorized official and the Contractor has caused its common seal to be affixed hereunto and the said two duplicates / has caused these presents and the said two duplicates hereof to be executed on its behalf, the place, day, month and year first hereinabove written (If the contractor is a Company).

Signature Clause.

SIGNED AND DELIVERED by the

Bank of Baroda by the hand of

Shri _____

(Name and Designation)

in the presence of

(i) _____

Address _____

(2)_____

Address _____

Witness

SIGNED AND DELIVERED by----

(If the party is a partnership firm or an Individual should be signed by all or on behalf of all the partners.)

in the presence of

(i) _____

Address _____

(2)_____

Address _____

Witness

The COMMON SEAL OF CONTRACTOR was hereunto affixed pursuant to the resolutions passed by its

---

(If the contractor signs under its common

Board of Directors at the meeting held on ----------in the

presence of

(1)----------

(2)----------

Directors who have signed these

presents in token thereof in the

presence of

(1)----------

(2)----------.

seal the signature clause should tally with the sealing clause in the Articles of Association)

SIGNED AND DELIVERED BY the

Contractor by the hand of

Shri_____

and duly constituted attorney

(If the contractor is signing by the hand of power of attorney whether a company or individual.)

IX- GENERAL CONDITIONS OF CONTRACT

1. Definitions & Interpretations

In construing these conditions, the Specifications, Bill of quantities and Contract Agreement etc. the following words shall have the meaning herein assigned to them except where the subject or context otherwise requires**.**

1.2 (i)

a) "Employer" / "Owner" means **Bank of Baroda. (BOB)** a Corporate Body constituted under Banking and Companies (Acquisition and Transfers of Undertaking) Act 1970 and having its Head Office at Mandvi, Vadodara with its Corporate Office office at Mumbai. The Project shall be executed under :

The General Manager & Head
Facilities Management & COA
Baroda Corporate Centre,
C-26,G Block, BKC,
Bandra-East ,Mumbai 400051

" Architect " means. Consulting Architect M/s. Pratap Kashalkar & Associates & Associates having their office at 149, B.J.Marg, Thakurdwar, Mumbai-400 002 and their authorized nominees & representatives or such other firms / persons, as shall be nominated by the Employer.

(ii) **"Contractor" shall** mean :-

a) In the case of a Partnership firm :- ---------- and ---------- trading as partners in the name and style of ---------- and having a place of business at ---------- and shall include the partners for the time being of the said firm and the legal representatives of a deceased partner.

b) In the case of individual Contractor :- Shri _____ trading in the name and style of _____ and shall include his heirs, successors & legal successors & legal representatives.

c) In the case of Company :- _____ a company incorporated under _____ 20___ and having its registered office at _____ and office at _____ and shall include its successors and assignee.

(iii) **"Site"** shall mean the site of the contract works including any building and erections thereon and any other land (inclusively) as aforesaid allotted by the Employer for the Contractor's use.

(iv) **"Contract"** shall mean the following documents, all duly signed, collective in that order of precedence.

a) Articles of Agreement
b) Letter of acceptance of Tender / Award of Work
c) The Bid including Appendix to Bid, Addendum if any
d) Special Conditions of Contract
e) General Conditions of Contract
f) Priced Bill of Quantities
g) Technical Specifications (including any further instructions by Architect/Employer / EIC during construction work)
h) Drawings (Tender drawings / Working drawings issued during construction)

(v) **"Notice in writing" or "written notice"** shall mean a notice in written, typed or printed characters sent (unless delivered personally or otherwise proved to have been received) by registered post to the last known private or business address or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post it would have been delivered.

(vi) **"Act of Insolvency"** shall mean any Act of Insolvency as defined by the Presidency Towns insolvency Act, or the Provincial Insolvency Act or any Act amending such original.

(vii) **"Net Prices" :** If in arriving at the contract amount, the Contractor shall have added to or deducted from the total amount of the items in the Tender any sum, either as a percentage or other wise, then the net price of any item in the tender shall be the sum arrived at by adding to or deducting from the actual figure appearing in the Tender as the price of that item and similar percentage or proportionate sum provided always that in determining the percentage or proportion of the sum so added or deducted by the Contractor, the total amount of any Prime Cost items and provisional sums of money shall be deducted from the total amount of the tender. The expression "net rates" or "net prices" when used with reference to the contract or accounts shall be held to mean rates or prices so arrived at.

(viii) **"Works"** means the permanent works described in the "Scope of Work" and / or to be executed in accordance with the Contract and includes materials, apparatus, equipment, temporary supports, fittings and things of all kinds to be provided, the obligations of the Contractor hereunder and work to be done by the Contractor under the contract.

(ix) **"Drawings"** means the drawings prepared by the Interior Designer s and issued by the Architect/Employer-in-Charge / Architect/Employer & referred to in the Specifications and any modification of such drawings and such other drawings as may be issued by the Architect/Employer from time to time.

(x) **"Bill of Quantities"** means the Schedule and Quantities of items, materials & rates, summaries, etc. as finally accepted.

(xi) **"Specification"** means the specifications given in these documents including relevant Indian standard specification where so required and where such a specification is not available, specifications will be provided and approved by the Architect/Employer.

(xii) **"Temporary Works"** means all temporary works of every kind required in or about the execution, completion or maintenance of the works.

(xiii) **"Materials"** means the materials, apparatus, equipments, fittings, fixtures and all such other material which are incorporated in the 'work".

(xiv) **"Virtual Completion of the Works"** means the completion of the whole of the works substantially in all respects as evidenced by issuance of a Certificate of Completion by the Architect/Employer-in-Charge / Architect/Employer.

(xv) **"Period of Maintenance / Defect Liability Period"** shall mean the period of 365 (Three hundred Sixty Five) days calculated from the date of virtual completion of the works as certified by the Architect/Employer-in-Charge / Architect/Employer.

(xvi) **"Urgent Works"** means any urgent works, which in the opinion of the Architect/Employer-In-Charge / Architect/Employer becomes necessary at the time of execution and / or during the progress of work to obviate any risk of accident or failure or to obviate any risk of damage to the structure or services or required to accelerate the progress of work for which becomes necessary for safety and security or for any other reason, the Architect/Employer / Employer may find it necessary.

(xvii) **"Market Rate"** means the rate as decided by the Architect/Employer-in-Charge / Architect/Employer on the basis of cost of materials at site inclusive of any tax, duty, octroi etc. at the time of execution of work.

(xviii) **"Approved"** means approved in writing; "Approval" means approval in writing.

(xix) **"Month"** means calendar month.

(xx) **"Week"** means seven consecutive calendar days.

(xxi) **"Day"** means a calendar day beginning and ending at 00 Hours and 24 hours respectively,

(xxii) **"Contract Value / Tender Value"** means the total value of the tender as accepted by the Employer.

(xxiii) **Interpretations / Marginal Note / Heading / Catch Lines**.

The Marginal Notes, Headings and in the catch lines hereto and in the annexures hereto are meant only for convenience of reference and shall not in any way be taken into account in the interpretation of these presents and the annexures hereto. The Contractor will have to carry out and complete the said work in every respect in accordance with this contract.

Words imparting the singular only also include the plural and vice versa where the context requires.

2. **Language and Law**

The language in which the Contract documents shall be drawn up shall be English only and the law governing the Contract is the law of Union of India.

3. **Errors, Omissions and Discrepancies**

In all cases of errors, omissions and / or doubts or discrepancies in any of the items or specifications, a reference shall be made to the Architect/Employer whose elucidation, elaboration or decision shall be considered as authentic. The Contractor shall be held responsible for any error that may occur in the work through lack of such reference and precaution.

4. **Scope of Contract**

The Contract comprises the construction, INTERIOR FURNISHING WORK , HVAC, Electrical and allied works, completion and maintenance of the works and except in so far as the Contract otherwise stipulates the provision of all labour, materials, constructional plant, machinery temporary works and everything whether of a temporary or permanent nature required in and for such construction, completion and maintenance so far as necessary for providing the same as specified in or reasonably to be inferred from the Contract.

5. (i) **Letter of Acceptance / Award**

Before signing of the Contract, the Employer shall issue by registered post or by otherwise depositing at the registered office of the Contractor, Letter of Acceptance / Award to enter into a Contract with the Contractor for the execution of the works in accordance with the contract. Until a formal contract agreement is prepared and executed, the tender documents i.e. Volume I, II, III & set of drawings together with the relevant correspondence exchanged from receipt of the tender to acceptance and together with the Employer's letter of Acceptance / Award shall constitute a binding contract between the parties.

(ii) **Contract Agreement**

On receipt of intimation from the Employer of the acceptance of his / their tender, the successful tenderer shall be bound to implement the contract & within seven **days thereof**, the successful tenderer shall sign an agreement in accordance with the draft agreement. The Contract shall be executed in quadruplicate and the Employer, the ARCHITECT and the Contractor shall be entitled to one executed copy each for their use.

(iii) **Commencement of Works**

Contractor shall commence the work within 7 days from the date of issue of the Acceptance Letter / Work Order issued to the Contractor or the date of handing over of site which ever is later.

(iv) **Possession of Site**

Save in so far as the Contract may prescribe the extent of portions of the Site of which the Contractor is to be given possession from time to time and the order in which such portions shall be made available to him and subject to any requirement in the Contract as to the order in which the Works shall be executed, the Employer will within 7 days from the date of issue of acceptance letter / work order give to the Contractor possession of so much of the Site as may be required to enable the Contractor to commence and proceed with the programme and otherwise in accordance with such reason able proposals of the Contractor as he shall, by notice in writing to the Architect/Employer, make and will from time to time as the Works proceed give to the Contractor possession of such further portions of the Site as may be required to enable the Contractor to proceed with the construction of

the Works in accordance with the said programme or proposals (as the case may be).

If the Contractor suffers delay or incurs expense from failure on the part of the Employer to give possession in accordance with the terms of this clause the EIC shall grant an extension of time for the completion of the works on approval from Employer.

(v) **Wayleaves, etc.**

The Contractor shall bear all expenses and charges for special or temporary wayleaves required by him in connection with access to the Site. The Contractor shall also provide at his own cost any additional accommodation outside the Site required by him for the purpose of the Works.

6. **Custody of Drawings & Specifications**

The Contractor will be given free of cost two copies of Drawings during the progress of the works. Any further copies of such Drawings required by the Contractor shall be obtained by him from the Architect/Employer on payment of necessary charges to be fixed by the Interior Designer. The Contractor shall keep one copy of all Drawings at the works site and the Architect/Employer/ ARCHITECT shall at all reasonable time have access to the same. Before the issue of the final certificate to the Contractor, he shall forthwith return to the Employer all Drawings and Specifications. No drawings shall be taken as in itself an order for execution unless, in addition to the Interior Designer signature, it is marked “Fit for Construction” by ARCHITECT.

7. **Disruption of Progress**

The Contractor shall give adequate but not less than 4 weeks time written notice to the Architect/Employer whenever planning or progress of the Works is likely to be delayed or disrupted unless any further drawing or order, including a direction, instruction or approval, is required to be issued by the Architect/Employer. The notice shall include details of the drawing or order required explaining why and by when it is required and of any delay or disruption likely to be suffered if it is late.

8. **Further Drawings and Instructions**

The Contractor shall carry out and complete the said work in every respect in accordance with this Contract and with the directions of and to the satisfaction of the Employer / ARCHITECT. The Architect/Employer may in his absolute discretion or in consultation with Architect/Employer and from time to time issue further drawings and / or written instructions, details, directions and explanations which are hereafter collectively referred to as "Architect/Employer's Instructions" in regard to:-

(a) The variation or modification of the design, quality or quantity of items of works or the addition or omission or substitution of any item.

(b) Any discrepancy in the Drawings or between the Bill of Quantities and / or Drawings and / or Specification.

(c) The removal from the site of any material brought thereon by the Contractor and the substitution of any other material therefore.

(d) The removal and / or re-execution of any works executed by the Contractor.

(e) The dismissal from the works of any persons employed thereupon.

(f) The opening up for inspection of any work covered up.

(g) The amending and making good of any defects.

The Contractor shall forthwith comply with and duly execute any work comprised such Architect/Employer's instructions provided always that verbal instructions, directions and explanations given to the Contractor or his representative upon the works by the Architect/Employer shall, if involving a variation, be confirmed in writing by the Contractor within three days & if not dissented from in writing within a further three days by the Architect/Employer, such shall be deemed to be Architect/Employer's instructions within the scope of the Contract.

10. **Contractor's General Responsibilities**

The Contractor shall provide at his cost everything necessary for the proper execution of the works according to the intent and meaning of the Drawings, Bill of Quantities and Specifications taken together with whether the same may or may not be particularly shown or described therein provided that the same can reasonably be inferred therefrom, and if the Contractor finds any discrepancy in the Drawings or between the Drawings, Bill of Quantities and Specifications, he shall immediately and in writing refer the same to the Architect/Employer.

The successful tenderer is bound to carry out any items of work necessary for the completion of the job even though such items are not included in the Bill of Quantities and rates. Instructions in respect of such additional items and their quantities will be issued in writing by the Architect/Employer on approval from Employer.

The Contractor must co-operate with the other contractors appointed by the Employer so that the work shall proceed smoothly to the satisfaction of the Architect/Employer.

The Contractor must bear in mind that all the work shall be carried out strictly in accordance with the Specifications as given in these documents and also in compliance of the requirements of

the local public authorities and to the requirements / satisfaction / direction of the Architect/Employer and no deviation on any account will be permitted. **So all requsite permission required from Govt Authorities will be sole responsibility of contractor.**

The Contractor shall have to use materials from the makes / manufacturers specified in the list of materials of approved brand and / or manufacture contained in contract documents and as approved by Architect/Employer in Consultation with Employer.

11. **Safety of Site Operations**

The Contractor shall take full responsibility for the safety, stability and adequacy of all site operations and methods of construction including all temporary works, provided that the Contractor shall not be responsible, except as may be expressly provided in the Contract, for the design or specification of the permanent works.

The integration of MEPF services above and below false ceiling shall be co-operated / co-related during the execution of the work and final integration drawing incorporating all services shall be prepared by the Architect before and after undertaking interior decoration/ furnishing and furniture work.

12. **Watching & Lighting**

The Contractor shall in connection with the Works provide and maintain at his own cost adequate lights, guards, fencing, warning signs and watch & ward staff when and where necessary or as directed by the Architect/Employer or as directed by duly constituted authority for the protection of the works or for the safety and convenience of the public or pilferage of materials from site.

13. **Care of Works**

From the commencement to the certified completion of the whole of Works, the contractor shall take full responsibility for the care thereof and of all Temporary Works and in case any damage loss or injury shall happen to the works or to any part thereof or to any Temporary Works from any cause whatsoever.

The Contractor shall at his own cost repair and make good the same so that on completion, the works shall be in good order and condition and in conformity to every respect with the requirements of the Contract and the Architect/Employer's instructions. The Contractor shall also be liable for any damage to the Works occasioned by him including his sub-contractors in the course of any operations carried out by him for the purpose of completing any outstanding work and complying with his obligations under **Clause no. 36** hereof. The Contractor shall indemnify the Employer from all risks on this account.

14. (i) **Contractor's Senior Representative for Execution & Co-ordination of Works**

The Contractor shall have on site at all times during working hours throughout the course of the Contract at least one competent senior representative who shall be

empowered to make decisions binding on the Contractor in respect of all matters likely to arise in connection with the execution & coordination of the Works at site and shall keep the Architect/Employer and the Employer informed at all times about the name and designation of such representative.

Any directions, explanations, instructions or notices given by the Architect/Employer to such representative shall be held to be given to the Contractor.

(ii) **Contractor's Employees**

The Contractor shall provide and employ after approval from the Architect/Employer on the site in connection with the execution, completion and maintenance of the Works all Employed staff / Technical assistants are qualified, skilled and experienced in their respective trades, foremen and leading hands as are competent to give proper supervision, ensuring quality & output to the work they are required to supervise, and also such skilled, semi-skilled and unskilled labour as are necessary for the proper and timely execution, completion and maintenance of the works.

As per the advisory received from the Ministry of Skill Development & Entrepreneurship, Government of India you are required to engage formally certified skilled workforce or ensure that all your workers would be skilled through Recognition of Prior Learning (RPL) within 2 months from the date of commencement of work under this order at your risk and cost.

This may also include a dedicated drive by carrying out RPL in mission mode for your existing skilled workers who are working without any formal certification. Necessary support/guidance shall be provided by the Ministry of skill development and Entrepreneurship by arranging and organizing special RPL camps and skill certification. Confirmation on complying above directive may be conveyed to Bank at regular intervals (quarterly) for reporting to the Ministry concerned accordingly.

(iii) **Removal of Contractor's Employees**

The Contractor shall on the direction of the Architect/Employer immediately dismiss from the works any person employed thereon by him who may, in the opinion of the Architect/Employer, be incompetent or misconduct himself and such person shall not be again employed on the works without the permission of the Architect/Employer.

(iv) **Unauthorized Persons**

No unauthorized persons are to be allowed on the site. The Contractor shall instruct all such persons to keep out and shall take steps to prevent trespassing.

15. **Compliance with Statutes, Regulations, Etc.**

The Contractor shall conform to the provisions of any Act of the legislature relating to the works and to the regulations and bye-laws of any authority, and of any water, electric supply and other companies and / or authorities with whose systems the structure is proposed to be connected, and shall, before making any variations from the Drawings or Specifications that may be necessitated by so regulations, give to the Architect/Employer written notice, specifying the variation proposed to be made and the reason for making it and apply for instructions thereon. In case, the Contractor shall not within ten days of submission of such notice, receive such instructions, he shall proceed with the work conforming to the provisions, regulations, or bye-laws in question, and any variation so necessitated shall be dealt with under **Clause no. 29** thereof.

The Contractor shall bring to the attention of the Architect/Employer all notices required for execution by the said Acts, regulations or bye-laws to be given to any authority and pay to such authority, or to any public office all fees that may be properly chargeable in respect of the works, and lodge the receipts with the Architect/Employer.

16. **Setting Out**

The Contractor shall set out the works and shall be responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions, and alignment of all parts thereof. If at any time any error in this respect shall appear during the progress of the works or within the defects liability period the Contractor shall, if so required, at his own expense rectify such error to the satisfaction of the Architect/Employer.

17. (i) **Quality of Materials & Workmanship & Test**

All materials and workmanship shall be the best of the respective kinds described in the Contract and in accordance with the Architect/Employer's instructions and shall be subjected from time to time to such tests as the Architect/Employer may direct at the place of manufacture or fabrication or on the Site or at Government recognized / any approved testing laboratory

The Contractor shall upon the instruction of the Architect/Employer furnish him with documentation to prove that the materials and goods comply with the requirements of contract and for requirement stated above. The Architect/Employer may issue instruction in regard to removal of material from site or any work, if these are not in accordance with the Contract. The Contractor shall provide such assistance instruments, machinery, labour and materials as are normally required for examining, measuring, sampling and testing any material or part of work before incorporation in the Works for testing as may be selected and required by the Architect/Employer.

(ii) **Samples**

All samples of adequate numbers, sizes, shades & pattern as per specification shall be supplied by the Contractor without any extra charge. Apart from adhering to any special provision made in the specifications regarding submission of samples the contractor shall provide to the Architect/Employer samples along with the detailed literature of all materials he proposes to use in the building irrespective of the fact that a specific make / material might have been stipulated at least before 90 days of their incorporation in work. If certain items proposed to be used are of such nature that samples cannot be presented or pre pared at the site, detailed literature / test certificate of the same shall be provided instead to the satisfaction of the Architect/Employer. Before submit ting the samples / literature the contractor shall satisfy himself that the material / equipment for which he is submitting the samples / literature meet with the requirement of the specification. The Architect/Employer shall check the samples and give his comments and / or approval to the same. Only when the samples are approved in writing by the Architect/Employer, the contractor shall proceed with the procurement and installation of the particular material / equipment. The approved samples shall be signed by the Architect/Employer for identification and shall be kept on record at site office until the completion and acceptance of the work and shall be available at the site for inspection / comparison at any time. The contractor shall keep with him a duplicate of such samples to enable him to process the matter.

For items of work where the samples are to be made at the site, the same procedure shall be followed. All such samples shall be prepared at a place where it can be left undisturbed until the completion of the project.

The Architect/Employer shall communicate his comments / approval to the Contractor to the samples at his earliest convenience. Any delay that might occur in approving of the samples for reasons of its not meeting with the specifications or other discrepancies, inadequacy in furnishing samples of best qualities from various manufacturers and such other aspects causing delay on the approval of the materials / equipments, etc. shall be to the account of the contractor. In this respect the decision of the Architect/Employer shall be final.

On delivery of the supplies of materials / equipment for permanent works at the site, the contractor shall specifically arrange to get the supply inspected by the Architect/Employer and compared with the approved sample and his specific approval obtained before using the same in the work.

(iii) **Inspection & Testing during Manufacture**

The Architect/Employer shall be entitled during manufacture to inspect, examine and test on the Contractor's premises during working hours the materials and workmanship and check the progress of manufacture of all fabrication materials to be supplied under the Contract, and if part of the said materials is being manufactured on other premises the Contractor shall obtain for the Architect/Employer permission to inspect, examine and test as if the said Plant were being manufactured on the Contractors premises. Such inspection, examination or

testing if made shall not relieve the Contractor from any obligation under the Contract.

(iv) **Dates for Inspection & Testing**

The Contractor shall agree with the Architect/Employer the date on and the place at which any plant / works will be ready for testing as provided in the Contract and unless the Architect/Employer shall attend at the place so named on the date agreed the Contractor may proceed with the tests, which shall be deemed to have been made in the Architect/Employer's presence, and shall forthwith forward to the Architect/Employer duly certified copies of the test readings. The Architect/Employer shall give the Contractor 24 hours notice in writing of his intention to attend the tests.

(v) **Facilities for Testing at Manufacturer's Works**

Where the Contract provides for tests on the premises of the Contractor or of any sub-contractor the Contractor shall provide such assistance, labour, materials, electricity, fuel, stores, apparatus and instruments as may be requisite and as may be reasonably demanded to carry out such tests efficiently.

(vi) **Certificate of Testing**

As and when fabrication materials shall pass the tests referred in this, the Architect/Employer shall furnish to the Contractor a certificate in writing to that effect.

(vii) **Rejection**

If as a result of such inspection, examination or test of the works the Architect/Employer shall decide that such material is defective or not in accordance with the Contract he shall notify the Contractor accordingly stating in writing his objection and reasons therefore. The Contractor shall with all speed make good the defect or ensure that the material complies with the Contract. Thereafter, if required by the Architect/Employer, the tests shall be repeated under the same terms and conditions and that all reasonable expenses to which the Employer may be put by the repetition of the tests shall be deducted from the Contract Sum.

(viii) **Delivery of Materials & Equipment**

Unless the Architect/Employer shall otherwise direct, no material shall be delivered to site until the Architect/Employer shall have issued, in respect of such material, a certificate under **Clause no. 17** above. Likewise Fabrication Materials or Contractor's Equipment shall be delivered to Site only upon an authorization in writing applied for and obtained by the Contractor from the Architect/Employer.

The Contractor shall be responsible for the reception on site of all Materials and Contractor's Equipment delivered for the purposes of the Contract.

(ix) **Inspection & Testing and Re inspection & Retesting**

All deficiencies revealed by testing and inspection shall be rectified by the Contractor at his own expense and to the satisfaction and approval of the Architect/Employer. Rectified components shall be subject to retesting and re-inspection.

(x) **Inspection Reports**

The Contractor shall provide the Architect/Employer with 3 copies of reports of all inspections and tests.

(xi) **Cost of Tests**

The cost of making any test shall be borne by the Contractor if such test is intended by or provided for in the Specification or Bill of Quantities or required as per standard practice of the trade / BIS and as advised by the Architect/ Employer .

(xii) **Costs of Tests not provided for, etc.**

If any test is ordered by the Architect/Employer which is either

(a) not so intended by or provided for or not required as per standard practice / BIS.

(b) (in the cases above mentioned) is not so particularized, or

(c) though so intended or provided for but ordered by the Architect/Employer to be carried out by an independent person authorized by Architect/Employer at any place other than the site or the place of manufacture / fabrication and shows the materials, plants not to be in accordance with the provision of contract then the cost of such test shall be borne by the Contractor.

18. **Absence of Specification**

If the specifications do not contain particulars of materials and works which are obviously necessary for the proper completion of the works, and the intention to include, which is inferred, all such materials and works shall be supplied and executed by the Contractor without extra charge. If the Contractor requires additional information, he shall request in writing well in advance to commencement of the particular work to the Architect/Employer who will issue such detailed information as necessary within a reasonable time.

Generally, in absence of any specification BIS code, CPWD and PWD Specification shall be followed in order of preference.

19. **Obtaining Information Related to Execution of Work**

No claim by the contractor for additional payment will be entertained which is consequent upon failure on his part to obtain correct information as to any matter affecting the execution of the works, nor will any misunderstandings or the obtaining of incorrect information or the failure to obtain correct information relieve him from any risks or from the entire responsibility for the fulfillment of the contract.

20. **Contractor's Superintendence**

The Contractor shall give all necessary personal superintendence during the execution of the works, and as long, thereafter, as the Architect/Employer may consider necessary until the expiry of the "Defects Liability Period" stated hereto.

21. **Access for Inspection**

The Employer/Architect and their respective representatives shall at all reasonable times have free access to the work and / or to the workshops, factories or other places where materials are lying or from which they are being obtained and the Contractor shall give to the Employer, Interior Designer, the Architect/Employer and their representatives every facility necessary for checking measurements, inspection and examination and test of the materials and workmanship. No person not authorized by the Architect/Employer except the representatives of public authorities shall be allowed on the works at any time.

22. (i) **Examination of Work Before Covering Up**

No work shall be covered up or put out of view without the approval of the Architect/Employer and the Contractor shall afford full opportunity for the Architect/Employer to examine and measure any work which is about to be covered up or put out of view and to examine foundations before permanent work is placed thereon. The Contractor shall give due notice to the Architect/Employer of any such work or foundations is or are ready or about to be ready for examination and the Architect/Employer shall without unreasonable delay, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such work or for examining such foundations.

(ii) **Uncovering and making openings**

The Contractor shall uncover any part or parts of the Works or make openings in or through the same as the Bank’s Architect/Employer/Architect may from time to time direct and shall reinstate and make good such part or parts to the satisfaction of the Architect/Employer. If any such part or parts have been covered up or put out of

view after compliance with the requirements of sub-clause (i) of this Clause and are found to be executed in accordance with the contract the expenses of uncovering, making openings in or through reinstating and making good the same shall be borne by the Employer but in any other case all such expenses shall be borne by the Contractor and shall be recoverable from him by the Employer or may be deducted by the Employer from any monies due or which may become due to the Contractor.

23.(i) **Assignment**

The whole of the works included in the contract shall be executed by the Contractor and the Contractor shall not directly or indirectly transfer, assign or sublet the contract or any part / share thereof or any interest therein without the prior written consent of the Employer & no undertaking shall relieve the Contractor from the full & entire responsibility of the contract or from active superintendence of the works during their progress.

(ii) **Work is to be Carried Out to the Satisfaction of Employer / Architect**

The Contractor shall carry out all the works strictly in accordance with Drawings, detailed Specifications and instructions of the Architect/Employer. If in the opinion of the Employer or EIC changes have to be made in the works the Contractor shall carry out the same, and payment, if any, arising out of these shall be made as per the terms of the contract.

(iii) **Removal of Improper Work & Materials**

The Architect/Employer shall, during the progress of the works, have power to order in writing from time to time the removal from the works within such reasonable time or times as may be specified in the order, of any materials which in the opinion of the Architect/Employer are not in accordance with the Specifications or the instructions of the Architect/Employer, the substitution of proper materials, and the removal and proper re-execution of any work executed with materials or workmanship not in accordance with the Drawings and Specifications or instructions, and the Contractor shall forthwith carry out such order at his own cost. In case of default on the part of the Contractor to carry out such order, the Employer shall have the power to employ and pay other persons to carryout the same, and all expenses consequent thereon, or incidental thereto, as certified by the Architect/Employer shall be borne by the Contractor, or may be deducted by the Employer from any moneys due, or that may become due, to the Contractor.

(iv)**Urgent Repairs**

If by reason of any accident or failure or other event occurring to in or in connection with the Works, or any part thereof, either during the execution of the Works or during the Period of Defect Liability / Maintenance any remedial or other work or repair shall, in the opinion of the

Architect/Employer / Employer or their representative be urgently necessary for security and safety of life or for the works or of adjoining property, and the Contractor is unable or unwilling at once to do such work or repair, the Employer may employ his own or other workmen do such work or repair, as the Architect/Employer / EIC or their representative may consider necessary. If the work or repair so done by the Employer which is in the opinion of the Architect/Employer, the Contractor was liable to do at his own expense under the Contract, all costs and charges incurred by the Employer in so doing shall on demand be paid by the Contractor to the Employer or may be deducted by the Employer from any amount due or which may become due to the Contractor. Provided always that the Architect/Employer or the Architect/Employer's representative (as the case may be) shall, as soon after the occurrence of any such emergency, as may be reasonably practicable notify, the Contractor thereof in writing.

(v) **Default of Contractor in Compliance**

If the Contractor after receipt of written notice from the Architect/Employer / EIC requiring compliance within ten days fails to comply with such further drawings and / or Architect/Employer's instructions the Employer may employ and pay other persons to execute any such work whatsoever that may be necessary to give effect thereto, and all costs incurred in connection therewith shall be recoverable from the Contractor by the Employer on the Certificate of the Architect/Employer as a debt or may be deducted by him from any moneys due to the Contractor.

24. (i) **Prime Cost Items**

The material(s) required for execution of any item for which a sum has been provided as a prime cost price in the tender, shall be procured by the contractor or supplied by the Employer at the sole discretion of the Employer. Every sum in the bill of quantities, which contains either as a whole or part the amount, as prime cost price of the materials shall be varied by substitution of the actual cost of the materials.

No variation shall be made in respect to the percentage quoted for labour and to cover for overheads & profits, work contract taxes, service taxes on account of variation in the prices, as above. Prime cost items will not be considered for Price Variation Adjustment.

(iii) **Use of Provisional Items**

DELETED.

(iv) **Production of Vouchers, Etc.**

The Contractor shall when required by the Employer / Architect produce all quotations, invoices, vouchers and accounts or receipts in connection with expenditure in respect of Prime Cost items.

(v) **Nominated Specialist Agencies / Objection to Nomination**

All Specialists, Merchants, Tradesman and others executing any work of supplying and fixing any goods for which prime cost items or provisional sums are included in the Bill of Quantities and / or Specification who may be nominated or selected by the Architect/Employer are hereby declared to be sub-Contractors employed by the Contractor and are herein referred to as nominated Sub-Contractors.

No nominated Sub-Contractor shall be employed on or in connection with the works against whom the Contractor shall make reasonable objection or who will not enter into a contract providing:

(a) That the nominated Sub-Contractor shall indemnify the Contractor against the same obligations in respect of the Sub-Contract as the Contractor is under in respect of this contract.

(b) That the nominated Sub-Contractor shall indemnify the Contractor against claims in respect of any negligence by the Sub-Contractor, his servants or agents or any misuse by him or them of any scaffolding or other plant, the property of the Contractor or under any Workmen's Compensation Act in force.

(c) Payment shall be made to the nominated Sub-Contractor by the contractor within fourteen days of his receipt of payment from the Employer provided that before any Certificate is issued, the Contractor shall upon request furnish to the Architect/Employer proof that all nominated Sub-Contractor's accounts included in previous certificates have been duly discharged, in default whereof the Employer may pay the same upon a Certificate of the Architect/Employer and deduct the amount thereof from any sums due to the Contractor. The exercise of this power shall not create privity of contract as between Employer and Sub-Contractor.

25. **Quantities and Variation**

i) The Bill of Quantities (BOQ), unless otherwise stated shall be deemed to have been prepared in accordance with the Indian Standard Method of Measurement and quantities in B.O.Q. are to be considered as estimated and not accurate. The rates quoted shall remain valid for any variation of quantity. However for AHR, for any variation above 25%, rate shall be paid as per market rate analysis.

26. **Works to be measured**

The Architect/Employer may from time to time intimate to the Contractor that he requires the works to be measured & the Contractor shall forthwith attend or send a qualified Representative to assist the Architect/Employer in taking such measurements and calculations and to furnish all particulars or to give all assistance required by any of them. Should the Contractor not attend or neglect or omit to send such Representative, then the measurement taken by the Architect/Employer or a person approved by him shall be taken to be correct measurements of the works. Such measurements shall be taken in accordance with the Mode of Measurements detailed in the Specifications.

The Architect/Employer shall take joint measurements with the contractor and the measurements shall be entered in the measurement book / sheet by the Architect/Employer's representative.The Contractor or his Representative may at the time of measurement take such notes and measurements as he may require. All authorized extra works, omissions and all variations made without the Architect/Employer's knowledge, but subsequently sanctioned by him in writing (with the prior approval in writing of the Employer) shall be included in such measurements.

27. **Claims for additional expenses**

The Contractor shall send to the Architect/Employer once in every month an account giving particulars as complete and fully detailed as required of all claims for any additional expenses, to which the Contractor may consider himself entitled and of all extra or additional / substituted work ordered by the Architect/Employer which he has executed during the preceding month subject of provisions under relevant clauses of contract hereof, and no claim for payment for any such work will be considered which has not been included in such particulars. Provided always that the Architect/Employer shall be entitled to authorize payment to be made for any such work notwithstanding the Contractor's failure to comply with this condition, if the Contractor has, at the earliest practicable opportunity notified the Architect/Employer in writing that he intends to make a claim for such work and thereafter send complete and detailed particulars of the claim to the Architect/Employer as directed by the Architect/Employer but not later than 10 days from the date of notification of his claim.

28. **Variations**

Any alteration, omission or variation ordered in writing by the Architect/Employer shall not vitiate this contract. In case the Architect/Employer / EIC think proper at any time during

the progress of the works to make any alterations in, or additions to or omissions from, the works or any alteration in the kind or quality of the materials to be used therein, the Architect/Employer shall give notice thereof in writing to the Contractor or shall confirm in writing within seven days of giving any such oral instructions. The Contractor shall alter, add to, or omit from, as the case may be, in accordance with such notice, but the Contractor shall not do any work extra to or make any alterations or additions to or omissions from the works or any deviation from any of the provisions of the Contract, stipulations, Specification or Contract Drawings without the previous consent in writing of the Architect/Employer and the value of such extras, alterations, additions or omissions shall in all cases be determined by the Architect/Employer in accordance with the provisions of **Clause no. 29** hereof, and the same shall be added to or deducted from the Contract value, as the case may be.

29. **Valuation of Variations**

No claim for an extra shall be allowed unless it shall have been executed under authority of the Architect/Employer with the concurrence of the Employer as herein mentioned. Any such extra is herein referred to as authorized extra and shall be made in accordance with the following provisions.

(a) Rates for all extra items, wherever possible, should be derived out of the accepted tender rates. The accepted net rates or prices in the contract shall determine the valuation of the extra work where such extra work is of similar character and executed under similar conditions as the work priced herein.

(b) Where the extra works are not of similar character and / or not executed under similar conditions as aforesaid or where the omissions vary the conditions under which any remaining items or works are carried out, then the contractor shall within 7 days of the date of receipt of order to carry out the work, inform the Architect/Employer of the rate which he intends to charge for such items of work, supported by analysis of the rate or rates claimed and the Architect/Employer shall fix such rate or prices as in the circumstances in his opinion are reasonable and proper, based on the verification of market rate.

(c) It is further clarified that for all such authorized extra items where rates cannot be derived from accepted tender rates, the Contractors shall submit rates supported by rate analysis worked on the “market rate basis", for material including all taxes, octroi and delivery at site, labour, hire / running charges of equipment and wastages etc. plus 20% towards establishment charges including water & electricity, contractor's overheads & profit, work contract tax, or like. **GST will be paid extra**

as per the prevailing statutory norms. In case of variation in items of works, which are subcontracted to specialist agencies, specialist agencies' profit and overhead is deemed to be included in above stated 20%. **Items derived from market rates shall not be eligible for escalation.**

The measurement and valuation in respect of the Contract shall be completed within the "Period of Final Measurement" stated in the Appendix.

30. **Security Deposit / Retention Money**

All compensation or other sums of money payable by the Contractor to the Employer under the terms of this contract may be deducted from the security deposit if the amount so permits and the Contractor shall, unless such deposit has become otherwise payable, within ten days after such deduction make good in cash the amount so deducted.

The security deposit of the contractor will be forfeited if he fails to comply with any of the conditions of the contract.

31. **Certificates & Payment**

(i) **Mobilization Advance –NA.**

(ii) **Secured Advance on Materials at Site**

The Contractor will be paid secured advance against cement, reinforcement steel & Structural steel and other non perishable and quantifiable material as decided by Architect/Employer and stacked at site for use in permanent works and in the opinion of the Architect/Employer are required to be procured in advance. The advance paid for the materials stacked at site shall be maximum 75% of the cost of the materials or **60% of the relevant item rate, whichever is less at the discretion of Employer** and the Contractor shall produce necessary vouchers / documents in support of cost of each material. No advance shall be admitted for perishable materials or cannot be stored and quantified properly and materials procured prematurely as decided by the Architect/Employer. The secured advance so given to the Contractor will be recovered from next three (3) R.A. Bills.

Where in any Certificate (of which the Contractor has received payment), the Architect/Employer has included the value of any unfixed materials intended for and / or placed on or adjacent to the works such materials shall become the property of the Employer and they shall not be removed except for use upon the works, without the written authority of the Architect/Employer. The Contractor shall be liable for any loss of or damage to, such materials.

The materials shall also be in conformity with contract specifications and of approved quality as stated in relevant clauses hereof. These advances shall be made on the basis of the quantity of each material lying at site at the time of preparation of each interim bill. The Contractor shall sign Indemnity Bond as per **Annexure I** for any loss either due to theft or fire etc.

(iii) **Interim Bill**

a. The Contractor shall be paid by the Employer from time to time by installments under Interim Certificate to be issued by the Architect/Employer to the Contractor on account of the works executed when in the opinion of the Architect/Employer, work to the approximate value named in the Appendix to Form of Tender "Minimum value of Work for Interim Certificate" (or less at the sole discretion of the Architect/Employer / Employer) has been executed in accordance with this contract, subject to a retention of the percentage of such value named in the Appendix to form of tender hereto as 'Retention Percentage for Interim Certificates' until the total amount retained shall reach the sum named in the Appendix to form of tender as 'Security Deposit'. **(Minimum value of RA bill –Rs 40 lacs)**

b) The contractor shall generally be paid one Interim bill in a month satisfying the minimum value of work, which shall include work done and secured advance against material. If in the opinion of the Architect/Employer the progress of the work warrants a second payment in a month, the same shall be so arranged by the Employer.

c) After submission of bill along with complete information, vouchers, etc. to the satisfaction of the Architect/Employer and after making necessary deductions toward Income Tax, Work Contract Tax and other recoveries deductible at source, the bill will be paid as follows:

i) An adhoc payment of 75% of the value of work done as assessed by the Architect/Employer and vetted by EIC/ Interior Designer shall be released within 7 working days by the Employer, after certification by the Architect/Employer/ Interior Designer who will certify within reasonable period from submission of Bill with necessary vouchers, documents etc.

ii) Balance amount shall be certified by the Architect/Employer/ Interior Designer on submission of bill and payment shall be released by the Employer within 15 working days of certificate receipt from the Architect/Employer/ Interior Designer.

d) All Interim Bill payment shall be regarded as payment by way of advance against the final payment only & not as payment for the work actually done.

e) All payments under this Clause will be released after due checking & verification by EIC/ Interior Designer.

f) Pending consideration of extension of date of completion, interim payments shall continue to be made as herein provided, without prejudice to the right of the employer to take action under the terms of the contract for delay in the completion of work, if the extension of date of completion is not granted by the competent authority.

(v) **Final Bill**

a) The Contractor shall submit final bill within 60 days from the date of issue of virtual completion certificate with all relevant information and details, documents as-built drawing etc. complete.

b) The Architect/Employer within 60 days of submission of the final bill, shall issue a certificate of payment against the final bill to the Employer / EIC who shall thereupon, within 60 days from the date of receipt of the certificate, shall release the balance payment to the contractor after effecting all recoveries, including advances and payments against interim certificates.

(c) The Architect/Employer / EIC shall have power to withhold Certification if the works or any parts thereof are not being carried out to his satisfaction.

(d) The Architect/Employer / EIC may by any Certificate make any correction in any previous Certificate, which shall have been issued by him.

(e) No payment shall be made to the Contractor if the Contractor fails to insure the works and keep them insured till the issue of the Virtual Completion Certificate.

32. **Time for Completion**

The entire work is to be completed in all respects within 75 days from the Date of Commencement as stated in Appendix to "Form of Tender" or such extended time as may be allowed under Clause no. 33 hereof. Time is the essence of the contract and shall be strictly observed by the contractor.

If required in the contract or as directed by the Architect/Employer, the contractor shall complete certain portion of the work before the completion of the whole of the work. However the completion date for whole of the work shall not change for above.

33. **Extension of Time for Completion**

i. If the Contractor needs an extension of time for the completion of the work or if the completion of work is likely to be delayed for any reasons beyond the due date of completion stipulated in the contract, the Contractor shall apply to the Employer for extension of time in writing at least 30 days before the expiry of the scheduled time and while applying for extension of time, Contractor shall furnish the reasons in detail and his justification, if any, for the delays.

ii. If in the opinion of the Architect/Employer the works be delayed for reasons beyond the control of the contractor, the Architect/Employer with due consultation with Employer may make a fair and reasonable extension of time for completion of the contract works such time extension will be said as “Authorised Time Extension” which will not qualify for levy of liquidated damages.

iii. If the works be delayed beyond the authorized time extension, the Architect/Employer with due consultation with Employer may allow extension of time for completion of contract works but with levy of Liquidated damage as stated under **Clause no. 37**.

Further, the contract shall remain in force even for the period beyond the due date of completion irrespective whether the extension is granted or not.

iv. The contractor shall be bound to extend validity of all insurance covers, Bank Guarantees till such period of completion as may be considered necessary at contract cost.

34. **Virtual Completion Certificate**

Virtual Completion of works means the completion of whole of the work substantially in all respects including all types of testing, obtaining all necessary statutory approvals and is fit for occupation. The works shall not be considered as completed until the Architect/Employer in Consultation with Employer has certified in writing that they have been virtually completed. The Defects Liability Period shall commence from the date of virtual completion as certified by the Architect/Employer.

35. **Approval Only by No Dues Certificate**

(i) **Final Completion Certificate**

On successful completion of entire works covered by the Contract to the full satisfaction of Employer / Architect, the Contractor shall ensure that the following works have been completed to the satisfaction of Architect/Employer : *(a)* clear the site of all scaffolding, wiring, pipes, surplus materials, Contractor's labour, equipment and machinery *(b)* demolish, dismantle and remove all Contractor's site offices and other temporary works, structures & constructions and other items and things whatsoever brought upon or erected at the site or any land allotted to the Contractor by the Owner and not incorporated in the permanent works *(c)* remove all rubbish, debris etc. from the site and the land allotted to Contractor and shall clear, level and dress, compact the site as required and said land to the satisfaction of the Architect/Employer *(d)* shall put the Owner in undisputed custody and possession of the site and all land allotted by the Owner to the Contractor *(e)* All defects / imperfections have been attended & rectified to full satisfaction of the Architect/Employer during the Defect Liability Period.

Unless the Contractor shall have fulfilled the provisions of the clause, the works shall not be deemed to have been completed.

Upon the satisfactory fulfillment by Contractor as stated above, the Contractor shall be entitled to apply to the Architect/Employer for a Final Completion Certificate in respect of the entire work.

If the Architect/Employer is satisfied of the completion of the work relative to which the Completion Certificate has been sought, the Architect/Employer shall within 14 (fourteen) days of the receipt of the application for Completion Certificate, issue a Completion Certificate in respect of the works for which the Completion Certificate has been applied.

This issuance of a Completion Certificate shall be without prejudice to the Employer's rights and Contractor's liabilities under the Contract, including the Contractor's liability for the Defect Liability Period nor shall the issuance of a Completion Certificate in respect of the works or work at any site be construed as a

waiver of any right or claim of the Employer against the Contractor in respect of work or the works at the site and in respect of which the Final Completion Certificate has been issued.

(ii) **No Dues Certificate**

The Contract shall remain valid and shall remain incomplete until no dues Certificate shall have been signed by the Architect/Employer and delivered to the Employer with a copy to the contractor. Such a certificate shall be given by the Architect/Employer within 30 days of completion of defects liability period (the last period to be considered if different periods to be considered if different parts of the work) or within 30 days from the date of payment of final bill whichever is later.

36. **Defect Liability Period**

Any defect, shrinkage, settlement or other faults which may appear within the "Defects Liability Period" stated in the Appendix hereto or, if none stated, then within 365 days after the date of the virtual completion of the works as certified by the Architect/Employer, arising in the opinion of the Architect/Employer from materials or workmanship not in accordance with the contract, shall upon the direction in writing of the Architect/Employer, and within such reasonable time as shall be specified therein, be amended and made good by the Contractor, at his own cost and in case of default the Employer may employ and pay other persons to amend and make good such defects, shrinkage, settlements or other faults, and all damages, loss and expenses consequent thereon or incidental thereto shall be made good and borne by the Contractor and such damage, loss and expenses shall be recoverable from him by the Employer or may be deducted by the Employer, upon the Architect/Employer's Certificate in writing, from any money due or that may become due to the Contractor, or the Employer may in lieu of such amending and making good by the Contractor deduct from any monies due to the Contractor, a sum, to be determined by the Architect/Employer equivalent to the cost of amending such work and in the event of the amount retained under **Clause no. 30** hereof being insufficient, recover the balance from the Contractor, together with any expenses the Employer may have incurred in connection therewith. Should any defective work have been done or material supplied by any Specialist Agencies employed on the works who has been nominated or approved by the Architect/Employer, the Contractor shall be liable to make good in the same manner as if such work or material had been done or supplied by the Contractor and been subject to the provisions of this Clause and **Clause no. 23 (ii)** hereof. The Contractor shall remain liable under the provisions of this Clause notwithstanding the signing of any certificate or the passing of any accounts, by the Architect/Employer. The Contractor will not be responsible for defects arising out of fair wear & tear & damage caused by Employer's personnel during the use of the building after being occupied.

37. **Liquidated Damages for Delay**

If the Contractor fails to complete the works by the period stated in the Appendix or within any authorized extended time under **Clause no. 33** hereof and the Architect/Employer with due Consultation with Employer certifies in writing that in his opinion the same ought to have been reasonably completed by the original completion date or authorized extended completion date, as the case may be, the Contractor shall pay the Employer the sum named in the Appendix to Form of Tender as "Liquidated Damages" for the period during which the said works shall so remain incomplete or the Employer may deduct such damages from any monies due to the Contractor. Liquidated Damages Bidder will have to pay liquidated damages (LD) to Bank of Baroda @ 1% of the contract value inclusive of all taxes, duties, levies etc., per week for delay beyond due date of completion, to a maximum of 10% of the contract value. If delay exceeds three weeks from due date of completion, Bank of Baroda reserves the right to cancel the entire order. If the selected Bidder fails to complete the due performance of the contract in accordance with the specifications and conditions agreed during the final contract negotiation, the Bank reserves the right either to cancel the contract as a whole or to accept performance already made by the bidder and get the remaining Contract performed by another contractor. All expenses incurred by the Bank in calling fresh bids will be borne by the bidder subject to a maximum of 5 % of contract value as Liquidated Damages for non-performance.

38. (i) **Default of Contractor**

It 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 or applies for voluntary winding up or subject to the supervision of the court and of the official Assignee or the Liquidator in such acts of insolvency or winding up shall be unable within seven days after notice to him requiring him to do so, to show to the reasonable satisfaction of the Architect / Employer that he is able to carry out and fulfill the Contract, and to give security therefore, if so required by the Architect / Employer

i) 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 Contract.
ii) Or shall assign or sub-let the Contract without the consent in writing of the Architect / Interior Designer / Employer first obtained.
iii) Or shall charge or encumber this Contract or any payments due or which might become due to the Contract or any payments due or which might become due to the Contractor there under.

Then in any of the said cases the Employer may not withstanding any previous waiver, after giving seven days notice in writing to the Contractor, determine the Contract but without thereby affecting the powers of the Interior Designer, or the obligations and liabilities of the Contractor, the whole of which shall continue in force as fully as if Contract has not been determined and as if the works subsequently executed had been executed by or on behalf of the Contractor. And further, the Employer, may enter upon and take possession of the work and all plant, tools, scaffoldings, sheds, machinery, seam and other power utensils and material lying upon the premises or the adjoining lands or roads and use the same as his own property or may employ the same by means if his own servants and workmen carrying on and completing the works and the Contractor shall not in any way interrupt or to do any act, matter or things to prevent or hinder such other

contractor or other person or persons employed for completing and finishing or using the materials and plant for the works. When the works shall be completed or as soon thereafter as convenient, the Architect/Employer 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 a period of 14 days after receipt thereof by him the employer shall sell the same by public auction and shall give credit to the Contractor for the amount realized after deducting there from the costs of removal and sales by the Employer for the values of the said and the expenses or loss which the Employer shall have been put to in procuring the works to be completed and the amount, it any, owing to the Contractor and the amount which shall be so certified shall thereupon be paid by the Employer, to the Contractor, or, by the Contractor to the Employer, as the case may be, and the certificate of the Architect / Employer shall be final and conclusive between the parties. On termination of the contract, the contractor shall forthwith remove himself and his workmen from the works site.

(ii) **Default of Employer**

If payment of the amount payable by the Employer under the Certificates of the Architect shall be in arrears and unpaid for 45 (forty five) days after notice in writing requiring payment of the amount shall have been given by the Contractor to the Employer, or the Employer commits any 'Act of Insolvency', or if the Employer being an individual or firm shall be adjudged insolvent or (being an incorporated company) shall have an order made against it or pass an effective resolution for winding up either compulsorily or subject to the supervision of the court or voluntarily, or if the official assignee of the Employer shall repudiate the contract, or if the official assignee or the liquidator in any such winding up fails within 15 (fifteen) days after notice to him requiring him to do so, to show to the reasonable satisfaction of the Contractor that he is able to carry out and fulfill the Contract and to make all payments due, and to

a) become due hereunder and if required by the Contractor, to give security for the same, or if the works be stopped for 3 (three) months under an order of the Architect/ or the Employer or by any injunction or other orders of any court of law, then and in any of the said cases the Contractor shall be at liberty to determine the Contract by notice in writing to the Employer, through the Architect, and he shall be entitled to recover from the employer payment for all works executed and for any loss he may sustain upon any plant or material supplied or purchased or prepared for the purpose of the Contract.
In arriving at the amount of such payment, the net rates or prices quoted for Item rate work contained in the Contractor's original tender shall be followed or where the same may not apply, valuation shall be made in accordance with Clause No. 29 (c) of GCC.

39. (i) **Determination of Contract**

The Employer shall in addition to any other power enabling him to determine the Contract have power to determine the Contract at any time by giving not less than fourteen (14) days notice in writing to the Contractor and on the expiry of such notice the Contractor shall forthwith determine but without prejudice to the claims of either party in respect of any antecedent breach thereof.

(ii) **Compliance with Architect/Employer's Direction on Determination**

If the Contract shall be determined under the provisions of the **Clause no. 39 (i)** the Contractor shall with all reasonable dispatch comply with the directions of the Architect/Employer in respect to:

(a) Cancellation of outstanding commitments

(b) Performance of further work required for the protection of work executed

(c) The removal of Constructional Plant Temporary Works and materials from the Site

(d) Any other matters arising out of the Contract with regard to which the Architect/Employer decides that directions are necessary or expedient.

(iii) **Payment on Determination**

In the event of the Contract being determined under the provisions of this Clause the sum payable to the Contractor shall be such sum as would have been payable under **Clause no. 43** hereof and

(a) The reasonable cost of complying with the Architect/Employer's directions under sub-clause (ii) hereof and

(b) Such reasonable sum as may be agreed between the parties or in default of agreement settled by arbitration in respect of the Contractor's overheads including any sums properly and necessarily incurred as the direct result of such determination.

(iv) The Architect/Employer has a right to ascertain the happening of any contingency, including but not limited to the contingencies listed below, which would vest in the Employer certain powers including, but not limited to, taking possession of the work so far as it has been performed and to completing the work either by himself or by employing some other Agency, retaining property of the Contractor, such as materials, plant or money already due to the Contractor:

a) Failure of Contractor to proceed with or complete the works in the time or manner stipulated

b) Contractor's bankruptcy

c) Failure of Contractor to commence the work

d) Failure of Contractor to regularly proceed with the work for a certain fixed period

e) Failure of Contractor to proceed to the satisfaction of the Employer or the Architect/Employer

e) Failure of Contractor to proceed with the work for any reason independent of prevention by Employer

g) If in the Architect/Employer's opinion, the Contractor is not exercising due diligence and proceeding with such dispatch as will enable the works to be duly completed in time

h) Failure of Contractor in complying with the orders and directions given by the Architect/Employer

i) Failure of Contractor in complying with the Specification, stipulations, conditions or Drawings

j) The Contractor being guilty of any default in the fulfillment of the contract

k) The Contractor leaves the work unfinished

l) Failure of Contractor, after due notice, to rectify defective work

m) The Contractor renouncing materials from site and

n) Failure of Contractor to maintain the works

40. **Work by Other Agencies**

The Employer / Architect reserves the right to use premises and any portions of the site for the execution of any work not included in this contract which it may desire to have carried out by other persons simultaneously, and the Contractor shall allow all reasonable facilities for the execution of such work, but shall not be required to provide any plant or material for the execution of such work except by special arrangement with the Employer. Such work shall be carried out in such manner as not to impede the progress of the works included in the Contract and the Contractor shall not be responsible for any damage or delay which may happen to or occasioned by such work.

41. **Insurance Policies**

On commencement for the work :-

a) The contractor shall take out a suitable C.A.R. Insurance policy covering entire scope of the works under this contract for the value of work as per contract tender conditions and arrange to keep the policy valid till issue of virtual completion certificate/ handing over of the project.

b) The contractor shall take out and submit to the Architect / Employer, a suitable insurance policy against third party risks. The limit of liability of this insurance shall be limited to Rs. 5 Lakh in respect of any one accident or series of accidents arising out of one event or Rs.2.5 Lakh in respect of any passer-by. The policy shall be kept valid, issue of virtual completion certificate/ handing over of the project.

c) The contractor shall take out and submit to Employer a suitable Insurance Policy against Workmen's compensation / Janata Policy as per requirements. The policy shall be kept valid till issue of virtual completion certificate/ handing over of the project.

d) Necessary PF & ESI contribution of contractor's labourers will have to be paid by contractor as per statutory authority's regulations and Employer shall be absolved of all the risk.

e) All the expenditure towards purchase of stamp duty will lie with bidder.

In Respect of Damage to Person and Property :-

From Commencement to Completion, the Contractor shall be responsible for all injury to persons, animal or things and for all structural and decorative damage to property which may arise from operation or neglect of himself or any subcontractor or of any of his or a sub-contractor's employee whether such injury or damage may arise from carelessness, accident or any other cause whether in any way connected with the carrying out of this contract. This clause shall be held to include interalia any damage to building, whether immediately adjacent or otherwise, any damages to roads, streets, footpaths, bridges, or ways as well as all damage to the buildings and works forming the subject of this contract by first or other inclemency weather. The contractor shall indemnify the Employer and hold him harmless in respect of all and

Any expenses arising from any such injury or damage to persons or property as aforesaid and also in respect of any claim made in respect of any award of compensation or damages consequent upon such claim.

The Contractor shall reinstate all damage of every spot mentioned in this clause so as to deliver up the whole of the contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties.

Against third party risks :-

On commencement of the work, the contractor shall take out and submit to the Employer a suitable insurance policy against third party risks. The limits of liability of this insurance shall be as follows:

Rs. 5 Lacs in respect of any one accident or series of accidents arising out of one event. Contractor shall take out third party insurance for 3 no. of such accidents and repetition of the same after three occurrence including visitors like Local Authority, Vendors etc.

CONTRACTOR'S LIABILITY AND INSURANCE SUMMARY

Sr. No	Nature and Scope of Risk	Value of Insurance	Validity Period of Insurance	Name of the Insurer	Insurance Policy No. and
1.	Loss of damage to works or any part thereof and all materials at site from any cause whatsoever. **CAR Policy**	100 % of Contract Amount	The policy shall be valid till issue of virtual completion certificate.	The policy shall be in the joint names of the Employer / Bank	
2.	Damage, Loss or Injury to any Property of the Employer or Consultant to any person including the Employer or Consultant for his Agents and Servants.	upto 3 claims	- DO -	- DO -	
3.	Claims under the Workmen's Compensation Act, 1923	As per Govt. Rules	- DO -	- DO -	

4.	Third party insurance	Contractor shall take out third party insurance for 3 no. of such accidents and repetition of the same after three occurrence including visitors like Local Authority, Vendors etc.	- DO -	- DO -	

42. (i) **Rate of Progress**

All materials and labour to be provided by the Contractor and the mode, manner and speed of execution and maintenance of the Works are to be of a kind and conducted in a manner to the satisfaction of the Architect/Employer. Should the rate of progress of the Works or any part thereof be at any time be in the opinion of the Architect/Employer too slow to ensure the completion of the whole of the Works by the prescribed time or extended time for completion, the Architect/Employer shall so notify the Contractor in writing and the Contractor shall there upon take such steps as considered necessary by the Architect/Employer to expedite progress so as to complete the works by the prescribed time or extended time for completion. Such communication from the Architect/Employer neither shall relieve the contractor from fulfilling obligations under the contract nor he will be entitled to raise claims arising out of such directions.

(ii) **Work during Night or on Holidays**

Subject to any provision to the contrary contained in the Contract none of the permanent work shall save as herein provided be carried on during the night or on Holidays without the permission in writing of the Architect/Employer, save when the work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the Works in which case the Contractor shall immediately advise the Architect/Employer. Provided always that the provisions of this clause shall not be applicable in the case of any work, which becomes essential to carry out by rotary or double shifts in order to achieve the progress & quality of the part of the works being technically required / continued with the prior approval of the Architect/Employer.

All work at night shall be carried out without unreasonable noise and disturbance and with the approval of the Architect/Employer and in addition that of the local authority, if so applicable. The Contractor shall indemnify the Employer from and against any liability for damages on account of noise or other disturbance created while or in carrying out the work and from and against all claims, demands, proceedings, costs, charges and expenses whatsoever in regard or in relation to such liability.

43. **Suspension of Work**

The Contractor shall on the written order of the Architect/Employer in Consultation with EIC suspend the progress of the Works or any part thereof for such time or times and in such manner as the Architect/Employer may consider necessary and shall during such suspension properly protect and secure the work so far as is necessary in the opinion of the Architect/Employer. The extra cost including all running wages to be paid on the Site, salaries, depreciation and maintenance of plant, Site on costs & overhead costs of the Contract relatable to the works done or incurred by the Contractor in giving effect to the Architect/Employer's

instructions under this Clause shall, be borne and paid by the Employer. However, the same will not be payable if the such suspension is :

(a) otherwise provided for in the Contract

OR

(b) necessary by reason of inclement weather conditions affecting adversely the safety or quality of the Works.

OR

(c) necessary by reason of some default on the part of the contractor

Provided that the Contractor shall not be entitled to recover any such extra cost unless he gives notice in writing of his intention to claim to the Architect/Employer within 28 days of the Architect/Employer's order. The Architect/Employer shall settle and determine such extra payment and / or extension of time under relevant Clause hereof to be made to the Contractor in respect of such claim as shall in the opinion of the Architect/Employer be fair and reasonable and the Architect/Employer's decision shall be final and binding.

44. **Settlement of Disputes and Differences**

Except where otherwise provided in the contract all questions and disputes relating to the meaning of the specifications, design, drawings and instructions herein before mentioned and as to the quality of workmanship or materials used on the work or as to any other question, claim, right, manner or thing whatsoever in any way arising out for relating to the contract, designs, drawings, specifications, estimates, instructions, orders or these conditions or otherwise concerning the work or the execution or failure to execute the same whether arising during the progress of the work or after the cancellation, Termination, completion or abandonment thereof shall be dealt with as mentioned herein after.

i) If the contractor considers that he is entitled to any extra payment or compensation in respect of the works over and above the amounts admitted as payable by the Employer **or**

ii) in case the contractor wants to dispute the validity of any deductions or recoveries made or proposed to be made from the contract or raise any dispute, the contractor shall forthwith give notice in writing of his claim, or dispute to the **Chief Manager -Facilities Management, Baroda Corporate Centre** and endorse a copy of the same to the Architect, within 30 days from the date Of disallowance thereof or the date of deduction or recovery. the said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and the contractor shall not be entitled to raise any claim nor shall the Bank be in any way liable in respect of any claim by the contractor unless

notice of such claim shall have been given by the contractor to the **Chief Manager -Facilities Management, Baroda Corporate Centre** in the manner and within the time as aforesaid. The contractor shall be deemed to have waived and extinguished all his rights in respect of any claim not notified to the **Chief Manager -Facilities Management,** in writing in the manner and within the time as aforesaid.

iii) **Chief Manager / Asst. General Manager, Bank of Baroda** shall give his decision in writing on the claims notified by the contractor. The contractor may within 30 days of the receipt of the decision of **Chief Manager -Facilities Management, Baroda Corporate Centre** submit his claims to the conciliating authority namely the **General Manager & Head, Facilities Management, Baroda Corporate Centre** for conciliation along with all details and copies of correspondence exchanged between him and the **Chief Manager.**

45. **Arbitration**

If the conciliation proceedings are terminated without settlement of the disputes, the contractor shall, within a period of 30 days of termination thereof shall give a notice to the concerned **General Manager & Head, Facilities Management, Baroda Corporate Centre** for appointment of an Arbitrator to adjudicate the notified claims failing which the claims of the contractor shall be deemed to have been considered absolutely barred and waived.

Except where the decision has become final, binding and conclusive in terms of the contract, all disputes or differences arising out of the notified claims of the contractor as aforesaid and all claims of the Bank shall be referred for adjudication through arbitration by the sole Arbitrator appointed by the **General Manager & Head, Facilities Management, Baroda Corporate Centre.** It will also be no objection to any such appointment that the Arbitrator so appointed is a Bank office and that he had to deal with matter to which the contract relates in the course of his duties as Bank officer. If the Arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reason whatsoever another sole Arbitrator shall be appointed in the manner aforesaid by the said the **General Manager & Head, Facilities Management, Baroda Corporate Centre.** Such person shall be entitled to proceed with the reference from the stage be entitled to proceed with the reference from the stage at which it was left by his Predecessor.

It is a term of this contract that the party invoking arbitration shall give a list of disputes with amount claimed in respect of each dispute along with the notice for appointment of arbitrator. It is also a term of this contract that no person other than a person appointed by such the **General Manager & Head, Facilities Management, Baroda Corporate Centre** as aforesaid should act as Arbitrator. The conciliation and arbitration shall be conducted in accordance with the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or re - enactment thereof and the rules made there under. It is also a term of the contract that if any fees are payable to the arbitrator these shall be paid equally by both the parties. However, no fees will be payable to the arbitrator if he is a

Bank officer. It is also a term of the contract that the arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their statement of claims and counter statement of claims. The venue of the arbitration shall be such place as may be fixed by the arbitrator in his sole discretion. The fees, if any, of the arbitrator shall, if required to be paid before the award is made and published, be paid half and half by each of the parties. The cost of the reference and of the award (including the fees, if any of the arbitrator) shall be in the discretion of the arbitrator who may direct to any by whom and in what manner, such costs or any part thereof, shall be paid and fix or settle the amount of costs to be so paid.

49. **Interference with Traffic and Adjoining Properties**

All operations necessary for the execution of the Works and for the construction of any Temporary Works shall so far as in compliance with the requirements of the Contract permits be carried on so as not to interfere unnecessarily or improperly with the public convenience or the access to use and occupation of public or private roads and footpaths or to or of properties whether in the possession of the Employer or of any other person and the Contractor shall save harmless and indemnify the Employer in respect of all claims, demands, proceedings, damages, costs, charges and expense whatsoever arising out of or in relation to any such matters in so far as the Contractor is responsible.

51. (i) **Contractor to Keep Site Clear**

During the progress of the works the Contractor shall keep the site reasonably free from all unnecessary obstruction and shall store or dispose of any constructional plant and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works which are no longer required.

(ii) **Clearance of Site on Completion**

On the completion of the Works the Contractor shall clear away and remove from the site all constructional plant, surplus materials, rubbish and temporary works of every kind and leave the whole of the site and works clean and in a workmanlike condition to the full satisfaction of the Architect/Employer / local authorities not later than 30 days from the virtual completion of the works or by such other later date as fixed by the Architect/Employer.

52. (ii) **Incorporation of Clause in Sub-Contracts**

Sub-contracting or back to back contracting not allowed. The Contractor shall when entering into any sub-contract for the execution of any specialized work incorporate in such sub-contract by reference or otherwise the provisions of this Clause in relation to Constructional Plant, Temporary

Works and Materials, Essential Hired Plant and Hire Purchase Plant brought on to the site by the Specialist Agency.

53. **Labour Laws**

53.1 The Contractor shall at all times during the continuance of the Contract, comply fully with all existing Acts, regulations and bylaws including all statutory amendments and re-enactment of State or Central Government and other local authorities and any other enactments, notifications and acts that may be passed in future either by the State or the Central Government or local authority, including Indian Workmen's Compensation Act. Contract Labour (Regulation and Abolition) Act 1970 and Equal Remuneration Act 1976, Factories Act, Minimum Wages Act, Provident Fund Regulations, Employees Provident Fund Act, schemes made under the same Act and also Labour Regulations as revised Health and Sanitary Arrangement for Workmen, Insurance and other benefits and shall keep Employer indemnified in case any action is commenced by competent authorities for contravention by the Contractor. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated henceforth on the part of the Contractor, the Interior Designer / Employer shall have the right to deduct from any money due to the Contractor, his amount of Performance Security or recover from the Contractor personally any sum required or estimated to be required for making good the loss or damage suffered by the Employer, responsibility in connection with the employees of the contractor, who shall, in no case, be treated as the employees of the Employer at any point of time.

53.2 Fair Wages:

The Contractor shall pay the labourers engaged by him on the work not less than fair wage which expression shall mean, whether for time of piecework, the respective rates of wages fixed by the local authorities as fair wages for the area payable to the different categories of labourers or those notified under the Minimum Wages Act for corresponding employees of the Employer, whichever may be higher.

53.3 The Contractor shall, notwithstanding the provisions of a contract to the contrary, cause to be paid a fair wage to labourers indirectly engaged on the Works, including any labour engaged by sub/contractors in connection with the said works as if the labourers had been directly employed by him.

53.4 **Notices:**

The Contractor shall before he commences the work, display, and correctly maintain in a clean and legible condition at a conspicuous place on the Site, notices in English and in a language spoken by the majority of the workers, stating therein the rate of wages which have been fixed as fair wages and the hours of work for which such wages are earned and send a copy of such notices to the Architect.

53.5 Record of wages etc.

The contractor shall maintain records of wages and other remuneration paid to his employees in such form as may be convenient and as per the requirements of the Employer/Architect and the Conciliation Officer (central), Ministry of Labour Government

of India, or such other authorized person appointed by the central or State Government and the same shall include the following particulars of each worker :

a. Name, worker's number and grade;

b. Rate of daily or monthly wage;

c. Nature of work on which employed;

d. Total number of days worked during each wage period;

e. Total, amount payable for the work during each wage period; All deductions made from the wage with details in each case of the ground for which the deduction is made;

f. Wage actually paid for each wage period.

g. The Contractor shall provide a Wage Slip for each worker, employed on the Works.

h. The Wage records and Wage Slips shall be preserved for at least 12 months after the last entry for Inspection of Wage Records.

i. The Contractor shall allow inspection of the aforesaid Wage Records and Wage Slips to the Architect/Employer and to any of his workers or to his agent at a convenient time and place after due notice is received, or to the Employer or any other person authorized by him on his behalf.

j. The Architect/Employer or any other person authorized by them on their behalf shall have power to make enquiries with a view to ascertaining and enforcing due and proper observance of the Fair Wages Clause. He shall also have the Power to investigate into any complaint regarding any default made by the Contractor or subcontractor in regard to such provision.

k. No party shall be represented by a legal practitioner in any investigation or inquiry under this Clause, unless Architect/Employer agree otherwise.

54. Safety Code

The Contractor shall comply with all the precautions as required for the safety of the workmen by the I.L.O. Convention No. 62 as far as they are applicable to the Contract. The Contractor shall provide all necessary safety appliances, gears like goggles, helmets, masks, etc. to the workmen and the staff.

SCAFFOLDS

i. Suitable scaffolds shall be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except in the case of short duration work which can be done safely from ladders. When a ladder is used, it shall be of rigid construction made either of good quality of wood or steel. The steps shall have a minimum width of 450 mm and a maximum rise of 300 mm. Suitable hand holds of good quality wood or steel shall be provided and the

ii. Scaffolding or staging more than 4m. above the ground floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly bolted, braced or otherwise secured, at least 1 m. above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

iii. Working platforms, gangways and stairways shall be so constructed that they do not sag unduly or unequally and if the height of the platform, gangway or stairway is more than 4 m. above ground level or floor level, they shall be closely boarded and shall have adequate width and be suitably fenced as described in (ii) above.

iv. Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 1 m. Wherever there are open excavations in ground, they shall be fenced of by suitable railing and danger signals installed at night so as to prevent persons slipping into the excavations.

v. Safe means of access shall be provided to all working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9m. in length while the width between side rails in rung ladder shall in no case, be less than 290mm. for ladder up to and including 3m. in length. For longer ladders this width shall be increased at least 20mm for each additional meter of length.

vi. A sketch of the ladders and scaffolds proposed to be used shall be prepared and approval of the Architect/Employer obtained prior to construction.

vii. All personnel of the contractor working within the plant site shall be provided with safety helmets. All welders shall wear welding goggles while doing welding work and all metal workers shall be provided with safety gloves. Persons employed on metal cutting and grinding shall wear safety glasses.

viii. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public.

DEMOLITION

a. Before any demolition work is commenced and also during the process of the work:

b. No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.

c. All practical steps shall be taken to prevent danger to persons employed from the risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

PERSONAL SAFETY EQUIPMENTS

i. All necessary personal safety equipment as considered adequate by the site Architect/Employer should be kept available for the use of the person employed on 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.

a) Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles.

b) Those engaged in white washing and mixing or stacking of cement bags or any material which is injuries to the eyes shall be provided with protective goggles.

c) Those engaged in welding works shall be provided with welder's protective eye sight lids.

d) The contractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead or any toxic material in any form. Wherever men above the age of 18 are employed on the work of such painting the following precautions should be taken:

e) No paint containing lead or lead products shall be used except in the form of paste or readymade paint. Paints like vinyl and epoxies having toxic fumes should be applied after following all precautions laid down by manufacturers.

f) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.

ii. Overalls shall be supplied by the contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.

iii. When the work is done near any public place where there is risk of drowning all necessary equipments should be provided and kept 'ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

iv. 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 constructions sound material and adequate strength and free from patent defect and shall be kept in good repair and in good working order.

b) Every rope used in hoisting or lowering materials or as means of suspension shall be of durable quality and adequate strength and free from patent defects.

v. Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years shall be in charge of any hoisting machine including any scaffolding which or give signals to operator.

vi. In case of every hoisting machine and of every chain ring hook, shackle shovel and pulley block used in hoisting or as means of suspension the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load, each safe working load and the. Conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

vii. In case of departmental machines, the safe working load shall be notified by the site Architect/Employer. As regards contractor's machines, the contractor shall notify the safe working load of the machine to the Architect/Employer whenever he brings any machinery to site of work and get it verified by the Architect/Employer concerned.

viii. Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce to the minimum of the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulated mats, wearing apparel, such as gloves, sleeves and boots as may be necessary, should be provided. The workers should not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

ix. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.

x. These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place at work spot. The person responsible for compliance of the safety code shall be named therein by the contractor.

xi. To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by the Labour Officer, Architect/Employers of the Department or their representatives.

xii. Notwithstanding the above clause from (i) to (xviii), there is nothing in these to exempt the contractor from the operations of any other Act or Rule in force in the Republic of India.

First Aid:

At every workplace, there shall be maintained in a readily accessible place first aid appliances including an adequate supply of sterilized dressings and sterilized cotton wool as prescribed in the Factory Rules of the State in which the work is carried on. The appliances shall be kept in good order and, in large workplaces; they shall be placed under the charge of a responsible person who shall be readily available during working hours.

Accommodation for Labour:

The Contractor shall during the progress of the Work provide, erect and maintain necessary temporary living accommodation and ancillary for labour at his own expenses.

Payment of Wages

a. Wages due to every worker shall be paid to him direct. All wages should by paid in current coins or currency or in both.

b. Wages of every worker employed on the Contract shall be paid where the wage period is one week, within THREE days from the end of the Wage period, and in any other case before the expiry of the 7th day or 10th day from the end of the wage period according as the number of workers does not exceed 1,000 or exceeds 1,000.

NOTE: The term "Working Day" means a day on which the work on which the labour is employed is in progress.

Employment Card:

The Contractor shall issue an employment card in the Form appended to these regulations to each worker on the day of work or entry into his employment. If a worker already has any such card with him issued by the previous employer, the Contractor shall merely endorse that Employment Card with relevant entries. On termination of employment, the Employment Card shall again be endorsed by the Contractor and returned to the worker.

Register of Wages, etc.:

i) A Register of Wages cum Muster Roll in the Form appended to these regulations shall be maintained and kept at the Work Site or as near to it as possible.

ii) A wage slip in the form appended to these regulations shall be issued to every worker employed by the Contractor at least a day prior to disbursement of wages.

55. Force Majeure

Conditions of Force Majeure

The terms “Force Majeure” as employed herein shall mean act of God, war, revolt, riot, fire, flood and Acts & Regulations of respective Governments of the two parties namely the Employer and the Contractor.

Note : ‘Typhoon’, ‘Cyclones’, ‘Hurricanes’, ‘Tornado’ are covered under act of God.

In the event of either party being rendered unable by force majeure to perform any of obligations required to be performed by them under the Contract, the relative obligation of the party affected by such Force Majeure shall upon notification to the other party be suspended for the period of delay, which is directly caused by such Force Majeure event.

Upon the occurrence of such cause and upon its termination, the party alleging that it has been rendered unable as aforesaid thereby, shall notify the other party in writing within (72) seventy two hours of the alleged beginning and ending thereof giving full particulars and satisfactory evidence in support of its claim.

Time for performance of the relative obligation suspended by the Force Majeure shall then stand extended by the period of delay, which is directly caused by Force Majeure event. The party who has given such notice shall be executed from timely performance of its obligations under the Contract, for so long as the relevant event of Force Majeure continues and to the extent that such parties performance is prevented, hindered or delayed, provided the party or parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect thereof upon its performance of the Contract and so to fulfill its obligations under the Contract.

If works to be executed by the Contractor are suspended by Force Majeure conditions lasting for more than (2) two months, the Employer shall have the option of cancelling or terminating this Contact in whole or part thereof at Employer’s discretion. Upon such termination provisions of Clause 39 shall apply.

Delay or non-performance by a party hereto caused by the occurrence of any of Force Majeure shall not:

a) Constitute a default or breach of the Contract,

b) Give rise to any claim for damages or additional cost or expense occasioned there by: if such delay or non-performance is caused by the occurrence of any event of Force Majeure. Force Majeure conditions shall not be payable under any circumstances.

56. The bidders must use online website to fill in the rates. (Any addition/ alteration in the text of the tender form made by the tenderer shall not be valid and would be liable of rejection).

57 The tender form must be filled in English and all entries must be typed properly. The rate and amount should be in figures and words. If any of the documents is missing or unsigned, the tender may be considered invalid by the Bank Representative in its discretion.

58 Rates should be quoted both in figures and in words in columns specified. All erasures and alterations made while filling the tender must be attested by initials of the bidder. Overwriting of figures is not permitted and failure to comply with either of these conditions will render the tender void at the Bank's option. No advice of any change in rate or conditions after the opening of the tender will be entertained.

59 Each of the Tender documents should be signed by the person or persons submitting the tender in token of his/their having acquainted himself/themselves with the General Conditions of Contract, General Specifications, Special Conditions etc., as laid down. Any tender with any of the documents not so signed will be rejected.

60 The tender submitted on behalf of a firm shall be signed by all the partners of the firm or by a partner who has the necessary authority on behalf of the firm to enter into the proposed contract. Otherwise the tender may be rejected by the Bank.

61. The Bank does not bind itself to accept the lowest or any tender and reserves to itself the right to accept or reject any or all the tenders, either in whole or in part, without assigning any reasons for doing so.

62 The Contractor shall not, without the written consent of the Bank assign this Contract, and shall not without the written consent of the Bank (which consent shall not be unreasonably withheld to the prejudice of the Contractor) sublet any portion of the work.
Bank may serve a notice in writing on the Contractor rescinding the contract, whereupon the security deposit shall stand forfeited to the Employer, without prejudice to his/other remedies against the Contractor.

63 The Contractor shall carry out all the work strictly in accordance with drawings, details and instructions of Bank's Architect & Engineer. If in the opinion of the Bank Representative, changes have to be made in the design and with the prior approval in writing of the Bank's Representative, they desire the Contractor to carry out the same, the Contractor shall carry out the same without any extra charge.

64 A schedule of Probable Quantities in respect of each work and Specifications accompany these Special Conditions. The Schedule of Probable Quantities is liable to alterations by omissions, deductions or additions at the discretion of the Bank. Each tender should contain not only the rates but also the value of each item of work entered in a separate column and all the amounts quoted against various items should be totaled in order to

show the aggregate value of the entire tender.

65 The bidder must obtain for himself on his own responsibility and at his own expense all the information which may be necessary for the purpose of making a tender and for entering into a contract and must examine the Drawings, inspect the site of the work, acquaint himself with all local conditions, means of access of the work, nature of the work and all matters pertaining thereof.

66 The rates quoted in the tender shall include all charges for clearing of site before commencement as well as after completion, water, electric consumption, meters, double scaffolding, centering, boxing, staging, planking, timbering and pumping out water including bailing, fencing, hoarding, plant and equipment, storage sheds, watching and lighting, by night as well as day including Sundays and Holidays, temporary plumbing and electric supply, protection of the public and safety of adjacent roads, streets. The rates quoted shall be deemed to be for the finished work to be measured at site. The rates shall also be firm and shall not be subject to exchange variations, Labour conditions, fluctuations in railway freights or any conditions whatsoever. *Tenderers must include in their rates GST, sales tax, excise duty, octroi, sales tax on VAT, Service Tax and any other tax and duty or other levy levied by the central government or any State Government or local authority, if applicable. No claim in respect of sales tax, excise duty, Octroi or other tax duty or levy whether existing or future shall be entertained by the employer*.

67 The Contractor should note that unless otherwise stated the tender is strictly on item rate basis and his attention is drawn to the fact that rates for each and every item should be correct, workable and self supporting. The quantities in the Schedule of Quantities approximately indicate the total extent of work but may vary to any extent and may even be omitted thus altering the aggregate value of the Contract.

68. Time allowed for carrying out the work as mentioned in the tender document shall be strictly observed by the successful bidder and it shall be reckoned from the seventh day after written order to commence the work is issued.

69 The Contractor shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or executing the work, whatever the cause of delays may be, including delays arising out of modification to the work entrusted to him.

70 The successful tenderer is bound to carry out any or all items of work necessary for the completion of the job even though such items are not included in the quantities and rates. Schedule of instructions in respect of such additional items and their quantities will be issued in writing by Bank.

71 The contractor must bear in mind that all the work shall be carried out strictly in accordance with the specifications made by the Bank and also in compliance of the requirements of the local public authorities and no deviation on any account will be permitted.

72 The bidder shall have to use materials of the makes/manufacturers specified in the list of material approved brand and/or manufacture contained in this tender form.

73 The contractor shall strictly comply with the provision of safety code annexed hereto.

74 I.S. Code numbers wherever mentioned in the tender shall be the latest version of I.S. codes as on the date of opening of Tenders.

76 **CONTRACTOR TO INFORM HIMSELF FULLY:**

The contractor shall be deemed to have carefully examined the work and sited conditions including Labour, the general and special conditions, the specifications, schedules and drawings and shall be deemed to have visited the site of work, to have fully informed himself regarding the local conditions and carried out his own investigations to arrive at the rates quoted in the tender. In this regard he will be given necessary information available with the department but without any guarantee about its accuracy.

If the contractor shall have any doubt as to the meaning of any portion of the general conditions, or the special conditions or the scope of the work or the specifications and drawings or any other matter concerning the contract he shall in good time, before submitting his tender, put forth the particulars thereof and submit them to the Bank, Mumbai in writing in order that such doubts may be clarified authoritatively in writing before tendering. Once a tender is submitted the matter will be decided according to tender conditions in the absence of such authentic pre-clarification.

I/We hereby declare that I/We have read and understood the above instructions for the guidance of tenderers.

Witness Signature …… **Contractor's Signature……**

Addresses…… **Address……..**

…… **……**

Date…… **Date……**

X- Special Condition of Contract

Materials & workmanship to confirm to description	All materials and workmanship shall so far as procurable be of the respective kinds described in the Schedule of Quantities and/or Specifications and in accordance with the Bank's instructions, and the Contractor shall upon the request of the Bank furnish it with all invoices, accounts, receipts and other vouchers to prove that the materials comply therewith. The Contractor shall at his own cost arrange for and/or carry out any test of any materials which the Bank may require as per the testing schedule of tender.
Contractor's superintendence and representative on the works.	The Contractor shall give all necessary personal superintendence during the execution of the works, and as long thereafter as the Bank may consider necessary until the expiry of the "Defects Liability Period" stated in the Appendix hereto.
Dismissal of workmen.	The Contractor shall on the request of the Bank immediately dismiss from the works any person employed thereon by him who may, in the opinion of the Bank be incompetent or misconduct himself and such persons shall not be again employed on the works without the permission of the Bank.
Access to works	The Employer, their respective representatives shall at all reasonable times have free access to the work and/ or to the workshops, factories or other places where materials are lying or from which they are being obtained and the Contractor shall give every facility to the Employer.
Schedule of Quantities.	The Schedule of Quantities, unless otherwise stated shall be deemed to have been prepared in accordance with the Standard Method of Measurement.
Sufficiency of Schedule of quantities	The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the prices stated in the Schedule of Quantities, and/or the Schedule of Rates and Prices which rates and prices shall cover all his obligations under the Contract, and all matters and things necessary for the proper completion of the works.
Measurement of works	The Bank may from time to time intimate to the Contractor and Employer that he requires the works to be measured, and the Contractor shall forthwith attend or send a qualified Agent to assist the Bank. The Contractor Should not attend or neglect or omit to send such Agent then the measurement taken by the Bank shall be taken to be correct measurements of the works. Such measurements shall be taken in

	accordance with the Mode of Measurements detailed in the Specifications. The Contractor or his Agency may at the time of measurement take such notes and measurements as he may require.
Unfixed materials when taken into account to be the property of the Employer.	Where in any Certificate (of which the Contractor has received payment), the Bank has included the value of any unfixed materials intended for and/or placed on or adjacent to the works such materials shall become the property of the Employer and they shall not be removed except for use upon the works, without the written authority of the Bank. The Contractor shall be liable for any loss of or damage to, such materials.
Defects after virtual completion.	Any defect, shrinkage, settlement or other faults which may appear within the "Defects Liability Period" stated in the Appendix hereto or, if none stated, then within twelve months after the virtual completion of the works, arising in the opinion of the Bank from materials or workmanship not in accordance with the contract, shall upon the directions in writing of the Bank, and within such reasonable time as shall be specified therein, be amended and made good by the Contractor, at his own cost and in case of default the Employer may employ and pay other persons to amend and make good such defects, shrinkage, settlement or other faults, and all damages loss and expenses consequent thereon or incidental thereto shall be made good and borne by the Contractor and such damage, loss and expenses shall be recoverable from him by the Employer.
Certificate of virtual completion & defects liability period.	The works shall not be considered as completed until the Bank has certified in writing that they have been virtually completed. The Defects Liability Period shall commence from the date of such Certificate.
Other persons employed by Employer.	The Employer reserves the right to use premises and any portions of the site for the execution of any work not included in this Contract which it may be desire to have carried out by other persons, and the contractor shall allow all reasonable facilities for the execution of such work, but shall not be required to provide any plant or material for the execution of such work except by special arrangement with the Employer. Such work shall be carried out in such manner as not to impede the progress of the works included in the Contract and the Contractor shall not be responsible for any damage or delay which may happen to or occasioned by such work.
Insurance in respect to damages to	The Contractor shall be responsible for all injury or damage to persons, animals or things and for all damage to property which may arise from

persons and property.

any factor omission on the part of the Contractor or any Sub-Contractor or any nominated Sub-Contractor or any of their employees. The liability under this clause shall cover also, interalia any damages to structures, whether immediately adjacent to the works or otherwise; any damage to roads, streets, footpaths, bridges as well as damage caused to the building and other structures and works forming the subject matter of this contract. The contractor shall also be responsible for any damage caused to the buildings and other structures and works forming the subject, matter of this contract due to rain, wind, frost or other inclemency of weather. The contractor shall, indemnify and keep indemnified the employer and hold him harmless in respect of all and any loss and expenses arising from any such injury or damage to persons or property as aforesaid and also against any claim made in respect of injury or damage, whether under any statute or otherwise and also in respect of any award or compensation or damage consequent upon such claims. The Contractor shall, at his own expense, effect and maintain till issue of the virtual completion certificate under this contract, with an insurance company approved by the Employer, an All Risk Policy for Insurance for the full amount of the contract in the joint names of the employer and the contractor (the name of the former being placed first in the policy) against all risk as per the standard all risk policy for contractors and deposit such policy or policies with the employer before commencing the works.

The Contractor shall reinstate all damage of every sort mentioned in this clause so as to do delivery of the whole of the works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to property or third parties.

The Contractor shall also indemnify and keep indemnified the Employer against all claims which may be made against the Employer by any person in respect of anything which may arise in respect of the works or in consequence thereof and shall at his own expense, effect and maintain until the virtual completion of the contract, with an Insurance Company approved by the employer a policy of Insurance in the joint names of the Employer and the Contractor (name of the former being placed first in the policy) against such risk and deposit such policy or policies before commencement of the works.

The minimum limit of the coverage under the policy shall be Rs.2 lakhs per person for any one accident or occurrence and Rs.5 lakhs in respect of damage to property for any one accident or occurrence. The contractor shall also indemnify the employer against all claim which may be made upon the Employer, whether under the Workmen's Compensation Act or any other statute in force, during the currency of this contract or at Common Law in respect of any employee of the contractor or of Sub-Contractor and shall be at his own expense effect and maintain until the virtual completion of the contract, or with an

Insurance Company, approved by the Employer, a policy of insurance against such risks and deposit such policy or policies with the Employer from time to time during the currency of this contract.

In default of the contractor insuring as provided above, the employer may so insure and may deduct the premiums paid from any moneys due or which may become due to the contractor.

The contractor shall be responsible for any liability which may not be covered by the Insurance Policies referred to above and also for all other damages to any person, animal or defective carrying out of this contract, whatever, may be the reasons due to which the damage shall have been caused.

The contractor shall also indemnify and keep Indemnified the Employer against all and any costs, charges or expenses arising out of any claim or proceedings relating to the works and also in respect of any of damage or compensation arising there from.

Without prejudice to the other rights of the employer against contractors in respect of such default, the employer shall be entitled to deduct from any sums payable to the contractor the amount of any damages, compensation costs, charges and other expenses paid by the employer and which are payable by the contractor under this clause.

The Contractor shall upon settlement by the insurer of any claim made against the insurer pursuant to a policy taken under this clause, proceed with due diligence to rebuild or repair the works destroyed or damaged. In this event all the money received from the Insurer in respect of such damage shall be paid to the Contractor and the contractor shall not be entitled to any further payment in respect of the expenditure incurred for rebuilding or repairing of the materials or goods destroyed or damaged.

The contractor, in case of re-building or reinstatement after damage shall be entitled to such extension of time for completion as the Bank deem fit, but shall, however, not be entitled to reimbursement by the employer of any shortfall or deficiency in the amount finally paid by the insurer in settlement of any claim arising as set out herein

Date of commencement and completion.

The Contractor shall be allowed admittance to the site on the “Date of Commencement” stated in the Appendix hereto, or such later date as may be specified by the Bank and he shall thereupon and forthwith begin the works and shall regularly proceed with and complete the same (except such painting or other decorative work as the Bank may desire to delay) on or before the “Date of Completion” stated in the Appendix subject nevertheless to the provisions for extension of time hereinafter contained.

Damage for non-completion	If the Contractor fails to complete the works by the date stated in the Appendix or within any extended time reasonably to have been completed the Contractor shall pay the Employer the sum named in the work order as “Liquidated Damages” for the period during which the said work shall so remain incomplete and the employer may deduct such damage from any moneys due to Contractor.
Delay and extension of time.	If in the opinion of the Bank the works be delayed (a) by force majeure or (b) by reason of any exceptionally inclement weather or (c) by reason of proceedings taken or threatened by or dispute with adjoining or neighboring owners or public authorities arising otherwise than through the Contractor’s own default or (d) by the works or delays of other Contractors or Tradesmen engaged or nominated by the Employer or the Bank and not referred to in the Schedule of Quantities and/or Specification or (e) by reason of Bank’s instructions as per Clause 2 hereof or (f) by reason of civil commotion, local combination of workmen or strike or lockout affecting any of the building trades or (g) in consequences of the Contractor not having received in due time necessary instructions from the Bank for which he shall have specifically applied in writing or (h) from other causes which the Bank may certify as beyond the control of contractor or (i) in the event, the value of work exceed the value of the priced schedule of quantities owing to variations the Bank may with previous approval in writing make fair and reasonable extension of time for completion of the Contract Works. In case of such strike or lockout the Contractor shall immediately give written notice thereof to the Bank but the Contractor shall nevertheless constantly use his endeavors to prevent delay and shall do all that may reasonably be required to the satisfaction of the Bank to proceed with work. If the Contractor needs an extension of time for the completion of the work or if the completion of work gets delayed for any reason beyond due date of completion stipulated in the contract, the Contractor shall apply to the Employer for extension of time in writing at least 7 days before the expiry of the scheduled time and while applying for extension of time Contractor shall furnish the reasons in detail and his justification, if any, for delays. Only that period of extension of time as granted by the Employer (on receipt of the application from the contractor or even in absence of any such application) will qualify for exemption of imposition of liquidated damages. Further, the contract shall remain in force even for the period beyond the due date of completion irrespective whether the Contractor has applied or not, for the grant of extension of time for completion unless the Employer decides to terminate the contract. The delay for completion of work for any reason will not entail any right to the contractor to claim any revision of rates or any extra compensation for any reason.
Termination of	If the Contractor being an individual or a firm commits any “act of

contract by The Employer	insolvency", or shall be adjudged an 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 and the Official Assignee or the Liquidator of such acts of insolvency or winding up, as the case may be, shall be unable within seven days after notice to him requiring him to do so, to show to the reasonable satisfaction of the Bank that he is able to carry out and fulfill the Contract and to give security therefore, if so required by the Bank. Or if the Contractor (when and individual, firm or incorporated Company) shall suffer execution or other process of Court attaching property to be issued against the Contractor. 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 sublet this Contract without the consent in writing of the Employer first had and obtained. Or shall charge or encumber this Contract or any payments due or which may become due to the Contractor hereunder.
Certificates and payments	The Contractor shall be paid by the Employer from time to time by installments under Interim Certificates to be issued by the Bank to the Contractor on account of the works executed when in the opinion of the Bank, found complete.
Settlement of disputes try arbitration.	All disputes and differences of any kind whatever arising out of or in connection with the contract or the carrying out of the works (whether during the progress of the works or within 12 months from the date of virtual completion of the work and whether before or within 12 months of determination abandonment or breach of the contract) shall be referred to giving inter-alia full details of the matter under dispute like quantities, rates, amount claimed and the reason thereto and settled by the Bank. The Arbitrator shall have power to open up, review and revise any Certificate, opinion, decision requisition or notice, save in regard to the excepted matters, referred to in the preceding Clause and to determine all matters in dispute which shall be submitted to arbitration and of which notice shall have been given as aforesaid. The Arbitrator shall make his award within one year (or such further extended time as may be decided by him or them as the case may be with the consent of the parties) from the date of entering on the reference. In case during the arbitration proceedings the parties mutually settle, compromise or compound their dispute or difference, the reference to arbitration, the reference to arbitration and the appointment of the Arbitrator shall be deemed to have been revoked and the

arbitration proceedings shall stand withdrawn or terminated, with effect from the date on which the parties file a joint memorandum of settlement thereof; with the Arbitrator or the Arbitrators as the case may be.

The submission shall be deemed to be a submission to arbitration within the meaning of the Indian Arbitration Act, 1996 or any statutory modification thereof.

It is agreed that the Contractor shall not delay the carrying out of the works by reason of any such matter, question or dispute being referred to arbitration, but shall proceed with the works with all due diligence and shall, until the decision of the Arbitrator or Arbitrators as the case may be, is given.

Right of Technical Scrutiny of Final Bill.	The Employer shall have a right to cause a technical examination of the works by any of the persons or organization as appointed by the employer and the final bill of the Contractor including all supporting vouchers, abstracts, etc. If as a result of this examination or otherwise any sum is found to have been overpaid or over certified it shall be lawful for the Employer to recover the sum from any payment due to the Contractor for this works or any other works being carried out by the contractors elsewhere under the BANK OF BARODA.
Employer entitled to recover compensation paid to workmen.	If, for any reason, the Employer is obliged, by virtue of the provisions of the Workmen's Compensation Act, 1923, or any statutory modification or re-enactment thereof to pay compensation to a workman employed by the Contractor in execution of the works, the Employer shall be entitled to recover from the Contractor the amount of compensation so paid, and without prejudice to the rights of the Employer under the said Act. The Employer shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by the Employer to the Contractor under this contract or otherwise. The Employer shall not be bound to contest any claim made against it under the said Act, except on the written request of the contractor and upon his giving to the Employer full security to the satisfaction of the Employer for all costs for which the Employer might become liable in consequence of contesting such claim.
Return of surplus materials	Notwithstanding anything to the contrary contained in any or all the clause of this Contract, where any material for the execution of the Contract is procured with the assistance of the Employer by purchases made under orders or permits or licenses issued by Government, the Contractor shall held the said materials economically and solely for the purpose of the Contract and not dispose of them without the prior written permission of the Employer and return it to the Employer, if required by the Employer, at the mutually agreed price. Price is inclusive of sales tax, octroi and other such levies paid by Contractor in respect thereof. In the event of breach of the aforesaid condition, the Contract shall, in addition

	to being liable to action for contravention of the terms of licenses or permit and or criminal breach of trust, be liable to Employer for all moneys, advantages or profits resulting or which in the usual course would have resulted to him by reason of such breach.
Right of Employer to terminate contract in the event of death of contractor if individual.	Without prejudice to any of the rights or remedies under this contract, it the Contractor, being an individual, dies, the Employer shall have the option of termination the contract without incurring any liability for such termination.

XI-INTEGRITY PACT (IP)

MODEL PRE-CONTRACT INTEGRITY PACT
(MAY BE MODIFIED AS PER PROJECT)

General

This pre-bid pre-contract Agreement (hereinafter called the Integrity Pact) is made on _____ day of _____ Month,

20____, between, on one hand, Bank of Baroda, a body corporate constituted under the Banking Companies (Acquisitions and Transfer of Undertakings) Act, 1970 having its head office at Mandvi Baroda, and its corporate office at Baroda Corporate Centre, C-26, G-Block, Bandra Kurla Complex, Bandra East, Mumbai-400051 (hereinafter called the "BUYER", which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns) of the First Part and M/s _____ represented by Shri _____, Chief Executive Officer (hereinafter called the "BIDDER/Seller" which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns) of the Second Part.

WHEREAS the BUYER proposes to procure (Name of the Stores/Equipment/Item/Services) and the BIDDER/Seller is willing to offer/has offered the said stores/equipment/item/services and

WHEREAS the BIDDER is a private company/public company/Government undertaking/partnership/registered export agency, constituted in accordance with the relevant law in the matter and the BUYER is a Public Sector Undertaking performing its functions on behalf of the President of India.

NOW, THEREFORE, To avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to :-

Enabling the BUYER to obtain the desired said stores/equipment at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and

Enabling BIDDERs to abstain from bribing or indulging in any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the BUYER will commit to prevent corruption, in any form, by its officials by following transparent procedures.

The parties hereto hereby agree to enter into this Integrity Pact and agree as follows:

1. **Independent Monitors**

1.1 Shri Harishwar Dayal has been appointed Independent External Monitors (hereinafter referred to as Monitors) for this Pact in consultation with the Central Vigilance Commission. The name and e-mail address of the IEM is as follows:

Name: Shri Harishwar Dayal

E-mail: dayalagra@gmail.com

1.2 The task of the Monitors shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this Pact.

1.3 The Monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.

1.4 Both the parties accept that the Monitors have the right to access all the documents relating to the project/procurement, including minutes of meetings.

1.5 As soon as the Monitor notices, or has reason to believe, a violation of this Pact, he will so inform the Authority designated by the BUYER.

1.6 The BIDDER(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the BUYER including that provided by the BIDDER. The BIDDER will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor shall be under contractual obligation to treat the information and documents of the BIDDER/Subcontractor(s) with confidentiality.

1.7 The BUYER will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the parties. The parties will offer to the Monitor the option to participate in such meetings.

1.8 The Monitor will submit a written report to the designated Authority of BUYER/Secretary in the Department/ within 8 to 10 weeks from the date of reference or intimation to him by the BUYER I BIDDER and, should the occasion arise, submit proposals for correcting problematic situations.

2. Facilitation of Investigation

In case of any allegation of violation of any provisions of this Pact or payment of commission, the BUYER or its agencies shall be entitled to examine all the documents including the Books of Accounts of the BIDDER and the BIDDER shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.

3. Law and Place of Jurisdiction

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the BUYER.

4. Other Legal Actions

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

5. Validity

The validity of this Integrity Pact shall be from date of its signing and extend upto 5 years or the complete execution of the contract to the satisfaction of both the BUYER and the BIDDER/Seller, including warranty period, whichever is later. In case BIDDER is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract.

5.1 Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intentions.

6. The parties hereby sign this Integrity Pact at _____ on _____

BUYER	BIDDER
Name of the Officer:	Chief Executive Officer
Designation:	Department:
Witness	Witness
1. _____	1. _____
2. _____	2. _____

1. Photographs :

During construction, the date stamp photographs shall be taken by the contractor each month and submitted to the Engineer-In-charge, showing details of specific requirements / measures being taken by the contractor towards above for documentary compliance and records.

XII-PROFORMAS & ANNEXURES

PROFORMAS & ANNEXURES

ANNEXURE – A NOTICE OF COMMENCEMENT / COMPLETION OF CONTRACT WORK

ANNEXURE – B FORTNIGHTLY PROGRESS REPORT

ANNEXURE – C RECEIPT & CONSUMPTION OF MATERIALS AT SITE

ANNEXURE – D MEASUREMENT BOOK (Interior Decoration WORK)

ANNEXURE – E RUNNING A/C BILL

ANNEXURE – F R. A. BILL CERTIFICATE

ANNEXURE – G PROFORMA OF UNDERTAKING IN CONNECTION WITH PAY MENTS OF ADVANCE ON MATERIALS BROUGHT BY THE CON TRACTORS TO THE SITE

ANNEXURE – H CERTIFICATE OF PAYMENT BY THE ARCHITECT

ANNEXURE – I HINDRANCE REGISTER

ANNEXURE – J EXTENSION OF TIME LIMIT

BARODA CORPORATE CENTRE ,BANK OF BARODA,BKC,MUMBAI-51

PROFORMA & ANNEXURES

ANNEXURE – A

PROFORMA OF NOTICE OF COMMENCEMENT / COMPLETION OF CONTRACT WORK

1. Name and principle employer & address

2. No. and date of certificate of registration

3. I / we hereby intimate that the contract work _____ (Name of work) given to _____ (Name and address of the Contractor) having License No. _____ dated _____ has commenced / has been completed with effect from _____ (date) / on _____ (date).

Signature of the Principle

Employer

The Inspector,

_____

_____

_____

PROFORMA & ANNEXURES

ANNEXURE – B

PROFORMA OF MONTHLY PROGRESS REPORT

Name of work
Progress report for the month
Report No.

Sr. No.	Description	Details of location where works is done	Approximate quantity executed

A. **GENERAL FURNISHING WORK**

1. Overall progress
2. Carpentry work, Partitions (half & full), Storage
3. Carpentry work for Meeting Rooms, Storages
4. False ceiling/Flooring/Wall Cladding
5. Loose furniture, Tables in cabins etc.

Sr. No.	Description of work	Date of Commencement	Due date of Completion	Percentage Progress Achieved

PROFORMA & ANNEXURES

ANNEXURE - C

RECEIPT & CONSUMPTION OF MATERIALS AT SITE

Sr. No.	Description	Opening Balance	Receipt during month	Consumption during month	Closing balance	Total quantity received till date

PROFORMA & ANNEXURES

ANNEXURE – D

MEASUREMENT BOOK (Interior Decoration Work)

Item. No.	Description	Measurements No.			Quantity
		L	B	D/H	

PROFORMA & ANNEXURES

ANNEXURE – E

I - RUNNING A/C BILL MEASUREMENTS

1. Name of Contractor / Agency

2. Name of work

3. Sr. No. of this bill

4. No. and date of previous bill

5. Reference to Agreement No.

6. Date of written order to commence

7. Date of completion as per agreement

Sr. No.	Item Description	Unit	Rate (Rs.)	As per Tender
1	2	3	4	5

Upto previous R/A. Bill		Upto date (Cumulative)		Present Bill		
Qty.	Amount (Rs.)	Qty.	Amount (Rs.)	Qty.	Amount (Rs.)	Remarks
6.	7.	8.	9.	10.	11.	12.

Note: 1) if part rate is allowed for any item, it should be indicated with reasons for allowing such a rate

2) if adoc payment is made, it should be mentioned specifically

_____

Net values since
Previous bill

PROFORMA & ANNEXURES

ANNEXURE – F

R.A. BILL CERTIFICATE

The measurements on the basis of which the above entries for the running bill no. : _____ were made have been taken jointly on_____ and are recorded at pages _____ to _____ of Measurement Book No. _____

Signature and date of Contractor

Signature and date of Architect/ Representative (seal)

The work recorded in the above mentioned measurements has been done at the site satisfactory as per tender drawings, conditions and specification.

Architect

Bank's Engineer

PROFORMA & ANNEXURES

ANNEXURE – G

PROFORMA OF UNDERTAKING IN CONNECTION WITH PAYMENTS OF ADVANCE ON MATERIALS BROUGHT BY THE CONTRACTORS TO THE SITE

The undertaking made this _____ day of _____ 2022_____ between the Bank of Baroda _____ and having its _____ office at (hereinafter called the Employer) of the one part and _____ (hereinafter called the Contractors of the other part).

The Employer and the Contractors have entered into an Agreement dated _____ hereinafter called as the said agreement and in terms of clause no. _____ of the conditions in the agreement, the Employer has agreed that the Contractors will be paid an advance of 75 % of the cost of non-perishable building materials brought by the Contractor to the site for consumption in the works at the discretion of the Employer.

The Contractors have applied to the Employer that they be allowed advances on the security of materials absolutely belonging to them and brought by them to the site of work. The Employer has agreed to do so on the terms and hereinafter set out.

Not this Letter of Undertaking witnesses that in consideration of the said agreement and in consideration of the amount paid / payable to the Contractors by the Employer and / or any further advances as may be made to the Contractors as aforesaid, the Contractors hereby agree with the Employer and undertake as under:

i) The amount advanced by the Employer to the Contractors as aforesaid and all or any further sum or sums advanced as aforesaid shall be employed by the Contractors in or towards expediting the execution of the said works and for no other purpose whatsoever.

ii) That the materials which have been offered to and accepted by the Employer as security are absolutely the Contractors own property and free from encumbrances of any kind and the Contractor will not make any application for or receive a further advance on the security of materials which are not absolutely his own property and free from encumbrances of any kind and the Contractors indemnify the Employer against all claims to any materials in respect of which an advance has been made to them as aforesaid.

iii) That the materials on the security of which any further advance or advances may hereafter be made as aforesaid (hereinafter called the said materials) shall be used by the Contractors solely in the execution of the said works in accordance with the directions of _____ of the Employer and accordance with the terms of the said agreement.

iv) That the contractors shall take their own cost all the necessary and adequate arrangement for the proper watch, safe custody and protection against all risks of the site of the said works in the

contractors custody and on their own responsibility and shall at all times be open to inspection to the Employer's Engineers or any Officer authorized by the Employer. In the event of the materials or any part thereof being stolen, destroyed or damaged, the Contractors will further replace the same with other materials of like quality or repair and make good the same as required by the Employer.

v) That the said materials shall not on any account be removed from the site of the said works except with the written permission of the_____ of Bank of Baroda.

vi) That the advances shall be repayable in full when or before the Contractors receive payment from the Employer of the price payable to them for the said works under the terms and the provisions of the said agreement provided that if any intermediate payments are made to the Contractors on account of work done, then on occasion of each such payment, the Employer will be at liberty to make a recovery from the Contractors bill for such payment by deducting there from the value of the said materials then actually used in the construction and in respect of which recovery has not been made previously, the value for this purpose being determined in respect of each description of materials at the rates at which the amount of the advances made under these presents were calculated.

vii) That if the Contractors shall at any time make any default in the performances or observance in any respect of any of the terms and provisions of the said agreement or of these presents, the total amount of advance or advances that may still be owing to the Employer, shall immediately on the happening of such default be repayable by the Contractors to the Employer together with interest thereon at 12% per annum from the date or respective dates of such advance or advances to the date of repayment and with all costs, charges, damages and expenses incurred by the Employer in or for the recovery thereof or the enforcement of this security or otherwise by reason of the default of the Contractors and the Contractors hereby covenant and agree with the Employer to repay and pay the same respectively to him accordingly.

viii) That the Contractors hereby charge all the said materials with the repayment to the Employer of the sum or sums advanced as aforesaid and all costs, charges, damages and expenses payable under these presents PROVIDED ALWAYS and it is hereby agreed and declared that notwithstanding anything in the said agreement and without prejudice to the powers contained therein if and whenever the covenant for payment and repayment hereinabove contained shall become enforceable and the money owing shall not be paid in accordance therewith, the Employer may at any time thereafter adopt all or any of the following courses as he may deem best:

ix) Seize and utilize the said materials or any part thereof in the completion of the said works on behalf of the Contractors in accordance with the provisions in that behalf contained in the said agreement debiting the Contractors with the actual cost of effecting such completion and the amount due in respect of advances under these presents and crediting the Contractors with the value of work done as if he had carried it out in accordance with the said agreement and at the

rates thereby provided. If the balance is against the Contractors, they are bound to pay the same to the Employer on demand.

x) Remove and sell by public auction the seized materials or any part thereof and out of the moneys arising from the sale, retain all the sums aforesaid repayable or payable to the Employer under these presents and pay over the surplus (if any) to the Contractor.

xi) Deduct all or any part of the money owing out of the Security Deposits or any sum due to the Contractor under the said agreement.

xii) That except in the event of such default on the part of the Contractors as aforesaid, no interest shall be payable on the said advance.

xiii) That in the event on any conflict between the provisions of these presents and the said agreement, the provisions of these presents shah prevail and in the event of any dispute or difference arising over the construction of effect of these presents the settlement of which has not been herein before expressly provided for the same shall be referred to the Officer in charge, Premises Department , whose decision shall be final and no appeal shall lie against his decision before any court, arbitrator or authority.

xiv) The provision of this Undertaking shall be deemed to be supplemental to the said agreement.

IN WITNESS WHEREOF the Contractors have set their hands to these presents the day and year first hereinabove written.

Signed, sealed and delivered by the said Contractors in the presence of Witness:

Signature

Name

Address

PROFORMA & ANNEXURES

ANNEXURE – H

PROFORMA OF CERTIFICATE OF PAYMENT BY the ARCHITECT

Certificate No. Interim	**Dated**	
Client:	Project No.	Interior Refurbishment Work
	Particulars:	
Contractor:	Contract / Letter No.	Dated:
	Contract's Bill No.	Dated:

This is to certify that the amount given below (*) is due to your contractors for the work done by them and / or against materials delivered at site and/or for advance towards contract on the above referred project.

Advance against contract:

Less: Advance adjusted to date

Balance Advance

Advance against material delivered at site

Amount of work done to date

Total

Less: Retention on work done

Less: Previously certified upto

Present Certificate (*)

Rupees _____

The cost of interior items or any other material supplied by you or payments made by you directly if any, and not covered herein above, should be adjusted before making the payment of the certified amount (*)

Necessary Deduction U/S 194C of the Income Tax 1961 and sales tax may be made before paying the above certified amount.

By a copy of this letter, we are intimating the contractors to call on you for the necessary payment. Remarks, if any

Details of insurance policy are enclosed .

Enclosures: Bill

Signature of the Architect

PROFORMA & ANNEXURES

ANNEXURE – I

PROFORMA OF HINDRANCE REGISTER

Name of the work : Date of state of work:

Name of Contractor : Period of Completion:

Agreement No. : Date of completion:

Sr. No.	Nature of Hindrance	Date of Occurrence of Hindrance	Date of which Hindrance was removed	Period of Hindrance	Signature of PMC	Remarks
1	2	3	4	5	6	7

_____

Architect :

PROFORMA & ANNEXURES

ANNEXURE – J

APPLICATION OF PROFORMA FOR EXTENSION OF TIME LIMIT

1. Name of Contractor

2. Name of the work as given in the Agreement

3. Agreement No.

4. Estimated Tender Amount.

5. Date of Commencement of work as per Agreement.

6. Period allowed for Completion of work as per Agreement.

7. Date of Completion Stipulated in Agreement.

8. Period for which Extension of Time has been given previously:

   a) 1st Extension vide Architects / Bank letter no. dtd, month, days

   b) 2nd Extension vide Architects / Bank letter no. dtd, month, days

   c) 3rd Extension vide Architects / Bank letter no. dtd, month, days

   d) 4th Extension vide Architects / Bank letter no. dtd, month, days

9. Total Extension previously given.

   a) Reasons for which extensions have been given (copies of the previous application should be attached)

10. Period for which extension is applied for :

11. Hindrances on account of which extension is applied for with dates on Hindrances occurred and the period for which these are likely to last :

a) Serial No.

b) Nature Of Hindrance:

c) Date of Occurrence:

d) Period for which is likely to last :

e) Period for which Extension required for this particulars Hindrance:

f) Overlapping period if any , with to item (e) above

g) Net extension applied for :

h) Remarks if any

12. Extension of time required for extra work

13. Details of extra work and amount involved :

a) Total value of extra work :

b) Proportionate period of extension time on estimated amount put tender

14. Total extension time required for 11 & 12 :

Submitted to the Architect / Employer/Bank's Engineer Incharge

---

Signature of contractor

Date:

XIII-TECHNICAL SPECIFICATION FOR FURNITURE WORK

SPECIFICATION OF MATERIALS

HARDWARE METALS

The hardware throughout shall be approved manufacturer and supply well-made and equal in every respect to the samples to be deposited with the Consultant / Employer. The Contractor may, be required to produce samples from many different source before the Consultants / Employer takes a decision and he should allow, in his rates for doing so.

Fittings generally shall have satin chrome or anodized finish, unless otherwise specified and shall be suitable for their intended purpose as per Consultant / Employer's approval.

Screws are to match the finish of the articles to be filed, and to be round or flat-headed or counter sunk as required.

The Contractor should cover up and protect the Brass and Bronze surfaces with a thick grease or other suitable protective material, renewal as necessary and subsequently clean off and clear on completion.

Aluminum and stainless steel shall be of approved manufacturer and suitable for its particular application. Generally, the surface or aluminum shall have an anodized finish and both shall comply with the samples approved by the Consultant. All stainless steel sheets shall be 304 S.S. Japan or equivalent with gauge as specified but not less than 16 GL.

All steel, brass, bronze, aluminum & stainless steel articles, shall be subjected to a reasonable test for strength, if so required the Consultants at the Contractor's expense.

All brazing and welds are to be executed in a clean and smooth manner, rubbed down and left in the flattest and tidiest way particularly where exposed.

Chromium plating shall be in accordance with BS 1224 standard or as per approved specifications for normal outdoor condition shall be on & base material of copper or brass.

GLAZIER

All glass to be of approved manufacture, complying with IS 3542-1966 as per approved quality and sample to be of the qualities specified and free from bubblers, smoke, wanes, air holes and other defects.

Polished plate glass shall be "Glazing Glass" (G.G.) quality that for mirrors shall be "silvering quality" (S.O.) conforming to IS-3438-1965 or as per approved sample and quality. The compound for glazing to metal is to be a special non hardening compound manufactured for the purpose and of a brand and quality approved by the Consultant.

While cutting glass, proper allowances to be made for expansion, each square of glazing to be in one whole sheet. On completion of work, clean all glass inside and out, replace all cracked scratched and broken panes and leave in good condition.

PAINT & POLISHES

All material required for the works shall be of specified and approved manufacturer delivered to the site in the manufacturer containers with the seals etc. unbroken and clearly marked with the manufacturer's name or trade-mark and description of the contents and colour. All materials are to be stored on the site of the work.

Spray painting with approved machines will be permitted only if written approval has been obtained from the Consultant prior to painting. No spraying will be permitted in the case of priming neither coats nor where the soiling of adjacent surfaces is likely to occur. The nozzle and pressure to be so operated as to give an even shade. The paint used for spraying is to comply generally with the specification concerned and is to be specially prepared by the manufacturer for spraying. Thinning of ready mixed paint made for brushing will not be allowed.

Wood preservatives shall be Solingen or other equal and approved impregnating wood preservative and all concealed wood work shall be treated with wood preservative.

All brushes, tools, pots, kettles etc. used in carrying out the work shall be clean and free from foreign matter and are to be thoroughly cleaned out before being used on a different type of class of material.

All iron or steel surface shall be thoroughly scrapped and rubbed with wire brushes and shall be entirely free from rust will scale etc. before applying the priming coat.

Surfaces of the wood work which is to be painted are to be rubbed down and cleaned down to the approval of the Consultants.

Surfaces of previously painted wood work which are to be painted are cleaned down with soap and water, detergent solution or approved solvent to remove dirt, grease etc. whilst wet, the surface shall be flatted down with a suitable abrasive and then rinsed down and allowed to dry. Minor areas of defective paint shall be removed by scrapping back to a firm edge and exposed surface touched in with primer as described and topped with putty. Where wood work has been previously painted or polished and is to be newly polished, scraping, burning off or rubbing down of the surface shall be satisfactorily done. Surfaces of previously painted metal which is to be painted are to be cleaned down and flatted wood work. Minor areas of defective paint and any rust and loose scale shall be removed completely by chipping scrapping and wire brushing back to the bare metal and touched up with primer as described.

Where glued joinery and carpentry work is likely to come in contact with moisture, the glue shall be waterproof. The use of animal glues will not be permitted.

Timber is to be cut to the required sizes and length as soon as practicable after the works are begun and stored under cover so that the air will circulate freely around it. Joinery is to be prepared immediately after the placing of the contract, framed up but not bounded and stored until required for fixing in position, when it is to be bounded and wedged up. Any portions that warp of develop shakes or other defects are to be replaced before wedging up. The whole work is to be formed and finished in a proper

and workmanlike manner, in accordance with the detailed drawings, and fitted with all necessary metal ties, straps belts, screws etc.

Turning bended joints are to be cross tongued with teak tongues and where over 1 ½ thick double cross tongued, joiner work generally is to be finished with fine class prepared surfaces unless otherwise specified.

Templates, boxes and molds shall be accurately set out and rigidly constructed so, as to remain accurate during the time they are in use.

Grounds are to be clean free from large knots, splayed as required plugged and fixed to walls etc. at 150 centers.

Wood plug are to be cut on the twist. Patent plugs or plastic filling may be in lies of wood plugs with the approval of the Architect.

Block board shall be of Mysore, Anchor or P.G. Brand shelves generally shall be constructed of plywood with edging of ½ teak tongued on.

One of the following I.S. specification or such approved adhesives shall be used.

I.S. 851.1957 Synthetic resin adhesive for construction work in wood.
I.S. 849-1957 Cold setting case in glue for wood.

01.	Teak Wood	Means 2nd quality C.P. Teak
	Seasoned	Kiln dried, moisture content less than 12% free from worm holes, loose or dead knots or other defects such as warping, splitting, chemically treated with wood preservatives of approved manufacturer.
02.	Plywood	Plywood shall be closed grain weather proof ply. It will be phenol bonded plywood shall be complying to IS-303-1960
03.	Block Board	Block board to comply with IS-1659.
04.	Particle Board	Complying with IS code No. 1734-1966
	Board (Exterior Grade)	Teak particle board shall have phenol bond and will comply with IS 3478
05.	Veneer	Veneer to have straight grains and will be selected from matching group. Veneer to comply with IS-1328-1930. Anchor brand of Indian Plywood or equivalent.
06.	Laminate	Laminate should be 1.00mm thick from Formica (Standard Range Deco-lam) Super Range / Formica / Royal Touch / Sunmica / Merino / Century / Archid or equivalent approved by Consultant / Employer

PANELLING & FURNITURE

MDF / PLY / GYPSUM

1.0 GENERAL

1.1 Indian Standards

Work shall be carried out to Indian Standards and Code of practices. In absence International standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies / conflict noticed shall be directed to the Architect / Bank for his direction / approval. However as a general rule more stringent specification shall take precedence.

(1)	IS 287	Recommendation for maximum permissible moisture content for timber used for different purposes
(2)	IS 303	Specification for plywood for general purposes
(3)	IS 401	Code of practice for preservation of timber.
(4)	IS 659	Specification for block boards
(5)	IS 710	Specification for marine plywood
(6)	IS 848	Specification for synthetic resin adhesives for plywood
(7)	IS 851	Specification for synthetic resin adhesives for construction work (nonstructural) in wood
(8)	IS 852	Specification for animal glue for general wood working purposes.
(9)	IS 1328	Specification for veneered decorative plywood
(10)	IS 1508	Specification for external for use in synthetic resin adhesives (urea-formaldehyde) plywood.
(11)	IS 1734	Methods of test for plywood
	Part 2	Determination of resistance to dry heat
	Part 3	Determination of fire resistance
	Part 1	Determination of density and moisture content
	Part 10	Determination of compressive strength
	Part 5	Test for adhesion of piles
	Part 18	Impact resistance test on the surface of plywood
	Part 19	Determination of nail and screw holding power
	Part 20	Acidity and alkalinity resistance test
	Part 4	Determination of glue shear strength
	Part 6	Determination of water resistance
(12)	IS 2380	Methods of test for wood particle boards and boards from other lignocellulosic material:
	Part 4	Determination of static bending strength

(13)	IS 3087	Specification for wood particle board for general purpose
(14)	IS 3513	Specification for high and medium density wood laminates (compreg):
	Part 4	Sampling and tests
(15)	IS 4962	Specification for wooden side sliding doors
(16)	IS 5509	Specification for fire retardant plywood
(17)	IS 7638	Method of sampling for plywood, fibre hardboard, insulation boards and particle boards.
(18)	IS 9188	Performance requirements for adhesive for structural laminated wood products for use under exterior exposure condition.
(19)	IS 11215	Methods of determination of moisture content of timber and timber products.
(20)	IS 12077	Code of practice for testing of timbers for plywood manufacture
(21)	IS 12120	Code of practice for preservation of plywood and other panel products.
(22)	IS 12823	Specification for pre-laminated particle boards
(23)	IS 2547	Specification for Gypsum building plaster
(24)	IS 2818	Specification for Indian Hessian
(25)	IS 412	Specification for Expanded metal steel sheets for general purpose.
(26)	IS 2095	Specification for gypsum plaster boards part - 3. Reinforced Gypsum plaster boards (second revision).
(27)	IS 2098	Specification for Asbestos cement building boards
(28)	BS 476	Method for classification of the surface spread of flame of products.
(29)	BS 1142	Specification for fiber building boards
(30)	BS 3046	Specification for adhesives for hanging flexible wall coverings.

1.2 Quality Assurance

1.2.1 Comply with standards specified for material and workmanship

1.2.2 Supervision and workmen employed shall be experienced in field of carpentry works and shall be able to guarantee workmanship and finish of standards as established and approved by the Architect / Bank.

1.2.3 Items specified from specific manufacturer with code no and of approved manufacturer shall be with quality assurance certificate from manufacturer shall be guaranteed for 5 years.

1.2.4 Installer Qualifications

An experienced installer who has completed architectural woodwork (Furniture) similar in material, design and extent to that indicated for this project and whose work has resulted in construction with a record of successful in service performance.

1.2.5 Fabricators Qualifications

A firm experienced in producing architectural woodwork similar to that indicated for this project and with a record of successful in service performance, as well as sufficient production capacity to produce required units.

1.2.6 Mock-ups

Before fabricating and installing interior architectural woodwork, build mock-ups for each form of construction and finish required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build comply with the following requirements, using materials indicated for the completed work:

1. Build mock-ups in the location and size indicated or, if not indicated, as directed by Architect
2. Notify Architect seven days in advance of dates and times when mock-ups will be fabricated and installed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mock-ups before starting interior architectural woodwork fabrication
5. Maintain mock-ups during construction in undisturbed conditions as a standard for judging the completed work.
6. Demolish and remove mock-ups when directed.
7. Approved mock-ups may become part of the completed work if undisturbed at time of substantial completion.

1.3.0 Submittals

1.3.1 For approval the contractor shall submit with detail note

a) Literature / Catalogue of product to be used.

b) Test certificates from independent laboratories conforming that product meets standards specified.

c) Manufacturers certification that product meets / exceeds specification for the project.

d) Include data for wood preservative treatment and chemical treatment from manufacturer and certification by treating plant that treated materials comply with requirement.

e) Literature describing each fabric wall covering product and its suitability for the surface intended shall be submitted. List materials composition of fabric materials including backing.

e) Samples

i) Timber piece - 300x100x60 mm 3 Nos.

ii) Veneers - 300x300mm

iii) Laminates - 300x300 with shade samples

iv) Prelaminated board of exterior quality – 300 X 300 mm

v) MDF Board of exterior quality – 300 x 300mm

v) Samples with polish / paint finish as specified.

vi) Fittings and fixtures samples

vii) Gypsum broad of size 300 x 300mm.

viii) GI channels, runners, studs about 300mm long

ix) 600 x 600mm samples for each type of fabric wall covering

2.0 MATERIAL

2.1 Timber

2.1.1 Timber shall be of quality as specified in BOQ and well-seasoned. When a kind of timber is not specified, good quality teak wood shall be used. It shall have uniform colour, be free from defects such as cracks, dead knots, soft spongy spots and waves of injurious open shapes. Grains shall be reasonably straight. The individual hard and sound knot shall not be larger than 6 sq. cm. The aggregate area of all knots shall not exceed 0.5% area of a piece. All timber is sawn unless otherwise stated.

Planed timber shall be used for external work, fascia large boards and other similar works to the approval of Architect.

2.1.2 All timber shall be treated with chemical wood preservatives and be kiln seasoned to IS 1141 and conform to IS 287 for moisture content. Maximum permissible limit shall be + 3% for average moisture content of all samples from a given lot and + 5% for individual sample of the given lot. This is applicable when thickness of timber is more than 50 mm. Small size tolerance shall be + 2% and + 3% respectively.

2.1.3 Timber used shall be treated with a 5 years guarantee and approved anti-termite treatment. Wood work in contact with masonry or concrete shall be painted with hot bitumen collator before being placed in position.

2.1.4 Timber received at site shall be marked and stamped for approval prior to being used at site.

2.1.5 Sizes specified are not indicative and shall be correct finished sizes within allowable tolerances.

2.1.6 All timber shall be finished to required dimension and texture prior to being treated for chemical preservation.

2.1.7 Readymade factory finished material shall be as specified and shall comply to IS code. It shall be ant termite treated, kiln seasoned.

2.1.8 Timber shall be treated with preservatives when used.

a) For permanent built-in and subjected to humid / damp conditions.

b) Used in exterior places / locations

c) In contact with masonry, plaster, concrete.

2.2 All Block boards and formed boards shall be of specified thickness, uniform in colour texture, finish. They shall comply to IS code and shall bear IS marking. They shall be pressed with exterior quality phenol formaldehyde resin in hot press.

2.3 Prelaminated Boards

Prelaminated boards / high /medium density Fiber boards shall be conforming to IS and shall be with exterior quality adhesive only. Boards with commercial or interior quality adhesive

shall not be used in works. Thickness shall be as specified**.** MDF of exterior grade shall be used. MDF shall be Phenol Formaldehyde bonded and generally conform to IS 3087 – 1965. The laminated board to be of approved colour and shade.

2.4 Lipping and Beading

Lipping and beading of wood particle board shall be done by the conventional method either with a veneer or with wood moulding or plastic moulding. Metal beading shall be done with suitable glue which will hold metal or wood.

2.5 Veneer

3.5 – 4.0mm thick straight grained matching approved veneers shall be used. All the veneer shall be from one lot and shall be group matched so as to be similar in grain and characters. Architect's prior approval of the lots is to be obtained before the same is procured and fixed in position. The veneer shall conform to IS 851 and shall be resin bonded & suitable for the intended use. All veneers shall be with ply back.

2.6 Plastic Laminated Sheets

2.6.1 Plastic laminated sheets shall be 1.0 mm on faces and backing shall be 0.7mm thick with an amino plastic facing, cigarette-proof and shall comply with IS Specification.

2.6.2 Sheets shall be of approved manufacturer from his range in approved colour.

2.7 Gypsum board as manufactured by India Gypsum Ltd. Haryana or equivalent approved. Board shall confirm to CBRI certification. Gypsum board is formed by enclosing and bonding together a core of set Gypsum plaster by two sheets of heavy paper. Board shall be fire resistant, light weight, strong, durable dimensionally stable, smooth surface finished such that ready to receive directly painting, wall papering etc.

2.8 All fittings and fixtures shall be as specified in bills of quantity or on drawing by Architect. Fittings shall be basically of brass or stainless steel and finished as directed. Brass fittings and fixtures may be chrome plated oxidized. Where specified stainless steel / bright finished shall be used. Approved makes only shall be used for respective items.

Fittings shall be guaranteed by the manufacturer for its performance. Woods screws shall be matching and of type as required for each fittings and shall conform to IS.

Nails, screws, pins, dowels, coach screws etc. shall be galvanized or non-ferrous materials when used in exterior locations.

2.9 Adhesives and glue shall be as per IS for exterior quality and water repellent.

2.10 Framing and Rough Lumber shall be of brass, stainless steel as required includes blocking, grounds, furring etc. to be suitable framing members for intended use as approved and specified.

2.11 G.I. sections

Pressed GI sheet metal sections shall be as required for system to be designed for location of its use and to approval of the Bank / Architect.

Pressed GI sheet floor / ceiling channels / runners, Studs, hollow section studs etc. as required shall be of desired designed thickness, size and shape.

2.12 Aluminum

2.12.1 Aluminum Extrusion shall be of fully heat treated aluminum alloy confirming to IS (63400 WP/HE9WP) or equivalent BS standards 6063- T5. Framing material shall comply as under

For extrusion Alloy to BS 6063 - T5 or T6, and ASTM B221

For sheets Alloy to BS 5005 - H16 and ASTM B 209

Other alloys and temper recommended by the manufacturer appropriate for specified finish.

Minimum thickness 2.0 mm for framing members and rails, 1.5mm thick for other intermediate supporting members, 1.8 mm for sheets and for glazing stops and similar components. Glazing beads shall be screw less type fitted into the frames.

2.13 Fabric

2.13.1 Fabric shall be of approved make and shade and fixed with approved adhesive as specified by Architect/Bank. Wall fabric shall achieve Class 1 surface spread of flame.

2.13.2 Sheet cork shall be 6mm thick continuous roll type, fire treated, set with adhesive, polyvinyl acetate.

2.13.3 Mineral fiberboard 20mm thick to wall panel size.

3. Fittings and Fixtures (Ironmongery)

a) All fittings and fixtures shall be detailed in shop drawings, conforming to specification and shall be fixed as per manufacturer's instructions.

b) Fittings and fixtures shall make assembly sturdy and securely placed.

c) Where finishes are to be done on installation remove fixtures and allow painter / polisher to work and on completion refix them.

3.1 Marine Plywood Partition

Providing, constructing & fixing in place MDF/ Marine Plywood Partitions of overall thickness 75mm thick with 50mm x 38mm recycled aluminum framing at every 450mm c/c with 12mm thk. MDF/ Marine Plywood on both sides. All other salient features such as bands, grooves, inlay patties & extra frame work and all other features indicated in drawing or as per instructions of architect to be the same as items of paneling. Mode of measurements also to be same as that of mentioned in paneling items. Cost of partition also to include providing, constructing & fixing MDF frame with necessary rebates of 38mm or 50mm as required to enable fixing of doors (on 3 sides of opening produced). Finishing items to be provided only on visually exposed surfaces of partitions and not on areas covered by storages, tables, fabric etc.

3.2 Gypsum board paneling

Pressed GI metal framing sections in combination of GI wire/section fixed with anchor fasteners to wall providing basic frame work. These are readily available or may be specially fabricated to suit site requirement. Frames are provided @ 450mm c/c. Grid shall be adjusted to suit other requirements to approval of the PM.

G.I. metal frame should be of 22 gauges.

3.3 Gypsum board Partition

Providing & constructing and fixing in place gypsum board partition of overall thickness of 75mm. Partition to have 12mm thk. Gypboard covering done from both sides on existing support members of the partition.

FALSE CEILING

1.0 GENERAL

1.1 Indian Standards

Work shall be carried out to Indian Standards and Code of practices. In absence International standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference guidance only. Any discrepancies / conflict noticed shall be directed to the Architect / EIC for his direction / approval. However as a general rule more stringent specification shall take precedence.

(1)	IS 2547	Specification for Gypsum building plaster
(2)	IS 2818	Specification for Indian Hessian
(3)	IS 412	Specification for Expanded metal steel sheets for general purpose.
(4)	IS 2095	Specification for gypsum plaster board's part - 3. Reinforced Gypsum plaster boards (second revision).
(5)	IS 2098	Specification for Asbestos cement building boards

1.2 Quality Assurance

1.2.1 Materials used shall conform to standards specified.

1.2.2 Material received at site shall be of approved manufacturer and shall certify that material conform to specification or exceeds than those required.

1.2.3 Material is acceptable to local authorities for safety and fire.

1.3 Submittals

1.3.1 The contractor shall submit technical details with test result of manufacturer and of the independent laboratories.

1.3.2 The contractor shall submit shop drawing giving details of

a) Plan and elevation of partition wall

b) Floor, wall, beam, soffit of slab fixing details.

c) Details and type of channels, runners, and studs used to have rigid, secured frame work for fixing boards.

d) Details of fixing boards, jointing details

e) Details of jointing with structural frame work.

f) Position and installation of acoustic / insulation.

1.3.3 Samples of all materials such as GI channels, runners, studs about 300mm long and Gypsum broad of size 300 x 300mm

2.0 MATERIAL

ALL MATERIALS SHOULD BE SATISFYING GREEN BUILDING REQUIREMENTS AND SHALL BE FROM SUGGESTED LIST OF MATERAILS.

2.1 Plaster of Paris ceiling tiles shall be reinforced with hessian cloth. Maximum size shall be limited to 750 mm x 750 mm. Tiles shall be true and exact shape with clean and regular chamfers and shall give a ringing sound when struck. The exposed face shall be truly plane and smooth.

2.2 Metal lath shall confirm to IS and as specified wire netting for metal laths shall be galvanized.

2.3 Gypboard as manufactured by India Gypsum Ltd. Haryana or equivalent approved. Board shall confirm to CBRI certification. Gypboard are formed by enclosing and bonding together a core of set Gypsum plaster by two sheets of heavy paper. Board shall be fire resistant, light weight, strong, durable dimensionally stable, smooth surface finished such that ready to receive directly painting, wall papering.

2.4 Expanded polystyrene or foamed stomper slab ceiling boards and tiles shall be of approved make in specified sizes, thickness, and finished colour.

2.5 Plywood and veneered decorated plywood confirming to IS and as specified may also be used as ceiling lining. Also other material like insulation block boards, wood particle board etc. confirming to IS and as specified shall be used in work.

2.6 Exposed Grid system

Heavy duty (allowable load $\geq$ 23.8 kg/m at 3.33 mm deflection) module of 600mm x 600mm with main and cross tees. Tees shall be galvanized, cold-rolled steel with 15mm flange width, 38mm height, 0.5mm thick main tee, 0.4mm thick cross tee.

Edge moulding shall be minimum 0.5mm thickness galvanized steel, channel or angle shaped with minimum 15mm flange width.

2.7 Suspension system shall be as specified and approved.

2.7.1 G.I. suspension system manufactured from pressed steel metal sheets shall be used. Angles, channels 'Tee's etc. along with GI wire and rawl plug fasteners shall be of approved size as per false ceiling drawing for desired location.

2.7.2 Approved quality wood battens of about 50 x 50mm to 50mm to 25mm as per design and requirement shall be used. Timber shall be kiln seasoned, ant termite treated and finished with a coat of lacquer. Battens shall be fixed with concrete / Masonry or structural steel by using GI screws, nut bolts etc. as required as per detail approved shop drawing.

2.7.3 Aluminum sections suspension system may also be used as specified and approved by the EIC. 100% recycled aluminum, sealants for aluminum to have VOC limits <250 g/l.

3.0 <u>WORKMANSHIP</u>

Wooden battens shall be kiln seasoned, ant termite treated and shall be FSC certified only.

3.1 Suspension system

3.1.1 Pressed GI metal sections in combination of GI wire/section hangers and fixed with anchor fasteners to ceiling providing basic hanging and suspension frame work. These are readily available or may be specially fabricated to suit site requirement. Hangers are provided

@1500 mm c/c on both ways. Grid shall be adjusted to suit other requirements to approval of the Bank/ Architect. G.I. metal frame should be of 22 gauge folded strip of 50mm width.

3.2 Use special corner metal studs and special metal trim corner beads at acute and obtuse corners of inter-sectioning wall and partition.

Aluminum angles / Tees and channels suspended in combination of GI/Aluminum hangers are also provided for creating hanging and suspension framework.

3.3 Wooden frame work shall consist of main and cross batten of specified sections in approved shop drawing. The longitudinal and header scanting shall be so arranged that tiles can be fixed to form the panel arrangement. The frame work shall be treated with approved wood preservative lacquer.

3.4 False ceiling panels

3.4.1 False ceiling may be concealed type or with lay in panels as detailed in BOQ. All lay in panels shall be fixed on back with non-uplifting pins. False ceiling shall be finished as with POP or painting or may be pre finished decorative tiles.

3.4.2 Plaster of Paris ceiling tiles shall be fixed with brass screws. Gypboard and other of shall be fixed such that they are rustles and in combination of suspension or panels not going to cause any harmful effect or get deteriorated. Fixing shall be approved by the Engineer.

3.4.3 False ceiling shall be provided to correct line, level with required finishes as specified.

3.5 Metal lathing Plaster

This shall be carried out to create a false ceiling or surface specially to cover up services behind it. Hence, all services must be tested and approved by the EIC prior to this plastering.

3.5.1 The GI metal lath used shall be of a specified gauge. Lath shall be supported and stretched with long way of the mesh across the support before nailing. Support of timber batten depending upon the location shall be spaced but shall not be greater than 450 mm center to center. Metal lath shall be secured with wooden batten by GI staples or nails and 0.9 mm GI wire. Overlap shall be arranged over intermediate support and not in the corners.

3.5.2 Plastering in lathing shall be carried out in two coats. The first coat shall be with stiff consistency mortar, applied uniformly with a trowel and keyed. It shall be allowed to harden and dry for a minimum period of 3 days. The second coat shall be applied in the usual manner of plastering and finished as specified. Both coats shall be wet cured as detailed earlier.

3.6 Acoustic Suspension system

3.6.1 Tiles shall be tightly butted, all sides of tile supported. Suspension system shall support the ceiling only. All the light fixtures, diffusers, grilles etc. shall be individually supported by supports / hangers. Use one 600 mm tee spline glued with acoustical cement to the back of a 600 mm x 600 mm panel for dimensional stability.

3.6.2 Provide 3.3mm pre-straightened galvanized steel rod hangers 1220 mm o.c. supporting main runners. Where partitions runners are fastened to runners, provide 4.1mm pre-straightened galvanized steel wire hangers to act as stiffeners for ceiling system. Provide clip inserts in structural slab to receive hangers of sufficient strength to support ceiling with a safety factor of 5.

3.7 Points to be checked are

3.7.1 It shall be responsibility of the false ceiling contractor to prepare reflected ceiling layout and get approved prior to start. He shall be responsible to provide and arrange required service doors, cut outs, fixing arrangements to receive light fitting, AC diffusers, Grills, etc.

3.7.2 Prior to start of false ceiling services work above false ceiling is completed.

3.7.3 Edge angle are fixed to correct line and level.

3.7.4 Hangers are located allowing movement of services within false ceiling.

3.7.5 Main and secondary runners are spaced with due care and perfect rigid frame work is achieved to correct line and level.

3.7.6 False ceiling panels shall be fixed with suspension by GI screws/pin etc. Joints shall be well treated and neatly finished as detailed.

4.0 RATES

False ceiling rates shall include

- Required suspension system
- Required false ceiling material
- Required arrangement to receive light fittings, fixtures, AC grills, diffusers, etc.
- Required access service door / shutter
- Masking tape
- Required finishing with POP or approved filler or painting or polishing as case may be.

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WOODEN JOINERY

1.0 GENERAL

1.1 INDIAN STANDARDS

Work shall be carried out to Indian Standards and Code of practices. In absence International standards shall be followed. These shall be latest issue. List given hereunder is not to be considered as conclusive and is for reference and guidance only. Any discrepancies / conflict noticed shall be directed to the Bank/Architect for his direction / approval. However as a general rule more stringent specification shall take precedence.

1. IS 287 Recommendation for maximum permissible moisture content for timber used for different purposes in different zones.
2. IS 401 Code of practice for preservation of timer.
3. IS 848 Specification for synthetic resin adhesives for plywood (phenolic and amino plastic).
4. IS 851 Specification for synthetic resin adhesive for construction (non-structural) in wood.
5. IS 852 Specification for animal glue for general wood working purposes.
6. IS 1003 Specification for timber paneled and glazed shutters
   Part 1 Door shutters

7.	IS 1141	Code of practice for seasoning of timber
8.	IS 1328	Specification for veneered decorative plywood
9.	IS 1508	Specification for external for use in synthetic resin adhesives (urea-formaldehyde) plywood.
10.	IS 2036	Phenolic laminated sheet
11.	IS 2202	Specification for wooden flush door shutter (Solid core type)
		Part I Plywood face panels
		Part II Particleboard and hard board face panels
12.	IS 2221	Method of test for amino plastic molding material
13.	IS 4020	Method of tests for shutters
		Part 1 to 15
14.	IS 4021	Specification for timber doors, window and ventilator frames.
15.	IS 4913	Code of practice for selection, installation and maintenance of timber doors and windows.
16.	IS 7196	Specification for hold fast
17.	IS 7638	Method of sampling for plywood, fiber hardboard, insulation boards and particle boards
18.	IS 9307	Method of Test for wood based structural sandwich construction.
		Part 2 Edgewise compression test.
		Part 3 Flat wise compression test.
		Part 4 Shear test
19.	IS 12120	Code of practice for preservation of plywood and other panel products.

1.2.0 Quality Assurance

1.2.1 Comply with standards specified for material and workmanship

1.2.2 Supervision and workmen employed shall be experienced in field of carpentry works and shall be able to guarantee workmanship and finish of standards as established and approved by the Bank / Architect.

1.2.3 Shutters manufacturer shall have ISI certification and each shutter received at site shall bear stamp of ISI, manufacturer and type of product, batch no., etc.

1.2.4 Shutter manufacturer shall have minimum 7 (seven) years' experience in this product.

1.3.0 Submittals

1.3.1 For approval the contractor shall submit with detail note

a) Literature / Catalogue of product to be used.

b) Test certificates from independent laboratories conforming that product meets standards specified.

c) Manufacturers certification that product meets / exceeds specification for the project.

d) Samples

i) Timber piece - 300x100x60 mm 3 Nos.

ii) Shutter - corner piers showing detail construction.

iii) Veneers - 300x300mm

iv) Laminates - 300x300 with shade samples

v) Samples with polish / paint finish as specified.

vi) Joinery details

1.3.2 Shop Drawings

The contractor shall prepare joinery detail drawing for site measurement. Drawings shall indicate each material, its installation, fixing details, finishing, etc. all in plan, elevation, section and typical details.

2.0 MATERIAL

ALL MATERIALS SHOULD BE SATISFYING GREEN BUILDING REQUIREMENTS AND SHALL BE FROM SUGGESTED LIST OF MATERAILS.

2.1 Timber

2.1.1 All wood used to be FSC certified only. Timber shall be of quality as specified in BOQ and well-seasoned. When a kind of timber is not specified, good quality teak wood shall be used. It shall have uniform color, be free from defects such as cracks, dead knots, soft spongy spots and waves of injurious open shapes. Grains shall be reasonably straight. The individual hard and sound knot shall not be larger than 6 sq. cm. The aggregate area of all knots shall not exceed 0.5% area of a piece. All timber is sawn unless otherwise stated.

2.1.2 All timber shall be treated with chemical wood preservatives and be kiln seasoned to IS 1141 and conform to IS 287 for moisture content. Maximum permissible limit shall be + 3% for average moisture content of all samples from a given lot and + 5% for individual sample of the given lot. This is applicable when thickness of timber is more than 50 mm. Small size tolerance shall be + 2% and + 3% respectively.

2.1.3 Timber used shall be treated with a 10 years guarantee and approved anti-termite treatment. Woodwork in contact with masonry or concrete shall be painted with hot bitumen collator before being placed in position.

2.1.4 Timber received at site shall be marked and stamped for approval prior to being used at site.

2.1.5 Sizes specified are not indicative and shall be correct finished sizes within allowable tolerances.

2.1.6 All timber shall be finished to required dimension and texture prior to being treated for chemical preservation.

2.2 Plywood

2.2.1 Plywood used shall be BWR type, of specified thickness and conforming to IS test as specified. Hardwood will not be accepted in lieu of plywood.

Marine ply shall be used in damp and exposed weather location / conditions.

2.2.2 Veneers of plywood face to be painted or finished with similar treatment or unaccessible needed not be totally free from knots, worm and beetle holes, splits, stains of glue or other acceptable defects.

2.2.3 Plywood face to be natural face finished and shall be totally free from knots, worm and beetle, holes, stains of glue splits or other acceptable defects.

2.3 Shutters

2.3.1 Shutters shall be as specified and shall comply with respective code of practice. Door shutter shall be tested from a laboratory to get confirmation that door shutter comply to IS specifications.

2.3.2 Shutters shall be of specified thickness. They will have natural ply or teak wood veneer finish or 1.2 mm thick melamine sheets as specified. These shall be hot pressed and bonded with water resistant formaldehyde synthetic resin of exterior quality as per IS specifications. The adhesive used for bonding cross band to core and face veneers to cross band shall conform to IS 848 (Phenolic and Amino plastic). Ensure that the adhesives are unaffected by any timber treatment.

2.3.3 Tolerance on width and height shall be + 2 mm. Tolerance on thickness shall be + 1 mm. Thickness of shutter shall be uniform throughout. Variation permissible shall be 0.8 mm.

2.4 All fittings and fixtures shall be as specified in schedule or bills of quantity or as directed by the EIC. It shall be conforming to IS and shall be of Brass of approved make. Fittings shall be guaranteed by the manufacturer for its performance. Woods screws shall be matching and of type as required for each fittings and shall conform to IS.

2.5 Nails / screws

All nails, screws etc. shall be hot dip galvanized or of brass or non-ferrous material.

2.6 Adhesives

Adhesives and glue shall be as per IS for exterior quality and water repellent.

2.7 Approved primer and sealer for the paint shall be used.

3.0 <u>SCOPE OF WORK</u>

3.1 Frames

Size of timber shall be specified in the Bills of Quantities. Frames shall be rebated to house the shutter. They may be rebated on both sides, or rounded or moulded, etc. as per drawing if specifically referred in BOQ. For single rebate, depth shall be 15 mm.

Frames shall be finished smooth to receive paint, polish or any other specified finish. Surface abutting against masonry or concrete must be with ant termite treatment and a coat of boiling coal tar or any other approved wood preservative or primer applied prior to placing in the final position.

3.2 Shutters

Provide approved quality shutter of size and thickness with required fire rating if any as specified in BOQ with required fittings and fixtures, and finished as specified in drawing / BOQ. Work shall include testing at independent laboratory supervision submitting guarantee for quality, fire rating if any etc. to EIC for work and executed.

3.3 Providing, preparing, moulding teak wood architraves of details as given by the Bank/Architect. Work shall including preparing, seasoning, moulding, cutting, fixing with

headless nail, etc. all complete and approved painted or polished as specified by the Bank/Architect.

4.0 WORKMANSHIP

4.1 General

4.1.1 Timber brought at site shall be as approved by the Bank/Architect.

4.1.2 No timber shall be painted, tarred, oiled, etc. before its inspection by the Bank/Architect. Any effort to hide the defects by plugging, painting, etc. shall render the piece to be rejected by the Bank/Architect.

4.1.3 All rejected timber shall be removed at once from the site of work.

4.1.4 All sawing of timber shall be done in straight lines and planes of uniform thickness.

4.1.5 All joints shall be tongued and grooved or of the type shown in the drawings specified in the item or as directed by the Bank/Architect. All joints shall be glued with approved water repellent adhesive.

Joints shall be strong, neat and shall fit without wedging or filling. They shall be pinned with hard wood or bamboo pins of 10- 15 mm dia after the members of the frame are glued and pressed together in a suitable vice-mechanism. Also jointing concealed pins shall be provided.

4.1.6 Prior to joining, wood members of frame shall be planed smooth and accurate to the full depth. Rebates, rounding's, moldings, etc. as shown in the drawing shall be done before the members are joined.

4.1.7 No defects which reduce the strength of the connection are permitted at joints, bearing or assembly connections.

4.1.8 All timber items shall be subjected to inspection by the Bank/Architect prior to any treatment to be carried out. No item shall be installed unless it is approved by the Bank/Architect.

4.2 Shutters

4.2.1 The timber used in core of door shutters shall be from species specified in Appendix of IS 2202 part I. For styles, rails and lapping timber specified in-group 2 of Appendix A shall be used. Moisture content in the timber shall not be more than 12% when tested according to IS 1708.

4.2.2 Timber shall be seasoned, chemically treated and antitermite treated. It shall be free from decay and insect attack.

4.2.3 Plywood used in shutters shall conform to BWR grade.

4.2.4 Cross band used in door shutters shall conform to the requirements laid down in BWR grade plywood.

4.2.5 Adhesives used shall be phenol formaldehyde synthetic resin conforming to BWR type. All bonding such as core members to one another including core frame, lapping, cross band and plywood to core and face veneers to cross band shall be with phenol formaldehyde or as approved exterior quality.

4.2.6 Construction shall conform to specification given in IS 2202 Part I.

4.2.6.1 A frame constructed of styles and rails shall be provided for holding the core. Width shall not be less than 50 mm and more than 100 mm inclusive of lapping if provided.

4.2.6.2 Core may be of wooden strips, particleboard, combination of block board and particleboard.

4.2.6.3 Styles and rails shall be made of one or more pieces glued together.

4.2.6.4 Levelling by planning of surfaces shall be carried out at each stage of construction to eliminate impressions of the core strips on the outside face.

4.2.6.5 Face panel shall be formed by gluing by hot press process on both faces of the core. Face panels shall be minimum 6 mm ply. Direction of grain on face to be vertical.

4.2.6.6 Lapping may be internal or as edge-band as specified and approved by the Bank/Architect. External lapping shall be solid and minimum 6 mm thick on the face of the door. Edge band lapping shall have a total depth of minimum 25 mm. Joints shall not be permitted in lapping.

4.2.6.7 Double leaved shutters shall be rebated meeting either by splayed or square type. Thickness of lapping shall not be less than 35 mm.

4.2.6.8 Opening for glazing and ventilation shall be provided if specified. Opening of glazing shall be lipped internally with solid timber.

4.2.6.9 Shutters shall be shop-prepared for taking mortise locks or latches as may be ordered. Sizes of block for fixing hardware shall conform to IS 2209.

4.2.7 All four edges of shutters shall be square or free from twist or warp in its plane. Both faces shall be sanded to a smooth even texture.

4.2.8 The shutters shall be sampled as per criteria given in Appendix B of IS 2202 part I and tested as per detail given in clause 9 of IS 2202 part I for

a) End Immersion Test

b) Knife Test

c) Glue Adhesion Test

4.3 Fittings and fixtures

The fittings shall be as specified in BOQ or the drawings for door shutters. All fittings and fixtures shall be new, sound and strong, required screws for fixing shall be in the same colour and included in the pricing. Fittings and fixtures shall be as approved by the EIC and conform to IS. Providing and fixing shall also include making grooves, chases, reinforcing, etc. Any fixtures damaged during fixing shall be removed and replaced with new one.

MODE OF MEASUREMENT FOR PAYMENT

01.	Counter	:- Running length along center of the depth of the counter.
02.	Cash	:- Running length along center of the depth of the counter.
03.	Wicket Gate	:- Width X Height
04.	Partitions	:- Length X Height up to the soffit of false ceiling including door frames and doors.
05a.	Paneling with Laminate	:- Length X Height up to the soffit of false ceiling.
05b.	Paneling with T.W. Moulding	:- -do- (including cost of T.W. moulding).
06.	Hexagonal surface	:- Overall external periphery X Height.
07.	Round Surface	:- Length of circumference X Height.
08.	Door	:- Main entrance – Glass – Shutter Length X Height.
09.	Tables	:- In No.
10.	Storage	:- Length X Height.
11.	Sofa	:- Length including armrest – externally measured.
12.	Sofa Chairs	:- Unit
13a.	Galvanized False Ceiling	:- Galvanized bottom surface Length X Breadth
13b.	Plaster of Paris False Ceiling	:- Exposed surface – including moulding (No additional payment will be made for moulding)
13c.	Acrylic False Ceiling	:- Length X Breadth.
14.	Wall Curtain (Window)	:- Finished Length X Finished Height.
15.	Vertical Blinds	:- Actual size of vertical blinds
16.	Notice Boards Etc.	:- Unit / No.
17.	Steel Monogram	:- Unit

18.	Steel letters of various heights	:- No.
19.	Paintings	:- a) Wall surface – Actual length X Height.
		:- b) M.S. Grill / Mesh / Without frame.
		:- c) M.S. Collapsible gate of one side.
		:- d) Cornice – Plain surface of P.O.P. False Ceiling.
		:- e) Fully paneled Door / Windows with frame :- 2.5 times area of one side.
		:- f) Partly Paneled / Partly glazed doors windows, partitions with frame and shutters :- 2 times area of one side.
		:- g) Fully glazed Window / Partition with frame and shutters :- 1 time area of one side.
20.	Granite Flooring	:- Finished Length X Breadth.
21.	Granite in Design	:- Finished Length X Breadth.
22.	Italian Marble	:- Finished Length X Breadth.
23.	P.V.C. Flooring	:- Finished Length X Breadth.
24.	Brick Wall	:- Length X Breadth X Height.
25.	Tiling Dado	:- Length X Breadth.
26.	Pantry Counter With Sink	:- Finished length in Running Fit including sink and tiling dado.
27.	Step / Riser	:- Square Ft.
28.	Breaking	:- Lump Sum.
29.	Fibre Glass Roof	:- Length X Breadth of bottom surface only. :- (No. Curvature shall be considered)
30.	Water proofing on Terrace, Toilet Blocks.	:- Length X Breadth (Area of slab in plan :- wata will not be separately) :- Water proof plaster – Length X Height.
31.	Name Board	:- Length X Height :- (No extra payments for brackets etc.)

32.	Delivery	:- All delivery on site. :- No extra Transportation, Taxes, Octroi etc.
33.	Payment	:- Made only to the principal Contractor, No Payment shall be made to labour, Contractor, supplier or private financier etc.
34.	TAXES	:- *Sales Tax, VAT, Turnover Tax, Central Excise Duty etc*

B . TECHNICAL SPECIFICATION FOR ELECTRICAL WORK

TECHNICAL SPECIFICATIONS FOR ELECTRICAL EQUIPMENTS

1.0 The following Technical Specifications are made applicable for the Stated Job and shall be rigidly adhered to while supplying and installing the materials at site.

1.1 **Codes And Standards** :

1.1.1 The following Codes and Standards shall be applicable for continuous performance of all electrical equipments to be supplied, delivered at site, erected, tested and commissioned. The Electrical equipments offered shall comply to the relevant Indian Standard Specifications, Fire Insurance Regulations, Tariff Advisory Committee's Regulations, and in particular to Indian Electricity Rules in all respects with all its latest amendments up-to-date.

1.1.2 For guidelines to the tenderers, few of the Indian Standards are indicated below:

IS 8084 / 1976	Interconnecting bus-bars for A.C voltage above 1KV up to & including 36KV.
IS 13032 / 1991	A.C miniature circuit breaker board for voltage not exceeding 1000V specification.
IS 3043 / 1987	Code of practice for earthing.
	IS 3427 / 1997 A.C metal enclosed switchgear & control gears for rated voltage above 1KV up to & including 52KV.
IS 3837 / 1976	Accessories for rigid steel conduits for electrical wiring.
IS 13947 / Part3 / 1993	Specification for low voltage switchgear & control gear.
IS 13947 / Part1 / 1993	Specification for low voltage switchgear & control gear.
IS 4615 / 1968	Switch socket outlets (Non-Interlocked type).
IS 5216 / Part1, 2 /1982	Guide for safety procedures & practices in electric work.
IS 5578 / 1984	Guide for marking of insulated conductors.
IS 5820 / 1970	Specification for precast concrete cable covers.
IS 6381 / 1972	Specifications for construction & testing of electrical apparatus with type of protection ‘e’.

IS 10322/ Part1, 2/1982 Specification of luminaries.

IS 10322 /Part3, 4/1984 Specification of luminaries.

IS 10322/Part5 (Sec1,2)/1985 Specification of luminaries.

IS 10322/Part5 (Sec3 to 5)/1987 Specification of luminaries

IS 13947 / Part1 / 1993	Specification for low-voltage switchgear & control gear.
IS 13703 / Part4 / 1993	Specification for low voltage fuse for voltages not exceeding 1000V AC or 1500V DC.
IS 2551 / 1982	Danger notice plates.
IS 2268 / 1994	Call bells / Buzzers.
IS 732 / 1989	Code of practice for electrical wiring installation.
IS 3854 / 1997	Switches for domestic & similar purpose.
IS 2312 / 1967	Exhaust fans.
IS 2309 / 1989	Code of practice for lighting production.

IS 2418 / Part1 to 3/1977 Tubular fluorescent lamps for general lighting service.

IS 1937 / Part3 / 1983	Conduits for electrical installations.
IS 13032 / 1991	AC miniature circuit breaker board for voltage not exceeding 1000V.
IS 2667 / 1988	Fittings for rigid steel conduits for electrical wiring.
IS 2675 / 1983	Enclosed distribution fuse boards cutouts for voltage up to 1000V.

IS 2706 / Part1 to 5/1992 Current transformers.

IS 15086 / Part1 / 2001	Surge arresters.
IS 13925 / Part1 / 1998	Shunt capacitors for AC power systems having a rated voltage above 1000V.
IS 13118 / 1991	Specification for HVAC circuit breakers.
IS 374 / 1979	Ceiling fans.

IS 5578 / 1984	Guide for marking of insulated conductors.
IS 418 / 1978	Tungsten filament general service electrical lamp.
IS 694 / 1990	PVC insulated cable & cords for power / lighting.
IS 13010 / 2002	A.C watt-hour meters.
IS 732 / 1989	Electrical wiring installation (up to 650V).
IS 10870 / 1984	Code of safety for hexane.
IS 1248 / Part1 / 1993	Direct acting indicating instruments & their accessories.
IS 1248 / Part2, 6 /1983	Direct acting indicating instruments & their accessories.
IS 1248 / Part7, 8/1984	Direct acting indicating instruments & their accessories.
IS 1248 / Part9/1983	Direct acting indicating instruments & their accessories.
IS 1293 / 1988	3 pin plugs & socket outlets.
IS 1554/Part1 to 3/1988	PVC insulated cables – heavy duty.
IS 13947/Part 1 to 5/1993	Low voltage switchgear & control gear.
IS 1651 / 1991	Lead acid cell batteries.
IS 9537 / Part 5 / 2000	Conduits for electrical installation.

The entire electrical installation work shall be strictly complied with the Codes Standards, Rules and Regulations framed under the Indian Electricity Act. Further, it shall be carried out as per the Regulations and Rules set out by "Tariff Advisory Committee and/or Fire Insurance Regulations".

Any other IS Codes As applicable at the time of execution over and above whatever stated above. Some of the Rules framed under Indian Electricity Rules of 1956 and all amendments thereof more particularly complied to :-

35, 43, 44, 44-A, 45 (Part-I), 50, 51, 59, 61 (a), 61 (c), 62, 63 (2), 65, 66, 67, 68, 69 and 92 (2).

SPECIFICATION FOR H.T./L.T. SUB-STATION EQUIPMENTS

1.0 **Scope :-**

This Specification covers the design, manufacture, testing and supplying of all substation equipment's required to be installed to complete of the sub-station in all respect and to complete the installation in working condition

2.0 **Applicable Standards :-**

All relevant Indian Standards shall be made applicable with latest amendments. Also any other specific application is required, then the same shall be complied to.

3.0 **440 Volts grade Warning Boards :-**

440 Volts Red Warning Boards of made up of Aluminum sheet and having size of 150 mm x 150 mm x 3 mm thick painted with self illuminated fluorescent “RED” Color paint shall be fixed at prominent places. These shall have minimum 2 languages inscribed on it, mainly Local Language, and English . The Warning Boards shall also have the usual Electrical Shock inscriptions as well as the small mark of Danger on it. These shall be fixed outside of all the electrical rooms and as per directions of Consultant/ Engineer in charge.

4.0 **Rubber Matting :-**

In the front operational part of Medium Voltage Panels a Rubber Matting shall be placed. The Rubber Matting shall be of approved quality of size not less than 1000 mm (wide) x 20 mm (thick). The length of the rubber matting shall be such as to cover the entire working area in front of all the equipment’s placed in the Main LT Room. These shall further comply to relevant standards under Indian Electricity Rules and Codes of Standards. The mats shall be so designed to withstand 11000 Volts for 1 minute and leakage of current shall not exceed 160 mA/square meter.

5.0 **Fire buckets, extinguishers and charts :-**

Fire buckets, Fire extinguishers and charts shall be supplied as per the list given below. The fire buckets shall be made up of galvanised Iron Sheets of approved thickness and painted Red with letters of 'FIRE' written on it. 5 such buckets shall form one set and they shall be hung by means of hook arrangement from a stand prepared out of Round steel bars with supporting frame. This frame work shall also be painted 'RED'.
The fire buckets shall be filled with clean, dry and peddle free sand ready for immediate use for extinguishing fires.
There shall be two such sets kept ready one in the switchyard under a proper weather protection shed and the other inside the HV/LV Room. The number of

Fire extinguishers shall be as per the insportate. These shall be CO2 type and shall be tested at least once in six months on the site, after erection. This shall be as per relevant Indian Standards of minimum 6.8 Kgs. Instructions charts of restoration of persons suffering from Electric shocks in English, Hindi and Marathi shall be displayed in an enclosed wooden/glass frame work, one in the LV Room and the other in the H.V. Room.

6.0 The Contractor has to also ensure the following things during the execution of the job or before starting of any wok/job.

(a) The Rate quoted by the contractor shall include all the associated civil work like cutting, chasing walls, making holes in wall/ceiling for cables and conduits, cable trays, grouting of panels, DB's etc and making good of the same.

(b) The Contractor should employ full time Degree holder site Engineer having minimum Twelve Years experience in the field. Further he should also employ Two Nos. full time Diploma holder site supervisor having minimum Seven years experience.

(c) The Contractor should produce copies of the Supervisors & Workmen licenses prior to start of any work at site.

(d) When there are differences between Specifications and Schedule of quaintness, the superior of the two will be applicable. No additional payment will be entertained. Also Consultants decision in this matter will be final and binding on both the parties.

(e) All changes made by the Architects/Consultants even after approval of shop or working drawings are to be incorporated in the said drawings without any extra cost. The owner will not entertained any claim on this account. Also the contractor has to submit minimum six copies for approval purpose.

(f) All the Measurements shall be taken as per IS standards.

(g) All Tool, Tackle, lifting or any other equipment needed for completion of the job is to be included in scope. No extra payment will be made to the contractor on this account.

(h) The Contractor has to submit Seven Copies of the As Built Drawings plus Four CD for record purpose. Also the contractor has to submit one set of drawings on Reproducible tracing film.

(i) The Contractor has submit Six copes of Operation and Maintenance manuals. Out of Six copies, One copy should be Original.

TECHNICAL SPECIFICATION FOR 415 VOLTS, MAIN LOW TENSION PANEL AND POWER CONTROL CENTRES AND DISTRIBUTION BOARDS

1.0 **Scope :-**

This Specification covers the design, manufacture, testing and supplying at site all LT Distribution Panels in all respect and to complete the installation in working condition

2.0 **Applicable Standards :-**

All relevant Indian Standards shall be made applicable with latest amendments. Also any other specific application is required, then the same shall be complied to.

3.0 **440 Volts grade Warning Boards :-**

All the warning Boards shall be 440 Volts Red in color and made up of Aluminum sheet and having size of 150 mm x 150 mm x 3 mm thick painted with self illuminated fluorescent "RED" Color paint shall be fixed at prominent places. These shall have minimum 2 languages inscribed on it, mainly Local Language, and English . The Warning Boards shall also have the usual Electrical Shock inscriptions as well as the small mark of Danger on it. These shall be fixed on The Main L.T Panel and All the Distribution Panels as per directions of Consultant.

1.1 **General Specification of Equipment :-**

1.2 The scope of work comprises of Designing, Obtaining Approval of the Consultants and Fabricating as per approved Drawings, Testing at Works, Packing and Forwarding, Supplying, at Site, Checking at site, Touching Up all Damaged portions, and assessing the Electrical Contractor while commissioning of the Panels at site. Further Touching up of damaged powder coated painting shall be carried at site after the installation of all panels is completed by the contractor.

1.3 The Main L.T. Panel, Power Control Centers, distribution boards shall be metal clad, totally enclosed, rigid, floor mounting, air-insulated, cubicle type for use on 415 volts, 3 phase 50 cycles system.

1.4 The equipment shall be designed for operation in high ambient temperature and high humidity tropical atmospheric conditions. Means shall be provided to facilitate ease of inspection, cleaning and repairs in the installations where continuity of operation is of prime importance.

1.5 **Standards :-**

The equipment shall be designed to conform to the following requirements and to the latest amendments in the codes or relevant IEC applicable standards.

a) IS 8623 - Part II of 1993 Factory Built Assemblies of switchgear and control gear.

b) IS 13947 - Part I General requirements for switchgears and control gear for voltages not exceeding 1000 Volts.

c) IS 13947 Part I - Degrees of protection provided by enclosures for low voltage switchgear and control-gear.

d) IS 11353 - Marking and arrangement of bus-bars.

e) IEC 660947-1 – General specification for Low voltage Switchgears

f) IEC 60947-2 – For ACB and MCCB

g) IEC 60947-3 – For Switches (Isolators and SDF)

h) IEC 60947-4 For Contactors and BMR

i) IEC 60898 – For MCB

1.6 Individual equipments housed in the power control center shall conform to the following IS specifications :

a) Air Circuit Breakers - IEC 647-2 and IS 13947-2

b) Molded Case Circuit Breakers - IEC 60947-2 and IS 13947-2.

c) HRC Fuse-links - IS.9224 Part II

d) Current Transformers- IS.2705 Part I, II & III of 1992.

e) Voltage Transformers - IS.3156 Part I,II,III &IV of 1992.

f) Relays - IS.3231 Part I, II, & III of 1987

g) Indicating Instruments - IS. 1248 Part I of 1993

h) Control Switches & Push Buttons - IS 13947 Part V Sec -1

i) AC Contractors - IS.13947 Part IV Sec - 4

2.0 **Construction :-**

2.1 The Main LT Panel, Power Control Centers, Distribution boards shall be :-

a) of the metal enclosed, indoor, floor mounted, free standing type.

b) be made up of the minimum 14 Gauge White CRCA Sheets vertical sections, which, when coupled together shall form continuous front operated dead back type switchboards except for Main L.T Panel which shall have back access.

c) Provide dust and vermin proof design. All the Panels should be designed in such a manner that the in Panel Temperature should not rise more than 30 degree Centigrade over an ambient of 45 degree Centigrade. The Vendors has to provide the temp sensors. If the temp of the cubicle increase more than 15 degree over an ambient the Exhaust Fan should be started and even after that the temp of the Bus Bars reaches to 85 degree the Alarm should be stared and should the command to the Main Breaker to Trip . All this provision has be done by the bidder without any extra cost. The Small Exhaust fans with the louvers should be provided for the Main Bus Bar chambers and all the cable alleys. All the fans should have the provision to start and stop by way of MCB. All the

fans should be suitable for continuous duty. All panels cable alleys should have dust proof ventilators with the provision to mount impedance compensated fans

d) be readily extensible on both sides by the addition of vertical sections after removal of the end covers or as otherwise as called for in the schedule of quantities.

2.2 The Main L.T Panel, Power Control Centers and Distribution Boards shall be constructed only of materials capable of withstanding the mechanical, electrical and thermal stresses, as well as the effects of humidity, which are likely to be encountered in normal service.

2.3 Each vertical section shall comprise :-

a) A front framed structure of rolled/folded sheet steel channel section, of minimum 14 Gauge thickness, rigidly bolted together. This structure shall house the components contributing to the major weight of the equipment, such as Air circuit breaker, Molded Case Circuit Breakers, main horizontal bus-bars, vertical risers and other front mounted accessories.

2.3.2 The structure shall be mounted on a rigid base frame fabricated using Galvanized Iron channel of minimum 100 mm height. The design shall ensure that weight of the components is adequately supported without deformation or loss of alignment during transit or during operation. The thick ness of the Galvanizing should be minimum 65 microns and it should be hot dipped.

a) A rear or front cable chamber housing shall be designed in such a manner that enough space is available for clamping of the cable cores terminating the same on the terminals. The design shall ensure generous availability of space for case of installation and maintenance of cabling, and adequately safety for working in one vertical section without coming into accidental contact with live parts in an adjacent section.

b) Galvanised Powder Coated Sheets of 18 gauge shall be provided inside all the horizontal and vertical Bus bar chamber and cable alleys. After the removal of the Bus Cover these painted sheets should be visible this is to be provided for ventilation purpose and to avoid direct access to Bus Bars or live parts after the removal of the Bus-bar covers. The size of the holes shall be less than 12.5 mm in diameter. This sheets should also go under seven tank painting process and should be power coated Egg Shell white in color. This sheets shall be fixed using magnetic locks and the ball catch fixed to the Main body.

c) All the doors should be fitted with neoprene gaskets with fasteners designed to ensure proper compression of gaskets. When covers are provided in place of doors, generous overlap shall be assured between sheet steel surfaces with closely spaced fasteners to preclude the entry of dust.

d) No Black sheets shall allowed. All sheets shall be white CRCA. If it is found at any stage that Black sheets have been used, The panel shall be summarily rejected.

2.4 The height of the panel should not be more than 2100 mm. The total depth of the panel should be adequate to cater for proper cabling space and should not be less than 1200 mm for ACB sections and 450 mm for MCCB sections. The Minimum size of the Compartments for the various sizes of MCCBs/ACBs shall be as shown in the General Arrangement drawings . The Contractor may modify to suit the site conditions.

2.5 Doors and compartment partitions shall be fabricated using 14 Gauge thick sheet steel. Sheet steel shrouds and partitions shall be of minimum 14 Gauge thickness. All sheet steel work forming the exterior of switch boards shall be smoothly finished, leveled and free from flaws. The corners should be rounded. All the Sheet steel forming the exterior of the switch board should be fabricated using 14 gauge White CRCA Sheets. The entire Panel shall be fabricated using 14 Gauge white CRCA Sheets only.

2.6 The apparatus and circuits in the Power Control Centers shall be so arranged as to facilitate their operation and maintenance and at the same time to ensure the necessary degree of safety.

2.7 Apparatus forming part of the Power Control Centers shall have the following recommended minimum clearances for un insulated or should be as per relevant IS Codes.

a) Between Phases - 25 mm.

b) Between Phases and Neutral - 25 mm.

c) Between Phases and Earth - 25 mm.

d) Between Neutral and Earth - 25 mm.

When, for any reason, the above clearances are not available, suitable insulation shall be provided. Clearances shall be maintained during normal service conditions. Creep age distances shall comply to those specified in relevant standards.

2.8 All insulating material used in the construction of the equipment shall be of non-hygroscopic material, duly treated to withstand the effects of high humidity, high temperature tropical ambient service conditions.

2.9 Functional units such as circuit breakers and fuse switches shall be arranged in multi-tier formation. All the Air Circuit Breakers shall housed in a single tier formations Only. Nothing shall be housed above and below the Bus- Coupler. The above and below compartments of the Bus-Coupler/Or shall be kept empty.

2.10 Metallic/insulated barriers shall be provided within vertical sections and between adjacent sections to ensure prevention of accidental contact with :

2.10.1 Main bus-bars and vertical risers during operation, inspection or maintenance of functional units and front mounted accessories.

2.11 All doors/covers providing access to live power equipments circuits shall be provided with tool operated fasteners to prevent unauthorized access.

2.12 Provision shall be made for permanently earthing the frames and other metal parts of the switchgear by two independent connections.

3.0 **METAL TREATMENT AND FINISH :-**

3.1 All steel work used in the construction of the switch board should have undergone a rigorous metal treatment process as follows.

3.1.1 Effective Cleaning by hot alkaline degreasing solution followed by cold water rinsing to remove traces of alkaline solution.

3.1.2 Pickling in dilute sulfuric acid to remove oxide seals and rust formation, if any, followed by cold water rinsing to remove traces of acidic solution.

3.1.3 A recognized phosphating process to facilitate durable coating of the paint on the metal surface and also to prevent the speared of rustling in the event of the paint film being mechanically damaged. This again, shall be followed by hot water rinsing to remove traces of phosphate solution.

3.1.4 Passivating in de-oxalite solution to retain and augment the effects of phosphating.

3.1.5 Drying with compressed air in a dust free atmosphere.

3.1.6 Two coats of granule finished Powder Coating of Siemens gray having shade No. RAL 7032 is to be done from inside and outside of the panel on the phosphate panels on all

exterior and interior side, by wet on wet process, with an interval of 2-3 minutes between coats. One coat involves 2 phases horizontally/ vertically over the entire surface on all exterior and interior side. In any case the thickness of the Paint should not be less than 65 Microns. All the panels shall be Granule finished powder coated painted with Siemens Gray having shade No RAL 7032 from Outside and Inside and dried up in oven.

4.0 **BUS-BARS :-**

4.1 The material of the Bus-Bars shall be electrolytic grade Copper and should have purity more than 99.95% and Conductivity more than 97 IACS. All the Bus Bars should be Tinned Copper throughout the length. The Oxygen contents in Copper should not be more than 10 parts in million. The Copper should be cold drawn and annealed up to 30%. All the Bus Bars should be tested as per relevant IS and latest IEC standard. The Bus Bar manufacture should submit the certificate from original supplier of Bus Bar for purity and oxygen contents in Copper. These shall confirm to I.S 613 of 2000 (Rev III) or the latest amendments. The size of the Bus bars used should be indicated by the Bidder in his Bid and shall be subject to the Consultants approval. For all the Molded Case Circuit Breakers (MCCBs) more than 63 Amps the connections should be done using Tinned Copper Bus bars . The connections to MCCBs

having rating 63 Amps and below can be done using FR Copper flexible of Lapp makes given in the document. To arrive at the bus bar size, the calculations will be based on 1000 Amps. Per sq. inch. The size of the bus bar thus arrived at shall be chosen to the nearest mm. The sizes of the shall be chosen in such a manner that the sizes of the terminals and the sizes of the are matches with each other.

4.2 The shall be suitably braced with non-hygroscopic SMC supports. The Neutral as well as the earth bar should also be cable of withstanding the stresses of electrical fault. Ridges shall be provided on the SMC supports to prevent tracking between adjacent .

4.3 Large clearances and creep age distances shall be provided on the system to minimized the possibility of a fault.

4.4 High tensile bolts and spring washers shall be provided at all joints.

4.5 The cross section of the bus-bars and risers for various ratings shall have been decided on the basis of temperature rise tests results carried out on some other Panels for the stated sections.

4.6 Connections from the main bus-bars to functional circuits shall be arranged and supported so as to withstand without any damage or deformation the thermal and dynamic stresses due to short circuit currents.

4.7 Bus-bars shall be color coded for easy identification of individual phases and neutral.

4.8 All the shall be provided with color coded heat sink sleeves through the full length. Intermittent color bands are not acceptable . The Earth Bus bar shall be provided with green color heat shrink sleeve. The size of the Earth shall be same as the size of the neutral bus bar but in any case it should not be less than 50 x 6 mm Tinned Cooper strip with Heat Shrinkable PVC Sleeve for Main L.T Panel and 25 x 6 mm Tinned Copper Strips for Small Panels.

5.0 **AIR CIRCUIT BREAKERS :-**

5.1 All Air Circuit breakers shall be Triple Pole with Neutral link or Four Pole as specified in the Bill of material or in drawing. All the Breakers shall be air break, horizontal draw out type, designed to be maintained.

5.2 The breakers shall comply fully with IEC 947-2 Or IS 13947-2 and should have microprocessor base trip unit and shall have ICs=ICu=ICw

5.3 A short circuit breaking capacity of not less than 65 KA RMS at 440 Volts 50 Hz AC.

5.4 A short circuit making capacity of 136 KA.

5.5 A short-time withstand circuit of 65 KA for 1 Second.

5.6 All the Circuit Breaker shall confirm to disconnection function and should have fault indication L.E.D

5.7 Air Circuit Breakers having rating 2500 Amps or Below shall have Maintenance free Electrical life of minimum 6000 operations.

5.8 The circuit breakers shall be fitted with detachable arc chutes on each pole designed to permit rapid dispersion, cooling and extinction of the arc. All the accessories shall be snap fitted in design and it should be possible to convert Manually operated Breaker into Electrically operated breaker at site without any major modification.

5.9 Arcing contacts shall be of hard wearing material of copper tungsten or silver tungsten.

5.10 The operating mechanism shall be of robust design, with a minimum number of linkages to ensure maximum reliability. Manually operated circuit breakers shall be provided with spring operated closing mechanism which are independent of speed of manual operation. Electrically operated breakers shall have a motor wound spring charged closing mechanism. Breaker operation shall be independent of the motor which shall be used solely for charging the closing spring.

5.11 The Breaker shall be Trip free type an should be provided with anti pumping function.

5.12 The Microprocessor Based Releases fitted on the Breaker shall confirm to the following

a) Long Time Current Setting and with adjustable Tripping Delay
b) Over Load Signal (LED)
c) Short Time Pick Up and Tripping Delay.
d) Adjustable Instantaneous Pick up.
e) Earth leakage or Earth Fault Pickup and Tripping Delay
f) Earth leakage or Earth Fault Test Button
g) Long Time rating Plug Screw
h) Test Connector.
i) Lamp + Battery test and indication Reset
j) Indication of tripping Cause.
k) High Resolution Screen
l) Measurement Display
m) Maintenance indicators (% Contact Wear Indication)
n) Protection Settings (Over & Under Voltage, Over Under Frequency, Current in balance, Phase Sequence, & Reverse Power)
o) Navigation buttons
p) Hole for Setting lockout pin on cover
q) Communication option
r) Indication option via programmable contacts.
s) Reverse Power Alarm
t) Phase Sequence.

u) Tripping History and Alarm History recorded in two separate history files and same should be displayed on Screen.(for last 10 faults as standalone breaker without communication)

v) All the above parameters should be able to communicated with the PC

w) It should be possible to change IDMT Charities (EIT/VI/DT/SIT &HF) for achieving the discrimination with upstream HV Breaker or a Fuse

5.13 Circuit breakers shall be individually housed in sheet metal cradle fabricated using MS Zinc passivated sheets. The breaker along with its operating mechanism shall be mounted on a robust carriage moving on guide rollers within the cradle. Isolating contacts for both power and control circuits shall be of robust design and fully self-aligning. The assembly shall be designed to allow smooth and easy movement of the breaker within its cradle .

5.14 Operating Mechanism

The operating mechanism shall be of the Open/Closed/Open stored-energy type. The closing springs shall be able to be manually charged by operating the front lever

The circuit breaker shall be of trip free type and shall be provided with built in mechanical Anti Pumping device. Closing coil & other auxiliary devices shall be available in sufficient number for the purpose of indication, alarms, annunciations on switch boards as well as on respective remote control panel in control room & for the purpose of interlocking scheme shall be provided

There shall be four distinct & separate position of the circuit breakers on the cradle as – Service / Test / Isolated / Maintenance. The first three position shall be positive , achieved only through the racking motion of draw out mechanism & not by trail & error. There shall be indicator clearly showing the above 3 conditions Circuit breaker shall be convertible from Manual to Electrical breaker at site.

5.15 The breaker shall have four distinct position within the cradle.

5.16 Service/Test/Isolate and Maintenance. The position shall be positive achieved through the racking handle motion. Their shall be indicator showing the above mentioned four conditions and should be possible to interlock the breaker at each position.

5.17 All Air Circuit Breakers should have molded case design with Class II front facia. All Air Circuit Breakers shall have indication of Mechanical wear of Contacts, enabling visible indication of Contact life.

5.18 Provision shall be available for the padlocking of the circuit breaker access flaps in any of three positions.

5.19 Automatically operated safety shutters shall be provided to screen the fixed isolating contacts when the breaker is drawn out from the cassette.

5.20 Auxiliary switches directly operated by the breaker operating mechanism and having 4 NO and 4 NC contacts, shall be provided on each breaker. The auxiliary switch contacts shall have a minimum rated thermal current of 10 Amps.

5.21 All the Air Circuit Breakers shall confirm to EMC and shall be immune to harmonics to avoid the nuisance tripping of the Breaker. Further all the Breaker shall be provided with RS 485 Communication port with facility to Operate the Breaker from Remote. The Vendor to provide the necessary software suitable to Profy Bus open Protocol.

5.22 The trip unit fitted on the Breaker shall have Thermal memory to store Temperature rise data in case of the respective faults.

5.23 All the Breakers shall have the facility of zone selectivity interlocking and their shall be indication of percentage loading of current in each phase of the Circuit Breaker. All Air circuit Breaker shall comply with IEC – 60947-2 & all incoming Air Circuit breaker should be four pole, electrical draw out type capable of setting Neutral Protection to N or N/2 to ensure precise neutral Protection. Breaking Capacity of Breaker in Main LT Panel shall be Ics = Icu = 65 KA at 440V & Ics = Icu = Icw (for 3 Sec)

5.24 All the breakers should not have any de rating up to 90 degree centigrade on the Main Bus bar terminals (45 degree ambient plus 45 degree rise at the bus bars) and 55 degree ambient inside the cubicle. The breakers shall confirm to the following power loss table. The Manufacture to confirm the same in writing and should be able to show the Test if required by the Consultant. Further all the Microprocessor based releases to be tested for

110 degree centigrade. i.e. it should not malfunction and the results produced by the releases should be type tested.

	Power loss per pole values(watt)	
Ratings	Min	Max
800	93	100
1000	150	230
1250	200	230
1600	210	385
2000	315	465
2500	510	600

3200	570	710
4000	660	900
5000	700	1050
6300	1100	1600

5.25 **Protection and Measurement Function :**

Protection Functions :

All shall have Microprocessor based releases capable of sensing true RMS value of Current based on Digital Technology

All ACB shall confirm to EMC & shall be immune to harmonics to avoid Nuisance tripping

Protection unit shall offer following as standard in all breakers excluding bus couplers

- Long time protection with adjustable time delay.
- Instantaneous or Short ckt protection with time delay. The short circuit setting (Isd) should necessarily be the function of the set current(Ir) of the ACB.
- Earth fault protection with settable absolute values& this protection will be only where specified in BOQ or in Drawing

  For all ACBs above 1250A, the maximum earth fault setting should not exceed 1250A

All the adjustments should be on line & the circuit breaker need not be switched off while adjusting the settings.

The control unit shall have thermal memory throughout the range to store temp rise data in case of repetitive Overloads or earth fault for protecting the cables & loads.

The Trip unit should also give the IDMTL long time protection, minimum & maximum voltage & frequency, voltage & current imbalance, phase sequence & reverse power protection.

Breaker shall have facility of Zone selective interlocking

Measurement Functions

Measurement function should be independent of protection functions & there shall be A power meter with graphical display & bar graph for showing the percentage loading in each phase built in the trip unit.

Communication Function

Main incoming breaker shall be equipped with communication output port & the circuit breaker shall be capable of communicating the following data via a bus:

Circuit-breaker status (open/closed, connected/disconnected/test, tripped on a fault, ready to close);

Control-unit settings;

Tripping causes;

The measurements processed by the control unit: current, voltage, frequency, power, power quality.

It shall be possible to remotely control the circuit breaker.

It shall be possible to remotely modify circuit-breaker settings:

Settings of the protection functions and the alarms.

Communications functions shall be independent of the control unit.

Main incoming breaker shall also have Event Logging facility for last ten faults, events storing & counting the no of operations & contact wear (electronic)

6.0 **MOULDED CASE CIRCUIT BREAKER :-**

All the MCCBS Shall be suitable for fault braking Capacity as mentioned in the Single line Diagrams but in any case should not be less than 16 KA. All the MCCBs shall be provided with variable Over Current, Short Circuit releases . The variable Earth fault release is optional. The same shall be provided if called for in the schedule of quantity. The MCCBS having rating 250 Amps and the above the releases shall be Microprocessor based only and the MCCBS of lower ratings the releases shall be Thermo magnetic type. All the MCCBS shall have ICs=100% of ICu. All the MCCBS shall conform to disconnection function as per IEC947-2 Section 7.1.2. All four pole MCCBS above 250 Amps shall have capability of setting Neutral to N or N/2. All accessories of MCCBS shall be snap fitted type . All MCCBS should have flexibility of Line Load reversibility. Manufacture should submit let through energy curves and discrimination charts and cascading table for the approval of the consultant prior to ordering the MCCBS. All the MCCBS should be designed in such a way that no live parts is accessible. All the MCCBS should comply to IEC 60947-2 and IS 13947-2. All the MCCBS should have three clear positions ON/OFF and TRIP. The Manufacturer to Provide direct or extended Rotary handle with door interlock facility for all the rating of the MCCBS. All the MCCBS should be suitable for total discrimination. The MCCBs having rating more than 250 Amps shall have communication option which should able to display the status of each breaker and its setting, Control the circuit breakers and

display the faults. All MCCB's shall be double break the current limiting type enabling full use of current limitation. Operating mechanism shall be of the quick make quick break type, with the speed of operation independent of the operator, and mechanically trip free from the operating handle so as to revert the contacts from being held closed against short-circuit and overload conditions. The operating mechanism shall be constructed to operate all poles in a multi-pole breaker simultaneously during opening, closing and tripped conditions.

Protection Function

All Molded Case Circuit Breakers should have Microprocessor based releases capable of sensing true RMS values of Current based on digital Technology & should have Centralized variable short circuit & overload setting

Electronic trip units shall comply with appendix F of IEC60947-2 standard (measurement of rms current values, electromagnetic compatibility, etc.).

All electronic components shall withstand temperatures up to 125°C. ‘

Earth fault protection if required should be an integral part of the release & should be

adjustable

The control unit shall have thermal memory to store temp rise data in case of repetitive

Overloads or earth fault for protecting the cables & loads.

The accessories like shunt trip, closing trip coils should be continuously rated to avoid the Burning due to sustained command.

The MCCBs should be with Class-2 front fascia in order to avoid any live part exposure in case the front cover is opened for the accessory mounting.

All the Molded Case Circuit Breakers should have load Monitor LED and Adjustable Magnetic Threshold above 200 Amps. All the MCCB,s Should have Trip Unit Interchangeability at site.

The MCCB shall be 3 pole / 4 pole as the need be. In case of 4 pole MCCB, the 4th pole shall be 100% rated.

The MCCB shall be available in fixed / draw-out version as the need be.

It shall be possible to fit accessories on the MCCB such as aux contact, trip indication contact, rotary handle, undervolt coil or shunt trip coil, etc. In case of rotary handle, the same shall have built-in door interlock, defeat & padlocking facility. The rotary handle shall be same as that for SDF or MPCB for better aesthetics.

The MCCB shall be manually operated or motor operated as the need be. It shall be possible to convert the MCCB from manually operated to motorized MCCB and vice-versa.

Electrical

All the MCCB shall be suitable for 690 V ac system voltage.

The MCCB shall be suitable for impulse withstand of 8 kV.

The MCCB shall have short circuit breaking capacity Icu of 18 or 40 or 70 kA rms. The MCCB breaking capacity shall have Icu = 100% of Ics for the entire range.

The MCCB shall have no de rating up to 50°C service temperature. In case the MCCB needs de rating, manufacturer shall declare the de rated current carrying capacity at 50°C service temperature.

The MCCB shall be current limiting and shall have line-load interchangeability without any loss of capacity.

The MCCBs above 100 A, shall have adjustable and properly calibrated overload and short circuit settings.

Trip Unit

The MCCBs up to 630 A shall be with thermo-magnetic trip unit. 800 A & above, the trip unit shall be microprocessor based. Static trip unit shall not be acceptable.

The trip unit shall be capable to accept any change in the setting on-line, without need to switch off the MCCB.

The trip unit shall have overload and short circuit protection. It shall be possible to change the trip unit from thermo-magnetic to microprocessor based and vice-versa.

7.0 MINIATURE CIRCUIT BREAKERS (MCB)

All the Miniature Case Circuit Breakers shall comply fully with IEC 8828-1996 and should have uniform breaking capacity of 10 KA.

7.1 All the MCB shall comply with Isolation function.

7.2 “C” Curve MCBS shall be used for Lighting and other small loads and “D” Curve MCBS should be used for Capacitors and UPS Loads.

7.3 All the accessories of the MCB should be Snap fit type in design.

7.4 The Power loss per pole of the MCB shall be less than as specified in relevant codes of IEC standards and Manufactures shall submit the test certificate for the same.

8.0 **Switch-Disconnector Fuse** –

The SDF shall conform to the latest IS specification IS – 13947 (3)

The SDF shall be suitable for 550 V ac system voltage.

The SDF shall be 3 pole with neutral. In case required, facility shall be available to have switched neutral.

It shall be possible to fit accessories on the SDF such as aux contact, castle-key interlock, etc. The rotary handle shall have built-in door interlock, defeat & padlocking facility. The rotary handle shall be same as that for MCCB or MPCB for better aesthetics.

The SDF shall have quad break mechanism and roller contact system for longer life.

9.0 **HRC Fuse** –

The HRC fuse shall conform to the latest standard IS – 13703.

The HRC fuse shall be suitable for 500 V ac system voltage.

The HRC fuse shall have non-deteriorating type characteristics.

The HRC fuse shall be of operating class G.

The HRC fuse shall be of link type construction as per DIN standard.

The HRC fuse shall have breaking capacity of minimum 120 kA.

The HRC fuse shall have trip indication flag / pop.

The fuse characteristics shall be such that it allows close selectivity between downstream or upstream fuses with a ratio of 1 : 1.25. Manufacturer to specify this ratio for the fuses offered.

10.0 **Contactors** –

The contactors shall conform to the latest IS specification IS – 13947 (4)

The contactors shall be suitable for 690 V ac with impulse withstand capacity of 8 KV.

The contactors shall have no de rating up to 55°C service temperature. In case the contactors need de rating, manufacturer shall declare the de rated current carrying capacity at 55°C service temperature.

The contactors shall be suitable for various duties viz AC1, AC2, AC3 & AC4.

For applications such as capacitor switching or crane duty etc, special definite purpose contactors shall be used.

Contactors above 45 A shall have arc chamber interlock to prevent ON operation if arc chamber is not in place.

Vendor to specify 10 seconds rating for the contactors offered.

Contactors above 16 A, shall have replaceable contacts. The spare kits shall be available.

The contactor – overload relay combination shall be type tested for type-2 co-ordination at 50 kA.

11.0 **Overload relays** –

The overload relays shall conform to the latest IS specification IS – 13947 (4)

The overload relays shall be suitable for 690 V ac.

The overload relays shall have no de rating up to 55°C service temperature. In case the overload relays need de rating, manufacturer shall declare the de rated current carrying capacity at 55°C service temperature.

The overload relay shall be bi-metallic type with built-in single-phase preventer and 1NO+1NC aux contacts.

The overload relay shall have trip test and auto / manual reset facility.

For critical motors, wherever specified, microprocessor based overload relay shall be used. Static relays shall not be allowed.

For motors above 75 kW, a microprocessor based motor protection relay shall be used. Static relays shall not be allowed. The relays shall offer at least following protections

3 ph balanced overload	- Locked rotor
Phase imbalance	- Earth fault
Single phasing	- Thermistor
Trip cause indication by LED &	- Trip class setting

12.0 **Motor Protection Circuit Breakers** –

The MPCB shall conform to the latest IS specification IS – 13947 (4)

The MPCB shall offer overload, single phasing and short circuit protection.

It shall be possible to fit accessories on the MPCB such as aux contact, trip indication contact, rotary handle, under volt coil or shunt trip coil, etc. In case of rotary handle, the same shall have built-in door interlock, defeat & padlocking facility. The rotary handle shall be same as that for SDF or MCCB for better aesthetics.

The MPCB shall have rotary handle mechanism with ON, OFF & TRIP positions.

The MPCB shall have no de rating up to 55°C service temperature. In case the MPCB needs de rating, manufacturer shall declare the de rated current carrying capacity at 55°C service temperature.

The contactor – MPCB combination shall be type tested for type-2 co-ordination at50 kA.

The MPCB shall sense the overload faults, however the tripping shall be by the contactor only. MPCB shall trip only on short circuit faults.

13.0 **Current Transformers :-**

13.1 Current transformers shall comply with the requirements of IS.2705. They shall have ratios, outputs and accuracy's as specified/required.

14.0 **Indicating/Integrating Meters :-**

14.1 All indicating instruments shall be of flush mounting industrial pattern, conforming to the requirements of I. S.

14.2 The instruments shall have non-reflecting bezels, clearly divided and indelibly marked scales, and shall be provided with zero adjusting devices in the front.

14.3 Integrating instruments shall be of flush mounting switchboard pattern, complying with the requirements of I. S.

15.0 **Relays :-**

15.1 Circuit breakers shall be provided with integrally mounted Microprocessor based Releases. The Releases shall have a set of 3 phase characteristics which shall be adjustable over wide range to provided discrimination between a multiplicity of devices.

15.2 Microprocessor based relays shall be used for all applications including auto changeover. These relays shall be draw out type with built-in test facilities. All the Microprocessor Relays shall conform to IEC 60255-5. LED indication shall be provided in these relays capable of being reset without opening the relay case.

16.0 **Control Switches :-**

16.1 Control switches shall be of the heavy duty rotary type with escutcheon plates clearly marked to show the operating position. They shall be semi-flush mounting with only the front plate and operating handle projecting.

16.2 Circuit breaker control switches shall be of the spring return to neutral type, while instrument selector switches shall be of the stay-put type.

16.3 All the Indicating lamps shall be of the LED type. All the Lamps shall be color LED lamps. Lamps and lenses shall be easily replaceable from the front. All the Lamps should be Tested and certified as per IS 13947 (Part II) 1993. All the lamps shall be provided with leakage voltage glow protection. All the lamps shall be Immune to vibrations. The Power Consumption of the lamps should not be more than 0.5 Watts at 230 Volts A.C. The Lamps should be suitable for –30% to + 20% of operating Voltage. The Lamps Housing material shall be Flame Retardant ABSTRYNOL with ribbed Poly Carbonate Lens. The Enclosure shall be IP 65 as per IS 13947- (1) of 1993. The Rated Insulation Voltage shall be 500 Volts and Insulation shall be above 500 Mega Ohms. The Termination shall be Totally enclosed/finger Touched proof glass filled nylon and suitable for 2.5 sq. mm FRLS wires with M 3 brass screws. All the Lamps shall be provided with color LEDs.

17.0 **Push Buttons :-**

17.1 Push buttons shall be of the momentary contact, push to actuate type, fitted with self reset contacts and provided with integral escutcheon plates marked with its functions.

18.0 **Cable Terminations :-**

18.1 Cable entries and terminals shall be provided in the switchboard to suit the number, type and size of aluminum conductor power cables and copper conductor control cable specified in the detailed specifications.

18.2 Provision shall be made for top or bottom entry of cables as required. Generous size of cabling chambers shall be provided, with the position of cable gland and terminals such that cables can be easily and safely terminated. The minimum depth of the panel shall be restricted to suit for this purpose.

18.3 Barriers or shrouds shall be provided to permit safe working at the terminals of one circuit without accidentally touching that of another live circuit.

18.4 Cable risers shall be adequately supported to withstand the effects of rated short circuit currents without damage and without causing secondary faults.

18.5 Cable sockets shall be of copper and of the crimping type as specified.

19.0 **Control Wiring :-**

19.1 All control wiring shall be carried out with color coded 1100 Volts grade single core FR wires of approved make conforming to IS 694 of 1990. All the wires should be Uniley in construction with more than 99.99% purity Copper. All the wires stranding should be of fine wires CLASS-5 Construction in accordance with VDE 0295 or IEC 60228. The Oxygen contents in Copper should not be more than 10 parts in million. The
Copper should be cold drawn and on line annealed. All the wires should be tested as per relevant IS and latest IEC standard. The Wire manufacture should submit the certificate from original supplier for purity and oxygen contents in Copper. The outer PVC insulation should be Flame Retardant as per IEC 332.1 The color coded wires should be used. For Potential Circuits "Red", "Yellow" and "Blue" Color wires to be used. For Neutral Black Color is to be used. For Earth Yellow/Green Wires is to be used. For Control's Wiring Gray Color wires are to be used. For CT and PT 2.5 sq. mm wires are to be used.

19.2 Wiring shall be neatly bunched, adequately supported and properly routed to allow for easy access and maintenance.

19.3 Wires shall be identified by numbered ferrules at each end. The ferrules shall be of the ring type and of non-deteriorating material. They shall be firmly located on each wire so as to prevent free movement.

19.4 All control circuits fuses shall be mounted in front of the panel and shall be easily accessible.

20.0 **Terminal Blocks :-**

20.1 Terminal blocks shall be of 500 volts grade of the suitable type. Insulating barriers shall be provided between adjacent terminals. All the Terminal Block shall be approved make.

20.2 Terminal blocks shall have a minimum current rating of 10 Amps. Provisions shall be made for label inscriptions.

21.0 **Labels :-**

21.1 Labels shall be of anodized aluminum, with white engraving on black background. They shall be properly secured with fasteners

22.0 **Tests :-**

22.1 The Following tests shall be conducted on all the Panels and Distribution Boards before the same are dispatched to the site from the vendors place. All the Tests shall be carried out in accordance with relevant IS codes and in presence of the Representative of Owner/ Consultant .

22.2 Visual inspection of Panels and checking the bill of materials as per the approved drawings and Mechanical ON/OFF operation of the components.

22.3 Checking of Protective Measures and electrical continuity of the protective circuits.

22.4 High Voltage Test by applying 2.5 kV, 1 minute for checking insulation of equipment and the Material used and recording the leakage current .

23.5 Megger tests before and after High Voltage Test at Vendors Factory.

24.6 Heat Run Test On Main L.T Panel .

24.7 Primary Injection Test for Checking of all Meters and Relays.

24.8 Testing of all the Microprocessor Releases at vendors factory and at site before commissioning of the ACBs and MCCBs. The Release should be tested by OEM only and necessary settings of releases to be done at site in consultation with Consultants.

24.9 Millie Volt Drop Test across the Bus-Bars Joints/ACB/MCCB/SFU/MCB and any other Equipment.

24.10 Testing of Barkers through Remote operation for ON/OFF and connectivity and operation of Barkers Through the Software and RS 485 Port.

24.11 Physical verification of all components.

24.12 Any other tests as desired by Owner / Consultant.

TECHNICAL SPECIFICATIONS FOR L. T. CAPACITORS

1.0 **Scope :**

This specifications covers the design, manufacture, supplying and testing of Gas Filled L.T. Capacitors required to be installed in L.T. Room of the sub-station for correction of the power factor.

2.0 **Standards :**

All relevant Indian Standards shall be made applicable with latest amendments and in particularly IS 133340/41, IEC 831-1-1996, IEC 831-2-1995, EN 60831-2-1996, VDE 560-46:3/95, VDE 560-47:3/95 and any other specific application is required, then the same shall be complied to.

3.0 **Specifications :**

3.1 The capacitors are to be provided with Extruded Aluminum , Easy disposal, Non populating case with IP 20 enclosure, indoor mounting. The containers shall be made up of Extruded Aluminum and should be heat-proof, dust-proof, indoor type and PCB environment .

3.2 The containers should be scratch and rust proof.

3.3 Terminal provided should be Double , Three way SIGUT terminal strip with protection against electric shock hazard. 9According to IP 20 /IP 54 to VDE 0106 part 100)

3.4 The capacitor should be able to handle in rush current up to 200 times the rated current and should be corona free.

3.5 The raw materials should be Non PCB inert gas and polypropylene film should be provided as dielectric.

3.6 The dielectric loss should be very low in the order of 0.25 Watts/KVAR or lower.

3.7 Each unit shall have over pressure tear off fuse, self healing technology, explosion proof construction, touch proof terminals Eco friendly, non flammable.

3.8 The Capacitors shall be of the 3 Phase, Delta connected natural or forced cooled type with capacitance tolerance 0f +5% . the capacitor should be able to perform up to humidity of 95% and discharge module resistor should be included.

3.9 The basic unit shall be of 5 KVAR to give 50 KVAR as basic step or any other step as specified in the schedule of quantities.

3.10 The Capacitors banks shall be erected directly inside the panel on the mounting stands and with complete treatment done to the stand. The stand shall be effectively doubled earthed to the earthing grid.

4.0 **Discharge Resistance :**

4.1 The Capacitors shall be provided with discharge resistors module so that residual voltage of the capacitor shall be reduced to 50 Volts or less within one minute after the capacitor is disconnected from the source of supply.

5.0 **Testing :**

5.1 The Capacitor bank shall be subject to all routine and acceptance tests as specified in relevant Indian Standards at the factory and the actual test results shall be furnished.

5.1.1 Residual voltage after switching of the capacitors shall be less than 50 Volts after one minute.

5.1.2 Insulation resistance shall be tested with a 1000 Volts megger between phases and phase to earth.

5.1.3 Each discharge resistors shall be tested for its working.

5.1.4 Loss angle test will be conducted and power losses will not exceed 025 Watts KVAR.

5.1.5 The value of discharge resistance shall be furnished at the time of testing.

LT POWER CABLES - GENERAL DESCRIPTION :

Electrolytic grade of Aluminum / high conductivity annealed copper conductor, as per IS : 8130, XLPE insulation, all sector shaped cores laid up with PP filler and PP tape (in case of extruded PVC inner sheath), taped/ extruded PVC inner sheath as per IS : 5831, armoured as per IS : 3975 and overall Flame Retardant ST2 PVC sheath as per IS:5831, 1100 Volts grade cable as per IS : 7098 (I).

LT CONTROL CABLES - GENERAL DESCRIPTION :

Plain annealed electrolytic grade of Copper conductor, as per IS : 8130, PVC insulation as per IS : 5831, cores laid up, STI PVC inner sheath as per IS : 5831, armoured as per IS : 3975 and overall STI PVC sheath as per IS : 5831, 1100 Volts grade cable as per IS : 1554 (I).

CONDUCTOR :

Conductor shall be stranded above 10 sqmm in case of Aluminum cables, and above 6 sqmm in case of copper cables, below which it shall be solid conductor. On customer demand stranded conductor can be supplied. Stranded conductor are shaped and compacted to reduce dimension and give a smoother profile.

Strand details shall be as below :

1.5 to 10 sqmm (CU)	-	7 Strands
6 to 10 sqmm (AL)	-	1 Strands
16 to 50 sqmm (CU/AL)	-	7 Strands
70 to 150 sqmm (CU/AL)	-	19 Strands
185 to 300 sqmm (CU/AL)	-	37 Strands
400 to 630 sqmm (CU/AL)	-	61 Strands
800 to 1000 sqmm (CU/AL)	-	91 Strands.

INSULATION :

Insulation shall be of cross linked polyethylene with IR value more than 100 Mega . ohm/km for power cables and shall be of PVC type A with IR value more than 50 Mega Ohm/km for PVC cables.

XLPE : Insulation having dielectric strength between (25 – 30 KV/MM)

PVC Type A : Insulation having dielectric strength between (30 – 36 KV/MM).

INNER SHEATH :

Inner sheath of ST-2 PVC along with **Polypropylene (PP) fillers**, in case of Taped Inner Sheath.

For extruded PVC inner sheath (if required) PP Fillers shall be provided with a binder of PP Tape.

ARMOUR :

ISI Marked armour, as per IS : 3975 should be provided over inner sheath to guard against mechanical damage. Armour should be galvanized steel wire/ strip. In case of single core cables used in A.C Systems, armouring should be non magnetic hard drawn aluminium wire/ strip. Round steel wire should be used where diameter over inner sheath is less than 13mm and flat steel strip

armour when diameter over inner sheath exceeds 13 mm. Round wire can be provided on specific request.

Armour coverage to be more than 95% to achieve better mechanical projection and low armour resistance.

OUTERSHEATH :

Outer sheath is of extruded ST-2 **Flame Retardant PVC** compound, black in colour as per IS : 5831. Having Oxygen index value of min 30%.

Outer sheath shall be resistant to terminate and rodent attack.

HT POWER CABLES – GENERAL DESCRIPTION :

Electrolytic grade Aluminum / annealed copper conductor, as per IS : 8130, conductor screen of semi-conducting compound. XLPE insulation, insulation screen of semi-conducting compound (All these three extruded in single tandem process of triple extrusion), copper tape screen (only above 6.6 KV (E)), cores laid up with PP fillers & PVC fillers and tape, PVC inner as per IS : 5831, armoured as per IS : 3975 and overall Flame Retardant ST2 PVC Sheath as per IS : 5831, from 3.3 KV (E) grade cable as per IS : 7098 (II).

CONDUCTOR :

Circular compacted stranded conductor of Electrolytic grade Aluminum / annealed copper as per following strand details.

35 to 50 sqmm - 7 Strands
70 to 150 sqmm - 19 Strands
185 to 300 sqmm - 37 Strands
400 to 630 sqmm - 61 Strands
800 to 1000 sqmm - 91 Strands.

CONDUCTOR SCREENING :

Shall be black extruded semi-conducting compound and extruded in tandem with insulation.

INSULATION :

Insulation shall be of cross linked polyethylene, extruded in tandem with both conductor screen and insulation screen. Insulation shall be free from voids, dust particulars and external elements.

CONDUCTOR & INSULATION SCREENING :

Insulation screen shall be black semi-conducting compound and be provided along with core insulation in tandem triple extrusion process.

CORE SCREENING :

Copper tape screening to achieve full coverage shall be provided over the cores for voltage grade from 6.6 KV (E) to 33 KV (E). Number of tapes and thickness of tape shall be chosen to meet required short circuiting rating. Core shall have binder / identification tape with number / colour coding or both.

INNER SHEATH :

Inner sheath of ST-2 PVC along with **Polypropylene (PP) fillers & PVC fillers (with a binder tape of PP tape in case of extruded PVC).**

ARMOUR :

ISI Marked armour, as per IS : 3975 should be provided over inner sheath to guard against mechanical damage. Armour should be galvanized steel wire/ strip. In case of single core cables used in A.C Systems, armouring should be non magnetic hard drawn aluminum wire

Armour coverage to be more than 95% to achieve better mechanical projection and low armour resistance.

OUTERSHEATH :

Outer sheath is of extruded ST-2 **Flame Retardant PVC** compound, black in colour as per IS : 5831. Having Oxygen index value of min 30%.

Outer sheath shall be resistant to terminate and rodent attack.

MARKING OVER OUTER SHEATH :

Progressive sequential marking, size marking, voltage grade, manufacturers name at every one meter shall be provided on the outer sheath.

PACKING :

Cables shall be supplied in non-returnable wooden or returnable steel drums of heavy construction as per IS : 10148. Wooden drums are properly seasoned, sound and free from defects. Drum shall be treated with antioxidants, and painted with good quality paint to increase the life of the packing drum.

DRUM LENGTHS :

Standard lengths for each size of power and control cables shall be 500/1000 mtrs. The cable length per drum shall be subject to a tolerance of +/-5% of the standard drum length.

A clear space at Min. 40mm shall be left between the cables and the lagging.

Each drums shall carry the manufacturers name, the purchaser's name, type, size and length of the cable, sequential marking detail, net and gross weight stenciled on sides of drum. An arrow and suitable accompanying wording shall be marked on one end of the reel indicating the direction in which it should be rolled.

Packing shall be sturdy and adequate to protect the cables from any injury due to mishandling or other conditions encountered during transportation, handling and storage. Both cable ends shall be sealed with PVC end caps.

Cable drum above 1600 mm should be provided with MS bush plate for spindle hole.

TESTING AND INSPECTION

1. **ROUTINE TEST :**

a) Conductor resistance test.
b) High voltage test.
c) Partial discharge test (for screened cable only)
(to be carried out on full drum length).

2. **TYPE TEST :**

a) Tests on conductor
Annealing test for copper

Tensile test (for aluminium)

Wrapping test (for aluminium)

Resistance test

b) Test for armouring wire/ strips

Tensile strength & elongation at break

Thickness of zinc coating (Dip Test)

Torsion/ Winding test

Resistivity Test

Mass of Zinc coating test

c) Test for thickness of insulation and sheath

d) Physical tests for insulation

Tensile strength & elongation at break

Ageing in air oven

Hot set test

Shrinkage test

Water absorption (gravimetric)

e) Physical test for outer sheath

Tensile strength & elongation at break

Ageing in air oven

Shrinkage test

Hot deformation

f) Insulation resistance (volume resistivity test)

g) High voltage test

h) Flammability test

i) Bleeding and blooming test (for outer sheath).

j) Partial discharge test.

k) Bending test.

l) Impulse withstand test.

3. **ACCEPTANCE TEST :**

a) Annealing test (for copper)

b) Tensile test (for Aluminium)

c) Wrapping test (for Aluminium)

d) Conductor resistance test

e) Test for thickness of insulation and sheath

f) Hot sheath test (for insulation)

g) Tensile strength and elongation at break test (for insulation & sheath)

h) Partial discharge test (for screen cable only)

i) High voltage test.

j) Insulation resistance test.

4. **SPECIAL TESTS FOR FRLS CABLES :**

i) Oxygen Index Test as per ASTM-D-2863

ii) Temp. Index Test as per ASTM-D-2863

iii) Acid Gas Generation test (HCL) as per IEC-754(I)

iv) Smoke Density test as per ASTM-D-2843

v) Flammability tests

a) As per IEC 332-P-I
b) As per IEC 332-P-3
c) Swedish Chimney As per SS-424-14-75 (Class F 3)
IEEE – 383.

TECHNICAL SPECIFICATIONS - EARTHING

1.0 **Scope :**

a) Earthing system to be provided shall comprise of earth electrode of copper plate or hot dipped Galvanised plates in earth pits, earth bus/grid of copper flats or GI Flats or Aluminium flats as called for and bare copper earth wires or Galvanised earth wires or aluminium earth wires as called for, for acting as earth continuity conductor.

b) Lightning Protection system shall comprise of earth electrode of Cu or GI plate in earth pits, earth bus of down conductors of Cu or GI flats.

c) Earthing of Compound, Flood Lighting and Road Lighting poles shall be done by using Cu or GI plates in earth pits near pole and 7/16 size galvanised strained wire for connecting to the pole or as specified in the Schedule or in drawings.

d) Entire earth system shall conform to the Code of Practice as per IS. 3043 of 1987.

2.0 **General Requirement :**

a) Enclosures and frame work of all current carrying equipment and accessories, structural steel/columns shall be adequately earthed to a single earthing system, unless separate earthing systems are specifically stipulated. All electrical equipment shall be earthed at two distinct points.

b) Earth loads and risers shall follow as direct and short a path as possible. Suitable risers shall be provided as directed if equipment is not available when earthing is installed.

3.0 **Earth Electrodes in Earth Pits :**

Plate electrodes of Copper shall be 600 x 600 x 6 mm thick and 600 x 600 x 12 mm thick for GI unless otherwise specified.

4.0 **Earth Bus and Earth Continuity Conductor :**

a) Earth bus is a copper strip or flat of specified size interconnecting all earth electrodes.

b) Switchgears and Power Distribution Boards shall be earthed by a copper flat strip.

c) Panels, fused DBs and motors up to 30 KW rating shall be earthed by a continuity conductor, as specified. Minimum size of continuity conductor shall be 25 x 3 mm bare copper strip, soft drawn.

d) Road Lighting Poles shall be earthed with Cu stranded wire conductor while for lighting and power wiring bare copper conductor shall be provided unless otherwise specified to use insulated conductor.

5.0 **Earth Bus Station :**

Earth Bus Station shall be provided to facilitate tapping of earth continuity conductor from earth bus/grid very conveniently. It will comprise of a 400 mm long 50 x 6 mm bare copper strips/flat fixed with rawl plugs/bolts securely on wall/column above floor level. Spacers of 20 mm to 25 mm shall be provided to keep the flat away from wall and facilitate connections of earth conductor for which 6 mm dia holes 8 to 10 numbers are provided with proper size brass nuts, bolts, and washers. Earth bus shall be connected to it.

6.0 **Lightning Protection System :**

a) Air termination shall be five prong type copper Rod with round head and the same shall be securely clamped/installed to withstand severe weather conditions and provide protection against lightning. Horizontal air termination conductors shall be Cu or GI flat/strip and shall be provided where specified.

b) Earth Electrodes for lightning protection system shall be Copper plate installed in earth pits as per IS.

c) The down conductors from air terminals shall be done in tinned Cu or GI Flat/strip, of size as specified in the schedule of quantities or drawings, but shall not be less than 12.5 x 3mm as required. The down conductors shall follow a direct path to the earth electrode without any sharp bend, turn or kinks. These down conductors shall not be connected to other earthing conductors above ground level but the metallic parts in the vicinity of lighting protection conductor such as ladders, pipes, etc. shall be effectively connected and bonded.

d) A test joint as per IS shall be provided for every down conductor within 1500 mm above ground level.

e) Hardware and clamps shall be similar as used for the Earthing systems.

7.0 **Artificial Treatment of Soil :**

If the earth resistance is too high and the multiple electrode earthing does not give adequate low resistance to earth, then the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, calcium chloride, sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions

8.0 **Resistance to Earth :**

The Contractor shall measure the resistance of the individual Earthing pit and report to the Architect/Consultants. The Contractor will make after due consultation with Consultants, No. of Earth pits, such that, the overall resistance in the earth mat does not exceed 1.0 ohm.

9.0 **Earthing Station :**

9.1 **Plate Electrode Earthing :**

Earthing electrode shall consist of a tinned copper plate not less than 600 x 600 x 6 mm thick, or, 600 x 600 x 12 mm G.I. as called for in the drawings. The plate electrode shall be buried as far as practicable below permanent moisture level but in any case not less than 3 mts. below ground level. Wherever possible earth electrode shall be located as near the water tap, water drain or a down take pipe as possible. Earth electrodes shall not be installed in proximity to a metal fence.

It shall be kept clear of the buildings foundations and in no case shall it be nearer than 1 meter from the outdoor face of the wall. The earth plate shall be set vertically and surrounded with 150 mm thick layer of charcoal dust and salt mixture. 20 mm G.I. pipe shall run from the top edge of the plate to the ground level. The top of the pipe shall be provided with a funnel and a mesh for watering the earth through the earth. The main earth conductors shall be connected to the electrode just below the funnel, with proper terminal lugs and checks nuts. The funnel over the G.I. pipe and earth connections houses 300 mm wide and 300 mm deep. The masonry chamber shall be provided with a cast iron cover resting cover a C.I. frame embedded in masonry.

9.2 **Pipe Electrode Earthing :**

Earthing electrode shall consist of a G.I. Pipe (Class 'B') Indian Tube Company make/ zenith or approved equal, not less than 40 mm dia and 5 meters long. G.I. Pipe electrode shall be cut tapered at the bottom and provided with holes of 12 mm dia. drilled at 75 mm interval upto 2.5

meters length from bottom. The electrode shall buried vertically in the ground as far as practicable below permanent moisture level with its top not less than 200 mm below ground level. The electrode shall be in one piece and no joints

shall be allowed in the electrode. Wherever possible earth electrodes shall be located as near water tap, water drain or a down take pipe. Earth electrode
shall not be located in proximity to a metal fence. It shall be kept clear of the building foundations and in no case shall be nearer than 2 meters from the outer face of the wall.

The pipe earth electrode shall be kept vertically and surrounded with 150 mm thick layer of charcoal dust and salt mixture upto a height of 2.5 meters from the bottom. At the top of the electrode a funnel with a mesh shall be provided for watering.

TECHNICAL SPECIFICATION FOR CABLE TRAYS

1.0 Perforated Cable Trays of ladder type and associated accessories tees, bends, elbows and reducers shall be fabricated from 12 gauge (2.5 mm) mild steel. Prefabricated Cable trays of perforated type and associated accessories tees, elbows and reducers shall be fabricated from 14 gauge (2 mm) White CRCA Sheets. Cable trays shall be made of corrosion resistant material or if made of material shall be adequately protected against the corrosion.

2.0 Cable trays accessories shall be painted with One Shop coat of Red oxide zinc chromate primer and two side coats of Aluminium alkyd paint.

3.0 Cable trays shall not have sharp edges, burrs or projections that may damage the insulation jackets of the wiring.

4.0 Cable trays shall not have side rails or equivalent structural members cable trays shall include fittings or other suitable means for change in direction and elevation of runs.

Cable Tray Mounting

Unless otherwise specifically noted on the relevant layout drawing, all cable tray mounting works to be carried out the following :

a) Cable tray mounting arrangement type to be as marked on layout drawing.

b) Assembly of tray mounting structures shall be supplied fabricated, erected & painted by the electrical contractor.

c) Tray Mounting structures shall be welded to plate inserts or to structural beams as approved by the Project Manager.

d) Wherever embedded plates & structural beams are not available for welding the tray mounting structure electrical contractor to supply the MS plate & fix them to floor slab by four anchor fasteners of minimum 16 mm dia having minimum holding power of 5000 Kg, at no extra cost.

e) Maximum loading on a horizontal support arm to be 120 Kg/metre of cable run.

f) Width of the horizontal arms of the tray supporting structures to be same as the tray widths specified in tray layout drawings, plus length required, for welding to the vertical supports.

g) The length of vertical supporting members for horizontal tray runs will be to suit the number of tray tiers shown in tray layout drawings.

h) Spacing between horizontal support arms of vertical tray runs to be 300 mm.

i) Cable trays will be welded to their mounting supports.

j) Minimum clearance between the top most tray tier and structural member to be 300 mm.

k) Cable in vertical race ways to be clamped by saddle type clamps to the horizontal slotted angles. Clamps to be fabricated from 3 mm. thick aluminium strip at site by the electrical contractor to suit cable groups.

l) The structural steel (standard quality) shall be according to latest revision of IS : 2062 & IS 808 Rev III of 1989 . Welding shall be as per latest revision of IS : 816 Rev I of 1969. All structural steel to be painted with one shop coat of red oxide and oil primer followed by a finishing coat of aluminium alkyd paint where any cuts or holes are made on finished steelwork these shall be sealed against oxidation by red oxide followed by the same finishing paint. Steel sheet covers wherever indicated to be similarly painted.

TECHNICAL SPECIFICATIONS FOR POINT WIRING USING PVC CONDUITS

1.0 **Scope of Work :**

The scope of this section comprises of supply, delivery, store at site, prepare the conduit assembly, fix and erect in proper position, rigid PVC conduits of minimum 2.0 mm wall thickness and as per IS 9537 Part III. Concealed work check before casting of slab, measure and tie the assembly to reinforcements, complete with providing GI pull wires.

1.1 **Applicable Standards :**

The relevant sections of Indian Standard Specifications as more particularly stated herein and broadly to all the codes, statues and regulations as applicable shall be strictly enforced and adhered to. More particularly following codes should be strictly followed.

IS 9537 Part III : Rigid non metallic conduits for Electrical work.
IS 2274 : Wiring Practice.
IS 3043 : Code of Practice of Earthing.

2.0 **Rigid PVC Conduit Work :**

2.1 **Material :**

2.1.1 The minimum wall thickness of Rigid PVC Conduits permitted for concealed conduiting shall be 2.0 mm thick and shall be suitable for heavy duty.

2.1.2 The tubing must be perfectly circular, without any burrs or kinks.

2.1.3 The Conduits shall be of such type, so as to be capable of making tight fitting joints.

2.1.4 The minimum size of Rigid PVC Conduits allowed in concealed work shall be of 20 mm and above.

2.2 **Conduit Accessories :**

2.2.1 All conduit accessories that are to be used in concealed work shall be of Rigid PVC type conforming to latest and relevant IS codes.

2.2.2 Conduit Accessories shall be capable of clean and tight fittings.

2.2.3 All junction boxes of one way or above shall be of high dome type with a depth of minimum 65 mm and minimum 2 mm wall thickness.

2.2.4 In concealed work, inspection types of bends are not allowed, normal bends/elbows may be permitted after specific approval.

2.3 **Conduit Assembly Work :**

2.3.1 The Contractor shall submit to the Architect/Consultant detail layout plan of conduit network containing particulars regarding size and routes of conduits, number of wires carrying in each conduit, inspection and junction boxes provided along with the routes of the conduits. The number of wires in each conduit shall not exceed as specified in the table of conduit capacity. All the conduits are supported using minimum 16 gauge M.S. Spacers and G.I Saddles fabricated using 16 gauge sheets and fixed using GI Screws.

2.3.2 Initially all drawings for concealed conduit work shall be inspected. Any discrepancies or otherwise occurring due to site conditions or change in internal layouts or in walls shall be reported. After rectification of the same, then the measurements and marking shall be done for the conduit assembly, on the shuttering of the slab.

2.3.3 All conduits shall be assembled. Wherever straight runs exceeds 3 mts., additional pull boxes or junction boxes shall be provided. However, the entire assembly shall be so assembled in order to facilitate renewal of wires etc. in the future.

2.3.4 Wherever fluorescent light fixtures are shown in the layout, the conduit shall be terminated in a high dome junction box at the centre of the fixture, unless otherwise specified or indicated in drawings.

2.3.5 In the concealed conduit work, all junction boxes, bends, elbows shall have PVC tapes on either side to ensure security of the accessories in its place. They shall also be PVC taped at all joints in order to prevent cement, water or slurry entering the Rigid PVC conduit assembly.

2.3.6 All precautions should be taken in concealed work, to ensure no entry of cement slurry or blocking of conduits due to concreting.

2.3.7 For all circuit wiring, i.e. from Lighting Distribution Boards to Individual Switchboards, minimum 25 mm Rigid PVC conduits and minimum 2.0 mm wall thickness conduits shall be used.

2.3.8 All PVC conduits drops that are to be taken for the purpose of joining the Distribution Board or Switch Boards shall be taken out of the shuttering with a clean hole. Sand then shall be provided at the bottom most part of the entry in the shuttering. The projected part of the PVC conduit shall have a coupling over the same.

2.3.9 The entire PVC conduit assembly shall be properly secured and bonded by means of steel wires, twisted and fixed to the reinforcements. Additional fixing shall be done near joints, junction boxes, pull boxes etc.

2.3.10 The entire Rigid PVC conduit assembly then shall be checked for rigidity and no movement shall be allowed in the assembly.

2.3.11 The entire Rigid PVC conduit assembly shall be provided with proper GI pull wires of minimum 14 gauge.

2.3.12 Adequate number of PVC, pull boxes of suitable sizes shall be provided in the PVC conduit assembly.

2.3.13 It shall be the entire responsibility of the Contractor to supervise the concealed conduit assembly work during the casting of the slabs. Adequate precautions should be taken to spread fine sand covering the opening of the PVC conduit boxes or junction boxes at the bottom of the slab.

2.3.14 Where the conduit passes through the flooring the same shall be passed through galvanised pipe of suitable size fixed in the flooring, so that conduits, cables or wires can be renewed at any time without breaking the floor.

2.3.15 Where the conduit runs in brick walls same should be necessarily fixed by using MS clamps. In the straight run the distance between the two clamps shall not exceed 500 mm and additional clamps should be provided near bend and junction box.

2.3.16 The entire jointing in PVC conduit assembly shall be done using PVC solvent cement only. Wherever the conduits are terminated in PVC switchboard boxes or PVC, socket outlets boxes, the use of collars, male female type of adaptors shall be only used.

2.4 **Conduit Capacity :**

The maximum capacity of a conduit for drawing in Flame Retardant Low Smoke (FRLS) wires shall be in accordance with IS 2274. The minimum size of conduit to be used shall not be less than 20 mm (approx.) and not more than two circuits connected to same phase be bunched in one conduit. Two different phases are not allowed in one conduit.

Commonly used sizes of 650/1100 Volts Flame Retardant Low Smoke (FRLS) wires and conduit capacities are as tabulated below :-

Size of Wire	Voltage Grade	Capacity of the Conduit 20 mm	25 mm
1.5 sq.mm.	650/1100	5 Nos.	8 Nos.
2.5 sq.mm.	650/1100	5 Nos.	6 Nos.
4.0 sq.mm.	650/1100	3 Nos.	5 Nos.
6.0 sq.mm.	650/1100	2 Nos.	3 Nos.
10.0 sq.mm.	650/1100	.....	3 Nos.

2.5 **Point Wiring :**

The wiring shall be of the looping in system as different from the tree system. Connectors should not be used without specific prior approval. Looping in on the phase side shall be at the switches and that on the neutral side at the ceiling roses. Every light point, fan point and plug point shall have individual control switch unless stated otherwise. Earthing shall be provided for all the points according to the statutory requirement wherever necessary. The number of points per circuit shall not exceed 8 in any case.

2.6 a) The point wiring in conduit consists of wiring from the branch distribution board in conduit with its ancillary work, such as inspection bends, junction boxes and FRLS wires upto the fixed terminals of ceiling roses, connectors, batten holders, etc. depending upon the type of point.

b) For easy identification, wires with different colours shall be used for phase and neutral as far as practicable.

c) The control switches for lights, fans, wall sockets and fan regulators shall suitably be grouped on sheet steel cases of all welded design fabricated out of 1.2 mm (approx.). Generally, the Bakelite sheet shall be 3 mm thick where SP Piano type flush mounting switches are to be accommodated and in all other cases it shall be 5 mm thick. The Bakelite sheet cover shall be fitted above the sheet steel case and shall be leveled on the outer edges. Control accessories for one circuit only shall be grouped on a sheet steel case. Not more than 2 ceiling fan regulators shall be mounted on a sheet steel case. Suitable earthing terminal shall be provided on the sheet steel case. All the conduits entering and leaving D.B. shall be bonded together with 4 sq.mm bare aluminium/copper wire and earth clips (as mentioned in the schedule.).

d) Point Wiring by using Flame Retardant Low Smoke (FRLS) Wires :-

This shall be similar to point wiring in conduit system. The fixing of cables shall, however, be according to the specifications.

e) All the Flame Retardant Low Smoke (FRLS) wires shall have a grade 650/1100 Volts for lighting and power wiring.

2.7 **Mains and Sub-Mains Wiring :**

This shall include the cost of all Flame Retardant Low Smoke (FRLS) wires conduit, conduit accessories, clamps spacers, Flame Retardant Low Smoke (FRLS) wires on battens depending upon the type of wiring, all masonry work, such as cutting, neat finishing of walls, floor openings etc. Only approximate lengths are included in the Schedule of Quantities and Rates, but the actual lengths of the mains and sub-mains executed will be measured between terminating points and will be paid for. Where the mains and sub-mains pass through the flooring, or through the wall, the same shall pass as specified in 3(b) above. Mains and Sub-Mains risers in conduit shall be bonded together with 4.0 sq.mm. bare aluminium/copper as specifically mentioned in Schedule and earth clips on each floor landing/mid-landing. The Flame Retardant Low Smoke (FRLS) wires are provided as mains and sub-mains, the same shall be fixed as per specifications.

3.0 **Switches, Sockets & Ceiling Roses :**

3.1 **Ceiling Roses :**

These shall be of Bakelite and of approved make and colour and shall not contain fuse terminals. These shall be provided with brass ceiling plate and M. T. Brass screws and washers with cord grip for termination of wires.

4.0 **Plate type, molded design - switches on white Urea Power pressed cover plates**

These shall be of single pole, double pole, two ways, one ways or otherwise as called for in the Schedule. These shall be manufactured as per relevant IS Codes and shall amply to Indian Electricity Rules. The minimum rating shall be 5 Amp at 250 V AC.

5.0 **Socket Outlets With Plugs :**

These shall be with porcelain base, in 2 Pin and earth design of best quality, suitable for single phase, 250 volts supply. The earth pin shall be effectively connected to the nearest conduit or earth connections in distribution board with not less than 3 mm2 (No. 14 SWG) copper wire. The socket outlet shall be complete unit shall be with ratings of 5 Amps. 250 Volts or 15 Amps 250 Volts to suit individual requirement as stated in Schedule of Quantities and Rates. The socket outlets shall be in flush mounting or on plate designs as called for in the Schedule.

6.0 **Interlocked Metal Clad Switch Fuse Units :**

a) The Metal Clad switch fuse unit shall be of the heavy duty type, quick make and quick break action, of approved pattern and capable of carrying continuously the current specified. All the switch fuse units shall have 'U' type contacts on fuse carriers and the switch fuse units of capacities 30 Amps. and above shall be provided with spring type contacts on the fuse bases. Unless otherwise specifically brought

out in the Schedule the metal cases shall be of cast iron and shall be provided with knock-outs for incoming and outgoing pipes or cables and earthing terminals. The cover of the switch shall be interlocked with the switch handle so that the cover cannot be opened unless the switch is 'OFF' and the switch cannot be made on unless the cover is fixed.

b) The fuse shall be either re-wireable type or HRC type as detailed in Schedule of Quantities and Rates. The Switches with HRC fuse links shall be supplied with insulated fuse removers.

SPECIFICATIONS FOR INSTALLATION OF ELECTRICAL EQUIPMENTS

1.0 Specification for Marking of Panels and Nomenclature:

All Panels shall borne the Nomenclature as suggested in the tender. The same shall be embossed on steel plates and not painted. All Panels shall also bear the name of the Consultants of the project. All panels shall also indicate the line diagram and the method of receiving Power from upstream Panel /Switch.

2.0 **Specification for Installation of Main L.T. Panel :-**

2.1 The Main L.T. Panel shall be installed in the electrical room allotted at site. The panels shall be properly assembled if dispatched in sections. All bus bars fish plates will be thoroughly cleaned, greased and bolted to instructions. The Main Panel will be mounted on base frame of adequate size using 100 x 50 x 6 mm ISMC channels fabricated to meet the design of the base frame of the Main L.T. Panel. The fabricated frame shall be welded in design and will undergo metal treatment process as stated in the specifications elsewhere. The base-frame shall have adequate size Anchor Fasteners which shall be grouted in the flooring. The base-frame of the panels will then be aligned with the fabricated base-frame already grouted. The whole structure will be rigid and will not in any way move while operating any of the switchgears. If found necessary, then, additional supports by way of angles horizontally bolted to the panel and grouted in the nearby wall shall be done. The entire erection of the panel shall have a neat and aesthetic appearance.

3.0 Specification for Installation of Power Control Centers and A.P.F.C. Panel.

3.1 The PCCs and APFC shall be installed in the electrical room allotted at site. The panels shall be properly assembled if dispatched in sections. All bus bars fish plates will be thoroughly cleaned, greased and bolted to instructions. The Main Panel will be mounted on base frame of adequate size using 100 x 50 x 6 mm ISMC channels fabricated to meet the design of the base frame of the PCCs or APFC Panel. The fabricated frame shall be welded in design and will undergo metal treatment process as stated in the specifications elsewhere. The base-frame shall have adequate size Anchor Fasteners which shall be grouted in the flooring. The base-frame of the panels will then be aligned with the fabricated base-frame already grouted.

The whole structure will be rigid and will not in any way move while operating any of the switchgears. If found necessary, then, additional supports by way of angles horizontally bolted to the panel and grouted in the nearby wall shall be done. The entire erection of the panel shall have a neat and aesthetic appearance.

4.0 Specifications for Installation of Sub-Power and Sub-Lighting Distribution Boards and Power & Lighting Distribution Boards

4.1 Before erecting the SLDB and SPDB and LDBs and PDBs at site, a thorough inspection shall be done by the Contractor and reported to the Architect / Consultants if any difficulties are envisaged for erection. Thereafter, an erection sketch shall be prepared, indicating the dimensions and the clearances between the Boards. A similar marking will also be made at site.

4.2 All Power and Distribution Boards shall be tested for mechanical endurance. After checking wiring and cable connections the entire boards, shall be erected in places indicated and marked on the plan. All touching up work of points shall then be done and foundation bolts granted. All necessary holes and civil works shall be done as per directions. The Panel after duly testing shall be put to commission for trial. All the lighting and power distribution boards shall be mounted directly on wall.

5.0 **Specification for installation of L.T. Capacitors :-**

5.1 L.T. Capacitor shall be neatly arranged and installed in tier formation. Proper checks should be done to ensure proper banking and number of L.T. Capacitors banked together. The Capacitors after installation and cable joints, shall be finally checked for any leakage etc. The L.T. Capacitors banks shall be fixed on angle iron frame work firmly granted in the floor and fixed as MS Channels frames. All Joints shall be checked for proper connections and after conducting all tests, the Capacitor Banks shall be commissioned. The Capacitor Banks shall be commissioned. The operation of banks shall also be tested and terminal voltages discharge should be tested and noted prior to commissioning.

6.0 **Specifications for installation of MV/LV cables :-**

6.1 **General :-**

6.1.1 MV Cables shall be inspected prior to laying, laid tested and commissioned in accordance with drawings, specifications, relevant Indian Standards Specifications and cable Manufacturer's instructions. The Cable

shall be delivered at Site in original drums with manufacturer's name clearly written in the drum.

6.1.2 The recommendations of the cable manufacturer with regard to jointing and sealing shall be strictly followed.

6.2 **Inspection :-**

6.2.1 All cables shall be inspected upon receipt at site and checked for any damage during transit.

6.2.2 While selecting cable route for external lighting, sewage effluent pipes, Fire Hydrant Pipes etc. shall be avoided; where this is not feasible, special precautions as decided by the Architect / Consultants, shall be taken.

6.2.3 **Proximity to communication cables :-**

a) Power and communication cables shall as far as possible cross at right angles. Where power cables are laid in proximity to communication cables the horizontal and vertical clearances shall not normally be less than 60 cms.

6.2.4 **Laying methods :-**

a) Cables shall be laid direct in ground, in pipes/ closed ducts, in open ducts or on surface depending on environmental and site conditions.

b) During the preliminary stages of laying the cables, consideration should be given to proper location of the joint position so that when the cables are actually laid the joints are made in the most suitable places. As far as possible water logged locations, carriage ways, pavements, proximity to telephone cables, gas or water mains, inaccessible places, ducts pipes racks etc. shall be avoided for joint position.

6.3 **Laying direct in ground :-**

6.3.1 **General :** This method shall be adopted where the cable route is along roads etc. and where no frequent excavations are encountered and where re-excavations is easily possible without affecting other services.

6.4 **Trenching :-**

6.4.1 **Width of trench** : The width of the trench shall first be determined on the following basis:

a) The minimum width of trench for laying single cable shall be 35 cm.

b) Where more than one cable is to be laid in the same trench in horizontal formation, the width of trench shall be increased such that the inter-axial spacing between the cables, except where otherwise specified shall be at least 20 cm.

c) There shall be a clearance of at least 15 cm between axis of the end cables and the sides of the trench.

6.4.2 **Depth of Trench :-**

The depth of the trench shall be determined on the following basis :

a) Where cables are laid in single tier formation, the total depth of trench shall not be less than 75 cm. for cables up to 1.1 KV and 1.20 m for cables above 1.1 KV.

b) When more than one tier of cables is unavoidable and vertical formation of laying is adopted, depth of trench in above shall be increased by 30 cm for each additional tier to be formed.

6.4.3 **Excavation of Trenches :-**

a) The trenches shall be excavated in reasonably straight lines. Wherever there is a change in direction, suitable curvature shall be provided complying with the requirements of the manufacturer.

b) Adequate precautions should be taken not to damage any existing cable(s), pipes or other such installation in the proposed route during excavation. Wherever bricks, tiles or protective covers or bare cables are encountered, further excavation shall not be carried out without the approval of the Architect / Consultants.

c) If there is any danger of a trench collapsing or endangering adjacent structures, the sides should be well shored up with timbering and/or sheeting as the excavation proceeds. Where necessary, these may even be left in places when back filling the trench.

d) Excavation through lawns shall be done in consultation with the staff of the department/owner concerned.

e) The bottom of the trench shall be level and free from stone, brick bats etc. The trench shall then be provided with a layer of clean, dry sand cushion of not less than 8 cm in depth.

6.5 **Laying of Cable in trench :-**

6.5.1 At the time of issue of cable for laying the cores shall be tested for continuity and insulation resistance.

6.5.2 When the cable has been properly straightened, the cores are tested for continuity and insulation resistance and the cable is then measured. In case of PVC cables suitable moisture seal tape shall be used for this purpose. All wastage to be contractors account.

6.5.3 a) Cable laid in trenches in a single timer formation shall have a covering of clean, dry sand of not less than 17 cms. above the base cushion of sand before the protective cover is laid.

b) In the case of vertical multi-tier formation after the first cable has been laid, a sand cushion of 30 cms. shall be provided over the initial bed before the second tier is laid. If additional tiers are formed, each of the subsequent tiers also shall have a sand

cushion of 30 cms. as stated above. The top most cable shall have a final sand covering not less than 17 cms. before the protective cover is laid.

6.5.4 At the time of original installation, approximately 3 m of surplus cable shall be left on each end of the cable and on each side of underground joints (straight through /Tee/Termination) and at entries and places as may be decided by the Consultants. The surplus cable shall be left in the form of a loop. Where there are long runs of cable length, loose cable may be left at suitable intervals as specified by the Consultants.

6.5.5 Unless otherwise specified, the cables shall be protected by second class bricks of not less than 20 cm x 10 cm x 10 cm (nominal size) protection covers placed on top of the sand, (bricks to be laid breadth wise) for the full length of the cable to the satisfaction of the Consultants. Where more than one cable is to be laid in the same trench, this protective covering shall cover all the cables and projects at least 5 cm. over the sides of the end cables.

6.6 **Back filling :-**

6.6.1 The trenches shall be then back filled with excavated earth free from stones or other sharp edged debris and shall be rammed and watered, if necessary, in successive layers not exceeding 30 cm. Unless otherwise specified, a crown of earth not less than 50 mm. in the center and tapering towards the sides of the trench shall be left to allow for subsidence. The crown of earth however should not exceed 10 cm. so as not to be a hazard to vehicular traffic.

The temporary reinstatements of roadways should be inspected at regular intervals, particularly during the wet weather, and any settlement should be made good by further filling as may be required. After the subsidence has ceased, trenches cut through roadways or other paved areas shall be restored to the same density and material as the surrounding area and repaved to the satisfaction of the Consultants.

6.6.2 Where road turns or lawns, have been cut to kerb stones displaced, the same shall be repaired and made good except turning / asphalting to the satisfaction of the Architect/Consultants and all surplus earth or rock removed to places as specified.

6.7 **Route Marker :-**

6.7.1 Route marker shall be provided along straight runs of the cables at locations approved by the Consultants and generally at intervals not exceeding 100 m. Markers shall also be provided to identify change in the direction of the cable route and also for location of every underground joint.

6.7.2 Route markers shall be made out of 100 mm x 100 mm x 5 mm GI/Aluminum plate, welded or bolted on to 35 mm x 35 mm x 6 mm angle iron 60 cm. long. Such plates marker shall be mounted parallel to and 0.5 m or so away from the edge of the trench.

6.7.3 The word `cable` and other details such as voltage grading size etc. as furnished by the Architect /Consultants shall be inscribed on the marker.

6.8 **Single Core Cables :-**

Three single core cables forming one three phase circuit shall normally be laid in close trefoil formation and shall be bound together at intervals of approximately 1 m. The relative position of the three cables shall be changed at each point, complete transposition being effected in every three consecutive cable lengths. The joints shall be clearly marked in an approved manner to indicate the circuit and phases. The arrangement for laying a number of parallel cables shall be as detailed of IS : 1255/1967.

6.9 **Laying in Pipes / Closed Ducts :-**

6.9.1 In locations such as road crossing, entry to buildings, on poles, in paved areas etc. cables shall be laid in pipes or closed ducts.

6.9.2 Stone ware pipes, GI, CI or Spun reinforced concrete pipes shall be used for such purposes. In the case of new construction, pipes as required shall be laid along with the Civil Works, and jointed as per the instructions of the Consultants. The size of the pipe shall be decided by the Consultants and shall not be less than 10 cm in diameter for a single cable and not less than 15 cm for more than one cable. These pipes shall be laid directly in ground without any special bed except for SW pipe which shall be laid over 10 cm. thick cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate of 40 mm nominal size) bed. No sand cushioning or tiles need be used in such situations. Unless otherwise specified, the top surface of pipes shall be at a minimum depth of 1 m. from the ground level when laid under roads, pavements etc.

Where steel pipes are employed for protection of single core cables feeding AC load, the pipe should be large enough to contain both cables in the case of single phase system and all cables in the case of poly-phase system.

6.9.3 Pipes for cable entries to the building shall slope downwards from the building and suitably sealed to prevent entry of water inside the building. Further, the mouth of the pipes at the building end shall be suitable sealed to avoid entry of water.

6.9.4 All chases and passage necessary for the laying of service cable connections to buildings shall be cut as required and made good to the original finish and to the satisfaction of the Consultants.

6.9.5 Cable grips/draw wires and winches etc. may be employed for drawing cables through pipes/closed ducts etc.

6.10 **Laying of Cables in open ducts/ Trenches :-**

6.10.1 Trenches with suitable removable covers shall be preferred in sub-stations, switch rooms, plant rooms, etc.

6.10.2 The cable ducts should be of suitable dimensions so that the cables can be conveniently laid. If necessary, cables may be fixed with clamps on the walls of the duct or taken in troughs in duct. The duct should be covered with removable slabs or chequered plates.

6.10.3 Ducts may be filled with dry sand after the cable is laid and covered as above or finished with cement plaster specially in high voltage applications.

6.10.4 Splices or joints of any type shall not be permitted.

6.10.5 As far as possible laying of cables with different voltage ratings in the same duct shall be avoided.

6.10.6 Where considered necessary, hooks or racks shall be provided for supporting the cables in masonry/concrete cable ducts, cable troughs. Otherwise cables shall be laid direct in the trench or trough etc. While deciding the layout of cables in such ducts, care should be exercised to ensure, that, unnecessary crossing of cables is avoided.

6.11 **Laying on Surface :-**

6.11.1 The cables may be laid in troughs or brackets at regular intervals or directly cleated to wall/ceiling. When laid over bracket supports, the cables shall be clamped to prevent undue sag.

6.11.2 Cable clamps shall be made from materials such as mild steel or Aluminum only. In case of single core cables the clamps shall be non-magnetic materials. A suitable non-corrosive packing shall be used for clamping unarmoured cables, to prevent damage to the cable sheath.

6.12 **Cable Identification Tags :-**

6.12.1 Wherever more than one cable is laid/run side by side, marker tags as approved, inscribed with cable identification details shall be permanently attached to all the cables in the manholes/open ducts etc. These shall also be attached to various cables laid direct in ground at suitable intervals as decided by the Consultants before trenches are filled up.

6.13 **Testing :-**

6.13.1 All cables before laying shall be tested with a 500 Volts megger for 1.1 KV grade or with a 2,500/5,000 Volts megger for cables of higher voltages. The cable cores shall be tested for continuity, absence of cross phasing, insulation resistance to earth/sheath/armor and insulation resistance between conductors.

6.13.2 All cables shall be subjected to above mentioned tests during laying, before covering the cables by protective covers and back filling and also before the jointing operations.

6.13.3 In the absence of facilities for pressure testing, it is sufficient to test for one minute with 1,000 Volts megger for cables for 1.1 KV grade and with 2,500/5,000 Volts megger for cables of higher voltages.

6.14 **Completion Plan and Completion Certificate :-**

6.14.1 The work shall be carried out in accordance with the drawings enclosed with the tender and also in accordance with the modifications thereto from time to time approved by the Consultants.

6.14.2 At Completion, all layout drawings should be on Auto-cad and on 1:100 scale. The contractor is required to submit 5 sets of as built drawings on A-1 Size white paper along with 5 sets of Rewritable CDs. The Virtual Completion certificate can be issued to the contractor only when he submit all the shop drawings, As built drawings, Operation and Maintenance Manual to owner, Consultant.

6.14.3 Layout of Cable Work.

6.14.4 Length, size, type and grade of cables.

6.14.5 Method of laying i.e. direct in ground, in pipes etc.

6.14.6 Location of each joint with jointing method followed.

6.14.7 Route marker and joint marker with respect to permanent land marks available at site.

6.14.8 Name of work, Job Number, accepted tender reference, date of completion, names of Division and Sub-Division, names of Contractor with their signature and scale of drawing.

6.15 Specifications for Earthing Grid and Earth Stations :-

The earthing system shall comply with the relevant standard as laid down in the Fire Insurance and Indian Standard Specifications.

The Earthing stations for Pipe and Plate Earthing shall be as per drawings. Entire Civil works, Salt, Charcoal in proper proportions, Watering chamber with wire mixing etc. shall be done. The Earth tapes wherever indicated shall be obtained by using Earth Megger. The results should comply with the Standards bid down by the Indian Standard Specifications.

The Lightning Arrestors shall be fixed on angle from frame work secured to the building walls at the top most painted and at all other points wherever indicated on the plan. They shall be connected to earth by using G.I. tapes of appropriate size. The entire unit shall have completed earth grid running around the unit and the same shall be inter-connected. The entire works of earthing should be complete in all respects such as welding the GI tape joints, tapping etc. There shall be no place where

earthing strips are not connected to earth stations. G.I. tape shall be fixed on walls or laid in prepared trenches or chiseled in ground and redone etc. as per directions.

7.0 **Document, Certificates, Drawings and Spare Requirements :**

7.1 The intent of this specification is to give a guideline of the Contractor to furnish in reproducible all sets of relevant papers and lists of spares for the continuous performance of the Owner`s Building. Nothing shall absolve the Contractor from not furnishing any information documents and/or papers that have not been specifically stated herein.

a) Document :- All relevant documents for maintenance, manuals procedures and data of all Electrical Equipment's supplied and erected by the Contractor on the site. The documents shall be bound and furnished to the Owner.

b) Certificates : All relevant tests certificates etc. and as more specifically stated in clause, shall be furnished. Contract shall also furnish all such certificates issued by the original manufacturer towards guarantee of performance of all equipment's supplied by the Contractor.

c) Drawings : All working and erection drawing of the final erected plan of all electrical installation work in reproducible of equipment's such as MV Panel Distribution Boards, Cable routing, sizing, connection diagrams, circuits, wiring diagram and conductor sizes, lengths, terminations details, operational charts, recorded readings, load details etc. shall be furnished to the Owner. The Owner reserves the right to the mode of submission of such details being furnished by the Contractor.

d) The Contractor shall, notwithstanding anything stated otherwise, shall furnish list of recommended maintenance tools, spares, fuses, sets, codes, catalogues, appropriate pricing, original equipment manufacturer's addresses etc. to the Owner. Prior to such furnishings contractor shall make a proper assessment of all such requirements and then proceed to make the lists. The Contractor shall also be deemed to have understood the requirements, in such a way that it ensures a continuous operation and functioning of the Electrical Equipment under the stated ratings, conditions and specifications.

A. TECHNICAL SPECIFICATION FOR AIR CONDITIONING WORK

GUIDE LINES TO TENDERERS

BASIS OF DESIGN

CONDITION	DBT-0F	WBT-0F	%RH
OUTSIDE (SUMMER)	110	**78**	**24**
INSIDE	**73.4**	**6`2.5**	**55**

DAILY RANGE : 26 Deg F

LATITUTE : 22.18 Deg

INSIDE CONDITIONS TO BE MAINTAINED AT : 73.4 Deg F+/- 1 Deg F.

1.0 Scope of work

1.1 The Contractor's scope of work covers supply, installation, commissioning and testing of the complete HVAC Installation as specified. Annexure 2.1 shows the division of work between the Contractor for above work and others.

2.0 Drawings, Specifications & Deviations

2.1 The drawings and specifications lay down minimum standards of equipment and workmanship. Should the tenderer wish to depart from the provisions of the specifications and drawings either on account of manufacturing practice or for any other reasons, he should clearly draw attention in his tender to the proposed points of departures and submit such complete information, drawings and specifications as will enable the relative merits of the deviations to be fully appreciated. In the absence of any deviations, it will be deemed that the tenderer is fully satisfied with the intents of the specifications and drawings and their compliance with the statutory provisions and local codes. All deviations shall be set down in Annexure 2.2. All deviations or departures from the specifications not indicated in Annexure.

2.2 In case of discrepancy between the drawings and specifications, the tenderer shall assume the more stringent of the two and furnish his rates accordingly.

2.3 The contractor shall prepare shop drawings and all work shall be according to approved working drawings. Shop drawings shall give all dimensions and shall incorporate the requirements for consultants, architects and interior designer. Approval of drawings does not relieve the Contractor of his responsibility to meet with the intents of the specifications. All such drawings for approval shall be in quadruplicate. In addition, the contractor shall submit manufacturers details and get them approved before ordering. This has to be done whether the materials / equipment are one of the approved makes or not . The liability of the material supplied at basic rate of the owner shall be binding on the contractor and shall be covered under defects liability period

2.4 Equipment data shall be submitted as per Annexure 2.5. Tenderers not submitting data in full will do so at the risk of their tenders being evaluated with such information as may be available with the Consultants. A list of recommended makes of materials and equipment is shown under Annexure 2.7. It is believed that the said makes meet the intents of the specifications and have sufficient field experience behind. However, the tenderer may propose alternate makes only at the time of tender, furnishing all the technical details, catalogues, usage experience etc. for approval by the Consultants. The client & consultant shall have the ultimate choice of the make of material. Where large differences in basic costs prevail in the basic costs of different makes, the tenderer may indicate decrease in the items as a percentage of the rates quoted on higher basic rates.

2.5 Power will be made available at 415/240V 3 Phase 4 wire 50 Hz earthed neutral system and all equipment shall be suitable for the above power supply with a variations of +/- 10% (Ten percent). All equipment shall operate at these voltages and any equipment /component operating at other than the above power supply shall be provided with necessary transformer.

It shall noted that welding transformer wit rectifier only is permitted for the all welding works inside the building during execution and power supply is free for commissioning & testing But not for construction for construction it shall be chargeable basis. Single point power point for construction shall be arranged at stilt level and extension to be made by respective contractor

3.0 Testing & Handing Over

3.1 The contractor shall carry out tests on different equipment as specified in various sections in the presence of Project Management Consultant / Architects and Consulting Engineers in order to

enable them to determine whether the plant, equipment and installation in general comply with the specifications.

3.2 All equipment shall be tested after carrying out the necessary adjustments and balancing to establish equipment ratings and all other design conditions. The test data shall be submitted in the Acceptance Test Forms supplied by the Consultants. At least four sets of readings shall be taken for each item tested and submitted in the form. Other Acceptance Test Forms supplied by the Consultants. Instruments required for testing shall be furnished by the contractor for testing with initial requirements of all consumables.

3.3 The plant shall be handed over after satisfactory testing along with four sets of documentation each consisting of :

3.3.1 Detailed equipment data in the Performa approved by the Consulting Engineers / Employer.

3.3.2 Manufacturer's maintenance and operating instructions

i) Set of as-built drawings, showing plant layouts, piping, ductinginstrumentation etc.

ii) Approved Test readings for all equipment & installation.

3.3.3 Certificates of approval from Statutory or Local Authorities for the operation and maintenance of the installation and equipment, wherever such approval or certification is required.

3.3.4 List of recommended spares.

3.3.5 Certificate from the contractors that they cleared the site of all debris and litter caused by them during the construction.

I) All tests to be certified by Project Management/Consultant/Engineer-in-charge/Clerk of works

ii) List of all readings etc to be maintained at a regular basis.

3.3.6 Submission of the above documentation shall form a precondition for the final acceptance of the plant and installation and final payment.

3.3.7 .The contractor has to furnish an undertaking that all materials supplied by him at site shall be fully tax paid and shall produce all documents for satisfaction of the owner or taxation authorities. All liabilities of the same shall be of the contractor.

3.3.8 Contractor shall also train and facilitate the facility staff of the building in operation and maintenance of the entire system

4.0 Performance Guarantee:

4.1 This contract is intended to be a performance based contract whereby the contractor will be liable to execute the work on the basis of the plans and designs hereby given and accepted by him. The contractor will have to guarantee for due and proper performance of the work agreed to be so erected and executed by him.

4.2 All equipment and the entire installation shall be guaranteed to yield the specified ratings and design conditions plus/minus 3% tolerance. Any equipment found short of the specified ratings by more than the allowable tolerance as determined by the test readings shall be rejected.

4.3 The performance guarantee shall be valid for a period of 12 months from the date of handling over of the fully installed and tested plant to the client the contractor shall replace all defective equipment/parts with new components including components subject to normal wear & tear and supply of consumable like refrigerant, oil etc. during the guarantee period and bear all incidental expenses for such work.

The AC Vendor to guarantee inside conditions for 5 years from commissioning.

5.0 Force Majeure

5.1 If by reason of war, hostilities, strikes, lockouts, embargoes or any act of god the fulfillment of this contract becomes impossible, the contract will be deemed to be null and void and no liability shall attach to either party. However, we will be paid for whatever work has already been done and equipment ordered or delivered to site.

6.0 Statutory Inspections

6.1 The Contractor shall be fully responsible for meeting all the statutory obligations & local inspectorates wherever applicable to the works carried out by them. The contractor should prepare all working drawings and obtain approval of competent authorities and also have the equipment and installation inspected and got approved. All official fees will be paid by the clients directly against demand in writing from the appropriate authority and all other expenses for submission and approval of the various and relevant statutory / bodies shall be embodied in the tender prices.

6.2 Liability due to malfunctioning of the installation of contractor which may damage any plant machinery of the owner during testing or during defect liability period shall be on account of the contractors.

6.3 Any increase in quantity over and above tender quantity, has to be brought to the notice of the Consultant and upon written confirmation only the contractor shall proceed further. In the absence of obtaining written permission as given above, the owner shall not assume liability for any of the works carried out.

SPECIFICATION OF EQUIPMENT/MATERIAL AND INSTALLATION STANDARDS

1.1 VARIABLE REFRIGERANT VOLUME TYPE SYSTEM (VRV System)

The system selected should be modular system, with number of indoors connected to centrally located outdoor units, as per detail designing given in the tender. The outdoor units for all the system shall be air cooled type and mounted on terrace of the building. Indoor units in various areas shall be as per enclosed drawings/ Bill of Quantities.

All the VRV air conditioners shall be fully factory assembled, wired, internally piped & tested. The outdoor unit shall be pre charged with first charge of R410A refrigerant. Additional charge shall be added as per refrigerant piping at site. All the units shall be suitable for operation with 415 V + 10%, 50 Hz + 3%, 3 Phase supply for outdoor units & 220 V + 10%, 50 Hz + 3%, 1 Phase supply for indoor units.

The VRV system shall provide stable, trouble free & safe operation, with flexibility of operating desired indoor units. The outdoor units must be capable of delivering exact capacity proportional to the number

of indoor units switched on & the heat load in the air conditioned area. The proportional operation shall be achieved by varying speed of the compressor in the outdoor units.

The operation of the VRV system shall be through independent wired/ wireless remote controllers as specified. The entire system shall be integrated with intelligent building management system of leading vendors like Honeywell / Johnson Controls / Siemens etc, through BAC Net Gateway. The detailing of operation required through BMS system are detailed under specifications of BMS system.

The system shall be multi-split system with inverter driven scroll compressor for application with R410A refrigerant and shall be composed of ceiling type indoor units / 4-way cassette type indoor units / 2-way cassette type indoor units / wall type indoor unit / floor type indoor unit and an outdoor unit as specified in tender drawings & Bill of Quantities, with a distributed refrigeration cycle, electrical components and enclosing cabinets. Both indoor units and outdoor unit shall be properly assembled, internally piped and wired, thoroughly tested and charged with refrigerant at factory and shall be topped up at site after erection.

Additional charge of refrigerant should be supported by engineering calculation. Each refrigeration cycle shall be equipped with scroll compressor, a solenoid valve, a heat exchanger, an accumulator, and a 4-way valve and flare connection parts.

SPECIFICATION OF OUTDOOR UNITS:

Out doors units of the VRV system shall be compact air cooled type.

All the compressors of the out door units must be Inverter scroll type. Each module of out door unit must have separate 1# inverter compressor, suitable to operate at heat load proportional to indoor requirement.

“Anti Corrosive” treatment (Blue Fins) for Al. fins of Condenser Coils is mandatory. The treatment should be suitable for areas of high pollution and salt laden air.

The outdoor units must be suitable for up to 150 m refrigerant piping between outdoor unit & the farthest indoor units, total piping of 300 m for all the indoor units. Allowable level difference between out door unit & indoor units shall be 50 m in case of out door unit on top & 40 m in case of out door unit at bottom. Allowable level difference between various indoor units connected to one out door unit shall be up to 15 m.

Back up operation, in case of failure of one of the compressors of out door unit, for single module outdoor units or failure of one of the modules in case of multiple module outdoor units shall be possible. The VRV outdoor unit shall always be supplying at least 33% of back up operation, of the full load capacity.

The outdoor unit shall employ system of equal run time for all the compressors, inverter or on/ off type, within each out door unit – Single Module or Multi Module.The outdoor units shall be suitable to operate within an ambient temperature range of –5 Deg C to 45 Deg C, in cooling mode & – 20 Deg C to 15 Deg C in heating mode.

Air cooled condenser shall have Axial Flow, upward throw fan, directly coupled to fan
motors with minimum IP 55 protection. The outdoor unit condenser fan shall be able to develop
external static pressure up to 6 mm of H2O.

The entire operation of out door units shall be through independent remotes of indoor units. No separate Start/ Stop function shall be required.Starter for the Out door Unit compressor shall “Direct on Line” type. Inverter compressor of the unit shall start first & at the minimum frequency, to reduce the inrush current during
starting. Refrigerant control in the out door unit shall be through Electronic Expansion Valve.

Complete refrigerant circuit, oil balancing/ equalizing circuit shall be factory assembled & tested.
The compressor(s) shall be hermetically sealed scroll and designed for continuous operation even at high ambient temperatures of Mumbai. All condensing unit should have a invertors driven scroll compressor. All invertors driven scroll compressor should have protection for electronic circuits and elimination of electromagnetic sound, which may interfere with the control function of the machine. The unit shall have safety device such as high-pressure switch, fan motor safety thermostat, invertors overload protector, fusible plugs and fuses for trouble free operation of the unit. The condenser shall be air cooled, made of Cu. tubes with extended Aluminium fins. The condenser coil shall be multi-pass, cross-finned tube type, equipped with highly efficient Aluminium fins, mechanically bonded to oxygen free copper tubes. The coil shall be cleaned, dehydrated and tested or leakage at the factory.

The Cabinets shall be fabricated out of heavy gauge steel, properly formed for close fit and structural rigidity. All access panels. shall be so constructed as to be quickly and easily removable. All outside surface shall be finished with powder coating for protection against humid weather. The condenser fans shall be stepped control depending on no. of compressor operational & ambient condition, driven and designed to achieve low condensing temperatures & operate continuously and silently. One outdoor unit should be capable to be connected up-to 16 nos. various indoor unit. All out-door units shall have BMS compatible communicable controller. Noise level of outdoor units shall not exceed 63 dB (A) at a distance of 1.5 m from the unit. The outdoor units shall confirm to Technological Guideline for Harmonic Suppression – JAEG 9702-1995. High Harmonic Environmental Target Level for Power Distribution system shall be 5%.

Out door units shall be complete with following safety devices:

High pressure switch

Fan driver overload protector

Inverter Overload Protector

Fusible Plug

Unit shall be supplied with

Installation manual

Operation Manual

Connection Pipes

Clamps

Units shall be available in configuration 5 HP, 8 HP upto 48 HP, within increments of 2 HP as specified in tender drawings & Bill of Quantities.

WALL MOUNTED UNITS

Wall mounted units must be compact & stylish design that does not detract from the décor of the room. Each indoor unit must have electronic expansion valve operated by microprocessor thermostat based temperature control to deliver cooling/ heating as per the heat load of the room. The unit must have provision of adding drain pump kit if required & specified. The drain pump must be suitable to lift drain up to 1000 mm from the bottom of the unit.

Unit must be insulated with sound absorbing thermal insulation material,Polystyrene/Polyethylene foam. The noise level of unit at the highest operating level shall not exceed 46 dB(A), at a vertical distance of 1.5 m from the grille of the unit.

The unit shall be supplied with Resin Net filter with Mold Resistance. The filter shall be easy to remove, clean & re install.

The unit grille must be washable with soap solution. It shall be possible to set minimum 5 steps of discharge angle by remote controller. It shall be possible to fit drain pipe from either side of the unit (Left or right)

The unit will be connected in series to a suitable out door unit & it must be possible to operate the unit independently, through corded/ cordless remote specified in the bill of quantities. The unit will be further connected to Intelligent Building Management System (To be supplied by other vendors) & it shall be possible to operate the unit through this IBMS system.

The unit shall be supplied with following from the factory –

Operation Manual

Installation Manual

Installation panel

Paper pattern for installation

Insulation tape/ Clamps/ Screws

The unit must be available in following capacities –

0.8 HP, 1 HP, 1.25 HP, 1.6 HP, 2.0 HP, 2.5 HP

AIR HANDLING UNITS

1. SCOPE:

Scope of this article covers the supply, installation, testing & commissioning of AIR HANDLING units

2. GENERAL CONSTRUCTION:

The unit shall be of double skinned sectionalized construction consisting of fan section with fan, motor and drive assembly, coil section with 6 row deep intertwined DX coil, filter section with filters, & drain pan.

The structure of the unit shall be of extruded aluminium section with thermal break profile, mechanically joined using electroplated galvanized hardware.

The double skin panels shall consist of powder coated CRC (22 G) outer skin & galvanized steel sheet inner skin (24 G) with 25 mm thick PUF insulation (40 kg/m3 density) in between. Air tight access door (Duly Insulated) with adjustable tension locking device for various sections shall be provided. The unit shall have an independent bolted M. S. Steel base frame for each sectionduly epoxy painted.

Neoprene/ silicone rubber gaskets shall be provided at the joints of each section which shall be mechanically bolted at site. The drain pan in Stainless Steel construction shall suitably extended to ensure proper collection of condensate drain. The drain pan should be easily replaceable.

Fan shall be of backward curve multi-blade type & mounted on a tubular shaft. The fan housing shall be made of die formed side sheets with streamlined inlets & guide vanes to ensure smooth airflow into the fan. Fan outlet velocity shall not exceed 9.3 m/s Fan & drive motor shall be mounted on a common base frame inside the fan section with separate vibration isolators. Vibration isolation efficiency 90% min.

Cooling coil shall be suitable for DX operation. Coils shall be with copper tubes (22 SWG) with aluminium fins (36 G). Tubes shall be 12 mm O.D. with 12 fins/inch. Coil shall be min. 6 row deep for auditorium & min. 4 row deep for other areas. The air velocity across the face of the coil shall not exceed 500 fpm for other areas.

The capacity of the coil shall be as per schedule of equipment. The DX coil will have intertwining with at least 2-3 circuit intertwined on one coil Filters shall washable HDP in aluminium construction having a filtration efficiency of not less than 95% down to 10 micron dust particle size.

The filter media shall have an extended surface by pleating & shall be of synthetic fibre bonded by resin. The media shall be sandwiched between two layers of HDPE mesh. The face velocity shall not exceed 300 fpm. The entire Unit shall be equipped with vibration eliminators of min. efficiency 95% in addition to the spring isolator below each fan. The fan drive motor shall with 3 phase squirrel cage induction T. E. F. C. motors; having a min. of 15 % margin over the rated fan power consumption & drive losses. Unit shall be complete with opposed blade dampers at fan outlet.

3. Controls:

Multi stage electronic thermostat for on off action of compressors.

4. Testing:

Units shall be tested for their design performance & test results shall be furnished as per article "Test Readings".**Also AHU should be compatible with Air Handling Unit Integration Kit enables a non-VRF Air Handling Unit to be fully integrated into a VRF system.**

CONTROLS SYSTEM FOR VRV AIR CONDITIONING SYSTEM WIRED REMOTE CONTROLLER

Wired remote controller shall be supplied as specified in the "Bill of Quantities".

The controller must have large crystal display screen, which displays complete operating status.

The digital display must allow setting of temperature with 1 Deg C interval.

Remote shall be able to individually program by timer the respective times for operation start and stop within a maximum of 72 hours .

Remote must be equipped with thermostat sensor in the remote controller that will make possible more comfortable room temperature control.

The remote shall be able to monitor room temperature & preset temperature by microcomputer & can select cool/ heat operation mode automatically.

The remote must constantly monitor malfunctions in the system & must be equipped with a "self diagnosis function" that let know by a message immediately when a malfunction occurs. It shall be possible to wire the remote up to 500 RMT.

WIRELESS REMOTE CONTROLLER

Wireless remote controller shall be supplied as specified in the “Bill of Quantities” The same operation modes & settings as with wired remote controllers must be possible. Compact light receiving unit to be mounted into wall or ceiling shall be included.

CENTRAL REMOTE CONTROLLER

Central Remote controller shall be supplied as specified in the “Bill of Quantities”

Following functions shall be possible

Control Max 64 Groups (128 indoor units)

Zone control

Malfunction code display

All the functions available with wired remote controller

It should be possible to wire the remote to 1000m

Control, Operation & Setting	Start/ Stop control Temperature adjustment mode setting Remote control setting Temperature setting Filter sign reset
Display	Air conditioner operation setting & status Set temperature Indoor unit error Indoor air inlet temperature Filter sign

The BAC Net gate way shall be as per ASHRAE 135, Data link - IEE802.3, BACnet/IP, conformance Class 3, with RS232C port.

BAC Net gateway hard ware shall be suitable for operation between -10 Deg C to 50 Deg C & humidity range between 0% to 98%, without condensation.

AIR CONDITIONING MANAGEMENT SYSTEM

The VRV system supplied must be provided with PC based air conditioning management system, form the supplier of VRV equipments. The required hard ware must be selected, suitable for up to minimum 128 indoor units.

The air conditioning management system, in broad terms must undertake following functions

Energy efficiency functions

Control & optimization of system

Operation & monitoring

Expanded network functions

Complete operation & monitoring of VRV air conditioning system shall be possible through this PC based system.

Following major functions shall be possible:

Monitoring	Air conditioning status monitoring Indoor unit error monitoring Indoor air inlet temperature monitoring Filter choke sign monitoring
Control, Operation & Setting	Start/ Stop control Temperature adjustment mode setting Remote control setting Temperature setting Filter sign reset
Display	Air conditioner operation setting & status Set temperature

	Indoor unit error Indoor air inlet temperature Filter sign
Measurement	Accurate operation time Number of switching times Power consumption (Optional with KWH meter) Room temperature Outdoor temperature
Printing	History Statistics Setting information

The A/C management system must be able to connect to existing LANs.

Remote monitoring of the complete HVAC system shall be possible.

System shall be capable to take external signal like Security/ Fire for forced shut off. Required hardware shall be suitable for operation between -10 Deg C to 50 Dg C & humidity range, of 0% to 98%, without condensation.

NOTE - ALL OUT-DOOR UNITS SHALL BE MOUNTED ON MS ANGLE FRAME STRUCTURE. THE MS ANGLE FRAME STRUCTURE SHALL BE PAINTED WITH EPOXY PAINT. THE SHADE OF THE PAINT SHALL BE APPROVED BY APPROVED BY THE ARCHITECT.

CONTROLS AND INTERLOCKING

All electrical control devices should be enclosed in the indoor and outdoor units. The compressor should be protected against breakdown by a quick response over current relay, ahigh-pressure switch, a wrap around type oil heater and a discharge gas thermistor.In addition to the compressor protection devices, the indoor / outdoor fan motor should be protected by an internal thermostat. The indoor fan motor shall be directly supplied with the power source from the control circuit.

The functions of these control devices shall compose an electrical sequence of manual starting and stopping, automatic continuous operation whenever the room thermostat requires, and the protection devices allow the operation.

The remote control switch should be designed to provide simple operation such as On/Off, temperature and fan speed only without trouble shooting functions. The remote control should be BMS compatible for centralized monitoring. All units/remote control shall have COM port for required interface with BMS. The required software with open protocol to transfer readings on the BMS shall be in your scope.

Codes and Standards:

The design, manufacture and performance of the Air-conditioner shall comply with all currently applicable statutes, regulations and safety coded in the locality where the equipment is being installed. The unit and its components shall also confirm to the latest applicable IS/ARI/ASHRAE standards.

4.0 Compressors:

4.1 The compressor shall be scroll type of multi cylinder configuration on three phases, 50c/s. 400 volts electric supply. The compressor could be either hermetically sealed or semi hermetic accessible type.

4.2 The refrigerant cooled motor of compressor should be protected against over heating by an internal thermostat embedded in the winding.

4.3 The compressor should be mounted on Dunlop cushy foot mountings to eliminate the vibration totally.

4.4 The compressor should be forced lubricated by a positive displacement oil pump working in either direction.

4.5 The Compressor performance data at different operating conditions for both cooling capacity and power consumption should be furnished along with performance curves.

4.6 Crank case heater should be a part of the compressor to prevent too high refrigerant solubility in oil during idle periods.

4.7 The compressor should be fully serviceable in our country with spare parts.

6.0 Cooling Coil:

6.1 Coils shall be of extended fin and tube type with aluminium fins firmly bonded to copper tubes. Velocity of air across the coil shall not exceed 152 meters per minute. The tubes shall be 16mm OD and will be bonded with 12 Fins per inch. Condenser coil shall have anti corrosive coating.

7.0 Evaporator Blower

7.1 Double inlet double width type centrifugal blower with forward curved blades impeller specially designed for noise free operation. The blower should develop a static pressure of 50 mm WG.

7.2 The blower motor shall be TEFC, Squirrel cage suitable for 3 phase, 50 HZ 400 volts supply.

8.0 Controls / Instrumentation:

8.1 Refrigeration controls and safety cutouts to be provided shall be as under: -

a) Thermostatic Expansion Valve.

b) Pilot solenoid Valve.

c) Hp Cutout

d) Lp Cutout

e) Adjustable Thermostat

f) Airstat

g) Humidistat

9.0 Testing

The split air-conditioner should be factory assembled pre-wired and tested for performance on a test bed. The test results of each unit should be furnished along with the test certificates while delivering the units.

REFRIGERANT PIPING

The indoor and outdoor units shall be connected with 18G Hard Copper refrigerant piping. Piping sizes should be to suit the distances between indoor and out door units and as per manufacturers recommendations. All piping connections for the units should be performed inside the unit. The refrigerant piping should be insulated with EPDM Rubber foam of minimum 19 MM thick. Lastly, cover up the pipes sections with the help of 36 G Aluminium sheets on straight pipes and 28 G Al. sheet on bends, tees, valves etc.

DRAIN PIPING

1) Condensate from the evaporator unit shall be drained through properly installed drain piping designed to prevent any accumulation of condensate in the drain pan.

Drain piping shall be made of 1.1/4" dia / 2" dia rigid PVC pipe of 6 Kg/Sq cm. pressure rating with water tight threaded connections, leading from the room unit to a suitable drain point.

Complete drain piping shall be made leak proof and water tight by means of precise installation and the use of leak proof sealant/adhesives.

4) Insulation of drain piping will be done by elastomeric Rubber insulation/ EPDM to be done with thickness recommended in BOQ

NOTE : ALL OUT-DOOR UNITS SHALL BE MOUNTED ON TERRACE TYPE M.S. ANGLE FRAME STRUCTURE. THE M.S. ANGLE FRAME STRUCTURE SHALL BE PAINTED WITH EPOXY PAINT. THE SHADE OF THE PAINT SHALL BE APPROVED BY THE ARCHITECT / CLIENT. THE CONDENSING UNIT STAND SHALL HAVE 300 MM CLEAR SPACE ALL AROUND CONDENSING UNITS

This system includes the AC system comprising of the following:

Mountings & Accessories Anti-vibrations mounting shall be provided by the AC Contractor. Flexible connections shall be securely fixed to the unit sections by means of fixing strips or flange connections. All flexible connection will be air tight and suitable for the maximum operating pressure associated with the system.

CHECK LIST FOR INSTALLATION

Following check list to be followed

1. While Brazing the Ref. Copper pipes be sure to blow Nitrogen (Bleeding 5psi/0.02MPa) through them.
2. The Hard Copper(16G) pipe should always be in a straight line clamped at 2mtr interval, whereas Soft Copper pipe should be clamped at 1mtr level. Make- Mandev
3. Position of Refnet(Joints) should be laid Horizontal. There is no restriction for Liquid pipe Joints.
4. Brazing rod should be of only Harris make. Do not use flux to braze, as it corrodes the pipe.
5. All Refrigerant pipes should be insulated with 19mm closed rubber Nitrile Insulation 'O' Class. Pipes after separation tube to Indoor Unit can be of 13mm thick.(standard condition 30ºC(86ºF)and 85% Humidity.
6. Wherever there are two insulations sleeve joints, the joints should be covered with Aerotape.(2mm thick- Self Adhesive)
7. Wherever there is a Brazing joint in the copper pipe at that point there should be a covering of red tape for future reference.
8. Wherever copper pipe with insulation is supported, the pipe should be covered with hard PVC (sleeve) before clamping to avoid compression & water leakage at a later date. (Clamping should not be allowed for copper pipe)
9. Entire Field Refrigerant pipes should be Flushed with N2, to remove out Foreign particles and Carbon deposits, if any. Pressure(leak) Test with N2 at 550-575psig for 24Hrs.
10. Entire drain pipe has to be covered with 6mm(exposed)/9mm(concealed) thick Nitrile Insulation
11. 'U' Trap to be provided in Condensate Drain, near all the Ductable(Med-Hi Static) Indoor.
12. Ensure Proper drain Slope of Main Header incase of Common Drain for Cassettes/Ductables.
13. All Flexible electrical cables should be in hard conduits.
14. Transmission cable 1.25Sqmm x 2 Core(shielded) and power supply cable should not lie in same conduit. Minimum 2 feet distance should maintain.
15. Digital Vaccum(micron) Guage to be used for Vaccum and it should attain 750- 500micron or minimum 8hours for both the Refrigerant lines.
16. Ref. Gas should be charged with proper Caliber Electronic Weighing Scale only
17. All the Outdoor condensing unit to have 2 anti vibration(Rubber pad- 10mm thick) mounts.

18. All the condensing units to have Isolator(MCB) & ELCB 100/300Ma for servicing & safety.

19. Hi-wall Split AC installation should have minimum 2" space on Top for sufficient Return Air.

20. Do not Install Units where Voltage changes a Lot, Large amount of Mineral/Cooking oil splash or Kitchen Exhaust is present.

INSTALLATION, START UP AND COMMISSIONING

1. Check for the Diversity of Indoor Unit and ODU. Do not allow diversity if all Indoor units are likely to be operated simultaneously.

2. Check drawings for Proper design of piping and distribution Joints as per the Installation manual (or approved Design Tool). Total piping length should not exceed

1000meters. This piping length includes all bends/Elbows. Farthest I/U can be at 165mtr from O/U. Farthest I/U from 1st Joint not more then 40mtr.

3. Carry out all visual checks and preliminary checks before start up (i.e. after achieving desired Vaccum) of the equipment viz Voltage, Earthing, Clean Indoor space etc.

4. Do not open the service Valve after Vaccumizing, as Oil may enter the Field pipe. Top up the additional Amount of Refrigerant Gas first, before charging the Refrigerant gas, Charging lines should be purge.(Note Charging Line size 5/16")

5. Charge the refrigerant through suction line(in a system with pre-charged refrigerant, only top up if required).

6. Make Sure Phase Voltage for 1Ø is 230V(+10%) and for 3Ø is 410V(+10%), E-N= 0V, 50Hz

7. Power Supply to TB1 in Outdoor and TB2 in Indoor, Transmission wire to T3 of outdoor and TB5 in Indoor.

8. Check for Communication wire properly connected to Indoor and Outdoor. Indoor unit setting from 1-50 and outdoor address setting 51-99,100.

9. Signal Receiver for a Wireless Remote controller should have a space of atleast 1mtr from General Lighting.

10. All Medium and Hi static Ductable Machines 'U' Trap to be filled with water Manually.

11. Check Compressor, Fan Motor Amps, Suction and Discharge Pressure, Condensor Air In/Out temperature. Maintenance Tool reading of 3 hours each at Full Load and Partial Load.

12. Check the Indoor Unit Blower direction for 3 phase Indoor Units.

13. Ensure that the Duct system is completed and practically Leakage-Free.

HANDING OVER DOCUMENTATION

1. Preparing Handing over documents covering following:-
2. All as Built Drawing duly certified by consultant/customer.
3. Technical catalogs/Bulletins of all equipments supplied/Installed.
4. Contact details of Equipment Supplier/Dealer/Customer.
5. Equipment Data with serial Numbers for all equipment.
6. Heat Load calculation sheets for all area covered in the projects.
7. Commissioning report comprising performance reading(Maintenance Tool).

TRAINING

With the help of all above documentation, end user's operating staff/Engineers must be imparted operational training. This initiative can ensure trouble free operation, avoid costly break down etc.

- **SHEET METAL WORK-**
- **SMACNA STANDARDS**

Unless otherwise specified here, the construction, erection, testing and performance of the ducting system shall conform to the SMACNA-2005 standards ("HVAC Duct Construction Standards – Metal and Flexible – Second Edition – 2005"-SMACNA)

All ducting shall be fabricated of LFQ (Lock Forming Quality) grade prime G.I. raw material furnished with accompanying Mill Test Certificates.

Galvanizing shall be of 120gms/sq.m. (total coating on both sides). In addition, if deemed necessary, samples of raw material, selected at random by owner's site representative shall be subject to approval and tested for thickness and zinc coating at contractor'sexpense.

- **SELECTION OF G.I. GAUGE AND TRANSVERSE CONNECTORS**

Duct Construction shall be in compliance with 2" (500 Pa) w.g. static norms as per SMACNA. All transverse connectors shall be the TDF/4-bolt slip-on flange system standard makes of similar 4-bolt systems with built-in sealant.

Non-toxic, AC-applications grade P.E. or PVC Gasketing is required between all mating flanged joints.

Gasket sizes should conform to flange manufacturer's specification.

Low Pressure Ducting (Up to 50mm of WG)

Sr No	Duct size (mm)	Nominal Thickness as per SMACNA	Joint/ Reinforcement class as per SMACNA
1	Up to 900	24 G/ 0.63 mm	TDF
2	901-1000	22 G/ 0.80 mm	TDF
3	1001-1200	20 G/ 1.00 mm	TDF
4	1201-2100	20 G/ 1.00 mm	Rolamate I
5	2001-2400	18 G/ 1.20 mm	Rolamate J
6	Above 2401	18 G/ 1.20 mm	Rolamate J with Intermediate reinforcement @ 600 mm

Notes:

***1- SMACNA** – Sheet Metal & Air conditioning Contractors' National Association Inc – "HVAC Duct Construction Standards- Metal and Flexible"-2000, U.S.A.

***2-Reading Guide**- For duct sizes between, say, 651 mm and 700 mm, when the pressure class is 1" w.g. static, we require a standard 'E' class flange and duct gauge of 26. For the same size range but with static pressure at 4" w.g. a standard 'H' class flange with duct gauge of 24 should be used.

***3-**The standard flange classes available are designated E, H and J. For E & H class of standard make use gasket size 10 mm wide and 4.5 mm thick. For standard J-class use 15 mm wide and 6 mm thick gasket.

Design Parameters for duct design shall be:

Maximum Velocity at Supply Air Duct : 1200FPM

- **DUCT CONSTRUCTION**

The fabricated duct dimensions should be as per approved drawings and all connecting sections are dimensionally matched to avoid any gaps.

Dimensional Tolerances: All fabricated dimensions will be within +/- 1.0mm of specified dimension. To obtain required perpendicular, permissible diagonal tolerances shall be +/- 1.0 mm per meter.

Each and every duct pieces should be identified by color coded sticker which shows specific part numbers, job name, drawing number, duct sizes and gauge. Ducts shall be straight and smooth on the inside. Longitudinal seams shall be airtight and at corners only, which shall be either Pittsburgh or Snap Button Punch as per SMACNA practice, to ensure air tightness

Changes in dimensions and shape of ducts shall be gradual (between 1:4 and 1:7). Turning vanes or air splitters shall be installed in all bends and duct collars designed to permit the air to make the turn without appreciable turbulence.

Plenums shall be shop/ Reinforcement of ducts shall be achieved by either cross breaking or straight beading depending on length of ducts

As per SMACNA page no. 1.74, fig. 1-8 “Duct Sizes 19” (483 mm) wide and larger which have more than 10 ft^2 of unbraced panel shall be beaded or cross broken unless ducts will have insulation covering or acoustical liner. This requirement is applicable to 20 G (1.00 mm) or less and 3” W.G. (750 Pa) pressure or less. Ducts for 4” W.G. (1000 Pa) or more do not require beads or cross-breaks.” factory fabricated panel type and assembled at site.

- **FLEXIBLE ALUMINIUM DUCTING**

The ducting shall be fully flexible, compressible and extendable made of 2 ply multi layered Aluminum polyester foil bonded together by quality adhesive and reinforced with high carbon corrosion proof spring wire. The distance between spring wires shall not exceed 1”. The ducting shall be strong, durable and should not go out of shape even fully extended. The ducting shouldbe also available with insulation of desired thickness.

SUPPORT FOR HORIZOTAL RECTANGULAR DUCT

Sr. No.	Maximum Duct Size(mm)	Hanger Rod Diameter	Interval (mm)
1	Upto - 700	6 mm	2400
2	701 - 1200	8 mm	2400
3	1201 - 2000	10 mm	2400
4	Above 2000	12 mm	2400

As an alternative, slotted galvanized brackets attached to the top two bolts of the Rolamate system may also be used as appropriate for the site condition. To provide the required thermal brake effect, Neoprene or equivalent material of suitable thickness shall be used between duct supports and duct profiles in all supply air ducts not enclosed by return air plenums.

- **INSTALLATION PRACTICE**

All ducts shall be installed as per tender drawings and in strict accordance with approved shop drawings to be prepared by the Contractor. The Contractor shall provide and neatly erect all sheet metal work as may be required to carry out the intent of these specifications and drawings. The work shall meet with the approval of Owner's site representative in all its parts and details.

All necessary allowances and provisions shall be made by the Contractor for beams, pipes, or other obstructions in the building whether or not the same are shown on the drawings. Where there is interference/fouling with other beams, structural work, plumbing and conduits, the ducts shall be suitably modified as per actual site conditions.

Ducting over false ceilings shall be supported from the slab above, or from beams. In no case shall any duct be supported from false ceilings hangers or be permitted to rest on false ceiling. All metal work in dead or furred down spaces shall be erected in time to occasion no delay to other contractor's work in the building.

Where ducts pass through brick or masonry openings, it shall be provided with 25mm thick appropriate insulation around the duct and totally covered with fire barrier mortar for complete sealing.

All ducts shall be totally free from vibration under all conditions of operation. Whenever ductwork is connected to fans, air handling units or blower coil units that may cause vibration in the ducts, ducts shall be provided with a flexible connection, located at the unit discharge.

- **TESTING**

After duct installation, a part of duct section (approximately 5 % of total ductwork) may be selected at random and tested for leakage. The procedure for leak testing should be followed as per SMACNA- "HVAC Air Duct Leakage Test Manual" (First Edition)

- **VOLUME CONTROL DAMPER**VCD

shall be fabricated of minimum 20G GSS and shall be of robust construction. VCD shall be single blade type for round duct and opposed blade type for rectangular duct. VCD shall have a locking device mounted outside the duct to hold the VCD in a fixed position without vibration. Fully open and fully closed position shall be marked for easier operation of VCD.

3. Motor operated VCD shall be provided, if specified. Actuator for dampers shall develop sufficient torque for easy operation of VCD.

4. VCD shall be provided with Teflon or brass bushing for blade shaft .

5.Motor operated VCD shall be provided with Teflon bushing or sealed ball bearing for blade shaft.

6. Volume control dampers shall be provided in every branch duct from individual main ducts. Volume control dampers shall also be provided in branch duct from main connecting to individual supply / exhaust air outlets, and inlets, fresh air intake duct, etc.

- **FIRE DAMPERS**

1. All supply and return air ducts at plant room crossings and at all floor crossings shall be provided with fire dampers of at least 90 minute fire rating. These shall be multi leaf dampers.

2. Fire dampers blades and outer frames shall be of 18G GSS construction. The damper blades shall be provided on both ends using chrome plated spindles in self lubricated bronze bushes. Stop shall be provided on top and bottom of damper housing made of 18G GSS. For preventing smoke leakage, side metallic compression seals shall be provided.

3. Fire damper shall be provided with factory fitted sleeves. Access doors shall be provided within the duct in accordance with the manufacturer's recommendation.

4. For SS duct, all fire dampers shall be fabricated from SS 304 sheet. Outdoor air grills shall be of the single louver type with opposed blade volume control dampers adjustable from the face of the grilles.

5. Fire isolating dampers complete with outer frame, damper blades, motorised or fusible link actuator, linkages and sleeves, shall be installed in all locations as may be required by the relevant Authorities. In particulars, fire dampers shall be installed in ducts where they pass through compartmentation walls, fire walls and concrete floors except in the case where the duct itself is in a fire isolated shaft.

5. Fusible link type fire dampers shall be provided at all locations. Fusible link fire dampers shall be of the spring or dead weight type and shall be complete with fusible link 72 Deg. C rating so that they close automatically and remain closed under fire condition. The damper shall have a rating of not less that the rating of the fire separation walls or floors and shall be tested by a approved testing authority.

6. All fire dampers shall be approved by the relevant Authorities. Inspection door shall be provided for fire dampers. Fire dampers shall be UL 555 rated and certified by UL. All fire dampers shall be complete with factory fabricated and fitted duct sleeve. The joints at the sleeve end shall be slip on type.

7. Fire damper for this project are Motorized dampers complete with UL listed Motorized actuators of suitable torque, Control panel, 230V.

- **GRILLES AND DIFFUSERS**A

DIFFUSERS AND GRILLES (AIR DIFFUSION EQUIPMENT)

1. Supply air diffuser shall be of the round universal type with adjustable GI/Aluminum round sliding volume control dampers. Dampers shall be adjustable by a removable key or screw driver from the face of the diffuser from below.

2. The type and quantity of diffusers and grilles shall be provided, as specified in the drawing. The CONTRACTOR shall ensure that the diffusers and grilles offered are of requisite capacity, throw and terminal velocity. Diffusers and grilles shall be fabricated from factory coated with rust resistant primer or extruded aluminum section with powder coating as specified in the drawing.

3. Whenever VCD is provided with diffusers or grilles it shall be located within the duct collar. Diffusers and grilles shall be of flush pattern.

4. Ceiling diffuser shall be equipped with fixed air distribution grids, removable key operated volume control dampers and anti-smudge rings. The extruded aluminum diffusers shall be provided with removable central core and concealed key operation for volume control damper.

5. Linear diffusers shall be of extruded aluminum construction.

6. Slot diffuser shall be of extruded aluminum construction multi-slot type with air pattern controller provided in each slot. Supply air slot diffusers shall be provided with hit and miss VCDs in each slot.

7. Grilles with VCD shall be single acting or double acting, as specified in the drawing. Grilles without VCD shall have fixed blades or adjustable blades, as specified in the drawing.

8. All round diffusers, grilles and registers shall be of extruded aluminum construction, and epoxy powder coated.

9. Aluminum registers, diffusers and grilles shall be approved by Architect. The shade of epoxy powder coating for grilles, registers and diffusers shall be approved by Architect.

10. All ceiling diffusers shall be of the louver face type with removable core complete with opposed blade volume control dampers. The diffuser surface shall be completely flush with the false ceiling.

11. Supply registers shall be of the rectangular universal type with adjustable horizontal and vertical vanes complete with opposed blade volume control dampers. Dampers shall be adjustable by a removable key or screwdriver from the face of the registers.

12. Fresh air and discharge air grilles shall be of the fixed single louver type with opposed blade volume control dampers adjustable from the face of the grilles. All diffusers, registers and grilles shall be selected to account for the noise levels as specified for various areas.

13. For areas where square ceiling diffusers are used, they shall be of the louver face type with removable core complete with opposed blade volume control damper.

14. Outdoor air grilles shall be of the fixed single louver type with opposed blade volume control dampers adjustable from the face of the grilles

- **ACCESS DOOR**

1. Access door shall be provided in duct before and after equipment installed in duct and at all fire damper locations. All access doors shall be fabricated of the same material as the duct work and shall have minimum two hinges. Hinges shall be zinc plated and pins shall be of brass. Access doors shall be of minimum of 305 mm x 305 mm size. At least two heavy solid brass fasteners and a brass handle are required for each door. A continuous neoprene rubber gasket shall be adhered to the opening frame with adhesive.

- **INSTALLATION**A

good quality expanded polyethylene /rubber of uniform thickness and width shall be used as gasket between flange joints. The gaskets shall be fixed by a suitable adhesive and holes made by passing a heated rod through.

1. All ducts shall be rigid and shall be adequately supported and braced where required with standing seams, tees or angles of ample size to keep the ducts true to shape and to prevent buckling, vibration or

breathing. All the joints shall be made tight and all interior surfaces shall be smooth. Bends shall be made with radius not less than one half the width of the duct or with properly designed interior curved vanes where metal ducts or sleeves terminate in woodwork, brick or masonry openings, tight-flanged collars. Ducting over false ceiling shall be supported from the slab above or from beams. In no case a duct shall be supported from the false ceiling hangers or to be permitted to rest on a hung ceiling.

2. All holes in concrete, masonry etc. made by contractor for fixing supports etc. shall be made good and restored to original finish by him.

3. Air handling units and fans shall be connected to duct work by inserting at air inlet and air outlet a double canvass sleeve. Each sleeve shall be minimum 100mm long, securely bolted to duct and units. Each sleeve shall be made smooth and the connecting ductwork rigidly held in the line with unit inlet or outlet.

- **TESTING All**

the test readings shall be furnished for peak summer and monsoon outside conditions.

1. After completion all such system shall be tested for leakage.

2. The entire air distribution system shall be balanced to supply the air quantities as required in various zones and rooms to maintain the specified room conditions. The final readings shall be recorded and submitted to the Consultant for approval before acceptance and taking over of the entire system by the Employer.

- **PAINTING**

Angle iron flanges, stiffeners, hangers and supports shall be painted with 2 coats of anti rust primer and those remaining uncovered shall be further painted with 2 coats of synthetic enamel paints of black color.

- **INSULATION**
- **ACOUSTIC INSULATION**First

3-meter length of supply air duct shall be acoustically insulated with 25m thick fiberglass of density 48 Kg./Cu. M. and covered with 28 G perforated Aluminium sheets from the inside of the duct.

a)Apply a thin layer of tar paints.

b)Fix-up fiberglass slabs

c)Cover-up with perforated Aluminium sheets with the help of G. I. Screw Washers.

- **THERMAL INSULATION**

Duct Insulation - Material Specification

Indoor – Duct Insulation - Thermal

- Insulation material shall be Closed Cell Elastomeric Nitrile Rubber.
- Density of Material shall be between 40 to 60 Kg/m3
- Thermal conductivity of elastomeric nitrile rubber shall not exceed 0.033 W/m.K at mean temperature of 0□C
- Water vapour permeability shall not exceed 1.74 x 10-14 Kg/m.s.Pa, i.e. Moisture Diffusion Resistance Factor or 'μ' value should be minimum 10,000.
- The insulation shall have fire performance such that it passes Class 1 as per BS476 Part 7 for surface spread of flame as per BS 476 and also pass Fire Propagation requirement as per BS476 Part 6 to meet the Class 'O' Fire category as per 1991 Building Regulations (England & Wales) and the Building Standards (Scotland) Regulations 1990
- Insulation material shall be with self adhesive option and should be an anti-microbial product, which is EPA (Environmental Protection Agency), USA approved, as an integral part of insulation that cannot be washed off or worn off.
- It shall give enhanced level of protection against harmful Microbes such as bacteria, mold, mildew and fungi and should confirm to following standards: Fungi / Mould Resistance – DIN EN ISO 846method A and Bacterial resistance –– DIN EN ISO 846 method C
- Material should be FM (Factory Mutual), USA approved.
- The material shall have ODP (Ozone Depletion Potential) and GWP (Global Warming Potential) of Zero.
- Thickness of the insulation shall be as specified for the individual application.

Outdoor – Duct Insulation – Thermal

- Insulation material shall be Closed Cell Elastomeric Nitrile Rubber
- Density of Material shall be between 40 to 60 Kg/m3
- Thermal conductivity of elastomeric nitrile rubber shall not exceed 0.035 W/m°K at an average temperature of 0°C
- Water vapour permeability shall not exceed 0.017 Perm inch (2.79 x 10-14 Kg/m.s.Pa), i.e. Moisture Diffusion Resistance Factor or 'μ' value should be minimum 7000.

- The insulation shall have fire performance such that it passes Class 1 as per BS476 Part 7 for surface spread of flame as per BS 476 and also pass Fire Propagation requirement as per BS476 Part 6 to meet the Class 'O' Fire category as per 1991 Building Regulations (England&Wales) and the Building Standards (Scotland) Regulations 1990

- Insulation material shall be with self adhesive option.

- Material should be FM (Factory Mutual), USA approved.

- The material shall have ODP (Ozone Depletion Potential) and GWP (Global Warming Potential) of Zero.

- Thickness of the insulation shall be as specified for the individual application.

- On nitrile insulation Chemically Treated (UV) Woven Glass Cloth covering (Factory Laminated) should be used for Mechanical & UV Protection.

Thickness

Ducting Specifications for Indoor & outdoor applications:

DUCT INSULATION : (Indoor / UN EXPOSED)- **Non Coastal Area**		
	Required Thickness (mm)	Material to be used
Supply Air Duct (Line Temperature 14 Deg. C)	19	**Nitrile Rubber** Sheet (Class O, Anti Microbial) – Self Adhesive
Return Air Duct (Line Temperature 22 Deg. C)	9	**Nitrile Rubber** Sheet (Class O, Anti Microbial) – Self Adhesive
Supply Air Duct in Return Air Path (Line Temp. 14 Deg. C)	9	**Nitrile Rubber** Sheet (Class O, Anti Microbial) – Self Adhesive

DUCT INSULATION : (Outdoor / UN EXPOSED)- **Non Coastal Area**		
	Required Thickness (mm)	Material to be used
Supply Air Duct (Line Temperature 14 Deg. C)	19	Nitrile Rubber Sheet (Class O) with Glass Cloth Covering – Self Adhesive
Return Air Duct (Line Temperature 22 Deg. C)	9	Nitrile Rubber Sheet (Class O) with Glass Cloth Covering – Self Adhesive
Supply Air Duct in Return Air Path (Line Temp. 14 Deg. C)	9	Nitrile Rubber Sheet (Class O) with Glass Cloth Covering – Self Adhesive

Ducting Specifications for Indoor & outdoor applications:

DUCT INSULATION : (Indoor / UN- EXPOSED)- **Coastal Area**		
	Required Thickness (mm)	Material to be used
Supply Air Duct (Line Temperature 14 Deg. C)	25	**Nitrile Rubber** Sheet (Class O, Anti Microbial)– Self Adhesive
Return Air Duct (Line Temperature 22 Deg. C)	9	**Nitrile Rubber** Sheet (Class O, Anti Microbial)– Self Adhesive

Supply Air Duct in Return Air Path (Line Temp. 14 Deg. C)	9	**Nitrile Rubber** Sheet (Class O, Anti Microbial)– Self Adhesive

DUCT INSULATION : (Outdoor / EXPOSED)- **Coastal Area**		
	Required Thickness (mm)	Material to be used
Supply Air Duct (Line Temperature 14 Deg. C)	32	Nitrile Rubber Sheet (Class O) with Glass ClothCovering – Self Adhesive
Return Air Duct (Line Temperature 22 Deg. C)	9	Nitrile Rubber Sheet (Class O) with Glass ClothCovering – Self Adhesive
Supply Air Duct in Return Air Path (Line Temp. 14 Deg. C)	9	Nitrile Rubber Sheet (Class O) with Glass Cloth Covering – Self Adhesive

Acoustic Insulation – Duct Insulation

Material shall be engineered Nitrile Rubber open cell foam

The Random Incidence Sound Absorption Coefficient (RISAC); tested as per ISO 354, shall be minimum as per enclosed chart

Freq (Hz)	125	250	500	1000	2000	4000	NRC
10 mm	0.03	0.04	0.14	0.04	0.88	1.00	0.40
15 mm	0.01	0.09	0.29	0.74	1.08	0.83	0.55
20 mm	0.04	0.13	0.4	0.9	1.04	0.90	0.60

25 mm	0.02	0.25	0.86	1.14	0.88	0.99	0.80
30 mm	0.07	0.32	0.99	1.16	0.93	1.08	0.85
50 mm	0.23	0.73	1.29	0.99	1.09	1.11	1.05

- The material shall be fibre free
- The density of the same shall be within 140-180 Kg/m3
- It shall have Microban®*; antimicrobial product protection, and shall pass Fungi /Mould Resistance as per DIN EN ISO 846method Aand Bacterial Resistance as per DIN EN ISO 846 method C, from an independent testing agency.
- The material shall have a thermal conductivity not exceeding 0.047 W/m.K @ 20 Deg.C
- The material shall withstand maximum surface temperature of +85 Deg.C and minimum surface temperature of -20 Deg.C
- The material shall conform to Class 1 rating for surface spread of Flame in accordance to BS 476 Part 7 & UL 94 (HB, V-0) in accordance to UL 94, 1996.
- The insulation shall pass Air Erosion Resistance Test in accordance to ASTM Standard C 1071-05 (section 12.7), from an independent accredited testing agency.

Thickness of the material shall be as specified for the individual application. The insulation shall be installed as per manufacturer's recommendation.

* Microban is a registered trademark of the Microban Products Company, USA.

Thickness

For Duct Acoustic Lining Application:

For Plenum Boxes & Duct sizing above 600 mm X 600 mm: 15 mm thk

For Duct sizing Lesser than 600 mm X 600 mm: 10 mm thk

For AHU/ Plant Room Acoustic Lining Application: Thickness of 25 to 30 mm is recommended. (refer to thickness mentioned in BOQ)

PIPING :

ASHRAE Guidelines.

01 – 04 Piping Insulation - Material Specification

Piping Insulation - Thermal

- Insulation material shall be Closed Cell Elastomeric Nitrile Rubber
- Density of Material shall be between 40 to 60 Kg/m3
- Thermal conductivity of elastomeric nitrile rubber shall not exceed 0.035 W/m.K at an mean temperature of 0□C
- Water vapour permeability shall not exceed 2.79 x 10-14 Kg/m.s.Pa), i.e. Moisture Diffusion Resistance Factor or 'μ' value should be minimum 7000.
- The insulation shall have fire performance such that it passes Class 1 as per BS476 Part 7 for surface spread of flame as per BS 476 and also pass Fire Propagation requirement as per BS476 Part 6 to meet the Class 'O' Fire category as per 1991Building Regulations (England & Wales) and the Building Standards (Scotland)

Regulations 1990

- Material should be FM (Factory Mutual), USA approved.
- The material shall have ODP (Ozone Depletion Potential) and GWP (Global Warming Potential) of Zero.
- On nitrile insulation Chemically Treated (UV) Woven Glass Cloth covering (Factory Laminated) should be used for Mechanical & UV Protection – **Outdoor Condition.**
- The tubes shall be fully factory (machine) slit along each length with two strips of double sided self adhesive tape pre-applied to each open slit surface. The self tape adhesive shall be solvent free acrylic with high initial tack and high peel strength.

Thickness

Thickness of the insulation shall be as specified for the individual application All chilled water, refrigerant and condensate drain pipe shall be insulated in the manner specified herein. An air gap of minimum 100 mm shall be present between adjacent insulated surfaces carrying chilled water or refrigerant and also between the insulated surface and the wall to allow natural ventilation without affecting its external surface coefficient of heat transfer. Before applying insulation, all pipes shall be

brushed and cleaned. All Pipe surfaces shall be free from dirt, dust, mortar, grease, oil, etc. Nitrile Rubber insulation shall be applied as follows:

- Insulating material in tube form shall be sleeved on the pipes.
- On existing piping, slit opened tube of the insulating material (slit with a very sharp knife in a straight line) shall be placed over the pipe and adhesive shall be applied as suggested by the manufacturer.
- Adhesive must be allowed to tack dry and then press surface firmly together starting from butt ends and working towards centre.
- Wherever flat sheets shall be used it shall be cut out in correct dimension. All longitudinal and transverse joints shall be sealed as per manufacturer recommendations.
- The insulation shall be continuous over the entire run of piping, fittings and valves.
- All valves, fittings, joints, strainers, etc. in chilled water piping shall be insulated to the same thickness as specified for the main run of piping and application shall be same as above. Valves bonnet, yokes and spindles shall be insulated in such a manner as not to cause damage to insulation when the valve is used or serviced.

The detailed application specifications are as mentioned separately. The manufacturer's trained installer shall only be used for installation.

THICKNESS SELECTION CHART FOR NITRILE RUBBER INSULATION **Design Basis: Condensation Control**			
Coastal Areas	Mumbai, Chennai, Kochi, Goa etc		
Design Conditions: 28.3 Deg. C & 90% RH (as per ASHRAE guidelines)			
CHILLED WATER PIPING **LINE TEMP 7 Deg.C**			
Pipe NB (mm)	**Required Thickness (mm)**	**Recommended material**	**Application**
25 to 40	**32**	**Use relevant Nitrile**	**Single layer of 32 mm**

		Rubber pre cut tubes	Tube with Glass Cloth covering
50 to 150	38	Use Nitrile Rubber Pre cut sheets for higher sizes(i.e.above 80 mm).	First layer of 19 mm and outer layer of 19 mm covered with Glass Cloth
200 to 600	44	Use Nitrile Rubber Pre cut sheets.	First layer of 25 mm and outer layer of 19 mm covered with Glass Cloth
Cold Water Tank	44	Use Nitrile Rubber sheets	First layer of 25 mm and outer layer of 19 mm covered with GlassCloth

REFRIGERANT PIPING			
LINE TEMP 3 Deg C			
Pipe NB (mm)	Required Thickness (mm)	Recommended material	Application
Up to 50	38	Use relevant Nitrile Rubber pre cut tubes	First layer of 19 mm and outer layer of 19 mm covered with Glass Cloth
Up to 100	44	Use relevant Nitrile Rubber pre cut tubes	First layer of 25 mm and outer layer of 19 mm covered with Glass Cloth

THICKNESS SELECTION CHART FOR NITRILE RUBBER INSULATION **Design Basis: Condensation Control** **Non Coastal Areas : Pune, Vadodara, etc..**			
Design Conditions: 26.8 Deg.C& 85% RH			
CHILLED WATER PIPING	LINE TEMP 7 Deg.C		
Pipe NB (mm)	**Required Thickness (mm)**	**Recommended material**	**Application**
Up to 40	**19**	**Use relevant Nitrile Rubber Pre cut tubes**	**Single layer of 19 mm Tube with Glass Cloth covering**
50 to 150	**25**	**Use Nitrile Rubber Pre cut sheets for higher sizes (i.e. above 80 mm).**	**Single layer of 25 mm Tube/Pre cut Sheets with Glass Cloth covering**
200 to 600	**32**	**Use Nitrile Rubber Pre cut sheets for higher sizes**	**Single layer of 32 mm Tube/Pre cut Sheets with Glass Cloth covering**

DRAIN PIPING			
Pipe NB (mm)	**Required Thickness (mm)**	**Recommended material**	**Application**
Up to 50	**13**	**Use relevant Nitrile Rubber Pre cut tubes**	**Single layer of 13 mm Tube withGlass Cloth covering**

REFRIGERANT PIPING			
LINE TEMP 3 Deg C			
Pipe NB (mm)	**Required Thickness (mm)**	**Recommended material**	**Application**
Up to 40	**25**	**Use relevant Nitrile Rubber Pre cut tubes**	**Single layer of 25 mm Tube with Glass Cloth covering**
Up to 100	**32**	**Use relevant Nitrile Rubber Pre cut tubes**	**Single layer of 32 mm Tube withGlass Cloth covering**

Installation Accessories

External Covering

Specification Clause:

For protection against mechanical impact and UV protection, insulation manufacturer supplied Treated Woven Glass Cloth Covering - shall be applied. Factory Laminated Glass Cloth on Sheets & Tubes can also be used.

Technical Details:

Temperature Range: 0°C to +105°C Overall (irrespective of the base product)

Colour: Black/Grey

Treatment: Shall be treated Water Based Acrylic binder to give crisp and non-piling property to the fabric, to help in easy installation, minimize fiber erosion, good aesthetics and resistance to abrasion. Fibre spillage / Thread raveling should be minimum.

Density: 200 +/- 20 gsm

Tensile Strength: 275 +/- 25 Kg / 50 mm (minimum)

Thickness: 0.18 mm / 7 mill

PSA Tape

Peel Strength: 1000 gm / 25 mm (minimum) - (Adhesive to steel)

Release Liner : Polyester

Factory made Elastomeric Nitrile Rubber Pipe Supports

Specification Clause:

Insulated pipe support, single piece with self-adhesive closure, PUR/PIR load bearing Inserts, embedded in Elastomeric Nitrile Rubber insulation with two outer metal shells made of aluminum sheet, which also acts as a vapour barrier for the CFC Free - PUR/PIR inserts.

Technical Details:

Temperature Range: - 50°C to +105°C (acc. to EN 14706, EN 14707 and EN 14304)

Moisture Resistance Factor μ > 7000 (acc. to EN 12086/EN 13469)

Thermal Conductivity at 0°C: 0.035 W/(m · K) (acc. to DIN EN 12667 & EN ISO 8497)

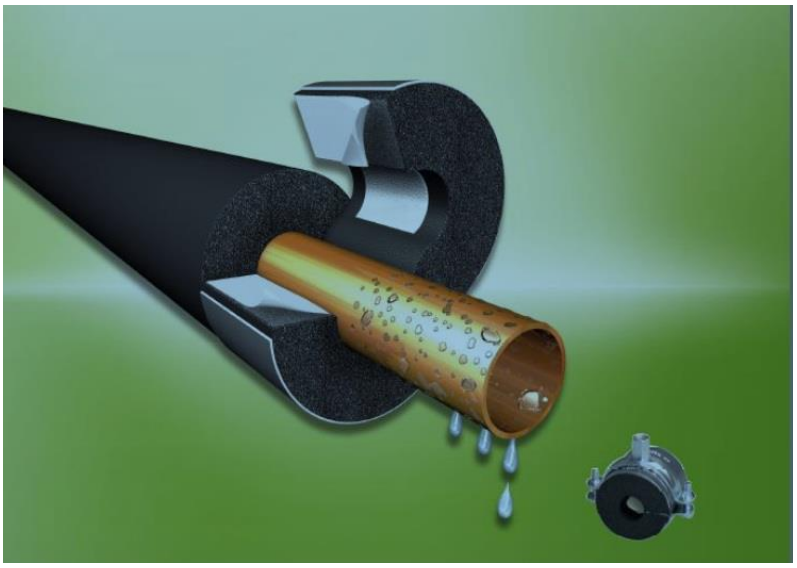
Thermal Conductivity at 40°C: 0.040 W/(m · K) (acc. to DIN EN 12667 & EN ISO 8497)

Reaction to Fire: Shall be Made from Class O* Rated Elastomeric Nitrile Rubber Insulation material

(* as per UK Building code, shall meet BS 476 Part 6 & 7)

Other Fire Class:Self-extinguishing, does not drip, does not spread flames

Colour: Black



Factory made Versatile Light Weight Pipe Supports with Elastomeric Insulation for fixing & hanging cooling, air conditioning and heating pipes Specification Clause:

Insulated donut type pipe supports, shall be single piece with self-adhesive closure, with special plastic load bearing Inserts, embedded in Elastomeric Nitrile Rubber insulation for HVAC applications.

Technical Details:

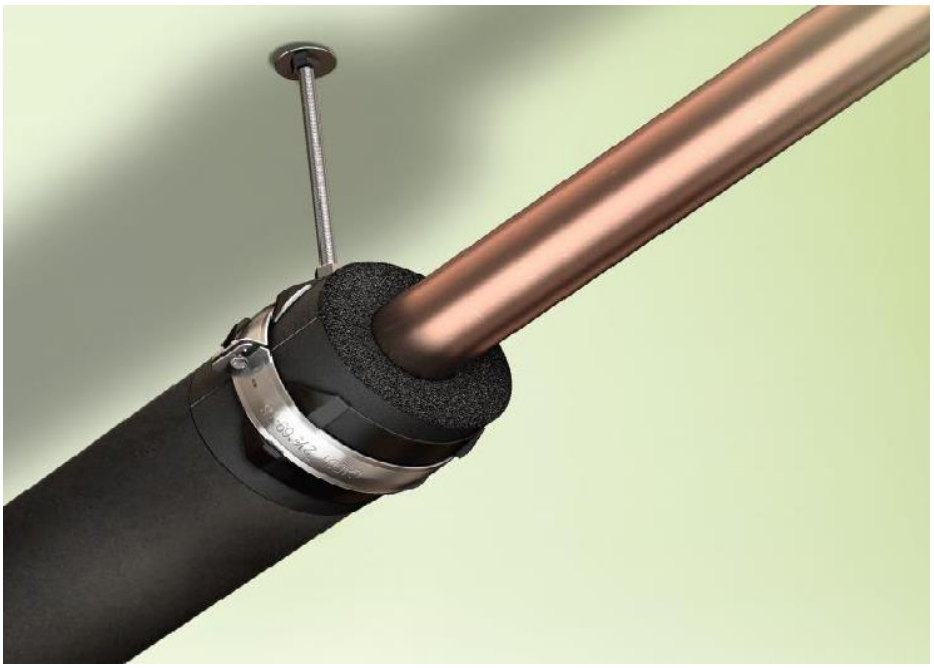
Temperature Range: - 0°C to +105°C (acc. to EN 14706, EN 14707 and EN 14304)

Moisture Resistance Factor μ > 7000 (acc. to EN 12086/EN 13469)

Thermal Conductivity at 0°C: 0.035 W/(m · K) Similar to elastomeric foam

Practical Fire Behaviour: Self-extinguishing, does not drip, does not spread flames

Colour: Black



Adhesive

Adhesive Specification

The adhesive shall be specially formulated for the pipe insulation application and supplied by insulation manufacturer. The adhesive shall be Solvent based rubber insulation adhesive, free from benzene. Excellent Bonding to Porous and Non Porous Surfaces. The adhesive shall be quick drying characteristics for tropical conditions and shall have service temperature of -25 deg C to +90 deg C.

Properties

Viscosity @ 30°C : 3500 - 4000 cps

Specific Gravity : 0.89 - 0.92 g/cc

Density : 0.085 kg/m3 + 0.01

Flash Point : > 10°C

Coverage : 4-5 square meters of bonded material per Litre

Drying Time : 7 - 8 Minutes

Tack Retention Time : 25 Minutes

SPECIAL NOTES FOR CONTRACTOR

a. Soft refrigerant piping where ever used shall be properly installed & bends shall be made using tube bender;

b. Where pipes &/or cables pass through walls or ceilings; proper G.I. Pipe sleeves shall be provided whether the same is specifically mentioned or not; no separate rates will be applicable

c. Refrigerant pipes shall be mounted on teak wood gutties to avoid physical contact with structure & shall be properly clamped & neatly laid; no separate rates will be applicable;

d. Site progress register shall be maintained at site;

e. All tools, tackles, instruments & manpower required for testing (including witness test by Engineer/ Consultant) shall be arranged free of cost by contractor as & when required including for re-tests if any;

f. Free periodic services for maintenance shall be provided by contractor (depending upon actual site requirement like choking of condenser coil etc.) but not less than **ONE SERVICE PER MONTH** to ensure efficient operation of the system.

g. The unit rates indicated shall be **INCLUSIVE OF ALL MATERIAL CHARGES, TRANSPORTATION, LOCAL LEVIES AS APPLICABLE, LOADING, UNLOADING, LIFTING- SHIFTING, ERECTION, TESTING ,COMMISSIONING, VAT, SALES TAX, ANY ADDITIONAL/SPECIAL DUTIES, EXCISE, CUSTOM DUTY ETC. AS APPLICABLE.**

h. **ANY ADDITIONAL LIABILITY ARISING OUT OF A DIFFERENT INTERPRETATION OF RELEVANT ACTS SHALL BE TO CONTRACTORS ACCOUNT.**

i. **TAXES & DUTIES INCLUDED (ITEMWISE) SHALL ALSO BE CLEARLY INDICATED BOTH AS PERCENTAGE & IN RUPEES.**

j. Grouting for supports of contractors' equipment shall be carried out by contractor,

k. The contractor shall carry out tests on different equipment's as specified in various sections, in the presence of clients/their authorized representatives &/or the consultants in order to enable them to determine whether the plant & equipment's and installation in general comply with the specifications

All alternative makes offered shall be clearly spelt out in the offer & shall be subject to our acceptance.

LIST OF RECOMMENDED MATERIALS – INTERIOR WORKS AS PER BANK

Sr No	Material	Approved Brand/ Manufacturer
A.	**INTERIOR WORK:**	
	MDF / Plywood	Century / Asian / Archid /Anchor/ Green Ply or Equivalent
	Laminated Sheet	Archidlam national / Formica / Greenlam / MERINO/century/Sunmica or equivalant
	Veneer	Green / Duro / Archid/Century / Timex / Anchor or equivalent
	Particle Board (only for Modular w/s & storage unit)	Archidply / Greenlam/Century equivalent ISI mark
	Acrylic sheet	ICI, GE or Equivalent ISI make
	Marine grade plywood	Century/ Kitply/ Greenply/ anchor/ Orchid/ Prince
	Adhesive	Fevicol/ Araldite/ Anchor or equivalent
	Solid surfaces (Curion)	DUPOINT/HI-MAC/STARON OR equivalent
	Marine Grade Block board	Century/ Kitply/Greenply/Anchor/Orchid or equivalent
	Flush Door	Century/ Kitply/Greenply/Anchor/Orchid or equivalent
	Polish	Asian / Dulex or equivalent
	Latex	MM Foam or equivalent ISI make
	High density Foam	U Foam or equivalent Isi make
	Locks	Godrej/ Haffle/ Hettich/Ebco or equivalent
	Storage Hardware	Godrej/ Haffle/ Hettich/Ebco or equivalent
	Screws / Nails & other accessories	GKW/Nettleford or equivalent
	False Flooring	Kebao/Armstrong/AMF or equivalent

	Vinayl Flooring	Armstrong/gerflor/Eurotex or equivalent
	Carpet	Unitex/Armstrong or equivalent
	Wooden laminated flooring	Pergo/Armstrong/Euro/Squarefeet or equivalent
	Plain/Toughned glass	Saint-Gobin/Indo Asahi/Modi or equivalent
	Hardware for general staff area	Dorma/Euro/Ozone/Enox/Ebco/Hamco or equivalent
	Hardware for main Glass doors (patch fittings)	Dorma/Euro/Ozone/Enox/Ebco/Hamco or equivalent
	Door Closers (general use)	Dorma/Euro/Ozone/Enox/Ebco/Hamco/Godrej or equivalent
	Floor springs (general use)	Dorma/Euro/Ozone/Enox/Ebco/Hamco or equivalent
	Floor springs for main glass doors	Dorma/Euro/Ozone/Enox/Ebco/Hamco or equivalent
	Aluminium Sections for Partitions	Jindal/Tata Steel or equivalent
	False Ceilings: Gypsum	India Gypsum/Saint Gobin/Asia
	False Ceiling: Grid (As Approved)	Armstrong/AMF or equivalent
	False Ceilings: Grid (Metal Ceiling)	Unimech/AMF/Armstrong/
	GI Sections	India Gypsum/Saint Gobin/Jindal or equivalent
	Acoustical False Ceilings: Mineral fiber board	Armstrong/Hunter/Douglas/Peritex or equivalent
	POP Punning	Gyprock/India Gypsum/Birla
	Paint	Asian/Nerolac/Dulex/Berger or equivalent
	Exterior Paint	Asian/Nerolac/Dulex/Berger or equivalent
	ACP (Exterior/Interior)	Aistone/Eurobond/Alucobond
	Cylicon	G E/Dow corning/Wacer
	Rolling/Vertical Blind	Vista/Peritex/Winfab/MAC or equivalent
	Frosted Film	Garware or equivalent
	Aluminium Skirting-50mm	Jindal or equivalent

	Water Proofing	Pidilite or equivalent
	Hardwood	Salewwod/Teakwood/Kapoor or equivalent
	Automated Rolling Shutter	Gandhi Automation/Toshi Automatic Systems/Akash Rolling Shutter or equivalent
	Glass	Saint Gobin/equivalent
4	**Electrical**	
	Light Fittings	Philips/Wipro/Osram/Havells/Crompton G or equivalent
	MCCB, MCB, RCCB, DB, ICTPN,TP,HRC Fuse, change over switch, switch fuse unit	L&T/ABB/Legrand/Siemens/Schneider or equivalent
	FRLS insulated Elec. Wire/cable armourd, unarmourd, Sheathed, unsheathed, flexible LT cable, Multi core, single core cable, flat cable	Finolex/Ploycab/Havells/RR Kabel/KEI or equivalent
	PVC condult (HEAVY DUTY ONLY)	CAP/Finolex/Polycab or equivalent
	PVC insulated copper conductor Wires	Finolex/Polycab/RR Cable or equivalent
	Distribution Box	Legrand/Schneider/ABB/Siemens/L&T or equivalent
	MCB & MCCB	Legrand/Schneider/ABB/Siemens/L&T or equivalent
	Light Fixture & Lamps	Philips/Wipro Osram/Havells/Crompton G./ Halonix
	HT Cable	Polycab/Havells or equivalent
	Modular Switches	ABB/Legrand/MK/ANCHOR/ELLEYS/ROMA
	DLP Trunking	Legrand/Schneider or equivalent
	Power Cable	CCi/skytone/Universal/LAPP/Torrent
	End Termination	Raychem/Mahindra/ELMEX
	PANEL	Crompton/L&T/C&S
	Fan	Crompton/Havells/Bajaj/Usha
	Raceway & Alu. Trunking	Tata/Jindal/Zenith

	Casing Caping	Finolex/Cap or equivalent
	Weather proof socket outlet with MCB	ABB/MDS/LEXIC/Neptune/Elcon-Clipsil/Siemens/Schneider(Merlin Gerin)
	Miniature Circuit Breaker	ABB/MDS/LEXIC/Clipsil/Siemens/HPL
	Earth Leakage Circuit Breaker	MDS/LEXIS/Siemens/HPL
	MCB Distribution Boards in sheet housing (double door)	ABB/MDS/LEXIC/Siemens/HPL
5	**Distribution**	
	MV Contractor/Timer/Relays/Starters	Legrand/Schneider (MG)/ABB/Siemens/L&T
	Moulded case circuit breakers	Legrand/Schneider (MG)/ABB/Siemens/L&T
	SFU/Fuses	HPL/L&T. Siemens/ GE Power/Schneider (MG)
	ACB	Schneider (MG)/ABB/Siemens/L&T
	Single Phase Preventer (Current Base)	L&T/Minilec
	Rasing Mains & Tap Off (Power coated)	Zeta/C&S/Siemens
	MV Switchboards (Powder Coated)	Tricolite Electrical Industries/Conlec Enginners Pvt. Ltd., Vidyut Control Pvt. Ltd., Trinitron Milestone Switchgear, Unilec Ltd., Madhu Electrical Advance Electro Control Pvt Ltd.
6	**Low Tension System**	
	Light & Fan Wire	Polycab/Finolex/Havells
	Telephone Wires	Delton/Skyline/Finolex/Rallison/batra Henley
	Telephone Tag Blcoks	Krone/Pouyet/TVS
7	**Cables and Accessories**	
	1100Volts grade Cables	CCI/Universal/Fort Gloster/Polycab/RPG (Asian)/ Nicco
	Cable Lugs	Dowells
	Cable compression Glands	Peeco/Comet

	Cable Trays/Cable ladders	Slotco Bharti/RICCO/Pilco/MM Enterprises
8	**Metering & Protection**	
	Cast Resin current transformers	Gilbert Maxwell/Kappa/AE/Precise
	Meters (Digital)	L&T Roshab/Automatic Electric/Siemens/Socomex
	Selector Switches	HPL/L&T Salzer/ Kaycee
	Indication lamp	L&T Vaisno Teknic
	KWH Electronics Digital Meter	Secure/L&T/Enercon/Socomec-HPL
9	**EPABX**	
	Exchange/Consol Panel	Copper connection/Flash Hymax/Accord CG/Tata Telecom/Panasonic
	CVT	Logicstat/Blue Bird/Selvon/Max Power
	UPS	HPL-Socomec/Tata Liebert/APC/Invensys/Copper Copper Connection
	Hand Set	Beetel/Tataphone/Crompton
	Tape off	Cat Vision/Shyam
10	**Electrical Items**	
	Panel Switch Gear & related Item	
	LT Panel/Bus Duct	By any Panel manufacturer who process C.P.R.I. certificate for specified fault level & IP level protection
	Fuse Disconnector switch/switch fuse unit	L&T/Siemens/Schneider/ABB/Legrand
	Ammeter Voltmeter	AE/L&T/MECO/Rishab
	Digital Meters/Intelligent Maultifunctional Digital Mater	AE/HPL/CONZERV
	Selector switch/Push button switch/emergency switch	KAY CEE/L&T/Siemens/Schneider
	Indication Lamp	AE/L&T/Siemens/Schneider
	CT's	L&T/AE/Kappa

	AT's	L&T/Siemens/Schneider/Legrand
	Voltage stabilizer for air conditioner (4/5 KVA) (170-270V)	V Guard/Microtek
	Air Conditioner-split Inverter AC (5 star)- (0.75 ton-1ton,1.5 ton,1.8ton-2ton)	Daikin/Blue Star/Carrier
	Air Conditioner-Cassette Inverter AC (5/4/3 star)-2.9 ton-3.5 Ton)	Daikin/Blue Star/Carrier
11	**Transformer**	
	Distribution Transformer	Jindal/Areva/Muskan/Alstrom
	11 or 33 KV VCB	Crompton/Alstom/ABB
	HT Termination & Jointing kit	Ray Chaem/Mahindra/ELMEX
	Cable Glands	Dowells/Siemens/Braco
	Lugs & Thimbles	Dowells/Johnson
	Upto & including 11KV cables (ISI markers)	CCI/Skytone/Gloster/Havells
	Insulating Mats	ISI Marked
	Capacitor Bank (ISI marked)	GE Power/BHEL/EPCOS/L&T
	Lightening Arrestor	Altas/Alstom/GE Power
	Protection & Other Relay	ABB/Siemens/Schneider/L&T/Allen Bradley
12	**Internal Wiring Related Works**	
	MCB/RCCS/Isolators (ISI) marked MCB DB	L&T Siemens/Schneider/Legrand
	PVC Condult	CAP/BEC/Seiko/AKG
	PVC insulated copper wire (ISI marked)	Skyline/Finolex/Havells/Polycab
	Telephone Cable	Skytone/Delton/NICCO/Polycab/Finolex
	Switch, TV & Telephone socket & boxes (Modular Type)	CPL/Legrand/ABB/Anchor

13	**Miscellaneous Items**	
	Lightening Protection Unit	Erico/Pheonix/INDELEC
	Relays	L&T/ABB/Siemens/BCH
	Contractors	L&T/GE Power/BCH/Siemens/ABB
	Changeover Switch	C&S/Havells/L&T/HPL
	KWH/PF Frequency meter	BHEL/AE/Havells/L&T/ALSTOM
	Push Buttons	L&T/Siemens
	Timers	L&T/Legrand/Schneider/Siemens/GE
	Timer Switch	L&T/Legrand/Schneider/Siemens/GE
14	**Networking**	
	Switches	Brocade/Cisco/ Digi-Link/3com/Nortel/Foundry/D-link
	Patch Panel, patch cord and I/o	Digi-Link/Tyco (AMP)/Schneider/D-Link
	Cable	Digilink/Clipser/National/Polycab/Lapp/Finolex
	Racks	ComRack/HCL/ValRack/APW President
15	**Modular/Chair**	Manufacturer approved accessories should be used.
	Extruded aluminium sections	Hindalco/Sant aluminium/Midi extrusions
	Pre laminated particle board	Action Tesa/Associate Décor/Asis/Century (Interior grade-2)
	PVC lipping	Rehau/Dolkin
	Hinges/storage and pedestal locks/miniflix fittings/sliding channels etc.	Ebco/hafele/Hettich or equivalent
	8 mm Glass	Modi/Saint Gobain/Asahi
	Door locks for cashier cabin	Godrej/Enox/Doorset/Ultra/Ebco
	Hydraulic door closer	Yele/Enox/Everite/Ebco
	Powder coating	Paramount/Narolac
	Fabric for panel	Response

	MDF	8mm/10mm/12mm/18mm MDF
	Chair	Godrej/Durian/Amardeep/Methodex/Euroscostic or equivalent
16	**AIRCONDITIONING**	
	Air-cooled VRF System	Voltas / Carrier / Blue Star / Hitachi
	Fans -	Kruger / Nicotra / Dynair
	Motor -	L&T/ Siemens/ ABB/ Crompton Greave
	Aluminium Grilles -	Cosmos / Air Products/ Dynacraft /Airmaster
	Dampers	Cosmos / Nutech / Air Products/Airmaster/ System air/Ruskin
	GSS Sheets	Jindal /Essar / Zenith/Tata
	Insulation Nitrile Rubber	Armaflex / K-Flex
	Insulation Fiberglas	UP Twiga /Equivalent
	Drain Pipe	Astral/ Prince
	Copper Pipe	Mandev/Equivalent
	Cables	Polycab
	Exhaust Fans	Nicotra, Kruger

All alternative makes offered shall be clearly spelt out in the offer & shall be subject to our acceptance.

Note : All materials should be purchased from Manufacturers/ authorized dealer and Bank may directly instruct the quality control team of the companies to visit the site to examine the genuineness of materials.