TENDER DOCUMENT

(e-Procurement)

Tender No: IISc/Tender-CIV-11/2023-24

For

Construction of Modern Indoor Sports Complex at Gymkhana IISc Bangalore

Office of the Project Engineer cum Estate officer

Centre for Campus Management and Development Indian Institute of Science

Indian Institute of Science Bangalore – 560012

080-2293-2202/2008

Website : https://iisc.ac.in/all-tenders/

INDEX

1. **Tender Notification**

Tender No: IISc/Tender-CIV-11/2023-24

Name of work	Construction of Modern Indoor Sports Complex at Gymkhana IISc Bangalore
Estimated Value of work	**Rs.117,46,07,470.45 (Incl. GST)**
Period of Work Completion	18 Months
Name of the Client	Indian Institute of Science, Bangalore
Address of the Client	The Registrar Indian Institute of Science Bangalore – 560 012 Tel No. 080-2293 2008/2202 e-mail: office.ccmd@iisc.ac.in
Submission of Tender Document	e-procurement portal- https://eprocure.gov.in/eprocure/app Helpline no: 0120-4001005
Earnest Money to be deposited with the Tender	**Rs.1,17,46,074.00** (1% of the Estimated Cost)
Last date and Time for online submission (uploading) of tender	**01.02.2024 at 1530Hrs**
Date and Time of opening of Tender (Technical Bid)	**02.02.2024 at 1530Hrs**
Date and Time of opening of Tender (Financial Bid)	Shall be intimated to technically qualified bidders thro' CPP portal.
Pre-bid meeting Date, Time & Venue	**19.01.2024 at 1530Hrs** Pre bid meeting will be held on Teams App. The web link will be forwarded to the intending bidders. They are requested to send the request to the email id: office.ccmd@iisc.ac.in **Queries can be mailed in prior to the same mail.**

Notice Inviting Tender

The Registrar, Indian Institute of Science invites tenders in two bids (Technical and Financial) system from eligible Bidders, for **"Construction of Modern Indoor Sports Complex at Gymkhana IISc, Bangalore"**

Bidders shall not be under a declaration of ineligibility for corrupt and fraudulent practices issued by the Government of India or any State Government of Union of India. (Authorized signatory should provide an undertaking). Tenders from Joint ventures are not acceptable.

2.1 All Bidders shall provide the required information accurately and enough as per details in Section 4: Eligibility Criteria

2.2 The Tenderer shall upload the valid copies of the documents as mentioned in the Chapter-4 (Eligibility criteria) in technical bid**, failing which the tender will be rejected**. If necessary, bidder shall produce all the original documents for verification.

2.3 The work shall be carried out as per the directions of the Project Engineer cum Estate Officer.

2.4 Blacklisted contractors in State / Central Govt. Departments / BBMP / PSU/ Central PSUs/ Autonomous bodies / Institutions are not eligible to quote, if found such tenders will be rejected.

2.5 The successful Bidder shall execute an Agreement within 10 days from the date of Receipt of intimation from this office, The Tender Document will form the part and parcel of the agreement, failing which the tender will deem to be get cancelled.

2.6 The material shall be got approved by the Project Engineer cum Estate Officer, IISc before execution of the work.

2.7 Further details of the work can be obtained from this office.

2.8 The rates quoted should reflect all taxes. The bid evaluation will be done inclusive of all Taxes / Cess. / Royalty etc. The statutory levies as per Govt. guidelines will be deducted. The IISc reserves the right to accept / reject any or all the tenders without assigning any reasons.

2.9 The work shall be commenced with all manpower, material, machinery & requisite resources within 10 days from the date of work order, failing which it would be presumed that the successful tenderer is not interested in the work and action will be taken to get the work executed through alternate agency at the risk and cost of the former Tenderer.

2.10 Conditional tenders will not be accepted and is liable for rejection.

2.11 Bidders who meet the specified minimum qualifying criteria, shall be eligible.

2.12 Even though the Bidders meet the eligibility criteria mentioned in Section-4 they are subject to be disqualified if they have:

- Made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements; and/or
- Record of poor performance such as abandoning the works, not properly completed the contract, inordinate delays in completion, litigation history, or financial failures etc.

2.15 Site visit:

The Bidder at his own responsibility is encouraged to visit and examine the Site of Works and its surroundings and obtain all information that may be necessary for preparing the Tender and entering into a contract for the Works. The cost of visiting the Site shall be at the Bidder's own expense.

2.16 The Tender document can be downloaded from e-procurement website: https://eprocure.gov.in/eprocure/app. It may be noted that all subsequent notifications, changes and amendments on the project/document would be posted only on the same website. The bidders are advised to visit e-procurement portal and get familiarized with the procedure for submission of the tenders.

2.17 **Content of Tender documents**

The bidders should go through the Tender Document and submit online response through e-procurement portal only.

2.18 Amendment of Tender documents

Before the deadline for submission of tenders, the IISc may modify the tender documents by issuing corrigendum / addendum.

Such corrigendum/ addendum thus issued shall be part of the tender documents and shall be published online in e-Procurement portal.

Prospective Bidders will be given reasonable time for submitting the bid by taking the corrigendum/ addendum into account.

2.19 Documents comprising the Tender

The Technical Bid submitted by the Bidder shall contain the documents as follows:

a) Earnest Money Deposit paid in the specified form as mentioned in the e-Procurement platform.

b) Qualification Information as per formats to comply the task created in the e-Procurement Portal under General Terms and Conditions and Technical parameters and Documents required from Bidder.

c) Any other documents / materials required to be completed and submitted by Bidders in accordance with these instructions. The required documents shall be filled in without exception.

The bidder shall submit the hard copies of the documents / credentials which are uploaded in the tender portal. The documents shall reach the designated office within 3 days from the tender opening date.

The Financial bid shall be submitted by the bidder through e-procurement portal only and no hard copy of financial bid should be attached or disclosed.

The contract shall be for category of works / whole works based on the priced Bill of Quantities submitted by the Bidder.

All prevailing duties, taxes, and other levies like CESS/Royalty payable by the contractor under the contract, or for any other cause, shall be included in the rates, prices and total Tender Price submitted by the Bidder.

2.20 Tender validity

Tenders shall remain valid for a period not less than **180 days** after the deadline date for tender submission. A tender valid for a shorter period shall be rejected by the IISc as non-responsive.

In exceptional circumstances, prior to expiry of the original time limit, the IISc. may request that the Bidders may extend the period of validity for a specified additional period. The request and the Bidders' responses shall be made in writing or by email. A Bidder may refuse the request without forfeiting his earnest money deposit. A Bidder agreeing to the request will not be required or permitted to modify his tender but will be required to extend the validity of his earnest money deposit for a period of the extension, and in compliance with Clause 2.18 and 2.22 in all respects.

2.21 Earnest money deposit:

The Bidder shall furnish, as part of his tender, earnest money deposit (EMD). The Bidder has to pay the Earnest Money Deposit (EMD) in the form of Demand draft drawn on "The Registrar, IISc" payable at "Bangalore".

The bidder has to scan the demand draft and submit it with Technical Bid Documents for our reference. The original DDs has to be submitted along with the hard copies of all the documents in a sealed cover as a pre-qualification bid (Technical bid) which were uploaded through e-procurement portal.

The EMD amount will have to be submitted by the bidder taking into account the following conditions:

a) The entire amount must be paid in a single transaction.
b) The earnest money deposit of unsuccessful Bidders will be returned after awarding the contract to the successful bidder.

The earnest money deposit may be forfeited:
a) If the Bidder withdraws the tender after tender opening during the period of tender validity,
b) If the Bidder fails within the specified time limit to
  i) Sign the Agreement; or
  ii) Furnish the required Security deposit

2.22 Provisions for Micro and Small Enterprises (MSE):

The MSE registered bidder should upload the registration certificate in the CPP portal along with the technical bid documents. The MSE registration to specify manufacturing / service of the tender item (s).

Policy is meant for procurement of only goods produced and services rendered by MSEs. However, traders are excluded from the purview of Public Procurement Policy.

Participating Micro and Small Enterprises quoting price within price band of L1+15%, will qualify to supply a portion of requirement by bringing down price to L1 price in a situation where L1 price is from someone other than a Micro and Small Enterprises.

2.23 Format and signing of Tender

Successful Bidder shall sign all the pages of the tender document as a token of acceptance of all the terms and conditions of the contract.

2.24 Submission of Tenders

Tenders must be submitted on-line in the e-Procurement portal by the Bidder before the notified date and time.

2.25 Deadline for submission of the Tenders

The Bidder shall submit a set of hard copies of all the documents in a sealed cover to IISc required as a pre-qualification bid (Technical bid) which were uploaded through e-procurement portal. In the event of any discrepancy between them, the original uploaded document in e-procurement shall govern.

The IISc may extend the deadline for submission of tenders by issuing an amendment, in which case all rights and obligations of the IISc and the Bidders previously subject to the original deadline will then be subject to the new deadline.

2.26 Late Tenders

In e-procurement system, Bidder shall not be able to submit the bid after the bid submission time and date as the icon or the task in the e-procurement portal will not be available. IISc will not be liable (or) responsible for any delay due to unavailability of the portal and the Internet link.

2.27 Modification and Withdrawal of Tenders

Bidder has all the time to modify and correct or upload any relevant document in the portal till last date and time for Bid submission, as published in the e-procurement portal.

The Bidder may withdraw his tender before the notified last date and time of tender submission. No Tender may be modified after the deadline for submission of Tenders.

Withdrawal or modification of a Tender between the deadline for submission of Tenders and the expiration of the original period of Tender validity specified in Clause 2.21 above may result in the forfeiture of the earnest money deposit.

2.28 **Tender Opening:**

The IISc will open all the Tenders received through' online mode, in the presence of the Bidders or their representatives who choose to attend on the specified date, time and place specified. In the event of the specified date of Tender opening being declared a holiday for the IISc. The Tenders will be opened at the appointed time and location on the next working day.

The IISc will evaluate and determine whether each tender meets the minimum qualification eligibility criteria.

Bidder to submit all the Original Documents, which are submitted in e-procurement portal, to the IISc for verification at the time of opening of Tender. The IISc will record the Tender opening.

2.29 Process to be confidential.

Information relating to the examination, clarification, evaluation, and comparison of Tenders and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced.

2.30 Clarification of Tenders

To assist in the examination, evaluation, the IISc may, at his discretion, ask any Bidder for clarification of his Tender. The request for clarification and the response shall be in writing or by e-mail along with the section number, page number and subject of clarification, but no change in the price or substance of the Tender shall be sought, offered, or permitted.

Subject to clause 2.31, no Bidder shall contact the IISc on any matter relating to its Tender from the time of the Tender opening to the time the contract is awarded. If the Bidder wishes to bring additional information to the notice of the IISc, he/she should do so in writing.

Any effort by the Bidder to influence the IISc in the Tender evaluation, or contract award decisions may result in the rejection of the Bidders' Tender.

2.31 **Examination of Tenders and determination of responsiveness**

Prior to the detailed evaluation of Tenders, the IISc will determine whether each Tender (a) meets the eligibility criteria (b) is accompanied by the required earnest money deposit and; (c) is substantially responsive to the requirements of the Tender documents.

A substantially responsive Tender is one which conforms to all the terms, conditions, and specifications of the Tender documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the Tender documents, the IISc's rights or the Bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other Bidders presenting substantially responsive Tenders.

If a Tender is not substantially responsive, it will be rejected by the IISc., and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

2.32 Correction of errors

No corrections to uploaded bid is permitted by the portal. Tenders determined to be substantially responsive will be checked by IISc.

2.33 **Evaluation and comparison of Tenders**

Opening of the Financial bid will be preceded by the evaluation of the Pre-qualification Offer (Technical bid), vis-a-vis the capability, capacity and credibility of the Bidder. Evaluation of the Prequalification Offer will be done by the Evaluation Committee constituted for the purpose. After evaluation is completed, all the Bidders who are qualified will be notified and will be intimated at the time of opening of the Financial bid. Financial bid will be opened in the presence of those who choose to be present or even in the absence of any Bidder.

The IISc will evaluate and compare the Tenders as per comparative statement downloaded from e-procurement portal.

In evaluating the Tenders, the IISc. will determine for each Tender the evaluated Tender Price by adjusting the Tender Price as follows:

a) Making any correction for errors and

b) Making appropriate adjustments to reflect discounts or other price modifications offered

The IISc reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, and alternative offers and other factors which are in excess of the requirements of the Tender documents or otherwise result in unsolicited benefits for the IISc shall not be taken into account in Tender evaluation.

2.34 Negotiations

The Bidder though technically qualified and whose financial offer is the lowest, fails to convince the Tender Evaluation Committee of his capability, capacity, credibility, his offer may be reviewed, and the Bidder intimated accordingly. In such case, the Bidder, who has quoted the lowest price, may be considered and his price may be negotiated as advised by the tender committee.

2.35 Award criteria

Subject to Clause 2.36, the IISc will award the Contract to the Bidder whose Tender has been determined to be substantially responsive to the Tender documents and who has offered the lowest evaluated Tender Price. After technical evaluation the technically qualified bidders will be considered for opening of the financial bids provided that such Bidder has been determined to be eligible in accordance with the provisions of this tender document and subsequent technical clarifications offered by the responsive bidders.

2.36 Right to accept any Tender and to reject any or all Tenders

Notwithstanding Clause 2.35, the IISc reserves the right to accept or reject any Tender, and to cancel the Tender process and reject all Tenders, at any time prior to the award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the IISc's action.

2.37 Notification of award and signing of Agreement

The Bidder whose Tender has been accepted will be notified of the award by the IISc. prior to expiration of the Tender validity period by e-mail or confirmed by letter. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") will state the sum that the IISc. will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

The notification of award will constitute the formation of the Contract, subject only to the furnishing of a performance security in accordance with the provisions of clause 2.39

The Agreement will incorporate all agreements between the IISc and the successful Bidder /Bidders. It will be kept ready for signature of the successful Bidder in the office of IISc. Following the notification of award along with the Letter of intent. The successful Bidder will sign the Agreement and deliver it to the IISc.

Upon the furnishing by the successful Bidder of the Security deposit, the IISc will issue formal work order.

The successful bidder is required to sign an agreement for the due fulfilment of the contract and start the work immediately on of the acceptance of his tender. A draft of the Articles of the Agreement is enclosed. The Earnest Money will be forfeited and at the absolute disposal of the Employer if the Contractor defaults from signing the Agreement of in starting the work.

2.38 Security deposit (SD)

Further percentage on the running bills and final bill in addition to Earnest Money Deposit shall be levied from the contractor. When the SD deducted from R.A Bills of the contractor **@ 6.5%** of the bill amount exceeds Rs.1.00 Lakh, the amount in excess of Rs. 1.00 Lakh may, at the request of the bidder, be released to him against the production of the bank guarantee issued from a Nationalized/Scheduled bank only for an equal amount in the prescribed form. The bank guarantee should be valid till the completion of the defect liability period.

If the security deposit is provided by the successful bidder in the form of a Bank Guarantee, it shall be issued either by a Nationalized/Scheduled bank.

Failure of the successful Bidder to comply with the requirements of clause 2.38 shall constitute sufficient grounds for cancellation of the award and forfeiture of the earnest money deposit.

2.39 Corrupt or Fraudulent practices

The IISc requires that the Bidders observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, IISc.

a) will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question.

b) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a IISc contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a IISc contract.

2.40 Payment Terms

For Civil works: Monthly running account bills.

For Electrical works: 80% against the supply of material and 10% after installation and 10% after testing and commissioning, subject to the other provisions of the tender document.

2.41 Work done as a sub- contractor under a prime contractor will not be considered for qualification. **"Prime Contractor"** means a firm that performs a construction work itself and that the work is directly entrusted to the firm by the owner/ government/ local body/ quasi government/ Government undertaking bodies.

2.42 <u>Make in India</u>

Only "Class–I and Class-II local supplier will be eligible to bid notified vide (DPIIT) Notification No. P-45021/2/2017-PP (BE-II) dated 4th June 2020 amended from time to time.

Declaration of Tenderer

Name of Work: "Construction of Modern Indoor Sports Complex at Gymkhana IISc, Bangalore"

3.1 I/We, declare that specifications, plans, designs and conditions of contract on which the rates have been quoted are completely studied by me/us before submitting this tender.

3.2 I/We declare that I/We have inspected the work spot and have made myself/ourselves thoroughly conversant and satisfied as regards the field conditions prevalent there, regarding the materials, labour and the particulars of various leads with which the materials required to be brought for the work.

3.3 I/We, declare that the rates quoted for items of works for which now tenders are called for are inclusive of leads with which I/We propose to bring the materials. I/We will not have any claims for higher leads, and my/our quoted rates are with all leads and lifts etc.,

3.4 I/We, declare that the rates tendered by me/us for this work have not been witnessed by any other contractor/s who has/have tendered for this work.

3.5 I/We, declare that I/We, have understood all the conditions mentioned above and also the specifications stipulated in tender condition either by going through myself/ourselves or by getting translated into my/our own mother tongue.

3 Eligibility Criteria

Technical Criteria:

4.1– Any specialised firms company registered under KPWD /CPWD/ railways/ MES/ central PSUs/ or any Government department of atleast Class I / Class A **Civil Contractors** are eligible to apply.

4.2 The Bidder should have Experience of having a successfully completed either of the following works:

(a) Three (03) completed works each costing not less than **40%** (forty percent) of the estimated cost i.e. **Rs.46,98,42,988.00**

(Or)

(b) Two (02) completed works each costing not less than **60%** (Sixty percent) of the estimated cost i.e. **Rs.70,47,64,482.00**

(Or)

(c) One (01) completed work costing not less than **80%** (eighty percent) of the estimated cost i.e. **Rs.93,96,85,976.00**

Note: The Experience certificate / work order should be in the same registered name as per Clause 4.1 and not as a joint venture.

Financial Criteria

4.3 The bidder should have registered for a minimum period of Ten years.

4.4 The average annual financial gross turnover should be **30%** of estimated cost in that last five years.

4.5 The minimum annual financial turnover for the two consecutive years should be **30%** of estimated cost.

4.6 The bidder should have not incurred any loss in more than two years. The bidder should submit the **solvency certificate** from the bank for 30% of estimated cost. The Solvency should not be more than Six-month-Old ending last day of the month, previous to the month in which tender is invited.

4.7 The average net worth of the bidder as of **2022-23** should be not less than 25% of estimated cost. Necessary certificate by the Charted Accountant shall be submitted.

4.8 The bidder should have not been blacklisted by any State / Central Govt. Departments / BBMP / PSU/ Central PSUs/ Autonomous bodies / Institutions.

4.9 The bidding capacity of the bidder should be 75% or more of the estimated cost.

The bidder should possess the bidding capacity as calculated by the following formula.

Available bid capacity = A x M x N -B, where

A = Maximum value of engineering (Civil/ Electrical/ Mechanical as relevant to work being procured) works executed in any one year during the last five years (updated at the current price level), taking into account the completed as well as works in progress.

M = Multiplier Factor (usually 1.5)

N = Number of years prescribed for completion of the work in question.

B = Value (updated at the current price level) of the existing commitments and ongoing works to be completed in the next 'N' years.

4.10 Information on works for which tenders have been submitted and ongoing works as on the date of this Tender.

(A) Existing commitments and on-going works:

Description of work	Place & State	Contract number & date	Name & address of the customer	Value of Contract in Lakhs	Stipulated period of completion	Value of work remaining to be completed in Lakhs	Anticipated date of completion
1	2	3	4	5	6	7	8

[Details to be furnished with necessary work order signed from concerned project in-charge not below the rank of Executive Engineer or Competent Authority. The Work order/Testimonials will be verified, if required]

(B) Works for which Tenders already submitted:

Description of work	Place & State	Name & address of the customer	Estimated value of work in lakhs	Stipulated period of completion	Date when decision is expected	Remark if any
1	2	3	4	5	6	7

4.11 Certificate from Charted Account stating turn over for the last five years is also to be uploaded.

Sl.No	Year	Turn over amount	Remark
1	2018-19		
2	2019-20		
3	2020-21		
4	2021-22		
5	2022-23		

Litigation and Arbitral Issues:

4.12 Net pending litigations should not be more than 50% of bidder's net worth. As a supporting document of undertaking letter to be submitted by Bidder. It must be certified by Authorized Legal person / lawyer.

4.13 No consistent history of court/arbitral award decisions against the bidder for the last five years. As a supporting document of under letter to be submitted by Bidder. It must be confirmed by Authorized Legal person / lawyer.

4 Special Conditions

5.1.1 Establishment of Labor Camp is strictly prohibited in the premises of Indian Institute of Science Campus. Essential labor for round the clock work at site will be allowed with prior permission of Project Engineer cum Estate Officer.

5.1.2 Any damage to the existing service lines during execution of work shall be got rectified by the bidder at his own cost and risk.

5.1.3 Debris shall be disposed-off to an undisputed place of Bangalore outskirts as per the direction of the Engineer-in-Charge, whenever required.

5.1.4 Labor employed at the site will not be allowed to use cellphone while working at the site.

5.1.5 Supply of Electricity: - Electricity required for construction shall be arranged by the contractor himself. Electricity if supplied to the contractor by the Institute will be metered and amount will be recovered in the Bills as per actual at rates fixed by the Institute. Supply of electricity from the Institute is not mandatory. Non-supply of electricity by the Institute cannot be held as reason for shortfall in progress.

5.1.6 Water supply: The Contractor has to make his own arrangement for water supply. However, if water supply to the site at one convenient point is made available by the Institute, the charges for the consumption of water will be borne by the Contractor at 1.50% of the value of the work.

5.2 Schedule of Quantities (Bill of Quantities) is attached herewith. It should, however, be clearly understood that these quantities are liable to alterations by omission, addition or variation, at the discretion of the Architects/Project Engineer Cum Estate Officer.

5.3 The drawings together with specifications and conditions of contract are enclosed. These should be studied carefully by the intending tenderers. In the absence of specifications for any item of work, material or ingredient in the specifications, CPWD/MoRTH specifications shall be followed and in the absence of specification for any item, materials are ingredient shall be fixed in all respects in accordance with the instructions and requirements of the Project Engineer Cum Estate Officer, the work will be the best of the kind.

5.4 The tenderer is expected to inspect the site and acquaint himself with the local conditions and will be deemed to have so done before submitting the tender.

5.5 The rates quoted shall be for finished work and shall include for all necessary incidental work. Sales or any other tax on materials in respect of this contract will be payable by the Contractor. The Contractors cannot presume any details regarding the contract.

5.6 It is entirely the responsibility of the Contractor to arrange for and provide all materials required for successful completion of the work except such special materials that may be supplied if any.

5.7 Tenders determined to be substantially responsive will be checked by IISc for any arithmetic errors. Errors will be corrected by the IISc as follows.

5.8 Where there is discrepancy between the rates in figures and in words, the lower of the two will be governed.

5.9 Where there is a discrepancy between the unit rate and the line-item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will be governed.

5.10 Where there is a discrepancy in entries of unit rate between the Original and Duplicate, the lower will govern.

5.11 The Contractor should make his own arrangements to cover the all-round construction area, by providing polyester net/polythene sheet/barricading to avoid inconvenience to other surrounding departments, as directed by the Project Engineer-cum-Estate Officer of the work.

5.12 The debris arise during the period of construction will have to be cleared then and there to keep the surroundings clean and tidy. Such debris shall, if not cleared, be cleared at contractor's risk and cost.

5.13 The contractor shall vacate the campus premises with all his men/ materials immediately after completion of the project.

5 GENERAL CONDITIONS

6.1 **DEFINITIONS OF TERMS**

In constituting these conditions and specifications, the following expressions shall have the meaning, therein assigned to them unless there is something repugnant in the subject of context in consisting with such meanings.

6.2 Institute shall mean the "Indian Institute of Science, Bangalore".

6.3 "Office" shall refer to the Office of the Project Engineer cum Estate officer.

6.4 "Contractors" shall mean the tenderer whether a firm, registered company, partnership or any individual whose tender has been accepted by Institute or by an Officer (duly authorized in this behalf) on behalf of the Institute and who has entered into agreement with Institute for due fulfillment of the contract and shall include the legal representatives, successors, heirs and assignees of the tenderer.

6.5 "Engineer" shall mean the "Project Engineer cum Estate officer", Indian Institute of Science, Bangalore or such other officer as may be appointed to call as the Project Engineer cum Estate officer for the purpose of the contract and shall also mean and include other officers of equivalent rank directly in charge of the work or any part thereof under administrative control of the Director, IISc, Bangalore-12.

6.6 When the Engineer is named as final authority, it includes all the above-mentioned officers and, in such matters, the contractors shall have the right of appeal against the orders up to the Director, IISc, Bangalore, whose decision shall be final and legally binding on all the parties concerned.

6.7 The Project Engineer cum Estate officer named as final authority for any decision taken, shall mean only the Director, IISc, Bangalore or his duly authorized assistant.

6.8 The Engineer in charge shall mean the Project Engineer cum Estate officer directly in charge of the work or his duly authorized assistants.

6.9 Plant shall mean and include any or all plants, machinery, tools and other implements of all description necessary for the execution of the work in a safe and workmen like manner.

6.10 The expression "Works" where used in these conditions shall unless thereby something in the subject or contract repayment to such construction, be construed to mean the work or the works constructed to be executed under or virtue of the contract whether temporary or permanent and whether original, altered, substituted or additional.

6.11 "Contract and contract document" shall mean and include the notice inviting tenders, proceedings of the pre bid meeting, the stamped agreement, conditions of contract, specifications and Schedules 'B', drawings and all other connected documents with tender schedule.

6.12 "Specifications" shall mean the specifications annexed and where these are not specifically mentioned shall be as may be detailed and necessary due to particular nature of work as approved by the Project Engineer cum Estate officer.

6.13 "Site" shall mean and include all the area in which operations in respect of the work

are carried out. This shall also include materials stacking yards and the area where temporary structures are put up for installing any machinery etc.

6.14 "Tests" shall mean such tests as are required to be carried out either by the contractor or by the Project Engineer cum Estate officer from time to time on completion as detailed in the specifications before the work is certified as being satisfactory and is taken over by the Project Engineer cum Estate officer.

6.15 "Month" shall mean a Calendar month.

6.16 "Prime contractor" means a firm that performs construction work itself and that the work is directly entrusted to the firm by the owner / Government / local body / Quasi Government / Government undertaking. Words used in singular shall also include the plural & vice-versa where the context so demands.

6.17 **CONTRACTOR TO INSPECT SITE**:

The contractor shall visit and examine the construction site and satisfy himself as to the nature of the existing roads or other means of communications, the character of the soil for the excavations, the extent and magnitude of the work and facilities for obtaining materials and shall obtain generally his own information on all matters affecting the execution of the work. No extra for charges made in consequence of any misunderstanding or incorrect information on any of these points or on the grounds of insufficient description will be allowed. All expenses incurred by the contractor in connection with obtaining information for submitting this tender including his visits to the site or efforts in compiling the tender shall be borne by the Tenderer and no claims for reimbursement thereof shall be entertained.
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6.18 ACCESS TO SITE:

The Contractor is to include in his rates for forming access to the site, with all temporary roads and gangways required for the works.

6.19 SETTING OUT:

The Contractor shall set out the building in accordance with the plans. All grid/center lines shall be pegged out to the satisfaction of the Engineer. The Contractor shall be responsible for the correctness of the lining out and any inaccuracies are to be rectified at his own expense. He will be responsible for taking ground levels of the site before setting out and recording them without any extra charge.

The Contractor shall construct and maintain proper benchmark at the intersection of all main walls, columns, etc., in order that the lines and levels may be accurately checked at all times.

6.20 **TREASURE TROVE**:

Should any treasure, fossils, minerals, or works of art of antique interest be found during excavation or while carrying out the works, the Contractor shall give immediate notice to the Engineer of any such discovery and shall make over such finds to the Institute.

6.21 **ACCESS FOR INSPECTION:**

The Contractor is to provide at all times during the progress of the works and the maintenance period proper means of access, with ladders, gangways etc., and the necessary attendants to move and adapt as directed for the inspection of measurement of the works by the Engineer or their representatives.

6.22 **ATTENDANCE UPON ALL TRADERS:**

The Contractor shall be required to permit tradesmen/ Specialized agencies appointed by the employer to execute works like water supply, Sanitary, Electrical installation, lifts, air conditioning, hardware and other specialized works. The contractor shall also permit the above mentioned agencies to use his scaffolding and retain the scaffolding till such works are completed. The rates quoted by the contractor shall be inclusive of the above facility.

6.23 **GATEKEEPER AND WATCHMAN:**

The Contractor from the time of being placed in possession of the site must make arrangements for watching, lighting and protecting the work, all materials, workmen and the public by round the clock on all days including Sundays and holidays at his own risk and cost.

6.24 **STORAGE OF MATERIALS:**

The Contractor shall provide for necessary sheds of adequate dimension for storage and protection of materials like cement, steel, lime, timber and such other materials including tools and equipment which are likely to deteriorate by the action of sun, wind, rain or other natural causes due to exposure in the open. The cement storage site shall be leak proof and shall hold at least 4 months requirement. All such sheds shall be cleared away and the whole area left in good order on completion of the contract to the satisfaction of the Engineer.

All materials which are stored on the site such as bricks, aggregates etc., shall be stacked in such a manner as to facilitate rapid and easy checking of quantities of such materials.

6.25 **COST OF TRANSPORTING**:

The Contractor shall allow in his cost for all transporting, unloading, stacking and storing of supplies of goods and materials for this work on the site and in the places approved from time to time by the Engineer. The Contractor shall allow in his price for transport of all materials controlled or otherwise to the site.

6.26 **W.C. AND SANITARY ACCOMMODATION AND OFFICE ACCESSORIES AND ACCOMMODATION**:

The contractor shall provide at his own cost and expense adequate closet and sanitary accommodation complying in every respect to the rules and regulations in force of the local authorities and other public bodies, for his workmen, for the workmen of nominated sub-contractors and other contractors / specified agencies working in the building, the Project Engineer of works and other Institute agents connected with this building project and maintain the same in good working order.

The Contractor shall also provide at his own expense adequate office accommodation for the Project Engineer of works preferably contiguous to his office and shall maintain the same in a satisfactory condition and shall provide light, fan and attendant etc., for the same and shall remove them after completion of the works. He shall arrange to provide latest survey Instruments and at all times maintain the same in good working order at site, to enable the Project Engineer of works or other representative of Institute to check the lines and levels of the work.

6.27 **MATERIALS**:

Materials shall be of approved quality and the best of their kind available and shall conform to I.S. specifications. The Contractor shall order all the materials required for the execution of work as early as necessary and ensure that such materials are on site well ahead of

requirement for use in the work. The work-involved calls for high standard of workmanship combined with speed and to the entire satisfaction of the Project Engineer.

6.28 **TO ASCERTAIN FROM CONTRACTORS FOR THE OTHER TRADES.**

The Contractor shall ascertain from all agencies / Sub-contractors all particulars relating to their work with regard to the order of its execution and the position in which chases, holes and similar items will be required; before the work is taken in hand as no patch works shall be allowed for cutting away work already executed in consequence of any neglect to ascertain these particulars beforehand.

6.29 **SAMPLE APPROVAL:**

Before ordering materials, the Contractor shall get the samples approved from the Project Engineer cum estate officer well in time.

6.30 **TESTING OF WORK AND MATERIAL**:

The Contractor shall, if required by the Engineer arrange to test materials and/or portions of the works at his own cost in order to prove their soundness and efficiency. If after any such test the work or portion of works is found in the opinion of the Engineer to be defective or unsound, the Contractor shall pull down and redo the same at his own cost. Defective materials shall immediately be removed from the site at his own cost.

6.31 **FOREMAN AND TRADESMEN:**

All Tradesmen shall be experienced men properly equipped with suitable tools for carrying out the work of carpentry and joinery and other specialist trades in a first-class manner and where the Engineer deem necessary, the Contractor shall provide such tools which are considered necessary for carrying out of the work in a proper manner.

All such tradesmen shall work under an experienced and properly trained Foreman, who shall be capable of reading and understanding all drawings, pertaining to this work and the contractor shall also comply with other conditions set out in different clauses of the conditions of the contract.

6.32 **PROJECT PROGRAMME OF WORKS AND WEEKLY PROGRESS REPORT**:

a) Organization chart:

The contractor should submit the proposed organization chart for the project including the details of staff to be deployed full time on site to the approval of Project Engineer, where the PROJECT ENGINEER raises any objection to either the qualification or experience or required professionalism of any of the staff deployed by the contractor, the same shall be replaced by suitably competent person to the approval of PROJECT ENGINEER within 7 days.

b) Program chart:

The Contractor shall furnish the detailed programme of execution for timely completion of the project (inclusive of rainy season). Such a detailed program of works prepared using Industry Standard Scheduling Software like MS Project 2000 or Primavera shall be submitted by the Contractor within ten days after receiving communication of tender acceptance. As per the detailed drawings and schedule of quantities; the contractor shall work out concurrent activities with start and finish times, integrating of all tasks with interface and milestone event drawn and to evaluate for reduction in total project duration through improved over lapping of tasks and activities where feasible. The Contractor shall

plan for improved planning and scheduling of activities and forecasting of resource requirements, ability to use the computer effectively to produce timely valid information for Project Management purpose. Accordingly, PERT; CPM Networking shall be drawn. GANNT charts shall also be furnished. The Contractor shall also furnish necessary particulars to the Project Engineer of works for compiling weekly progress reports in the form furnished by the Institute. A monthly financial programme shall also be submitted.

6.33 **CLEARING OF SITE**:

The contractor shall after completion of the work clear the site of all debris and left-over materials at his own expense to the entire satisfaction of the Institute. The same should be carted out of the Institute at his own cost.

The contractor shall also clear the labour camp/RMC plant of all types of permanent/temporary structures, soak pits, sump, septic tanks or any other such installations as identified by the PROJECT ENGINEER to the entire satisfaction of the Institute. The debris/excess stuff shall be carted out of the Institute at his own risk and cost.

6.34 **PHOTOGRAPHS**:

The Contractor shall at his own expense supply to the Institute photographs in duplicate copies not less than 25 cm x 20 cm. (10" x 8") along with soft copy, of the works taken from all the portions of the building at intervals of not more than one week during the progress of the work, or at every important stage of construction, as directed by the Project Engineer of work.

6.35 **PROVISION OF NOTICE BOARD**:

The Contractor shall provide a notice board on proper supports 3m x 2m (10' x 6') in a position approved by the Engineer. He shall allow for painting and lettering stating name of work; name of Architects; Structural Consultants; General Contractor and Sub-Contractors. All letters except that of the name of the work shall be in letters not exceeding 5 cm. in height and all to the approval of the Engineer. Proper barricading shall be erected all-round the site before commencement of the work.

6.36 **PROTECTION:**

The contractor shall properly cover up and protect all work throughout the duration of work until completion, particularly masonry, moldings, steps, terrazzo or floor finishes, staircases and balustrades, doors and window frames, plaster angles corners lighting and sanitary fittings, glass, paint work and all finishing.

6.37 **PREPARATION OF BUILDING FOR OCCUPATION AND USE ON COMPLETION:**

The whole of the work shall be thoroughly inspected by the Contractors and all deficiencies and defects set right. On completion of such inspection, the Contractor shall inform the Engineer in writing that he has finished the work and it is ready for the Engineer's inspection.

On completion, the Contractor shall clean all windows and doors and all glass panes, including cleaning of all floors, staircases and every part of the building including oiling of all hardware. He will leave the entire building neat and clean and ready for immediate occupation and to the satisfaction of the Engineer.

6.38 The tenderer must understand clearly that the rates quoted are for complete items of works including charges due to materials, labour, all lead and lift, HOM of plant and

machineries, scaffolding, supervision, service works, power, all types of royalties, sales tax, labor cess, all types of taxes payable to the Govt and local bodies, overhead charges, etc., and includes all extra to cover the cost of night work if and when required and no claim for additional payment beyond the prices or rates quoted will be entertained for payment subsequently towards any claims on the grounds of misrepresentation or on point that he was supplied with information given by promise or guarantee by the Institute, or by any person whether member of or employee in Institute will not be entertained. Failure on the contractor's part to obtain all necessary information for the purpose of submitting his tender and quoting rates therein shall not absolve him of any risk or liability consequent upon the submission for tender.

6.39 All the works shall be carried out as per specifications prescribed by BIS, National Building code, CPWD / KPWD specifications, relevant IS codes or as directed by the Project Engineer in the absence thereof.

6.40 In case there is any conflict in the specifications and drawings the decision of the Project Engineer cum Estate officer shall be final and binding on the contractor.

6.41 All the materials shall be got approved by the Project Engineer cum Estate officer before use.

6.42 The rates quoted for in individual items shall include labour, cost of materials conveyance and lift charges for all materials required for successful completion of work and all taxes payable to any authority as per rules in vogue from time to time.

6.43 Necessary pillars shall be constructed by the Contractor for benchmark at no extra cost as directed by the Project Engineer.

6.44 Site order book shall be maintained in the work spot and the contractor shall sign in the order book in token of having gone through the instructions issued by the inspecting officers and carryout the instructions promptly.

6.45 In the work spot the contractor shall provide suitable temporary office with a covered area of 1000 sq.ft matching that of the Contractor's office with necessary furniture for use of Institute as directed by the Project Engineer for which no extra payment or compensation shall be claimed. The furniture however will after completion of the work, be the property of the contractor and shall remove them at the close of the contract.

6.46 The contractor shall take all precautions against damage from accident. No compensation will be allowed to the contractors for their tools and plant materials lost or damaged from any cause. The contractor is liable to make good the structure or plants damaged by any other cause at his own cost. The Institute will not pay the contractor for corrections or repairing any damaged portion of work done during construction.

6.47 The contractor shall employ adequate no. of skilled & unskilled labours required for successful timely execution of work. He shall submit daily reports to the Engineer in charge regarding the strength of labour employed both skilled and unskilled.

6.48 The contractor shall furnish weekly medical report showing number of persons ill or incapacitated and nature of their illness, to the Project Engineer.

6.49 The contractor shall furnish a report of any accident which may occur, within 24 hours

of its occurrence to the Project Engineer.

6.50 The contractor shall keep on site of work a qualified Engineer as required as per rules of registration as their authorized representative who will receive all instructions given from the Institute officers. The representative shall have permanent office at site of work where communications can be sent and notices can be served by the Project Engineer throughout the duration of work.

6.51 Prior approval should be obtained from the Project Engineer for the construction and location of the temporary site office, store sheds and labour quarters, within the premises of the site, similarly the contractor shall get approval of the Project Engineer regarding the areas to be utilized for stacking the materials etc., for the work.

6.52 Reference to detailed specifications are indicated against the items contained in the Schedule 'B', in case there is any item for which no detailed specifications is indicated, it shall be carried out as per specifications intimated by the Project Engineer. The contractor shall not be entitled for any extra claims or compensation on this account. In case of additional or extra items not covered by the Schedule 'B', the contractor shall carry out the work as per specifications intimated by the Project Engineer.

6.53 The Engineer shall have the right to direct the contractor to progress the various items of works in the manner prescribed by him.

6.54 Failure to adhere to any of the above will be sufficient cause for taking action under clause (2) or clause (3) or both along with their sub clauses of conditions of contract.

6.55 Contractor shall make arrangements at his own cost to construct approach road for conveyance of materials etc., preferably on the alignment accepted by the Institute to procure land etc. for housing, staff and workmen near the site of the work.

6.56 It is not possible for the Institute to release any quarry (metal and sand etc.,) for this work. The contractor has to make his own arrangements. No claim regarding leads and lift will be accepted.

6.57 The contractor has to make his own arrangements in regard to power supply and water required for construction and drinking water facilities.

6.58 Tool, Tax, Octroi, Royalty for collecting earth, gravel, sand, stone, excise duty, sales tax, labour cess or any other tax payable on account of this contract shall be met by Contractor.

6.59 The contractor shall be entirely responsible for sufficiency of the scaffolding, timbering, machinery, tools, implement and generally of all means used for fulfillment of the work. Whether such means may not be approved or recommended by the Project Engineer, the contractor must accept at his own cost all risks of accidents or damages.

6.60 After completion of the work, service drawings as per actual execution in Auto CAD should be submitted by the agency for services such as Electrical, Water supply and Sanitary before submission of final bill.

6.61 Extra care shall be taken regarding the laborers by providing waist belt, Helmets scaffolding etc. at your own cost and supervision and shall be carried out as per the

directions of the Project Engineer.

6.62 WORKMANSHIP AND LABOUR:

The quality of all materials, tools, operators and labour used on the work shall be subject to the approval of the Project Engineer cum Estate officer or his authorized agent who shall have power to order immediate removal by the contractor any of the above that may not meet with his approval.

In case of failure to carry out orders of removal within the time specified, the Project Engineer or his authorized agents shall get the same removed at the contractor's expense.

6.63 KEEPING DRY AND PUMPING:

Unless otherwise provided for in the contract, the contractor will at his own expense keep all portions of the work free from undue water, whether due to springs, soakage or inclement weather and will use his own implements and machinery for this purpose.

6.64 BAILING OUT OR DEWATERING:

Adequate arrangements shall be made by the contractor for dewatering the foundation trenches and excavation and keeping the same dry while the masonry or concrete work is in progress and till the Project Engineer considers that the mortar is sufficiently set.

The rates for the various items include the cost of shoring, strutting, coffer dam, channels or other incidental devices necessary for diverting the water met within foundation. The cofferdam and the diversion channel shall, however, be maintained in good and working condition till the completion of the structure or until such time, as in the opinion of the Project Engineer till the coffer dam or/and diversion channel is no longer necessary. Bailing out water necessitated by the failure to maintain the cofferdam and diversion channel will not be paid for separately under any conditions.

No extra rate shall be paid for removing any stuff outside, which might find excess due to rains or for reasons whatsoever from the sides or bottom of the foundation trenches and excavation or from also where when the dewatering operations are in progress.

The contractor must assure himself by making the necessary investigation regarding the depths to which foundations are likely to go. If any work is ordered to be done beyond dimensions or deviations marked in the drawings, no extra rate other than the rate for the Undertaking of work quoted by the contractor be paid.

The contractor will make himself arrangements for necessary plant such as Pump, engines, and other materials required in this connection.

6.65 FACILITIES FOR INSPECTION:

The work at all times be open for inspection by the Project Engineer or his duly authorized Assistant and the contractor shall arrange easy access to every part of the work and shall provide such ladders, scaffolding and lifts for this purpose as necessary at his own cost.

6.66 DELIVERY OF WORKS:

The final bill will be prepared after the work is handed over to the Project Engineer or his duly authorized representative in a thoroughly complete, clean, sound and workman like

state.

6.67 EXTRA ITEM:

Whenever the contractor is ordered by the Project Engineer or the person duly authorized by him to execute any item of work, which is not in his tender, it shall be the contractors duty to see that the order is duly entered in the order book on the work, unless a separate communication to this effect is received by him, it shall be his duty to get the rates sanctioned for the item by the appropriate authority. For any extra item of work not thus ordered either by any entry in the order book or separate communication, the contractor shall have no claim to payment.

6.68 COMPLIANCE WITH BYELAWS AND PROTECTIONS AGAINST ACCIDENTS, ETC:

Contractor is responsible for complying with all acts, bye-laws, Municipal and other regulations for the provision and maintenance of lights during nights, barricading, providing any other protection that may be necessary and will be liable for all claims that may arise from accidents of nuisance caused by works.

6.69 DISPUTES:

Disputes on the points between the Project Engineer and the contractors shall be referred to the Center for campus management and Development, whose decision shall be given in writing and shall be final and binding on the contractor.

6.70 TOOLS ETC.,

The contractor shall unless otherwise specially stated in the contract, be responsible for the payment of all import duties, octroi duties, sales tax, quarry fees etc., on all materials and articles brought to site.

6.71 CLEARANCE OF SITE:

The site described and shown on the plan is to be cleared of all obstruction, loose stones and materials, rubbish of all kinds of shrubs and brushwood, the roots being entirely removed.

The products of the cleaning to be stacked in such a place and manner as ordered by the Project Engineer.

In jungle clearing all trees not marked for preservation, jungle wood and brushwood shall be cut down and their roots entirely removed up. All wood and materials from the clearings will be property of the Institute and should be stacked as the Engineer in charge directs. Trees shall not be cut without prior permission of the Institute.

All holes or hollow, whether originally existing or produced by digging up roots, shall be carefully filled up with earth well rammed to the required density and leveled off, as may be directed.

6.72 LINE OUT:

The contractor shall use necessary measuring instruments, theodolite, workstation and other materials like flags, strings, pegs, nails, pillars, paints, etc., and also Labour required for ascertaining of the initial ground levels at the different stages of excavation and construction of masonry or other structures at his own cost. Any dispute in regard to the accuracy of the measuring instruments and the device shall be subjected to the final decision of the Engineer-in charge of the work.

6.73 MACHINERY: All the machinery that will be employed on the work shall be approved, efficient and thoroughly, complying with the specifications of each machine or parts and

shall have been manufactured by reputed and qualified firms. All the machinery employed on the work shall be open to inspection at all working hours, by the Project Engineer and any defect shall be rectified, repaired, replaced, renewed or remodeled so that its performance in the opinion of the Project Engineer is satisfactory. Any defective part of the machine, which requires replacement, shall be promptly replaced, failing which the Engineer-in-charge, shall be at liberty to cause the defective fittings removed from site of work at the cost of the contractor.

6.74 OPERATORS: The machines shall be in charge of efficient and trained operators, which terms shall include drivers, mechanics or other personnel who are actually operating the machines. The Engineer in-charge has the right to test operators, etc., as deemed necessary by him for the class of machinery, which he is to operate and shall drive out such of the operators who fail in the tests.

6.75 SAFETY PRECAUTION: All reasonable safety precautions for the safety of workers shall be taken. The contractors shall be responsible for the maintenance of all regulations under the Factory Act, workmen's compensation. Minimum wages act and other act for the safety and welfare of the workers employed by him. In addition, the contractors shall provide adequate protection to all workers employed by him against natural elements such as rain, sun, wind etc., during working hours and provide free, pure protected drinking water during working hours.

6.76 NON-STOP OPERATION:
In the continuous or non-stop operations suitable shifts or working hours for each shift shall be maintained. The contractor is liable for all reasonable extra payment for all extra hours of work done by the workers employed by him.

6.77 TESTS:
The Project Engineer cum Estate officer or his authorized representatives shall have full scope and right of entry at all times to examine and test, measure, count, weigh, take bores, or in any manner satisfy himself that the work executed is according to the specifications and required strength. Any portion of work got disturbed, during such tests, shall be made good by the contractors, without extra cost. The Engineer in charge has the right to change the design proportions, mixes within reasonable limits to ensure requisite strength of the structure. Laboratory for requisite tests shall be established by the Contractor at site only, at his own cost.

6.78 ADEQUATE ARRANGEMENTS TO ACHIEVE PROGRESS:
The Project Engineer shall have the right to advise the contractor on the strength, quality and nature of labour to be employed on work to maintain progress on the work, commensurate with the strength of structure. Similarly, he shall advise the contractor on the nature and adequacy of the machinery that are required on the work.

6.79 DETAILS TO BE FURNISHED FOR ENGAGING SUB-CONTRACTOR FOR SPECIALISED WORKS:
The tenderer shall be required to engage agencies of standing and repute who have experience in executing works of similar nature and magnitude. Such specialized trades cover electrical installation (HT/LT), Lifts, A.C. sanitary and water supply works, firefighting installation and any such other trades as may be directed by the Institute. The successful tenderer shall be required to engage Sub-agencies for such specialized trades only with the prior written approval of the Project Engineer cum Estate officer after

giving an opportunity to the Project Engineer cum Estate officer to evaluate the experience and competence of the sub-agency for each trade. In order to ensure implementation of this requirement, it is required that each tenderer shall submit along with his tender, names of three sub-agencies for each trade amongst whom tenderer proposes to engage if successful in the tender. Along with names of sub-agencies for each trade, the tenderer shall furnish in detail the following particulars in respect of each sub-agency.in the format furnished in Technical Bid.

All such information concerning sub-agencies shall be furnished along with the tender. Any tender containing insufficient information in this regard is liable for rejection. In the event of non-compliance of this requirement, the Institute shall have the right to nominate any sub-agency who in their opinion meets the selection criteria. In such event it would be incumbent on the successful tenderer, to accept and appoint then nominated sub-agency without demur and on this account, if there is any additional cost, such cost shall be borne by the successful tenderer. The Institute shall have no liability on this account. The Institute has the right to evaluate the experience, reputation etc., of such sub-agencies and on their approval in writing to the successful tenderer, successful tenderer shall be required to engage only such approved agencies for execution.

If the Institute is not satisfied with the performance or capability of the names in the panel furnished by the tenderer, the successful tenderer shall be required to engage an agency nominated by Institute. In all these matters, there shall be no additional financial implication to the Institute. The successful tenderer shall be required to execute works within the accepted rates only and no claim will be accepted due to the Institute, insistence on engaging any sub-agency. The Institute further reserves the right to instruct the successful tenderer to terminate the work of sub-agency at any time during the contract, if the performance is found unsatisfactory. In such case, the successful tenderer shall be required to furnish a further panel of names from whom a similar selection can be made by the Institute In this instance also, the Institute is not liable for any additional cost. Responsibility for the delay occurred in this process, if any shall rest with the successful tenderer.

It is the responsibility of the successful tenderer to ensure that the sub-agencies engaged in the work comply with all the clauses in the agreement between the Institute and the successful tender. It shall be responsibility of the successful tenderer to exercise first line supervision on the works executed by his subagencies including supervision on the quality of materials and workmanship and to ensure that the sub agencies comply with the technical specifications, drawings and bill of quantities. The successful tenderer shall also establish competent site organization technically and administratively to ensure that the works of various sub-agencies are supervised and well co-ordinate to ensure proper sequencing of construction and finishing works and to ensure that the overall time schedule is fully complied with.
The detailed construction programme schedule to be furnished by successful tenderer shall include action plan for procurement of materials and execution of works at site for each of the sub-agency and the detailed construction programme schedule shall reflect proper integration of each component of the building to ensure well-coordinated execution so as to complete the project including services within the stipulated time schedule.

6.80 Existing service lines such as electrical, water supply, sewer lines, telephone lines etc., shall be carefully protected and preserved before commencement and during excavation, dismantling /demolition operations. Details of UG facilities shall be provided to the

successful tenderer. Any damage caused to the aforesaid service lines, etc., during excavation, demolition/dismantling shall be made good at Contractor's own expense/cost. Restoration of any service lines, which needs to be shifted and found in the proposed site, is the responsibility of the contractor and the agency shall carry out the work as per the direction of Project Engineer the cost of such work will be borne by the Institute.

6.81 Dust nuisance to neighbour shall be minimized by providing and erecting screens to the required height as per direction of Project Engineer cum Estate officer with Aluminium sheets or canvas or other suitable material before commencement of the work. The site shall be cleared off such protection arrangement after virtual completion of work. All the operations shall be carried out strictly in accordance to regulations of municipal and other local authorities and shall be restricted to normal working hours.

6.82 No debris or materials got from dismantlement/demolition the building(s) shall be thrown in the public road causing inconvenience to the traffic and any fine or penalty imposed by local authority for non-compliance of this provision shall be borne by the contractor.

6.83 The Contractor shall be responsible for any injury to persons, animals, or things and for all structural damage to property which may arise from the operation or neglect of himself and or any nominated sub-contractors, contractor's Employees and or third party whether such injury or damage arising from carelessness, accident or any other cause whatsoever, in any way connected with the carrying out the construction/dismantling/demolition.

The contractor shall take required insurance cover with an approved insurance company as provided in the contract and deposit with the Institute well before commencement of construction/ demolition / dismantling.

6.84 **Preservation of trees**: The contractor shall preserve all existing trees in and adjacent to

6.85 the site which does not interfere with the construction as determined by the Engineer-in charge.

6.86 **Drawings and working Details:** The work shall be carried out strictly in accordance with the approved plans and estimates and specifications and as per the instructions of the Engineer-in-charge, and no deviations or changes are permitted without the written order of the Engineer. The designs and drawings enclosed with the tender documents are only typical and tentative. The working drawings and the working details of the several components of works will be prepared and made available at the time of execution and the contractor shall carryout the work in accordance with such working drawings and working details.

6.87 **Omissions and discrepancies in drawings and instructions:**
In all cases of omissions, doubts or discrepancies in the dimensions or discrepancies in the drawings and item of work, a reference shall be made to the Project Engineer cum Estate officer, whose elucidation and elaboration shall be considered as authorized. The Contractor shall be held responsible for any error that may occur in the work through lack of such reference and precautions.

6.88 The contractor shall be responsible for accuracy for all shapes, dimensions, and

Alignments both vertical and horizontal etc., of all the components of the work.

6.89 **Lands for the use of the Contractors Camp:**

The contractor shall have to make his own arrangements at his own cost for construction of living accommodation outside the IISc premises. The Employee shall not provide any space / building for labour camp.

6.90 **Undesirable Person to be removed from site:**

The contractor shall not employ on site any person who is undesirable, if in the opinion of the Project Engineer the person or persons at site of work employed on behalf of the contractor is/are considered undesirable. The Project Engineer shall notify the contractor to this effect and the contractor will be bound by the decision of the Project Engineer to remove such person or persons from the site of work and from the labour camp. The contractor shall not be entitled to any damage or loss on this account. On the contrary, the contractor shall be liable to compensate the Institute for any loss or damage to the Institute property caused by the employment of such person.

6.91 **Labour Statistics**:

The contractor shall submit daily reports on the following:

(a) Total No. of labour employed in the working area.

6.92 **Execution of work during night times:**

The work shall normally be carried out between 08.00 hours and 17.00 hours with a break of one hour and when permitted during night period, the second shift shall be between 17.00 hours and 00 hours with a break of half an hour during night. When ordered to work at night, adequate provision for lighting the working area should be made by the contractor at his cost and got approved by Engineer. The agency shall not be paid extra for the works executed during night.

6.93 **Safety code:**

a) The Contractor at a prominent place at work spot should bring these safety provisions to the notice of all concerned by display on notice board. The persons responsible for compliance of the safety code shall be named therein by the contractor.
b) To ensure effective enforcement of the rules relating to safety precautions, the arrangement made by the contractor shall be open to inspection by the Labour Officer, Engineer or his representatives.
c) All necessary personal safety equipment's as considered adequate by the Engineer should be kept available for immediate use of persons employed at the site and maintained in the good condition and the contractor should take adequate steps to ensure proper use of equipment by those concerned.
d) Workers employed on mixing concrete, cement grout, cement mortar shall be provided with protective footwear protective goggles and protective gloves. Those engaged in mixing or stacking cement or any materials injurious to the eye, nose and mouth shall be provided with a face mask and protective cover free of cost by the contractor.
e) Those engaged in welding work shall be provided with welder's protective eye Shield and gloves. Stonebreakers shall be provided with protective goggle and protective clothing and seated at sufficiently safe intervals.
f) Those engaged in binding and fabricating steel shall be provided with protective

gloves.

g) Those engaged in deep cuts, large rock excavation shall be provided with helmets.
h) All labour / persons at work shall wear helmet compulsorily.
i) When the work is near any place where there is risk of drowning all necessary equipment's shall be kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provisions should be made for prompt first aid treatment of all injuries likely to be sustained during the course of work.
j) Adequate and suitable caution and danger signal boards shall be prominently exhibited at road/high tension overhead line/where heavy electrical machines are working where overhead cranes or hoist; derricks, winches are working where blasting zone is demarcated. The content of the board shall be in English and the local language for easy identification.
k) All scaffolding, ladder, stairways, gangways, staging, centering, form work and temporary support and safety devices etc., shall be sound in strength and constructed and maintained as such throughout its use. The agency shall obtain approval from Project Engineer cum Estate officer for scaffolding, formwork etc., before commencement of work.
l) No materials on any site of work shall be so stacked as to cause danger or inconvenience to any persons or public.
m) The Contractor shall provide all necessary fencing and lighting to protect the public/working men from accident and shall be bound to bear the expense of defense of every suit action or other proceedings of law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost, which may be awarded in any such suit action or proceedings to any such persons or which may with consent of the contractor be paid to compensate any claims by any such person.
n) No electric cables or apparatus, which is liable to be a source of danger to persons, employed shall remain electrically charged unless a caution Board is put into that effect and close approach to the same is prohibited.
o) All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosives. No floor, roof or other portion of any building used for residence shall be so over-loaded with debris or materials so as to render it unsafe.
p) The final disposal of water used for work or removed from work spot as well as the supply used for domestic consumption shall be as directed by the Engineer. The contractor shall make his own arrangement for purification of domestic water supply used by his staff and labour colony and used on the site of work to the satisfaction of the Engineer.

q) The source of drinking water supply/distribution system in workers colony shall be protected from chances of contamination by poisonous materials epidemic causing infections bacteria etc., by maintaining the source and system under adequate hygienic conditions.
r) Notwithstanding the above clauses, there is nothing in this to exempt the contractor to exclude the operations of any other Act or Rules in force of the Central Govt., State Govt.

6.94 **AWARENESS OF SITE CONDITIONS AND CARRYING OUT OF SITE INSPECTION PRIOR TO TENDER SUBMISSION:**

Prior to the preparation and submission of his Tender, the Contractor shall make visits to the site and carry out all the necessary inspections and investigations in order to obtain

all information and to make his own assessment of the conditions and constraints at site, including the means of access to it. The Contractor shall make himself aware of all the features of the site and the working conditions and space and shall, in general, be responsible for obtaining all the necessary and requisite information needed for him to prepare and submit his Tender.
Should the Contractor require any clarifications he shall seek these in writing from the Project Engineer before submitting his Tender. At no stage will any extra claims be entertained or allowed on any matter or for any reason arising from or as a consequence of the Contractor's failure to comply with all the requirements stipulated in this Clause.

6.95 **WORK AND WORKMANSHIP**

To determine the acceptable standard of workmanship, the Project Engineer may order the Contractor to execute certain portions of works and services under the close supervision of the Project Engineer. On approval, they shall label these items as guiding samples so that further works are executed to conform to these samples.

6.96 **TEST CERTIFICATES**

The contractor shall submit copy of test certificates for all the major electrical equipment such as circuit breakers, CTs, PTs, instruments, relays, busducts, rising mains, busbars, cables etc., and panel as a whole, confirming to relevant IS/BIS standards issued by manufacturers.

6.97 **SAMPLES AND CATALOGUES**

Before ordering the material necessary for these installations, the contractor shall submit to the Engineer-in-Charge/Consultants for approval, a sample of every kind of material such as cables, conductors, conduits, switches, socket outlets, circuit breakers, lighting fixtures, boxes etc., along with the catalogues with their dimensional details.
For major items such as sub lighting panels distribution boards, the submission of drawings/catalogues along with technical details shall be enough. Prior to ordering any electrical equipment/material/system, the contractor shall submit to the Engineer-in-Charge/Consultants the catalogues, along with the samples, where applicable, from the approved manufacturer. The contractor shall arrange inspection and testing at the manufacturer's factory or assembly shop for final approval. No material shall be procured prior to the approval of the Engineer-in- Charge/Consultant.

Also, the contractor shall ensure that the dimensional details of the equipment fit into the allotted space provided in the building.

6.98 **COMPLETION CERTIFICATE**

On completion of the electrical installation a certificate shall be furnished by the contractor countersigned by the licensed supervisor, under whose direct supervision the installation was carried out.

6.99 **PERFORMANCE GUARANTEE**

The contractor shall indemnify the Institute against defective materials and workmanship for a period of one year after completion of the work. The contractor shall also hold himself fully responsible during that period for reinstallation or replacement at free of cost to institute, the following:
Any defective work or material supplied by the Contractor.

Any material or equipment damaged or destroyed as a result of defective workmanship

by the contractor.

6.100 **RATE ANALYSIS**

At any time and at the request of the Project Engineer the contractor shall provide details or breakdown of costs and prices of any part or parts of the works.

6.101 The Project Engineer cum estate officer of IISc reserves the rights to delete any item from the contractor's scope of work.

6 CONTRACTOR'S LABOUR REGULATIONS

7.1 DEFINITION:

In these regulations unless otherwise, expressed or indicated the following words and expressions shall have the meaning hereby assigned respectively that is to say:

Labour means workers employed by the contractor or the Institute directly or indirectly through sub-contractor or any other person, or any agent on his behalf on a payment as per prevailing Karnataka State labour regulations and will not include supervisory staff like overseers etc.

Fair wages means whether for item or place of work notified at the time of inviting tenders for the work and where such wages have not been so notified, the wages prescribed by the Karnataka Public Works Department for the district in which the work is done.

Contractors shall include every person whether a sub-contractor head or agent employing labour on the work taken contract.

The relevant orders of Government of Karnataka in regard to payment of wages as amended from time to time shall be followed by the contractor.

7.2 WORKING HOURS:

Normally working hours of a labour employed should not exceed 8 hours a day. The working day shall be so arranged that inclusive of interval for rest if any, it shall not spread over more than 12 hours on any day.

When a worker is made to work for more than 8 hours on a day or for more than 48 hours in any week, he is entitled to double the ordinary rate of wages. Children shall not be made to work.

Every worker shall be given a paid weekly holiday normally on Sunday.

7.3 DISPLAY OF NOTICE REGARDING WAGES ETC.

The contractor shall (a) before he commences his work on contract, display and correctly maintain in a clean legible condition in conspicuous places on the work, notices in English and in the local language spoken by the majority of the workers, giving the rate of wages which have been certified by the Regional Labour Commissioner, as fair wages and the hours of work which such wages are earned, and a copy of such notices shall be sent to the certifying officers.

7.4 PAYMENT OF WAGES:

Wages due to every worker shall be paid to him direct.

7.5 FIXATION OF WAGES PERIODS:

The contractor shall fix the wages period of which the wages shall be payable.
Wages of every worker employed on the contract shall be paid.

In case of establishments in which the wage period is one week, within three days from the end of the wage period wages shall be paid. In the case of other establishment before the expiry of the 7th day or 10th day from the end of the wage period according to the numbers of the workers employed in such establishment does not exceed 100 or exceeds 1000.

When the employment of any workers is terminated by or on behalf of the contractor the wages earned by him shall be paid before the expiry of the days succeeding the one which his employment is terminated.
All payment of wages shall be made on a working day except when the work is completed before the expiry of the wages period in which case final payment shall be made within 48 hours of the last working day at work site and during the time.
NOTE: The term working day means a day on which the labour is employed, and the work is in progress.

7.6 FINE AND DEDUCTIONS WHICH MAY BE MADE FROM WAGES:

The Wages of workers shall be paid to him without any deductions of any kind except the following deductions:
Deductions for absence for duty i.e., from the place or the places whereby the terms of his employment he is required to work. The amount of deductions shall be in proportion to the period for which he was absent.

Deductions for damage or loss of goods expressly entrusted to the employed person for custody or for loss of money or any other deduction which he is required to account, where such damage or loss is directly attributable to neglect or default.

Deduction for recovery of advance or for adjustment of over payment of wages, advance granted shall be entered in a register.

And other deductions which the Institute may from time to time allow.

7.7 Fine:

No fine shall be imposed on any worker save in respect of such acts and the Commissioner of Labour has approved omissions on his part as.

No fine shall be imposed on a worker and no deduction for damage or loss be made from his wages until the worker has been given an opportunity. Undertaking of showing cause against such fines or deductions.

The total amount of fines which may be imposed in any one wage period on a worker shall not exceed an amount equal to the wages payable to him in respect of that wage period.

No fine imposed on any worker shall be recovered from him by instalments or after the expiry of sixty days from the date which it was imposed.

Every fine shall be deemed to have imposed on a day of the act or omission in respect of which it was imposed.

The contractor shall issue an employment card in Form III to each worker on the day of the worker's entry into the employment. If the worker has already any such card with him for the previous employment of contractor, he 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.

7.8 REGISTER OF UNPAID WAGES:

The contractor should maintain a register of unpaid wages in such a form as may be convenient at the place of work but same shall include the following particulars:

- Full particulars of the labourer's whose wages have not been paid.
- Reference number of the muster roll and wage register
- Rate of wages
- The period
- Total amount not paid
- Reasons for not making payment
- How the amount of unpaid wages was utilized
- Acquaintance with dates.

7.9 REGISTER OF ACCIDENTS:

The contractor shall maintain a register of accidents in such form as may be convenient at the workplace but the same shall include the following particulars.

- Full particulars of the laborers who met with accidents.
- Rate of wages
- Sex
- Age
- Nature of accidents and cause of accident
- Time and date of accidents
- Date and time when admitted in Hospital
- Date of discharge from the Hospital.

The agency shall alone be liable to pay compensation for any damage/death /injury sustained by the personnel or any other members of the agency in the course of their work/duty at the Institute during the contract period. Govt. of India issued guidelines on payment of compensation in cases of death / permanent incapacitation of person due to unintended/ unforeseen occurrences during maintenance, operation and provisioning of public services. Under these guidelines, the agency has to pay an amount of Rs. 10 Lakhs as compensation in the cases where a person is died and up to Rs. 7.5 Lakhs in the case of disabled based on loss of earning capacity. Institute has the right to recover further penalty in the cases where the incidents have happened with the negligence of the agency.

7.10 REGISTER OF FINE ETC.

The contractor shall maintain a register of fines and a register of deductions for damages or loss in form Nos. I and II respectively which shall be kept at the place of work.

The contractor shall maintain both in English and local language a list approved by Commissioner for labour clearly stating the acts and commissions for which penalty or fine may be imposed on a workman and display it in a good condition in conspicuous place on the work.

7.11 SUBMISSION OF RETURNS:

The contractor shall submit periodical returns as may be specified from time to time.

7.12 AMENDMENTS:

The Government of Karnataka may from time to time add to or amend the regulations and on may question as to the application interpretation on effect if these regulations the decision of the Commissioner of Labour or Deputy Commissioner for Labour to Govt. in that behalf shall be final.

7.13 Labour Clause

No labourers below the age of 18 years shall be employed on the work.

Payments of wages of labourers. The contractor shall pay not less than fair wage of labourers engaged by him on the work.

EXPLANATION:

(a) The contractor shall notwithstanding the provision of any contract to the contrary cause to be paid wages to labourers indirectly engaged for the work including any labour engaged by his sub-contractors in connection with the same works if the labourers have been immediately employed by him.

(b) In respect of all labours directly or indirectly employed in the works for the performance of the contractor's part of this agreement, the contractor shall comply with or cause to be complied with Govt. of India, Contractors Labour Regulations from time to time, in regard to payment of wages. Wage period, deductions from wages recovery of wages not paid and deductions unauthorized made, maintenance of wage book, wage slips, publication of scale of wage and other terms of employment, inspection and submission of periodical returns and all other matter of a like nature.

The Project Engineer cum Estate officer or In-charge Engineer concerned shall have the right to deduct from the money due to the contractors any sum required for making good the loss suffered by a worker or workers by reason of non-fulfilment of the conditions of the contract for the benefit of the workers, non-payment of wages or of deductions made from his or her wages which are not justified by their terms of the contractor non-observance of the regulations.

(c) For payment of minimum wages, the Contractor is bound to follow the relevant orders of Govt. of India from time to time.

(d) Vis-à-vis the Institute the contractor shall be primarily liable for all payments to be made under and for the observance of the regulations aforesaid without prejudice to his right to claim indemnity from his sub-contractors. The regulations aforesaid shall be deemed to be part of this contract, and any breach thereof shall be deemed to be a breach of this.

7.14 In respect of all labour directly or indirectly employed in the work for the performance of the contractor's part of this agreements the contractor shall at his own expense arrange for the safety provisions as per Karnataka P.W.D. safety code framed from time to time and shall at his own expense provide for all facilities in arrangements and provide necessary facilities as aforesaid he shall be liable to pay penalty of Rs.50/- for each default and in addition the Project Engineer cum Estate officer in charge shall be at liberty to make arrangements and provide facilities as aforesaid, and recover the cost incurred in that behalf from the contractor.

7.15 The contractor shall submit by the 4th and 19th of every month to the Project Engineer of true statement showing in respect of the second half of the preceding month and the first half of the current month respectively (1) the name of labourers employed by him on the work (2) their working hours, (3) the wages paid to them, (4) the accidents that occurred during the said fortnight showing the circumstances under which they happened and the extent of damage and injury caused to them and (5) the number of female workers who have been allowed, maternity benefit according to clause 19F and the amount paid to them, failing which the contractor shall be liable to pay the Institute a sum of not exceeding Rs. 50/- for each default or materially incorrect statement by deduction from any bill due to the contractor and amount levied as fine.

7.16 In respect of all labour directly or indirectly employed in the works for the performance of the contractor's part of this agreement, the contractor shall comply with or cause to be complied with all the rules framed by Institute from time to time for the protection of health and

sanitary arrangements for workers employed by the Indian Institute of Science and its contractors.

7.17 Maternity benefit rules for female workers employed by contractor, leave and pay during leave shall be regulated as follows:

(i) in case of delivery: Leave during maternity leave not exceeding 8 weeks up to and including the day of delivery and 4 weeks following that day.

(ii)In case of miscarriage, up to 3 weeks from the date of miscarriage.

7.18 Pay:

i) In case of delivery: Leave pay during maternity leave will be at the rate of women's average daily earning calculated on the total wages earned on the days when full time work was done during the period of three months immediately preceding the date on which she gives notice that she expects to be confined.

ii) In case of miscarriages: Leave pay at the rate of average daily earnings calculated on the total wages earned on the day's full time works was due during a period of 3 months immediately preceding the date of miscarriage.

iii) Conditions for the grant of maternity leave: No maternity leave benefit shall be admissible to a woman unless she has been employed for a total period of not less than 10 Months immediately preceding the date of delivery /miscarriage.

7 CONDITIONS OF CONTRACT

Clause 1. Security Deposit

Estimated cost of the work put to tender	E.M.D Percentage	S.D. Percentage
(i)	(ii)	(iii)
Rs.117,46,07,470.45	1%	6.5%
Note : EMD + SD to be limited to 7.5% of the contract value		

(a) Clause -1(a) The person/persons whose tender may be accepted (hereinafter called the contractor which expression shall unless the context otherwise requires, include his heirs, executors, administrators and assigns) shall pay Earnest Money Deposit indicated in Column (ii) of the table given below and shall permit Institute (a) to deduct SD at the percentage mentioned in Column (iii) of the table given below of all moneys payable of work done under the Contract, at the time of making such payments to him/them and (b) to hold such deductions as further Security Deposit. The EMD + SD will be limited to 7.5% of the contract value.

E.M.D - Earnest Money Deposit
S.D - Security Deposit

No Interest will be paid on EMD / Further / Additional Security deposit.

(b) Additional or Reduction in Security Deposit

The EMD for the tendered work and additional amount of Security Deposit at the rates mentioned in **Sub-clause 1(a)** above should be, paid by the contractor. The Project Engineer cum Estate officer may allow if a portion of the work is withdrawn from the Contractor under the provisions of Clause 12(a) a proportionate reduction in the amount of security Deposit.

a) EMD paid along with the tender shall be refunded only after the completion of the defect liability period or payment of final bill whichever is later without any interest.

b) 1% labour cess towards workers Welfare Fund on the works expenditure will be recovered from RA bills for depositing the same to the welfare board as per Karnataka Govt. Order. Rates quoted should be inclusive of cess.

(c) However, if the Contractor desires, agency may furnish a BG issued by the Public Sector Undertaking Bank / Scheduled commercial Bank / Nationalized Bank in favour of the Registrar, Indian Institute of Science, payable at Bangalore amounting to **6.5%** of the total contract value valid up to completion of defect liability period in which case EMD deposited by them will be refunded and no recoveries towards security deposit will be effected in the running account bills.

(d) Dues to Institute, to be set off against Security Deposit.

All compensation or other sums of money payable by the Contractor to Institute under the terms of this contract may be realized or deducted from any Security Deposit payable to him or from any sums which may be due or may become due by Institute to

the Contractor on any account whatsoever and in the event of his security deposit being reduced by reason of any such realization or deduction as aforesaid, the Contractor shall, within ten days thereafter, make good in cash any sum or sums which have been deducted from his security deposit or any part thereof. Otherwise, the amount will be treated as outstanding due from the agency.

(e) Refund of Security Deposit (EMD & SD):

i) EMD paid by the contractor at the time of tendering and SD deducted from the R.A bills at the prescribed rates shall be refunded to the contractor immediately after the virtual completion of the work against production of bank guarantee for an equal amount from any of the Scheduled commercial Bank/Nationalized Bank valid for a period as mentioned in clause (ii) below.

ii) The bank guarantee received as stipulated in (i) above, will be treated as performance guarantee and shall be returned to the contractor after the final bill is paid or after **Twenty Four Months including monsoon period** from the date of virtual completion of the work during which period the work should be maintained by the contractor in good order, whichever is later. The validity of the bank guarantee shall be maintained for the above period.

iii) In case of BG's furnished towards security deposit same shall be returned after completion of the defect liability period.

Clause 2. <u>PENALTY FOR DELAY</u>

a) Written Order to Commence Work

After acceptance of the tender, the Project Engineer cum Estate officer shall issue a written order to the successful Tenderer to commence the work. The Contractor shall enter upon or commence any portion of work only with the written authority and instructions of the Project Engineer cum Estate officer. Without such instructions the Contractor shall have no claim to demand for measurements of or payment for, work done by him.

b) Programme of work

The time allowed for carrying out the work as entered in the tender shall be strictly observed by the contractor. It shall be reckoned from the date of handing over the site to the Contractor not less than 75 percent of work site area comprising a continuous block. The work shall throughout the stipulated period of the contract be proceeded with, all due diligence (time being deemed to be the essence of the contract on the part of the Contractor). To ensure good progress during the execution of the work, the contractor shall be bound (in all cases in which the time allowed for any work exceeds one month) to comply with the time schedule according to the programme of execution of the work as agreed upon and enclosed by the contractor during execution of agreement.

c) Review of progress and responsibility for delay etc.,

The Project Engineer cum Estate officer shall review the progress of all works with the contractor at least once every month. Such a review shall take into account the programme fixed for the previous week, obligations on the part of the Institute for issue of drawings etc, and also the obligations on the part of the Contractor. The review shall also examine the accumulated delays by the contractor if any and mitigation measures proposed by the contractor to overcome the delay.

Apportioning of responsibility for delay between Contractor and Institute.

In case the progress achieved falls short by more than 25 percent of the cumulative programme, the reasons for such shortfall shall be examined and a record made thereof apportioning the responsibilities for the delay between the contractor and the Institute. This record should be signed in full and dated both by the Project Engineer cum Estate officer and the Contractor. If the contractor refuses to sign the said record, approval of the reasons for delay may be submitted to **CENTER FOR CAMPUS MANAGEMENT AND DEVELOPMENT (CCMD)** for approval and such approval is binding on the contractor.

Shortfall in progress made up subsequently.

To the extent the shortfall is assessed, as due to the delay on the part of the contractor, a notice shall be issued to him by the Project Engineer cum Estate officer to make up the shortfall. If the shortfall is not made up before the progress of the work is reviewed during the second month succeeding the month in which the shortfall was observed, the Contractor shall be liable to pay penalty as indicated in **Clause 2(d)** below.

Grant of extension of time.

If the delay is attributable to reasons beyond the control of the Contractor, requisite extension of time shall be granted by the Project Engineer cum Estate officer in accordance with **Clause 5** after obtaining the approval of his higher authorities, wherever necessary.

Review of progress by Centre for Campus Management and Development.

The Centre for Campus Management and Development shall review the progress periodically, preferably more number of times as required. These reviews are in addition to the monthly reviews required to be done by the Project Engineer cum Estate officer. The results of such review by the CENTER FOR CAMPUS MANAGEMENT AND DEVELOPMENT (CCMD) shall, wherever necessary, be incorporated in the next review of the Project Engineer cum Estate officer.

If the Contractor stops the work for 45 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Employer, then The Employer may terminate the Contract at the risk and cost of the contractor.

Settlement of dispute regarding shortfall in progress.

In case of dispute between the Project Engineer cum Estate officer and Contractor regarding the responsibility for the shortfall in progress, the matter shall be referred to the Centre for Campus Management and Development who shall thereupon give a decision within fifteen days from the date of receipt of reference. The decision of the Centre for campus management and Development shall be final and binding on the contractor and the Project Engineer cum Estate officer.

d) Penalty for delay

In respect of the shortfall in progress, assessed as due to the delay on the part of contractor as per **Clause 2(b)** and **2 (c)**, the contractor shall be liable to pay as penalty

an amount equal to one percent of the contract value of the balance work assessed according to the programme(Clause 35), for every week that the due quantity of work remains incomplete; provided always that the total amount of penalty to be paid under the provisions of this clause subjected to a maximum of 10 percent of the contract value of the entire work as shown in the tender, provided further that in the event of the contractor making up the shortfall in progress within the stipulated or extended time of completion, the penalty so recovered may be refunded on an application in writing by the contractor.

Note: If the Project Engineer cum Estate officer considers it necessary, he/she shall be entitled to take action as indicated in **Clause 3 (d)** also.

d.(1). Liquidated damages

The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestone as stated in the Contract Data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages does not affect the Contractor's liabilities.

If the Intended Completion Date is extended after liquidated damages have been paid, the Employer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment of bill.

(e) Adjustment of excess/over payments.

Excess/over payments as soon as they are discovered should be adjusted in the next running account bill of the contractor and in case the final bill has already been paid, the excess/over payment made shall be recovered from the Security Deposit of the contractor together with interest at such percentages as Institute may decide from time to time, from the date of such excess or over payment to the date of recovery.

ACTION WHEN WHOLE OF SECURITY DEPOSIT IS FORFEITED

Clause 3. In any case in which under any clause or clauses of this contract the contractor shall have rendered himself liable to pay compensation and/or penalty amounting to the whole of his security deposit including the amount deducted in instalment from his bills as Further Security Deposit, the Project Engineer cum Estate officer on behalf of the Director, IISc shall have power to adopt any of the following courses as he may deem best suited in the interest of Institute.

(a) Forfeiture of Security Deposit.

Without prejudice to Institute's right to recover any loss from the Contractor under sub-clauses (b) and (c) of Clause 3 of the Contract, to rescind the contract (of which rescission notice in writing to the contractor under the hand of the Project Engineer cum Estate officer shall be conclusive evidence). And in that case, the security deposit of the

contractor including whole or part of the lump sum deposited by him and also the amount deducted from his bills as Further Security Deposit, shall stand forfeited and be absolutely at the disposal of the Institute.

(b) Debiting cost of labour and materials supplied.

To employ labour paid by the Institute and to supply materials to carry out the work or any part of the work, debiting the contractor with the cost of the labour and the price of the materials (as to the correctness of which cost and price the certificate of the Project Engineer cum Estate officer shall be final and conclusive against the contractor) and crediting him with the value of the work done; in all respects in the same manner and at the same rates as if it had been carried out by the contractor under terms of this contract, and in that case the certificate of the Project Engineer cum Estate officer as to the value of the work done shall be final and conclusive against the contractor.

(c) Recovery of extra cost on unexecuted work

To measure up the work of the contractor and to take such part thereof as is remaining unexecuted out of his hands and to give it to another contractor to complete it in which case any expenses which may be incurred in excess of the sum which would have been paid to the original contractor, if the whole work had been executed by him (as to the amount of which excess expenses the certificate in writing of the Project Engineer cum Estate officer shall be final and conclusive) shall be borne and paid by the original contractor and shall be deducted from any money due to him by Institute Otherwise the amount will be treated as outstanding due from the agency.

(d) Action against unsatisfactory progress

If the contractor does not maintain the rate of progress as required under **Clause 2** and if the progress of any particular portion of work is unsatisfactory even after taking action under **Clause 2(c)** and **2(d)**, the Project Engineer cum Estate officer shall be entitled to take action under **Clause 3(b)** or **3(c)** at his discretion in order to maintain the rate of progress after giving the contractor 10 days notice in writing whereupon the contractor will have no claim for any loss sustained by him owing to such actions.

(e) No compensation for loss sustained on advance action

In the event of any of the above courses being adopted by the Project Engineer cum Estate officer, the contractor shall have no claim to compensation for any loss sustained by him by reason of his having purchased, or procured any materials, entered into any agreements or made any advances on account of, or with a view to the execution of the work or the performance of the contract. And in case the contract shall be rescinded under the provision aforesaid the contractor shall not be entitled to recover or be paid any sum for any work thereof actually performed by him under his contract, unless and until the Project Engineer cum Estate officer shall have certified in writing the performance of such work and the amount payable in respect thereof, and he shall only be entitled to be paid the amount so certified.

(f) Recovery of 1% of the contract value towards the laborers welfare fund created by the Government of Karnataka will be effected in the running account bills of the contractor.

Clause 4. <u>CONTRACTOR TO REMAIN LIABLE TO PAY COMPENSATION IF ACTION IS NOT TAKEN UNDER CLAUSE-3</u>.

In any case in which any of the powers conferred upon the Project Engineer cum Estate officer by **Clause 3** thereof shall have become exercisable and the same shall not have been exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable in the event of any future case of default by the contractor for which under any clause hereof he is declared liable to pay compensation or penalty amounting to the whole of his security deposit and the liability of the contractor for past and future compensation or penalty shall remain unaffected.

Power to take possession of or require removal of or sell contractor's properties.

In the event of the Project Engineer cum Estate officer taking action under **sub-clause (a)** or **(c) of Clause 3**, he may, if he so desires, take possession of all or any tools, plant, materials and stores, in or upon works or the site thereof or belonging to the contractor, or procured by him and intended to be used for the execution of the work or any part thereof, paying or allowing for the same in account at the contract rates; or in the case of contract rates not being applicable, at current market rates, to be certified by the Project Engineer cum Estate officer whose certificate thereof shall be final. In the alternative, the Project Engineer cum Estate officer may after giving notice in writing to the contractor or his clerk of the works, foreman or other authorised agent, require him to remove such tools, plant, materials or stores from the premises within a time to be specified in such notice; and in the event of the contractor, failing to comply with any such requisition, the Project Engineer cum Estate officer may remove them at the contractor's expense or sell them by auction or private sale on account of the contractor and at his risk in all respect, and the certificate of the Project Engineer cum Estate officer as to the expense of any such removal; and the amount of the proceeds and expense of any such sale shall be final and conclusive against the contractor.

Clause 5. GRANT OF EXTENSION OF TIME

(a) If the contractor shall desire an extension of the time for completion of the work, he shall apply in writing to the Project Engineer cum Estate officer before the expiry of the period stipulated in the tender or before the expiry of 30 days from the date on which he was hindered as aforesaid or on which the cause for asking for extension occurred, whichever is earlier and the Project Engineer cum Estate officer or other competent authority may if in his opinion, there are reasonable grounds for granting an extension, grant such extension as he thinks necessary or proper. The decision of such competent authority in this matter shall be final.

(b) The time limit for completion of the work shall be extended commensurate with its increase in cost occasioned by alterations or additions and the certificate of the Project Engineer cum Estate officer or other competent authority as to such proportion shall be conclusive.

Clause 6. ISSUE OF FINAL CERTIFICATE – CONDITIONS REGARDING

On completion of the work the contractor shall report in writing to the Project Engineer cum Estate officer the completion of the work. Then he shall be furnished with a certificate by the Project Engineer cum Estate officer of such completion, but no such certificate shall be given nor shall the work be considered to be complete until the contractor shall have removed from the premises on which the work shall have been executed, all scaffolding, surplus materials and rubbish, and shall have cleaned

thoroughly all wood work, doors, windows, wall, floor or other parts of any building, in or upon which the work has been executed, or of which he may have had possession for the purpose of executing the work, nor until the works shall have been measured by the Project Engineer cum Estate officer or other competent authority, or where the measurements have been taken by his Project Engineer until they have received the approval of the Project Engineer cum Estate officer or other competent authority, the said measurements being binding and conclusive against the contractor. If the contractor shall fail to comply with the requirements of this clause as to the removal of scaffolding, surplus materials and rubbish, and cleaning on or before the date fixed for the completion of the work the Project Engineer cum Estate officer or other competent authority may, at the expense of the contractor, remove such scaffolding, surplus materials and rubbish, and dispose of the same as he think fit and clean off such dirt etc., as aforesaid and contractor shall be liable to pay the amount of all expenses incurred but shall have no claim in respect of any such scaffolding or surplus materials as aforesaid except for any sum actually realized by the sale thereof.

Note: CLOSURE OF CONTRACT PENDING COMPLETION OF MINOR ITEMS.

In cases where it is not desirable to keep the building contract open for minor items, such as flooring in the bathrooms, etc., which can be carried out only after installation of sanitary work the main contract may be finalized after getting a supplementary agreement executed in the prescribed form by the same contractor for doing the residual work.

Clause 7. Contractor to submit bills monthly in printed form

(a) A bill shall be submitted by the contractor on or before 15th of each month for all items of work executed in the previous month as required by IISc. The Running account bills will be paid within three weeks from the date of submission of the bill in complete acceptable form after duly checked and certified by concerned Engineer, under normal circumstances.

All bills shall be prepared in the prescribed printed and electronic form in PDF/Excel format in quadruplicate and handed over to the Project Engineer in charge of the work/ Project Engineer cum Estate officer's Office and acknowledgment obtained.

The charges to be made in the bills shall always be entered at the rates specified in the tender in full or in part as the case may be, in the case of any extra work ordered in pursuance of these conditions, and not mentioned or provided for in the tender, the charges in the bills shall be entered at the rates hereinafter provided for such work.

(b) Scrutiny of Bills and measurement of work

The details furnished by the Contractor in the bill will be completely scrutinized and the said work will be measured by the Project Engineer in the presence of the Contractor or his duly authorized agent. The countersignature of the contractor or the said agent in the measurement book shall be sufficient proof to the correctness of the measurements, along with the Test certificates to be produced with the bill, which shall be binding on the contractor in all respects.

(c) One copy of the passed bill shall be given to the Contractor without any charge.

Clause 8. PAYMENT PROPORTIONATE TO WORK APPROVED AND PASSED.

No payment shall be made for any work estimated to cost rupees five thousand or less until after the whole of the work shall have been completed and certificates of completion given. But in the case of works estimated to cost more than Rs. 5,000 the contractor shall on submitting the bill and after due verification by the Project Engineer as per Clause 7(b) entitled to necessary Payment proportionate to the part of the work then approved and passed by the Project Engineer cum Estate officer or other competent authority whose certificate of such approval and passing of the sum so payable shall be final and conclusive against the contractor i.e. part payment of submitted RA bills is admissible to contractor. Any such reduced payment amount is admissible for adjustment in the successive RA Bills or Final Bill.

Payment at reduced rates

The rates for several items of works agreed to within shall be valid only when the items concerned are accepted as having been completed fully in accordance with the stipulated specifications. In cases where the items of work are not accepted as so completed, The Project Engineer cum Estate officer or other competent authority may make payment on account of such items at such reduced rates as he may consider reasonable in the preparation of final or on account bills.

Payment or intermediate certificates be regarded as advances:

All such intermediate payments shall be regarded as payments by way of advance against the final payments only and not as payments for work actually done and completed, and shall not preclude the Project Engineer cum Estate officer or other competent authority from requiring any bad, unsound imperfect or unskilful work to be removed or taken away and reconstructed or re-erected nor shall any such payment be considered as an admission for the due performance of the Contract or any part thereof in any respect or the accruing of any claim, nor shall it conclude determine or affect in any other way the powers of the Project Engineer cum Estate officer or other competent authority as to the final settlement and adjustment of the accounts, or otherwise or in any other way vary or affect the contract.

Submission of Final bill and its settlement

The contractor shall submit the final bill within one month from the date of actual completion of the work in all respects. His claims shall be settled within five months from the date of submission of the bill in complete acceptable form after duly checked and certified by concerned Engineer, under normal circumstances.

Disputed items

Note: The contractor shall submit a list of the disputed items within 30 days from the disallowance thereof and if he fails to do this, his claim shall be deemed to have been fully waived and absolutely extinguished.

Clause 9. Definition of Work :

a. The expression `Work' or 'Works' where used in these conditions, shall unless there be something in the subject or context repugnant to such construction, be construed to mean the work or works contracted to be executed under or in virtue of the contract, whether temporary or permanent and whether original, altered, substituted or additional.

b. Work to be executed in accordance with specifications, drawings, orders etc.

The contractor shall execute the whole and every part of the work in the most sound and substantial and workmanlike manner, and in strict accordance with the specifications both as regards materials and workmanship. The contractor shall also conform exactly, fully and faithfully to the designs, drawings and instructions in writing relating to the work signed by the Project Engineer cum Estate officer or other competent authority and lodged in his office and to which the contractor shall be entitled to have access at such office, or on the site of the work for the purpose of inspection during office hours. The contractor shall also be responsible for the delivery of structure in sound conditions and the execution of the work strictly in accordance with the specifications of the work.

c. Action where there is no specification

In the case of any class of work for which there is no such specification, then in such a case of the work shall be carried out in all respects in accordance with the instructions and requirements of the Project Engineer cum Estate officer or other competent authority.

d. Work as per Specifications and IS Codes.

The detailed specification, which forms a part of contract, accompanies the tender document. In carrying out the various items of work as described in Schedule B of the tender documents and the additional, substituted, altered items of work, this detailed specification shall be strictly adhered to, supplemented by relevant provisions of Indian standard specifications, the code of practice; etc., The Indian standard specification, National Building Code and the code of practice to be followed shall be the latest versions of those listed in the detailed technical specifications. Any class of work, not covered by the detailed technical specifications, shall be executed in accordance with the instructions and requirements of the Project Engineer cum Estate officer and the relevant provisions of the Indian standard specifications.

Clause 10. <u>Alteration in quantity of work, specifications and designs, Additional work, deletion of work</u>

The Project Engineer cum Estate officer shall have power to make any alternations in, omissions from additions to or substitutions for the original specification, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work. For that purpose or if for any other reason it shall in his opinion be desirable, he shall have power to order the Contractor to do and the contractor shall do any or all the following: -

a) Increase or decrease the quantity of any work included in the contract.
b) Omit any such work.
c) Change the character or quality or kind of any such work,
d) Change the levels, lines, positions and dimensions of any part of the work,
e) Execute additional work of any kind necessary for the completion of the works and
f) change in any specified sequence, methods or timing of construction of any part of the work.

Contractor bound by Project Engineer cum Estate officer's instructions

The Contractor shall be bound to carry out the work in accordance with any instructions in this connection which may be given to him in writing signed by the Project Engineer cum Estate officer or other competent authority and such alteration shall not in any way vitiate or invalidate the contract.

Standard Quantity Take-off (SQT)

Contractor within **14 days** of Issue of LOI to submit the Project Manager & seek approval for the Standard quantity Take-off sheets for all the items mentioned in the Tender BOQ, after due referencing the Tender/ GFC drawings and the Technical Specification. Upon approval, the SQT shall remain the base document for initiating any change orders/ variation in accordance to Clause 31, tracking the daily project progress, and for the measurement sheets.

Orders for variations to be in writing

1. No such variations shall be made by the Contractor without an order in writing of the Project Engineer cum Estate officer; provided that no order in writing shall be required for increase or decrease in the quantity of any work where such increase or decrease is the result of the quantities exceeding or being less than those stated in the 'Schedule B' provided also that if for any reason the Project Engineer cum Estate officer shall consider it desirable to give any such order verbally, the Contractor shall comply with such order without any confirmation in writing of such verbal order given by the Project Engineer cum Estate officer, whether before or after the carrying out of the order, shall be deemed to be an order in writing within the meaning of the clause; provided further that if the Contractor shall within seven days confirm in writing to the Project Engineer cum Estate officer and if such confirmation is not contradicted in writing within fourteen days by the Project Engineer cum Estate officer, it shall be deemed to be an order in writing by the Project Engineer cum Estate officer.

2. **a)** Any additional work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the Contractor on same conditions in all respects on which he agreed to do the main work and same rates as are specified in the tender for the main work. However, change in the Undertaking rates tendered and accepted shall be considered in respect of items under which the quantity of work performed exceeds tendered quantity by more than 25 percent and this actual change in rate will be restricted only to such excess quantity (i.e. beyond 125 percent of the tendered quantity).

(b) Rate for excess quantity beyond 125 percent of tendered quantity

The Additional quantity which exceeds 125 percent of the tendered quantity shall be paid at the rates entered in or derived from Schedule of Rates prevalent at the time of executing additions and alterations plus or minus the overall percentage of the original tendered rates over the current Schedule of Rates (KPWD) of the year in which the tender is accepted (as per the comparative Statement prepared at the time of acceptance of the tender).

(c) Rates for additional, substituted, altered items of work

If the additional, substituted or altered work includes any class of work for which no rate is specified in the contract, then such work shall be carried out at the rates specified for or derived from similar item of work in the agreement. In the absence of similar items in agreement, rate shall be as specified for or derived from similar items in the schedule of rates of KPWD prevalent at the time of execution of such additional substituted or altered items of works, plus or minus the overall percentage of original tendered rates over the current schedule of rates of (KPWD) the year in which tender is accepted as mentioned in sub clause (b) above. With regard to the question whether the additional, substituted or altered item/items of work/works is / are similar or not, to that/those in the agreement / in the Schedule of Rates of KPWD and the decision of the CCMD shall be final and binding on the contractor.

(d) Determination of rates for items not found in Estimate or Schedule of Rates

If the rates for additional, substituted or altered work cannot be determined in the manner specified in sub **clauses (b)** and **(c)** above, then the contractor shall within 7 days of the date of receipt by him of the order to carry out the work, inform the Project Engineer cum Estate officer of the rates which it is his intention to charge for such class or work, supported by analysis of the rate or rates claimed. Thereupon the Project Engineer cum Estate officer shall determine the rate or rates on the basis of observed data and failing this, on the basis of prevailing market rates. Under no circumstances the contractor shall suspend the work on the plea of non- settlement of rates for items falling under this clause. In the event of any dispute regarding the rates for such items the decision of Project Engineer cum Estate Officer, CCMD shall be final.

Working out the data rates for non-SR/ non tendered items shall be based on the procedures laid down in the standard rate analysis format of KPWD Bangalore circle Bangalore. The data rates shall be approved by the Project Engineer cum Estate Officer, CCMD and shall be binding on the contractor.

Clause 11. <u>TIME LIMITS UNFORSEEN CLAIMS</u>

Under no circumstances whatever shall the contractor be entitled to any compensation from Institute on any account unless the contractor shall have submitted claim in writing to the Project Engineer cum Estate officer or other competent authority within 30 days of the cause of such claim occurring.

Clause 12. <u>NO CLAIM TO ANY PAYMENT OR COMPENSATION FOR DELETION OF WHOLE OR PART OF WORK</u>

(a) If at any time after the execution of the contract documents, the Project Engineer cum Estate officer or other competent authority shall, for any reason whatsoever, require the whole or any part of the work as specified in the tender, to be stopped for any period or require the whole or part of the work (i) not to be carried out at all or (ii) not to be carried out by the tendered contractor, he shall give notice in writing of the fact to the contractor who will thereupon suspend or stop the work totally or partially as the case may be. In any such case, except as provided hereunder, the contractor shall have no claim to any payment of compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full but which he did not so derive in consequence of the full amount of the work not having been carried out, or on account of any loss that he may be put on account of materials purchased or agreed to be

purchased, or for unemployment of labour recruited by him. He shall not also have any claim for compensation by reason of any alterations having been made in the original specifications, drawings, designs and instructions, which may involve any curtailment of the work, as originally contemplated.

(b) Payment for materials already purchased or ordered by contractor.

Where, however, materials have already been purchased or agreed to be purchased by the contractor before receipt by him the said notice the contractor shall be paid for such materials, at the rates determined by the Project Engineer cum Estate officer or other competent authority provided they are not in excess of requirements and are of approved quality, and/or shall be compensated for the loss, if any, that he may be put to, in respect of materials agreed to be purchased by him, the amount of such compensation to be determined by the Project Engineer cum Estate officer or other competent authority whose decision shall be final.

(c) Labour charges during stoppage of work

If the contractor suffers any loss on account of his having to pay labour charges during the period during which the stoppage of work has been ordered under this clause, the contractor shall on application, be entitled to such compensation on account of labour charges as the Project Engineer cum Estate officer or other competent authority, whose decision shall be final, may consider reasonable. Provided that the contractor shall not be entitled to any compensation on account of labour charges if in the opinion of the Project Engineer cum Estate officer or other competent authority, the labour could have been employed in the same locality by the contractor for the whole or part of the period during which the stoppage of the work has been ordered as aforesaid.

(d) Time limit for stoppage of work

The period of stoppage ordered by the Project Engineer cum Estate officer or other competent authority should not ordinarily exceed six months. Thereafter the portion of works stopped may be treated as deleted from this agreement if a notice in writing to that effect is given to the Project Engineer cum Estate officer or other competent authority by the contractor within seven days after the expiry of the above period.

Execution of work deleted:

The portion of work thus deleted may be got executed from the same contractor on supplemental agreement on mutually agreed rates, which shall not exceed current Schedule of Rates plus or minus tender percentage.

Clause 13. <u>ACTION AND PENALTY IN CASE OF BAD WORK</u>

If at any time before the security deposit is refunded to the contractor, it shall appear to the Project Engineer cum Estate officer or other competent authority that any work has been executed with unsound, imperfect or unskilful workmanship or with materials of inferior quality, or that any materials or articles provided by him for the execution of the work are unsound or of a quality inferior to that contracted for, or are otherwise not in accordance with the contract, it shall be lawful for the Project Engineer cum Estate officer or other competent authority to intimate this fact in writing to the contractor and

then notwithstanding the fact that the work, materials or articles complained of may have been paid for, the contractor shall be bound forthwith to rectify, or remove and reconstruct the work so specified on whole or in part as the case may require, or if, so required shall remove the materials or articles at his own charge and cost and in the event of his failing to do so within a period to be specified by the Project Engineer cum Estate officer or the competent authority in the written intimation aforesaid, the contractor shall be liable to pay a penalty not exceeding one percent on the amount of the estimate for every day not exceeding ten days during which the failure, so continues and in the case of any such failure the Project Engineer cum Estate officer or other competent authority may rectify or remove, and re-execute the work or remove and replace the materia1s or articles complained of, as the case may be at the risk and expense in all respects of the contractor should the Project Engineer cum Estate officer or other competent authority for any valid reasons consider that any such inferior work or materials as described above is to be accepted or made use of, it shall be within his discretion to accept the same at such reduced rates he may fix thereof.

Clause 14. WORK TO BE OPEN TO INSPECTION - CONTRACTOR OR RESPONSIBLE AGENT TO BE PRESENT

(a) All works under or in course of execution or executed in pursuance of the contract shall at all time be open to the inspection and supervision of the Project Engineer cum Estate officer or other competent authority and his Engineer-in-charge, and the contractor shall at all times during the usual working hours, and at all other times at which reasonable notice of the intention of the Project Engineer cum Estate officer or other competent authority Project Engineer to visit the work shall have been given to the contractor, either himself be present to receive orders and instructions or have a responsible agent duly accredited in writing present for the purpose. Orders given to the contractor duly authorized agent shall be considered to have the same force and effect as if they had been given to the contractor himself.

(b) Employment of Minimum Technical Staff

The Contractor shall employ the following technical staff during execution of this work:

a) One qualified Graduate Engineer & One qualified Diploma Engineer, when the cost of the work to be executed up to 1 Crore,
b) Two qualified Graduate Engineer & Three qualified Diploma Engineer, when the cost of the work to be executed from 1 Crore to 10 crores;
c) Three qualified Graduate Engineer & Six qualified Diploma Engineer, when the cost of the work to be executed above 10 crores;
d) In addition to (i) and (ii) above, the contractor shall employ different types of such technical personnel as may be required and sufficient for execution of work and directed by the Project Engineer cum Estate officer to ensure efficient execution of work.
e) The technical staff so employed, should be available at site whenever required by Engineer in-charge to take instructions.
f) If the contractor fails to employ the technical staff as aforesaid, he shall be liable to pay a sum of Rs. 25000 (Rupees Twenty thousand only) for each month of default in the case of Graduate Engineers and Rs. 15000 (Rupees Ten thousand only) for each month of default in case of Diploma Holders.

g) If the Contractor himself possesses the required qualification and is available at the site for receiving instructions from the Project Engineer cum Estate officer and other competent authority vide **sub-clause (a**) above it will not be necessary for the technical staff to be available at site for receiving instructions.

Clause 15. NOTICE TO BE GIVEN BEFORE WORK IS COVERED UP

The contractor shall give not less than five days' notice in writing to the Project Engineer cum Estate officer or his Project Engineer in charge of the work before covering up or otherwise placing beyond the reach of the measurement any work in order that the same may be measured; and correct dimensions thereof taken before the same is so covered up or placed beyond the reach of measurement, and shall not cover up or place beyond the reach of measurement, and work without the consent in writing of the Project Engineer cum Estate officer or other competent authority or his Project Engineer in charge of work; and if any work shall be covered up or placed beyond the reach of measurement, without such notice having been given or consent obtained, the same shall be uncovered at the contractor's expense, and in default thereof no payment or allowance shall be made for such work or for the materials with which the same was executed.

Clause 16. CONTRACTOR LIABLE FOR DAMAGE DONE, AND FOR IMPERFECTIONS FOR TWELVE MONTHS AFTER CERTIFICATE OF COMPLETION

If the Contractor or his workmen or servants shall break, deface, injure or destroy any part of a building in which they may be working, or any building, road fence, enclosure or grassland or cultivated ground contiguous to the premises on which the work or any part thereof is being executed, or if any damage shall be done to the work, while it is in progress from any cause whatever or if any imperfections become apparent in it within Twelve months of the grant of a certificate of completion, final or otherwise, by the Project Engineer cum Estate officer or other competent authority the contractor shall make good the same at his own expenses, or in default the Project Engineer cum Estate officer or other competent authority may cause the same to be made good by other workmen, and deduct the expenses (of which the certificate of the Project Engineer cum Estate officer or other competent authority shall be final) from any sums that may be due or may thereafter become due to the contractor, or from his Security Deposit or the proceeds of sale thereof, or of a sufficient portion thereof.

The Defects liability period shall be extended for as long as defects remain to be corrected. Every time notice of a Defect is given, the Contractor shall correct the notified Defect within the length of time specified by the Institute.

Clause 17. CONTRACTOR TO SUPPLY PLANT, LADDERS, SCAFFOLDINGS, ETC., AND IS LIABLE FOR DAMAGES ARISING FROM NON-PROVISION OF LIGHT, FENCING ETC

The contractor shall supply at his own cost all materials, plant, tools, appliance, implements, ladders, scaffolding, and temporary works required for the proper execution of the work whether in the original, altered or substituted form and whether included in the specification, or other documents forming part of the contract or referred to in these conditions or not, and which may be necessary for the purpose of satisfying

or complying with the requirements of the Project Engineer cum Estate officer or other competent authority as to any matter as to which under these conditions he is entitled to be satisfied, or which he is entitled to require together with carriage therefore, to and from the work. The contractor shall also supply without charge the requisite number of persons with the means and materials necessary for the purpose of setting out works, and counting, weighing and assisting in the measurement or examination at any time and from time to time of the work or the materials. Failing this, the same may be provided by the Project Engineer cum Estate officer or other competent authority at the expense of the contractor and expense may be deducted from any money due to the contractor under the contract or from his security deposit or the proceeds of sale thereof, or of a sufficient portion thereof. The contractor shall provide necessary fencing and lights required to protect the public from accident, and shall also be bound to bear the expense of defense of every suit, action or other legal proceedings, that maybe brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and costs which may be awarded in any suit, action or proceedings to any person, or which may with the consent of the contractor be paid for compromising any claim by any such person.

Clause 18. Measures for prevention of fire

The contractor shall not set fire to any standing jungle, trees, brushwood or grass without a written permit from the Project Engineer cum Estate officer. When such permission is given, and also in all cases when destroying cut or dug up trees, brushwood grass, etc., by fire the contractor shall take necessary measures to prevent such fire spreading to or otherwise damaging surrounding property.

Clause 19. Liability of contractor for any damages done in or outside work Area.

Compensation for all damages done by contractor or his men whether in or beyond the limits of Institute property including any damage caused by spreading of fire mentioned in Clause 18 shall be estimated by the Project Engineer cum Estate officer and the estimate of the Project Engineer cum Estate officer, subject to the decision of the Centre for Campus Management and Development on appeal shall be final and the contractor shall be bound to pay the amount of the assessed compensation on demand failing which the same will be recovered from the contractor as the damages in the manner prescribed in clause 1(c) or deducted by the Project Engineer cum Estate officer or other competent authority from any sums that may be due or become due from Institute to the contractor under this contract or otherwise.

The contractor shall bear the expenses of defending any action or other legal proceedings that may be brought by any person for injury sustained by him owing to neglect of precautions to prevent the spread of fire and shall pay any damages and cost that may be awarded by the court in consequence.

Clause 20. Work on Notified Holiday

No work shall be done on any notified holiday without the sanction in writing of the Project Engineer cum Estate officer or other competent authority.

Clause 21. <u>WORK NOT TO BE SUBLET</u>

(a) The contract shall not be assigned or sublet by the contractor. However, any specific portion of the work which is of a specialized nature and normally not executable by a general contractor could be got done by the specialized agencies which are executing such works, after obtaining the specific approval of the Project Engineer cum Estate officer in writing in each case. Such consent to sublet the work, if given, shall not relieve the contractor from any liability or obligation under the contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor or his agents, servants or workmate as fully as if they were the acts, defaults or neglects of the contractor, his agents, servants or workmen.

Consequences of subletting work without approval, becoming insolvent, bribing etc., by contractor and action against the contractor.

If the contractor shall assign or sublet his contract or any portion thereof without the specific approval of the Project Engineer cum Estate officer or attempts to do so or become insolvent or commence any proceedings to get himself adjudicated as insolvent or make any composition with his creditors or attempts so to do or if any bribe, gratuity, or indirectly be given, promised or offered by the contractor or any of his servants or agents to any officer or person in the employ of Institute in any way relating to his office or employment or if any such officer or person in the employment or if any such officer or person shall become in any way directly or indirectly interested in the contract, the Project Engineer cum Estate officer or other competent authority may thereupon by notice in writing rescind the contract and the security deposit of the contractor shall thereupon stand forfeited and be absolutely at the disposal of Institute and the same consequences shall ensure as if the contract had been rescinded under Clause 3 here of and in addition, the contractor shall not be entitled to recover or be paid for any work actually performed under contract.

(b) **Recovery of excess payments based on excess measurements and action against contractor.**

Whenever it is noticed that excess payments have been made to the contractor based on excess measurements recorded by the Project Engineer in the measurement book and countersigned by the contractor or his duly authorized agent, action shall be taken to recover the excess payments together with interest immediately. Action may also be taken to remove the name of the contractor from the approved list of contractors and also to blacklist him.

Change in classification of excavations accepted not permitted.

Once the measurements mentioning the classification of the excavations are recorded in the measurement book and the same is signed by the contractor or his authorized agent in token of acceptance, no request for reclassification by the contractors shall be entrained.

(c) **Criminal proceedings against IISc Officer and Contractor for the lapses.**

Institute also reserve the right to initiate criminal proceedings against the concerned Institute Officers who are directly responsible for the lapse and the contractors who

have colluded with the officers of the Institute in the lapse and fraudulently received amounts not due to them legitimately.

Clause 22. SUM PAYABLE BY WAY OF COMPENSATION TO BE CONSIDERED AS REASONABLE COMPENSATION WITHOUT REFERENCE TO ACTUAL LOSS.

All sums payable by a contractor by way of compensation under any of these conditions shall be considered as reasonable compensation to be applied for the use of Institute without reference to the actual loss or damage sustained and whether any damage has or has not been sustained.

Clause 23. SETTLEMENT OF DISPUTES -TIME LIMIT FOR DECISION

(a) If any dispute or difference of any kind whatsoever were to arise between the Project Engineer cum Estate officer and the contractor regarding the following matters namely,

(i) The meaning of the specification's designs, drawing and instructions herein before mentioned,

(ii) The quality of workmanship or materials used on the work and

(iii) Any other question, claim right, matter, thing whatsoever, in any way arising out of or relating to the contract, designs, drawings, specification, estimates, instructions, or orders, or those conditions, failure to execute the same whether arising during the progress of the work, or after the completion, termination or abandonment thereof, the dispute shall, in the first place, be referred to the Centre for campus management and Development who have jurisdiction over the work specified in the contract. The Centre for campus management and Development shall within a period of fifteen days from the date of being requested by the Contractor to do so give written notice of its decision to the Contractor.

If the decision of the Centre for campus management and Development is not acceptable to the contractor, he may approach the **Director, IISc within** a period of 15 days for settlement.

(b) Director, IISc decision's final.

Subject to other form of settlement hereafter provided, the Director's decision in respect of every dispute or difference so referred shall be final binding upon the contractor. The said decision shall forthwith be given effect to and contractor shall proceed with the execution of the work with all due diligence.

(c) Remedy when Director's decision is not acceptable to contractor.

In case the decision of the Director is not acceptable to the contractor, he may approach the Law Court at Bangalore for settlement of dispute after giving due written notice in this regard to the Director within a period of ninety days from the date of receipt of the written notice of the decision of the Director. Further, the Bangalore courts alone shall have the exclusive jurisdiction.

(d) Time limit for notice to approach Court of law by contractor

If the Director has given written notice of his decision to the contractor and no written notice to approach the law court has been communicated to him by the contractor within a period of ninety days from receipt of such notice, the said decision of Director shall be final and binding upon the contractor.

(e) Time limit for notice to approach law court by contractor when decision is not given by Director, IISc as at (b).

If the Director fails to give notice of his decision within a period of ninety days from the receipt of the contractor's request in writing for settlement of any dispute or difference as aforesaid, the Contractor may within ninety days after the expiry of the first named period of ninety days approach the Law Courts at Bangalore giving due notice to the Director.

(f) Contractor to execute and complete work pending settlement of dispute.

Whether the claim is referred to the Director or to the Law Courts, as the case may be, the contractor shall proceed to execute and complete the works with all due diligence pending settlement of the said dispute or differences.

(g) Obligations of the Project Engineer cum Estate officer and contractor shall remain unsettled during considerations of dispute.

The reference of any dispute or difference to the Director or the Law Court may proceed notwithstanding that the works shall then be or be alleged to be complete, provided always that the obligations of the Project Engineer cum Estate officer and the contractor shall not be altered by reason of the said dispute or difference being referred to the Director or the Law Court during the progress of the works.

Clause 24. CONTRACTOR TO PAY COMPENSATION UNDER WORKMEN'S COMPENSATION ACT.

(a) The contractor shall be responsible for and shall pay any compensation to his own workmen payable under the relevant Workmen's Compensation Act for injuries caused to the workmen. If Institute pays such compensation on behalf of the contractor it shall be recoverable by Institute from the contractor under as per relevant clauses.

(b) Contractor to pay expenses of providing medical aid to workmen.

The contractor shall be responsible for and shall pay the expenses of providing medical aid to any workman who may suffer a bodily injury as a result of an accident. If Institute incurs such expenses, the same shall be recoverable from the contractor forthwith and be deducted without prejudice to any other remedy of Institute, from any amount due or that may become due to the contractor.

Clause 25. CONTRACTOR TO PROVIDE PERSONAL SAFETY EQUIPMENT FIRST AID APPARATUS, TREATMENT etc.

The contractor shall provide all necessary personal safety equipment and first aid apparatus for the use of the persons employed on the site and shall maintain the same

in good condition suitable for immediate use, at any time and shall comply with the following regulations in connection therewith: -

- The worker will be required to use the equipment so provided by the contractor and the contractor shall take adequate steps to ensure proper use of the equipment by those concerned.
- When work is carried on in proximity to any place where there is a risk of drowning; all necessary steps shall be taken for the prompt rescue of any person in danger.
- Adequate provision shall be made for prompt first - aid treatment of all injuries likely to be sustained during he course of the work.

Clause 26. <u>Minimum Age of Person Employed by Contractor</u>

(a): No contractor shall employ

- Any person who is under age of 18 years.
- Who does not produce a valid certificate of vaccination against epidemic deceases in respect of himself/ herself as well as all the members of his/her family.

(b) The contractor shall provide potable water facilities to the workers. Similar amenities shall be provided to the workers engaged on large works in urban area.

(c) Removal of persons not satisfying conditions (a) (i) & (ii)

The Project Engineer cum Estate officer or other authority is authorized to direct the removal or to remove through - his own agency, from the work any person referred to in sub-clauses (a) above not satisfying these conditions and no responsibility shall be accepted by the Institute for any delay caused in the completion of the work by such directions for removal.

(d) Payment of fair and reasonable wages by contractor.

The contractor shall pay fair and reasonable wages, which shall not be less than the minimum wages fixed by Govt. of India from time to time to the workmen employed by him in the contract undertaken by him. In the event of any dispute arising between the contractor, and his workmen on the ground that the wages paid are not fair and reasonable the dispute shall be referred without delay to the Project Engineer cum Estate officer or other competent authority, who shall decide the same. The decision shall not in any way affect the conditions in the contract regarding the payment to be made by Institute at the agreed tender rates.

Clause 27. <u>CONTRACTOR NOT ENTITLED TO ANY CLAIM OR COMPENSATION FOR DELAY IN EXECUTION OF WORK IN BORROW PITS</u>.

The contractor shall not be entitled to claim compensation if there is any delay in the execution of the work on account of water standing in borrow pits and Compartments. The rates are inclusive for hard or cracked soil, excavation in mud, sub-soil water or water standing in borrow pits and no claim for extra rate shall be entertained, unless otherwise specified.

Clause 28. <u>METHOD OF PAYMENT OF BILLS</u>

Payment to contractors shall be made by RTGS by the Institute.

Clause 29. SET OFF AGAINST ANY CLAIM OF INSTITUTE

Any sum of money due and payable to the contractor (including the security deposit refundable to him) under this contract may be appropriated by the Institute and set off against any claim of Institute in respect of a payment of a sum of money arising out of or under any other contract made by the contract with the Institute.

Clause 30. RATES INCLUSIVE OF SALES TAX AND LABOUR CESS AND ROYALTY

(a) The rates to be quoted by the contractor shall be inclusive of all taxes like GST , Labour cess, Royalty etc., No extra payment on this account will be made to the contractor.

(b) When there is a change in existing taxes from time to time i.e. upward or downward is admissible accordingly

(c) All quarry fees, octroi dues levied by the state or any local body or authority and ground rent, if any, charged by the Project Engineer cum Estate officer for stacking materials should be paid by the contractor.

Clause 31. IMPORTANCE OF SAFETY

In addition to Contractor's Contractual Obligations on Safety as per the relevant clauses stated, The Contractor shall comply with all safety standards to the satisfaction of the Employer's Representative.

In respect of all labour, directly or indirectly employed on the project for the performance and execution of the Contractor's Work under the Contract, the Contractor shall at its own expense arrange for all the safety provisions as listed in (i) Safety codes of C.P.W.D. and Bureau of Indian Standards, (ii) The Electricity Act, (iii) The Mines Act, and Regulations, Rules and Orders made there under and such other acts as applicable. Precautions as stated in the safety clause are the minimum necessary and shall not preclude the Contractor taking additional safety precautions as may be warranted for the particular type of work or situations. Also mere observance of these precautions shall not absolve the Contractor of his liability in case of loss or damage to property or injury to any person including but not limited to the Contractor's labour, the Employer's, Architect's, Employer's Representative's and Project Manager's representatives or any member of the public or resulting in the death of any of these.

The Contractor shall institute and implement to the satisfaction of the Project Manager a construction safety programme, including:

1 Preparing a Site-specific written safety programme consistent with the EHS Plan, Indian law and best practices. As a minimum, the programme shall require applicable safety equipment for all workers, use of barriers and barricades around potentially dangerous areas, protection of workers working under elevated conditions, accident reporting, first aid provisions etc.

2 Weekly safety reviews and 'risk assessments' shall be carried out in conjunction with the Project Manager and the Employer in order to identify potential safety hazards and to mitigate against them.

3 Attending weekly or as scheduled safety meetings at site conducted by the site safety representative of project manager

4 The Contractor will be required to provide all personnel entering the Site an Identity and safety rules card and verbal explanation of the safety programme.

5 Requiring all Sub-Contractors and other workers under the responsibility of the Contractor (including the Vendors or later phases of the construction of the Project) to adhere to the written safety programme as per approved format.

Experienced safety officers with adequate number of supporting personnel shall be appointed by the Contractor for full time on the site during the Contract period.

NON-COMPLIANCE OF REGULATIONS

If the Project Manager or the Employer's Representative notifies the Contractor of non-compliance with the foregoing regulations, the Contractor shall immediately, if so directed, or in any event not more than eighteen (18) hours after receipt of such notice, make all reasonable efforts to correct such non-compliance. If the Contractor fails to do so, the Employer may suspend all or any part of the Work. When the Contractor has undertaken satisfactory corrective action, Employer shall lift the suspension of the Work. The Contractor shall not claim any extension of time to complete the Work or additional fees due to any such work suspension.

The Client reserves the right to levy penalty if the safety norms such as not wearing helmets, safety gloves/belts/shoes/jackets. etc., even after a written notice by the enforcing authority, a penalty of Rs. 10,000/- per day per event or till the safety norms are adhered to in addition to stopping of work till the safety norms are adhered

Clause 32 Refund of Security Deposit (EMD & SD):

The Security Deposit lodged/paid by a Contractor shall be refunded to him after the final bill is paid or after the successful completion of defect liability period, during which period the work should be maintained by the Contractor in good order, whichever is later.

Clause 33 BAR CHART / CPM CHART:

BAR chart /CPM chart shall be produced during agreement by the contractor. According to the bar chart work is to be executed otherwise penalty will be levied for the delay of work

THE ARTICLES OF AGREEMENT

This Agreement is made at Bangalore, on this **XXth day of MONTH** in the year **TWO THOUSAND AND TWENTY FOUR (XX.XX.2024**).

BY AND BETWEEN

INDIAN INSTITUTE OF SCIENCE herein referred as IISc, a Trust registered under the Charitable Endowments Act, 1890, a deemed University and an autonomous Institution funded by the Ministry of Education, Government of India having its office at **Sir C.V Raman Road, Malleswaram, BANGALORE 560 012**, represented by the **Registrar IISc**, Bangalore (hereinafter referred to as the IISc which expression shall unless repugnant to the context or meaning thereof, mean and include its successors in interest, trustees and permitted assigns) of the ONE PART

AND

M/s xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx Bangalore – 5600xx, hereinafter referred to as the "CONTRACTOR", (which expression shall unless repugnant to the context or meaning thereof, mean and include their partners, their respective heirs, executors, administrators and assigns) on the OTHER PART.

RECITALS

WHEREAS the IISc is desirous of getting the work **of "Construction of Modern Indoor Sports Complex at Gymkhana IISc, Bangalore"** "(hereinafter called the work) executed by the Contractor at the rates quoted by him amounting to **Rs.xxxxxxxx (Rupees xxxxxxxxxxxxxxxxxxxxxx only**) Inclusive of all Taxes which is **xxx% Above/Below** the estimated amount put to tender.

B. WHEREAS the Contractor has agreed to execute the aforesaid work on terms and conditions mentioned herein and subject to Tender Conditions of Contract and in accordance with the particular specifications, general notes and the schedule of quantities, schedule of rates, payment, and penalty condition, to the satisfaction of the IISc, Bangalore

NOW THIS AGREEMENT WITNESSETH AND THE PARTIES HERETO AGREE AND SOLEMNLY AFFIRM AS FOLLOWS:

1. In consideration of the payment to be made to them as hereinafter provided, the contractor shall, subject to the terms, conditions, specifications, schedule of quantities, drawings, etc., more particularly stated in the Schedules aforesaid, execute and complete the work within **18 Months** for the work after 10 days of issuance of work order or from the date of handing over of site, whichever is later.

2. IISc shall pay to the contractor such sums as shall become payable hereunder at the time and in the manner specified in the conditions contained in the schedule aforesaid.

3. The time allowed for carrying out the work as entered in the tender Agreement shall be strictly observed by the contractor and shall be deemed to be the essence of the contract on the part of the contractor and shall be reckoned from 10 days after the date on which the work order to commence the work is issued to the Contractor or the date of handing over of site, whichever is later. The work shall throughout the stipulated period of the contract be proceeded with all due diligence and the Contractor shall pay compensation an amount equal to one percent, or such smaller amount, as the Director, Indian Institute of Science (whose decision shall be final) may decide on the amount of estimated cost of the whole work as shown in the tender for every day that the work remains un-commenced or unfinished, after scheduled dates.

4. The contractor shall ensure good progress during the execution of the work be bound in all cases in which the time allowed for any work exceeds one month (save for special jobs) to complete Mile stone-1 i.e.15% of the whole work before the time allowed under the contract has elapsed, Mile stone-2 35% of the work before the time has elapsed, Mile stone-3 60% of the work before the time has elapsed, Mile stone-4 80% of the work before of the time has elapsed,100% of the work before completion of such time has elapsed.

However, for special jobs if a time schedule has been submitted by the contractor and the same has been accepted by the Project Engineer-cum-Estate Officer, CCMD the contractor shall comply with the said schedule. In the event of the Contractor failing to comply with the conditions he shall be liable to pay as compensation an amount equal to one percent or such smallest amount, as the Director, Indian Institute of Science (Whose decision in shall be final), may decide on the said estimated cost of the whole work for every day that the due quantity of work remains incomplete; provided always that the entire amount of compensation to be paid

under the provisions of this clause shall not exceed ten (10%) percent of the estimated value of the contract as shown in the tender, provided further that in the event of contractor making up the short fall in progress within the stipulated or extended time of completion, the penalty so recovered may be refunded on an application in writing by the Contractor.

5. The Engineer in charge shall review the progress of all works with the contractor once every week. Such a review shall take into account the programme fixed for the previous week, obligations on the part of the Institute for issue of drawings etc., and also the obligations on the part of the Contractor. The review shall also examine the accumulated delays by the contractor if any and mitigation measures proposed by the contractor to overcome the delay. In case the progress achieved falls short by more than 25 percent of the cumulative programme, the reasons for such shortfall shall be examined and a record made thereof apportioning the responsibilities for the delay between the IISc and the contractor. This record should be signed in full and dated both by the Project Engineer and the Contractor.

6. The Director, Indian Institute of Science, without prejudice to its rights under the contract in any respect of any delay or inferior workmanship or otherwise, or to any claim for damages in respect of any breaches of the Contract and without prejudice to any rights of remedies under any of the provisions of this contract or otherwise and whether the date of completion has or has not elapsed, by notice in writing absolutely determine the contract in any of the following cases: -

(i) If the contractor having been given by the Project Engineer-cum-Estate Officer, CCMD a notice in writing to rectify reconstruct or replace any defective work or that the work is being performed in any inefficient or otherwise improper or unworkmanlike manner, shall omit to comply with the requirements of such notice for a period of seven days of such notice thereafter or if the contractor shall delay or suspend the execution of the work so that in the judgment of the Project Engineer-cum-Estate Officer, CCMD (which shall be final and binding) either they will be unable to secure completion of the work by the date for completion of the work or they had already failed to complete the work by that date.

(ii) If the Contractor being a company passes a resolution or if the Court passes an order to wind up the company or if a receiver or a manager is appointed on behalf of the creditors of the company or under circumstances which entitles the Court or the creditors to appoint a receiver or manager which would entitle the Court to make a winding-up order.

(iii) If the Contractor commits breach of any of the terms or conditions of this contract.

(iv) If the contractor assigns or sublets without written approval of the Project Engineer-cum-Estate Officer, CCMD becomes insolvent.

The Director of the Institute shall have following powers:

a) To determine or rescind the Contract as aforesaid (in which termination or recession notice in writing to the Contractor underhand of the Project Engineer-cum-Estate Officer, CCMD shall be conclusive evidence). Upon such determination or recession the security deposit of the Contractor shall be liable to be forfeited and shall absolutely be at the disposal of Institute.

(2) To employ labor paid by the Institute and supply materials to carry out the work or any part by debiting the Contractor with the cost of the labor and the price of the materials (of the amount of which cost and price certified by the Project Engineer-cum-Estate

Officer, CCMD shall be final and conclusive against the Contractor) and crediting him with the value of the work done in all respect on the same manner and at the same rates as if it has been carried out by the contractor under the term of his contract. The certificate of the Project Engineer-cum-Estate Officer, CCMD as to the value of the work done shall be final and conclusive against the contractor, provided always that action under the sub-section shall only be taken after giving notice in writing to the contractor. Provided also that if the expenses incurred by the Institute are less than the amount payable to the contractor at his agreement rates, the difference shall not be paid to the Contractor.

(3) After giving notice to the contractor to measure up the work of the contractor and to take such part thereof as shall be un-executed out of their hands and to give it to another contractor to complete in which case any expenses which may be incurred in excess a sum of which would have been paid to the original contractor if the whole work had been executed by him (of the amount of which excess the certificate in writing of the Project Engineer-cum-Estate Officer, CCMD shall be final and conclusive) shall be borne and paid by the original contractor and may be deducted from any monies due to him from the Institute under this contract or any other account whatsoever, of from his security deposit or the proceeds of sales thereof, or a sufficient part thereof as the case may be.

In the event of any one or more of the above courses being adopted by the Project Engineer-cum-Estate Officer, CCMD, the contractor shall have no claim to compensation for any loss sustained by them by reason of having purchased or procured any materials or entered into any engagements or made any advances on account or with a view to the execution of the work or the performance of the contract. And in case of action is taken under any of the provisions, aforesaid, the contractor shall not be entitled to recover or be paid any sum for work thereto/for actually performed under this contract unless the Project Engineer-cum-Estate Officer, CCMD has certified in writing the performance of such work and the value payable in respect thereof and they shall only be entitled to be paid the value so certified.

7. The schedules above mentioned include the General Rules and Directions to Contractors and the following documents, viz.,
   i) Letter of Intent
   ii) Letter of Acceptance
   iii) Work Order
   iv) Conditions of Contract
   v) Contractor's Bid – Bill of Quantities
   vi) Technical Specifications
   vii) Drawings
   viii) The pre-Bid meeting proceedings and corrigendum
   ix) Any other document listed in the Contract Data as forming part of the contract shall form an integral part of the agreement and the decision of the Project Engineer-cum-Estate Officer, CCMD in reference to all matters of a dispute as to material and workmanship shall be final and binding on both the parties.

8. The IISc reserves the right of altering the drawings of the works and of adding to or omitting any item of work from or of having portions of the same carried out departmentally or otherwise and such alterations or variations shall not violate this agreement.
9. This agreement comprises the work aforesaid, and all subsidiary works connected therewith even though such works may not be shown on the schedule appended hereto.

10. In the event the contractor or their employees, agents, sub-contractors deface or destroy the property or the establishment belonging to IISc, the same shall be made good by the contractor at their own expenses.
11. The Contractor shall ensure cleanliness at the premises of IISc ensure cleaning of site and removal of debris every week. In any event the contractor ceases to comply the foregoing the IISc shall ensure the site cleaned at the expense of the contractor.
12. The Contractor shall at all time be responsible for the safety of their employees, agents, sub-contractors, and in any event during the commission of work or in their due course of work the IISc shall not be held responsible. The contractor shall defend, indemnify and hold the Institute harmless from any liability or damage, law suits, penalties imposed by any State or Central Government or statutory body or by a third party for reasons of violation of any of statutory provisions or requirements by the contractor.
13. The Contractor shall adhere to the working conditions and its scope strictly and any act not in confirmation with the scope of work which is mutually accepted by both the parties shall only be done after prior approval and acceptance in writing by the Director.
14. The Contractor shall at any time be responsible for the completion of work in time, also the contractor shall be responsible to submit the final bill within one month after completion of the work.
15. Notwithstanding anything contained in the tender submitted by the contractor, all the clauses of this agreement shall be binding on both parties.
16. Where counter-terms and conditions, printed or copied, are offered by the contractor, the same shall not be deemed to have been accepted by the IISc, unless specific written acceptance thereof is furnished by the IISc. Notwithstanding the foregoing, no verbal agreement or inference from a conversation with any office members/representatives/employees of the IISc before, during, or after the execution of the agreement, shall in any way affect or modify any of the terms/obligations contained herein.
17. In the event the contract is terminated by the IISc due to any aforementioned act/omission on the part of the contractor, or for any reason whatsoever, the IISc shall be entitled to engage the services of any other person, agency or Contractor to meet its requirement, without prejudice to its rights including claim for damages against the Contractor.

18. This agreement can be terminated by IISc with the prior written notice of Seven (7) days in the event of a breach of any of its terms of this agreement and even otherwise this Agreement may be terminated by IISc by giving a minimum of 7 days prior written notice to the Contractor.

19. The IISc shall be indemnified for all losses due to commissions and omissions of persons deployed by the contractor. If any loss or damage is caused to the IISc on account of any negligence, carelessness, acts of omissions. commissions of contractors, its employees or staff, the same shall be made good by the contractor. The contractor shall defend, indemnify and hold the Institute harmless from any liability or damage, law suits, penalties imposed by any State or Central Government or statutory body or by a third party for reasons of violation of any of statutory provisions or requirements by the contractor. The IISc shall not be liable for any damage or compensation payable to any workmen or to any person as a consequence of this work and the IISc shall be completely indemnified accordingly.

20. The contractor shall pay wages directly to its personnel The contractor shall also ensure that no amount by way of commission or otherwise is deducted from the wages of the workmen. The contract labourers deployed by the agency shall not involve in any theft/pilferage/damage to Institute property. After necessary investigations, if proved that the contractor or their personnel are responsible for the incident, the contractor is liable

and will be penalized to the extent of the value of the loss and additionally Rs. 50,000/- for each such incident.

21. All terms and conditions, the scope of work, and other conditions as mentioned in the tender document will be diligently complied by the contractor. The terms and conditions, the scope of work, and other conditions mentioned in the tender documents shall form a part and parcel of this agreement.

22. The Contractor hereby agrees and affirms that during or subsequent to the performance of the duties under this Agreement, the Contractor shall maintain confidentiality and shall not divulge, communicate, use or appropriate any of the IISc Information, except to the extent necessary for the Contractor to fulfill his obligations or duties to the IISc under this Agreement. The Contractor shall not cause transmission, removal or transfer of tangible embodiments of, or files from the IISc place of business, without the prior written consent of the IISc and shall not disclose any information of the IISc to any third part

23. In case of disputes including all questions relating to the performance of the obligations under this agreement and all the dispute and differences which shall arise either during or after the agreement period or other matters arising out of or relating to this agreement or payments to be made in pursuance thereof shall be decided by the Director of IISc whose decision shall be binding on the contractor. The Contractor hereby agrees to be bound by the decision of the Director, IISc.

24. **COURTS:**

Courts of appropriate jurisdiction situated in Bangalore City shall have exclusive jurisdiction. Any dispute or difference arising between the parties to the agreement in relation to any of the matters specified herein, shall be settled in the Courts of appropriate jurisdiction situated in Bangalore City which shall have exclusive jurisdiction in regard to any matter arising under or in relation to this agreement. Laws of India and the State of Karnataka, shall be applicable in this regard

25. **GOVERNING LAW**

This Contract shall be governed by the Law of India for the time being in force

IN WITNESS WHEREOF the parties hereto have set their respective hands the day and the year here in above written.

In the presence of: Signed by for and on behalf of the said Contractor.
Witness 1:

(Company Name)

In the presence of:
Witness 2:

Signed by for and on behalf of the IISc.

REGISTRAR
INDIAN INSTITUTE OF SCIENCE
BANGALORE-12

MEMORANDUM OF WORK

INDIAN INSTITUTE OF SCIENCE, BANGALORE-12
ITEM RATE TENDER FOR WORK

1.	General Description	Construction of Modern Indoor Sports Complex at Gymkhana IISc, Bangalore"
2.	Estimated Cost	**Rs.117,46,07,470.45.00 (Incl.GST)**
3.	Earnest Money	Rs.1,17,46,074.00
4	Date of Commencement of work	Within ten days from the date of issue of work order or the date of handing over the site whichever is later
5	Frequency of interim Certificate and payment	Once every month.
6.	Further Security Deposit	6.5% on the running account bills and final bill in addition to Earnest Money Deposit. When the S.D. deducted from the RA bills of the Contractor @ 6.5% of the bill amount exceeds Rs.1.00 lakhs, the amount in excess of Rs.1.00 lakh may, at the request of the Contractor, be released to him against the production of a bank guarantee issued by a Nationalized Bank only for an equal amount in the prescribed form. The bank guarantee should be valid till the completion of the period mentioned in page 2 of Sl.No.1.
5.	Time allowed for the completion of work in all respects from the date of commencement of work	**18 Months**
6	Bills Of Quantities.	As per enclosure.
7	Defects liability period /release of security deposit.	The security deposit lodged/paid by a contractor shall be refunded to him after the final bill is paid or after Twenty Four **24 months** from the date of completion of the work, during which period the work so executed should be maintained by the contractor in good order, whichever is later.
8	Period for payment of Running Bill.	Four weeks from the date of submission of each Running account bill by the Contractor.
9	Period for submitting the final Bill.	One month from the date of virtual completion of the work by the Contractor.

10	Specifications.	The work shall be carried out strictly in accordance with the enclosed specifications and wherever items are not covered by those specifications in accordance with specifications/drawings /designs/requirements and directions of the Project Engineer-cum-Estate Officer, CCMD

I/We, hereby tender for the execution for the Indian Institute of Science, Bangalore-12 of the works specified in the under mentioned memorandum within the time specified in such memorandum at the rates specified therein and in accordance, in all respects, with the specifications, designs, drawings and instructions in writing which have been read by me/read and explained to me and with such materials as provided for by and in all other respects in accordance with such conditions as for as possible.

I/We hereby agree to abide by and fulfill all the terms and provisions of the conditions contained in the articles of agreement, which have been read by me/us or in default thereof to forfeit and pay to the Registrar, Indian Institute of Science or his successors he sums of monies mentioned in the said conditions

The sum of **Rs.1,17,46,074.00 (Rupees One Crore Seventeen Lakhs Forty Six Thousand and Seventy Four Only)** has been deposited in cash/bank draft as Earnest Money the full value which is to be absolutely forfeited to the Registrar or his successors in Office should I/We fail to commence the work specified in the above memorandum and complete the same.

Dated this XX **day of XX 2024**.

Signature of the Contractor

Witness to Contractor/s Signature:
NAME
ADDRESS
OOCCUPATION

The above tender is hereby accepted by me on behalf of the Indian Institute of Science, Bangalore-12.

REGISTRAR
INDIAN INSTITUTE OF SICENCE
BANGALORE.

Indian Institute of Science, Bangalore-12
A P P E N D I X

1.Name of the work	Construction of Modern Indoor Sports Complex at Gymkhana IISc Bangalore
2.Date of commencement of work	Within Ten days from the date of issue of work order or the date of handing over the site whichever is later
3.Time of Completion	**18 Months**
4.Frequency of interim Certificate and payment	Once in every month.
5.Further Security deposit	6.5% on the running bills and final bill in addition to earnest money deposit. When the S.D. deducted from the R.A. Bills of the contractor @ **6.5%** of the bill amount exceeds Rs.1.00 Lakhs, the amount in excess of Rs.1.00 Lakh may, at the request of the contractor, be released to him against the production of bank guarantee issued from a Nationalised /Scheduled Bank only for an equal amount in the prescribed form. The bank guarantee should be valid till the completion of the defect liability period.
6. Defects liability period / retention amount from the final bill/release of balance of deposit.	The security deposit lodged/paid by a contractor shall be refunded to him after the final bill is paid or after Twenty Four 24 months from the date of completion of the work, during which period the work so executed should be maintained by the contractor in good order, whichever is later.
7. Penalty for delay	In respect of the shortfall in progress, assessed as due to the delay on the part of contractor as per clause 2(b) and 2(c), the contractor shall be liable to pay as penalty an amount equal to one percent of the estimated cost of the balance work assessed according to the programme, for every day that the due quantity of work remains incomplete, provided always that the total amount of penalty to be paid under the provisions of this clause shall not exceed 7 ½ percent of the estimated cost of the entire work as shown in the tender, provided further that in the event of the contractor making up the shortfall in progress within the stipulated or extended time of completion, the penalty so recovered may be refunded on an application in writing by the contractor.
8. Period for payment of Running Bill	Three weeks from the date of submission of each Running account bills by the Contractor.
9. Period for submitting the final Bill	One month from the date of virtual completion of the work by the Contractor.

REFERENCES

I.S. STANDARDS OF ELECTRICAL WORKS

The installation in entirety shall comply with latest codes/standards published by National Building Code of India, CPWD/KPWD, National Electric Code (NEC), IEEE, Bureau of Indian Standards (BIS) as well as local regulations from departments like Pollution Control Board, Electrical inspectorate, Fire Authorities, Airport Authority of India (AAI), High rise committee, Indian Electricity rules etc. Some of the standards are mentioned here below for reference:

Sl.No	STANDARDS	TITLE
	Code of Practice / Guide	
1	IS : 732 – 1989	Code of Practice for Electrical wiring installations.
2	IS : 4648 – 1968	Guide for Electrical layout in residential buildings
3	IS : 80614 – 1976	Code of Practice for Design, installation and maintenance of service lines up to and including 650V.
4	IS : 7752 (Part-1) - 1976	Code of Practice for interior illumination : General requirements and recommendations for welding interiors.
5	IS : 4347 – 1967	Code of Practice for hospital lighting
6	IS : 6665 – 1972	Code of Practice for industrial lighting
7	IS : 2672 – 1966	Code of Practice for Library lighting
8	IS : 10118 (Part-1) - 1982	Code of Practice for selection, installation and maintenance of switcher and Control gear : Installation.
9	IS : 4146 – 1983	Application guide for voltage transformers.
10	IS : 3043 – 1987	Code of practice for earthing.
11	IS : 5216 (Part-2) - 1982	Guide for safety procedures and practices in electrical work : General.
12	IS : 4237 – 1982	General requirements for switchgear and control gear for voltages not exceeding 1000 V AC or 1200 V DC.
13	IS : 6875 - (Part-1) - 1973	Control switches (Switching devices for control and auxiliary circuits including 1000 V AC and 1200 V DC : General requirements and tests.
14	IS : 10027 – 2000	Composite units of Air-Break switches and rewireable type fuses for voltages not exceeding 650 V AC.
15	IS : 4064 (Part-1) - 1978	Composite units of Air-Break disconnector, Air-Break switch disconnector and fuse- combination units for voltages not exceeding 1000 V AC or 120 V DC : General requirements.
16	IS : 8828 – 1996	Electrical accessories - circuit breakers for over current protection for household and similar installation.

17	IS : 2516 (Part-1/Sec01)-1985	Circuit-Breaks : Requirements and tests : Voltages not exceeding 100 V AC or 1200 V DC.
18	IS : 5039 – 1983	Distribution pillars for Voltages not exceeding 1000 V AC or 1200 V DC.
19	IS : 8544 (Part-4) - 1979	Motor starters for voltages not exceeding 1000 V : Reduced voltage AC starters, two- step auto transformer starters.
20	IS : 9537 (Part-1) - 1980	Conduits for electrical installations General requirements
21	IS : 9537 (Part-4) - 1983	Conduits for electrical installations : Pliable self recovering conduits of insulating materials.
22	IS : 3854 – 1997	Switches for domestic and similar purposes.
23	IS : 1293 – 1988	Plugs and sockets outlets of rated voltage up to and including 250 Volts and current up to and including 16 Amperes.
24	IS : 2418 (Part-1) - 1977	Tubular Fluorescent lamps for general lighting services : Requirements and tests.
25	IS : 9900 (Part-1) - 1981	High pressure mercury vapor lamps : Requirements and tests.
26	IS : 1913 (Part-1) - 1978	General and safety requirements for luminaries : Tubular fluorescent lamps.
27	IS : 10322 (Part-1) - 1982	Luminaries : General requirements
28	IS : 302 (Part-1) - 1979	General and safety requirements for household and similar electrical appliances.
29	IS : 6236 – 1971	Direct recording electrical measuring instruments.
30	IS : 2705 (Part-1) - 1992	Current transformers : General requirements.
31	IS : 2448 (Part-1) - 1963	Adhesive insulating tapes for electrical purposes : Tapes with cotton textile substrates.
32	IS: 8130-1984	Code for Conductor Construction
33	IS: 5831-1984	Code for Insulation & sheath material
34	IS:694-1990	PVC insulated Flexible Single Core Wire/ Unarmoured Multicore/ Flat Cables. For working voltage upto & including 1100V.

35	IS:1554(Part-1)-1988	Copper or Aluminium Conductor, PVC insulated, extruded inner sheathed PVC, galvanised steel wire/strip armoured, extruded PVC sheathed LT Control/Power Cable. For working voltage up to & including 1.1KV.
36	IS:3975-1990	Code for Number of Strips in armouring construction.
37	IS: 7098/II/85	XLPE insulated HT & AB Cables. For working voltage 6.35/11KV.
38	IS:14255-1995	Code for Aerial Bunched Cables. For working voltage up to 1.1KV.
39	IS:13573/VDE 0278/IEC 60502/HD 629.1.S2 CENELEC	Code of Type tests for HT termination jointing kit.
40	IS 7569:1987	Cast Acrylic Sheets for use in Luminaires
41	IS 8030:1976	Specifications for Luminaires for Hospitals
42	IS 10242: Part 3: Sec 6: 1986	Electrical installations in ships: Part 3 Equipment, Section 6 Luminaires & accessories
43	IS 10322: Part 2 1982	Specification for Luminaires - Part 2: Constructional Requirements
44	IS 10322: Part 3 1984	Specification for Luminaires - Part 3: Screw & Screw Less Terminals
45	IS 10322: Part 4 1984	Specification for Luminaires - Part 4: Method of Tests
46	IS 10322: Part 5: Sec 1: 2012	Luminaires: Part 5 Particulars requirements, Sec 1 General Purpose Luminaires
47	IS 10322: Part 5: Sec2: 2012	Specifications for Luminaires - Part 5 : Particular Requirements - Section 2: Recessed Luminaires
48	IS 10322: Part 5: Sec4: 1987	Luminaires: Part 5 Particulars requirements, Section 4 Portable general-purpose luminaires
49	IS 13383: Part 1 : 1992	Photometry of Luminaires - Method of Measurement - Part 1: Luminaires for use in interior Lighting
50	IS 13383: Part 2 : 1992	Methods of Photometry of luminaires: Part 2 Luminaires for road & street lighting
51	IS 13383: Part 3 : 1992	Photometry of Luminaires - Method of Measurement - Part 3: Luminaires for Floodlighting

52	BSEN 10025 Grade 5, 355JO (or) ASTM A 572-50	Steel sheet thickness
53	IS 875 Part 3	Wind Velocity
54	IS 2062 (or) ASTM A 572-50	Base Plate
55	BSEN ISO 1461 (or) ASTM A123 (or) IS 2629	Galvanized in single hot dip / With Average 70 Microns
56	BS 5135	Welded Single L-Seam Joint
57	AISI 304 Grade	Stainless Steel Wire Rope (Factor of Safety: TR No. 7)
58	IS 1239	Maximum Load Carrying Capacity (Lantern)
59	IS 9595 (or) IS 10178 AWS	Single Section & Single Joint welded
60	ASTM - A 123 and 153	Hot dip Galvanized in Single dipping with not less than 65 Microns

EARTH WORK - IS CODES		
1	IS-1200 (Part 1)	Method of measurement of building and Civil Engineering Works.
2	IS 1200 (Part 1)	Method of measurement of earth work
3	IS 1200 (Part-27)	Method of measurement of earth work (by Mechanical Appliances)
4	IS 4988 (Part IV)	Excavators
5	IS 12138	Earth moving Equipment's
6	IS 3764	Safety code for excavation work
7	IS 4082	Recommendations of stacking and storage of construction materials at site

CONCRETE WORK - IS CODES		
1	IS 383	Specification for coarse and fine aggregate from natural sources for Concrete.
2	IS 456	Plain and reinforced concrete - Code of practice
3	IS 516	Method of test for strength of concrete
4	IS 1199	Method of sampling and analysis of concrete
5	IS 1200 (Part II)	Method of measurement of building and civil engineering work (concrete work)
6	IS 2386	Method of test for aggregates for concrete Part I to Part V
7	IS 4656	Specification for form vibrators for concrete.
8	IS 456	Code of Practices for plain and Reinforced concrete.
9	IS 516	Method of test for strength of concrete.
10	IS 1200 (Part II)	Method of measurement of building and civil engineering work – concrete work
11	IS 1791	Specification for batch type concrete mixes
12	IS 4925	Batch plants specification for concrete batching and mixing plant
13	IS 4926	Ready – Mixed Concrete
14	IS 10262	Recommended guidelines for concrete mix design
15	IS 13311 (Part I)	Indian standard for non-destructive testing of concrete. Method of test for ultrasonic pulse velocity
16	IS 13311	Indian standard for non-destructive testing of concrete. Method of testing by rebound hammer.
17	IS1343:2012	Pre-Stressed Concrete Code of practice
STRUCTURAL STEEL WORK - IS CODES		
1	IS 226	Structural steel (Standard quality)
2	IS 800	Code of Practice for use of structural steel in general building construction.
3	IS 801	Code of practice for use of cold formed light gauge steel structural member's in general building construction.
4	IS 806	Code of Practice for use of steel tubes in general building construction.
5	IS 808	Dimension for hot rolled steel sections.
6	IS 813	Scheme of symbols for welding.
7	IS 814	Covered electrodes for metal arc welding of (Part I & II) structural steel.
8	IS 816	Code of practice for use of metal arc welding and general construction in mild steel.
9	IS 822	Code of Practice for inspection of welds.
10	IS 961	Structural steel (high tensile)
11	IS 1120	Coach Screws.
12	IS 1149	Specification for light tensile steel rivet, bars for structural purposes.
13	IS 1161	Steel tubes for structural purposes.
14	IS 1182	Recommended practice for Radiograph examination of fusion welded butt joints in steel plates.
15	IS 1200	Method of measurement in Building Civil Engineering work.

16	IS 1239	Mild steel tubes, tubulars and other wrought steel fittings
17	Part I	Mild Steel
18	Part II	Mild steel tubulars and other wrought sheet pipe fittings.
19	IS 1363	Black hexagonal bolts, nut and black hexagon screws product of Grade C (size range M25 to M64) (Part 1 to 3).
20	IS 1365	Slotted counter sunk screws.
21	IS 1367	Technical supply conditions for threaded fasteners.
22	IS 1977	Structural steel (ordinary quality)
23	IS 2016	Plain washer.
24	IS 2062	Structural steel (fusion welding quality)
25	IS 2595	Code of practice for Radiographic testing.
26	IS 4000	High strength bolts in steel structures Code of practice.
27	IS 4923	Hollow steel sections for structural use.
28	IS 5624	Specification for foundation bolts.
29	IS 6227	Code of practice for use of metal arc welding in tubular structure.
30	IS 7215	Tolerances for fabrication of steel structures.
GI SHEET FIXING		
1	IS 277	Galvanised steel sheets (plain and corrugated)
2	IS 1367 (PT - 13)	Technical supply conditions for threaded steel fasteners pt.13 hot dip galvanized coating on threaded fasteners
3	IS 1200 (PT.IX)	Method of measurements of building and civil engineering works Part - 9 Roof covering (including cladding)
DEMOLISHING WORK		
1.	IS 1200 (Pt - XVIII)	Method of Measurements of Building and Civil Engineering Works (Part -XVIII) Demolition and Dismantling
2.	IS 4130	Demolition of Buildings-

ABBREVIATIONS:

The following abbreviations wherever they appear in the specifications, shall have the meaning or implication hereby assigned to them:

Mm	Millimetre
Cm	Centimetre
M	Metre
Km	Kilometre
Mm /sqmm 2	Square Millimetre
Cm /sqcm 2	Square centimetre
Dm /sqdm 2	Square decimetre
M /sqm 2	Square metre
Cm / cubic cm 3	Cubic centimetre
Dm / cubic dm 3	Cubic decimetre
M3/cum 3	Cubic metre
Ml	Millilitre
Kl	Kilolitre
Gm	Gram
Kg	Kilogram
Q	Quintal
T	Tonne
Fps system	Foot pound second system
°C	Degree Celsius temperature
Fig	Figure
Re/Rs	Rupee/ Rupees
No	Number
Dia	Diameter
AC	Asbestos cement
CI	Cast Iron
GC	Galvanised corrugated
GP	Galvanised plain
GI	Galvanised iron
PVC	Polyvinyl chloride
RCC	Reinforced cement concrete
SW	Stone ware
SWG	Standard wire Gauge

The work shall be carried out as per CPWD / KPWD Specification and relevant IS codes. In case of discrepancy between technical specification and BOQ, the BOQ prevails.

LIST OF APPROVED MAKES

S.No	ITEM	APPROVED MAKE
	ELECTRICAL WORK	
1	LT Switchboards other than TTA panel	Any CPRI Tested Panel Manufacturer With 7 Tank Process
2	Main LT panel as per IEC 61439 (TTA/ DESIGN VERIFIED PANELS)	L&T/Siemens/Schneider/ABB
3	Sandwich bus duct	Schenider / Siemens / C&S / Legrand
4	PLC & SCADA	Siemens / Schneider / Rock well Automation/Honeywell
5	Energy Billing software	Schneider / Legrand/Honeywell
6	ACB	ABB T- MAX / SIEMENS -3 WL / SCHNEIDER ELECTRIC MASTERPACT NW/ LEGRAND DMX3/L&T(U-Power)
7	MCCB	ABB (T-MAX) / SIEMENS (VL) / SCHNEIDER COMPACT NSX / LEGRAND (DX3) /L&T (D- Sine)
8	MPCB	ABB (T-MAX) / SIEMENS (VL) / SCHNEIDER COMPACT NSX / LEGRAND (DX3) /L&T (D- Sine)
9	Contactor (Type-2 coordinated)	Schneider / ABB / Siemens / Legrand / L&T
10	MCB/RCCB, RCBO, SPD/Distribution board	Schneider / ABB / Siemens / Legrand / Hager
11	Auto transfer switches with over ing neutral (7000, 300 & 230 Series)	SCHNEIDER / ABB/ Legrand / Hager
12	On-load changeover switches	Socomec / ABB / Siemens/HPL
13	Transient voltage surge suppressors	SCHNEIDER / ZOTUP/OBO/Legrand
14	Indicating meters - Digital	Conserv / Secure/L&T/AE/ EL-MEASURE
15	Indicating meters - Analog	Conserv / Secure/L&T/AE/ EL-MEASURE

16	Power Monitor with RS-485 Port	Schneider / Circutor / Secure
17	Digital Load Monitor with RS- 485 Port	Schneider / Circutor / Secure
18	KWH Meters - ETVM	L & T / Secure/Conserve/HPL
19	Dual KWH Meters with RS-485	Schneider / Circutor
20	Current transformer	BCH /C&S/AE/ Kappa
21	Potential transformer	BCH /C&S/AE/ Kappa
22	APFC relay/ Numeric Type Protection Relays	Epcos / Schneider / Neptune/Siemens/ L&T/ ABB GE
23	Capacitor Banks	Epcos / Schneider / Neptune
24	Series reactors (tuned filters), Capacitor duty contactors/ Thyristor Switching Module	Epcos / Schneider / Neptune
25	Push button stations/	Schneider / Siemens / L&T/ABB/Legrand
26	Selector switches	Salzer / Kaycee / BCH
27	LED Indicating lamp	Siemens / Schneider/ ESBEE/Vaishno
28	Terminals	Wago / Phenonix / Connect well/Elemex
29	LT/HT Cables	Poly Cab / KEI /Havells/Finolex
30	FRLS/FS/ZHFR PVC Insulated PVC sheathed multistrand copper conductor cables (Single & multi core)	Polycab / Finolex / KEI/ Havells /RR Kabel
31	Glands & Lugs	COMMET / GRIPWEL / DOWELL / RAYCHEM/ BRACO
32	HT Panels	Schneider/ Siemens/ ABB/C&S
33	Dry Type Cast Resin Distribution Transformer	KIRLOSKAR / VOLTAMP / HITACHI / RAYCHEM
34	11/0.415 kV Compact Substation (CSS)with Dry type Transformer	Schneider/Siemens/ABB
35	Bus bar	Hindalco
36	OLTC/RTCC	OLGR/ESAUN/CTR

37	Outdoor Enclosures	Hensel / Schneider /Neptune/ Mennekes
38	Lighting Inverters (Hybrid with Solar Type)	Emerson / Delta / Tmec / Microteck /As Per Oem/ Zenner
39	Modular Switch & Socket, Industrial Socket, Fan Regulator, Metal Boxes, RJ 11, Standalone RJ 45, TV Outlet, Etc	Northwest (Artisa)/ Anchor Panasonic (Vision)/ Crabtree (Murano)/ Legrand (Arteor) / Schneider (Zen Celo)
40	Occupancy Sensors	Lutron / Crestron / Leviton / Honeywell / Philips
41	Industrial Type Socket with Plug Top	Mennekes / Hensel / Schneider / Neptune
42	Cable Trays	Profab / Obo / Legrand /Indiana/Ricoh
43	Floor / Ceiling Wire Ways	Profab / Obo / Legrand /Indiana/Ricoh
44	PVC Conduits - Frls	VIP / Precision / Polycab/AKG/BEC
45	Conduits - Ms	Gb/BEC/AKG/Rm-CON
46	Lightning Arrester	Obo / Jeff / Cape/Erico/L&T
47	Plate and Pipe Electrodes	Class B – Tata /Jindal./SAIL
48	Pipe – Galvanized for Plate & Pipe Electrodes	Class B – Tata /Jindal./SAIL
49	Maintenance Free Electrode	Erico / Obo / Jeff / Cape
50	Network switches	CISCO/ JUNIPER / EXTREME / HPE (ARUBA)
51	Monitor	Bosch/Honeywell/Pelco/Siemens
52	Computer	HP/Dell/IBM
53	Earth Strips	Hot Dip Galvanised
54	Earth Bus with Insulators	Electrolytic Grade Copper / Aluminium / Hot Dip Galvanised
55	OFC Cable, LIU, Jack Panel, Patch Panel, Patch Cord, Face Plate, Cat – 6A Cable, Cat6A I/O, Cable Manager	SIEMON/ SCHNEIDER/ MOLEX/ LEGRAND/BELDEN/ COMMSCOPE
56	Cat – 6A Cable, Cat6A I/O, Cable Manager	SIEMON/ SCHNEIDER/ MOLEX/ LEGRAND/BELDEN/ COMMSCOPE

57	Ceiling/exhaust Fan	Cromtron/Almonard/ Havells / Polycab / Atomberg
58	Luminaries	Philips/Trilux/Havells/Crompton/ Lighting Technology/
59	Active Harmonic Filter	Schneider / Abb / Neptune / Epcos / Circutor
60	Explosion Proof Sockets	Baliga / Abb/ Legrand / Stall
61	Lighting poles	Bajaj /Philips/K-lite/Wipro/Twinkle
62	Aviation obstruction light	Bajaj/Binay/Actos
63	Lighting control	Lutron/Philips/ Crestron
64	DWC Pipe (Double wall corrugated pipe)	Ashirwad/Supreme/Astral/Duraline/Nocil
65	Diesel Genset/Engine	Caterpillar / Cummins India / Perkins / Mitsubishi/Kirloskar
66	Alternator	Leroy Somer / Stamford/Kirloskar
67	Synchronizing panel / AMF panel,Auxiliary Panel and Motor Control Centre	Any CPRI Tested Panel Manufacturer With 7 Tank Process
68	PLC & SCADA	Allen Bradley / Larsen & Toubro / Modicon (Schneider Electric) / Siemens
69	Cooling Towers	Paharpur/Bell
70	Power Monitor with RS-485 Port	Schneider / Siemens / ABB / Circutor
71	Digital Load Monitor with RS- 485 Port	Schneider / Siemens / ABB / Circutor
72	Terminals	Wago / Phenonix / Connect well
73	HRC fusses for PT protection	Alstom / L&T / Pentagon / Cooper Busman
74	Terminaiton kits	3M/Raychem/M Seal
75	Glands & Lugs/Bimetalic lugs	HMI / Dowells / SMI/Comet
76	Fire Sealant & Fire-Retardant Paint	Jotun/HILTI /Asian/STPL
77	M.S. Pipe upto 200 MM Dia.	Jindal / Tata Steel / SAIL
78	MS PIPES above 200 mm dia factory rolled	TATA / JINDAL / SAIL

79	Pot Strainer	Emerald / Sant
80	Vibration Isolators	Cori / Dunlop / Kanwal Industries Corporation / Flexionics / Resistoflex / GERB
81	Noise Control Silencer / Muffler (Residential Type Silencer)	Intertec / Sound Control India
82	HSD Fuel Transfer Pumps	Rotodel / Kirloskar/Grundfos
83	Insulation / Fiberglass	Polyond / Rockwool india
84	Pressure Gauge	Emrald / Fiebig /H Guru.
85	Thermometer	Emerald / H Guru / Taylor
86	Alarm Annunciator	Advani Oralikon / Larsen & Toubro / Minilec
87	Pumps	MATHER&PLATT/ FRANKLIN/ KSB/ GRUNDFOS/ XYLEM/ ARMSTRONG/ KIRLOSKAR
88	Motors	Siemens / ABB / Kirloskar/Crompton
89	Plug Valve	AUDCO/ ADVANCE/ TYCO/ ZOLOTO/ VICTAULIC/ KIRLOSKAR
90	Butterfly valves	AUDCO/ ADVANCE/ TYCO/ ZOLOTO/ VICTAULIC/ KIRLOSKAR
91	Gate / NRV / Check valves	Danfoss / Honeywell / Johnsons Control / Belimo/ Flowcon/Zoloto
92	Flexible Pipe Connections	Flexionics / Resistoflex
93	Pypcoat (AW4) for fuel tank & Burried oil piping	IWL
94	Temperature sensors, pressure gauge, flow switch, pressure switch, differential pressure switch, actuators, room thermostat, humidity sensor, flow meter, hardness analyzer, ph, chlorine, tds, co, co2 sensors etc.	Honeywell/ Schneider Electric/ Siemens / Johnson Control / Danfoss/ Trane/ H-Guru / Belimo
95	Level Indicator (Oil)	Forbes Marshall

96	Anchor Fastner	Fisher / Hilti/ Mungo
97	GI Pipe Fittings	Unik / Zoloto M/TATA
98	Welding Rod	ADOR / Advani / Cosmos / Esab
99	Battery Charger & Batteries	Exide / Hitachi / Panasonic /Amar Raja / Amaron
100	Insulating Mats (as per local state electricity board) Portable Fire Extinguishers	Commercial Enterprises / DL Miller & Co. Ltd. /Premier Polyfilm Ltd./ RMG Polyvinyl India Ltd Steelage / Minimax / Vijay fire / TYCO

101	UPS systems	Schneider / Socomec / Delta / Emerson / Tmeic/Eaton
102	Battery	Exide / Hitachi / Panasonic /Amar Raja / Amaron
103	K13 Isolation transformer	MGM / Datson / Elmas
104	**SECURITY SYSTEMS** IP Camera (Multi Sensor, Dome, Multii)	SONY/BOSCH/ AXIS / PELCO/HONEYWELL
105	Sensor & Bullet Camera	SONY/BOSCH/ AXIS / PELCO/HONEYWELL
106	Video Management Software	Honeywell / Qognify/ Genetec / Camera Oem
107	Network Video Recorder	Honeywell / Ibm, Dell, Hp, Camera Oem
108	Central Management Server	Ibm, Dell, Hp, Camera Oem
109	Housing, Lens	Honeywell / Siemens / Schneider / Bosch / Arecont Vision / Mobotix
110	Joystick	Honeywell / Siemens / Schneider / Bosch / Arecont Vision / Mobotix
111	Industrial Grade Monitor	Sony / Lg / Samsung
112	Client Workstation	Dell / Hp / Compaq / Ibm
113	Networks Switches	Cisco/ Juniper / Extreme / Hpe (Aruba)
114	Network Components(Server Racks,Connectors)	Val Rack / Rittal / Apw / Net Rack / D Link

115	Sc Connectors	Amp / Digilink/Honeywell / Siemens
116	Acs Controller	Honeywell / Siemens / Schneider / Hid
117	Acs Software	Honeywell / Siemens / Schneider / Hid/Onguard / Ccure
118	Panic Bar	Dorma / Trimec / Locknetics
119	Card/ Card Reader	Hid / Indala / Exceed/cardex/GE/Kaba
120	Magnetic Door Lock	Bel / Locknetics / Abloy/Ebelco/Siemens/ Dorma/Dynalock
121	Housing, Power Supply	Honeywell / Bosch / Ge / Lenel
122	Industrial Grade Monitor	Sony / LG / Samsung
123	Door controller & software	American Dynamics/Bosch/Automatic Systems /CardKey GE – Casirusco/Honeywell – Prowatch Series/Kaba Siemens/Tyco
124	Electric Door Strikes	Kaba/Lock netics/Miwa Lock/Rutherford/Trimec
125	Boom Barriers/ Half Height Swing /Retractable /Flap type Barriers (Imported)	Automatic Systems (Belgium)/FAAC (ITALY)/Gunnebo Kaba /Magnetic/Somfy India
126	Door Frame Metal Detectors	Metor/Garett/Godrej
127	Authorized System Integrators for Fire Alarm & CCTV System	Honeywell/UTC/Prudential/L&T/Percept Devices Marketing Sterling & Wilson
128	Solar PV Modules	Approved As Per Prevailing Om /Almm List Of Mnre /Approved By Engineer Incharge As Per Tender Specifications
129	Power Conditioning Unit	Fronus/ SMA/ Delta/ Fimer / Emerson/ Growatt/ Goodwe /Solis/ OEM of SPV Module
130	Accessories / Connectors	MC / Tyco solar/HENSEL GERMANY / ELTSO /VNT/ TECHSER/ OEM OF SPV MODULES.
131	Data logger / System Performance	ABB / Electro industries / Energy / Recommence / Energy tracking IIC / Schlumberger
132	**PHE WORKS** CPVC pipe	Astral pro, Ashirwad, Supreme, Finolex

133	CPVC fittings	Astral pro, Ashirwad, Supreme, Finolex
134	GI fittings	R' Brand, Unik, HB / NVR
135	GI pipes	TATA/ Jindal/SAIL
136	CI pipes and fittings	Neco/ BIC/SAIL
137	Butterfly valve (50mm to 100mm)	Intervalve, Audco, L &T
138	Kurra CI / SS	Neer, Kessel, Aco
139	Kurra UpVC	Supreme or Approved equivalent
140	Non return valve	Intervalve, Audco, L &T
141	Ball valve (15mm to 40mm)	Lehry, RB, Legris, Conex
142	Air release valve	Zoloto, RB, Lehry, Legries / Conex/Itap
143	Water meter	Dasmesh, Acteris, Krnati, Kaycee
144	Anchor fastner	Hilti, Fischer/Mungo
145	U' Clamps	Hitech supports & hangers pvt ltd, Itech
146	RCC hume pipes	Indian hume pipe, Sudarshan hume pipe, Approved equivalent
147	UPVC pipes (SWR Quality)	Astral pro, Ashirwad, Supreme
148	UPVC pipes (Agriculture series)	Astral pro, Ashirwad, Supreme
149	PVC fittings (Fabricated)	Clarion or approved equivalent
150	PVC fittings (Moulded)	Astral pro, Ashirwad, Supreme
151	PVC floor traps (Moulded)	Astral pro, Ashirwad
152	Manhole cover - Cast iron	BIC, Jayaswal Neco Industries Ltd/Hepco
153	Manhole cover - (RCC Precast)	Rajvaibhav, SFRC, DM precast, Sobha concrete products/Southern concrete
154	Level Controllers	Aqua inteltech, Vinayaka

155	Insulation for GI buried pipes	Pypkote, Tapex, IWL
156	Enamel paint	Asian paints, Apcolite, Berger,
157	Hot water pipe insulation	Vidoflex, Armaflex
158	Air admittance valve	Studor, Din Certo, Essenco
159	Pressure reducing valve	Hawk, TBS, Cimberio, RB / Varie
160	Y' Strainer	RB, TBS, Cimberio, Energy/Sant/Leader
161	UPVC - SCHEDULE 80 Pipe &Pipe fittings	Astral pro, Ashirwad, Supreme
162	HDPE pipe	Astral pro, Supreme or approved equivalent
163	DWC Pipe (Double wall corrugated pipe)	Ashirwad, Supreme/Astral/Duraline
164	Motorised valve	HONEYWELL/ SCHNEIDER ELECTRIC/ SIEMENS / JOHNSON CONTROL / DANFOSS/ TRANE/ H-GURU / BELIMO
165	FRP/GRP covers	Thermodrain
166	Pumps	MATHER&PLATT/ FRANKLIN/ KSB/ GRUNDFOS/ XYLEM/ ARMSTRONG/ KIRLOSKAR
167	Fire protection PUMPS	KIRLOSKAR / MATHER & PLATT (WILO) / GRUNDFOS/ Armstrong
168	G. I PIPES	TATA/ JINDAL (HISSAR)/ SAIL/ VIZAG STEEL Note: Pipe shall be ISI mark.
169	PIPE FITTINGS	MONTEX FORGE / B&M / JAINSONS / SANT
170	ANTICORROSIVE MATERIAL	IWL / RUSTECH
171	FIRE EXTINGUISHERS	CEASEFIRE / KANEX / SUPREMEX / MINIMAX
172	BUTTERFLY VALVE	L&T / SANT / ZOLOTO / INTERVALVE
173	PAINT	ASIAN / BERGER

174	ANCHOR FASTENERS	HILTI / FISCHER / MUPRO
175	SUPPORTS	MUPRO / FISCHER / HI TECH
176	Balancing Valve, Butterfly Valve, Sluice Valve, Nrv/Check Valve, Strainer And Other Type Of Valves	AUDCO/ ADVANCE/ TYCO/ ZOLOTO/ VICTAULIC/ KIRLOSKAR
177	FLOW METER	FEDRAL / TELEFLO / EUREKA
178	PRESSURE SWITCH	INDFOS / SWITZER / DANFOS
179	THERMOMETERS/ PRESSURE GAUGE	H. GURU / FIEBIG / GENERAL INSTRUMENTS
180	FIRE BRIGADE CONNECTION, AIR RELEASE VALVE, HYDRANT VALVE, FIRST AID HOSE REEL (DRUM AND BRACKET), FIRE HOSE, BRANCH PIPE, FIREMAN AXE, RRL HOSE, HOSE CABINET	SAFEX/ NEWAGE/ GETECH/ VICTAULIC/ TYCO
181	FIRE SEALANT	HILTI / 3M / STI
182	SPRINKLER ALARM VALVE	MONSHER (SHARP) / NEWAGE PLUS / RAPIDROP / VIKING
183	SPRINKLER	TYCO / HD / NEWAGE/ EVERSAFE/ GETECH/ VIKING /SAFEX
184	FLOW SWITCH	HONEYWELL / SYSTEM SENSOR / POTTER
185	FLEXIBLE DROP	RESISTOFLEX / DUNLOP / EASYFLEX/NEWAGE/SAFEX
186	ROSETTE PLATES	VIKING / RAPIDROP / EQUIVALENT
187	EXPANSION BELLOWS	EASYFLEX / RESISTOFLEX / CORI
188	HUME PIPES	INDIAN HUME PIPES / EQUIVALENT
189	DIESEL ENGINE	KOEL / CUMMINS / GREAVES / ASHOK LEYLAND
190	PHOTOLUMINESCENT SIGNAGES	PROLITE / AUTOLITE

191	BATTERY OPERATED SIGNAGE'S	TEKNOWARE / PROLITE / EATON
192	FIRE ALARM AND EMERGENCY VOICE EVACUATION PANEL	Honeywell(Notifier)/BOSCH/Siemens
193	DETECTION DEVICES	Honeywell(Notifier)/BOSCH/Siemens
194	ANNUNCIATION DEVICES	Honeywell(Notifier)/BOSCH/Siemens
195	MODULES	Honeywell(Notifier)/BOSCH/Siemens
196	CONTROL / POWER CABLES	POLYCAB / Havells/KEI
197	SPEAKERS	EST / SECUTRON (MIRCOM) / SIEMENS
198	DIGITSL VOICE COMMAND	EST / SECUTRON (MIRCOM) / SIEMENS
199	AMPLIFIERS & ACCESSORIES	EST / SECUTRON (MIRCOM) / SIEMENS
200	FIRE CURTAIN	ORIENT FIRE / KENT / PACIFIC FIRE CONTROLS
201	NOVEC 1230 AGENT	KIDDE (UTC) / ANSUL / CRYPTZO
202	SEAMLESS CYLINDERS	RAMA / EKC
203	SEAMLESS PIPES	TATA/ JINDAL (HISSAR)/ SAIL/ VIZAG STEEL Note: Pipe shall be ISI mark.
204	DISCHARGE NOZZLES	KIDDE (UTC) / ANSUL / CRYPTZO
205	DISCHARGE / ACTUATION HOSE	KIDDE (UTC) / ANSUL / CRYPTZO
206	ELECTRIC ACTUATOR	KIDDE (UTC) / ANSUL / CRYPTZO
207	PRESSURE SWITCH	KIDDE (UTC) / ANSUL / CRYPTZO
208	MANUAL ACTUATOR	KIDDE (UTC) / ANSUL / CRYPTZO
209	MANIFOLD CHECK VALVE	KIDDE (UTC) / ANSUL / CRYPTZO
210	AGENT RELEASE PANEL	RAVEL / FIRE FITE / VIGNAHARATA

211	CONVENTIONAL DETECTORS	SYSTEM SENSOR / SIEMENS / RAVEL
212	TALK BACK SYSTEM	GST / A² / ROYAL ELECTRONICS
213	PANEL PROTECTION SYSTEM	CEASEFIRE / KANEX / FIRE DETEC
214	PA RACK	NETCAB / NET RACK
215	**HVAC** BAFFLES SYSTEM	Oorja/ Cani
216	CHILLER UNIT	CLIMAVENETA / TRANE / DAIKIN / CARRIER / BLUE STAR
217	AIR COOLED SCREW CHILLER LOW TEMPERATURE	CLIMAVENETA / TRANE / DAIKIN / CARRIER / BLUE STAR
218	AIR COOLED SCREW CHILLER MEDIUM TEMPERATRE	CLIMAVENETA / DAIKIN / VOLTAS
219	VARIABLE FREQUENCY DRIVE STARTER PANEL	Danfos / Siemens / Schnider / ABB / L&T
220	VARIABLR PRIMARY CHILLED WATER PUMPS	ARMSTRONG / GRUNFOS / XYLEM
221	VFD LOGICAL CONTROL PANEL (FOR VARIABLE PRIMARY FLOW OPERATION)	ARMSTRONG / GRUNFOS / XYLEM
222	PAC UNIT	Climaventa / Flakt wood / schinder / Blue Box / Vertive
223	CHILLED WATER PAC	Climaventa / Flakt wood / schinder / Blue Box / Vertive
224	DX PAC	Climaventa / Flakt wood / schinder / Blue Box / Vertive
225	Split Unit (5 Star as per BEE) /	Daikin, Mitsubishi,Toshiba,O-General, Blue Star, Hitachi Midea, LG
226	Double Skin Floor Mounted Doas - Chilled Water Type	VTS / Systemair / Zeco/Vayhan/Citizen
227	IDEC-UNIT	HMX / HUMIDIN
228	AIR HANDLING UNITS, FAN SECTION UNITS	ZECO / EDGETECH / SYSTEMAIRE / FLAKTWOOD/ NUTECH/ YORK/ VTS/ HUMIDIN/ CASILICA
229	COPPER REFRIGERANT PIPING	Janaya / Nippon / Mandev / Mexflow / PTP-K-Series
230	LADDER TYPE CABLE TRAY	Profab / EAE / Indiana / Patny

231	PERFORATAED TYPE CABLE TRAY	Profab / EAE / Indiana / Patny
232	CONDENSATE DRAIN PUMP	Aspen / Cruise/Ashirwad
233	MAKE UP WATER PIPE	Supreme/ Ashirwad / Finolex / Prince
234	EGG CRATE GRILLE	Systemair / Airmaster / Mapro / Carryiare / Dynacraft
235	PERFORATED FLOOR TILE WITH OPPOSED BLADE DAMPER (OBD)	Unitle / Yemag
236	VENTILATION UNITS FANS - INLINE, CABINET, CENTRIFUGAL, TUBE AXIAL, WALL MOUNTED, MIXED FLOW, ETC	Nictora / Flakt /Greenheck / Carryaire / Airflow / Kruger / Maico Dynair
237	KITCHEN DRY SCRUBBER WITH SISW FAN	Rydair / Espair /Trion /Emerald
238	NRV VALVE	Audco / Danfoss / UTAM / Advance / Zoloto / Sant
239	WATER SIDE MS PIPING - CLASS C	Tata/Jindal/SAIL
240	BUTTERFLY, BALANCING,	Audco / Danfoss / UTAM / Advance / Zoloto / Sant
241	Y'-STRAINER	Sant/Emerald/UTAM/Advance / Zoloto / Sant
242	BALL VALVE FOR Y-STRAINER	Leader/R.B. Italy/UTAM / Zoloto / ITAP / Sant / Danfoss / Advance
243	BALL VALVE WITHOUT STRAINER	Leader/R.B. Italy/UTAM / Zoloto / ITAP / Sant / Danfoss / Advance
244	PRESSURE INDEPENDENT TYPE DYNAMIC BALANCING CUM FLOW CONTROL VALVE.	Flowcon / Danfoss / Delta - P/ Frese / Beilimo / Advance / Siemens
245	BTU METER FOR METERING	Kamstrup/Siemens/Sharky / Danfoss FORBMARSHALL / Shanitech / Sontay / Omricorn / DIEHL/ Belimo / Landis / Gyre
246	FLOW METER	Kamstrup/Siemens/Sharky / Danfoss FORBMARSHALL / Shanitech / Sontay / Omricorn / DIEHL/ Belimo / Landis / Gyre
247	AUTOMATIC AIR VENT.	Anergy / ITAP / RB
248	THERMOMETER	Waree/Acutherm Italy/Dwyer / Omricron
249	THERMOWELL	Anergy / ITAP / RB

250	PRESSURE GAUGE (GLYCERINE FILLED)	Fieldmarshell / H-Guru / Fibig / Dwyer/Waree / Baumer
251	CONDENSATE DRAINPIPE	Supreme/ Ashirwad / Finolex / Prince
252	PRESSURE REGULATING VALVE	RB / Danfoss
253	FLEXIBLE RUBBER BELLOWS	Cori / Easyflex
254	PRESSURE MAINTAINING STATION	Anergy / Savcon / K D Agencies
255	LOWSIDE G.S.S DUCTING AS PER SMACNA STANDARDS	Rolastar / Camduct / Zeco / Vedha / Westerair Air / Devduct
256	ROUND DUCT	G.P. Spiro/Westerair Ducts / Sevenstar / Spiral Tube / Devduct
257	MS DUCT FOR KITCHEN EXHAUST	Devduct / Kanva cooling / Sree Fabricators
258	ALUMINIUM DUCTING FOR MRI	G.P. Spiro/Westerair Ducts / Sevenstar / Spiral Tube / Devduct
259	FRP DUCTING	QMAX Composites / FRP lining services /
260	DOUBLE SKIN PLENUM	ZECO / EDGETECH / SYSTEMAIRE / WAVES / AIRCOIL
261	ACOUSTIC INSULATION	Armacell/ K-Flex/Aeroflex/Durkflex
262	THERMAL INSULATION	Armacell / K-Flex / Aeroflex / Thermobreak / Trocilin / Durkflex
263	BUTTERFLY DAMPER - CIRCULAR - SINGLE FLAP-GI	Systemair / Airmaster / Carryaire / Vedha / Syncro / Cosmos
264	ROUND FLEXIBLE DUCTS WITH INSULATION	ATCO/Supaflex/Sevenstar/Ductmaster / Cosmos
265	SPILL AIR PLENUM BOX.	Syncro / Vedha / Kanva Cooling
266	VOLUME CONTROL OPPOSED BLADE DAMPER (QUADRANT TYPE)	Systemair/ Airmaster/Carryaire / Vedha / Syncro / Cosmos
267	BACK DRAFT DAMPER	Systemair/ Airmaster/Carryaire / Vedha / Syncro / Cosmos
268	COLLAR DAMPER - OPPOSED BLADE TYPE	Systemair/ Airmaster/Carryaire / Vedha / Syncro / Cosmos
269	HIT & MISS DAMPER - AL.	Systemair/ Airmaster/Carryaire / Vedha / Syncro / Cosmos
270	PLAQUE TYPE SQUARE DIFFUSER - AL.	Systemair / Airmaster / Mapro / Carryiare / Dynacraft / Cosmos

271	ROUND DIFFUSER - AL.	Systemair / Airmaster / Mapro / Carryiare / Dynacraft / Cosmos
272	MOTORIZED VOLUME CONTROL OPPOSED BLADE DAMPER - STANDARD TYPE	Systemair/ Airmaster/Carryaire / Vedha / Syncro / Cosmos
273	FIRE DAMPER WITH OPPOSED BLADE (FUSIBLE LINK TYPE) - EXTENDED SLEEVE TYPE - WITH 450 MM SLEEVE	Greenheck/ Ruskin Titus / Systemair / Airmaster / Carryiare
274	MOTORISED FIRE & SMOKE DAMPER WITH OPPOSED BLADE - EXTENDED SLEEVE TYPE - WITH 600 MM LONG	Greenheck/ Ruskin Titus / Systemair / Airmaster / Carryiare
275	SLOT DIFFUSERS	Systemair/Airmaster/Sachin / Vedha / Mapro / Cosmos
276	GRILLES - AL.	Makes: Systemair/Airmaster/Sachin / Vedha / Syncro / Mapro / Cosmos
277	JET NOZZLE - AL.	Systemair/ Airmaster/Carryaire / Vedha / Cosmos
278	LOUVERS - AL.	Systemair/ Airmaster/Carryaire / Vedha / Cosmos
279	VARIABLE AIR VOLUME BOXES (VAV)	Eneffen/Neptronics / Syncro / Cosmos
280	EXHAUST VALVE - AL.	Systemair/ Airmaster/Carryaire / Syncro / Vedha / Cosmos
281	TERMINAL HEPA FILTER MODULE	AAF/Spectrum/Camfil /Pyramid
282	FILTERS FOR FRESH AIR FAN	AAF/Spectrum/Camfil /Pyramid
283	CO (CARBON MONOXIDE) DETECTOR / SENSORS	Greystone /Johnson Controls / Siemens / Produal / Omricorn / MSR
284	TEMPERATURE SENSOR FOR AHUS	Greystone/Johnson Controls / Siemens / Produal / Omricorn
285	HYDROGEN DETECTOR / SENSORS	Greystone / Siemens / Produal / Omricorn/Ambitronics
286	Temperature / Rh Sensor For Ot Touch Panel	Schnieder / Siemens / JCI / DIGISENSE
287	VRF Type Varaiable Refrigerant Flow System	Daikin/Toshiba /Blue star/Voltas/carrier
288	UV lamp (UL Listed)	Honeywell Edgetech (American Collaboration) IAQURE Ultrafresh Lynserve
289	Motor	ABB/Siemens/ Kirloskar

290	Variable Frequency Drive (VFD)	ABB,Danfoss, Fuji Electric, Siemens, Yaskawa
291	IBMS	SIEMENS/ JCI / CARRIER AUTOLOGIC / ENEFFEN
292	Operator Workstation	HP / DELL / LENOVA
293	Printer	HP/SAMSUNG/CANON
294	Color Monitor/Multicolor Graphics	HP / DELL / LENOVA
295	monitor Mouse (Optical)	LG / SAMSUNG / MICROSOFT SIEMENS / CARRIER
296	GUI Software	HONEYWELL-TREND / TRANE / SIEMENS-PXC.MODULAR, / JCIMETASYS NCE
297	DDC Controller	HONEYWELL-TREND / TRANE / SIEMENS-PXC.MODULAR, / JCIMETASYS NCE
298	Interfaces / Router / Gateways / Network	HONEYWELL-TREND / TRANE / SIEMENS-PXC.MODULAR, / JCIMETASYS NCE
299	Controllers Immersion type temperature sensor	HONEYWELL-TREND / TRANE / SIEMENS-PXC.MODULAR,/ JCIMETASYS NCE
300	Grill, Diffuser, Fire Damper, Fire Damper, Volume Control Damper	SYSTEM AIR /CARRYAIRE/ AIRMASTER/ AIR FLOW/ CONAIR/ DYNACRAFT
301	Hydrogen Sensor	MSR / PRITECH/AMBETRONICS/OMICRON
302	VERTICAL TRANSPORTATION/Lifts	Johnson Lifts/ Schindler/ Thyssen Krup/ Mitsubishi Electric

LIST OF APPROVED MAKES (CIVIL & INTERIOR WORKS)

S No.	MATERIAL	APPROVED MAKES
	Civil Works	
1	Anti-Termite Chemical	Vam Organic / NOCIL / Bayer / Fosroc Chemicals (India) Ltd / Lupin ,Pest Control India (PCI), Hindustan insecticide
2	Cement	ACC/ Birla / Ultratech / JK / Ambuja / Jaypee cement
3	TMT Steel	TATA TISCO / SAIL / JSW Steel / Vizag Steel, Jindal steel & Power ltd.
4	Bitumen Impregnated Expansion Board	Bengal Chemical Ltd./ STP
5	Construction Chemicals & Plasticisers	Fosroc / Roff / Pidilite / Sika
6	Bitumen	Aggarwal/ Tiki Tar/ Bitumen India/ Bitcol
7	Non Shink Grout	Fosroc / Sika / BASF / Soprema/ MYK Arment , Pidilite, Master builders Solutions/Ferrous crete,Latapoxy/weber
8	Water Proofing Chemicals & Membranes	Fosroc / Sika / BASF / Soprema/ Pidilite , MYK Arment, Fosroc, Dr Fixit, Master builders Solutions
9	Geotextile fabric	Manas/ Suntek/ Ocean/ Parishudh/ Parry/ J.T. Fabric
10	UPVC Pipes	Astral/ Supreme/ Finolex
11	Autoclaved aerated concrete Block	Magicrete/ PrimeACC/ Biltech/Xtralite/Birla Aerocon
12	Welded Mesh	Swish Weldmesh / IRC/ Multiweld Wire Co.
	Wall Finishing Work	
13	White Cement Based Putty	Birla/ JK/ Asian paint
14	Non pigmented Textured Paints	Asian/ Berger/ Nerolac/Heritage/Spectrum paints
15	Internal Texture Paint (wall & ceiling)	Oikos/ Asian/ Berger/Nerolac
16	Cement based Paint	Snowcem / ICI/ Berger,
17	Acrylic Smooth exterior paint	Asian / Nerolac / Berger/ Dulux
18	Acrylic interior paint	Asian / Nerolac / Berger/ Dulux
19	Dry Distemper /OBD	Asian / Nerolac / Berger / Dulux
20	Ceramic glazed wall tiles	Nitco / Kajaria / Johnson / RAK / Somany, H&RJohnson, RAK, Kajaria
21	Acoustical Insulation	Lloyd Insulation/Saint gobain/ Knauf/
22	Lacquered Glass	Saint Gobain Planique/ AIS /Modi
23	Anti-Fungal Paints	Asian / Dulux / ICI / Berger, Jotun
24	Glass partitions & Doors profiles	Dorma/ Jeb/ Alloy
25	Frosting Film	3M/ Llumar/ LG
26	Epoxy Paint	Asian/ Sika/ Shalimar/STPL/
27	Plywood, Block Boards, Particle Boards	Green/ Century/ Archid/ Kitply/ Duro
28	Upholstery Foam	Sheela/ Allied/ Flexipol/ SKPI/ Jumex/ Suryaa
29	Calcium silicate board, tiles & panel	Ramco/ Aerolite/ Armstrong
30	MDF Board	Greenpanel/ Century/ Actiontesa
31	Mirror	Modiguard / Saint Gobain/ AIS
32	Plaster of Paris	Sakarni/ Shriram/ Superfine/ JK
33	Changing room lockers	Godrej / green lam / equivalent
34	PVC seating for halls	Innovative Seatings / KF systems /equivalent
35	Storage Rack	Godrej/ Silverlining/ Giraffe/ Spider/ Mex
	Steel Work & Roofing	
36	Structural Steel Section	Tisco/ SAIL/ Apollo/ Vizag/ JSW /Tata steel limited, Jindal steel & Power ltd.

37	Structural Steel tubular Section	Tata Structura/ Apollo Steel Pipes/ SAIL/ Kalinga/ JSW/Jindal steel & Power Ltd, SAIL, **(to be procured from Primary producers)**
38	Welding Rods	Advani/ Esab/ Nucor,Victor, D&H Norma
39	Mild Steel Plates, Flat, Angles, Chequred Plate	Tisco/ SAIL/ Apollo/ Vizag/ JSW
40	Stainless Steel	Salem/ Jindal/Sail
41	Synthetic Enamel Paint	Asian / Nerolac / Berger / Dulux / ICI, Jotun
42	Deck sheeting	Tata/ SAIL/ Jindal/Tata Blue Scope.
43	Fire rated Paint	Akzo Nobel Coatings Pvt. Ltd./ Asian Paints Ltd. Berger, Jotun, Carboline, Newkem
44	Roof Sheeting	Tata Bluescope/ Multicolor/ Jindal
45	Multiwall/ Plain Polycarbonate	Danpal/ DPI Daylight / Polygal / Coxiwell/GE lexon
	Flooring Works	
46	Vitrified Tiles	Nitco / Kajaria / Johnson / RAK / Somany / Restile
47	Tactile tile	Johnson / Somany / Restile
48	Tile Adhesive	Laticrete / Ardex Endura / Weber /Kera Bond/Asian Paints
49	Epoxy Filler Grout	Laticrete / Ardex Endura / Weber / Fosroc/ Sika/
50	Floor Surface Hardners	Fosroc/ BASF /Sika
51	Glass Fiber reinforcement	Recron/ UP Twiga/ Owenscorning
52	Acrylic emulsion cement modified and water based concrete bonding agent	Sika/ Fosroc/ Pidilite/ Soprema
53	Epoxy urethane joint Sealer	Fosroc/ Sika/ Laticrete / Ardex Endura / Weber / MYK Arment, Pidilite, Master builders Solutions
54	Road marking Paint	Asian PPG/ ITS coating/ Kataline
55	Self Levelling screed	Fosroc/ Dubond/ Neocrete
56	Bamboo plank Flooring & Cladding work	Epitome / equivalent
57	Heavy Duty Door Mats made with flexible vinyl (Virgin PVC)	3M or equivalent
	Specialized Sports Floorings	
58	Sports Flooring for Badminton	Robbins/ Action/ Apex/ Asian / Ebaco *as per BWF norms & approved makes*
59	Sports Flooring Matt for Badminton	Dongxings/ Gerflor/ Tarkett /Yonex *as per BWF norms & approved makes*
60	Sports Flooring for Basketball	Robbins/ Action/ Junkers / Haro *as per FIBA norms & approved makes*
61	Sports Flooring for Snooker room in Carpet	Flotex/ Milliken/ Modylus
62	Sports Flooring for Volley Ball in PU	Rephouse/ Casali/ Sika (pulastic) *as per FIVB norms & approved makes*
63	Sports Flooring for General areas in PU flooring	Ebaco / sunflex / Apex / Asian
64	Sports Flooring for Cricket Turf in 13mm thickness	Limonta/ Polton/ Domo / Tiger Turf
65	Sports Flooring for Gym, Arobics etc. in Rubber Flooring	Terrain/ Mirod/ Ecore / Durafit
66	Sports Flooring- Wrestling Mat	Stag/ Vinex/ Jinling / Freewill /knoxton / gravolite /x fit / *as per WFI norms & approved makes*
67	Sports Flooring- Judo mat	Stag/ Vinex/ Jinling *as per IJF norms & approved makes*
68	Sports Flooring- Kabaddi Mat	Stag/ Vinex/ Jinling / Gravolite /Gymnco / Grip *as per AKFI norms & approved makes*
69.a	Sports Flooring for Squash Court in wooden flooring	Acer / Haro / junkers *as per WSF norms & approved makes*
b	Sports Flooring for other areas wooden flooring	Apex/ Asian / Ebaco

70	Squash Court Glass	Saintgobain/ Syncotts International *as per WSF norms & approved makes*
71	Squash Hard Plaster	Syncotts International / equivalent *as per WSF norms & approved makes*
72	Squash Tin	*as per WSF norms & approved makes*
	Ceiling Works	
73	Gypsum board/Tiles ceiling	Saint Gobain Gyproc/ Lafarge Boral Gypsum/ USG Knauf/
74	Calcium silicate board/Tiles Ceiling	Ramco/ Aerolite/ Approved equivalent
75	Mineral fibre tiles Ceiling	Armstrong/ Saint Gobain/ USG Knauf/ Anutone
76	Open cell ceiling	Durlum/ Lindner /Hunter Douglas/ Armstorng
77	Acoustical Glass wool ceiling	Ecophone/ Armstrong/ USG Knauf/
78	Acoustical Baffle	Ecophone/ USG/ Knauf/ Armstrong
79	Acoustical Spray Plaster	Ecophone/ Asona/ Approved equivalent
	Door, Windows & Coverings	
80	Flush Doors	Duro/ Century/ Green/ Merino/ Mayur/ Kitply
81	Laminates	Greenlam / Merino/ Formica/ Century/kitlam
82	Veneer	Decowood Green/ Duro/ Century
83	Stainless Steel hardware	Ozone/ Geze/ Dorma/ haffele/ Hettich
84	Fire rated Doors hardware	Hormann/ Geze/ Dorma/ Assa Abloy/Dorset/ Ingersolrand
85	Aluminium Extrusion	Jindal/ Hindalco/ SAPA/ Bourka/ Century/ INDAL INFRA
86	Aluminium Hardware	Alualpha/ Lavaal/ Giesse/ Kinlong
87	Aluminium Louvers	Technal/ Fasado/ Vitrocsa/ Sapa/ VS1/ Wicona
88	Microwave Cured EPDM Gasket	Avigiri/ Kotwan/ Osaka
89	Aluminium Skirting, Corner, Groove, covering, transit profiles	Alucraft/ Baux/ Dural trims
90	Fire Rated Steel Door	Shaktihormann/ Navair/ TATA pravesh,Godrej
91	General Steel Door	Shaktihormann/ Navair/ Sukri/
92	Acoustical Steel Door	Shaktihormann/ Navair/ Sukri/
93	Fire rated Glazed Door	Shaktihormann/ Navair/ Sukri/
94	Toilet Partitions/ Cubicles	Greenlam/ Merino
95	Window Blinds	Hunter Douglas/ Vista/ De Décor/ MAC
96	Wood Adhesive	Fevicol / Jivanjor / Vamicol/Dunlop/Vamorganic
	Façade Work	
97	Aluminium Extrusions	Jindal / Bhoruka / Sapa /Hindalco
98	Reflective Glass	Saint Gobain /Guardian / Sisecam/ Asahi
99	Clear Float Glass	Saint Gobain /Guardian / Sisecam/ Asahi
100	Fire Rated Glass	Saint Gobain / Pilkington / Schott
101	Glass Processing	Saint Gobain / GlassTech / Sejal / FG / Fuso / Asahi / Impact Safety
102	PVB Lamination	Kuraray
103	SGP Lamination	Kuraray
104	Weather Sealant	Sika / DowCorning / Momentive
105	Structural Sealant	Sika / DowCorning / Momentive
106	ACP	Alpolic / Alucobond / Reynobond / Alstone / Virgo
107	Solid Aluminium Sheet	Novelis / DWALL Metallic
108	Anchor Fastners	Hilti / Fischer / Mungo
109	Anchor Channels (Cast in Channel)	Halfen / Hilti / Jordhal
110	EPDM & Silicon Gasket	Amee Rubber / Osaka / Eltech/ Bohra/Roop

111	Powder Coating	Jotun / Akzonoble
112	PVDF Coating	Valspar / PPG / Akzonoble
113	Powder & PVDF Processer	SP Coating / MJ Coaters / Aura International
114	Spacer Tape (Open PU	
115	Cell)	Norton / BOW
116	Glass wool (Insulation)	UP Twiga / Rockwool
117	Rock wool (Fire Stop)	Siderise / Hilti/
118	Smoke Seal Intumescent	Siderise / Hilti/ Promat/Raven
119	Baker Rod	Supreme Industries
120	SS Spider Fittings	Dorma /ozone/Hafele
121	SS Patch Fitting	Dorma / ozone/Hafele
122	Automatic Sliding doors	Dorma / Geze / Kaba
123	Revolving Doors	Dorma / Boonedam / Kaba
124	SS Clamps (Stone cladding)	Hilti / Blick
125	Mild steel	Jindal / Sail / Tata
126	Stainless Steel	Salem Steel
127	Façade Systems	Technal / Schueco / Aluk/ Fasado
128	Anodizing	Dow Chemicals
129	Accessories	
129.01	SS Friction Hinges	Giesse / Cotswold / Securistyle / Hettich/Dorma
129.02	Multipoint Locking sets	Giesse / Cotswold / Securistyle / system based
129.03	Handle	Giesse / Cotswold / Securistyle / system based
129.04	Rollers for Slidings	Giesse / Alualpha / Savio / Alutech / Lavaal
129.05	Flush lock for Slidings	Giesse / Alualpha / Savio / Alutech / Lavaal
130	Stainless Steel Cramps	Hilti / Fischer/ Canon
131	GRC Jali	Unistone/ Birla/ Everest/ Shenisha
132	Alumnium Expanded Metal Jali System	Citadel/ PEMPL /
133	Aluminium Louvered System	Hunter Douglas/ Durlum/ Lindner
134	Aluminium composite panel	Alucobond/ Eurobond/ Aludecor/ Reynobond/ Alstone/ Alstrong
135	SS wire grill system	Nitin Wire/ Satyam Impex/ Chirag Enterprises
	Road Work	
136	Bitumen	Aggarwal/ Tiki Tar/ Bitumen India/ Bitcol
137	Interlocking concrete Paver Block	Ultra/Hindustan tiles/nitco/Basant Benton
	Lifts (Elevators)	
138	Passenger Lift	Otis/ Kone/ Schindler/ Mitsubishi
139	Good Lift	Johnson/ TKE/ Otis

140	Aggregates (Course and Fine Aggregates)	As per IS and Mix design for concrete work or zone.
141	Anchor Fasteners / Rebar	Hilti, Fischer, Wurth.
142	PVC Water Stop	Dr fixit, Rubber Udyog (I) Ltd,Hydrolite/ Hydroswell,BASF
143	GI Pipe	Tata, Jindal, Zenith
144	Perforated Pipe	Astral , Supreme.
145	FRP Manhole Cover	Amrock, Fibrocast, Everlast
146	Fire Proof Spray (Vermiculite)	Newkem , Berger - Promat , Carboline
147	Primer Prior to Fire proof paint/Spray	Berger, AsianPPG, Jotun, Carboline
148	Damp Proof Material	FOSROC,SIKA,BASF
149	Plasticiser & Super Plasticiser	PLASTIMENT/ SIKAMENT, CONPLAST SP430, CHRYSO - HP / DELTA / OPTIMA, BASF

150	Water proof adhesive	Sika,Cico,Proofex
151	Ready mix concrete	Ultratech,ACC,
152	High Density (HDF) Prelaminated board	Pergo,Greenply,Marino
153	UPVC Doors, Door Frames and Windows	Fenesta,LG,Komaraling,Duroplast,NCL veka
154	Mild steel butt hinges	Jyoti,Amit,garg,Swift,Deepak,Saswat,Supreme,Jolly
155	Stainless Steel bolts, washers, nuts	Hilti,Atul,Pooja,Kundan
156	Stainless steel pressure plate screws	Hilti,Atul,Pooja,Kundan
157	False celing	Armstrong/Saint gobain Gyproc/Aerolite/USG Boral
158	False Ceiling Members (perimeter, Ceiling Section, Intermediates, angles etc.)	Armstrong/Saint Gobain/Aerolite
159	Pink primer	Asian/Berger/Dulex
160	Acrylic Emulsion	Asian/Berger/ICI Dulex
161	Ready mix Cement plaster	Gyproc/Ultratech/Ferrous crete
162	Melamine Polish	Asian/Melamine gold wufin/polycure
163	Anti corrosive Bitumastic paint	Shalimar/Asian/Berger
164	Cement primer	Asian/JK/Berger
165	Epoxy coating	BASF/FOSROC/sika
166	Soalr stud/Median marker	3M/Avery Dennison/Nikkalite
167	Vitreous Commodes / Washbasin	Hindware/Parryware/Jaquar
168	Flushing Cistern	Hindware/Parryware/Jaquar
169	Water supply fixtures like bibcock, shower panels, Health faucet and other fixtures	Jaquar/Parryware/Hindware/Cera/Euronics
170	Masking Tape	3M,sun,wonder polymer,Roop
171	PVC flooring	Armstrong,LG hausya,Ger flor
172	Grass Paver	Unistone, Ultra, NITCO, Besant Betons, Hindustan Tiles
173	FRP door frame and shutter	Duroplast, Polyline,Cactus
174	Non Metallic Floor Surface Hardeners	FOSROC/ SIKA/ BASF/ CICO/ Pidilite
175	PU Enamel Metallic Paints on MS Structure & Epoxy paints (Premium Quality)	Asian/ Berger/
176	Structural Glazing	Modi,Saint gobin

LIST OF APPROVED MAKES FOR EQUIPMENT & MATERIALS PLUMBING SYSTEM

S.No.		Details of Materials / Equipment
1.a	Vitreous China Sanitaryware	Hindware/ Cera/ Parryware /Jaquar
b	WC Connectors	Supreme/Ashirwad/ Poloplast
2	Stainless Steel Sink	Hindware/ Jyna/ Neelkanth/ Nirali
3	Auto Urinal Flush System	AOS Auto/ Robo Flushing System/ Euronics/ UTEC System Jaquar
4	Hand Drier	Blue Circle/ Euronics/ Kopal/ UTEC System
5	CP Brass Fittings	Jaquar/ Schell/ Grohe
6	Flow Control Devices	Con-Serv Jaquar RST Schell
7	Floor Drain Fixture, Rain Water Outlets	ACO GMGR Neer
8	Pre fabricated Car parking / Drain channel	ACO Viega
9	C.P. Grating for Floor Trap	Chilly Jayna Neer
10	GI / MS Pipes (IS : 1239 and IS : 3589)	Tata Steel Jindal (Hissar),Sail,,Tisco,vizag,Jindal
11	GI pipe sealent	Henkel - LOCTITE 55
12	UPVC Pipe	Finolex/ Supreme/ Astral/ Ashirwad
13	PP Pipe	Poloplast/ Hublot/ Astral/ Rehau
14	PERT pipes	George/ Fischer/ Viega/ Kantherm
15	CPVC Pipe	Prince/ Supreme/ Astral/ AKG
16	RCC Pipe	Indian Hume Pipe/Madurai spun/lakshmi sood & sood,Jain &co
17	Stoneware Pipes, Gully Traps	Perfect Potteries, Jabalpur Rajura/ Anand
18	GM / Forged Brass Ball Valves	Sant/ Zoloto/ Audco/ Leader
19	Butterfly Valve	Audco/ Castle/ Zoloto/ Sant/ SKS
20	Check Valve – WaferType	Audco Castle Zoloto Sant SKS
21	Check Valve – Dual Plate	Audco / Castle/ Zoloto / Sant/ SKS
22	Check Valve Forged Screwed	Sant/ Zoloto/ CIM/ RB
23	Pressure Reducing Valve	Sant/ Zoloto/ CIM/ Castle
24	Solenoid Valve	Avcon/ Zoloto/ Sant/ CIM
25	Thermostatic valve	Oventrop
26	Air Release Valve	Leader/ Zoloto / RBM/Kerloskar
27	Ball Float Valve	Esseti/ HBD / SKS/Leader/zoloto/IBP
28	Water Meter (Mechanical Type)	Actaris/ Capstan/ Kaycee/ Kranti
29	Electronic Flow Meter	Krohne (Forbes Marshall)/ Rockwin/ Cirrus Engineering
30	Paints	Asian Paints/ Berger/ ICI
31	MH / Water Tank Plastic Steps	KGM Patel/ Pranali Industries
32	Insulation for Hot Water Pipes	Armacell – Armaflex Eurobatex/ Union Foam K-Flex/ Thermaflex
33	Welding Rods	ADOR/ Esab/ Advani
34	Fastner	Fisher/Hilti/ Mupro
35	U.V. Sterlizer	ALFA/ Pentair/ Eureka Forbes
36	. Pipe Protection Wrapping	IWL - Pypkote/ Rustech – Coatek/ STP
37	PP Traps	Viega
38	Fastners	Hilti/ Fischer/ Wurth

39	Welding Rods	ESAB/ Advani
40	Temperature Sensor / Gauge	Forbes/ Marshall/ Danfoss/ Wika
41	PHE	Alfa laval/ GE
42	. Hot Water Pumps	Grundfos/ DP - Holland/ Xylem/ Wilo
43	Anti Vibration Mounting Connections	Cori/ Dunlop/ Easyflex/ Resistoflex/ NECO
44	D. I. Pipes	NECO/ Electrosteel/TATA/Jindal
45	Electric Hot Water Generator	Emerald/ Rapid Cool/ Olympia
46	Grease Traps	ACO/ Kessels
47	Centrifugally Caste (Spun) Iron	JINDAL/Electrosteel/
48	Spun Cast Iron Fittings	Electrosteel/Neco/Kartar/Hepco
49	SFRC Cover and grating	KK/ Advent/kutty/Nu tech/DEC
50	Plastic Encapsulated Foot Rest	KK India/KGM/Acurate buildcon
51	Spun cast iron covers & gratings	Neco/ Jagannath/ Kapilansh Centrifugal/ SKF brand

LIST OF APPROVED ITEMS (FIREFIGHTING WORKS)		
S No.	**MATERIAL**	**APPROVED MAKES**
1	Fire / Sprinkler Main Pump / Jockey	Kirloskar/ Wilo - Mather & Platt/ Xylem/ Lubi
2	Diesel Engine	Cummins/ Greaves/ Koel
3	Motor	ABB/ Bharat Bijlee/ Kirloskar/ Siemens
4	G.I. / M.S. Pipes (IS : 1239 / IS : 3589)	Jindal (Hissar)/ TATA/SAIL
5	Standard M.S. Fittings	Seamless Fittings Pipeline Products
6	DI / CI / Forged Steel Fittings	Jainsons Industries/ VS/ BM Fittings/ Bharat Forge
7	C.I. (Class L.A.) Pipes	Electro Steel Culcutta/ NECO/ Kesoram Calcutta
8	RCC Pipe	K K/ Pranali/ Pragati
9	DI MH Cover & Frame	Kartar Pipe and fittings/ NECO/ Raj Iron Foundry, Agra
10	Paints	Asian Paints/ Berger/ ICI/ Shalimar Paints
11	Double / Single Headed Landing Valve	Safeguard/ Lifeguard/ Kalpex/ Omex/ Exflame
12	Fire Hose	Safeguard/ Lifeguard/ Kalpex/ Omex/ Exflame
13	First Aid Hose Reel (LPCB Approved)	Safeguard/ Lifeguard/ Kalpex/ Omex/ Exflame
14	Branch Pipe	Safeguard/ Lifeguard/ Kalpex/ Omex/ Exflame
15	Fireman Axe	Safeguard/ Lifeguard/ Kalpex/ Omex/ Exflame
16	Installation Control Valve	Victaulic/ Tyco/ Viking/ HD
17	Sprinkler Heads	Victaulic/ Tyco/ Viking/ Reliable
18	Flexible Drop Connection (UL Listed)	Victaulic/ Exflame/ Tyco/ Easyflex
19	Fire Extinguishers	Safeguard/ Lifeguard/ Kalpex/ Omex/ Ceasefire
20	Water Flow Switch	Honeywell/ Potter/ System Sensor/ Indfoss
21	Pipe Protection Wrapping	IWL - Pypkote/ Rustech – Coatek/ STP
22	Pipe clamp & supports	Chilly/ Euroclamp/ Kanwal/ Mupro
23	GM / Forged Brass Valves	Zoloto/ CIM/ Honeywell/ Sant/ leader
24	Sluice Valves	AIP/ Kirloskar/ Kalpana
25	Butterfly Valve	Zoloto/ Castle/ Advance/ Sant/ SKS
26	Check Valve – Wafer Type	Zoloto/ Castle/ Advance/ Sant/ SKS
27	Check Valve – Dual Plate	Zoloto/ Castle/ Advance/ Sant/ SKS
28	Pressure Reducing Valve (Listed)	Tyco/ Victaulic
29	Air Release Valve	CIM/ Sant/ Castle/ Zoloto
30	Ball Float Valve	Esseti/ HBD/ Zoloto

31	Y Strainer	Emerald/ Sant/ Zoloto/ SKS
32	Hose Reel Drum (ISI marked)	Exflame/ Safeguard/ Lifeguard/ Omex
33	Siamese breaching connection/Fire service inlet draw out connection	Exflame/ Safeguard/ Lifeguard/ Omex
34	Inspector's test assembly	Victaulic/ Giacomini/ Viking
35	Fire Buckets	Exflame/ Safeguard/ Lifeguard/ Omex
36	Mechanical Seal	Burgmann/ Sealol
37	Couplings	Lovejoy/ Dunlop
38	Pressure Gauge	Fiebig/ H Guru
39	Level Controller & Indicator (Water)	Auto Pump/ Cirrus Engineering /Technika/ Techtrol
40	Welding Rods	ADOR/ Esab
41	Fastner	Fisher/ Hilti/ Wurth
42	Fire Sealant	Birla/ 3 M/ Hilti/ Promat
43	Tamper switch	Honeywell/ Infoss/ Potter/ System Sensor
44	Foot valve	Kirloskar/ Normex

THE MENTIONING OF PARTICULAR MAKE UNDER APPROVED MAKES DOES NOT FULFIL AUTOMATICALLY FOR ACCEPTANCE. THE MAKE SHALL COMPLY ALL THE PARTICULAR SPECIFICATIONS, ITEM OF WORK AND OTHER CONDITIONS OF THE CONTRACT.

IF THE ABOVE ANY BRAND OR NON AVILABILTIY OF MATERIAL IN THE APPROVED MAKE LIST THE EQUIVALENT MATERIAL TO BE APPROVED BY THE ENGINEER-IN-CHARGE.

The work shall be carried out as per KPWD/CPWD Specifications up to latest amendments and relevant IS codes. In case of discrepancy between technical specification and BOQ, the BOQ prevails.	
PREAMBLE	
1	The work shall be carried out strictly in compliance with this tender and design requirement. The onus of demonstrating satisfactory performance of entire system shall be sole responsibility of the contractor and supplied material shall be as per specifications and approved shop drawings. Relevant Indian Standards shall be adhered.
2	The unit rate for all items in the BOQ shall be quoted in Indian Rupees (INR) and include cost of equipment, wastage, accessories, tools, appliances, labour, installation, testing & commissioning upto satisfactory handover.
3	The contractor shall ensure that unit price of each item includes cost of Equipment, materials, fixing accessories, appliances, tools, plants, transport, labour and incidentals required in preparation for and in the full and entire execution, testing, balancing, commissioning and completion of work called for in the item and as per Specifications and Drawings.
4	The contractor to ensure that all waste and debris is collected and satisfactorily disposed off from site.
5	The contractor shall ensure that unit price of each item includes loading, transporting, unloading, handling/double handling, hoisting to all levels, setting, fixing in position and insurance up to satisfactory handover including security.
6	The specifications and drawings shall be read in conjunction to the Bill of Quantities. In case of conflict between Bill of Quantities and other documents including the specifications, the most stringent shall apply. The interpretation of the Architect / Consultant /Project Engineer shall be final and binding
7	The quantities mentioned in the BOQ are for contractor guidance only. The actual procurement of material shall be done only after written approval of shop drawings & technical submittals. This shall also apply to the Contractor's requisition for Owner supplied materials. The contractor shall be solely responsible for material supplied at site.
9	The contractor shall ensure work is carried out in conformity with the approved shop drawings and taking cognizance of latest architectural and other discipline drawings. The execution at site should be based on coordinated shop drawings or after obtaining written approval of Project Engineer/Architect/Consultant.
10	The progress of work shall be in accordance with approved pert chart which will be prepared by Contractor at the time of award of work and duly revised from time to time.
11	All shop drawings will be made on Autocad or Revit as per Project Engineer requirement. Colored prints shall be provided for site work. The shop drawings will clearly indicate requirement of hangars, supports, quantities and instructions for installation.
12	Tests and Inspection of MEP items: The authorized representatives from IISc may visit the works during manufacture of equipment to assess the progress of work as well as to ascertain that only quality raw materials are used for the same. They shall be given all assistance to carry out the inspection without any extra cost.

	To conduct factory test the testing facility shall be arranged as per requirement as stated in the Tender. For factory test, the cost of travelling to the factory, lodging & boarding expenditure to be included in the rate quoted.

1. TECHNICAL SPECIFICATION

The Civil, Electrical and other allied works shall be carried out as per KPWD/CPWD Specifications as amended from time to time and relevant IS codes. In case of discrepancy between technical specification and BOQ, the BOQ prevails.

GENERAL SPECIFICATIONS

PART -1 Specifications for Civil Works

1.0 EXCAVATION

1.1 The places where excavation is directed to be done shall be cleared of all shrubs, weeds, grass and vegetation including roots, where necessary and if so directed, the excavated earth must be deposited in layers of 15 cms and the clods broken. During excavations, if so directed, 'dead-man' (of volume not more 5% of the excavation volume shall be left at the places directed for verification of the dimensions of excavation). These 'dead-man' shall be removed and earth deposited at places shown before full rate is paid, Alternatively or in addition to 'dead-man', block level at intervals as directed will be jointly taken and recorded by the contractors representative and employer's representative before starting of excavation and after completion. Recording of – block levels or leaving of 'dead-man' may be avoided in the case of narrow foundations and trenches, if so directed.

1.2 The rate quoted shall include bailing or otherwise removing all water which may accumulate in the excavation from all causes and removing of swish, trimming of all sides plumb or otherwise as directed, dismantling removing and stacking as directed any existing water pipes and or soil pipes etc., encountered within the excavation.

2.0 CONCRETE WORKS

2.1 Proportion of ordinary cement concrete will be expressed as 1:4:8, 1:3:6, 1:2:4 etc., The first figure will be quantity of ordinary Portland cement by volume, the second figure will be dry coarse sand (fine aggregate) by volume and the third figure will be the quantity of coarse aggregate by volume. Cement shall be measured by weight. The weight is to be derived on the basis that one cubic meter will weigh 1440 kg or one full bag of 50kg will be assumed to be 35 lts. When the sand is wet or moist suitable corrections for bulking is to be given while proportioning. The clerk of works may allow measuring cement by volume.

2.2 Unless otherwise specified, the rates for all RCC will be exclusive of reinforcements but including from work, Reinforcements will be measured and paid separately.

2.2.1 Unless otherwise stated for all RCC work the size of coarse aggregate will be 20MM and down size.

2.2.2 Concrete proposed for roof slab and roof beams is ready mixed concrete. The contractor should quote, his rate keeping in view that the rate should include for ready mixed concrete all as per specifications and directions of Engineer-in-charge.

2.3 READY MIXED CONCRETE (RMC) IS: 4926-1976

a. The RMC from suppliers mentioned in approved list of makes should only be used.

b. The rates are inclusive of all lead and lift. Additional lead and lift charges.

c. The rate is inclusive of all necessary form work, centering and scaffolding capable of withstanding pumping of concrete.

d. The rates are applicable to the materials with a maximum radius of 25 km from the city center.

e. Test results of concrete for 28 days strength be obtained from the concerned RMC supplying firm

2.4 MATERIALS.

2.4.1 Cement:-

2.4.1.1 Cement shall comply in every respect with the requirements of the latest publication of IS: 269 and unless otherwise specified, ordinary Portland cement shall be used. No other make of cement but that approved by the Architects/ Employers will be allowed on works and the source of supply shall not be changed without approval of the Architects/Employer in writing test certificates to show that the cement used fully complies with the relevant IS specifications shall be submitted to the Architects/ Employer and not withstanding this the architects may at their discretion order that the cement brought to site and which they may consider damaged or of doubtful quality for any reasons whatsoever shall be rested in an approved testing laboratory and fresh certificate of its soundness shall be produced, Cement ordered for retesting shall not be for any work pending results of retest.

2.4.1.2 Cement shall be stored neatly packed in piles not exceeding 10 bags high in weather-proof sheds with raised wooden plank flooring to prevent deterioration by dampness or intrusion of foreign matter. It shall be stored in such a way as to allow the removal and use of cement in chronological order of receipt, i.e., the first received being first used. Cement deteriorated and/or clotted shall not be used on work but shall be removed at once from the site daily record of cement received and consumed shall be maintained by the contractor in an approved from and a copy submitted to the employer once a month.

2.4.2 Fine Aggregates:

2.4.2.1 Sand shall conform to IS: 383 it shall pass through IS sieve 4.75mm (3/ from a 16" B S) test sieve, leaving a residue not more than 5%. It shall be from a natural source or crushed stone screedings it shall we washed, if directed, to reduce the percentage of deleterious substances to acceptable-limits. Sandshall not contain any trace of salt and sand containing any trace of salt shall be rejected.

2.4.2.2 The fine aggregate for concrete shall be graded within limits as specified in IS: 383 and the fineness modules shall range between 2.60 to 3.20 the fine aggregates shall be stacked. Carefully, on a clear hard dry surface so that will not get mixed up with deleterious foreign materials. If such a surface is not available, a platform of planks or corrugated sheets or brick floor or concrete floor shall be prepared. Sand shall be added in the desired proportion as required for the strength specified, with suitable correction for "bulking".

2.4.2.3 Coarse aggregates: Coarse aggregate shall conform to IS:383. It shall consist of crushed or broken stone, 95% of which shall be retained on 4.75 mm IS test sieve. It shall be obtained from crushed granite, trap, basalt or similar approved stones from approved quarry. Coarse aggregate shall be chemically inert when mixed with cement and shall be angular in shape and free from soft friable thin porous laminated or flaky pieces. It shall be free dust and other foreign matter. – Gravel/shingle of desired grading may be permitted as a

substitute in part or full in plain cement concrete if the Architect/Employer is otherwise satisfied about the quality of aggregate.

2.5 MIXING OF CONCRETE:

2.5.1 Machine mixing:- Aggregates shall be accurately measured out in boxes and mixed dry along with required cement. Water shall then be added in measured quantity and mixing shall be continued until there is uniform distribution of the materials and the mass is uniform in colour and consistency but in no case shall the mixing be done less than two minutes. Only hopper loading mixer shall be used.

2.5.2 Hand mixing: when hand mixing is permitted with the approval of the Project-Engineer – Cum – Estate Officer, CCMD, it shall be carried out in water tight, mixing platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. If required by, the architect/consultant 10% extra cement has to be used at the contractor's cost if hand mixing is done.

2.5.3 Consistency:

2.5.3.1 Only sufficient water giving due allowance for the moisture content of aggregate shall be added to the cement and aggregate during mixing to produce a mixture of sufficient workability to enable it to be well consolidated to be worked in to corners of the shuttering and around the reinforcements (where there is reinforcements) to give the specified finish and to have the specified strength.

2.5.3.2 Normally for every 50 kg of cement in the concrete in the mix, total water including moisture content of aggregate should not be more than 34 lts for 1:3:6 mix, 32 lts for 1:2:4 mix 30 lts for 1:1 ½ :3 and 27 ltrs for 1:1:2 mix

2.5.3.3 If difficulty be experienced in placing concrete of specified mix and approved consistency between and below reinforcement bars, in the bottom of beams and similar situations, the concrete shall have improved workability by increasing the proportion of water with corresponding additional quantity of cement using aggregates of smaller size than specified as directed by the Architect/ Employer for which extra will be paid.

2.5.3.4 The consistency shall be determined by making trail mixtures with dried aggregates, or. When so instructed by test laboratory made test cubes under the direction of Architect/ Employer by slump – Test using a standard cone or the Architect/Employer may direct the use of any other means of testing the consistency.

2.5.3.5 If the apparatus used for the slump test is a standard cone, the cone when filled, shall be raised vertically – clear of the concrete: The 'slump' shall be 300mm minus the height of the slumped cone of concrete. Care shall be taken to prevent vibration of the samples being tested. The following slumps shall be adopted for different kinds of works:

		With Vibrator	Without Vibrator
A	Mass concrete in RCC foundations, footings and retaining walls	10 to 25mm	80 mm
B	RCC beam, slabs and columns	25 to 40 mm	100 to 125 mm
C	Thin RCC section or section with congested steel	40 to 50mm	125 to 150mm

2.5.4 Placing and Compacting

2.5.4.1 Method of placing concrete shall be such as to preclude segregation and as far as practicable the placing shall be continues.

2.5.4.2 Special care shall be taken in accordance with 18:456 while laying concrete under extreme weather. Concrete, during the operation of placing shall be thoroughly worked around the reinforcements, embedded fixtures, spaded against comers of the form work by punning, rodding or by any other approved means and thoroughly compacted by mechanical vibrators. The number and type of vibrator to be used, and in general immersion type vibrators shall be used.

2.5.4.3 Consolidation by using immersion vibrator will be in accordance with Is: 3558 sufficient number of reserve vibrators in good working condition shall be kept on hand at all times, so as to ensure that there is no slacking or interruption in compacting.

2.6 ADMIXTURE

The use of admixtures may be allowed only if approved b the Architect/Consultant their decision in this regard shall be final.

2.7 TRANSPORTING

Concrete shall be conveyed from the place of mixing to the place of final deposit as rapidly as practicable by methods which will prevent segregation of loss of any of ingredients? If segregation does occur during transport the concrete shall be remixed before being placed, normally not more than 30 minutes shall lapse between mixing and consolidation in position.

2.8 CURING:

All cement concrete after laying shall be protected from damages, till it sets and shall be cured thereafter for not less than ten days. The work shall be protected from direct wind and direct sun, rays. Water used for curing shall be free from sediments of any kind and generally fit for drinking.

2.9 STRENGTH OF ORDINARY CONCRETE:

2.9.1 The Contractor has to ensure that proper- materials in specified proportion are used and the correct water cement ratio, just sufficient for the workability is maintained to see that the minimum strength of concrete as provided under paragraph 3.9.2 (below) are obtained. To verify this, test cubes from the concrete pours should be made and tested. The frequency of testing and the acceptability criteria will be according to IS: 456.

2.9.2 Compressive strength of 15 cm cubes at 28 days after mixing shall be as follows: same as Para 3.13.2

2.9.3 Six pubes shall be taken from any mix selected at random as directed by Engineer-in-charge three of these should be tested after 7 days and three after 28 days. The strength at 7 days must be 2/3 of the strength at 28 days. The criteria for acceptance are only the strength at 28 days.

2.10 FORMWORK AND CENTERING

2.10.1 The form: work shall conform to the shape, lines and dimensions of the faces of concrete shown on the drawings and be so constructed as to remain sufficiently rigid the placing and compacting of the concrete and shall be sufficiently water tight to prevent loss of cement slurry from the concrete.Form work shall be constructed of steel or timber or marine plywood and adequately designed to support the full weight of wet concrete (deflectionlimited to 3mm) and retain its form during laying, consolidation arid setting of concrete. Timber used shall be properly seasoned so as to prevent deformation when wetted.

2.10.2 Props shall be straight and of full height and no joints shall be allowed props be braced bamboo's or wooden battens or other means in both directions at I intervals of 1500mm and where additional staging is necessary, extra care shall be taken to use bigger size props with bracing at necessary levels. All the props shall be supported on sole plates double wedged. At the time of removing props these wedges be gently eased and not knocked out.

2.10.3 All rubbish, chipping, shavings, sawdust etc., shall be removed from the interior of the forms before concrete is placed. The form work in contact with the concrete shall be cleaned and thoroughly wetted and treared with non staining mineral oil or any other approved material. Care shall be taken that " oil or such similar material is kept out of contact with the reinforcement.

2.10.4 Officer, GGMD at convenient places for washing down all the rubbish. These are to be closed before concreting.

2.10.5 All form work shall be removed without shock or vibration and shall be eased off carefully in order to allow the structure to take up its load gradually. Forms shall not be disturbed until concrete had adequately hardened to take up its own weight and superimposed load coming on it and in no circumstances shall forms be struck until the concrete reaches its strength of at least twice the stress to which the concrete may be subjected to at the time of striking. The said forms shall be so fixed that while removing them the supporting forms and props are not disturbed.

2.10.6 In the case of folded plates and shell roofs the contractor should take prior approval of the pattern of centering and shuttering along with programme for deshuttering.

2.10.7 The tolerance of shuttering and stripping time will be as set forth in IS : 456 if directed, forms shall be given an upward camber to ensure that the beams do not have any sa. No honey combing will be permitted, however any honey combing of minor nature as specifically allowed by the clerks of works shall be repaired neatly be with cement mortar 1:2

2.10.8 Any work showing signs of damage through premature or careless removal of centering or shuttering, shall be reconstructed by the contractor at his own cost. Surface that has to remain exposed after removal of forms shall be carefully examined and any fins, burrs, projections etc., that are detected shall be removed

2.10.9 Centering and shuttering is specified to be paid for separately, measurement of such centering and shuttering will be taken according to IS: 1200

2.11 Steel Reinforcement

2.11.1 Reinforcement for all works shall be TMT steel bars, as specified in the drawings. TMT steel bars shall be of tested quality conforming to grade I ofIS : 432 and high yield strength (of 550 N/sqmm) TMT bars shall be of IS:1786 or 1139 as appropriate. Reinforcement where called for shall be keptclean and free from pitting, loose rust millseale- oil, grease- earth paint orany material which may impair the bond between concrete and reinforcement or which may cause high corrosion of the reinforcement or deterioration of the concrete.

2.11.2 Reinforcement shall be accurately done to the dimensions, spacing and minimum cover as per structural drawings. The contractor shall submit to the clerk of work bar bending schedules, prior to the commencement of fabrication. All joints in TMT reinforcement up to and including 16mm dia shall be overlapped. The length of overlap for tension and

compression joints in TMT steel reinforcement above 16mm dia may be welded subject to the approval of the project Engineer- cum estate officer.

2.11.3 Wherever specified and / or approved, welded laps shall be provided subject to the following.

2.11.3.1 Random samples of typical – welded joints shall be made and got tested in an approved laboratory at the contractor's expenses.

2.11.3.2 If the cold twisted deformed bar has an untwisted end at lapping joint, such portion – shall be cut off prior to welding.

2.11.3.3 Bars shall be free from rust at the joints to be welded.

2.11.3.4Bars can be aligned and kept in proper axis in order to minimize crookedness in bar welding.

2.11.3.5Nothing extra shall be payable towards lap welding of joint unless specifically mentioned or agreed otherwise.

2.11.4 Reinforcement shall be rigidly held in place inside the form work using chairs (bent from steel bars) spacer bars and cement concrete blocks each block shall be secured to the reinforcement with wire or clip embedded in the center of block so that it shall not be in contact with form work. Interactions of reinforcement shall be bound together with 18 gauge annealed soft iron binding wire.

2.11.5 Before proceeding to place reinforcements the contractor shall ensure that appropriate cover between the bars and or the form work is available. Should any difficult arise during the placing of steel in obtaining the required cover the contractor shall immediately draw the attention of the architect/consultant to the difficulty and shall carryout such corrective measures as the architect/ consultant may instruct.

2.11.6 Reinforcement left projecting from newly placed concrete shall be supported in a way there is no risk of disturbance, which would cause damage to newly placed concrete.

2.11.7 The contractor shall ensure that movement of men and material subsequent to fixing in position of the reinforcement is organized such that displacement of the reinforcement will not occur.

2.11.8 The measurements recorded for reinforcements shall be including all laps and wastages as approved by the project Engineer- cum Estate officer's representative.

2.12 INSERTS IN CONCRETE

The contractor shall fix all necessary inserts such as steel – plates, pipes, sleeves, bolts etc., and shall make provisions in the form work for holes, pockets dowels, etc., at no extra cost (unless otherwise specified) to enable, subsequent fixing of supports, brackets or similar items. He shall also ensure that all conduits, inserts etc., are in position before placing concrete.

2.13 CONTROLLED CONCRETE

2.13.1 Controlled concrete shall be taken to mean that there shall be full field control of(a) predetermined grading of all aggregates that go into concrete and (b) Predetermined proportion of coarse aggregate, fine aggregate, cement and water for the required strength.

2.13.2 Strength shall mean the acceptable field strength after 28 days of curing on the tests conducted on 15 cm cubes from concrete taken during concreting in the manner set if forth in IS 456. A statement to acceptable minimum field strength is noted below.

Compressive Strength		
Grade	Preliminary test (Kg/ Sq Cm)	Work Test (Kg/Sq Cm)
M10	135	100
M15	200	150
M20	260	200
M25	320	250
M30	380	300
M35	440	350
M40	500	400

2.13.3 Arrive at the proportion to be adopted to obtain the grade of concrete, the mix should be based on laboratory tests conducted using the aggregate actually available at site which would be used for making/ concrete. The design mix should give suitable workability to enable it to be well consolidated to be worked into the corners of the shuttering and around the reinforcement.

2.13.4 Where difficulty is likely to be encountered in placing and compacting concrete and where there is crowding of reinforcements a separate mix is to be designed for required strength and used without extra cost, the mix design along with the workability obtainable with the designed mix should be furnished to the architect/employer beforehand approval obtained. A laboratory is to be established at site to assess the moisture content of aggregate as frequently as necessary and as instructed by the Architect/employer based on which corrections is to be applied to the quantity of water to be used for mixing.

2.13.5 All aggregates are to confirm strictly to IS: 383. The aggregates will be tested as frequently as directed by the Architect/Employer to see that their specifications is the same as adopted in the mix design they must be stored on clean plat form made for the purpose.

2.13.6 Concrete shall be weigh batched, Dials of weigh batching unit to be used shall be checked with standard weights periodically. The conversions of weights volume will be allowed by Project Engineer cum Estate Officer, under special circumstances. Despite the design for several, mixes the following quantities of cement are the minimum to be used per cubic meter of the different grades of concrete.

Sl No	Grade of Concrete	Cement/ Cum (Bags)
1	M5	3.20
2	M7.5	3.60
3	M10	4.40

4	M15	4.80
5	M20	6.40
6	M25	6.80
7	M30	7.20

3.0 SIZE STONE MASONRY

3.1 Size stone shall be hard granite, basalt or trap stone obtainable from approved quarry, the stones shall be clean and wetted before they are used

3.2 Height of each course shall not be less than 15cm and all courses shall be of uniform height.

3.3 No face stone shall be less in depth than in height or shall tail into the work to a length less than the height stone shall break joints at least half the height of course faces of stones shall be hammers dressed such that the buildings are not more than 25mm thickness of joints shall not be more than 20mm. Edges of face stones of exposed faces shall be chiseled true to both longitudinal and vertical lines exposed faces of corner stones are to be two lines dressed 50mm wide.

3.4 Bond or through stones shall be provided not exceeding 2.0m apart in each course and shall be staggered bond stone shall be from the front to back of the walls fro walls up to 60cms thick; they shall either be in one piece (if available locally) or be in the series of headers; each header overlapping the adjoining one by not less than 150mm bond or through stones shall be marked as directed to enable easy detection even after having been built in position. The interior (or filling) shall be with flat bedded stones laid in mortar joints and shall not exceed 10% of the quantity of stone masonry. Care is to be taken that no dry work or hollow spaces shall be left anywhere in the masonry.

3.5 The work shall include.

3.5.1 All scaffolding – platforms, staging etc.,

3.5.2 Hacking and roughening of concrete or other surfaces for binding of the masonry.

3.5.3 Raking out joints for plastering and / or pointing.

3.5.4 Leveling up and preparing and pointing.

3.5.5 Building in holdfasts or similar inserts.

3.5.6 Keeping (the work) in damp condition for two weeks

3.5.7 Construction watery situation.

4.0 BRICK MASONRY:

4.1 GENERAL

4.1.1 All brick work should be carried out as shown on the drawings with setbacks, projections, cuttings, too things etc., wherever the proportion of cement mortar has not been specifically mentioned, cement mortar in the proportion of 1:6 shall be used. Flat brick arches shall be provided, wherever required, without any extra cost. Brickwork shall be

kept wet while in progress till mortar has properly set. On holidays ro when the work is stopped top of all unfinished masonry shall be kept wet, should the mortar be dry, white or powdery, due to lack of curing work shall be pulled down and rebuilt at the contractors expense.

4.1.2 Table moulded bricks shall be locally available or brought from outside first quality having a minimum crushing strength of 40kg per sqcm and water absorption not more than 20% by weight. Bricks shall be thoroughly cleaned and well wetted. Table moulded bricks shall be soaked for atleast 12 hours in fresh water before being used on the work.

4.1.3 Unless otherwise specified, brickwork shall be done in English bond with frog upwards. The bricks shall be bedded and joined with mortar in such a manner as not to leave voids. Each brick shall be correctly into position by tapping with the handle of trowel. Grouting of mortar slurry will not be allowed expect where necessary for special reasons and in such cases, prior permission of the Architect/ Employer shall be obtained.

4.1.4 A care shall be taken that each course of brick work is truly horizontal and perfect in bond and the face of the wall is straight, plumb and even. The mortar joints shall be 10mm in thickness, except where extra thickness is required for the purpose of bringing the work to the required height or level. Half bricks or bats shall not be used except for obtaining the bond and where absolutely necessary.

4.1.5 Brickwork in 239 mm wall: If bricks are of size such that the width of the header course does not come equal to the width of the stretcher course, the difference shall be made up during construction of brickwork itself by same mortar as used for construction of masonry to provide a plane vertical surface. The surface should also be scarified to receive plaster.

4.1.6 All junctions of walk shall be carefully bonded into the main walls. The rate of laying masonry will be up to a height of 100cm per day if cement mortar is used greater heights may be built only if permitted by the Project Engineer-Cum Estate Officer.

4.1.7 During rains, the work shall be carefully covered to prevent mortar from being washed away. Should any mortar or cement be washed away the work shall be removed and rebuilt at the contractors expense.

4.2 HALF BRICK WORK:

This shall be set in cement mortar as specified. Unless otherwise specified, the walls be reinforced with 2 no's of 6mm mild steel bars with tie bars at 1m interval on the top of the first course and at every fifth course thereafter. The cost of the half brick work shall include the cost of reinforcement where reinforcement of half brick walls is specified.

5.0 Wood Works:
5.1 GRP Door shutters as per the Engineer-in-charge/ Architects approval

5.2 GLAZING WORKS

All glass shall be specified in the drawings and schedule of quantities and free from air bubbles, specks and scratches or other defects. All glass shall be cut to fit the sashes or other members as required. All glass, shall be properly bedded, securely fixed and finished as indicated on the drawings. T.W beading moulded as specified shall be provided for fixing the glass. No glazing shall be complete until all the stains and marks have been removed from the surface of glass.

6.0 ALLUMINIUM DOOR, WINDOWS ETC.,

6.1 GENERAL

6.1.1 These shall be custom-built units of approved established manufacturer using standard aluminum alloy extruded sections generally conforming to the relevant basic concept drawings of the Architects and Schedule of quantities including necessary glazing's, fittings, fastenings, locking arrangements polysulphide sealants etc., to ensure water tightness.

6.1.2 Based on the Architects concept drawings, the contractor shall submit detailed fabrication/ assembly/ erection drawings for the approval of the Engineer-in-charge. Samples of each unit, based on the approved fabrication and assembly drawings shall be made by the contractor and got approved by the Engineer-in-charge before bulk fabrication and assembly of each unit

6.2 STORAGE AND HANDLING:

The contractor shall take particular care to stack the fabricated frames etc., on the site under cover. These shall be handled with care and stacked on edge of level bearers and supported evenly.

6.3 Before erecting- the frames coming in contact with concrete, masonry, plaster or dissimilar metals, shall be treated with a coat of zinc chromate. The contractor shall cover the work with transparent lacquer based or methacrylate or cellulose butyrate, tithe surface from wet cement during installation. This coating shall be removed on completion. Before handing over, the aluminium work shall be washed with mild solution of non-alki soap and water.

6.4 The colour of anodizing shall be uniform mat natural finish otherwise stated and its sample shall be submitted for the Engineer-in-charge, approval before work commences. The section shall be anodized to a minimum thickness of 20 macros. The contractor must submit necessary evidence to the satisfaction of the Engineer-in-charge that Ae thickness of the anodisation is not less than 20 microns. In case of doubt the Engineer-in-charge may reject the materials.

6.5 TOLERANCE ON SIZE.

Frames should be made to fit the actual openings with not more than 5mm clearance all round. Discrepancies in overall width or height exceeding 5mm will not be allowed and frames will be rejected in such cases. Minor discrepancies acceptable to the Architect/ Employer shall have the gaps suitably filled. The sizes of frames, if noted in the drawings/ schedule of quantities, may vary up to plus or minus 50mm beyond which the rate payable will be increased or decreased proportionate to the changes, where the rate quoted is for one unit number, if the rate quoted is for superficial area, such area will be net finished size of the opening.

7.0 STEEL WORK:

The fabrication, supply and erection of the steel (Fe 500 N/mm2) work consists of accomplishing all related jobs like providing all labour, tools and plant, all materials and consumables such as welding electrodes, bolts and nuts, oxygen and acetylene gases, oils for cleaning etc., All of approved quality, the work shall be executed. In an expeditious and workmen like manner, as contemplated in the drawings and to the complete satisfaction of the project Engineer-cum – Estate Officer, CCMD, representative. The work shall also include providing shop primer coat of paint and grouting of hold down bolts.

8.0 PLASTERING- WORKS:

8.1 EXTENT AND INTENT

The contractor shall furnish all materials, labour , scaffolding, equipment, tools, plant and incidentals necessary as required for the completion of all plaster and wall finishes, subject to approval by the Project Engineer-cum- Estate Officer, CCMD.

8.2 GENERAL

8.2.1 Plaster as here in specified shall be applied to ail internal and external surfaces where called for Flazed tile dado, terrazzo dado and wall finishes other than plaster shall be provided where indicated on drawings and schedule of finishes. Areas called for on drawings and typical shall be considered to apply to appropriate adjoining area whether shown on same drawings or not whether indicated or not.

8.2.2 All plaster works and other wall finishes shall be executed by skilled workmen in a workman like manner and shall be of the best workmanship and in strict accordance with the dimensions on drawings subject to the approval of the project Engineer-Cum-Estate Officer, CCMD.

8.2.3 The primary requirement of plaster work shall be to provide absolutely water tight enclosure, dense, smooth, and hard and devoid of any cracks on the interior and / or exterior. The contractor shall do all that is necessary to ensure that this objective is achieved. All plastering shall be finished to the true plane, without any imperfections and shall be square with adjoining work and form proper foundation for finishing materials such as paints etc.,

8.2.4 Masonry and concrete surfaces, which call for applications of plaster, shall be clean, free from efflorescence, damp and sufficiently rough and keyed to ensure proper bond, subject to the approval of the Project Engineer-Cum- Estate Officer.

8.2.5 Wherever directed by the Project Engineer-cum-Estate Officer, CCMD, or other representative, all joints between concrete frames and masonry infilling shall be expressed by a groove cut in the plaster. The said groove shall coincide with the joints beneath as directed. Where grooves are not called for the joints between concrete members and masonry infilling shall be 24 gauge galvanized chicken mesh strip 400mm wide or as called for on drawings/documents which shall be in position before plastering.

8.3 CHASING AND CUTTING:

All chasings, installations of conduits, insert boxes etc., shall be completed before any plastering or other wall finish is commenced on a surface. No chasing or cutting of plaster or other finish on a surface shall be permitted. Broken corners shall be cut back not less than 150mm on both sides and patched with plaster of Paris as directed. All corners shall be rounded to a radius of 8mm or as directed by the Project Engineer-Cum-Estate Officer, CCMD.

8.4 SAMPLES:

Samples of each, type of plaster and other wall finish shall be prepared well in advance of undertaking the work for approval by the Project Engineer-Cum-Estate Officer, CCMD.

8.5 PROPORTIONS:

The materials used for plastering shall be proportioned by volume by means of gauge boxes.

8.6 PREPARATIONS OF SURFACES.

The joints in all walls, both existing and freshly built shall be raked to a depth of 15 cleaned with wire brushes, dusted and thoroughly wetted before starting plastering work. Concrete surfaces to receive plaster shall be roughened by hacking over theentire surface so that the skin of the concrete is completely removed, as approved by the Architect/ Employer to ensure proper key for the plaster.

8.7 PLASTER TO WALLS:

Unless otherwise specified, all works shall be plastered and finished as follows:

Internal faces : 20mm thick with cement mortar 1:6 (one part of cement and six parts of fine river sand) finished smooth with lime rendering.

External faces: 12mm thick base coat with cement Mortar 1:4 (one part of cement and four part of fine river sand) finished rough to receive the final coat and 6mm thick final coat with cement mortar 1:3 (one part of cement and three parts of coarse river sand) sponge finished.

8.8 MORTAR MIXING

Mortar shall be prepared as specified in small quantities as required and applied within fifteen minutes of mixing.

8.9 Plaster application shall be commenced only after the preparatory work is approved by the Project Engineer- Cum- Estate Officer, CCMD. Correct thickness of piaster shall be obtained by laying plaster screeds (gauges) at intervals of 1.5 m as directed. Mortar shall be firmly applied, well pressed, intothe joints, rubbed and finished to give a smooth and even surface to the satisfaction of the Project Engineer-Cum-Estate.

8.10 CURING

Finishing Plaster shall be kept wet for at least ten days after completion in hot weather, walls exposed to such shall be screened with matting kept constantly wet or by other approved means.

8.11 CLEANING PLASTERING:

Plaster to ceiling, so fits of stairs flight slabs and similar locations, where called for, shall be 12 mm thick comprising of one part cement and three parts of clean fine sand unless otherwise specified. The surface shall be brushed, swept clean and thoroughly wetted before plastering. Mortar shall be applied firmly pressed to the surface, rubbed and finished smooth evenly subject to the approval of the Project Engineer-Cum-Estate Officer, CCMD.

8.12 CEMENT MORTAR:

8.12.1 Cement mortar shall be of proportion specified for each type of work. It shall be composed of Portland cement and sand. The ingredients shall be accurately gauged and shall be evenly mixed together in a mechanical mixer. Care should be taken not to add more water than necessary. If hand mix is allowed, it shall be done on pucca waterproof platform. The gauged materials shall be put on platform and thoroughly mixed dry. Water shall Then be added and the whole then be added and the whole mixed thoroughly until the mix is homogeneous and of uniform colour. Quantity of mortar mixed should not be more than what can be consumed within half an hour of mixing.

8.12.2 Cement mortar mix are specified in 1:2, 1:3,1:4,1:5 etc., the first figure will mean one part of Portland cement by volume and the second will mean so many parts of sand by volume. For example cement mortar 1:4 would meone part of cement and four parts of sand.

8.12.3 Cement and sand must conform to relevant I.S specification

8.13 LIME RENDERING:

This will be prepared out of best quality fat lime slaked at site with fresh water not less than one week or not more than two weeks before use. All impurities, ashes and improperly burnt stuff shall be screened and picked out before slackening. Slaked lime shall be screened through to remove all unslaked materials, stones etc., so that only a fine creamy paste is available for rendering. Slaked lime is to be diluted with just sufficient water to give a thick consistent pulp suitable for effective covering of base surface. Before the base coat sets, the lime rendering is applied and finished smooth and the entire plastered surface is made truly plane.

9.0FLOORING:GRANOLITHIC FLOORING

9.1.1General:

The flooring shall be of specified thickness and shall consist of1:2:4 concrete base or as specified and 12mm thick granolithic wearing coat.The granolithic flooring shall be laid in alternate panels. The size of panels shall be as decided by the Project Engineer-Cum-Estate Officer, CCMD

9.1.2Laying of 1:2:4 concrete base:

9.1.2.1 The 1:2:4 concrete shall be of graded coarse aggregate of maximum size 10mm, coarse sand and cement. The ingredients shall be thoroughly mixed with sufficient water to obtain the required plasticity.

9.1.2.2 The free water on the surface of the base shall be removed and a coat of cement slurry of the consistency of thick cream shall be brushed on the surface.

9.1.2.3 The prepared 1:2:4 concrete shall be laid immediately after mixing on the fresh grouted base. The concrete shall be spread evenly and leveled carefully. Low places shall be filled, humps removed and the whole surface again leveled. The layer shall be compacted by ramming trowel led and allowed to set.

9.1.2.4 Mixing and laying of wearing coat: one part of cement in dry state shall be mixed with 1.5 parts by volume of well graded/crushed granite chips of6mm maximum size. The ingredients shall be then mixed with sufficient water so for ordinary concrete. The wearing coat shall be laid 12mm thick over the base concrete immediately after it has set, compacted and leveled with a steel trowel. Just sufficient trowel ling shall be made to give a level surface. The surface should not be over trowelled as excessive trowelling will bring the cement to the surface which shall be strictly avoided. When the initial set takes place, further compaction by steel trowelling shall be done and final brushing shall be made before the topping becomes too hard.

9.1.3 Curing as soon as the surface is hard enough, it shall be covered with sacking or sand and kept continuously wet for a period of at least one week.

9.2 A bed of cement mortar 1:4 shall be laid and properly leveled to average thickness of 20mm and the surface kept slightly rough to form a satisfactory key for the tiles, neat cement paste of honey like consistency shall be spread over mortar bed, over such an area so that the paste will not harden before laying tiles. Slabs shall be soaked in water for 15 minutes and allowed to dry. The slab shall be then fixed as per approved pattern with thin coat of cement paste applied on back of each slab and tapped with a wooden mallet till it is properly bedded in level with adjoining slabs. Joints shall be not more than 1:5wide. The surplus cement grout that may have come out of the joints has to be wiped off gently and joints cleaned. The joints shall, be filled up with grey or white cement with an admixture pigment to match the shade of the slab. The flooring shall be cured for 14 days. Then it

shall be polished according to IS: 1443, and pointed with cement mortar: 1:1 (1 part of cement and 1 part of fine screened sand) mixed with matching colour pigment.

9.3 GRANITE SLAB WORK:

9.3.1 General: The slab must he of uniform thickness as specified, the variation in the thickness hot exceeding 12 mm and must be from the same source. They shall be of uniform texture and colour free of anv-yeins and streaks. All the edge shall be chiseled true to line, square and shape. The surface should be rough dressed/ one line dressed. Three line dressed pulmane dressed/mirror polish as specified.

9.3.2 Rough Dressing: The stone surface to be chisel dressed to one plane by removing all bushings so that the maximum depression is not more than 6 mm.

9.3.3 One Line Dressing: This is done after the rough dressing is completed by point chiseling so that the variations are not more than 4mm. Work includes rough dressing also.

9.3.4 Two Line Dressing: This is done after, one line dressing is done by chiseling so that variations are not more than 2.5mm work includes rough and one line dressing also.

9.3.5 Three Line Dressing: This is done after two lines dressing is over by chiseling so that variations are not more than 1.5mm work includes rough, one line dressing also.

9.3.6 Pulmane Dressing: After the three line-dressing is over, the surface is smoothened by using a special pulmane tool to further even out three line dressed surface so that the maximum variation in surface evenness is not more than 1.0mm work includes rough, one line, two line and three line dressing also unless otherwise stated.

9.3.7 Mirror polishing: The surfaces are to be polished by grinding using manual or mechanical process to give a smooth even perfect plane surface or as may be directed. The polished surface should reflect light like a mirror and must be free from scratches and depressions.

9.4 GLAZED TILING

9.4.1 Glazed tiles shall be from an approved manufacture conforming to IS.777 of specified size, thickness and colour, All specials viz coves, internal and external angels, corners beads etc., shall be used wherever directed. Under layer of 12mm average thickness of cement mortar 1:3 proportion shall be laid tiles shall be well soaked in water washed clean and set in cement grout each tile being gently tapped with wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints should be kept as thin as possible and in straight lines or to suit the required pattern after tiles have been laid surplus cement grout shall be cleaned off the depth of % mm and all dust and loose mortar removed joints shall then be flush pointed with white cement if necessary mixed with pigment to match the colour of the tile. The floor / dado shall be kept wet for 14 days, after curing the surface shall be washed with mild hydrochloric acid and clean water, the finished floor/ dado shall not sound hollow when tapped with wooden mallet, the rate will include the cost of under layer of cement mortar.

10.0 PAINTING

10.1 The specifications covers the various types of all surfaces thought the interior and exterior of the building the number of coats required in various situations and also the type of finish required for the several items of work such as cement based paint, plastic emulsion point, oil bound distemper etc., are specified in the schedule of quantities and specifications.

10.2 Before commencement of the work, the contractor shall provide sample panels of painting at this own cost for the approval of the Project Engineer-Cum-Estate Officer-CCMD, to enable him to keep an accurate check on the materials supplied and final shade to be painted. It is however, the responsibility of the contractor to provide any deviations and defects shall have to be Rectified by the contractor at his own cost.

10.3 Contractor shall protect not only his own work at all times but also all the adjacent work and materials by suitable covering, protection or other methodsacceptable to the Project Engineer-Cum-Estate Officer, CCMD during progress of painting, it is of painting work to remove all paint and varnish spots from floors, walls , glass panes and other surfaces and restore them to original conditions. The work generally touched up shall be attended to after all workmen have left. Accumulated – material, rubbish etc., have to be cleared and the premises left in clean, orderly and acceptable conditions.

10.4 Contractor shall provide scaffolding wherever necessary erected on double supports tied together by horizontals. No ballies, bamboos or planks shall rest on or touch the surface, which is being painted. Contractor is demand to have considered the following while tendering and no extra claim on account of these will be entertained.

10.4.1 Supplying the paint and other materials required of approved colour and brand.

10.4.2 Preparing the surfaces to be painted.

10.4.3 Providing and erecting scaffolding and removing the same after completion of the

10.4.4 Lifting of materials to any height and painting at all levels.

10.4.5 Applications of painting as per the specification and to manufactures instruction.

10.4.6 Curing, protecting the painted surfaces and adjacent work and thoroughly cleaning of premises.

10.5 The paint shall generally conform to the chemical composition and other characteristics laid down in the relevant Indian standard specification. The entire materials required for painting work shall be obtained direct from approved manufactures or their authorized agents and brought to site in original manufactures containers with seals unbroken.

10.6 Paint shall be ready mixed of quality of the approved brand and manufacture. Mixing of paint by the contractor at site will not be allowed, except preparation and their quality shall be strictly maintained as per manufacture's instruction and all as directed by the Project Engineer-cum-Estate Officer, CCMD. All the materials shall be kept properly protected when not actually in use. Lids of containers shall be kept closed. Materials which have become stale or flat (in opinion of the project Engineer-Cum-Estate Officer, CCMD) shall not be permitted to be used on the works and shall be removed from site forthwith. Any materials found not conforming to
the relevant specifications shall have to be removed by the contractor from
the site at his own expenses.

10.7 Providing two coats of synthetic enamel paint of approved make colour over one coat of primer on plastered surfaces, wooden surfaces and steel surfaces: A fully putty coating has to be given after primer coat in the case of wooden surfaces. The putty shall be made from pure whiting mixed to the proper consistency with new linseed oil, a little whilte lead being mixed to help hardening of putty. On no account putty is to be used before primary coat. Primers to be used shall be according to the manufacture specifications.

10.8 The manner of taking measurements will be in accordance with ISI: 1200.

11.0 WHITE WASHING

White wash shall be prepared from fat lime or shell lime slaked on site mixed with just enough water to make a thick paste and allowed to remain for at least 7 days before use. At the

time of using the paste shall be diluted with just sufficient water and strained through cloth. 4 kg of gun dissolved in hot water shall be added to each cubic meter of cream (115 GMS per eft). Ultra marine blue or other approved locally available colour pigment shall be added to give required whiteness. The number of coats as specified in the bill of quantities shall be added to give required whiteness. The number of coats as specified in the bill of quantities shall be applied by using flat brushes or spray pimps, on surface prepared. Each coat shall be allowed to dry before next coat is applied.

12 TREATMENT FOR SUNKEN FLOOR SLAB:

A. Brick bat aggregate shall be from well burnt bricks. The proprietary water proofing compound and the quantity to be used shall be as per para 15.1

B. The surface shall be thoroughly cleaned with wire brushes. All loose scales shall be removed and dusted off. The surface (bottom as well as sides) shall be treated with cement slurry admixed with proprietary water proofing compound to penetrate interstices and 1111 p al 1 the porosotoes in the surface.

C. After the slurry coat is laid, a layer of well burnt brick bats/ aggregates of about 40mm size shall be laid in cement mortar of mix as specified by the specialist firm but not leaner than 1:5 (a cement : 5 coarse sand) admixed with proprietary water proofing compound the mortar being filled to half the depth of the aggregate. The brick bat/aggregate layer shall be rounded off at junctions with the beam all etc., and tapered towards top to a height of 100mm long beams/ wall, etc., curing of this layer shall be done for 3 days.

D. After curing the surface shall be applied with a coat of cement slurry admixed with proprietary water proofing compound.

E. Joints of brick bat/ aggregate shall be filled fully with cement mortar of mix as specified by the specialist firm but not leaner than 1:4 (1 cement. 4 coarse sand) admixed with proprietary water proofing compound and top finished with average 20mm thick layer of some water. This layer of mortar shall be continued to the sides of beam. Wall etc., the height upto which this treatment is to be extended on the sides shall be as directed by the Engineer-in-charge.The surface shall be finished smooth with cement slurry admixed with proprietary water proofing compound.

F. While the water proofing treatment is 3qrie it shall be ensured that the outlet pipes are properly fixed arid the gap between the wall and pipes are properly filled with brick/stone aggregate and cement mortar admixed with proprietary water proofing compound and grouted with cement slurry admixed with proprietary water proofing compound by injection process.

G. Water proofing treatment shall be cured for 10 days

H. Measurements: measurements for the floor treatment shall be taken on plain area of floor treated nothing extra shall be paid for rounding off at junctions and taking the treatment along sides of beams and walls for about 100mm sides of beam/wall etc., where the treatment is only with mortar shall be measured and paid separately , length and breadth shall be measured correct to once centimetre and area calculated correct to 0.01 sqm

I. Rates: The rates shall include the cost of all labour and material involved in all the operations described above. Base treatment and side's treatment will be paid separately under respective items.

PART II: SPECIFICATIONS FOR WATER SUPPLY AND SANITARY WORKS

1.0 GENERAL
1.0 SCOPE OF WORK:

The general character and the scope of work to be carried out is illustrated in the drawings and specifications. The contractor shall carry out and complete the said work under this contract in every respect in conformity with the rules and regulations of the local authority. The contractor shall furnish all labour, supply and install all materials, appliances, tools, equipments etc., necessary for the complete provision and testing of the whole plumbing services installation as specified here as per the relevant ISI codes as shown on the drawings. This also includes any material, appliances, equipment not specifically mentioned herein or noted on the drawings as being furnished or installed but which are necessary and customary to make a complete installation as shown on the drawings or described herein, properly connected and in working order.

In general, the work to be performed under this contract shall comprise of the following:

1.1 All incidental jobs connected with water supply services installation, such as excavation in trenches and back filling, cutting chases in concrete, brick etc., and making good cutting drilling holes through walls, floors and grouting for embedding of fixtures, equipment and fixing of valves, pumps etc.,

1.2 Furnish and install a complete workable, service installation as shown on the drawings and as per the latest ISI specifications including all that which is reasonably inferred.

1.3 Complete installation of internal water supply system.

1.4 Complete installation of the sewerage and sewerage appurtenances internally and around the building.

1.5 Complete installation of all sanitary and plumbing fixtures.

1.6 Co-operation with other crafts in putting the installation in places. Any work without regard or consultation with other trades, shall be removed by the contractor without any traditional cost to the employer, to permit the proper installation of all other work, as prescribed by the architects.

1.7 Repair all damages done to the premises as a result of this installation and remove all debris arising there from to the satisfaction of Project- Engineer – cum- Estate Officer.

1.8 Cleaning of all plumbing “fixtures, testing and showing satisfactory performance all the fixtures at the time of handing over to the Project Engineer-cum-Estate Officer.

1.9 It is the responsibility of the contractor to safe guard and takes care of all the fixtures fitted until the time handing over to the Project Engineer-cum-Estate Officer.

1.10 Painting of all concealed and exposed pipes as specified.

1.11 Assume full responsibility of all statutory requirements.

1.12 At the completion of the work, furnish necessary information like invert levels and layout of pipeline etc., and prepare final completion drawings to the Project-Engineer-cum-Estate Officer.

2.0 REGULATIONS AND STANDARDS:

2.1 The installations shall conform in all respects to the following board list of standards in general:

IS 3114 – 1965	:	Code of practice for laying of CI pipes
IS 1230-1968 steel	:	Specifications for mild steel tube, tubular and other pipe fittings part I
IS 1536 – 1980	:	Centrifugally cast (spun) cast iron pressure pipes for water gas and sewerage.
IS 780 – 1980	:	Sluice valve for water works purposes
IS 1520 – 1980	:	Horizontal centrifugal – pumps.

2.2.1 The installation shall also be in conformity with the byelaws and requirement of the local authority in so far as these become applicable to the installation wherever this "specification calls for a higher standard of materials and / or workmanship than those required by any of the above regulations and standards then this specification shall take precedence over the said regulations and standards. Wherever the specification require something which will violate the regulations, the regulations shall govern.

3.0 PERMITS AND TESTS:

On completion of the work, the Contractor shall obtain and deliver to the Project Engineer-cum-Estate Officer, CCMD certificates of final inspection and approval by the local authority as may be applicable. The Project Engineer-cum-Estate Officer, CCMD shall have full power to require the materials or work to be tested by any independent agency at the contractors expenses in order to prove their soundness and adequacy.

4.0 DRAWINGS AND SPECIFICATION

The drawings and specification shall be considered as part of this and any work or materials shown on the drawings and not called for in the specifications or vice versa shall be executed as if specifically called for in both. The contract drawings shall indicate the extent of general, arrangement of the fixtures, drainage system etc., and essentially diagrammatic. The drawings indicate the points of supply and termination of pipe runs and broadly suggest the routes to be followed. The work shall be installed as indicated on the drawings, however, any changes found essential to coordinate, this work with other trades shall be made without any additional cost. The data given herein and on the drawings is as exact as could be secured but its complete accuracy is not guaranteed. The drawings and specifications are of the assistance and guidance to the contractor and exact location distance and levels will be governed by the individual building and site condition, therefore approval of the Project Engineer-cum – Estate Officer, CCMD on tracing cloth.

5.0 MANUFACTURERS INSTRUCTIONS:

Where manufacturers have furnished specific instructions, relating to the materials used in this job, covering points not specifically mentioned in job, covering points not specifically mentioned in these documents. These instructions shall be followed in all cases.

6.0 CHANGE IN DIMENSION

If the size of the fixture mentioned is not available, then the nearest available size shall be fixed with due consent of the Engineer-in-chief, CCMD.

7.0 MATERIALS:

7.1 Materials shall be of the best quality obtainable and unless otherwise specified they shall conform to the respective Indian Standards Specification.

7.2 Samples of all materials shall be as per the list of approved branch manufacture. The samples shall be got approved before placing order and the approved samples shall be deposited with the Engineer-in-chief, CCMD.

7.3 In case of non availability of materials in merits, sizes, the nearest size of EPS units shall be provided with prior approval of the Engineer-in-chief Project Engineer-Cum-Estate Officer, CCMD, for which no extra will be paid.

8.0 TRENCHES FOR PIPE DRAINS:

8.1 Opening out trenches: In excavating the trenches etc., the road metalling pavement curbing etc., are to be placed on one side and preserved for reinstatement when the trench or other excavation shall be filled up at no extra cost.

Before any road metal is replaced, it shall be carefully shifted, the surface of all trenches and holes shall be restored and maintained to the satisfaction of the Architects. The contractor shall not-cut or break down any live fence of trees in the one of proposed works but shall tunnel under them unless the Architects shall order to the contrary. The contractor shall scrub up and

clear the surface over the trenches and other excavations of all stumps, roots and all other encumbrances affecting execution of the work and shall remove them from site to the approval of the Project Engineer-Cum-Estate, Officer, CCMD.

8.2 Cutting of roads: All works across the roads, shall be carried out as per the directions of the Project Engineer-Cum Estate Officer, CCMD.

8.3 Excavation to be taken to proper depth: The trenches shall be excavated in all conditions of soil and to such a depth that the pipelines shall rest as described in the several clauses relating thereto and so that the inverts may be at the levels given the drawings. In loose soil, the Project Engineer-cum-Estate Officer, CCMD. May order the contractor to excavate to a great depth than shown on the drawings to fill up the extra excavation with concrete, sand, gravel or other materials. For such authorized filling of materials the contractor shall be paid extra at the rates laid down under clause 20.0 of the general conditions of contract, if the extra work was ordered by the Project Engineer-Cum-Estate Officer, CCMD. If the contractor should excavate the trench to a greater depth than is required without a specific order to that effect in writing, the extra depth shall have to be filled up with concrete at the contractor's own cost to the requirements and satisfaction of the Project Engineer-Cum- Estate Officer, CCMD.

8.4 Refilling: After the pipes or other fittings has been laid and proved to be water tight, the trench or other excavation shall be refilled. Utmost care shall be taken in doing this, so that no damage shall be caused to the pipes and other permanent works. Filling in the trenches and up to 50cm above the pipes shall consist of the finest selected materials placed carefully and consolidated. After this has been laid, the trench and other excavation shall be refilled carefully in 15cm layers with materials taken from the excavation each layer being watered and consolidated.

8.5 Settlement and Damages: The contractor shall, at his own cost make good promptly, during the whole period the works are in hand, any settlement that may occur in the surfaces of roads, beams, footpaths, gardens, open spaces, etc., whether public or private caused by his trenches or by his other excavations and he shall be liable for any accidents caused thereby. He also shall at his own expenses and charge, repair and make good any damage to the buildings and other properties.

8.6 Disposal of surplus soil: The contractor shall at his own cost and charge, dispose within the site all surplus excavated material not required to be used on the works to within a distance of 50cm.

8.7 Timbering of pipe line and trenches: The contractor shall at all times support efficiently and effectively the sides of the pipe trenches and other excavations by suitable timbering, piling, sheering etc., without any extra cost. All timbering, sheeting and pilling with their walling and supports shall be of adequate dimensions and strength and fully braced and strutted so that there is no risk of collapse or subsidence of the walls of the trench. The contractor shall be held accountable and responsible for the sufficiency of all timbering, bracing, sheeting and pilling used and for all damages to persons and property resulting from the improper quality, strength, placing, and maintenance or removing of the same.

8.8 Removal of water from pipeline, trenches etc., : The contractor shall at all times during the progress of work keep the trenches and excavations free from water which shall be disposed of by him in a manner as will neither cause injury to the public health nor to the work completed or in progress nor to the surface of any roads or streets nor cause any interference with the use of the same.

8.9 The width of the excavated trench shall be as per the table given below width at bottom

• Excavation up to 90cms depth	33cm	33cm
• 90 to 150cm depth	60cm	60cm
• 150 to 300cm depth	75cm	75cm
• 300 to 500cm depth	90cm	100cm

8.10 Protection of existing services : All pipes, water mains, cables etc., met in the course of excavation shall be carefully protected and supported.

8.11 Concreting: All pipes at shallow road crossings and made up ground shall be laid on a bed of 15cm concrete with one part of cement, 4 parts of sand and 8 parts of 40mm gauge stone metal property consolidated. Concrete shall be laid to the full width of the trench and also in haunches.

8.12 CAST IRON PIPES AND FITTINGS

8.12.1 Cast – iron soil, waste and vent pipes and fittings shall be of heavy quality conforming to IS 1536-1967 and fittings to IS 1537-1960

8.12.2 Claying and Jointing: The pipes shall be laid, underground, under the floors, or on walls either buried or exposed as the case may be as shown on the drawings.

8.12.3 Cast Iron, Pipes: Cast iron pipes shall be laid and jointed in conformity with the code of practice for laying of cast iron pipes. Cast iron pipes shall be jointed by best quality caulking lead free from all impurities in wet trenches, joints shall be made with lead wool. The spigot shall be centered in the adjoining socket by tightly caulking in sufficient turns of tarred gaskin to leave unfilled the required depth of socket for lead. Where the gaskin has been caulking tightly home, a jointing ring shall be placed round and barrel and

against the face of the socket. Molten lead shall then be poured into fill the remainder of the socket in one with suitable tools by hammering right-round the joint, to make up for the shrinkage of the molten metal on cooling and shall preferably finish 3mm behind the socket face. Lead for caulking shall conform to IS 782-1966. The quantity of lead to be filled per joint in various sizes of cast iron pipes. Shall be as follows:

Water main pipes	**Lead /joint (Kg)**
80mm (3") pipe	1.8
100mm (4") pipe	2.2
125mm (5") pipe	2.6
150mm (6") pipe	3.4
200mm (8") pipe	5.0

8.12.4 The joints and pipes laid for water supply systems shall be tested to a pressure of 12kg.sqcm for two hours without developing leaks/fall in pressure. The drainage pipelines and joints shall be tested to a head of 150cm for two hours without developing leaks/fall in pressure. In case of leaks the piping shall be redone in such portion and the test repeated till achieving satisfactory results.

8.12.5 Underground piping shall be of CI tyton type confirming to IS class A 1536 the piping shall be laid not less than 1Mt below the ground level. Suitable masonry/ PCC support anchor blocks shall be provided at change in direction with soil conditions are unsatisfactory.

8.12.6 All fittings shall be CI flanged confirming to IS 1538. The flanges shall be drilled as per relevant Indian Standards Flanges shall be faced and cleaned and shall have jointing of rubber insertion or asbestos compound. In case of tytronpipes the joint shall be made by using rubber gaskets as per manufactures specification. The joint shall be capable of withstanding a pressure of 10.5 Kg/Sqcm.

9.0 SLUICE VALUES

Sluice valves shall conform to IS: 780 valves shall be of right hand type. Only flanged valves shall be used . Valve wheel shall have an arrow engraved or cast thereon showing the direction of turning open or close operation.

10.0NON-RETURN VALVES

Non return valve shall be of cast iron with gun metal seat. Non return of valves shall be of flanged type. Spring loaded valves shall not be used. The valves shall be suitable for a test pressure of 21 kgs/Sqcm.

11.0 MODE OF MEASUREMENT

11.1 Excavation (General): the width of excavation shall be limited to as said earlier.

11.2 Cast iron pipes: Cast iron pipes shall be measured along the center line of the pipe including all specials in Rmt. The quoted rate for respective item shall be Rmt, and shall include the following:

A. Cost of respective pipes and specials and jointing materials etc.,

B. Laying fixing and jointing with necessary clamps, brackets, bolts, nuts and washers.

C. Making good all damages to the parts of the building to suit the surroundings and making good the defects if any.

D. Testing and making good the defects if any

Valves: Valves shall be per number only and shall include the following:

A. Cost of valve and jointing materials
B. Fixing and jointing with necessary bolts, nuts, rubber insertion etc.,
C. Testing and making good the defects if any:

11.4 GI Pipes and Fittings:

The pipes shall be of the medium quality (class B) unless otherwise specified and shall be of galvanized iron, screwed socketed and shall conform to IS: 1239. They shall be manufactured by a firm of repute. All fittings shall be malleable iron galvanized fittings of approved best Indian make.

11.4.1 LAYING AND FIXING

11.4.1 Where pipes have to be cut or re-threaded, ends shall be carefully out so that no obstruction to bore is offered. For internal work all pipes and fittings shall be fixed truly vertical and horizontal either by means of standard pattern holder bat clamps keeping the pipes (12mm) clear of the wall everywhere or concealed as re-directed.

11.4.1.2 For external work, G.I pipes and fittings shall be laid in trenches. The width of the trench shall be the minimum width required for working. The pipes laid underground shall not be less than 60cms. From the finished ground level. The work of excavation and refilling shall be done as specified elsewhere or concealed as directed.

11.4.2 Painting : The burred pipes shall be painted with two coats of bit mastic paint.

11.4.3 Testing: Before any pieces are painted or covered, they shall be tested to a hydrostatic pressure of 7 kg/sqcm pressure shall be maintained for at least eight hours without appreciate drop in pressure, in addition to the sectional testing of water supply pipes, the contractor shall test the whole installation to the entire satisfaction of the Project Engineer-Cum – Estate Officer, CCMD. He shall rectify any leakages, failure of fittings or valves.

11.4.4 Mode of measurements: G.I pipes above and below ground shall be measured along the center line of the pipes and fittings the quoted rate for respective item shall be per Rmt and shall include the following:

a) Cost of respective pipes and specials
b) Laying, fixing and jointing with necessary clamps
c) Cutting hole and chases in walls floors, etc., and making good the same
d) Testing and making good the defects if any.

General Specification for Electrical

Technical Specifications for Main LT Panel

1	Design, fabrication, assembling, wiring and supply, installation, testing and commissioning of Main LT Panels fabricated out of (load bearing member of 2mm and non load bearing member 1.6 mm thick) CRCA sheet steel in cubicle compartmentised modular 4b construction, free standing floor mounted with bottom cable entry, dust and vermin proof with reinforcement of suitable size angle iron, channel, `T' sections and / or flats wherever necessary. 3 mm thick cable gland plates shall be provided on top as well as at the bottom of the panels. Panels shall be treated with all anticorrosive process before powder coating as per specifications and final approved shade. 2 Nos. earthing terminals shall be provided for all distribution panels. Panels shall be suitable for 415V, 3 phase, 4 wire, 50 HZ supply system. Lifting hooks shall also be provided in case of large panels. Approval shall be taken for each panel in the form of shop drawings before fabrication. Galvanised hardwares with zinc passivation shall be used in fabrication of panels.
	Main LT Panel shall be conform to relevant IEC 61439 standard and manufactured by OEM authorized franchise, necessary authorization certificate/letter to be provided. The Panel including the earth leakage protection complete as per specification & drawings as required and as given below. All internal wiring in the panels shall be carried out using high temperature FRLSZH wires.
	All live accessible parts shall be shrouded and all equipment shall be finger touch proof. The busbars shall be insulated with heat shrinkable sleeves. SMC/DMC shrouds and busbar supports suitably spaced shall be used. Hinged doors with padlocking facility shall be provided on all outgoing feeders with switch handles lockable in OFF position.
	Space provision @ 15% for future expansion
	All MCCBs shall be current limiting type microprocessor based, rated for requisite specified Service short circuit breaking capacity (Ics suitable for isolation conforming to latest IEC947-2/IS13947-2 duly marked on MCCB, at operating voltage (Ue) of 415 V, insulation voltage (Ui) 750 V and with trip free mechanism, handle indicating ON/OFF/tripped position. The breaking capacity as mentioned shall be Ics values.
	All MCCB has inbuilt feature of earth fault protection.
	MCCBs shall be compact (As the Engineer may decide), suitably designed to provide protection of motors, cables, busbars to suit rated current, unbalanced power distribution as required and with front adjustable overload and short circuit releases and minimum electrical endurance of the order of 7000-8000 operation cycles for capacity of 100-250 amps.
	MCBs shall conform to IEC898/IS 8828 (latest) and, with breaking capacity 9/10 kA at 415 V AC, current limiting type lower powerloss appx 40 - 70% of the stipulated value and suitable for magnetic releases operating between 3 to 5 times rated current for normal power distribution application and 5 to 10 times rated current for moter application duty, with minimum Electrical endurance of the order of 20000 operation cycles.
2	**MAIN LT PANEL (LT PANEL ROOM) (GROUND FLOOR)**
	Incomer comprising of:
	2000 amps 4 Pole Electrically operated fully draw out type air circuit breaker Ics 50 kA with microprocessor release unit. The release shall have following protection: Overcurrent(L), ShortCircuit,(S), GroundFault(G), Maximum demand, Fault History records, Event records facilities, LED display, % loading with adjustable setting as per specification - 2 Set
	Multifunction meter for disturbance direction detection with sag/swell monitoring and waveform capture, harmonic analyser utpo 63rd order, V,A, KWHr, Hz, P, kVAR with CT's and dual ethernet communication port - 2 Set
	Breaker ON / OFF / TRIP, Ready to close contact & indicating lights with control MCB - 2 Set
	Phase sequence relay - 2 Set

	RYB Phase indicating light protected by 2 amps MCB's. - 2 Set
	Auto-manual / test selector / switch - 2 Set
	Under Voltage and over voltage relay (27 & 59) with timer - 2 Set
	Under / over frequency relay (81) - 2 Set
	Class – B surge arrestor (Lines to Neutral) & (Neutral to Earth) suitable for 3 phases with protection fuse.
3	**Incomer from DG-01**
	1250 amps 4 Pole Electrically operated fully draw out type air circuit breaker Ics 50 kA with microprocessor release unit. The release shall have following protection: • Over current• Short Circuit (S), • Ground Fault (G), Maximum demand, Fault History records, Event records facilities, LED display, % loading with adjustable setting as per specification - 1 Set
	Multifunction meter with NextGen features like Harmonics & Min/Max Monitoring, Digital security, V,A, PF, THD, F, W, Wh, VA, VAh, Var, Varh, Runhrs, Onhrs, Interupts,Preloaded Demand & Import /Export with POP or RS485 - 1 Set
	Breaker ON / OFF / TRIP, Ready to close contact & indicating lights with control MCB - 1 Set
	RYB Phase indicating light protected by 2 amps MCB's. - 1 Set
	Auto-manual / test selector / switch - 1 Set
	Under Voltage and over voltage relay (27 & 59) with timer - 1 Set
	Excitor field DC voltmeter and ammeter.
	Voltage resrained over current protection (50 V / 51 V) type CDV62 or equivalent with CT's - 1 Set
	Engine cranking relay- 1 Set
	Microprocessor based engine control automatic failure stand by relay including all accessories
	Selector switch for engine control OFF/ON
	Five push buttons – start, stop, reset, test and accept
	Three indicating lamps "load on set', 'Load on Mains' and " Set fail to start'.
	16 Window alarm annunciators panel with hooter, push buttons, aux. Contactors etc as required as per specification.
	Battery charger with voltmeter of range 0-50 volts and ammeter of range 0-50 amps for trickle and boost charging.
	Temperature scanner
	Under power Relay with Timer - 1 Set
	Reverse Power Relay - 1 Set
	Phase Sequence Relay - 1 Set
	Under / Over Frequency Relay - 1 Set

4	**Incomer from DG-02**
	800 amps 4 Pole Electrically operated fully draw out type air circuit breaker Ics 50 kA with microprocessor release unit. The release shall have following protection: •Overcurrent,ShortCircuit(S),GroundFault(G), Maximum demand, Fault History records, Event records facilities, LED display, % loading with adjustable setting as per specification - 1 Set
	Multifunction meter with NextGen features like Harmonics & Min/Max Monitoring, Digital security, V,A, PF, THD, F, W, Wh, VA, VAh, Var, Varh, Runhrs, Onhrs, Interupts,Preloaded Demand & Import /Export with POP or RS485 port - 1 Set

	Breaker ON / OFF / TRIP, Ready to close contact & indicating lights with control MCB - 1 Set
	RYB Phase indicating light protected by 2 amps MCB's. - 1 Set
	Auto-manual / test selector / switch - 1 Set
	Under Voltage and over voltage relay (27 & 59) with timer - 1 Set
	Excitor field DC voltmeter and ammeter.
	Voltage resrained over current protection (50 V / 51 V) type CDV62 or equivalent with CT's - 1 Set
	Engine cranking relay- 1 Set
	Microprocessor based engine control automatic failure stand by relay including all accessories
	Selector switch for engine control OFF/ON
	Five push buttons – start, stop, reset, test and accept
	Three indicating lamps "load on set', 'Load on Mains' and " Set fail to start'.
	16 Window alarm annunciators panel with hooter, push buttons, aux. Contactors etc as required as per specification.
	Battery charger with voltmeter of range 0-50 volts and ammeter of range 0-50 amps for trickle and boost charging.
	Temperature scanner
	Underpower Relay with Timer - 1 Set
	Reverse Power Relay - 1 Set
	Phase Sequence Relay - 1 Set
	Under / Over Frequency Relay - 1 Set
	Incomer from Solar Panel System
	400 TPN MCCB with Microprocessor release for over current, short circuit & earth fault protection etc. - 1 Set
	Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 400/5 15 VA, CL 0.5, 3 No. CTs- 1 Set
	Breaker ON / OFF / TRIP indicating lights with control MCB - 1 Set
	Phase indicating light protected by 2 amps MCB's. - 1 Set
	400 4pole Contactor - 1 set
	Bus Coupler comprising of
	1250 amps 4 pole electrically operated fully drawout type air circuit breaker with ON / OFF / TRIP indicating lamps with control MCB's, shunt trip, breaker control switch etc. - 1 Set
	Bus Bar comprising of :
	2500 Amps 4 Pole Aluminium Bus Bar throughout the panel with colour coded heat shrinkable steeve

5	**Outgoing comprising of :**
	630 Amps TPN MCCB Microprocessor based releases for SC and OL& EF protections etc. - 4 Set
	400 Amps TPN MCCB Microprocessor based releases for SC and OL& EF protections etc. - 3 Set
	250 amps TPN MCCB with Microprocessor release for SC, OL & EF Protection protection etc. -6 Set

	160 Amps TPN MCCB with Thermal magnetic based releases for SC and OL protections - 2 Set
	125 Amps TPN MCCB with Thermal magnetic based releases for SC and OL protections - 7 Set
	100 Amps TPN MCCB with Thermal magnetic based releases for SC and OL protections - 7 Set
	63 Amps TPN MCCB with Thermal magnetic based releases for SC and OL protections - 1 Set
	Notes:-
	All Outgoing feeders shall be provided with **Energy Meter** for VAF, PF, Power & eneregy with **RS - 485 port with 15 VA, CL 0.5** and all meters wired at one point for BMS compatibility.
	All ACB, MCCB RS 485 ports and meters shall be wired at one point for BMS compatibility.
	All Outgoing feeders shall be provided with Three phase indicating lamps protected by 2 amps SP MCBs.
	All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.
	All incoming and outgoing breakers shall be electrically/ mechanically interlocked through a **Load Sharing cum Synchronization PLC** comprising suitable nos. digital inputs (24 VDC) and output (Relay) for auto operation of DGs as per load requirement. PLC bypass shall also be provided.
	All incoming, outgoing and buscoupler breakers shall be minimum **35 kA** rating with Icu = Ics.
	Each section of the panel shall be provided with LED light & limit switch, space heater and thermostat etc.
	Transformer & DG Section shall be in Blue & Orange Colour. Bus Coupler shall be in Green Colour.
	All outgoing breakers shall have Z CT & EF relay.
	2000/5, 15 VA dual ratio CT's shall be provided for APFCR on each transformer incomer.
	MAIN LT PANEL (LT PANEL ROOM) (GROUND FLOOR) described as above

NOTE: Contact Details of Independent External Monitors are Provided Below;

- Mr. Najib Shah, Ph no: 9311706358, Email ID: najibshah@hotmail.com
- Mr. MJ Joseph, Ph No: 9560697979, Email ID: mohan.joseph@gamil.com

Sl. No	Description	Unit	Qty
1	Earth work excavation for Foundation by mechanical means for all works & depth upto 3 m, as per drawing and technical specifications, including setting out, shoring, strutting, barricading, caution lights, including dressing of excavated surfaces, disposing off or levelling the excavated earth or sorting & stacking the selected earth for reuse in a radius of 50 m and lift upto 1.5 m including cost of labour, tools, usage of machinery & other appurtenaces required to complete the work In all kinds of soils Depth upto 3 m Note: Cost of De-watering upto 5 % of (A+B) may be added, where required assessment for dewatering shall be made as per site condition	Cum.	17853.00
2	Earth work excavation for Foundation by mechanical means for all works & depth upto 3 m, as per drawing and technical specifications, including setting out, shoring, strutting, barricading, caution lights, including dressing of excavated surfaces, disposing off or levelling the excavated earth or sorting & stacking the selected earth for reuse in a radius of 50 m and lift upto 1.5 m including cost of labour, tools, usage of machinery & other appurtenaces required to complete the work Depth 3m to 6m Note: Cost of dewatering upto 7.5 % of (A+B) may be added, where required assessment for dewatering shall be made as per site condition	Cum.	17853.00
3	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations and other similar works etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift upto 1.5 m.	Cum.	15352.00
4	Supplying and filling in plinth with sand under floors, foundation of Bridges including watering, ramming, consolidating and dressing complete.	Cum.	1315.00
5	Providing and injecting chemical emulsion for Pre-constructional Anti-Termite Treatment, creating continuous chemical barrier under and around the column pits, walls, trenches, basement excavation, top surface of the plinth filling, junction of wall and floor, along the external perimeter of building, expansion joints, over the top surface of consolidated earth on which apron is to be laid, surrounding of pipes and conduits with Chlorpyriphos 20% E.C. / Lindane 20% E.C. @ 3.19 l/m2 including cost of chemical, diluting in water to one percent concentration, labour, usage charges of machinery, complete as per specifications.	Sqm.	3655.00
6	Providing and laying in position plain cement concrete for levelling course for all works in foundation. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed, laid in layers not exceeding 150 mm thickness, well compacted using plate vibrators, including all lead & lifts, cost of all materials of quality, labour, Usage charges of machineries, curing, and all the other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement & formwork shall be paid separately) Mix 1:3:6 (M10) Using 20 mm nominal size graded crushed coarse aggregates	Cum.	766.00
7	Providing and laying in position Reinforced cement concrete for all Sub structures of building, Irrigation works, Sub structure works of bridges, Drain works & other parallel works from 0.50m to 3.50 m height. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers, laid in layers, well compacted using needle vibrators, providing weep holes wherever necesary, including all lead & lifts, cost of all materials of quality, confirming to the requirements of relevant IS codes, labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement & formwork to be paid separately) Mix 1:2:4 (M15) Using 20 mm nominal size graded crushed coarse aggregates	Cum.	722.00
8	Construction of Granular Sub-Base of required grading as per design mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, completme as per clause 401 For Grading -I Material	Cum.	366.00
9	Construction of Granular Sub-Base of required grading as per design mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading -II Material	Cum.	366.00

10	Making plinth protection 50mm thick of cement concrete 1:3:6 (1 cement : 3 coarse sand (zone-III) derived from natural sources : 6 graded stone aggregate 20 mm nominal size derived from natural sources) over 75mm thick bed of dry brick ballast 40 mm nominal size, well rammed and consolidated and grouted with fine sand, including necessary excavation, levelling & dressing & finishing the top smooth.	Sqm.	321.00
11	Providing and laying damp-proof course 40mm thick with cement concrete 1:2:4 (1 cement : 2 coarse sand (zone-III) derived from natural sources : 4 graded stone aggregate 12.5mm nominal size derived from natural sources)	Sqm.	100.00
12	Providing & applying a coat of residual petroleum bitumen of grade of VG-10 of approved quality using 1.7kg per square meter on damp proof course after cleaning the surface with brushes and finally with apiece of cloth lightly soaked in kerosene oil.	Sqm.	100.00
13	Providing Thermo-Mechanically Treated bars of grade Fe-500D or more Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position, binding and anchoring to adjacent members whereever necessary complete as per Design including cost of material, labour, usage charges complete as per specifications. (The laps and wastages shall not be measured separately)	Kg.	2203357.00
14	Providing and laying in position Reinforced cement concrete for all Sub structures of building, Irrigation works, Sub structure works of bridges, Drain works & other parallel works from 0.50m to 3.50 m height. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers, laid in layers, well compacted using needle vibrators, providing weep holes wherever necesary, including all lead & lifts, cost of all materials of quality, confirming to the requirements of relevant IS codes, labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Isolated Footings	Cum.	934.00
15	Providing and laying in position Reinforced cement concrete for all Sub structures of building, Irrigation works, Sub structure works of bridges, Drain works & other parallel works from 0.50m to 3.50 m height. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers, laid in layers, well compacted using needle vibrators, providing weep holes wherever necesary, including all lead & lifts, cost of all materials of quality, confirming to the requirements of relevant IS codes, labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Other type of Foundation	Cum.	3664.00
16	Providing and laying in position Reinforced cement concrete for all Sub structures of building, Irrigation works, Sub structure works of bridges, Drain works & other parallel works from 0.50m to 3.50 m height. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers, laid in layers, well compacted using needle vibrators, providing weep holes wherever necesary, including all lead & lifts, cost of all materials of quality, confirming to the requirements of relevant IS codes, labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement & formwork to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Plinth Beam/Beams	Cum.	220.00
17	Providing and laying in position Reinforced cement concrete for all Sub structures of building, Irrigation works, Sub structure works of bridges, Drain works & other parallel works from 0.50m to 3.50 m height. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers, laid in layers, well compacted using needle vibrators, providing weep holes wherever necesary, including all lead & lifts, cost of all materials of quality, confirming to the requirements of relevant IS codes, labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Walls	Cum.	913.00

18	Providing and laying in position Reinforced cement concrete for all Sub structures of building, Irrigation works, Sub structure works of bridges, Drain works & other parallel works from 0.50m to 3.50 m height. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers, laid in layers, well compacted using needle vibrators, providing weep holes wherever necesary, including all lead & lifts, cost of all materials of quality, confirming to the requirements of relevant IS codes, labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Grade Slab	Cum.	413.00
19	Providing and laying in position Reinforced cement concrete for all Sub structures of building, Irrigation works, Sub structure works of bridges, Drain works & other parallel works from 0.50m to 3.50 m height. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers, laid in layers, well compacted using needle vibrators, providing weep holes wherever necesary, including all lead & lifts, cost of all materials of quality, confirming to the requirements of relevant IS codes, labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcemen to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Slab	Cum.	532.00
20	Providing and laying in position Reinforced cement concrete for all Sub structures of building, Irrigation works, Sub structure works of bridges, Drain works & other parallel works from 0.50m to 3.50 m height. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers, laid in layers, well compacted using needle vibrators, providing weep holes wherever necesary, including all lead & lifts, cost of all materials of quality, confirming to the requirements of relevant IS codes, labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcemen to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Stair	Cum.	47.00
21	Providing and laying in position Reinforced cement concrete for all Sub structures of building, Irrigation works, Sub structure works of bridges, Drain works & other parallel works from 0.50m to 3.50 m height. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers, laid in layers, well compacted using needle vibrators, providing weep holes wherever necesary, including all lead & lifts, cost of all materials of quality, confirming to the requirements of relevant IS codes, labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcemen to be paid separately but inclusive of centering & Shuttering) M40 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Column	Cum.	291.00
22	Providing and laying in position Reinforced cement concrete for all Super structures of building , Road works, Water works, Irrigation works & super structure works of bridges upto 3.50 m height. The granite/ trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers laid in layers, well compacted using needle vibrators. The cost includes all lead & lifts, cost of all materials, quality confirming to the requirements of relevant IS codes , labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Lintel	Cum.	296.84
23	Providing and laying in position Reinforced cement concrete for all Super structures of building , Road works, Water works, Irrigation works & super structure works of bridges upto 3.50 m height. The granite/ trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers laid in layers, well compacted using needle vibrators. The cost includes all lead & lifts, cost of all materials, quality confirming to the requirements of relevant IS codes , labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Slab Level Beams	Cum.	2172.24

24	Providing and laying in position Reinforced cement concrete for all Super structures of building , Road works, Water works, Irrigation works & super structure works of bridges upto 3.50 m height. The granite/ trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers laid in layers, well compacted using needle vibrators. The cost includes all lead & lifts, cost of all materials, quality confirming to the requirements of relevant IS codes , labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Slab	Cum.	2427.49
25	Providing and laying in position Reinforced cement concrete for all Super structures of building , Road works, Water works, Irrigation works & super structure works of bridges upto 3.50 m height. The granite/ trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers laid in layers, well compacted using needle vibrators. The cost includes all lead & lifts, cost of all materials, quality confirming to the requirements of relevant IS codes , labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregatesWalls	Cum.	420.53
26	Providing and laying in position Reinforced cement concrete for all Super structures of building , Road works, Water works, Irrigation works & super structure works of bridges upto 3.50 m height. The granite/ trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers laid in layers, well compacted using needle vibrators. The cost includes all lead & lifts, cost of all materials, quality confirming to the requirements of relevant IS codes , labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M35 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Stair	Cum.	332.00
27	Providing and laying in position Reinforced cement concrete for all Super structures of building , Road works, Water works, Irrigation works & super structure works of bridges upto 3.50 m height. The granite/ trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers laid in layers, well compacted using needle vibrators. The cost includes all lead & lifts, cost of all materials, quality confirming to the requirements of relevant IS codes , labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M40 Design Mix Using 20 mm nominal size graded crushed coarse aggregates Columns (all Level)	Cum.	1562.00
28	Providing and laying in position Reinforced cement concrete for all Super structures of building , Road works, Water works, Irrigation works & super structure works of bridges upto 3.50 m height. The granite/ trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers laid in layers, well compacted using needle vibrators. The cost includes all lead & lifts, cost of all materials, quality confirming to the requirements of relevant IS codes , labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M40 Design Mix Using 20 mm nominal size graded crushed coarse aggregates PT Beam	Cum.	2103.00
29	Providing and laying in position Reinforced cement concrete for all Super structures of building , Road works, Water works, Irrigation works & super structure works of bridges upto 3.50 m height. The granite/ trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticisers laid in layers, well compacted using needle vibrators. The cost includes all lead & lifts, cost of all materials, quality confirming to the requirements of relevant IS codes , labour, Usage charges of machinery, curing and all other appurtenances required to complete the work as per technical specifications. (The cost of steel reinforcement to be paid separately but inclusive of centering & Shuttering) M40 Design Mix Using 20 mm nominal size graded crushed coarse aggregates PT Slab	Cum.	478.00

30	Providing and laying cinder concrete in cement 1:15 (1 cement : 15 cinder of 12.5mm nominal gauge) on terraced roof or sunken slabs, laid to slope compacting, including cost of materials, labour, curing complete as per specifications.	Cum.	315.00
31	Providing and fixing in position 200mm wide Stainless steel Grade 304 plate-1.0 mm thick as per design for expansion joints. Floor Joint of 50-100 mm gap	m	318.00
32	Designs & Execution of Post Tensioning works including de coiling the strands, cutting to the required lengths, supplying and laying of HT strands, sheathing(GI corrugated ducts 0.30 mm thick) jointing and inserting the strands, profiling, fixing live end anchorages including the supply of stressing anchorages suitable for 2/3/4/5/7/12/19 strand Tendons, grout vents, making dead end anchorages including flowering the strands, fixing tendon support bars, supervising the fixing of anti bursting reinforcement, stressing the cables, end trimming, grouting the cables with cement and admixtures, with required Plant & Machineries, tools and tackles, consumables etc., works including PT designs and drawings & obtaining approval from client/consultant for the work done as per the requirement of Engineer-In charge at site.	MT	73.00
33	Providing & Laying non-shrink, free-flowing and high strength cementitious grout meeting the requirements of ASTM –C-1107, for depths up to 60 mm.	Cum.	5.00
34	Providing and laying water proofing treatment to the Roof with PU based single component elastomeric pure polyurethane based coating on New terrace/Chajjas/Sunken portion of WC:Bathroom, cold applied PU waterproofing membrane that is highly elastic with elongation greater than 400% and tensile strength greater than 2MPa as per ASTM D412. The waterproofing membrane to be applied in 2coats @ 1.6kg per m2 to achieve final DFT (dry film thickness) of 1mm including prime coat of epoxy primer @150 g per m2 and protection with 120gsm Geo-textile over the waterproofing membrane. The finished cost to include surface preparation, making coving at Junction, Bore Packing, treatment of construction joints completely as per specification & with a 10 years warranty on product & work from certified manufacturers as per the direction of the Engineer In charge.	Sqm.	1946.00
35	Providing and fixing polyurethane foam (PUF) slab 60mm thick average with PU slab density 36+/-2 kg/m³ insulation for over deck covered with two layers of 40mm thick cement concrete screed with mix proportion 1:1.5:3 (M20grade) smooth finished with floating coat of neat cement, including necessary polymerized plaster reinforced with glass fibre mesh for PUF slab, epoxy bases bonding adhesive etc., complete	Sqm.	1946.00
36	Providing and Applying PU based Elastomeric Liquid Applied PU Waterproofing Membrane single component, cold applied, water based acrylic PU dispersion with highly elastic and UV resistant water proofing treatment to the Existing Roof surface/Chajjas/Sunken portion of WC:Bathroom applied @ 1.2L/per m2,having tensile strength greater than 1.5N/mm2, elongation greater than 300% with solid content not less than 60% in 2 coats including surface preparation, priming the surface with water based acrylic primer @0.1 L/m2, and spreading 60 gsm geotextile between two top coats completely as per specification. The finished cost to include surface preparation, making coving at Junction, Bore Packing, treatment of construction joints completely as per specification & with a 10 years warranty on product & work from certified manufacturers as per the direction of the Engineer In charge.	Sqm.	2021.00
37	Providing and laying water proofing treatment to the Retaining wall area with PU Elastomeric Single component liquid applied, cold applied, moisture cured high tensile elastomeric PU waterproofing membrane having elongation of more than 400% and having solid content of above 90% @ 1.6kg per m2 in 2 coats to achieve final DFT (dry film thickness) of 1mm including prime coat of epoxy primer @150 g/ m2. The cost is inclusive of surface preparation, crack filling, repair of loose mortar etc. completely as per specification & with a 10 years warranty on product & work from certified manufacturers as per the direction of the Engineer In charge.	Sqm.	3268.00

38	Providing and laying water proofing treatment to the Rafts, Below grade slab, Lift pits, water retaining structures with fully bonded High Density Polyethlene Membrane (HDPE) of 1.2mm composite thickness and having tensile strength of >25 MPa (as per ASTM D 412), elongation of >500% (as per ASTM D 412), puncture resistance of >1000N (as per ASTM E 154), peel adhesion to concrete >1200N/m (as per ASTM D 903), hydrostatic head resistance >70m (as per ASTM D 5385). The system should be fully bonded to the RCC thereby conforming to IS 16471:2017 requirements of UG waterproofing structures. The membrane should be minimum 2.4m wide to reduce the number of joints with minimum 75mm factory made selvedge's and comprising of an HDPE layer and a pressure sensitive adhesive layer which is covered by a weather proof protective and trafficable granular layer to protect self-adhesive polymer layer, etc, including surface preparation completely as per specification & with a 10 years warranty on product & work from certified manufacturers as per the direction of the Engineer In charge.	Sqm.	3692.00
39	Providing and laying water proofing treatment to the Water tanks & Liquid Retaining structures with two component acrylic polymer modified cementitious waterproofing membrane with minimum elongation of 50% applied @ 1.5 kg/m2 for internal side waterproofing in two layers with waiting period of 4-6 hrs per layer and food grade epoxy coating in two coats certified by CFTRI Mysuru, including surface preparation completely as per specification & with a 10 years warranty on product & work from certified manufacturers as per the direction of the Engineer In charge.	Sqm.	425.00
40	Providing and laying waterproofing treatment by chemical injection grout process on retaining walls and raft of basement using 25mm dia M.S nozzles inserted minimum 1/3 thickness of walls,and 1/3 thickness of basement raft & U.G Sump raft placed and fixed @ 0.7 m C/C distance in both directions and @ 0.75 m C/C along construction joints,consisting of injecting cement slurries of different viscosities under pressure by pump using water proofing grout @ 225 gm/50 kg of cement or approved equivalent make conforming to IS: 2645 and as per manufacturer's specification and sealing of nozzles after the injection operation with suitable admixture. All complete as per direction of the Project - incharge.	Sqm.	425.00
41	Supplying, filling, spreading & leveling gravels of size range 5 mm to 10 mm, in the recharge pit, over the existing layer of boulders, in required thickness, for all leads & lifts, all complete as per direction of Engineer-in-charge.	Cum.	338.00
42	Supplying, filling, spreading &leveling coarse sand of size range 1.5 mm to 2 mm in recharge pit, in required thickness over gravel layer, for all leads & lifts, all complete as per direction of Engineer -in-charge.	Cum.	169.00
43	Gravel packing in tube well construction in accordance with IS: 4097, including providing gravel fine/ medium/ coarse, in required grading & sizes as per actual requirement, all complete as per direction of Engineer-in-charge.	Cum.	169.00
44	Providing & Laying geotextile 120 GSM over horizontal/sloped surfaces Cost is inclusive of overlapping, only applicable area will be measured for payment.	Sqm.	1688.00
45	Providing, jointing and fixing perforated uPVC drainage system conforming to IS : 13592 - Type B and UPVC fittings (moulded as well as fabricated) like bends, tees, Y-tees, crosses, boss connections, access pieces, saddle pieces, cleanouts, adaptors for connections to other materials, plugs, reducers, cowls, offsets,cleanout plug and other specials. Jointing shall be done with pushfit EPDM ring jointing technique in general. Solvent cement joints may be provided for fittings and specials which are not manufactured with pushfit rubber joints. 110 mm dia	Rmt.	225.00
46	Providing Brick work with common burnt clay Non Modular bricks of class designation 3.5 in foundation and plinth in Cement mortar 1:6 (1 cement : 6 coarse sand) including cost of all materials, labour, scaffolding and usage charges of machinery & other incidental charges complete as per the direction of engineer incharge of work.	Cum.	1133.00
47	Providing and laying autoclaved aerated cement blocks masonry with 150mm/230mm/300 mm thick AAC blocks as per IS 2185 (Part III) in super structure above plinth level up to floor I level with RCC band at sill level and lintel level with approved block laying polymer modified adhesive mortar including cost of all materials, labour, scaffolding and usage charges of machinery & other incidental charges complete as per the direction of engineer incharge of work. Cement mortar 1:6 (1 cement : 6 coarse sand)	Cum.	2486.00

48	Extra for brick work/ AAC block masonry/ Tile brick masonry in superstructure above floor V level, for each four floors or part thereof by mechanical means.	Cum.	1106.00
49	Providing Half brick masonry with common burnt clay Non Modular bricks of class designation 3.5 in superstructure above plinth level up to floor 1 level cement mortar 1:4 (1 cement :4 coarse sand) including cost of all materials, labour, scaffolding and usage charges of machinery & other incidental charges complete as per the direction of engineer incharge of work.	Sqm.	100.00
50	Extra for providing and placing in position 2 Nos 6mm dia. M.S. bars at every third course of half brick masonry.	Sqm.	100.00
51	Providing cement plaster with cement mortar 1:4 (1 cement: 4 fine sand) to brick masonry including rounding off corners wherever required smooth rendering, providing and removing scaffolding, including cost of materials, labour, curing complete as per specifications and as per directions of Engineer-in-charge. 12 mm average thickness	Sqm.	8853.00
52	Providing cement plaster with cement mortar 1:4 (1 cement: 4 fine sand) to brick masonry including rounding off corners wherever required smooth rendering, providing and removing scaffolding, including cost of materials, labour, curing complete as per specifications and as per directions of Engineer-in-charge. 15mm average thickness	Sqm.	13940.00
53	Providing 18 mm cement plaster in two coats under layer 12 mm thick cement plaster with cement mortar 1:5 (1 cement : 5 coarse sand) finished with a top layer 6 mm thick cement plaster with cement mortar 1:6 (1 cement : 6 fine sand) to brick masonry including rounding off corners wherever required smooth rendering, providing and removing scaffolding, including cost of materials, labour, curing complete as per specifications and as per directions of Engineer-in-charge.	Sqm.	10455.00
54	Providing 6 mm cement plaster with cement mortar 1:3 (1 cement : 3 fine sand) including rounding off corners wherever required smooth rendering, providing and removing scaffolding, including cost of materials, labour, curing complete as per specifications and as per directions of Engineer-in-charge.	Sqm.	1496.00
55	Providing and applying white cement based putty of average thickness 1 mm, of approved brand and manufacturer, over the plastered wall surface to prepare the surface even and smooth complete as per specifications and as per directions of Engineer in charge.	Sqm.	24289.00
56	Providing & applying Exterior grade texture paint non-pigmented stone finish with Natural mineral aggregates combined with adhesives and resins. The Finish to be water repellent, anti-fungal, breathes out trapped moisture, having unique property of elasticity & flexibility (due to temperature variation no hairline cracks to appear) protective and decorative coating on exterior surfaces such as, concrete & plastered Surface (as per approved) in colour and pattern as per direction of engineer-in-charge. The works include providing and laying one coat of primer and sealer mixed in equal ratio followed by one coat of basecoat with steel trowel made of natural stone crushed powder, 2nd coat to be applied with steel trowel and finished by acrylic trowel or spray gun of natural stone crushed powder added with granite chips. Final coat of ultra protect shall be applied with roller/spray diluted with water, (as per manufacturer's specification and approval of E-I-C) including cost and conveyance of all material, labour, sundries, tools and machinery etc. all complete. (The base preparation with putty shall be included & will not be paid separately)	Sqm.	4705.00
57	Finishing walls with water proofing cement paint of required shade :Old work (one coats applied @ 2.20 kg/10 m²) over priming coat of primer applied @ 0.80 litrs/10 m² complete including cost of Priming coat including preparing the surface after thoroughly cleaning the surface to remove all dirt, dust and foreign matter, cost of materials, labour complete as per specifications and as per directions of Engineer-in-charge.	Sqm.	500.00
58	Finishing walls with Acrylic Smooth exterior paint of required shade :New work (Two coat applied @ 1.67 ltr/10 m² over and including priming coat of exterior primer applied @ 2.20 kg/10 m²) with paint of approved quality to give an even shade, after thoroughly brooming the surface to remove all dirt, dust, mortar drops and foreign matter including preparing the surface even and sand paper smooth, cost of materials, labour complete as per specifications and as per directions of Engineer-in-charge.	Sqm.	3500.00

59	Acrylic Emulsion Paint:- Finishing walls with 100% Premium acrylic emulsion paint having VOC less than 50 gm/litre and UV resistance as per IS 15489:2004, Alkali & fungal resistance, dirt resistance exterior paint of required shade (Company Depot Tinted) with silicon additives, New work (Two coats applied @ 1.43 litre/ 10 m². Over and including priming coat of exterior primer applied @ 0.90 litre/10 m² with paint of approved quality to give an even shade, after thoroughly brooming the surface to remove all dirt, dust, mortar drops and foreign matter including preparing the surface even and sand paper smooth, cost of materials, labour complete as per specifications and as per directions of Engineer-in-charge.	Sqm.	64147.00
60	Ceramic glazed wall tile:- Providing and fixing 1st quality rectified ceramic glazed wall tiles conforming to IS: 15622 (thickness to be specified by the manufacturer), of approved make, in all colours, shades except burgundy, bottle green, black of any size as approved by Engineer- in-Charge, in skirting, risers of steps and dados, over 12 mm thick bed of cement mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per m2, including pointing in white cement mixed with pigment of matching shade complete.	Sqm.	3202.00
61	Providing & Fixing of 6mm thick lacquered toughened glass of approved shade and colour, fixed with compatible alkoxy neutral core silicon over levelled surface in design and pattern as per drawings fixed over available strata. The Lacquered glass shall be highly durable, humid resistance, polyurethane lacquer glass. Lacquered glass must be made industrially (via curtain coating process); opaque (if viewed against a support wall), coated with PU lacquer (50 micron thick); color consistency (measured by Minolta spectrophotometer CM5081); highly durable (passes PERSOZ hardness test for minimum 220 oscillations); humid resistant (conforms to BS EN 1036 1999); environmentally friendly (no lead, no arsenic, no copper, no formaldehyde); appropriate recycled content (12% post industrial / 6% post consumer); compressive strength (1000 MPa) & tensile strength (40 MPa),same as float glass. Silicone used should not react with lacquer coating (compatible, alkoxy neutral core), low VOC content <100g/l, low sag, curing time 36 hrs, medium to high modulus. cost is inclusive of provision of Aluminium base frame & base ply to recieve the 6mm thick lacquered glass. Complete in all respect as per the direction of the Engineer-in-charge. Cost is inclusive of all necessary scaffolding.	Sqm.	216.00
62	Supply and Fixing of Slim Glass partition of 10mm Toughened Glass with insertion of Thermoplastic gasket to adhere the glass firm & airtight. The sound reduction Value is from 32 to 35 Db, using System Anodized Aluminium Frames to a height of maximum 3m or as per drawing.The Fixed glass to be fixed using Aluminum Profiles at Top & Bottom & end at sides. The profile size to be 45-50x25-30MM to be fixed on to the floor/wall/ ceiling as per the architect design. H Junction profile to be used at all Glass to Glass vertical joints, 90 Deg L Junction Profiles and T Junction profiles necessary as per design. Aluminium profiles should be suitable for Glass thickness of 10/12/13.52mm.The Profile should be matt desired coloured anodized, the Profile Manufacturer to supply all the necessary clips, seals and fixing accessories for the system. All Profiles to be with 2 mm Gauge thickness Excluding 20-25 Micron of Anodizing.	Sqm.	648.00
63	Frosting Film:- Providing and applying 3M frosting film over the glass surface as per approved pattern. (Base rate 1500/- per Sqm). Complete in all respect as per the direction of the Engineer-in-charge. Cost is inclusive of all necessary scaffolding.	Sqm.	200.00
64	Providing, Making and Fixing up to 600 mm. deep Back storage cabinets with shutters and drawers made out of 19 mm thk. water proof ply with back of 6 mm thk. water proof ply finished with 1.5 mm. thk. Laminate and 0.6 mm thick backing laminate on all internal surfaces as per the design and approval of the Architect including providing PVC edging at all junctions and all exposed surface and edges (including fixing SS hinges, Hardware & modular accessories as approved & required.). Shutter are framed 1.5mm thick laminate cold pressed over 19mm board as per design. Front area to be measured for payment. Complete in all respect as per the direction of Architect/Engineer-in-charge.	Sqm.	148.00
65	Providing and applying Water dispersed polyurethane dustproof, easily cleanable and resistant to penetration of oils and liquids, resistant to corrosion, chemicals and abrasion coating and sealer to provide a pigmented sealing coat onto cementitious and concrete surfaces. It is contractor responsibilty to protect all surrounding Flooring, Wall, Window, Door etc. during the process of application.	Sqm.	5922.00

66	Soft pad panelling ertical poles to be covered with a 19mm foam padding up to 10 feet in height to protect players from injury. Foam Padding for fencing poles up to 10 feet in height. with 12mm waterproof treated plywood over wooden base framing 19mm thermo foam and waterproof fabric	Sqm.	543.00
67	Providing & Fixing in position Acoustical wall panelling with Integral Densified Square/Butt edged Fully Perforated Eco Friendly Lightweight Calcium Silicate panels/tiles with fabricated galvanised mild steel frame work for Auditoriums, Community halls, Offices, Institutions, Airports, Meeting halls, Indoor Stadiums and Studios. The Eco Friendly Lightweight Calcium Silicate wall panels/tiles shall be made from Non Cementitious Hydrated Calcium Silicate Slurry/Mixture, Reinforced recycled material with fibers and natural fillers. Free from Formaldehyde and other harmful materials. Doesn't contain any toxic ingrediants. The wall panels/tiles size of 595x595mm and 15mm thick should have Humidity Resistance (RH) of 100%, Water Resistance, Non Combustible: as per BS:476 Part-4, Fire Performance: as per BS:476 Part-6 for Fire Propagation, as per BS:476 Part-7 for Surface Spread of Flame, As per UK standards Fire Performace A1-S1-d0, Thermal Conductivity K= 0.048 to 0.050 w/m K as per ECBC code 2007, NRC (Noise Reductions Coefficient) 0.65 to 0.85 (Fully Perforated wall panels/Tiles) as per IS 8225:1987, Sound Attenuation (STA) 30-32dB,Thickness of tile should be 15mm thick with 450 kg/m3 density all around on edge resting portion with Integral Densified edge and 10mm thick with 350 kg/m3 density in the center of the body, Light Reflectance > 85%, Weight of material is 5-5.5 kg/m2 and Suitable for Green Building application with InOrganic Recycled content of 46- 50% out of which 18-20% should be FLYASH and meets the GRIHA & SVAGRIHA norms under the categories: GRIHA V.2015 criterion:11&12, GRIHA V.3 criterion: 17&29 and SVAGRIHA criterion:12. The frame work comprising of a frame made especially fabricated galvanised mild steel sheet of 0.50 mm thick pressed section (galvanizing@ 120 grams per m2 including both sides) i.e. vertical studs of size 48x34x36mm are placed at 600mm centre to centre in a floor and ceiling channel section of size 50x32mm fixed to the floor and soffit at 600mm centres using 12mm dia, 40mm long wedge type expanded zinc alloy dash fastner with 10mm bolt. This same channel is then to be fixed in horizontal direction at 600mm centre to centre so as to form a grid of 600x600mm. Glass wool of 50mm thickness with density of 16 kg/m3 is then to be inserted in the slots and finally Lightweight calcium silicate wall panels/tiles are to be screw fixed with self-tapping pan head nickle coated mild steel screws of size 13x3.2mm on to this grid leaving an even groove of 1 mm between the panels. The joints between the panels are to be duly jointed and finished using recommended jointing calcium silicate based compound and fibre joint tape roll 50mm wide (90metre) roll and two coats of premier suitable for panelling as per manfacturer's specification as per direction of engineer-in-charge all complete.	Sqm.	1986.00
68	Providing & fixing perforated 19mm thick MDF board over hardwood frame of 50mm x 50mm section with thermal insulation with Resin Bonded Fibre glass wool conforming to IS: 8183 having density of 32 kg/m3, 50 mm thick, wrapped in 200G Virgin Polythene Bags fixed with screw, rawl plug & washers and held in position by criss-crossing GI wires etc complete as per directions of Engineer-in-Charge. Perforrated MDF board will be finished in approved shade of Automotive paint.	Sqm.	489.00
69	Providing and fixing Structural Steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete including cost of materials, labour, usage charges of machinery complete as per specifications and as per directions of the Engineer-in-Charge.	Kg.	108905.00
70	Providing and fixing Steel work in built up tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete. Hot finished welded type tubes including cost of materials, labour, usage charges of machinery complete as per specifications and as per directions of the Engineer-in-Charge.	Kg.	67468.00
71	Providing and fixing Steel work welded in built up sections/ framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer using structural steel etc. as required. In gratings, frames, guard bar, ladder, railings, brackets, gates and similar works including cost of materials, labour, usage charges of machinery complete as per specifications and as per directions of the Engineer-in-Charge.	Kg.	50466.00
72	Supplying and fixing rolling shutters of approved make, made of required size M.S. laths, interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and outside locking with push and pull operation complete, including the cost of providing and fixing necessary 27.5 cm long wire springs manufactured from high tensile steel wire of adequate strength conforming to IS: 4454 - part 1 and M.S. top cover of required thickness for rolling shutters. 80x1.25 mm M.S. laths with 1.25 mm thick top cover including cost of materials, labour, usage charges of machinery complete as per specifications and as per directions of the Engineer-in-Charge.	Sqm.	32.00

73	Providing and fixing ball bearing for rolling shutters including cost of materials, labour, usage charges of machinery complete as per specifications and as per directions of the Engineer-in-Charge.	Each.	8.00
74	Extra for providing mechanical device chain and crank operation for operating rolling shutters: Exceeding 10.00 m² and upto 16.80 m² in the area including cost of materials, labour, usage charges of machinery complete as per specifications and as per directions of the Engineer-in-Charge.	Sqm.	32.00
75	Finishing with Epoxy paint (two coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, preparation of surface, etc. complete. On steel work including preparing the surface after thorougly cleaning oil, grease, dirt and foreign matter, cost of materials, labour complete as per specifications and as per directions of Enginer-in-charge.	Sqm.	3675.00
76	Applying 50 micron powder coating over MS work as per IS code 13871.	Sqm.	1056.00
77	Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc., of required size, on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in- charge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.) including cost of materials, labour, usage charges of machinery complete as per specifications and as per directions of the Engineer-in-Charge.	Kg.	200.00
78	Deck Sheeting Providing and fixing roofing consist of 0.8 mm thick galvanized steel deck sheet conforming to IS 277:1992 used as permanent shuttering over which MS wire mesh 3mm laid at 100x100 mm grid including edge trim covered with concrete. This metal deck will be supported on structural steel beam with shear studs. (Structural steel like beam, column, joists etc. & concrete of different grade as per design will be paid separately).	Sqm.	850.00
79	Fire PaintSupplying and Installing by airless spray method 3 coat fire paint system (Water based), fully compliance with GRIHA rating with a combined VOC (Volatile Organic Content) of not more than 250GMS/LTR. Water based single pack Intumescent coating applied on –site after steel erection to a DFT for fire protection of steel structure upto 1 hour as per NBC. The fire proof materials to be independently tested, assessed and approved to ASTM-E119 ,or BS -476/21.Test standards; at NAMAS and NATA approved laboratories such as WFRC,BRE,IFC ,BRANZ, Underwriters Laboratories (UL) . All packaging should be stamped with a Testing Lab Label, confirming accredited Third Party Certification of the contents to comply with requirements stipulated in test reports. All applications to be only by specialist companies certified by manufacturer. All applications to be checked/audited by Manufacturers Q/A representative, and Warranties for 15 years to be provided by the Contractor. All work shall be carried out as per manufacturer's specification and direction of engineer-in-charge.	Sqm.	2350.00
80	Providing and fixing G.I. chain link fabric fencing of required width in mesh size 50x50 mm including strengthening with 2 mm dia wire or nuts, bolts and washers as required complete as per the direction of Engineer-in-charge. (Made of G.I. wire of dia. 4 mm, PVC coated to achieve outer dia not less than 5 mm in required colour and shade)	Sqm.	100.00

81	Top sheet - Supply and Installation of colour coated 0.45mm base metal thickness 0.50mm TCT KLIP-LOK concealed fix profile of 700 mm effective cover width, with four major deep corrugation, 43mm deep rib spaced at 233mm c/c along with micro stiffeners perpendicular to ribs for strength. The male and female rib shall have anti-capillary groove. The steel sheet is having yield strength 550MPa (Fy=550Mpa), metallic coated with Zinc-Aluminium alloy (i.e. 55% Al, 43.4% Zinc, 1.6% Si - Zincalume), AZ150 (min 150 gm/m2 total on both side), pre-painted with Super Durable Polyester quality paint includes inorganic infrared reflective pigment of 20µm exterior coat on top surface and 5µm reverse coat on back surface over 5µm primer coat on both surfaces of approved color shade by concern authority. The sheet conforms to general requirement of AS/NZS 2728 type 4 / IS 15965 class 3 durability and gloss value of 25% - 40%. The "Concealed fix" sheets shall be fixed to every purlin by means of patented clips having spurs which will securely hold the sheets in position and lock-in the side-lap and both centre ribs. The clip shall be fastened with 40µm zinc coated or nominal 25µm zinc-tin alloy coated, Hex head, self-drilling screw as per AS 3566-2002 Class 3 fasteners of approved make with EPDM washer as per the requirement considering the profile shape and design load. The profile sheet, fastener size etc. needs to be approved by the concern authority. All the accessories like gutter/ flashing / capping shall be made from the same material used for main cladding. Bottom sheet - Supply of colour coated 0.45mm base metal thickness 0.50mm TCT trapezoidal profile of 1015 mm effective cover width, with five major corrugation, 28mm high rib spaced at 203mm c/c with subtle square fluting in the pan. The end rib shall have anti-capillary groove and return leg. The steel sheet is having yield strength 550MPa (Fy=550Mpa), metallic coated with Zinc-Aluminium alloy (i.e. 55% Al, 43.4% Zinc, 1.6% Si - Zincalume), AZ150 (min 150 gm/m2 total on both side), pre-painted with Super Durable Polyester quality paint includes inorganic infrared reflective pigment of 20µm exterior coat on top surface and 5µm reverse coat on back surface over 5µm primer coat on both surfaces of approved color shade by concern authority. The sheet conforms to general requirement of AS/NZS 2728 type 4 / IS 15965 class 3 durability and gloss value of 25% - 40%. The sheet shall have brand marking of the manufacturer giving product details on the back of the sheet at every 1 meter c/c for confirming genuinity of the material. The steel sheet shall be fastened with 25 µm zinc-tin alloy coated, Hex head, self-drilling screw as per AS 3566 Class 3 fasteners of approved make with EPDM washer as per the requirement considering the profile shape and design load. The fastener size shall be calculated as per the design or manufacturers recommendations. All the accessories like gutter/ flashing / capping shall be made from the same material (or manufacturer's recommendation) which is used for main cladding application. Two Layer of 50mm Thk. 48kg/m3 density Glasswool Insulation with one side FSK facing Insulation – Insulation – In between top and bottom sheet Supply and application The galvanised Z120 sub-girts (as per design requirement) depth shall be fixed above the bottom sheet & Purlin using suitable fastener. The panel shall be 15-17% perforated backed with Non woven acoustic tissue paper, for acoustic properties.	Sqm	2165.00
82	All the accessories like flashing / capping /Gutter, Downspouts/Ridge shall be made from the material specifications (0.42MM BMT /0.47 MM TCT, mentioned as above in approved colour shade & as per manufacturers' recommendation. 306 to 610mm Girth	Rmt	258.00
83	All the accessories like flashing / capping /Gutter, Downspouts/Ridge shall be made from the material specifications (0.42MM BMT /0.47 MM TCT, mentioned as above in approved colour shade & as per manufacturers' recommendation. 611 to 900mm Girth	Rmt	250.00
84	All the accessories like flashing / capping /Gutter, Downspouts/Ridge shall be made from the material specifications (0.42MM BMT /0.47 MM TCT, mentioned as above in approved colour shade & as per manufacturers' recommendation.901 to 1220 mm Girth	Rmt	258.00
85	Providing and fixing on wall face unplasticised Rigid PVC rain water pipes conforming to IS : 13592 Type A, including jointing with seal ring conforming to IS : 5382, leaving 10 mm gap for thermal expansion, (i) Single socketed pipes. 110 mm diameter	Rmt.	410.00
86	Providing and fixing on wall face unplasticised - PVC moulded fittings/ accessories for unplasticised Rigid PVC rain water pipes conforming to IS : 13592 Type A, including jointing with seal ring conforming to IS : 5382, leaving 10 mm gap for thermal expansion. Coupler 110 mm diameter	Each	12.00
87	Providing and fixing on wall face unplasticised - PVC moulded fittings/ accessories for unplasticised Rigid PVC rain water pipes conforming to IS : 13592 Type A, including jointing with seal ring conforming to IS : 5382, leaving 10 mm gap for thermal expansion. Bend 87.5° 110mm	Each	12.00
88	Providing and fixing on wall face unplasticised - PVC moulded fittings/ accessories for unplasticised Rigid PVC rain water pipes conforming to IS : 13592 Type A, including jointing with seal ring conforming to IS : 5382, leaving 10 mm gap for thermal expansion. Shoe (Plain) 110mm	Each	12.00

89	Providing and applying two coats of PU coating with minimum thickness of 200 microns with approved make on steel surfaces of gutters within an interval of 6-8 hrs over one coat of Epoxy Zinc Primer including preparation of surface by removing and cleaning the surface to ensure it free form dust, loose material, paint, oil or any other material by wire brushing etc. and filling all joint gaps with single component PU sealant. complete as per specifications and direction of engineer-in-charge.	Sqm.	1032.00
90	Providing and fixing unglazed, uncoated, metal pressed, full body homogeneous anti-algal, all weather resistant ready to install step tile with built-in- bull nose and anti skid strip, smooth and anti skid surface confirming to IS: 4457-2007 and having water absorption of <0.05% in 12mm thickness in sizes as required as per site condition in treads of stairs. These anti skid tiles are to be laid on 20mm thick cement mortar of mix 1:4 (1 cement: 4 coarse sand) and joints filled with polymer based cement grout with all labour, material, cement, tile, sand, grout etc as a complete job & as per direction of Engineer-in-charge.	Sqm.	1436.00
91	Providing and fixing unglazed, uncoated, metal pressed, full body homogeneous anti-algal, all weather resistant tile with smooth and anti skid surface confirming to IS: 4457-2007 and having water absorption of <0.05% in 12mm thickness in sizes as required as per site condition in riser and skirting of stairs. These anti skid tiles are to be laid on 12mm thick cement mortar of mix 1:3 (1 cement: 3 coarse sand) and joints filled with polymer based cement grout with all labour, material, cement, tile, sand, grout etc as a complete job & as per direction of Engineer-in-charge.	Sqm.	412.00
92	Providing and laying tactile tile (for vision impaired persons as per standards) of size 300x300x9.8mm having with water absorption less than 0.5% and conforming to IS:15622 of approved make in all colours and shades in for outdoor floors such as footpath, court yard, multi modals location etc., laid on 20mm thick base of cement mortar 1:4 (1 cement : 4 coarse sand) in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc. complete as per direction of Engineer-in-Charge.	Sqm.	600.00
93	Deduct for not using 20 mm thick cement mortar 1:4 (1 cement : 4 coarse sand) bedding in laying of floor tiles and jointing with grey cement slurry @ 3.3 kg/ m2.	Sqm.	500.00
94	Fixing glazed/ Ceramic/ Vitrified floor tiles with cement based high polymer modified quick-set tile adhesive (Water based) conforming to IS: 15477, in average 3mm thickness.	Sqm.	500.00
95	Providing and laying Matt/ Antiskid finish vitrified tiles in floor in 600mm x 600mm size (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade, laid on 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) jointing with grey cement slurry @3.3 kg/sqm including grouting the joints with white cement and matching pigments etc. The tiles must be cut with the zero chipping diamond cutter only. Laying of tiles will be done with the notch trowel, plier, wedge, clips of required thickness, leveling system and rubber mallet for placing the tiles gently and easily. (Vitrified tile with at least 10% recycled content by weight. Preference should be given to GRIHA certified Vitrified tiles).	Sqm.	1922.00
96	Grouting the joints of flooring/ wall tiles having joints of 3 mm width, using epoxy grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg), including filling / grouting and finishing complete as per direction of Engineer-in-charge. Size of Tile 300x600 mm	Sqm.	3202.00
97	Grouting the joints of flooring/ wall tiles having joints of 3 mm width, using epoxy grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg), including filling / grouting and finishing complete as per direction of Engineer-in-charge.Size of Tile 600x600 mm	Sqm.	1922.00
98	Providing and laying Shot Blasted finish Granite stone flooring of approved & required design, shade and patterns, in linear as well as curvilinear portions of the building all complete as per the architectural drawings with 18 mm thick stone slab over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand)/ Adhesive laid and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade including rubbing, curing and polishing etc. all complete as specified and as directed by the Engineer-in-charge. Polished Granite stone slab will be as per approved colour/shade by Engineer-in-charge.	Sqm.	206.00

99	Providing and installing 18 mm thick gang saw cut, mirror polished, pre-moulded and pre-polished granite counter, machine cut for kitchen platforms, vanity counters, window sills, facias and similar locations of required size, approved shade, colour and texture laid over 20 mm thick base cement mortar 1:4 (1 cement : 4 coarse sand) / adhesive, joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edges to give high gloss finish etc., complete in all respects as per the direction of the Engineer-in-charge.	Sqm.	874.00
100	Providing and laying Polished Granite stone flooring as per approved colour/shade by Engineer-in-charge. in required design and patterns, in linear as well as curvilinear portions of the building all complete as per the architectural drawings with 18 mm thick stone slab over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade including rubbing, curing and polishing etc. all complete as specified and as directed by the Engineer-in-charge.	Sqm.	1297.00
101	Making 3nos. Grooves 3mm x 3mm in treads of Granite/ Kota Stone/ Marble stone as direction of Engineers-in-charge/Architect.	Rmt.	59.00
102	Providing and laying Rectified Glazed Ceramic floor/Wall tiles of size 300x300 mm or more (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in colours White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement: 4 Coarse sand), jointing with grey cement slurry @ 3.3 kg/ sqm including grouting the joints with white cement and matching pigments etc., complete.	Sqm.	561.00
103	Vitrified Tile Flooring:- Providing and laying Fullbody vitrified floor tiles in floor/Skiting in required size thickness as per maufacturers specification with water absorption less than 0.08% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade, laid on 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) jointing with grey cement slurry @3.3 kg/sqm in skirting, riser of steps, over 12 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand). Tiles will be laid with 3mm thick spacer joint which will be filled the epoxy grout matching with tile colour/ as approved by Architect or Engineer-incharge. The tiles must be cut with the zero chipping diamond cutter only. Laying of tiles will be done with the notch trowel, plier, wedge, clips of required thickness, leveling system and rubber mallet for placing the tiles gently and easily. Cost is inclusive of Grouting the joints of flooring tiles having joints of 3 mm width, using epoxy grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg), including filling / grouting and finishing complete as per direction of Engineer-in-charge. In tiles size 600mm x 600mm	Sqm.	1592.00
104	Vitrified Tile Flooring:- Providing and laying Fullbody vitrified floor tiles in floor/Skiting in required size thickness as per maufacturers specification with water absorption less than 0.08% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade, laid on 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) jointing with grey cement slurry @3.3 kg/sqm in skirting, riser of steps, over 12 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand). Tiles will be laid with 3mm thick spacer joint which will be filled the epoxy grout matching with tile colour/ as approved by Architect or Engineer-incharge. The tiles must be cut with the zero chipping diamond cutter only. Laying of tiles will be done with the notch trowel, plier, wedge, clips of required thickness, leveling system and rubber mallet for placing the tiles gently and easily. Cost is inclusive of Grouting the joints of flooring tiles having joints of 3 mm width, using epoxy grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg), including filling / grouting and finishing complete as per direction of Engineer-in-charge. In tiles size 800mm x 800mm	Sqm.	1592.00
105	Vitrified Tile Flooring:-Providing and laying Fullbody vitrified floor tiles in floor/Skiting in required size thickness as per maufacturers specification with water absorption less than 0.08% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade, laid on 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) jointing with grey cement slurry @3.3 kg/sqm in skirting, riser of steps, over 12 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand). Tiles will be laid with 3mm thick spacer joint which will be filled the epoxy grout matching with tile colour/ as approved by Architect or Engineer-incharge. The tiles must be cut with the zero chipping diamond cutter only. Laying of tiles will be done with the notch trowel, plier, wedge, clips of required thickness, leveling system and rubber mallet for placing the tiles gently and easily. Cost is inclusive of Grouting the joints of flooring tiles having joints of 3 mm width, using epoxy grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg), including filling / grouting and finishing complete as per direction of Engineer-in-charge.In tiles size 600mm x 1200mm	Sqm.	4776.00
106	Providing and laying Vitrified tiles in 600mm x 600mm (thickness to be specified by manufacturer), with water absorption less than 0.08 % and conforming to I.S. 15622, of approved make, in all colours & shade, over 12 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand), jointing with grey cement slurry @ 3.3 kg/ m2 including grouting the joint with white cement & matching pigments etc. complete.	Sqm.	805.00

107	Providing and laying C.C. pavement of mix M-25 with ready mixed concrete from batching plant. The ready mixed concrete shall be laid and finished with screed board vibrator , vacuum dewatering process and finally finished by floating, brooming with wire brush etc. complete as per specifications and directions of Engineer-incharge. (The panel shuttering work shall be paid for separately). (Note:- Cement content considered in this item is @ 330 kg/cum. Excess/less cement used as per design mix is payable/ recoverable separately).	Cum.	341.00
108	Extra for providing and mixing hardening compound of sodium silicate based transparent surface hardener, dust proofer, sealing and curing compound for concrete.	Liters	1311.00
109	Extra for providing and mixing Glass fibre reinforcement in VDF Flooring.	Cum.	341.00
110	Extra for providing and mixing high performance superplasticiser in conretre intended to high water reduction and long workability retention are required.	Cum.	341.00
111	Providing and applying Acrylic emulsion cement modified and water based concrete bonding agent. Adhesion to concrete substrate:- 20N/mm2(BS6319) The bonding agent shall be an acrylic based emulsified solution containing a minimum of 43% solids and compatible with cementitious materials. The bonding agent shall provide adequate bond strength when directly applied on concrete and also mixed with neat cement	Sqm.	5243.00
112	Cutting of Control/Cold joint Groove in cement concrete flooring. Groove Size 4mm x 10mm	Rmt.	1250.00
113	Cutting of Control/Cold joint Groove in cement concrete flooring. Groove Size 8mm x 18mm	Rmt.	1250.00
114	Filling of Control/Cold joint Groove with Epoxy urethane joint Sealer with suitable backer rod. 4mm x 4mm groove with 6mm dia backer rod.	Rmt.	1250.00
115	Filling of Control/Cold joint Groove with Epoxy urethane joint Sealer with suitable backer rod. 8mm x 8mm groove with 10mm dia backer rod.	Rmt.	1250.00
116	Providing & fixing of anodized aluminium skirting & end profile with plastic corners and rubber gasket and connnectors. Aluminium screw on skirting, are ideal to cover any types of wall base to protect from foot scratches and any type of floor covering thereby providing a neat finish on the joint. It is installed using a screw for neat fixing. 100mm Wide	Rmt.	6000.00
117	Providing & fixing of anodized aluminium skirting & end profile with plastic corners and rubber gasket and connnectors. Aluminium screw on skirting, are ideal to cover any types of wall base to protect from foot scratches and any type of floor covering thereby providing a neat finish on the joint. It is installed using a screw for neat fixing. 50mm wide	Rmt.	6000.00
118	Painting road surface marking with adequate nos. of coats to give uniform finish with ready mixed road marking paint conforming to IS : 164, on bituminous/RCC surface in white/ yellow shade, including cleaning the surface of all dirt, scales, oil, grease and foreign material etc. complete.New work (Two or more coats)	Sqm.	150.00
119	Providing & Laying Cementitious Self-Leveling Underlay Screed upto 15mm thickness under the flooring to achieve a smooth finish even surface. Compressive Strength should not be less than 35N/Sqmm, Flexural Strength should not less than 7 N/Sqmm, Adhesion Strength not less than 2.5-2.8 N/Sqmm in 28 days. Abration class complies with AR 2(as per BS 8204)	Sqm.	3427.00

120	Badminton & Table Tennis Flooring:- Supply & Installation of Wooden flooring system consisting of a polythene sheet on top of concrete to act as vapour barrier followed 10mm rubber cushion pad followed by pine wood runner of thickness 32mm/45mm treated and placed at 350mm interval with hard wood flooring made of Maple wood of 20mm thick and give a sanding / grinding finish assembled using Tongue and Groove joint. The wood manufacturer should be associated with BWF / ITTF approved product. Work shall be executed all Complete as per direction of Engineer-incharge/Architect. SURFACE BOARD: - Maple Wood Sports Flooring "Certified by the BWF according to BWF standards – Approved Level 1A & 1B with 20 mm thick, 55 to 85mm wide and in random length in tongue and groove shape. The edges of the boards will have a finger lock groove and the bottom side with air pass groove and treated with special anti-termite and water-resistant lacquer. THE UNDER FRAME: - Resilient SPF Pine Wood sleeper subfloor of 70 mm x 45 mm, treated with anti-termite solution and fixed on the bottom side with 19 mm thick EPDM rubber pads, stapled through the two wings at 350 mm x 350 mm. INSTALLATION: - IPS subfloor treated with a vapour barrier to be placed on the levelled IPS sub-floor before laying the under frame. The runners having air cushion pads to be placed on the vapour barrier in perfect level at 350 mm in 1 direction. The surface board to be screwed to the runner through the tongue only and will lock the screwed tongue by the groove of adjoining board. Ends of the boards will be locked by inserting the wooden fingers through the edge grooves and fixed with suitable adhesive. The expansion of 12-15 mm will be left open between the wooden flooring and the surrounding tiled area /walls. FINISHING: - After installation the floor will be machine sanded in uniform level and finished with P. U. Polishing water based polyurethane lacquer. Game line marking to be carried out in required colours before applying the finish coat.	Sqm.	2019.00
121	On top of the wooden sub floor the PVC rolls of thickness 4.5mm Approved by Badminton World Federation And Certified by Labosport Grade 1 – EN 14904 As Per Badminton World Federation Standards should be installed with game line marking. PVC roll fixed with Welding Cord & Tape. Work shall be executed all Complete as per direction of Engineer-in-charge/Architect.	Sqm.	2019.00
122	Multi-Purpose Hall Wooden Flooring:- Supply & Installation of Wooden flooring system consisting of a polythene sheet on top of concrete to act as vapour barrier followed 10mm rubber cushion pad followed by pine wood runner of thickness 32mm/45mm treated and placed at 350mm interval with hard wood flooring made of Maple wood of 20mm thick and give a sanding / grinding finish assembled using Tongue and Groove joint with polishing. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	599.00
123	Basketball Court Flooring-Supply & Installation of Wooden flooring systm consisting of 10mm rubber cushion pad followed by pine wood runner of thickness 32mm/45mm treated and placed at 350mm interval with hard wood flooring made of Maple wood of 20mm thick and give a Polished finish. The wood manufacturer should be associated with MFMA and FIBA lab test report shoud be submitted and confirms to FIBA approved product. The polish which is suppose to be used should also be FIBA approved. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.SURFACE BOARD: - Maple Sports Flooring "Certified by the MFMA /FIBA standards - Grade 1" LABO SPORTS Test Certify EN 14904 Standard finished with 20 mm thick, 55 to 85mm wide and in random length in tongue and groove shape. The edges of the boards will have a finger lock groove and the bottom side with air pass groove and treated with special anti-termite and water-resistant lacquer.THE UNDER FRAME: - Resilient SPF Pine Wood sleeper subfloor of 70 mm x 45 mm, treated with anti-termite solution and fixed on the bottom side with 10 mm thick EPDM rubber pads, stapled through the two wings at 350 mm x 350 mm.INSTALLATION: - IPS subfloor treated with a vapour barrier to be placed on the levelled IPS sub-floor before laying the under frame. The runners having air cushion pads to be placed on the vapour barrier in perfect level at 350 mm in 1 direction. The surface board to be screwed to the runner through the tongue only and will lock the screwed tongue by the groove of adjoining board. Ends of the boards will be locked by inserting the wooden fingers through the edge grooves and fixed with suitable adhesive. The expansion of 12-15 mm will be left open between the wooden flooring and the surrounding tiled area / walls.FINISHING: - After installation the floor will be machine sanded in uniform level and finished with P. U. Polishing water based polyurethane lacquer. Game line marking to be carried out in required colors before applying the finish coat	Sqm.	922.00
124	Providing and fixing Heat Resistant Terrace Tiles (300 mm x 300 mm x 20 mm) with SRI (solar refractive index) > 78, solar reflection > 0.70 and initial emittance > 0.75 on waterproof and sloped surface of terrace, laid on 20 mm thick cement sand mortar in the ratio of 1:4 (1 cement : 4 coarse sand) and grouting the joints with mix of white cement & marble powder in ratio of 1:1, including rubbing and polishing of the surface upto 3 cuts complete, including providing skirting upto 150 mm height along the parapet walls in the same manner as per direction of incharge.	Sqm.	2618.00

125	Carpet Flooring Providing & Fixing of Flocked textile floor covering of 100% Nylon 6.6 face fiber completely water proof resilient backing. The flooring should be Anti static with thickness of 4.3 mm and approximate weight of 1.8 k.g./sqm of roll form. The carpet should be completely stain resistant and of a density approx. 80 million fibers/sq.mtr (70 million fiber/sq.yd) in the width of 2 mtr .The floor covering should have Fire Test EN-13501, Appearance Retention Hexapod ISO 140-8, Friction Slip Resistance Test EN 14041 Class DS, with resilient waterproof backing, anti allergic which is certified by British allergy foundation. The carpet should have permanent static contro. The work should be carried out by the authorized installer of the Company in India. Carpet should be laid on zero leveled surface. Carpet should be stick with SR 998/ Floor Fix on the floor. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	556.00
126	Volley ball Court Flooring:- Supply & Installation of PU Flooring having thickness of 7mm (5+2) 5mm SBR rolls / Insitu smoothened with a Sealer/ self leveller followed by a 2mm PU Coating. FIVB Recommended Game line marking Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	1245.00
127	PU Flooring for General Sports areas :- Providing & Laying PU Sports Flooring System – PU Sports Flooring to be installed on Cement Base smooth leveled surface. Cleaning and moisture checking should be done during the sub-base preparation. Adhesive layer will be laid followed by Primer Layer. 5mm Rubber Mat/Cast in situ (SBR granules with PU Binder & Laid evenly) will be laid over primer layer followed with Pore filler coat. Two Layers of 1mm liquid will applied over PU layer followed by one coat of color on top Surface with Game Line Marking. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	434.66
128	Supply & Instalation of 13mm turf manufactured by FIFA preferred producer. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	114.00
129	Supply & Installation of Rubber flooring having thickness of 15mm of tile size 500mm x 500mm of interlocking type. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	1212.00
130	Wrestling mat - Of size 2mt x 1mt made of material JSR PVC Cover of thickness 70mm. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	293.55
131	Judo mat of density 220 - 240 of mat size 2mts x 1mt with material of high quality bonded foam 1000 dernier cover of thickness 50mm. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	155.00
132	Kabbadi mat - Each mat of size 1mt x 1mt made up of Material EVA & JSR of density 130 kg.cum (Tolerence +/- 10%) and hardness of 30 degree (Tolerence +/- 15%) having thickness 40mm. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	303.00
133	Squash Court Flooring: - Providing & laying Squash Court Wooden Flooring as per following steps a. Polythene Sheet on top of Concrete b. Cushion pads nailed to Pine Wood (10mm) c. Pine wood of 32mm/45mm thick treated placed at 350mm intervals d. Hard Wood .Maple installed over the pine wood (20 mm) should be WSF approved e. Sanding/Grinding to be done on the Hardwood once installed Providing and laying of hard plaster consist of plaster (4 mm), fiber reinforced, cement based and resin modified. Marking lines in red colour and painting with epoxy paint. Approved by WSF. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	146.26
134	Squash Court Glass:- Providing & fixing rear 4 panel glass wall with a door 12mm thick with 15mm fins inclusive of all required accessories & hardwares approved by WSF. Size of Glass wall (21 ft. X 7 ft). Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	2.00

135	Squash Hard Plaster:- Providing and laying of hard plaster consist of plaster 4mm thick, fiber reinforced, cement based and resin modified. Marking lines in red colour and painting with epoxy paint. Approved by WSF. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Sqm.	200.00
136	Providing & fixing Tin Board approved by WSF. Work shall be executed all Complete as per direction of Engineer-incharge/Architect.	Each.	2.00
137	Providing & fixing in position Phenol bonded Bamboowood flooring with planks of sizes 14mm thick, minimum 1800mm length and minimum 100 mm wide, in approved colour, texture and finish, having Performance Appraisal Certificate (PAC) issued by Building Materials & Technology Promotion Council (BMTPC). The flooring shall be fixed with tongue and groove interlocking system, with underlayment of 4mm thick expanded polyethylene foam sheets having density 40kg/cum, over prepared surface with necessary quarter round planks of size 1900mm x 18mm and door reducer of size 1900mm x 44mm, wherever required. The bamboowood planks shall have minimum density of 1000 Kg/cum & minimum Hardness 1000 Kgf. with Eco friendly UV coating, all complete as per direction of the Engineer in-charge.	Sqm.	150.00
138	Providing & fixing in position Phenol bonded Bamboowood wall cladding at all height with planks of sizes 10mm thick, minimum 1800mm length and minimum 100 mm wide, in approved colour, texture and finish, having Performance Appraisal Certificate (PAC) issued by Building Materials & Technology Promotion Council (BMTPC), with necesasary profiled edges fixed with 40mm SS screws 5 nos in each tile to frame work made of second class teak wood of size 20x15 mm in centre of each tile and bottom and top of work height, 40x15mm placed at ends of each tile. The cladding shall be laid over backlayment of 1.00 mm thick expanded polyethylene foam of density 40kg/cum in two layers, first layer on wall surface before fixing wooden frame and second layer on frame under cladding. The bamboowood planks shall have minimum density of 1000 Kg/cum & minimum Hardness 1000 Kgf. with Eco friendly UV coating, all complete as per direction of the Engineer in-charge.	Sqm.	75.00
139	Providing and laying 9100 Terra Z web Heavy Duty matt made of flexible vinyl (Virgin PVC) open mesh structure. The open mesh structure allows water to run through the matting so the surface stays drier than the surrounding area. Suitable for high Foot traffic application overall provide comfortable walking surface which scrap, trap & stop being enter in to a building. Z Element Gap Minimum Avg is 11 +/- 1mm/1 Waves. Mass per sq mtrs Minimum Avg is 7800 gm. With Z Web Waves design. Total Thickness Minimum Avg is 10.8 mm (ASTM 3767 with precondition at 60 degree Temperature for 2 hour and COOL IT measure at 25 degree Temperature). Anti Skid Minimum Avg is Yes dry 0.91 and wet 0.57 Product should be certified from NFSI (National Floor Safety Institute) for anti skid properties Flexible Z Web Waves material. Must qualify for Partial LEEDs points and come along with authorisation certificate from 3M India.	Sqm.	15.00
140	Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm center to center, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm center to center, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm center to center, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm center, with 25mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound , jointing tapes, finishing with jointing compound in 3 layers covering up to 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification and direction of the Engineer-in-charge but excluding the cost of painting with :12.5 mm thick tapered edge gypsum plain board conforming to IS: 2095- (Part I) :2011 (Board with BIS certification marks)	Sqm.	470.00
141	Extra over & above the respective items of gypsum board ceiling for cove up to a width of 750 mm.	Rmt.	100.00

142	Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm center to center, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm center to center, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm center to center, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm center, with 25mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound , jointing tapes, finishing with jointing compound in 3 layers covering up to 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification and direction of the Engineer-in-charge but excluding the cost of painting with : Fully Perforated Gypsum Plaster Board of size 1200 x 2400x12.5 mm having approx. 15 % perforated area with perforation size and pattern as approved by the Engineer- in-charge and as per manufacturer's specification, with all 4 side tapered and backed by acoustical tissue with NRC value not less than 0.60	Sqm.	200.00
143	Calcium Silicate Board CeilingProviding & fixing false ceiling at all height including providing & fixing of framework made of special section, power pressed from M.S. sheets and galvanised with zinc coating of 120 gms/ m2 (both side inclusive) as per IS : 277 and consisting of angle cleat of size 25mm wide x 1.6mm thick with flanges of 27mm and 37mm, at 1200mm c/c, one flange fixed to the ceiling with dash fastener 12.5mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25 x10 x0.50mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I chanels 45 x15 x 0.90mm running at the spacing of 1200 mm c/c, to which the ceiling section 0.5mm thick bottom wedge of 80mm with tapered flanges of 26 mm each having lips of 10.5mm, at 450mm c/c, shall be fixed in a direction perpendicular to G.I intermediate channel with connecting clip made out of 2.64mm dia x 230mm long G.I wire at every junction, including fixing perimeter channels 0.50mm thick 27mm high havingflanges of 20mm and 30mm long, the perimeter of ceiling fixed to wall/ partitions with the help of Rawl plugs at 450mm centre, with 25mm longdry wall screws @ 230mm interval, including fixing of Calcium Silicate Board to ceiling section and perimeter channels with the help of dry wallscrews of size 3.5 x25mm at 230mm c/c, including jointing & finishing to a flush finish of tapered and square edges of the board with recommendedjointing compounds, jointing tapes,finishing with jointing compounds in three layers covering up to 150mm on both sides of joints and twocoats of primer suitable for boards, all as per manufacture's specification and also including the cost of making opening for light fittings, grills, diffusers, cut outs made with frame of perimeter channels suitably fixed, all complete as per drawings, specificaton and direction of the Engineer in charge but excluding the cost of painting with:8 mm thick Calcium Silicate Board made with Calcareous & Siliceous materials reinforced with cellulose fiber manufactured through autoclaving process.	Sqm.	750.00

144	Providing & Fixing of Integral Densified Tegular/Butt edged Eco Friendly Lightweight Calcium Silicate Suspended Ceiling System in Module Size of 600x600x15mm with Exposed GI Plain T24 Grid for Offices, Hospitals, Institutions, Airports, Banking Sector, Auditoriums, Community halls, laboratories, Factories and All buildings in high humidity or coastal Areas. The Eco Friendly Lightweight Calcium Silicate Ceiling tiles shall be made from Non Cementitious Hydrated Calcium Silicate Slurry/ Mixture, Reinforced recycled material with fibers and natural fillers. Free from Formaldehyde and other harmful materials. Doesn't contain any toxic ingredients.The Tiles should have Humidity Resistance (RH) of 100%, Water Resistance, Non Combustible: as per BS:476 Part-4, Fire Performance: as per BS:476 Part-6 for Fire Propagation, as per BS:476 Part-7 for Surface Spread of Flame, As per UK standards Fire Performace A1-S1-d0, Thermal Conductivity K= 0.048 to 0.050 w/m K as per ECBC code 2007, NRC (Noise Reductions Coefficient) 0.5 to 0.75 (Semi Perforated & Fully Perforated Tiles) as per IS 8225:1987, Sound Attenuation (STA) 30-32dB,Thickness of tile should be 15mm thick with 450 kg/m3 density all around on edge resting portion with Integral Densified edge and 10mm thick with 350 kg/m3 density in the center of the body, Light Reflectance > 85%, Weight of material is 5-5.5 kg/m2 and Suitable for Green Building application with InOrganic Recycled content of 46- 50% out of which 18-20% should be FLYASH and meets the GRIHA & SVAGRIHA norms under the categories: GRIHA V.2015 criterion:11&12, GRIHA V.3 criterion: 17&29 and SVAGRIHA criterion:12 The tiles Shall be laid on 24mm Wide T-Sections Flanges colour white having rotary stitching on all T sections i.e. the Main runner with a web height of 38mm and 1200mm & 600mm Cross Tees with a web height of 32mm having thickness of 0.33mm and Wall angle of 24*24mm with 0.4 mm thickness , having load carrying capacity of 15 kg/m2. The T sections should have Galvanizing of 120 grams per m2 and need to be installed with Suspension system.	Sqm.	937.00
145	Providing & Fixing of Mineral Fibre Acoustical Suspended Ceiling System in module size of 600 x 600 x 16mm with Exposed Grid for Hospitals, Shopping malls, Commercial establishments and office complexes. The tiles should have Humidity Resistance (RH) of 99%, NRC 0.5, Light Reflectance <o87%, Thermal Conductivity k = 0.052 - 0.057 w/m K, Colour White, Fire Performance UK Class 0 I Class 1 (BS 476 pt- 6 &7) and suitable for Green Building application with Recycled content of 30%. The tile shall be laid on 24 mm wide T - section flanges colour white having rotary stitching on all T sections i.e. the Main Runner, 1200 mm & 600 mm Cross Tees with a web height of 38mm and a load carrying capacity of 15 kg/m2 &pull out strength of minimum 100 kg The T Sections should have a Galvanizing of 90 grams per m2 and need to be installed with Suspension system.	Sqm.	282.00
146	Providing & fixing Hinge able open cell ceiling with cell size of 100mm made out of 0.3mm thick coil coated GMS. The assembled cell ceiling panels shall be in size of 600x1200 made out of blades in 9mm (W) x 40mm (H). The assembled cell ceiling panels are then clipped into type-1 U shaped carriers in GMS, coated in black enamelled finished at 1200mm c/c. Wire clips shall hold the cell ceiling panels into the type-1 U shaped carriers. Once the type-1 U shaped carriers are installed then primary angles made out of GMS, type-2 U are cross connected to the type-1 U carriers at 1200mm c/c. for lateral bracing The whole ceiling shall be suspended by M6 threaded rods installed 1200mm c.c. All panel modules must be hinge able through wire clips. The panels are fully downward demountable / hinged from the proprietary type-1 U carrier section using spring panels. The system should be in accordance with Material class as per the Direction of the Engineer-in-charge. The system will meet fire retardant standards of BS 476: Part 6 & Part 7 tolerance. Finish: As per approved shade.	Sqm.	2506.00
147	Providing & fixing 75 mm Hinge able open cell ceiling with cell size of 75mm made out of 0.3mm thick coil coated GMS. The assembled cell ceiling panels shall be in size of 600x1200 made out of blades in 9mm (W) x 40mm (H). The assembled cell ceiling panels are then clipped into type-1 U shaped carriers in GMS, coated in black enamelled finished at 1200mm c/c. Wire clips shall hold the cell ceiling panels into the type-1 U shaped carriers. Once the type-1 U shaped carriers are installed then primary angles made out of GMS, type-2 U are cross connected to the type-1 U carriers at 1200mm c/c. for lateral bracing The whole ceiling shall be suspended by M6 threaded rods installed 1200mm c.c. All panel modules must be hinge able through wire clips. The panels are fully downward demountable / hinged from the proprietary type-1 U carrier section using spring panels. The system should be in accordance with Material class as per the Direction of the Engineer-in-charge. The system will meet fire retardant standards of BS 476: Part 6 & Part 7 tolerance.Finish: As per approved shade.	Sqm.	408.00

148	Acoustical Ceiling Supply and Installation of Acoustical ceiling, Square edge, magnesite-bonded pinewood fibre core, factory prepainted, fully encapsulated with texture finish,GreenPro certified, ceiling tile of size 600x2400x20mm/600x1200x20mm, volume density 400Kgs/m3, weight 8kg/m2 which is installed by using non-visible fasteners using suitable Strut & Fasteners. Acoustical ceiling framework system shall include Type-1 Strut, fully knurled, sectional thickness 0.55mm, length 3600mm, unequal flanges of 20 & 30mm and web of 25mm, fixed along the perimeters of the wall with nylon sleeves and suitable fasteners at every 300mm centers.Then suspend Type-2 Strut, fully knurled, sectional thickness 0.8mm, length 3600mm, equal flanges of 15mm and web 45mm from the soffit at 1200mm centers fastened to the Strut perpendicularly at 600mm centers. Strut having sectional thickness 2mm and length 2400mm to be fixed perpendicular to the Strut Cross Channel at 600mm centers. The system is backlined with the acoustical infill Anutone Synth PF 10x50 Technical Parameters • Fire (Class) – 1 & P • Acoustics – NRC 0.91 (For 50mm thk E250* Mounting) • Thermal conductivity (W/mk)– 0.09 • Climate (°C, RH) – 50, 91 • Light reflectance (%) – 76 • Green (VOC, RC %) – Low, 30	Sqm.	50.00
149	Acoustical Baffle Panels Providing & insallation of Acoustical Baffle of size 1200 length, thickness 40 mm with drop height 200/300 as options. Easily demountable. Manufactured from high density glass wool , with finished surface on both the sides. Edges are straight cut and painted. Acoustics-Sound absorption - 0.9 at 1000 Hz at 600 mm o.d.s as per EN ISO 354:2003 Humidity Resistance -Permanent ambient RH upto 95% at 30 * C without sagging , warping or delaminating. Fire Safety-Tested and classified as non combustible according to EN ISO 1182 with reaction to fire classification. Light Reflectance - 85% light reflectance Indoor Health & Well-being as per Indian standards. Cost is inclusive of hanging arrangement with suitable SS wire with locking arrangement.	sqm	1560.00
150	Acoustical Spray plasterProviding & Proccessing Acoustic Spray Installation using 25mm board + 3mm Plaster: 0.8 NRC in white finish, an inorganic acoustic plaster that is sanded to an ultra-smooth finish to be applied on the ceiling, or any curved and angled walls or any surface with light reflectance 93.3/-0.1% with Class A fire rating, NRC up to 0.80 and Alpha w of 0.80, cradle to cradle silver certified, UV-light resistant as per ISO 18314-1, 2015 and A+ against French VOC regulations.Acoustic plaster is sprayed directly onto a substrate either glued or mechanically fixed to concrete substrate to a total thickness of 28mm and trowel it nicely. For completely smooth surface sand the entire surface. The Measurement to be considered entire surface area of Horizontal and vertical including beams and pillars."PERFORMANCE CRITERIAA. NRC as high as 0.8B. Fire testing as per EN 13501-1:2002 + EN 13238:2001: A2-s1,d0C. Fire testing as per ASTM E84-11a: Class AE. 93% Light Reflectance as per ISO 18314-1, 2015: 83F. VOC (0.014 mg/m2h) 0,02 g/L as per the M1 Protocol for Chemical and Sensory Testing of Building Materials as per IS.G. Internal stress as per ASTM D6991-17: 1.8 MpaH. Resistance to Mold: Meets ASTM D3273-16 mold specification requirements.I. Resistance to UV-light exposure as per ASTM G 154-16 & ISO 18314-1, 2015: No visible changes after 1000 hoursJ. Determination of resistance to humidity as per DS/EN ISO 6270-2, 2005, 40°C (104.00°F)/95%RH: No visible changesK. Cradle to Cradle version 3.1: Must have achieved the Cradle to Cradle version 3.1 certification onSilver Level. (LEED CERTIFICATION)L. EPD Certified (Environment product declaration)	sqm	720.00
151	Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with hold fast lugs or with dash fasteners of required dia & length. Second class teak wood.	Cum.	2.80
152	Providing and fixing flush door shutter made out of solid core block board type, well seasoned , chemicaly treated hard wood battens and internal frame with minimum 45 mm wide wooden frame alround door shutters covered with cross bonded wooden sheets (core veneer) hot pressed and fastened on both sides of the door useing liquid phenol formaldehyde resin as per IS specifications 2202 (part-I) 1991. from manufacturer complete as per spcification. 40 mm thick both side commercial	Sqm.	53.00
153	Extra for providing lipping with 2nd class teak wood battens 25 mm minimum depth on all edges of flush door shutters (over all area of door shutter to be measured).	Sqm.	53.00

154	Extra for providing rectangular/ square vision panel not exceeding 0.1 sqm in all type of flush doors (cost of glass excluded) (overall area of door shutter to be measured):	Sqm.	10.00
155	Extra if louvers (not exceeding 0.2 sqm) are provided in flush door shutters (overall area of door shutters to be measured).	Sqm.	53.00
156	Providing & fixing 1mm thick decorative high pressure laminated sheet of plain / wood grain in gloss / matt/ suede finish with high density protective surface layer and reverse side of adhesive bonding quality conforming to IS : 2046 Type S, including cost of adhesive of approved quality.	Sqm.	106.00
157	Providing & fixing 1mm thick SS Kick Plate as per design & drawing.	Sqm.	13.00
158	Providing and fixing IS : 12817 marked stainless steel butt hinges 125x64x1.90mm with stainless steel screws etc. complete :	Each.	84.00
159	Providing and fixing SS hanging floor single rubber door stopper.	Each.	21.00
160	Providing and fixing SS Tower Bolt 300mm	Each.	21.00
161	Providing and fixing SS Handle 125mm	Each.	21.00
162	Providing and fixing Mortise cylinder lock case, 55mm backset, 72mm center distance, 24mm square forend, SS matt double cylinder, 40+40 = 80mm, non-master keyed, matt nickel hollow and SS lever handle with cylinder escutcheon. Complete in all respect as per the direction of the Engineer-in-charge.	Each.	21.00
163	Providing and fixing Alumninum channel arrangement for sliding door with all required accessories.	Each.	21.00
164	Providing and fixing of Aluminium Z Louvre Casement Door on Hinge with suitable outer frame. The fixing shall be done in masonary / RCC by drilling holes inserting PVC sleeve and stainless steel counter-sunk screws of appropriate size, anchoring in the masonary. The periphery of frame shall be sealed by application of weather sealant with backer rod of colour as approved, both outside and inside between aluminium member and masonary/ RCC. The fabrication shall be done with joints mitred. including providing masking tape on the profile for safety against external scratches (masking tape to be removed only at the time of hand over).	Sqm.	191.00
165	Insulated Fire rated doorset FD 120 with 30 minutes insulation Double Leaf doorset - Insulated Fire rated doorset (FD 120) - Staircase / exit pathway application / Refuge area. Providing and fixing of ISI marked fire doors as per IS 3614:2021, 120 minutes fire rating with 30 minutes insulation double leaf doorset tested to IS/ISO 3008. Doorset shall include grooved step frame profile of 125x75mm, made of 1.2mm GI (120GSM) and 60mm thick shutter made of 1.2mm GI (120GSM) with infill of 120kg density mineral wool. Grooved frame shall include EPDM smoke seal. Include hardwares, minimum 6nos SS ball bearing hinges of SS304 100x89x3mm, 1no of Single point Panic device and external trim with key cylinder on active leaf and 1no two point Panic device on the inactive leaf, tested as per EN1125 and CE marked. 2no of Door closer with spring size of EN 3-5, as per EN1154 and CE marked. 1no door coordinator for sequencing. 2nos vision panel 200 x 300 with 6mm clear fire rated glass and finished in desired colour of powder coating not less than 50microns including suitable anchors & fire rated puff grouting all inclusive for fixing of doorset - for staircase / exit pathway / Refuge area applications.	Sqm.	212.00

166	General Steel Doors Single leaf door - General steel doors Providing and fixing of single leaf hollow metal steel door. Doorset shall include grooved frame profile of 125x55mm made of 1.2mm GI conforming to IS 277 (120GSM) and 46mm thick shutter made of 1.2mm GI (120GSM) with infill of honeycomb core. Grooved frame shall include PVC smoke seal.Vision lite should be minimum 5mm toughned glass on shutter, Include hardwares, 3Nos SS ball bearing hinges of SS304 of size 100x75x3mm, 1no mortise dead lock, 55mm BS, 20 mm2 forend, including escutheion, sss with euro profile cylinder both side key, 1pair Pull handle D type, 22dia, CTC 300mm, back to back, with spindle, SS 304, SSS finish. 1nos of Door closer with spring size of EN 2-4, as per EN1154. vision panel 150 x 750 with 5mm clear glass and finished in desired colour of powder coating not less than 50microns including suitable anchors & puff grouting all inclusive for fixing of doorset - for all utility and all general application.	Sqm.	73.00
167	Double leaf door - General Steel doors Providing and fixing of double leaf hollow metal steel door. Doorset shall include grooved frame profile of 125x55mm made of 1.2mm GI conforming to IS 277 (120GSM) and 46mm thick shutter made of 1.2mm GI (120GSM) with infill of honeycomb core. Grooved frame shall include PVC smoke seal.Vision lite should be minimum 5mm toughned glass on shutter, Include hardwares, 6Nos SS ball bearing hinges of SS304 grade of size 100x75x3mm, 1no mortise dead lock, 55mm BS, 20mm sq. forend, including escutheion, sss with both side key cylinder on active leaf, 2pairs Pull handle D type, 22dia, CTC 300mm, back to back, with spindle, SS 304, SSS finish. 2nos of Door closer with spring size of EN 2-4, as per EN1154. 2nos flush bolt on the inactive leaf, 1no dust proof socket. 2Nos vision panel 150 x 750 with 5mm clear glass and finished in desired colour of powder coating not less than 50microns including suitable anchors & puff grouting all inclusive for fixing of doorset - for all utility and all general application.	Sqm.	542.00
168	Insulated Galzed fire door - Double leafProviding and fixing of double leaf insulated glazed fire door as per IS 16947 for integrity (E/EW 120) & Insulation (EI 30). Glazed door shall be tested to IS/ISO 834-1, IS/ISO 3009-1 for integrity & insulation (E/ EW 120). Glazed door shall be tested from CBRI for maximum rating of 120min, Door frames and partitions shall be single rebate frame profile of size 125 x 60mm made out of 1.60mm GI (120GSM). Door leaf shall be fully glazed with minimum 60 x 100mm profile step box section for taking glass elements. Door leaf shall be manufactured from 1.2mm GI (120GSM). For doors and partitions, beeding shall be minimum 1.2 mm GI with 25mm height, with screws 6 x 19mm. The infill material shall be mineral wool 96kg density. The glass shall be fire rated, ultra clear, interlayered minimum 13mm thick, for (E) 120 minutes integrity & (EI 30) 30minutes insulation with light transmission of minimum 89% as per EN1363 and EN1364. Glass shall have a impact resistance of 1B1 as per EN 12600 and sound insulation of 37db including ceramic tape. Cost of single leaf doorset shall include following hardware and accessories as a complete assembly, 6nos SS ball bearing hinges of SS304 grade of size 100x75x3mm, 1no Fire rated mortise dead lock, 55mm BS, 20mm sq. forend, including escutheion, sss as per EN 12209 with both side key cylinder on active leaf, 2pairs Pull handle D type, 22dia, CTC 300mm, back to back, with spindle, SS 304, SSS finish. 2nos of Door closer with spring size of EN 2-4, as per EN1154 and CE marked. 2nos flush bolt on the inactive leaf, 1no dust proof socket. Suitable anchor fastners for fixing on different type of wall construction as per manufacturer recommendation. All doors and frames shall be finished Pure Polyster Powder coated and shall have passed minimum 500 hours of salt sprey test. Once frame installed should be filled with PUF as recomended by the manufacturer or engineer.	Sqm.	116.00
169	Providing & fixing Toilet Cubicle (Bottom Colsed with Skirting) of following standard dimension which includes 600mm door size width made of heat, bacteria, water, chemical, scratch and impact resistant 12mm thick solid compact laminate panels including doors, pilasters & intermediate panels finished with approved texture/shade as per the detail drawings & as per IS 2046 (Indian Standard) and as per fire retardant BS-476/97 standard. The product should have Green Guard Certificate. This also includes providing and fixing in position necessary hardware made out of Stainless steel (Grade 304) as per manufacturer's specifications & Engineer-in-charge's instructions like (1) Door Knob, (2) Gravity Hinges, (3) Thumb turn lockset with Occupancy indicators, (4) Coat hooks with Door stopper (5) U- Channels, (6) Adjustable foot/pedestal, (7) Top rail with Corner connector (8) Rubber noise deafening tape, (9) Screws & wall Plugs. The top fitting should consist of SS round top rail which will get fixed with pilasters, with SS panel tube holder, SS corner bend (connected with top rail) will be used on the corner of cubicle in absence of brick wall, SS wall fixing is used only on the wall which will hold the ss top rail. All screws will of 304 Grade in stainless steel with satin finish. All pilasters are supported by stainless steel Bottom Cladding.Toilet Cubicle with dimension as drawing, which includes 600mm door size width.	Each.	175.00

170	Accoustic door Providing and fixing of Medium duty accoustic door as per IS 16074 & IS 4351 made of pressed galvanized steel confirming to IS 277 with the following specification. Door shall be suitable for 39db, STC rating and manufcatured in ISO 9001: 2015 certfied company for quality management. Door frame shall be single rebate step grooved profile of size 125 x 75mm made out of 1.60mm (16gauge) minimum thick galvanized steel sheet. Frames shall be mitered and field assembled with self tabs. Frames to have inbuild grooved sealing system and shall be site fitted with PVC gasket as standard. All provision should be mortised, drilled and tapped for receiving appropriate hardware. Permimeter seal of approved make Athmer/Legancy to be provided on all three sides of the frame jamb. Frames should be provided with back plate bracket and anchor fasteners for installation on a finished plastered masonry wall opening. Frames shall be filled with puff. Door leaf shall be 60mm thick step design fully flush double skin door, insulated without vision lite. Door leaf shall be manufactured from 1.2mm (18guage) minimum thick galvanised steel sheet. The internal construction of the door should be rigid reinforcement pads for receiving appropriate hardware. The infill material shall be 120kg/sq.mt. high density rockwool/mineral wool material. All doors shall be factory prepped for receiving appropriate hardware and provided with necessary reinforcement for hinges, locks, and door closers. The edges should be interlocked with a bending radius of 1.4mm. For pair of doors integrated astragals has to be provided on the meeting stile for both active and inactive leaf. Door shall be equiped with additional seals like auto door bottom All doors and frames shall be finished Pure Polyster Powder coated and shall have passed minimum 500 hours of salt sprey test. Rate shall include supply and installation of frame, shutter as a complete assembly, hardware & accessories.	sqm	26.00
171	Reception Table:- (Size L:- 3000mm x W:- 750mm x H:- 1050mm & 750mm) Providing, making & fixing two level (1050mm & 750mm) Reception Table made out of 19 mm thick water proof ply structure. Granite stone to be pasted on top and vertical face as per drawing with resin hardener adhesive over 19+19mm thick waterproof ply base. Table consists of drawer unit, storage pedestal, CPU trolly and keyboard tray as per drawing. The keyboard tray and drawer shall run on powder coated M.S. channels. All other surfaces shall be finished with 1.5 mm palstic laminate.	JOB	1.00
172	Reception Back Drop (L:-5890mm x H:-3050mm)Providing, making & fixing 200mm thick reception back drop with Signage, logo, Green plant wall made over the MS structure as detailed in drawing. Cost is inclusive of all accessories & lighting fixtures to illuminate the reception back drop. Provision of lighting arrangement will be paid in relevant head.	JOB	1.00
173	Supply and Installation of Blockout fabric made up of 100% Polyester with Acrylic coated of 0.32mm (PVC free) of thickness 0.50mm ±5% and wieghing 270-295gsm with openess factor of 0%. Shrinkage % Warp<0.5 & Weft <0.5,Color fastness>5-6. The Roller blind system consists of 38mm OD extruded out of Aluminium alloy with silver anodized to provide an everlasting finish and luster, the rotary unit shall be 36mm in OD incorporating a clutch mechanism composed of low – flexing braided polyster cord with nylon core, Control Ball chain shall be composed of braided nylon cord with high engineering grade plastic beads mounted co-axially on the cord. Bottom rail should be powder coated Aluminium flat bottom rail of 290 gm to finish it from the ends it should have rail end caps. The clutch will be at the tube. The return end cap bracket shall incorporate snap spring design to facilitate easy installation and removal for maintenance activities. The bracket shall be finished with a flush mounting cover on each side providing an aesthetic finish. It should handle up to 5 Kgs of material. The clutch should mount flush to the face of the bracket which minimize the light gap between the shade and the window frame.	Sqm.	1030.00
174	Providing and supplying aluminium extruded tubular and other aluminium sections as per the architectural drawings and approved drawings of Chief Architect, GoK.The aluminium quality shall be as per grade 6063 T5 or T6 as per BS 1474,including super durable powder coating of 60-80 microns conforming to AAMA 2604 of required colour and shade as approved by the Engineer-in-Charge. (The item includes cost of material such as cleats, sleeves, screws etc. necessary for fabrication of extruded aluminium frame work. Nothing extra shall be paid on this account).The weight of aluminium extruded section shall be taken for purpose of payment.	Kg.	19572.00

175	SEMI UNITIZED STRUCTURAL GLAZING Designing, fabricating, testing, protection, installing and fixing in position semi (grid) unitized system of structural glazing (with open joints) for linear as well as curvilinear portions of the building for all heights and all levels, including:(a) Structural analysis & design and preparation of shop drawings for the specified design loads conforming to IS 875 part III (the system must passed the proof test at 1.5 times design wind pressure without any failure), including functional design of the aluminum sections for fixing glazing panels of various thicknesses, aluminium cleats, sleeves and splice plates etc. gaskets, screws, toggles, nuts, bolts, clamps etc., structural and weather silicone sealants, flashings, fire stop (barrier)-cum-smoke seals, microwave cured EPDM gaskets for water tightness, pressure equalisation & drainage and protection against fire hazard including:(b) Fabricating and supplying serrated M.S. hot dip galvanised / Aluminium alloy of 6005 T5 brackets of required sizes, sections and profiles etc. to accommodate 3 Dimentional movement for achieving perfect verticality and fixing structural glazing system rigidly to the RCC/ masonry/structural steel framework of buildingstructure using stainless steel anchor fasteners/ bolts, nylon seperator to prevent bimetallic contacts with nuts and washers etc. of stainless steel grade 316, of the required capacity and in required numbers. (c) Providing and filling, two part pump filled, structural silicone sealant and one part weather silicone sealant compatible with the structural silicone sealant of required bite size in a clean and controlled factory / work shop environment, including double sided spacer tape, setting blocks and backer rod, all of approved grade, brand and manufacture, as per the approved sealant design, within and all around the perimeter for holding glass.(d)Providing and fixing in position flashings of solid aluminium sheet 1 mm thick and of sizes, shapes and profiles, as required as per the site conditions, to seal the gap between the building structure and all its interfaces with curtain glazing to make it watertight. (e) Making provision for drainage of moisture/ water that enters the curtain glazing system to make it watertight, by incorporating principles of pressure equalization, providing suitable gutter profiles at bottom (if required), making necessary holes of required sizes and of required numbers etc. complete.This item includes cost of all inputs of designing, labour for fabricating and installation of aluminium grid, installation of glazed units, T&P, scaffolding and other incidental charges including wastages etc., enabling temporary structures and services, cranes or cradles etc. as described above and as specified. The item includes the cost of getting all the structural and functional design including shop drawings checked by a structural designer, dully approved by Engineer-incharge. The item also includes the cost of all mock ups at site, cost of all samples of the individual components for testing in an approved laboratory, field tests on the assembled working structural glazing as specified, cleaning and protection till the handing over of the building for occupation. In the end, the Contractor shall provide a water tight structural glazing having all the performance characteristics etc. all complete as required, as per the Architectural drawings, as per item description, as specified, as per the approved shop drawings and as directed by the Engineer- in-Charge.Note:- 1. The cost of providing extruded aluminium frames, shadow boxes, extruded aluminium section capping for fixing in the grooves of the curtain glazing and vermin proof stainless steel wire mesh shall be paid for separately under relevant items under this sub- head. However, for the purpose of payment, only the actual area of structural glazing (including width of grooves) on the external face shall be measured in m2 . up to two decimal places.Note:-2. The following performance test are to be conducted on structural glazing system if area of structural glazing exceeds 2500 m2 from the certified laboratories accreditated by NABL(National Accreditation Board for Testing and Calibration Laboratories), Department of Science & Technologies, India. Cost of testing is payable separately.The NIT approving authority will decide the necessity of testing on the basis of cost of the work, cost of the test and importance of the work. Performance Testing of Structural glazing system Tests to be conducted in the NABL accredited lab or by any other accreditation body which operates in accordance with ISO / IEC 17011 and accredits labs as per ISO/ IEC 17025. 1. Performance Laboratory Test for Air Leakage Test (-50pa to -300pa) & (+50pa to +300pa) as per ASTM E-283-04 testing method for a range of testing limit 1 to 200 mVhr 2. Static Water Penetration Test. (50pa to 1500p) as per ASTME- 331-09 testing method for a range up to 2000 ml.,3. Dynamic Water Penetration (50pa to 1500pa) as per AAMA 501.01-05 testing method for a range upto 2000 ml,4. Structural Performance Deflection and deformation by static air pressure test (1.5 times design wind pressure without any failure) asper ASTME-330-10 testing method for a range upto 50 mm 5. Seismic Movement Test (upto 30 mm) as per AAMA 501.4-09 testing method for Qualitative test, Tests to be conducted on site. 6. Onsite Test for Water Leakage for a pressure range 50 kpa to 240 kpa (35psi) upto 2000 ml	Sqm.	1631.00
176	INFILL MATERIAL IN SEMI UNITIZED STRUCTURAL GLAZINGProviding, assembling and supplying vision glass panels (IGUs) comprising of hermetically-sealed 6-12- 6 mm insulated glass (double glazed) vision panel units of size and shape as required and specified, comprising of an outer heat strengthened float glass 6mm thick, of approved colour and shade with reflective soft coating on surface # 2 of approved colour and shade, an inner Heat strengthned clear float glass 6mm thick, spacer tube 12mm wide, dessicants, including primary seal and secondary seal (structural silicone sealant) etc. all complete for the required performances, as per the Architectural drawings, as per the approved shop drawings, as specified and as directed by the Engineer-in-Charge. The IGUs shall be assembled in the factory/ workshop of the glass processor.(Payment for fixing of IGU Panels in the curtain glazing is included in cost of item No.18.2)For payment, only the actual area of glass on face # 1 of the glass panels (excluding the areas of the grooves and weather silicone sealant) provided and fixed in position, shall be measured in m2.(i)Neutral toughened glass 6mm thick substrate with High performance soft Low-E coating on face # 2, + 12mm Airgap + 6mm Toughened clear Glass of approved make having properties as visible Light transmittance (VLT) of 41%, Light reflection internal 15%, light reflection external 20%, Solar Factor 0.24 SHGC/SF, shading coefficient 0.27 and U value of less than 1.5-1.6 W/m2 degree K, etc. The properties of performance glass shall be decided by technical sanctioning authority as per the site requirement.	Sqm.	1631.00

177	Aluminum hinge door with Accesson Entrance Design, Fabrication, Supply, installation, protection, cleaning & handover of Aluminum hinge doors . The door shall accomodate 6mm Clear FT glass with Aluminium frame profile with 35 - 40 micron PVDF Finish. The door shall have door closer / floor spring function as directed by PMC. Hold open for exit requirement door shall have possibilitiy of remaining fully open . Door shall have required seals on all four sides of the door to keep the air and water seal requirement . Door shall be from SYSTEM company, of approved brand only. All Material make/ Glass processing plant / coating plant / etc shall be as per Annexure 1 The quote rate shall include all design, engineering & shop drawing approval from architect & consultant. The quote rate shall include all Taxes, duties, statutory obligations and safety code compliance as per PMC. 12mm thk. Clear FT Shutter Size : as per requirement	Sqm.	10.00
178	Patch Fitting Door Design, Fabrication, Supply, installation, Testing (Onsite & Off site), protection, cleaning & handover of Single leaf aluminum frame swing door made with 6mm thick clear float fully tempered glass with Dorma make stainless floor spring. Complete with latch , handle -30mm dia SS handle 1200mm long , Door lock at bottom of each shutter and BTS 75 V 90 deg with EN 1-4 spring capacity floor spring. Floor spring covers shall be SS satin finish. as per Architect's approved shop drawings. Door glass of 6 mm thk clear float fully tempered size as per requirement. Provide SS threshold of 10mm at bottom of door to prevent water entering thru floor level. The door glass shall have brush pile at bottom to act as weather seal. Cost shall be included all design, engineering & shop drawing approval from architect & consultant. The quote rate shall include all Taxes, duties, statutory obligations and safety code compliance as per PMC.	Sqm.	10.00
179	Providing, fabricating and supplying shadow box of required size and shape, for fixing in the spandrel portion of the structural glazing, in linear as well as curvilinear portions of the building by providing semi -rigid, inorganic, non-combustible fibre glass wool insulation 50 mm thick, conforming to IS: 8183 and BS: 3958 Part 5. The insulation layer shall have facing (factory bonded on surface # 1 of the fibre glass insulationlayer), of black non-woven fibre glass tissue of nominal thickness 0.5 mm and nominal mass not less than 60 g/m2,made of randomly oriented glass fibres distributed in a binder by a wet-lay process including fixing 1.5 mm thick solid aluminum sheet backing using, 6 mm thick cement board including SS rivets, nuts, bolts, washers etc complete.	Sqm.	84.00
180	Providing and supplying Spandrel Glass Panels comprising of 6 mm thick heat strengthened monolithic float glass of approved colour and shade with reflective soft coating on surface # 2 of approved colour and shade so as to match the colour and shade of the IGUs in the vision panels etc. ,all complete for the required performances as specified, as per the Architectural drawings, as per the approved shop drawings, as specified, and as directed by the Engineer- in- Charge. For payment, only the actual area of glass on face # 1 of the glass panels (but excluding the area of grooves and weather silicone sealant) provided and fixed in position, shall be measured in m2. (Payment for fixing of Spandrel Glass Panels in the curtain glazing is included in cost of relevent Item*).“(i) Coloured tinted float glass 6mm thick substrate with reflective soft coating on face # 2, having properties as visible Light transmittance (VLT) of 25 to 35 %, Light reflection internal 10 to 15%, light reflection external 10 to 20 %, shading coefficient (0.25- 0.28) and U value of 3.0 to 3.3 W/m2 K etc. . The properties of performance glass shall be decided by technical sanctioning authority as per the site requirement.	Sqm.	84.00
181	Extra for openable side / top hung vision glass panels (IGUs) including providing and supplying at site all accessories and hardwares for the openable panels as specified and of the approved make such as heavy duty stainless steel friction hinges, min 4 -point cremone locking sets with stainless steel plates, handles, buffers etc. including necessary stainless steel screws/ fasteners, nuts, bolts, washers etc. all complete as per the Architectural drawings, as per the approved shop drawings, as specified and as directed by the Engineer- in-Charge.	Sqm.	30.00
182	Providing and fixing dry cladding upto 10 metre heights with 30mm thick gang saw cut stone with (machine cut edges) of uniform colour and size upto 1mx1m, fixed to structural steel frame work and/ or with the help of cramps, pins etc. and sealing the joints with approved weather sealant as per Architectural drawing and direction of Engineer-in-charge. (The steel frame work, stainless steel cramps and pins etc. shall be paid for separately). Red sand stone - 30mm thick gang saw cut stone	Sqm.	2250.00
183	Additional charges for using 30mm thick unpolished Granite of approved Shade.	Sqm.	2250.00

184	STONE WORK DRY CLADDING Providing and fixing structural steel frame (for dry cladding with 30 mm thick gang saw cut with machine cut edges sand stone) on walls at all heights using M.S. square/ rectangular tube in the required pattern as per architectural drawing, including cost of cutting, bending, welding etc. The frame work shall be fixed to the wall with the help of M.S. brackets/ lugs of angle iron/ flats etc. which shall be welded to the frame and embedded in brick wall with cement concrete block 1:2:4 (1 cement :2 coarse sand :4 graded stone aggregate 20 mm nominal size) of size 300x230x300 mm, including cost of necessary centering and shuttering and with approved expansion hold fasteners on CC/RCC surface, including drilling necessary holes. Approved cramps/ pins etc. shall be welded to the frame work to support stone cladding, the steel work will be given a priming coat of Zinc primer as approved by the Engineer-in-charge and painted with two or more coats of epoxy paint (Shop drawings shall be submitted by the contractor to the Engineer-in-charge for approval before execution). The frame work shall be fixed in true horizontal & vertical lines/planes. (Only structural steel frame work shall be measured for the purpose of payment, stainless steel cramps shall be paid for separately and nothing extra shall be paid).	Kg.	33750.00
185	Providing and fixing adjustable stainless steel cramps of approved quality, required shape and size, adjustable with stainless steel nuts, bolts and washer (total weight not less than 260 gms), for dry stone cladding fixed on frame work at suitable location, including making necessary recesses in stone slab, drilling required holes etc complete as per direction of the Engineer-in-charge.	Each	6750.00
186	GRC Jali:- Design, engineer, furnish, fabricate, package, deliver (to jobsite) and install: facade consisting of GRC at location as shown in elevation, supported on MS substructure , and GRC panels to mimic look of JAALI AS PER DESIGN, custom designed to with stand design wind pressure of 190 kg/sq.mtr confirming to IS -875 part III. (The system must pass the proof test at 1.5 times design wind pressure i.e. 285 kg/sq.mtr without any failure) . The system shall have drainage gutter profile with the possibility of drain container wherever exposed, for weather protection and complete air seal. The facade shall be designed as in architectural intent, supported with structural calculations to ensure stability under deflection . Panels shall be fixed as per design drawings. MS substructure to be designed as per drawing provided (architectural, sectional and detailed) . Intent to be maintained- the grid consistes of vertical members CHS 105 mm 2.5mm thick and interspersed by RHS 150 2.5 thick RHS at required interval meters, placed at groove intervals such that they are in tune with all the performance requirements. Form an interface between the Main structure through welded joints at roof level and come down to bear the GRC and the glass as per architectural intent.Further the structure shall carry a continous substructure made of MS to carry GRC panels in formation of a ring beam as shown in intent. This floating facade to have all the relevant drainage and water non- infiltration capacities in system inbuild. All extruded Mild steel section/brackets shall comply to IS 2062 Grade A and shall be coated with antirust paint of 275 microns comprising primer of 75 microns and two topcoat epoxy high performance architectural paint (Colour as per architect intent) of 100 microns each after shot blasting as per BS standards. The fastening materials like Anchors, Nuts, Bolts, Rivets, washers, clamps, straps etc required for fixing the framing members to the mild steel structure shall be of stainless steel 316 grade and corrosion resistant of approved make as per Architects/Consultants Specification. Provide exterior perimeter sealants where GRC cladding systems abutt adjacent materials including, but not limited to concrete shear walls, slab on grade and penetrations for ancillary equipment and accessories. he quote rate shall include all design, engineering & shop drawing approval FOR GRC JAALI AS DETAILED ABOVE from architect & consultant. The quote rate shall include all Taxes, duties, statutory obligations and safety code compliance as per PMC.(wt-06)	Sqm.	518.00
187	Expanded Metal Mesh JaliProviding & fixing pwoder coated expanded metal mesh (Grid remains same while skin shall be matal exoanded mesh with eyelets as per approved by Architect and thickness of metal shall be 2.0mm) in place of jaali as detailed above from architect & consultant. The quote rate shall include all Taxes, duties, statutory obligations and safety code compliance as per PMC.(wt-02)	Sqm.	196.00

188	Extruded Fin System Complete unitised system as mentioned Below Design, Supply and Install Extruded aluminum coated fin system custom designed to with stand the design wind pressure of 190 kg/sq.mtr confirming to IS -875 part III. (The system must pass the proof test at 1.5 times design wind pressure i.e.285 kg/sq.mtr without any failure) , Bracketing system with MS hot dip galvanized bracket system designed to accommodate three dimensional movements with serrations in bracket and washers, SS 316 grade fasteners and anchor bolts of approved make, nylon separators to prevent bi-metallic contacts, 2.0 mm thk aluminium trims and flashings to seal the gaps between curtain wall and the building structure all complete required to perform as per specification and drawing in conjunction with BOQ. The system design shall be based on system and design that shall include MS horizontal load bearing coated member running continously at the slab periphery, and the fins installed with custom brackets on and below . The system shall incorporate details required to fix top flashing as shown in perspective with termination detail. The system shall be designed considering surface temperatures of 80-90 deg Cel and temperature differential of 25 deg cel without creating excess stress in the system. The system shall be designed of floor height units spanning between the floors with slab/steel mounted bracket with provision to accommodate movement at all floor levels and at every grid panels horizontally. The system performance test shall be mandatory to verify the design performance meeting the requirement as per technical specification including all material tests. The price shall be seperately shown in the BOQ. The design to accommodate building movements, thermal expansions and the seismic movementsshould have performaning air seal and water seal alongwith fulfilling windload serviceability requirement . Performance Requirements: 1. Wind Loads: Completed system shall withstand wind pressure loads normal to wall plane indicated above. 2. Deflection: Maximum allowable deflection in any member when tested in accordance with AAMA Specifications for Aluminum Structures.a. For spans up to and including 4.1m deflection shall be limited to L/175. b. For spans greater than 4.1m, but less than12.2m, deflection shall be limited to L/175 or L/240 + 1/4” (6.4mm). MS horizontal load bearing coated member running continously at the slab periphery, grouted / fastened into slab face surface .Bracketing system designed to accommodate three dimensional movements with serrations in bracket and serrated washers, SS 316 grade fasteners and anchor bolts of approved make, nylon separators to prevent bi-metallic contacts, mechanism to be able to maintain line and level . The extruded aluminium sections of Alloy 6063 T5 / T6 and tolerances confirming to DIN standard from approved extruder. The structual profiles shall have minimum 2.5mm wall thickness. All the external visible surfaces shall have minimum 35 microns PVDF finish in solid color or as per architect approval. The non visible aluminium surfaces shall have minimum chromatizing treatment. Termination / interface of curtainwall façade with civil surface shall be treated with 2.0 mm thk aluminium trims and flashings to seal the gaps between curtain wall and the building structure all complete required to perform as per specification and drawing in conjunction with BOQ. The colour will follow the same as that with the fin members . All flashings to be in two layers (one with non metallic membrane) and have movement capacities to accomodate building movements and thermal expansion without gaps.The floor closure shall be provided continuously at beam top level with 1mm thk GI flashing closing gap between curtain wall and building line. Mock-up installation as per the sequence specified above shall be carried till system finally passes . The performance criteria for the system shall be as per the guidelines laid down in the tender specification or as suggested by the façade consultant for the project.The Mock-up width of the sample shall be not less than of three typical adjoining wall panels/units. The height of the sample shall be not less than 2 storey high and must contain full height modules of thefin system. The std. performance test shall be : • Structural test at 50% and 100% of inward design pressure (or) structural performance @50% and 100% Design wind pressure – As per ASTM E 330-10. • Structural test at 50% and 100% of outward design pressure (or) Structural performance @50% and 100% Design wind pressure –As per ASTM E 330-10. • Structural test at 150% of inward design pressure(or) Structural performance @ 1.5 X Design wind pressure at two directions – As per ASTM E 330-10. • Structural test at 150% of outward design pressure Structural performance @ 1.5 X Design wind pressure at two directions – As per ASTM E 330-10. Cost shall be inclusive to carry out all of the above mentioned test sequence including the complete mock up fabrication,transportation, installation cost. Also visit of 4 persons i.e client representative, architect and consultant to witness the test shall be included in the quote rate.	Rmt.	1567.00

189	POWDER COATED SHEET BENT FIN system: (4.8M WIDTH)Including FINS for glazing mentioned BelowDesign, Supply and Install Extruded aluminum coated fin system custom designed to with stand the design wind pressure of 190 kg/sq.mtr confirming to IS -875 part III. (The system must pass the proof test at 1.5 times design wind pressure i.e.285 kg/sq.mtr without any failure) , Bracketing system with MS hot dip galvanized bracket system designed to accommodate three dimensional movements with serrations in bracket and washers, SS 316 grade fasteners and anchor bolts of approved make, nylon separators to prevent bi-metallic contacts, 2.0 mm thk aluminium trims and flashings to seal the gaps between curtain wall and the building structure all complete required to perform as per specification and drawing in conjunction with BOQ.The system design shall be based on system and design that shall include MS horizontal load bearing coated member running continously at the slab periphery, and the fins installed with custom brackets on and below . The system shall incorporate details required to fix top flashing as shown in perspective with termination detail. The system shall be designed considering surface temperatures of 80-90 deg Cel and temperature differential of 25 deg cel without creating excess stress in the system. The system shall be designed of floor height units spanning between the floors with slab/steel mounted bracket with provision to accommodate movement at all floor levels and at every grid panels horizontally. The system performance test shall be mandatory to verify the design performance meeting the requirement as per technical specification including all material tests. The price shall be seperately shown in the BOQ. The design to accommodate building movements, thermal expansions and the seismic movementsshould have performaning air seal and water seal alongwith fulfilling windload serviceability requirement . Performance Requirements: 1. Wind Loads: Completed system shall withstand wind pressure loads normal to wall plane indicated above.2. Deflection: Maximum allowable deflection in any member when tested in accordance with AAMA Specifications for Aluminum Structures.a. For spans up to and including 4.1m deflection shall be limited to L/175. ,b. For spans greater than 4.1m, but less than12.2m, deflection shall be limited to L/175 or L/240 + 1/4" (6.4mm).MS horizontal load bearing coated member running continously at the slab periphery, grouted / fastened into slab face surface .Bracketing system designed to accommodate three dimensional movements with serrations in bracket and serrated washers, SS 316 grade fasteners and anchor bolts of approved make, nylon separators to prevent bi-metallic contacts, mechanism to be able to maintain line and level .The extruded aluminium sections of Alloy 6063 T5 / T6 and tolerances confirming to DIN standard from approved extruder. The structual profiles shall have minimum 2.5mm wall thickness. All the external visible surfaces shall have minimum 35 microns PVDF finish in solid color or as per architect approval. The non visible aluminium surfaces shall have minimum chromatizing treatment. Termination / interface of curtainwall façade with civil surface shall be treated with 2.0 mm thk aluminium trims and flashings to seal the gaps between curtain wall and the building structure all complete required to perform as per specification and drawing in conjunction with BOQ. The colour will follow the same as that with the fin members . All flashings to be in two layers (one with non metallic membrane) and have movement capacities to accomodate building movements and thermal expansion without gaps.The floor closure shall be provided continuously at beam top level with 1mm thk GI flashing closing gap between curtain wall and building line. Mock-up installation as per the sequence specified above shall be carried till system finally passes . The performance criteria for the system shall be as per the guidelines laid down in the tender specification or as suggested by the façade consultant for the project.The Mock-up width of the sample shall be not less than of three typical adjoining wall panels/units. The height of the sample shall be not less than 2 storey high and must contain full height modules of thefin system. The std. performance test shall be : • Structural test at 50% and 100% of inward design pressure (or) structural performance @50% and 100% Design wind pressure – As per ASTM E 330-10.• Structural test at 50% and 100% of outward design pressure (or) Structural performance @50% and 100% Design wind pressure –As per ASTM E 330-10.• Structural test at 150% of inward design pressure(or) Structural performance @ 1.5 X Design wind pressure at two directions – As per ASTM E 330-10.• Structural test at 150% of outward design pressure Structural performance @ 1.5 X Design wind pressure at two directions – As per ASTM E 330-10. Cost shall be inclusive to carry out all of the above mentioned test sequence including the complete mock up fabrication,transportation, installation cost. Also visit of 4 persons i.e client representative, architect and consultant to witness the test shall be included in the quote rate.	Rmt.	342.00
190	Aluminium Louvered System with Plain Panels Providing and fixing Aluminium Louvers with Plain Panel of approved colour consisting of panel 84 mm wide x 16mm deep x 0.6mm thick with round edges panel length upto 5mtrs coil coated on a continuous paint line double baked and roll formed from enameled corrosion Resistance Aluminum Alloy for higher strength and good Roll forming characteristics. Panels shall be clipped at a distance of 69mm to baked enameled Aluminium panel stringer 33mm wide and 65mm deep x 0.95 mm thick in a standard length of 5mtrs made of double baked enameled Aluminium Alloy to hold the panel in a module of 69.4mm centre to centre. The prongs on stringers shall be to accommodate an angle of 24 Degrees between two panels as per enclosed profile details. Stringers shall be fixed at 150 mm from panel ends and at a distance of maximum 900 mm center to center across the panel span. The carrier shall be fixed to a suitable structure by means of rigid fixing details. Cladding manufacturer should have in-house testing lab in India. The manufacturer should have inhouse roll forming machine to achieve the roll formed edges of Panels. All Panels shall be factory made. No site fabrication & cutting of panels is allowed. Paint Finish: -Panel shall be stove enamelled and finished with SDP of the approved colour on the exposed side and the reverse side with epoxy. Louver Panel Color -As approved by Architect/ Engineer-in-charge. Stringer Color - Black	Sqm.	451.00
191	ACP Cladding For Verticle straight portionsProviding and fixing of Aluminium composite panel of approved make and colour for wall cladding for Brick/Rcc/stone walls & coloumns/ beams with necessary aluminium frame works at required level made out of 50x25x4mm C section or equivalent. The panel should consist of 3mm thick non-halogenated FR grade mineral based polymer (2 hrs fire resistance as per ASTM E119-12 and clause B, S1, do as per ENT 13501-1sandwiched between 0.50 skins thick aluminium sheet making a total panel thickness of 4mm. The surfaces will be finished with PVDF based coating on topsides and service coating on reverse sides would be in polyester paint. The system shall be fixed using GI brackets, aluminium L cleats and stainless steel bolts and nuts complete with spring washer and cap nuts and all other necessary accessories, sealing shall be done with necessary rods etc., complete	Sqm.	224.00

192	ACP Cladding For Roof & Parapet coping Providing and fixing of Aluminium composite panel of approved make and colour for wall cladding for Brick/Rcc/stone walls & coloumns/ beams with necessary aluminium frame works at required level made out of 50x25x4mm C section or equivalent. The panel should consist of 3mm thick non-halogenated FR grade mineral based polymer (2 hrs fire resistance as per ASTM E119-12 and clause B, S1, do as per ENT 13501-1sandwiched between 0.50 skins thick aluminium sheet making a total panel thickness of 4mm. The surfaces will be finished with PVDF based coating on topsides and service coating on reverse sides would be in polyester paint. The system shall be fixed using GI brackets, aluminium L cleats and stainless steel bolts and nuts complete with spring washer and cap nuts and all other necessary accessories, sealing shall be done with necessary rods etc., complete	Sqm.	1604.00
193	Providing & Installing invisible SS wire grill system. The System Includes Alumninium track channel with 3 or 2 inch spacing with double pad SS 304 bolts. Grill will be developed in Nylon coated marine grade SS316 wire of 2mm thickness (12+1 wire construction). Channel will be fixed with SS anchor faseners for streching the grill. SS316 garde stiffeners will be used for horizontal & verticle intersection as per approved pattern & design. System cost is inclusive of all neccessory arrangements & accessories to fix & develope the SS Grill System.	Sqm.	350.00
194	Removal of Unserviceable Soil with Disposal upto a suitable distance as directed by the Engineer incharge of work	Cum.	900.00
195	Construction of sub-grade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2	Cum.	900.00
196	Preparation and surface treatment of formation by removing mud and slurry, watering to the extent needed to maintain the desired moisture content, trimming to the required line, grade, profile and rolling with 8-10 t smooth wheeled roller, complete as per clause 310.	Sqm.	3000.00
197	Construction of Granular Sub-Base of required grading as per design mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading -I Material	Cum.	450.00
198	Construction of Granular Sub-Base of required grading as per design mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per clause 401 For Grading -II Material	Cum.	450.00
199	Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver/grader in sub-base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density.	Cum.	300.00
200	Construction of M40 grade un-reinforced, dowel jointed, plain cement concrete pavement over a prepared sub base with Cement @ 315 kg/m3 and GGBS@ 105 kg/m3, coarse and fine aggregate conforming to IS 383:2016, maximum size of coarse aggregate not exceeding 25 mm, mixed in a batching and mixing plant as per approved mix design transported to site, laid with a paver finisher, spread, compacted and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, dowel bar, tie rod, admixtures as approved, curing compound, finishing to lines and grades as per drawing	Cum.	11.00
201	Filling of Control/Cold joint Groove with Epoxy urethane joint Sealer with suitable backer rod. 4mm x 4mm groove with 6mm dia backer rod.	Rmt.	30.00
202	Filling of Control/Cold joint Groove with Epoxy urethane joint Sealer with suitable backer rod. 8mm x 8mm groove with 10mm dia backer rod.	Rmt.	30.00

203	Providing and fixing factory made precast RCC perforated drain covers 100mm thick, having concrete of strength not less than M-35, of required size, reinforced with 8 mm dia 100mm c/c both ways with cross sectional T.M.T. hoop bars, including providing 50 mm dia perforations @ 100 mm c/c, including providing edge binding with M.S. flats of size 50 mm x 1.6 mm complete, all as per direction of Engineer-in-charge.	Sqm.	500.00
204	Providing and laying 60mm thick factory made cement concrete paver block of approved shape and colour of M -30 grade made of C&D waste by block making machine with vibratory compaction laid in required pattern and including over 50mm thick compacted bed of coarse sand, filling the joints with fine sand etc. all complete as per the direction of Engineer-in-charge.	Sqm.	662.00
205	Providing and laying Machine cut shot blasted granite cobbles (30mm thick) stone flooring in required design and patterns, in linear as well as curvilinear portions. all complete as per the architectural drawings with 18 mm thick stone slab over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade including rubbing, curing and polishing etc. all complete as specified and as directed by the Engineer-in-Charge.	Sqm.	600.00
206	Supplying and fixing M15 grade precast cement concrete Kerb stones for Roadway, Sidewalls and gutters fixed with CM 1:3 fixed and finsihed in line as per direction of Engineer in charge. (The cost of PCC shall be paid extra) 300 x 250 x 100 mm Kerb Stone	Rmt.	1000.00
207	Providing & Fixing Precast Saucer Drain as par requirement	Sqm.	350.00
208	Providing and laying 80mm thick faciory made cement concrete interlocking paver block of M -40 grade made by block making machine with strong vibratory compaction, of approved size, design & shape, laid in required colour and pattern over and including 50mm thick compacted bed of coarse sand, filling the joints with line sand etc. all complete as per the direction of Engineer-in-charge.	Sqm.	1020.00
209	Providing, laying and rolling of bituminous cold mix on prepared base consisting of a mixture of unheated mineral aggregate and emulsified or cutback bitumen, including mixing in a plant of suitable type and capacity, transporting, laying, compacting and finishing to specified grades and levels. Using SS1 bitumen emulsion and 9.5 mm or 13.2 mm size aggregate.	Cum.	55.00
210	BUILDING SIGNAGE Providing, Carving and fixing of 3D Black Granite Stone Logo & lettering thickness as per drawing 30 mm ,height 400 mm Cost is inclusive of all neccessory fixture hardware in Stainless steel, Scaffolding etc. , all complete as per direction of Engineer-in-charge & Architect.	Each.	1.00
211	STAINLESS STEEL NAME PLATE WITH PICTOGRAM Providing and fixing of Steel Name plate,304 Grade,16 Guage with engraved texts and cutout pictograms .Fixing provision using 3M VHP double sided tape as required. Signage Size 14 "x 14" inch, all complete as per direction of Engineer-in-charge & Architect.	Each.	311.00
212	STEEL DIRECTIONAL HANGING SIGNAGE Providing and fixing of Steel directional hanging Signage,304 Grade ,16 Guage with engraved texts and cutout pictograms .Fixing provision SS Wires as required. Signage Size 48 "x 10" inch, all complete as per direction of Engineer-in-charge & Architect.	Each.	32.00
213	FLOOR DIRECTORY Providing and fixing of Steel directory wall mounted Signage,304 Grade ,16 Guage with engraved texts and cutout pictograms,directions signs .Fixing provision SS Studs/ 3M VHP Tape as required. Signage Size 14 "x 14" inch all complete as per direction of Engineer-in-charge & Architect.	Each.	40.00
214	FIRE EVACUATION MAP / SIGN. Providing and fixing of Clear Acrylic sandwich frame of 3mm & 2mm acrylic with Evacuation Plan Printed on photoluminescent media and inserted between the two frames. Should be fixed on the wall using 4 Screw/ SS studs. Size 12 inch x 17 all complete as per direction of Engineer-in-charge & Architect.	Each.	16.00
215	FIRE SAFETY SIGNAGEProviding fabricating and fixing of Steel signage sheet at base with engraved plan Complete including fixing on wall with screws and washerS. all complete as per direction of Engineer-in-charge & Architect.Photoluminescent, Fire Hose Reel - 10"x8"	Each.	64.00

216	FIRE SAFETY SIGNAGE Providing fabricating and fixing of Steel signage sheet at base with engraved plan Complete including fixing on wall with screws and washerS. all complete as per direction of Engineer-in-charge & Architect. Photoluminescent, Fire Exit / Escape Sign - 18"x6"	Each.	64.00
217	FIRE SAFETY SIGNAGE Providing fabricating and fixing of Steel signage sheet at base with engraved plan Complete including fixing on wall with screws and washerS. all complete as per direction of Engineer-in-charge & Architect. Photoluminescent, Floor Level - 18"x6"	Each.	48.00
218	FIRE SAFETY SIGNAGE Providing fabricating and fixing of Steel signage sheet at base with engraved plan Complete including fixing on wall with screws and washerS. all complete as per direction of Engineer-in-charge & Architect. Photoluminescent, Fire Alarm Call Point - 10"x8"	Each.	16.00
219	FIRE SAFETY SIGNAGE Providing fabricating and fixing of Steel signage sheet at base with engraved plan Complete including fixing on wall with screws and washerS. all complete as per direction of Engineer-in-charge & Architect. Photoluminescent, Fire do not use lift- 10"x8"	Each.	16.00
220	FIRE SAFETY SIGNAGE Providing fabricating and fixing of Steel signage sheet at base with engraved plan Complete including fixing on wall with screws and washerS. all complete as per direction of Engineer-in-charge & Architect. Photoluminescent Signs, Fire Extinguishers - 10"x8"	Each.	48.00
221	Demolition of Existing Buildings including disposal of unserviceable materials and crediting of Serviceable materials of Distressed/dilapidated building of RCC Two storey framed structure building with slopped roof at IISc, Bangalore, including upto 1500mm below the ground level completely and allied structures such as walkway, UG sump, walls, Drains,Stone slab Flooring etc., including disposal of building rubbish/malba/similar unserviceable, dismantled or waste materials from the site by mechanical means, including all operation i.e leveling, dressing, loading, transporting, unloading at approved municipal dumping ground for all leads including all lifts involved complete as per direction of Engineer-in-charge.(Bid is exclusive of land below & surrounding of the buildings). (Total Plinth Area = 2860 sqm)	Sqm.	2861.00
222	Barricading Work Hire charges for providing temporary barricading around the site using GI corrugated sheet to a height of 6m. The GI corrugated /plain sheets of 0.35mm thick shall be fixed to the framework made out of 50mm dia MS pipe for vertical strut placed at about 3m center to center with required bracing using 40mm dia MS pipe placed about 2m center to center and fixing diagonal middle braces using 25mm dia MS pipe forming a rigid frame work as per the architectural drawing and direction of Engineer-in-charge. The barricade shall remain in the same location till the completion of the new work construction project. No additional charges shall be paid for the extended period of contract. The rate quoted shall be including cost of conveyance of all required materials to work site, erecting, removing and disposing the same after completion of work, cost of J bolts washers, cement concrete bed 45cm x 45cm x 75cm in CC 1:2:4 and labour charges etc., complete as per direction of Engineer-in-charge. (Note :- One time payment shall be made for providing barricading from start of work till completion of work i/c shifting. The barricading provided shall remain to be the property of the contractor on completion of the work).	Sqm.	3100.00
223	Cleaning/clearing of land Clearing of land by cutting of thick and sparse growth plants(0.25 mt thickness plants and clearing of bushes along with roots(throwing away to 1.5mtr height and 50 mtr far)	Sqm.	1000.00
224	Planting of treesDigging pits of size 0.75 x 0.75x 0.75m, filling 50% of the pit with top soil and remaining 50% of pit with 1:2:3 proportion of sand (0.035cum) FYM (0.070cum) Red earth (0.105 cum) and planting of well grown tree saplings (excluding cost of plants) Normal soil	Each.	225.00

225	Planting of Shrubs Digging pits of size 0.45 x 0.45 x0.45m filling 50% of the pit with top soil and remaining 50% of pit with1:2:3 proportion of sand (0.007), FYM (0.014cm) red earth (0.021cm) and and planting of well grown tree saplings (excluding cost of plants) Normal soil	Each.	450.00
226	Planting of Creepers Digging pits of size 0.45 x 0.45 x0.45m filling 50% of the pit with top soil and remaining 50% of pit with1:2:3 proportion of sand (0.007), FYM (0.014cm) red earth (0.021cm) and planting of well grown (excluding cost of plants) Normal soil	Each.	150.00
227	Planting of Ground cover plants Digging of 1.0mx1.0mx0.45m area and filling 50% of the area with top soiland remaining 50% area with 1:2:3 proportion of sand (0.0375 cum),FYM (0.075 cum) red earth (0.0112 cum) and planting of well grown saplings/plants (excluding cost of plants) Normal soil	Each.	50.00
228	Rose garden/growing of rose plants Digging pits of 0.6x 0.6 x0.6m size and filling 50% of the pit with top soil and remaining 50% of pit with 1:6:6 proportion of sand (0.008), FYM (0.048cm) red earth (0.048cm), Neem oil cake (200 gram), Bone meal (100gram), Gingali oil (100gram),Suphala (10 gms), Rose mix (5 gms) and other plant protection chemicals and planting of different varieties of rose plants etc. (excluding cost of plants) Normal soil	Each.	100.00
229	Growing of Flower beds Digging of 1.0mx1.0mx0.45m area and filling 50% of the area with top soil and remaining 50% area with 1:2:3 proportion of sand (0.0375 cum),FYM (0.075 cum) red earth (0.0112 cum) and planting of well grown saplings/plants (excluding cost of plants) Normal soil	Each.	50.00
230	Growing of Flower beds using corms/bulbs (Cana,Tuberose,Gladiolus etc) Digging of 1.0mx1.0mx0.45m area and filling 50% of the area with top soil and remaining 50% area with 1:2:3 proportion of sand (0.0375 cum),FYM (0.075 cum) red earth (0.0112 cum) and planting of corms/bubs/tubers in the following spacing. Cana and tuberose-0.2mx0.3m,gladiolus and others-02mx0.2m((excluding cost of planting materail) Normal soil	Each.	100.00
231	Growing of Hedges Digging trench of size 1mx0.30mx0.45m and filling 50% of the trench with top soil and remaining 50% trench with1:2:3 proportion of sand (0.0112), FYM (0.0224cum) red earth (0.0336cum) and planting of well grown plants (excluding cost of plants) Normal soil	Rmt	500.00
232	Lawn development : SCRAPPING AND REMOVING TOP SOIL :-Scrapping the area by removing 0.15m soil and removing of unwanted plants,grass along with roots.25km initial transport, including lead, lift loading and unloading charges. (1x1x0.15mt)	0.15 Cum.	150.00
233	Lawn development : 1ST DIGGING:-Digging of the area for developing lawn including removing weeds, debris if any and breaking of clumps, watering etc. (1x1x0.45mt)	0.45 Cum.	450.00
234	Lawn development : 2ND DIGGING:- Digging of soil by removing grass etc if any and levelling of the soil etc .. (1x1x0.45mt)	0.45 Cum.	150.00
235	Lawn development :procurement of quality red earth/soil and heap around pit (1x1x0.15mt)	0.15 Cum.	150.00

236	Lawn development : Supply of inputs such as sand, FYM, Red earth in 1:3:6 ratio.mixing and spreadingthe mixture to 7.50cm thickness wherever required with Red soil	0.0075 Cum.	1000.00
237	Lawn development : Supply of inputs such as sand, FYM, Red earth in 1:3:6 ratio.mixing and spreadingthe mixture to 7.50cm thickness wherever required with Farm Yard manure	0.0225 Cum.	22.50
238	Lawn development : Supply of inputs such as sand, FYM, Red earth in 1:3:6 ratio.mixing and spreadingthe mixture to 7.50cm thickness wherever required with Sand	0.045 Cum.	45.00
239	Supply of Fertiliser Super Phosphate	50 gram	250.00
240	Supply of Fertiliser Neem oilcake	250 gram	100.00
241	Supply of Fertiliser Bone meal	250 gram	100.00
242	Supply of Fertiliser Potash	50 gram	250.00
243	Supply of Fertiliser Furadan	25 gram	100.00
244	Supply of Fertiliser Ammonium Sulphate	100 gram	250.00
245	Supply of Fertiliser Chlorophyriphos	Liter	50.00
246	Designing, providing and installing vector art work (Base rate of Rs. 600 per sqft.) as per approved theme. The artwork shall be printed on 3M Scotchcal IJ40 / IJ220 vinyl with graphic cum UV protective layer 3M matte finish laminate. The approved artwork digitally reproduced using water-based inks certified to have no hazardous air pollutants. Self-adhesive, bubble-free installation to be done on a smooth, dust free putty surface that has a coat of oil-based primer, Printed on Latex technology by Authorised printer only. All complete as per design, drawing and approval of Architect. (Base Rate Rs. 450 Sft)	Sqm.	90.00
247	Design, Research & Painting art work over the available external wall surfaces. Art work will be done by exterior grade paints incldues base preperation with suitable exterior grade putty to get even suface. All complete as per the approval of the Architect/ Engineer-in-charge. For Single Height (Base rate for complete process Rs. 200/ Sft)	Sqm.	396.00
248	Design, Research & Painting art work over the available external wall surfaces. Art work will be done by exterior grade paints incldues base preperation with suitable exterior grade putty to get even suface. All complete as per the approval of the Architect/ Engineer-in-charge. For Additional Height (Base rate for complete process Rs. 350/ Sft)	Sqm.	240.00
249	Mural Work in Approved Design and pattern with Selected mateial by IISC & Engineer Incharge. (Basic Rate Rs. 2000 per Sft)	Sqm.	40.00

250	Metal Art Work in FaçadeSupply and fixing of screen panel cladding fixed system manufactured. The Screen panels of maximum sizes say 1000 mm X 2500 mm as per design requirement shall be manufactured from Aluminium material of 2mm thick. Screen panels shall have customized perforation/Pattern/foramtion as per architects design. Combination of perforations to be provided to suite the design Panels.The panels of required length and height shall be fixed to sub structure by means of screen panel guide clamps of 20x43x2mm. Panels shall be bent from all four sides and shall have extended flanges to accommodate clamps. Installer or Client shall provide sub frame made from Aluminium Steel. The Panels shall be fixed to a suitable structure by means of rigid fixing details, taking into account the relevant live loads and a dead load. Installation shall be carried out as per manufacturer recommendation/ as per Direction of Engineer-in-charge.The manufacturer should have inhouse roll forming /Bending machine to achieve the roll formed edges o. All Panels shall be factory made. No site fabrication & cutting of panels is allowed.Dimensional Tolerances:Gauge: The tolerance in thickness is ±0.03 mmWidth: The tolerance in the width of the strip is ±0.2 mm.Cost is inclusive of all Substructure required to fix screen facade.	Sqm	150.00
251	Water Closet Providing and fixing white vitreous china extended wall mounting water closet of size 780x370x690 mm of approved shape including providing & fixing white vitreous china cistern with dual flush fitting, of flushing capacity 3 litre/ 6 litre (adjustable to 4 litre/ 8 litres), including seat cover, and cistern fittings, nuts, bolts and gasket etc complete.	Each	125
252	Health Faucet Providing and fixing of Health faucet with regulator with flexible pipe 1.0 m long, wall hooked complete as required with flow rate of 3.8 LPM complying to Green Building requirements.	Each	125
253	Bib Cock Providing and fixing of 15 mm dia CP brass bib cock with CP wall flange of approved quality with flow rate of 3.8 LPM complying to Green Building requirements.	Each	125
254	Providing and fixing toilet paper holder : C.P. brass	Each	125
255	Coat Hook Providing and fixing of C.P. brass twin coat hook with PVC rawl plug & C.P. brass screw complete as required.	Each	125
256	Infrared sensor operated urinal Providing and fixing white vitreous china battery based infrared sensor operated urinal of approx. size 610 x 390 x 370 mm having pre & post flushing with water (250 ml & 500 ml consumption), having water inlet from back side, including fixing to wall with suitable brackets all as per manufacturers specification and direction of Engineer-in-charge.	Each	53
257	Providing and fixing granite stone slab with table rubbed, edges rounded and polished, of size 75x50 cm deep and 1.8 cm thick, fixed in urinal partitions by cutting a chase of appropriate width with chase cutter and embedding the stone in the chase with epoxy grout or with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 6 mm nominal size) as per direction of Engineer-in-charge and finished smooth.	m2	12.89
258	Providing and fixing wash basin with C.I. brackets, 15 mm C.P. brass pillar taps, 32 mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require: White Vitreous China Wash basin size 630x450 mm with a single 15 mm C.P. brass pillar tap	each	127
259	Providing and fixing CP Brass 32mm size Bottle Trap of approved quality & make and as per the direction of Engineer-in-charge.	each	127
260	Supply, Receiving, Storing & Fixing of ABS plastic body liquid soap dispenser with push lever assembly complete with soap refill.	Each	72
261	Providing and fixing 600x450 mm beveled edge mirror of superior glass (of approved quality) complete with 6 mm thick hard board ground fixed to wooden cleats with C.P. brass screws and washers complete.	each	127
262	Providing and fixing C.P. brass long body bib cock of approved quality conforming to IS standards and weighing not less than 690 g.	Nos.	24
263	Providing and fixing C.P. brass angle valve for basin mixer and geyser points of approved quality conforming to IS:8931	Nos.	280
264	Providing and fixing unplasticised PVC connection pipe with brass unions : 45 cm length 15 mm nominal bore	Nos.	125
265	Supply of solid state, no touch operting, fully hygienic hand drier of approved shade with single blower, with time delay, summer & winter control, music while drying, volume ON/OFF controls complete as required.	Each	35

266	Providing and fixing of CP Brass Shower Mixer with provision of overhead shower with 115mm long bend pipe, in built spout, spout / shower selector with wall flange complete with all accessories as required and making good the walls wherever required. with flow rate of 6.0 LPM complying to Green Building requirements.	Each	77
267	Providing and fixing of CP Brass 115mm long Shower Arm with wall flange and pressure adjustable 100 mm dia Shower Rose complete with all accessories as required and making good the walls wherever required .	Each	77
268	Providing & fixing of CP brass soap dish with brackets fixed to wooden cleats with CP brass screws with approved design and make.	Each	77
269	Providing and fixing of 600 mm long Nickel Chromium Plated towel rail complete with brackets fixed to wooden cleats with CP brass screws with concealed fittings arrangement of approved quality and colour, of approved brand & manufacture complete as per direction of Engineer in Charge.	Each	77
270	Providing and fxing of one no. hinged rail 76 cm & 4 nos. of grab bar 60 cm for handicap toilet & Hadicap shower complete as required.	Each	42
271	Providing and fixing of Storage type water heater/ Geyser with required accessories like 15 mm CP angle valve on inlet & outlet line, heavy duty reinforced flexible PVC connector for cold water line and flexible CP brass connector with CP checkout for hot water line, CPVC line connection, MS bracket with two coats of enamel paint, anchor fastners etc to hang the units, providing and fixing of 16 A 3 Pin plug of Anchor make, etc complete as required. Make:-Jaquar VERSA VERTICAL or equivalent Capacity 40 Liters	Each	14
272	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, i/c fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and the cost of cutting chases and making good the same including testing of joints complete as per direction of Engineer in Charge. Concealed work, including cutting chases and making good the walls etc. 15 mm nominal outer dia Pipes	Metre	1765
273	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, i/c fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and the cost of cutting chases and making good the same including testing of joints complete as per direction of Engineer in Charge. Concealed work, including cutting chases and making good the walls etc. 20 mm nominal outer dia Pipes	Metre	45
274	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, i/c fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and the cost of cutting chases and making good the same including testing of joints complete as per direction of Engineer in Charge. Concealed work, including cutting chases and making good the walls etc. 25 mm nominal outer dia Pipes	Metre	245
275	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge.Internal work - Exposed on wall15 mm dia nominal bore	Metre	815

276	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge. Internal work - Exposed on wall 20 mm dia nominal bore	Metre	665
277	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge. Internal work - Exposed on wall 25 mm dia nominal bore	Metre	260
278	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge. Internal work - Exposed on wall 32 mm dia nominal bore	Metre	270
279	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge. Internal work - Exposed on wall 40 mm dia nominal bore	Metre	550
280	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge. Internal work - Exposed on wall 50 mm dia nominal bore	Metre	235
281	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge. Internal work - Exposed on wall 65 mm nominal bore	Metre	180
282	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge. Internal work - Exposed on wall 80 mm nominal bore	Metre	30
283	Providing, fixing, jointing and testing in position the following U-PVC pressure threaded Pipes as per ASTM D 1785 Schedule 40 and threaded conforming to IS:554. Cut to required lengths including all necessary fittings and specials such as bends, tees, unions, reducers, flanges and plugs etc. Cost shall be inclusive of excavation, dewatering, backfilling, ramming surrounding the pipe all round with minimum 150 mm thick all round compacted silver sand and providing thrust block. (Pipe shall be provided with anti crossive protective treatment confirming to AWWA C 203 / IS 10221 standard complete as per specification). All work complete as per specification and satisfaction of the Engineer-in-Charge. (For Municipal / Tanker water supply) 25mm dia	Metre	50

284	Providing, fixing, jointing and testing in position the following U-PVC pressure threaded Pipes as per ASTM D 1785 Schedule 40 and threaded conforming to IS:554. Cut to required lengths including all necessary fittings and specials such as bends, tees, unions, reducers, flanges and plugs etc. Cost shall be inclusive of excavation, dewatering, backfilling, ramming surrounding the pipe all round with minimum 150 mm thick all round compacted silver sand and providing thrust block. (Pipe shall be provided with anti crossive protective treatment confirming to AWWA C 203 / IS 10221 standard complete as per specification). All work complete as per specification and satisfaction of the Engineer-in-Charge. (For Municipal / Tanker water supply)32mm dia	Metre	175
285	Providing, fixing, jointing and testing in position the following U-PVC pressure threaded Pipes as per ASTM D 1785 Schedule 40 and threaded conforming to IS:554. Cut to required lengths including all necessary fittings and specials such as bends, tees, unions, reducers, flanges and plugs etc. Cost shall be inclusive of excavation, dewatering, backfilling, ramming surrounding the pipe all round with minimum 150 mm thick all round compacted silver sand and providing thrust block. (Pipe shall be provided with anti crossive protective treatment confirming to AWWA C 203 / IS 10221 standard complete as per specification). All work complete as per specification and satisfaction of the Engineer-in-Charge. (For Municipal / Tanker water supply) 40mm dia	Metre	35
286	Providing, fixing, jointing and testing in position the following U-PVC pressure threaded Pipes as per ASTM D 1785 Schedule 40 and threaded conforming to IS:554. Cut to required lengths including all necessary fittings and specials such as bends, tees, unions, reducers, flanges and plugs etc. Cost shall be inclusive of excavation, dewatering, backfilling, ramming surrounding the pipe all round with minimum 150 mm thick all round compacted silver sand and providing thrust block. (Pipe shall be provided with anti crossive protective treatment confirming to AWWA C 203 / IS 10221 standard complete as per specification). All work complete as per specification and satisfaction of the Engineer-in-Charge. (For Municipal / Tanker water supply) 50mm dia	Metre	115
287	Providing, fixing, jointing and testing in position the following U-PVC pressure threaded Pipes as per ASTM D 1785 Schedule 40 and threaded conforming to IS:554. Cut to required lengths including all necessary fittings and specials such as bends, tees, unions, reducers, flanges and plugs etc. Cost shall be inclusive of excavation, dewatering, backfilling, ramming surrounding the pipe all round with minimum 150 mm thick all round compacted silver sand and providing thrust block. (Pipe shall be provided with anti crossive protective treatment confirming to AWWA C 203 / IS 10221 standard complete as per specification). All work complete as per specification and satisfaction of the Engineer-in-Charge. (For Municipal / Tanker water supply) 80mm dia	Metre	60
288	Providing, fixing, jointing and testing in position the following U-PVC pressure threaded Pipes as per ASTM D 1785 Schedule 40 and threaded conforming to IS:554. Cut to required lengths including all necessary fittings and specials such as bends, tees, unions, reducers, flanges and plugs etc. Cost shall be inclusive of excavation, dewatering, backfilling, ramming surrounding the pipe all round with minimum 150 mm thick all round compacted silver sand and providing thrust block. (Pipe shall be provided with anti crossive protective treatment confirming to AWWA C 203 / IS 10221 standard complete as per specification). All work complete as per specification and satisfaction of the Engineer-in-Charge. (For Municipal / Tanker water supply) 100mm dia	Metre	60
289	Supply and delivery at site GM (copper alloy) gate valves confirming to Class-I as per IS 778 with latest amendments, 1 No. screwed in bonnet inside screw, rising spring spindle integral seat screwed females ends confirming to IS 554/ 1990 body hydraulically tested 1.5HP seat standard tested 1 HP with IS mark. For 15 mm dia GM (Copper alloy) Gate valves	Each	11
290	Supply and delivery at site GM (copper alloy) gate valves confirming to Class-I as per IS 778 with latest amendments, 1 No. screwed in bonnet inside screw, rising spring spindle integral seat screwed females ends confirming to IS 554/ 1990 body hydraulically tested 1.5HP seat standard tested 1 HP with IS mark. For 20 mm dia GM (Copper alloy) Gate valves	Each	27

291	Supply and delivery at site GM (copper alloy) gate valves confirming to Class-I as per IS 778 with latest amendments, 1 No. screwed in bonnet inside screw, rising spring spindle integral seat screwed females ends confirming to IS 554/ 1990 body hydraulically tested 1.5HP seat standard tested 1 HP with IS mark. For 25 mm dia GM (Copper alloy) Gate valves	Each	17
292	Supply and delivery at site GM (copper alloy) gate valves confirming to Class-I as per IS 778 with latest amendments, 1 No. screwed in bonnet inside screw, rising spring spindle integral seat screwed females ends confirming to IS 554/ 1990 body hydraulically tested 1.5HP seat standard tested 1 HP with IS mark.For 32 mm dia GM (Copper alloy) Gate valves	Each	26
293	Supply and delivery at site GM (copper alloy) gate valves confirming to Class-I as per IS 778 with latest amendments, 1 No. screwed in bonnet inside screw, rising spring spindle integral seat screwed females ends confirming to IS 554/ 1990 body hydraulically tested 1.5HP seat standard tested 1 HP with IS mark. For 40 mm dia GM (Copper alloy) Gate valves	Each	6
294	Supply and delivery at site GM (copper alloy) gate valves confirming to Class-I as per IS 778 with latest amendments, 1 No. screwed in bonnet inside screw, rising spring spindle integral seat screwed females ends confirming to IS 554/ 1990 body hydraulically tested 1.5HP seat standard tested 1 HP with IS mark. For 50 mm dia GM (Copper alloy) Gate valves	Each	5
295	BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water / hot water circulation as specified. 80 mm dia	Each	2
296	BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water / hot water circulation as specified. 65 mm dia	Each	1
297	Providing and fixing in position of approved quality high pressure rated Gun Metal Float Valve with copper ball float and brass rods of required length suitable for test pressure of not less than 15 Kg/sqcm of the following sizes: 40mm nominal bore	Each	2
298	Constructing brick masonry chamber of internal dimension 600x600mm and depth of 600mm (inner dimensions) with modular bricks of CD 75 in cement mortar 1:6, bed concrete 150mm thick with 1:3:6, plastering 12 mm thick with cement mortar 1:4, CC 1:2:4 coping 75mm thk for fixing CI cover & frame etc. excluding the cost of CI frame and cover..	Each	8
299	Constructing masonry Chamber 120x120x100 cm inside, in brick work in cement mortar 1:4 (1 cement : 4 coarse sand) for sluice valve, with C.I. surface box 100 mm top diameter, 160 mm bottom diameter and 180 mm deep (inside) with chained lid and RCC top slab 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) , i/c necessary excavation, foundation concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate 40 mm nominal size) and inside plastering with cement mortar 1:3 (1 cement : 3 coarse sand) 12 mm thick, finished with a floating coat of neat cement complete as per standard design bricks of class designation 7.5	Each	1
300	Providing & fixing Auto Air vent for cold water supply risers, suitable for pressure not less than 15 Kg/Sq.cm. 15 mm dia	Each	17
301	Providing & fixing in position 25 mm dia lawn hydrants consisting of 25 mm dia Ball valve, GI nipple and quick release coupling / threaded hose receiver complete as required.	Each	7
302	Providing and fixing enclosed type water meter (bulk type) conforming to IS : 2373 and tested by Municipal Board complete with bolts, nuts, rubber insertions etc. (The tail pieces if required will be paid separately) : 100 mm dia nominal bore	Each	1

303	Providing & fixing on line turbine type flow meter with preamplifier & microprocessor based electronic flow meter mounted in plumbing plant room electrical control panel with the following features. Monitoring the total flow, Flow rate, high low arm batching and blending etc. Including electrical wiring from preamplifier to microprocessor based flow meter. Complete with all type of Plumbing & Electrical connections, accessories, wiring, conduits & supports complete with all respect. The signal from read out shall be 4-20 m.amps to be received on BAS. 40 mm dia	Each	2
304	Providing & fixing on line turbine type flow meter with preamplifier & microprocessor based electronic flow meter mounted in plumbing plant room electrical control panel with the following features. Monitoring the total flow, Flow rate, high low arm batching and blending etc. Including electrical wiring from preamplifier to microprocessor based flow meter. Complete with all type of Plumbing & Electrical connections, accessories, wiring, conduits & supports complete with all respect. The signal from read out shall be 4-20 m.amps to be received on BAS. 50 mm dia	Each	1
305	Providing, fixing and effecting connection from Existing Water Supply line including necessary excavation & making good the same including cutting, boring and tapping the Existing line by providing and installing ferrule / Tee connections with necessary fittings as required and making good the same. The rate for this item also includes complete services from the contractor for liasoning works such as filing necessary applications, submission of forms for approval to the municipal authorities, depositing the fees / other amounts as required for getting the premises / installations, inspected and approved and all other formalities required till the water connection is obtained. All the expenses incurred in this regard shall be borne by the Contractor except for the official payments to be made for any security deposit etc which will be reimbursed on production of original voucher.	L/S	1
306	Providing, jointing and fixing UPVC Soil, Waste & Vent system conforming to IS : 13592 - Type B and UPVC fittings (moulded as well as fabricated) like bends, tees, Y-tees, crosses, boss connections, access pieces, saddle pieces, cleanouts, adaptors for connections to other materials, plugs, reducers, cowls, offsets and other specials. Jointing shall be done with pushfit EPDM ring jointing technique in general. Solvent cement joints may be provided for fittings and specials which are not manufactured with pushfit rubber joints. Pipes may be laid / fixed in sunken floors, under slung from ceiling. The pipes laid in sunken floor shall be encased with 75 mm thick cement concrete (1:2:4) all around. The installation shall be complete in all respects including cutting chases / holes in walls, slabs and making good the same as per specifications. 75 mm dia	Metre	190
307	Providing, jointing and fixing UPVC Soil, Waste & Vent system conforming to IS : 13592 - Type B and UPVC fittings (moulded as well as fabricated) like bends, tees, Y-tees, crosses, boss connections, access pieces, saddle pieces, cleanouts, adaptors for connections to other materials, plugs, reducers, cowls, offsets and other specials. Jointing shall be done with pushfit EPDM ring jointing technique in general. Solvent cement joints may be provided for fittings and specials which are not manufactured with pushfit rubber joints. Pipes may be laid / fixed in sunken floors, under slung from ceiling. The pipes laid in sunken floor shall be encased with 75 mm thick cement concrete (1:2:4) all around. The installation shall be complete in all respects including cutting chases / holes in walls, slabs and making good the same as per specifications. 110 mm dia	Metre	1550
308	Providing, fixing, jointing, testing and commissioning PVC (Class III) of pressure rating 6.0 kg/sqcm Rain water downtake pipe conforming to IS:4985 cut to required lengths including all necessary fittings and specials. Fixing at wall/ceiling level supported by galvanized steel clamps & hangers etc. as required for proper seismic loading as per the calculations. Making proper connection with cement solvent joint as per BIS / manufacturer. Cutting chases/holes in floors / walls / slab. All Down take RWP pipe only). 110 mm dia.	Metre	235
309	Providing, fixing, jointing, testing and commissioning PVC (Class III) of pressure rating 6.0 kg/sqcm Rain water downtake pipe conforming to IS:4985 cut to required lengths including all necessary fittings and specials. Fixing at wall/ceiling level supported by galvanized steel clamps & hangers etc. as required for proper seismic loading as per the calculations. Making proper connection with cement solvent joint as per BIS / manufacturer. Cutting chases/holes in floors / walls / slab. All Down take RWP pipe only). 160 mm dia.	Metre	265

310	Providing, fixing, jointing, testing and commissioning PVC (Class III) of pressure rating 6.0 kg/sqcm Rain water downtake pipe conforming to IS:4985 cut to required lengths including all necessary fittings and specials. Fixing at wall/ceiling level supported by galvanized steel clamps & hangers etc. as required for proper seismic loading as per the calculations. Making proper connection with cement solvent joint as per BIS / manufacturer. Cutting chases/holes in floors / walls / slab. All Down take RWP pipe only). 210 mm dia.	Metre	125
311	Providing, fixing, jointing and testing of UPVC Floor Traps formed out of bore 'P' trap with 50 mm water seal, setting in 1:2:4 mix cement concrete block or clamping to the wall or suspending with the ceiling including cutting and making good the walls and floors wherever required. 110 mm inlet and 110 mm outlet.	No.	191
312	Providing and fixing floor drain points formed out of 110 x 63 mm PVC dia elbow with suitable extension piece, setting in 1:2:4 mix cement concrete block or clamping to the wall or suspending with the ceiling including cutting and making good the walls and floors wherever required	No.	125
313	Providing and fixing EXTENTION PIECE for floor trap, formed out of 110 mm PVC pipe with multiple side inlets formed with saddle pieces, suitable for 32, 40, 50 and 63 mm dia side connections as per standard detail and support through galvanized steel support from slab or set in cement concrete mix 1:2:4 complete as required.	No.	191
314	Providing and fixing Heavy class CP grating with Cockroach proof SS strainer of approved design including setting in floor with cement motor to match with floor finish as per architect requirement suitable for waster and Floor drain.Size 127 mm x 127 mm	Each	316
315	Providing and fixing cast iron gratings for Rain Water Pipes. 225x225mm	Each	14
316	Providing and fixing uPVC clean out plug with opening arrangements for soil / waste pipe and other necessary fittings inlcuding jointing, all complete as per standard detail. For 110 mm dia pipe	Each	78
317	Providing and fixing uPVC clean out plug with opening arrangements for soil / waste pipe and other necessary fittings inlcuding jointing, all complete as per standard detail. For 160 mm dia pipe	Each	2
318	Providing, fixing, jointing and testing UPVC soil, waste, vent pipework comprising UPVC pipe conforming to IS :4985-1983 and of required class as specified below and fittings (moulded as well as fabricated) like elbows, bends, reducers, threaded tail pieces, caps, suitable elbow with suitable extension piece for drain point and other specials jointing with cement solvent, chasing, cutting and making good the walls & floors pipes laid in floors shall be encased with 40 mm thick concrete all around, complete in all respects including testing of complete installation. 40 mm dia 6 kg/cm2 (Class III)	Metre	225
319	Providing, fixing, jointing and testing UPVC soil, waste, vent pipework comprising UPVC pipe conforming to IS :4985-1983 and of required class as specified below and fittings (moulded as well as fabricated) like elbows, bends, reducers, threaded tail pieces, caps, suitable elbow with suitable extension piece for drain point and other specials jointing with cement solvent, chasing, cutting and making good the walls & floors pipes laid in floors shall be encased with 40 mm thick concrete all around, complete in all respects including testing of complete installation. 50 mm dia 6 kg/cm2 (Class III)	Metre	105
320	Providing, fixing, jointing and testing UPVC soil, waste, vent pipework comprising UPVC pipe conforming to IS :4985-1983 and of required class as specified below and fittings (moulded as well as fabricated) like elbows, bends, reducers, threaded tail pieces, caps, suitable elbow with suitable extension piece for drain point and other specials jointing with cement solvent, chasing, cutting and making good the walls & floors pipes laid in floors shall be encased with 40 mm thick concrete all around, complete in all respects including testing of complete installation. 63 mm dia 6 kg/cm2 (Class III)	Metre	130

321	Providing and fixing floor clean out on soil & waste pipes, with opening arrangements for soil / waste pipe and other necessary fittings inlcuding jointing, to the satisfaction of the Project Manager / Consultants. For 110 mm dia pipe	No.	8
322	Supplying, laying and jointing HDPE pipes of specified grade and conforming to IS 4984-2016 with latest ammendments and conveying to work site including loading and unloading at both destinations and rolling and lowering into trenches, laying true to line and jointing of pipes and specials with electrofusion welding, giving hydraulic test as per relevant ISS with all lead and lifts including encasing the pipe alround to a depth of not less than 15 cms. with soft gravel or selected earth available from the excation, testing and commissioning. The rate is exclusive of required specials and fittings wherever necessary like saddle Tee, stub ends, flanged sets, bedns, reducers etc. complete (Contractor will make his own arrangements for procuring water for testing) etc Note: Upto 110mm dia Coil shall be used. For Grade PE80 PN6.0 : HDPE Grade PE80-PN6.0, 90mm dia	Metre	235
323	Supplying and installation of Class SN8 Double Wall Corrugated HDPE pipe outer wall corrugated and inner wall smooth piping system in accordance with IS 16098 part 2 and conveying to work site and lowering into trenches, laying true to line and level and perfect linking at joints with the help of two “O” rings and a coupler of suitable size, including loading and unloading at both destination and cutting of pipes where ever necessary including jointing with all labour, all lead and lift including encasing the pipe around to a depth of not less than 15 cm with screened soft soil available from the excavated soil. The testing commissioning including necessary hydraulic test to the required pressure as per ISS shall be done the contractor shall have to make his own arrangement for procuring water for testing SN8 Double Wall Corrugated HDPE pipe sizes of 200 mm dia	Metre	240
324	Supplying and installation of Class SN8 Double Wall Corrugated HDPE pipe outer wall corrugated and inner wall smooth piping system in accordance with IS 16098 part 2 and conveying to work site and lowering into trenches, laying true to line and level and perfect linking at joints with the help of two “O” rings and a coupler of suitable size, including loading and unloading at both destination and cutting of pipes where ever necessary including jointing with all labour, all lead and lift including encasing the pipe around to a depth of not less than 15 cm with screened soft soil available from the excavated soil. The testing commissioning including necessary hydraulic test to the required pressure as per ISS shall be done the contractor shall have to make his own arrangement for procuring water for testingSN8 Double Wall Corrugated HDPE pipe sizes of 250 mm dia	Metre	560
325	Providing and laying cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size) all-round S.W. pipes including bed concrete as per standard design: 150mm dia SW /RCC pipepipe	Metre	240
326	Providing and laying cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm nominal size) all-round S.W. pipes including bed concrete as per standard design: 250mm dia SW /RCC pipepipe	Metre	110
327	Providing and fixing square-mouth S.W. gully trap class SP-1 complete with C.I. grating brick masonry chamber with water tight C.I. cover with frame of 300 x300 mm size (inside) the weight of cover to be not less than 4.50 kg and frame to be not less than 2.70 kg as per standard design: 180x150 mm size P type With common burnt clay F.P.S. (non modular) bricks of class designation 7.5	Each	3
328	Constructing brick masonry road gully chamber 50x45x60 cm with bricks in cement mortar 1:4 (1 cement : 4 coarse sand) including 500x450 mm pre-cast R.C.C. horizontal grating with frame complete as per standard design : With common burnt clay F.P.S. (non modular) bricks of class designation 7.5	Each	1

329	Providing, supplying and fixing in position of High density poly ethylene Machinehole of 1200 mm internal diameter for all depths with top opening of 600mm, PE Machinehole chambers shall be on the basis of EN13598- 2:9009 shall meet relevant BIS/ASTM standards and specifications. All chambers shall be of a solid single wall 100mm or greater thickness construction made of 100% virgin PE material without recycling or foam content. All chambers shall come with a prefabricated integrated base with apprpriate benching with a gredient of 1-2%. The Machinehole shall be seated on M10 cement concrete (1:3:6) of 200mm depth. The inlet pipes to be connected with elastomer seal for a flexible connection of pipes according to EN 681-1. The Machinehole shall have straight channel DN 200 with four extra inlets DN 200/160/110, 45o and 90o right and left and drop arrangement if required and Outlet DN 200/160/110 including steps. The Machinehole shall also be designed to receive house connection at shaft level as per requirement. In case the system is made of midular parts then triple safety (three sided lip/element) seal according to standard practices to be used to connect the parts. Machinehole shall have corrossion resistance steps vertical step distance 25 cms in order to safe guard against uplift pressure, Machinehole should have solid horizontal re-inforcement ribs of appropriate thickness and width. These ribs should be stratagically placed at regular intervals all along the outside of the shaft of the Machinehole. During installation, special care must be taken to ensure proper compaction of the excavated earth with proctar density of 95%, below and around the Machinehole, suitably anchored over concrete to take traffic load without settlement. HDPE Machinehole of 1200mm dia and upto 1.0 m height	each	38
330	Supplying and fixing SFRC frame and cover conforming to IS 12592 (part-I)-1988 and IS 12592 (part-II)- 1991 with latest amendment, including cutting slabs to the required size for the opening and fixing the covering C.C. 1:2:4 and C.M. 1:3 plastering 20 mm thick to all exposed faces, curing for 10 days with all lead and lift with appurtenances. complete. Medium Duty	each	38
331	Providing and fixing medium duty circular manhole cover with frame size 525 mm dia, total weight 50 kg complete in all respects. (For overhead tanks)	Each	3
332	Providing and fixing medium duty circular manhole cover with frame size 525 mm dia, total weight 116 kg complete in all respects. (For Underground tanks)	Each	4
333	Providing and fixing 700mm long puddle flanges fabricated out of 6mm thick M.S. plates along with flanges of suitable size properly fixed in walls and top slabs of (for Underground & overhead tanks). 32mm dia	Each	1
334	Providing and fixing 700mm long puddle flanges fabricated out of 6mm thick M.S. plates along with flanges of suitable size properly fixed in walls and top slabs of (for Underground & overhead tanks).40mm dia	Each	4
335	Providing and fixing 700mm long puddle flanges fabricated out of 6mm thick M.S. plates along with flanges of suitable size properly fixed in walls and top slabs of (for Underground & overhead tanks). 50mm dia	Each	4
336	Providing and fixing 700mm long puddle flanges fabricated out of 6mm thick M.S. plates along with flanges of suitable size properly fixed in walls and top slabs of (for Underground & overhead tanks). 65mm dia	Each	1
337	Providing and fixing 700mm long puddle flanges fabricated out of 6mm thick M.S. plates along with flanges of suitable size properly fixed in walls and top slabs of (for Underground & overhead tanks). 80mm dia	Each	11
338	Providing and fixing 700mm long puddle flanges fabricated out of 6mm thick M.S. plates along with flanges of suitable size properly fixed in walls and top slabs of (for Underground & overhead tanks). 100mm dia	Each	13
339	Providing and fixing 700mm long puddle flanges fabricated out of 6mm thick M.S. plates along with flanges of suitable size properly fixed in walls and top slabs of (for Underground & overhead tanks). 150mm dia	Each	13
340	Providing and fixing 700mm long puddle flanges fabricated out of 6mm thick M.S. plates along with flanges of suitable size properly fixed in walls and top slabs of (for Underground & overhead tanks). 250mm dia	Each	2

341	Providing and fixing 80mm dia G.I. vent pipe on Under ground and over head tank inlcuding cost of 2 Nos. 900 bend and painting with enamel paint complete with in all respect.(for underground tanks & overhead tanks).	Each	12
342	Providing orange colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS : 10910, on 12 mm dia steel bar conforming to IS: 1786, having minimum cross section as 23 mmx25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufacture's permanent identification mark to be visible even after fixing, including fixing in manholes with 30x20x15 cm cement concrete block 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) complete as per design.	Each	54.00
343	Providing & installation of Water cooler with RO system having Capacity to purify water @ 80 liter /hours.	Each	14
344	Supplying, installation, testing and commissioning of Electric driven Main Fire Pump suitable for automatic operation and consisting of following, complete in all respects, as required : (a) Horizontal type, multistage, centrifugal, split casing pump of cast iron body & bronze impeller with stainless steel shaft, mechanical seal conforming to IS 1520. (b) Suitable HP Squirrel cage induction motor, TEFC, synchronous speed 1500 RPM, suitable for operation on 415 volts, 3 phase 50 Hz, AC supply with IP 55 protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS-325. (c) M.S. fabricated Common base plate, coupling, coupling guard, foundation bolts etc. as required. d) Suitable cement concrete foundation duly plastered with anti vibration pads. **2280 lpm at 88 m Head** Note: *The head of the pump is selected in a manner so as to give a minimum 3.5kgf/cm2 pressure at the highest/farthest point.	Set	2
345	Supplying, installation, testing and commissioning of diesel engine driven main fire pump suitable for automatic operation and consisting of following, complete in all respects, as required : (Diesel Driven Pump)Horizontal type, multistage, centrifugal pump of cast of iron body and bronze impeller with stainless steel shaft, mechanical seal conforming to IS 1520.Suitable HP, 1500 RPM water cooled with radiator, diesel engine conforming to relevant IS standard complete with auto starting mechanism, 12 /24 volts electric starting equipment, diesel tank, exhaust pipe extended upto 10 m outside pump house duly insulated with 50 mm thick glass wool with 1.0 mm thick aluminium sheet cladding, residential silencer, instruments and protection as per standard specification, stop solenoid for auto stop in the event of fault with audio indications, painted with post office red colour etc. as required.M.S fabricated, common base plate, coupling, coupling guard, foundation bolts etc. as required.Suitable cement concrete foundation duly plastered and with anti vibration pads.**2280 lpm at 88 m Head**Note: * The head of the pump is selected in a manner so as to give a minimum 3.5kgf/cm2 pressure at the highest/farthest point.	Set	1
346	Supplying, installation, testing and commissioning of electric driven pressurisation pump suitable for automatic operation and consisting of following, complete in all respects, as required : (Jockey Pump) Horizontal type, multistage, centrifugal pump of cast iron body and bronze impeller with stainless steel shaft, mechanical seal conforming to IS : 1520. Suitable HP squirell cage induction motor TEFC type suitable for operation on 415 volts, 3 phase 50 Hz AC supply with IP 55 class of protection for enclosure, horizontal foot mounted type with Class-'F' insulation, conforming to IS : 325. M.S.fabricated Common base plate, coupling, coupling guard, foundation bolts etc. as required. Suitable cement concrete foundation duly plastered and with anti vibration pads. **180 lpm at 88 m Head**	Set	2

347	Supplying, installation, testing and commissioning of electric driven terrace pump suitable for automatic operation and consisting of following, complete in all respects, as required: (Terrace Pump) (a) Horizontal type, multistage, centrifugal, split casing pump of cast iron body & bronze impeller with stainless steel shaft, mechanical confirming to IS : 1520 b) Suitable HP squirell cage induction motor TEFC type suitable for operation on 415 volts, 3 phase, 50 Hz, AC supply with IP55 class of protection for enclosure, horiziontal foot mounted type with Class-'F' insulation, conforming to IS-325. (c) M.S.fabricated common base plate, coupling, coupling guard, foundation bolts etc.as required. **900 lpm at 35 m Head**	Nos.	1
348	Providing, fixing, testing andcommissioning of **precharged air vessel** (size 450 mm dia & 2000 mm height) for pressurization of hydrant / sprinkler system complete with adequate pressure switches (as per design / requirement) with valves to operate as per operating sequences including 25 mm dia drain valve, air release valve with stop cock on the top, 25 mm dia inlet with isolating valve duly painted from inside and outside complete as required. Note:Contractor shall include in his rates for providing level controllers, pressure switches, wiring, cabling from level controller / pressure switch to panel etc. complete as required to operate the system automatic/manual. Pump shall be protected against running dry.	Set	2
349	Providing & fixing dial type (100 mm) **pressure gauge** with isolation ball valve suitable for working pressure of 250 PSI. Cost shall be inclusive of providing any short pieces, nipples, elbows etc as required.	Each	5
350	Providing & fixing of **pressure switch** in M.S. pipe line including connection etc. as required.	Each	5
351	Providing & installing Galvanized Iron Pipe 5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 65 mm dia. complete	M	5
352	Providing & installing Galvanized Iron Pipe 5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications.Galvanized Iron Pipes 80 mm dia. complete	M	7.5
353	Providing & installing Galvanized Iron Pipe 5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 100 mm dia. complete	M	7.5
354	Providing & installing Galvanized Iron Pipe 5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 150 mm dia. complete	M	10
355	Providing & installing Galvanized Iron Pipe 5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 200 mm dia. complete	M	25

356	Providing & installing Galvanized Iron Pipe 5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. 250 NB (IS: 3589, 6.0 mm thick)	M	25
357	Providing & fixing heavy duty double flanged flexicon rubber expansion joint (suitable for system test pressure) of standard length as per manufacturers specs including rubber gaskets, flanges, nuts, bolts and washers complete as required. 150 mm dia	Each	3
358	Providing & fixing heavy duty double flanged flexicon rubber expansion joint (suitable for system test pressure) of standard length as per manufacturers specs including rubber gaskets, flanges, nuts, bolts and washers complete as required. 80 mm dia	Each	1
359	Providing & fixing heavy duty double flanged flexicon rubber expansion joint (suitable for system test pressure) of standard length as per manufacturers specs including rubber gaskets, flanges, nuts, bolts and washers complete as required. 65 mm dia	Each	2
360	Supplying, fixing, testing and commissioning of butterfly valve of PN 1.6 rating with bronze/gunmetal seat duly ISI marked complete with nuts, bolts, washers, gaskets conforming to IS 13095 of following sizes as required : 65 mm dia	Set	2
361	Supplying, fixing, testing and commissioning of butterfly valve of PN 1.6 rating with bronze/gunmetal seat duly ISI marked complete with nuts, bolts, washers, gaskets conforming to IS 13095 of following sizes as required : 80 mm dia	Set	5
362	Supplying, fixing, testing and commissioning of butterfly valve of PN 1.6 rating with bronze/gunmetal seat duly ISI marked complete with nuts, bolts, washers, gaskets conforming to IS 13095 of following sizes as required : Supplying, fixing, testing and commissioning of butterfly valve of PN 1.6 rating with bronze/gunmetal seat duly ISI marked complete with nuts, bolts, washers, gaskets conforming to IS 13095 of following sizes as required : 150 mm dia	Set	9
363	Supplying, fixing, testing and commissioning of butterfly valve of PN 1.6 rating with bronze/gunmetal seat duly ISI marked complete with nuts, bolts, washers, gaskets conforming to IS 13095 of following sizes as required : 200 mm dia	Set	4
364	Supplying, fixing, testing and commissioning of butterfly valve of PN 1.6 rating with bronze/gunmetal seat duly ISI marked complete with nuts, bolts, washers, gaskets conforming to IS 13095 of following sizes as required :250 mm dia	Set	4
365	Providing, installation, testing and commissioning of non-return valve of following sizes confirming to IS: 5312 complete with rubber gasket, GI bolts, nuts, washers etc.as required : 65 mm dia	Set	2
366	Providing, installation, testing and commissioning of non-return valve of following sizes confirming to IS: 5312 complete with rubber gasket, GI bolts, nuts, washers etc.as required : 80 mm dia	Set	3
367	Providing, installation, testing and commissioning of non-return valve of following sizes confirming to IS: 5312 complete with rubber gasket, GI bolts, nuts, washers etc.as required : 150 mm dia	Set	3
368	Providing, installation, testing and commissioning of non-return valve of following sizes confirming to IS: 5312 complete with rubber gasket, GI bolts, nuts, washers etc.as required : 200 mm dia	Set	1

369	Providing, installation, testing and commissioning of stainless steel Y-strainer fabricated out of 1.6 mm thick stainless steel, Grade 304, sheet with 3 mm dia holes with stainless steel flange. 250mm dia	Each	2
370	Supplying and fixing **air vessel made of 250 mm dia**, 8 mm thick MS sheet, 1200 mm in height with air release valve on top and flanged connection to riser, drain arrangement with 25 mm dia gun metal wheel valve with required accessories, pressure gauge and paintingwith synthetic enamel paint of approved shade as required.	Set	6
371	Providing & fixing dial type (100 mm) **pressure gauge** with isolation ball valve suitable for working pressure of 250 PSI. Cost shall be inclusive of providing any short pieces, nipples, elbows etc as required.	Each	44
372	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 25 mm dia. complete	RM	105
373	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 80 mm dia. complete	RM	115
374	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 100 mm dia. complete	RM	130
375	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 150 mm dia. complete	RM	1045
376	Supplying, fixing, testing and commissioning of butterfly valve of PN 1.6 rating with bronze/gunmetal seat duly ISI marked complete with nuts, bolts, washers, gaskets conforming to IS 13095 of following sizes as required : 150 mm dia	Set	7
377	Providing, installation, testing and commissioning of non-return valve of following sizes confirming to IS: 5312 complete with rubber gasket, GI bolts, nuts, washers etc.as required : 150 mm dia	Set	7
378	Providing, installation, testing and commissioning of stainless steel Y-strainer fabricated out of 1.6 mm thick stainless steel, Grade 304, sheet with 3 mm dia holes with stainless steel flange.150 mm dia	Each	1
379	Providing and fixing tamper switch on **butterfly valve / sluice valve / isolation valve** for remote mointing of the valve open / close position. The tamper switch shall be provided with potential free contact with 2 No. NONC. The valve shall also be provided with manual lock & chain arrangement.	Set	7
380	Supplying and fixing single headed internal hydrant valve with instantaneous Gunmetal/Stainless Steel coupling of 63 mm dia with cast iron wheel ISI marked conforming to IS 5290 (Type -A) with blank Gunmetal/Stainless Steel cap and chain as required : Single headed Stainless steel	Each	44
381	Supplying and fixing Single headed external yard hydrant valve with 1 No. 63 mm dia instantaneous FM Gunmetal/Stainless Steel coupling and cast iron wheel, ISI marked, conforming to IS 5290 (type A) with blank Gunmetal/Stainless Steel cap and chain as required : Single headed Stainless steel	Set	6
382	Supplying and fixing 63 mm dia, 15 m long RRL hose pipe with 63 mm dia male and female couplings duly bound with GI wire, rivets etc. conforming to IS 636 (type-A) as required : Stainless Steel (Grade 304)	Set	88

383	Providing & fixing controlled **percolation fire hose pipe** (as per IS:8423) of 63 mm dia and 15 meter length rated for brust pressure of 35.7 Kg/sqcm. The hose shall be tested for flame resistance test in accordance to IS:8423. Hose shall be complete with ISI marked brass male & female coupling (IS:903) bound & riveted to hose pipe with copper rivets & 1.5 mm copper wire **(Location : External fire hydrant)**	Set	12
384	Supplying and fixing first-aid Hose Reel with MS construction spray painted in post office red, conforming to IS 884 complete with the following as required. 20 mm nominal internal dia water hose thermoplastic (Textile reinforced) type -2 as per IS: 12585 20 mm nominal internal dia gun metal globe valve & nozzle. Drum and brackets for fixing the equipmets on wall Connections from riser with 25 mm dia stop gun metal valve & M.S. Pipe and socket. 30 m	Set	44
385	Supplying & fixing 63 mm dia gun metal short branch pipe with 20 mm nominal internal diameter size nozzle conforming to IS 903 suitable for instantaneous connection to interconnect hose pipe coupling as required : Stainless Steel (Grade 304)	Nos.	50
386	Supplying and fixing of fire brigade connection of cast iron body with gun metal male instantaneous inlet couplings complete with cap and chain as reqd. for suitable dia MS pipe connection conforming to IS 904 as required : 2 way-100 mm dia M.S. Pipe	Set	1
387	Supplying and fixing of fire brigade connection of cast iron body with gun metal male instantaneous inlet couplings complete with cap and chain as reqd. for suitable dia MS pipe connection conforming to IS 904 as required : 4 way-150 mm dia M.S. Pipe	Set	2
388	Providing and fixing standard **firemans axe** with heavy rubber handle.	Each	44
389	Supplying Installing, testing and commissioning of Hose reel cabin	Each	44
390	Providing and fixing heavy duty SS Floor grating with frame of approved design including setting in floor with cement motor to match with floor finish as per architect requirement. (for FHC drain pipe) Size 100 mm x 100 mm	Each	44
391	Supplying Installing, testing and commissioning of **Hose cabinet** made out of 18 gauge M.S.sheet with double glass door with lacing arrangement and painted with two coats of Fire red Enamel paint at outer ise of the Box and two coats of white enamel paint at inner side of the box is to accomodated **2 Nos. of Fire hose box** size 20"x24"x10" complete including cost of materials, labour, usage charges of machinery complete as per specifications.	Each	6
392	Providing & fixing **MS cabinet** (to enclose above FB connection and draw out connection) fabricated from 16g MS sheet with full front glass door and locking arrangement duly painted with one coat of primer and two or more coats of synthetic enamel paint of approved make and shade and suitably mounted on a raised masonry platform as required (Approx 0.6m x 0.6m x 0.45m)	Each	3
393	Providing laying, testing & commissioning of 'C' class heavy duty GI Pipe conforming to IS 1239/3589 i/c fittings like elbows, tees, flanges, tapers, nuts bolts, gaskets etc. in ground including welding, excavation & providing cement concrete blocks as supports, anticorrosive treatment with coaltar/asphalt tape as per IS 10221, refilling the trench etc. of following sizes complete as required.100 mm. Dia	M	10
394	Providing laying, testing & commissioning of 'C' class heavy duty GI Pipe conforming to IS 1239/3589 i/c fittings like elbows, tees, flanges, tapers, nuts bolts, gaskets etc. in ground including welding, excavation & providing cement concrete blocks as supports, anticorrosive treatment with coaltar/asphalt tape as per IS 10221, refilling the trench etc. of following sizes complete as required. 150 mm. Dia	M	15
395	Supplying Installing, testing and commissioning of Gun metal **AIR RELEASE VALVE** SIZE OF 25mm dia including cost of materials, labour, usage charges of machinery complete as per specifications. Complete	Each	2
396	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 25 mm dia. complete	M	5920

397	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 32 mm dia. complete	M	355
398	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 40 mm dia. complete	M	2415
399	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 50 mm dia. complete	M	370
400	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 65 mm dia. complete	M	640
401	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 80 mm dia. complete	M	1345
402	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 100 mm dia. complete	M	775
403	5.40mm thick @ 21.20 Kg/m, Such as Tees elbows check nuts unions, Flanger, Nipples etc. including cutting welding, Trending fixing on walls, ceiling (Using 41- Tech pipe/M.S.angle supports work includes two coats of metal primer and two coats of Red enamel paint etc. including cost of materials, labour, usage charges of machinery complete as per specifications. Galvanized Iron Pipes 150 mm dia. complete	M	815
404	Providing, fixing, testing & commissioning of 15mm dia quartzoid bulb type sprinklers of rating 68 degree centigrade with required accessories : Pendent Sprinkler	Each	2371
405	Providing, fixing, testing & commissioning of 15mm dia quartzoid bulb type sprinklers of rating 68 degree centigrade with required accessories : Upright Sprinkler	Each	2269
406	Providing & fixing Flow Switch in following sizes M.S. pipe including connection etc as required.150mm dia	Each	15
407	Supplying, fixing, testing and commissioning of butterfly valve of PN 1.6 rating with bronze/gunmetal seat duly ISI marked complete with nuts, bolts, washers, gaskets conforming to IS 13095 of following sizes as required : 150 mm dia	Set	17
408	Providing, fixing, testing & commissioning of installation control valve of cast iron body,brass/bronze working parts comprising of water motor alarm, bronze seat clapper, clapper arm and hydraulically driven mechanical gong bell to sound continuous alarm when the wet riser/sprinkler system activates, pressure gauges, emergency releases, strainer, pressure switch, cock valve complete with drain valve and bypass, test control box, ball valves, MS pipe of required size, flanges, orifice plate, gasket etc of follwing sizes as required : 150mm dia	Set	1
409	Providing, installation, testing & commissioning of **adjustable rosette plate** for 15mm dia in white finish UL Listed or FM approved complete as required.	Each	1250

410	Providing and fixing inspectors **test assembly** complete with test valve, sight glass sectional drain valve, 25mm and 50mm dia medium class (Class B) G.I. pipes conforming to IS:1239 cut to required lengths including threaded fittings,union with corrosion resistant orifice all complete strictly as per drawing.	Set	15
411	Supply, installation, testing and commissioning of **4.5Kg CO2 Gas Type Fire Extinugisher**, Trolley Mounted, 2 Easy Weight Management used Unused Mechanism, Squeeze Grip, Gross Weight 19.1 Kg. empty Weight 14.6 Kg. Can Height 860MM Diameter 140MM, Discharge Time less than13 Sees, Controllable discharge mechanism, Applicable on Class 8&C Fire, 8 Rating 138, Can Constuctin : Hot spinning/Forging, Valve Construction : Forging & Machining, Internal Coating of Can : Not Applicable, External coating of Can : Spray Painting, Sheet metal thickness : 4.5M M lSI Approved 1Year Warranty. with instalert system with Superior quality EPDM Rubber Hosepipe etc., including cost of materials, labour, usage charges of machinery complete as per specifications. complete	Each	44
412	**Supply, installation, testing and commissioning of ABC Powder based MAP 50, 6Kg** Providing 6kg Fir e Ex tinguisher Mono Ammonium Phos phate Powder 50, Stored Pressure Type, Pressure Gauge, Gross Weight 9.5 Kg, empty weight 3.5 Kg, Can Height 435MM, Diameter 160MM, Discharge Time less than 9 Sees, Controllable discharge mechanism (Squeeze grip with easy snap safety seal), Range minimum 4 meters, applicable on Class A,8,C and electrically started Fire, A Rating 3A, 8 Rating 218, Can construction : Deep drawn & Co., Mig welded, valve Construciton : Forging and Mechining, Internal Coating of Can: Epoxy powder coating, External Coating of Can: Epoxy PoIyster power coating, Sheet metal thickness: 1.60MM, 5 years Warranty with instalert system with Superior quality EPDM Rubber Hosepipe etc., including cost of materials, labour, usage charges of machinery complete as per specifications. complete. IS 15683 Approved, CE Marked	Each	44
413	**Supply, installation, testing and commissioning of ABC Powder based MAP 50, 9Kg** Providing 9kg Fire Extinguisher Mono Ammonium Phosphate Powder 50, Stored Pressure Type, Pressure Gauge, Gross Weight 14.90 Kg, empty weight 5.90 Kg, Can Height 615MM, Diameter 175M M, Discharge Time less than 13Secs, Controllable discharge mechanism (Squeeze grip with easy snap safety seal), Range minimum 4 meters, applicable on Class A,8, C and electrically started Fire, A Rating 4A, 8 Rating 348, Can construction : Deep drawn & Co., Mig welded, valve Construciton : Forging and Mechining, Internal Coating of Can: Epoxy powder coating, External Coating of Can: Epoxy Polyster power coating, Sheet metal thickness: 2.00MM, 5 years Warranty with instalert system with Superior quality EPDM Rubber Hosepipe etc., including cost of materials, labour, usage charges of machinery complete as per specifications. complete IS 15683, CE Marked	Each	2
414	**Supply, installation, testing and commissioning of Aqueous Film-Forming Foam - 50 Ltr** Providing 50 Ltr Fire Extinugisher Aqueous Film-Forming Foam Type, External Cartridge Type, Pressure Gauge, Gross Weight 102kg. empty weight 52kg Can Height 1192MM, Diameter 300 MM, Discharge Time less than 180 Sees, Controllable discharge mechanism (Squeeze grip with easy snap safety seal), Range minimum 10 Meters, applicable on Class A,B,Can Construction; Deep drawn & C02, Mig welded, Valve Construction: Forging & Machining, Internal Coating of Can : Epoxy Powder coating, External Coating of Can : Epoxy Polyster Powder coating, Sheet metal thickness: 4.0MM, 1 Years Warranty with instalert system with Superior quality EPDM Rubber Hosepipe etc., including cost of materials, labour, usage charges of machinery complete as per specifications. complete.	Each	1
415	Supply, installation, testing and commissioning of four **bucket stand** alongwith **buckets**. Complete	Each	1
416	Supply, installation, testing and commissioning of "**FIRE EXIT** " Autoglow ,fixed on the exit door(**SINGLE SIDE**)	Each	30
417	Supply, installation, testing and commissioning of "**EXTINGUISHER Signages**" - Autoglow, with suspension chains	Each	44
418	Supply, installation, testing and commissioning of "**EMERGENCY EXIT** "Autoglow, with suspension chains(**SINGLE SIDE**)	Each	55
419	Supply, installation, testing and commissioning of "**EMERGENCY EXIT** "Autoglow, with suspension chains(**DOUBLE SIDE**)	Each	21
420	Supply, installation, testing and commissioning of "**MCP Signages**" - Autoglow, with suspension chains	Each	33
421	Preparation of drawing and providing, Autoglow Fire **escape route map** in clear acrylic glass and required glass studs supports etc. Indicating direction, Key plan, contact numbers etc. (The sample of the same need to be presented for approval before execution)…. (Maximum size of the board A2)	Each	16
422	Supply & Installation of Nylon net: sides Nets of 50mmx50mm (In Millimeters) Color of nets - green. Size - 50 X 50mm. For Basketball, Cricket, Volleyball All complete as per direction of Engineer-in-charge/Architect.	SFT	1209.7
423	Supply & Installation of Nylon Nets- Top covered from the top. Color of top net - white. Size - 50 X 50mm All complete as per direction of Engineer-in-charge/Architect.	SFT	24674.43

424	Supply & Installation of Manual flipping scoreboard with 2 digits from 0 to 30 and 2 digits from 0 to 9, can be used for badminton. All complete as per direction of Engineer-in-charge/Architect.	PCS	13
425	Supply & Installation of badminton poles and net as per BWF standard. All complete as per direction of Engineer-in-charge/Architect.	PCS	10
426	Supply & Installation of Volleyball Post, Antenna & Net as per FIVB standard.All complete as per direction of Engineer-in-charge/Architect.	SET	2
427	Supply & Installation of Benches for players. All complete as per direction of Engineer-in-charge/Architect.	PCS	50
428	Supply & Installation of Free standing Volleyball referee stand as per FIVB standard. All complete as per direction of Engineer-in-charge/Architect.	PCS	2
429	Supply & Installation of Badminton umpire chairs as per BWF standard. All complete as per direction of Engineer-in-charge/Architect.	PCS	10
430	Supply & Installation of Ball cart as per FIVB standard. All complete as per direction of Engineer-in-charge/Architect.	PCS	2
431	Supply & Installation of Fixed type basketball post as per FIVB standard. All complete as per direction of Engineer-in-charge/Architect.	Set	2
432	Supply & Installation of Indoor multisport scoreboard for Volleyball as per FIVB standard. All complete as per direction of Engineer-in-charge/Architect.	PCS	2
433	Supply & Installation of Fixed Type wall mounted Stadium PVC Chairs. Complete with all neccessory hardware & accessories. All complete as per direction of Engineer-in-charge/Architect.	PCS	400
434	Supply & Installation of Cricket Net Nylon net: sides Nets of 50mmx50mm (In Millimeters) Color of nets - green. Size - 50 X 50mm. Cricket Net should cover the all neccessory area as per requirement. All complete as per direction of Engineer-in-charge/Architect.	LS	1
435	Supply & Installation of Metal Lockers Size 380mm(W) x 450mm(D) x 1830mm(H). Each with 6 doors. Finished in epoxy polyester powder coated to the thickness of 50 microns. Handle/Label holder shall be Aesthetically appealing Snap fit ABS plastic handle. Ventilation shall be attractive punched pattern. All complete as per direction of Engineer-in-charge/Architect.	Nos.	350

436	SEWAGE TREATMENT PLANT (50 KLD)Design, Engineering, supplying, installation, testing and commissioning of aerobic Sewage Treatment Plant based on MBBR Technology process (with air diffuser system), completely at basement level with total effluent handling capacity of 50 KLD. The Plant shall be complete with a central Electrical Power and Control panel fully pre/site wired and with all power and control cables to all pumps and equipment including all instrumentation, water level controllers and other controls. All the equipment, piping, pumps, blowers and electrical are to be housed in a plant room to be built below grade level. MS (hot dipped galvanized) puddle flange, inlet, outlet, overflow, vent, M.S. cover, drain channel with M.S. gratings, rungs, sump to house pumps will be included. Nature of Effluent : Domestic sewage from Public toilet use and pantry/kitchen waste etc. The rates will include all pumps, piping, valves, controls, reactor and tube settler media, blowers, diffusers, all power and control cables to all pumps and equipment including all instrumentation, water level controllers, electronic type water level indicator, Sight tube and other controls. BASIC DATA ON INFLUENT RAW WASTE WATER Total Suspended Solids (TSS) : 250 - 450 mg/lit, BOD5 : 250 - 400 mg/lit, COD : 500 - 700 mg/lit, pH : 6.0 - 8.5, Oil / Grease : up to 50 mg/lit, Inflow time : 16 HRS, Peak factor : 3 Temperature : Ambient TREATED EFFLUENT WASTE WATER QUALITY As stipulated by State Pollution Control Board (PCB), the treated effluent quality shall be within the following values for various parameters, for both present and future. The treated water quality should be fit for Flushing, Softening (after softening) and Landscaping & Construction purpose – pH : 7 - 8, Total Suspended Solids (TSS) : < 10 mg/lit, COD : < 50 mg/lit, BOD5 : < 10 mg/lit, Oil / Grease : < 10 mg/lit, Color : Colorless, Odor : unobjectionable, E.coli : Nil, NH4-N :< 5 mg/litN , Total :< 10 mg/lit, PO4-P : 2 mg/lit The STP shall be designed based on the attached details and parameters. The capacities of various tanks and pumps are guidelines to the vendor. The contractor has to submit detailed calculations of system and equipment he proposes to install.Taking Approval from pollution board at initial & various other stages of works including preparation of report / drawings as per pollution board requirement, arrangement of raw sewage for testing & commissioning. Contractor shall include the cost of all chemicals consumed during testing & commissioning and the cost of such items of works which are not explicitly mentioned above, but are mandatory to have pollution board approval. (All relevant fee for PCB Approval shall be paid by client). The STP should follow all the concern Indian and local norms. The Contractor shall have to submit detailed GA drawings (Plan & Section), P & I diagram, Electrical SLD, Schematic diagram and Shop drawings of the plant indicating all sleeves etc. for the various component and additional component if so required for the complete working of the STP also indicating all components in plant room required. The drawings will have to submit for approval before start of work.Bypass arrangement shall be provided so that raw sewage transfer pumps can be used to pump out sewage to external sewer line incase of maintenance of STP (Battery Limit = From Raw Sewage Transfer Pumps to up to 2 meters outside from STP unit). Arrangement shall be provided so that balance treated water transfer pumps can be used to pump out to external sewer line on a regular basis. (Battery Limit = From Treated water Transfer Pumps to up to 2 meters outside from STP unit).The scope of work includes design, drawings, coordinating during construction, erection, commissioning, trial run and obtaining test results of completely below ground sewage treatment plant with electrical, mechanical, piping and controls. The work is required to be carried out on a turnkey basis covering a guarantee of satisfactory performance as per the standards laid for a minimum of One year. The contractor will be solely responsible for smooth running of the sewage treatment plant and overall functioning of STP. In case it is found in the later stage that some additional fixtures / equipment are required to be added in order to achieve desired quality, the contractor would be liable to provide without any extra charges. Ventilation of the plant room / tanks including exhaust fans, ducts etc. shall be coordinated with the Ventilation Consultant. Ventilation work shall be carried by ventilation vendor. The STP shall consist of following units but not limited to these unit as may be required by the manufacturer's design to achieve the desired quality parameters in treated effluent. a. Bar Screen chamber with suitable lifting arrangements complete as required. b. Oil / Grease removal chamber complete in all respect. c. Raw sewage Collection cum Equalization tank for housing of submersible sewage lifting pumps. Provision for aeration of sump will be kept with adequate numbers of coarse air bubble air diffusers to avoid any smell and sedimentation problems.d. Anoxic tank with all required inlet, outlet & other necessary provisionse. e. MBBR tanks with air diffusion system and piping complete of adequate capacity. f. Secondary settling tank having hopper bottom, baffle wall, outlet launders with arrangement of lifting sludge from the bottom complete as required. g. Filter Feed Tank with suitable inlets, outlets, drain, overflow facility complete as required. h. Softener Feed Tank with suitable inlets, outlets, drain, overflow facility complete as required. i. Sludge Holding tank with provision of inlet, outlet, drain, overflow, supernatant withdrawal arrangement with provision of air diffusers for aeration. j. Treated water storage tank to collect treated water with inlet, outlet, drain, overflow facility complete. k. UF water storage tank to collect treated water with inlet, outlet, drain, overflow facility complete. l. Plant room drainage sump to collect the waste water from the back washes, drains etc. m. Stairs, Railing, Sheds, Foot rests, Manhole covers, Maintenance Platform, equipment's foundation etc. ELECTRO MECHANICAL WORKS: Supply, installation, testing and commissioning of following electro mechanical works and equipment's - 2 Nos S.S. 304 bar screen having 10 mm opening with suitable lifting arrangements complete as required.		
437	2 Nos S.S. 304 bar screen having 10 mm opening with suitable lifting arrangements complete as required.	2	Nos.
438	Air diffuser system with Twin type rotary air blowers capable of delivering min. 60 cum/hr. of free air at 0.5 kg/cm2 driven through "V" belt or directly coupled through flexible coupling to a TEFC motor of suitable HP Suitable for 415 + 10% volts, 3 phase, 50 cycles A/C supply fine bubble membrane type diffusers complete with valves & air distribution grid complete as required. Qty : 2 Nos (1W+1S)	2	Nos.
439	Non clog type air dispersion system capable of handling required 3-5 cfm of air with oxygen transfer efficiency 3-4% per meter water depth. Air dispersion grid shall be assembled in modular form so that they can be replaced / repaired easily from platform at the top. Air dispersion system shall be provided coarse air bubble type diffusers for raw sewage equalization tank & sludge holding tank and fine bubble type diffusers for MBBR Tanks.	1	Lot
440	Non clogging type submersible raw sewage pumps for transfer of equalization tank to Anoxic tank capable of handling solids minimum 32/35 mm, in CI casing and impeller, SS shaft, IP 68, Class F / B insulation, mechanical seal complete with all accessories, motor of required capacity, Pressure gauge on delivery line with isolation valve, NRV of resin ball type suitable for sewergae application, level controller,level switch (with wiring) to control the level of sump automatically including bypass line from pump outlet to external sewer line as per site with all valves. (for Bypass connection, battery limit of STP vendor is From Raw Sewage Transfer Pumps to up to 10 meters outside from STP unit). Flow rate : 2.5 cum/hr. at 12 meter head. Qty : 2 Nos (1W+1S).	2	Nos.

441	Non clogging type horizontal centrifugal Sludge transfer / disposal / recirculation pumps capable of handling solids up to 8 mm, having C.I. casing, C.I. impeller, SS shaft, chrome steel shaft sleeve, IP 55, Class B insulation, mechanical seal complete with all accessories, motor of required capacity, Pressure gauge on delivery line with isolation valve, NRV of resin ball type suitable for sewergae application, level controller (with wiring) to control the level of sump automatically. Flow rate : 2 cum/hr. at 10 meter head. Qty : 2 Nos (1W+1S).	2	Nos.
442	Supply, installation, testing & commissioning of Non Clogging type Horizontal Centrifuge Feed Pumps capable of handling 10mm solids having CI Casing, CI Impeller, SS Shaft, Crome Steel Shaft, IP 55 Class B Insulation with Mechnical Seal complete with all accessories, motor of required capacity, pressure gauge on delivery with isolation cock, controller (with wiring). Duty - 1 Cu-m/Hr; 10 Meter Head.	2	Nos.
443	Providing ,fixing testing and commissioning of basket type centrifuge shall have the holding cap of 30 kg dry solid , having MOC of CI casing & base frame and wetted parts in SS304 construction with complete with the electronic motor of suitable KW ,2950 rpm suitable for 451 (± 10%) , 50 Hz operation with centrifuge v-belt pulley , motor v-belt pulley ,1 set of V-belt protection box, rubber buffers with all required spares and fitting complete in all respect Poly Dosing PUMP - 0-6 LPH , (MAKE - E-DOSE) & Poly Dosing Tank - 200 L	1	Set
444	Providing, fixing, testing and commissioning of single stage, horizontal, centrifugal, 2 pole, 50 HZ, AC, Monoblock pumps (as per IS : 9079) incorporating C.I. casing and frame, stainless steel shaft, bronze / SS impeller, TEFC induction motor directly coupled to the pump, IP44 protection, class B insulated, C.I. body, hydraulically and dynamically balanced to give vibration free operation, with mechanical seal arrangement, fixed on a base plate with suitable vibration eliminator pads complete with PCC foundation, bolts grouted in CC blocks of 1:2:4, suitably rated DOL / star-delta starter fixed inside main electrical panel complete with level controller, necessary wiring, pressure gauge on the delivery side and strainer on suction side, including non-return valve and isolating valves on suction and delivering sides as required, including suction and delivery headers complete in all respects. (i) Filter Feed Pumps - 2 Nos (1W+1S), having discharge : 3 cum/hr. (each) at 30 meter head	2	Nos.
445	Providing, fixing, testing and commissioning of single stage, horizontal, centrifugal, 2 pole, 50 HZ, AC, Monoblock pumps (as per IS : 9079) incorporating C.I. casing and frame, stainless steel shaft, bronze / SS impeller, TEFC induction motor directly coupled to the pump, IP44 protection, class B insulated, C.I. body, hydraulically and dynamically balanced to give vibration free operation, with mechanical seal arrangement, fixed on a base plate with suitable vibration eliminator pads complete with PCC foundation, bolts grouted in CC blocks of 1:2:4, suitably rated DOL / star-delta starter fixed inside main electrical panel complete with level controller, necessary wiring, pressure gauge on the delivery side and strainer on suction side, including non-return valve and isolating valves on suction and delivering sides as required, including suction and delivery headers complete in all respects. (ii) Softener Feed Pumps - 2 Nos (1W+1S), having discharge : 2.6 cum/hr. (each) at 30 meter head	2	Nos.
446	Plant room drainage sump with 2 Nos. submersible dewatering pumps having 18 cum/hr. discharge at 12 meter head in CI casing and impeller, SS shaft, 12 mm min particle size, 50 Hz, 400 volts, IP68, F / B class insulation with float valve / level controller, piping, valves, nerve etc. complete. The outlet pipe from dewatering pumps to be connected to Equalization Tank. In case of excess inflow into the sump, both pumps shall start automatically with magnetic water level controllers, audio, visual & alarm Including all standard accessories for pumps auto On/ Off Lights, dry running protection etc. complete in all respect.	2	Nos.
447	Supply, installation, testing & commissioning of Random Media for attached growth process (MBBR Technology) MOC = PP, Specific Gravity = 0.93 - 0.95, Surface Area = 400 sq.mtr / cum.mtr. (Note : Volumetric check of MBBR Media to be done at site. Also STP Vendor should provide the Test Certificate of MBBR Media.).	3.5	cum
448	Supply, installation, testing and commissioning of PVC tube deck settling media to be installed in secondary settling tank. VH-750 mm, Angle of Inclination - 60° slope, Shape - Hexagonal Chevron.	1.5	cum
449	Supply, installation & testing and commissioning of vertical floor mounted FRP type Multi Grade filter of suitable size for required flow and head, provided with an inlet distributor. The vessel is provided frontal piping & valves, back wash system & filter media etc. complete with standard fittings like pressure gauge at inlet & outlet, sampling cock,MPV, air vent valve with piping, bolts, nuts & rubber gaskets. Flow rate = 3 M3 / hr at 16 hrs operation, Vessel Dia = 550 mm, HOS = Min. 1600 mm, Filteration rate = 18 M3/M2/Hr, Working pressure = 3.5 Kg/Sq.cm., Test pressure = 5.5 Kg/Sq.cm. Qty. = 1 Set	1	Set

450	Supply, installation & testing and commissioning of vertical floor mounted FRP type Activated Carbon filter of suitable size for required flow and head, provided with an inlet distributor. The vessel is provided with frontal piping & valves, back wash system & filter media etc. complete with standard fittings like, pressure gauge at inlet & outlet, sampling cock,MPV, air vent valve with piping, bolts, nuts & rubber gaskets. Flow rate =3 M3 / hr at 16 hrs operation, Vessel Dia = 550 mm, HOS = Min. 1600 mm, Filteration rate = 15 M3/M2/Hr, Working pressure = 3.5 Kg/Sq.cm., Test pressure = 5.5 Kg/Sq.cm., Qty. = 1 Set	1	Set
451	Supply, installation, testing & commissioning of water Softening Plant (FRP) comprising HDPE brine tank of 300 liters capacity with brine ejector, MSFRP/SS mixer with plastic pipng complete with fitting like manhole cover, legs, filter pressure gauges, sampling cock, MPV, and brine filtering media and complete charge of cation exchange resin as per specification for the capacity as given below. Flow rate =2.6 M3 / hr at 16 hrs operation, Incoming hardness 345 ppm (approx), Outgoing harness less than 50 ppm, Working pressure 3.0 Kg/Sq cm, Testing pressure 4.5 Kg/Sq cm, OBR- 50 cum, Approx resin =320 ltrs, Diameter 650mm x 1800mm height, Further to be confirmed by vendor calculation.	1	Set
452	Supply, Installation of hollow UF Filtration system with fully automatic 90 % recovery.PVDF Membrane area in each module 40 sqm minimum. Cost shall includes all required piping , automatic valves manual basket strainer back wash line with suitable SS screen and other accessories required within the system for automatic operation without harming the UF membrane. Acid ,alkali and hypo dosing with tank and pump with metering. Providing and fixing single/multi stage, monobloc vertical/ horizontal in-line pumps stainless steel, head and base in cast iron, pump shaft and impeller in stainless steel AISI 304, mechanical seal coupled to a TEFC electric motor, 2900 RPM. Each pump should be operate to a curve required by the operating conditions connected to a TEFC induction motor suitable for 400/440 volts, 3 phase 50 cycles A.C. supply having IP 55 protection enclosure, vibration eliminating pads etc. complete with base and frame, nuts and bolts and necessary RCC foundations as per requirement and as per instructions UF Feed Pump - 2 Nos (1W +1S) Capacity : 2.5 cum/hr Head : 30 Mts or as per OEM recommendation MAKE = GRUNDFOS / WILOUF backwash Pump - 2Nos (1W +1S) Capacity : 3 cum/hr Head : 30 Mts or as per OEM recommendation MAKE = GRUNDFOS / WILO Manual Basket Strainer in feed line - 1 No Flow : 2.5 cum/hr Size : 100 micron size MAKE = IMPEL Acid Dosing pumps with mechanical diaphragm with PP pump head including FRP tank of 100 liters. - 1 No Capacity : 20 LPH Head : 35 Mts PUMP TANK Alkali Dosing pumps with mechanical diaphragm with PP pump head including FRP tank of 100 liters. - 1 NoCapacity : 20 LPH Head : 35 Mts TANK Hypo Chlorite dosing pumps with mechanical diaphragm with PP pump head including FRP tank of 200 liters.- 1 No Capacity : 20 LPH Head : 35 Mts MAKE = E-DOSETANK MAKE = SHEETAL Interconnecting Piping and valvingUPVC piping with sch 40 rating and Solenoid/Motorised Vales with actuators as required and compressor to operate the valves. Including water flowmeter of rotameter type diameter :32 mm, flow range 0-5 m3/h .UF unit Skid and Membrane . MAKE - QUA / TOREY Chemical cleaning system for cleaning the membranes comprising of at least one SS pump of required capacity (approx. 3000 lph) at 35M head, CIP tank in HDPE of required capacity with interconnecting pipe work, valves and on line micron filter of 3000 lph capacity in SS 316 construction. All accessories / allied equipment to be included to complete the CIP system.No. of Membrane shall be atleast 1 nos or as per OEM. OEM to submit all technical details with flux not exceeding 45-50LMH, datasheets, Electrical Panel and P & I with PLC details for review and approval. MS epoxy : Air grid piping-non submergedGI Piping coated (Class 'C') : All non submerged piping before filter feed tank. GI Piping (Class 'C') : All piping after filter feed tank. uPVC (Sch 80) : Pipe for Dewatering Pumps uPVC (Sch 80) : Pipe for By pass line to the first manhole	1	Set
453	The various pipe sizes should be selected that the maximum velocity in any pipe should not exceed 1.50 mps. Minimum 65 mm pipe dia is required in individual line of raw sewage transfer pumps and minimum 80 mm uPVC Sch 40 pipe to be considered for each dewatering pumps outlet and common header will be 100 mm dia.	1	Lot
454	Design, Providing, Fixing of heavy class MS (hot dipped galvanized) puddle flanges as required to be provided of various diameters.	1	Lot
455	Supply, Installation, testing & commissioning of electro-magnetic type flow meter to be installed at raw sewage pump outlet line. 65 mm dia. MAKE= ASTER / MANAS	1	Nos.
456	Supply, Installation, testing & commissioning of Bulk Water meter in Flushing, Softneing and Horticulture Feeder Line. 40 mm dia. MAKE= KRANTI/ KENT	1	Nos.

457	Providing, fixing, testing & commissioning of Chlorine dozing pump with 100 lits. HDPE/ FRP solution tank, injection fitting assembly, suction and delivery hose upto the point of injection, capacity 2.5 ml/hr to 7.5 l/h at 3 kg/sq.cm injection pressure, complete in all respects for treated water tank.Dosing pump shall be with powerful variable-speed stepper motor with internal stoke speed control and the turndown ratio of pump shall not below 1:3000. Accuracy of repeatability shall be +/- 1%.Pump shall be compatible to handle the liquid temperature range between -10 °C to 45°C. (PUMP MAKE - ASIA LMI) ,	1	Set
458	Supply, installation, testing & commissioning of multi tubes Disinfection system (UV) comprising of U.V Reactor in a close circuit chamber suitable for waste water application. The system should be provided with self cleaning mechanism. Max. operating pressure at 120 psig, electronic ballast type operating frequency 30 kHz - 50 kHz, cabinet safety standard rating IP54, material of treatment chamber SS 316L and uv dosage (uW-sec/cm2) = >60000. Flow rate of 1.5 cum/hr. Qty. = 1 Set	1	Set
459	Supply Installation, Testing & Commissioning of Agitator for Anoxic Tank.The Mixer shall be in PP/SS with suitable RPM and power to provide proper agitation in anoxic tank complete in all respect.	1	Nos
460	Non clogging type horizontal centrifugal Sludge recirculation pumps (between MBBR tank to Anoxic Tank) capable of handling solids upto 8 mm, having C.I. casing, C.I. impeller, SS shaft, chrome steel shaft sleeve, IP 55, Class B insulation, mechanical seal complete with all accessories, motor of required capacity, Pressure gauge on delivery line with isolation cock, level controller (with wiring) to control the level of sump automatically. Flow rate : 10 cum/hour at 10M head. Qty : 2 Nos (1W+1S)	2	Nos.
461	The prefabricated structure for STP shall be constructed of MS FRP plates with necessary supports and base frame. The structure shall be constructed of minimum 5mm vertical plate and 6mm bottom plate. The structure shall be painted internally with epoxy and externally with enamel paint. All tanks shall have manhole cover of 560 dia and Lifting lugs @300 C/c for maintenance purpose. Screen Chamber (Volume- 0.5 KL +free Board)1No Equalization Tank (Volume- 18 KL + free Board)1No Oil and Grease Tank(Volume- 1.25 KL + free Board)1No Anoxic Tank (Volume- 7.5 KL + free Board)1No MBBR cum Aeartion tank (Volume- 7.5KL + free Board)2Nos. Tube Settler Water Tank (Area 1.6 x1.6 Sqm + height as requied)1No Sludge Holding Tank (Volume- 10 KL + free Board)1No Clear Water Tank (Volume- 5KL + free Board)1No Treated Water Tank (Volume- 5 KL + free Board)1No. Flushing Water Tank/ UF Permeate Tank (Volume- 5 KL + free Board)2No Soft Water Tank (Volume- 10 KL + free Board)2Nos. Foundation for MS tanks and equipments1Lot	1	No
462	ONLINE MONITORING SYSTEMProviding & fixing of online monitoring system comprising of following : Analyzer type : Cabinet type & multiparameter Measuring principala) COD/BOD/TSS : UV light absorption (scan between 180nm and 800nm) b) pH : External sensor.Measuring rangea) COD : 0-1000 mg/lb) BOD : 0-1000 mg/lc) TSS : 0-1000 mg/ld) pH : 0-14Operating pressure : <0.5 bars | Operating temperature : 0-80°C | Operating flow : 5 LPM | Encloser protection : IP 65 Communicationa) RS 485 for communicationb) USB Port for USB communicationc) Capable of operation on Wifi / Lan based Internet network.Memory : Upto 16 GB with date & time | Display : 8.5" TFT screen 16/9 (LED backlight) [minimum 7"] | Power supply : 10-240 VAC (50-60 Hz) or 24 VDC. Calibration requirementa) Zero calibration : An auto zero is performed at every cleaning cycleb) Span :Factory calibratedOnline monitoring system shall include all instrument, fitting & accessories to make the system function. Data transmission to CPCB server - 1st Year Installation Charges Extended Warranty : 12 Months including Comprehensive AMC 3 Years Comprehensive AMC for Online Monitoring System (After Warranty Period) Scope of Spares Covered : (Flow cell, Flow lamp, Electronic card, Sample pumps) ; Excluding pH SensorData transmission to CPCB server - After 1st Year 4 TB Hard Disk (Seagate/Eqt Hard Disk) (Including Remote Monitoring Feature)Connectivity with CPCB Server Per Year	1	Set

463	STP Panel Supply, Installation, testing and commissioning of motor control centre shall be fabricated out of 14 gauge CRCA sheet steel in form in 3b formation with reinforcement of suitable size angle iron, channel 'T' sections irons and/or flats wherever necessary. Cable gland plates shall be provided on top as well as at the bottom of the panels. Panels shall be treated with all anticorrosive process before painting as per specifications with 2 coats of red oxide primer and final approved shade of powder coated paint. 2 Nos. earthing terminals shall be provided for 3 phase, 4 wire, 50 Hz supply system. Lifting hooks shall also be provided in case of large panels. Approval shall be taken for each panel before fabrication. Galvanised hardware with zinc passivation shall be used in fabrication of panels. Incoming (1 No.) 200 amps 4P MCCB Thermal magnetic - 1 No. Bus Bars 250 amps TPN, 10 KA, aluminium bus bars with heat shrinkable insulation sleeve. Outgoings as per STP Equipments required - 1 Lot Power & Control Cables - 1 Lot Perforated Type Cable Tray Supply and fixing of factory fabricated MS powder coated Perforated type cable trays with radial bends, reducers, Tee etc. complete with all accessories. As per the involving sizes are required.	1	LOT
464	Supplying, installing, testing and commissioning of vertical inline type centrifugal pump with SS-304 casing, SS-304 impeller & SS shaft suitable for operation 400/440 volts, 3 phase, 50 Hz, 2900 rpm, TEFC electric motor with efficiency class of min. IE-3 mounted on common channel base plate with coupling guard. Pump shall have pressure gauge with isolation cock, Isolation valve, NRV on delivery line, strainer (with by-pass) at suction which will be paid separately under respective items. Pump shall be provided with mechanical seal, suitable vibration elimination pads of approved design, drain pipe with valve (25 dia). The pump shall be suitable for auto/ manual operation. The installation shall be complete with all necessary ancillaries & accessories including base plate complete as required. It shall be mounted on MS channel common base plate & fixed with suitable bolts grouted in PCC foundation in PCC (1:2:4) type B-1 using 20 mm graded stone aggregate 30 cm above floor level including making connection of inlet & outlet with fittings including nut, bolts, packing etc.Cost for Antivibration arrangement of cushy foot mountings is deemed to be included in this item cost.Vendor to submit proposed pump model with duty curve.The entire work shall be complete as per specifications & as per directions of E-I-C.Flow rate : 1.5 LPS eachHead : 65 MtsNo. of pumps : 2 (1 Working + 1 Standby)Required for : Domestic water Transfer / Liftting pump	1	Set
465	Supplying, installing, testing and commissioning of vertical inline type centrifugal pump with SS-304 casing, SS-304 impeller & SS shaft suitable for operation 400/440 volts, 3 phase, 50 Hz, 2900 rpm, TEFC electric motor with efficiency class of min. IE-3 mounted on common channel base plate with coupling guard. Pump shall have pressure gauge with isolation cock, Isolation valve, NRV on delivery line, strainer (with by-pass) at suction which will be paid separately under respective items. Pump shall be provided with mechanical seal, suitable vibration elimination pads of approved design, drain pipe with valve (25 dia). The pump shall be suitable for auto/ manual operation. The installation shall be complete with all necessary ancillaries & accessories including base plate complete as required. It shall be mounted on MS channel common base plate & fixed with suitable bolts grouted in PCC foundation in PCC (1:2:4) type B-1 using 20 mm graded stone aggregate 30 cm above floor level including making connection of inlet & outlet with fittings including nut, bolts, packing etc.Cost for Antivibration arrangement of cushy foot mountings is deemed to be included in this item cost. Vendor to submit proposed pump model with duty curve. The entire work shall be complete as per specifications & as per directions of E-I-C. Flow rate : 1.5 LPS each Head : 65 Mts No. of pumps : 2 (1 Working + 1 Standby) Required for : Flushing water Transfer / Liftting pump	1	Set

466	Supplying, installing, testing and commissioning of vertical inline type centrifugal pump with SS-304 casing, SS-304 impeller & SS shaft suitable for operation 400/440 volts, 3 phase, 50 Hz, 2900 rpm, TEFC electric motor with efficiency class of min. IE-3 mounted on common channel base plate with coupling guard. Pump shall have pressure gauge with isolation cock, Isolation valve, NRV on delivery line, strainer (with by-pass) at suction which will be paid separately under respective items. Pump shall be provided with mechanical seal, suitable vibration elimination pads of approved design, drain pipe with valve (25 dia). The pump shall be suitable for auto/ manual operation. The installation shall be complete with all necessary ancillaries & accessories including base plate complete as required. It shall be mounted on MS channel common base plate & fixed with suitable bolts grouted in PCC foundation in PCC (1:2:4) type B-1 using 20 mm graded stone aggregate 30 cm above floor level including making connection of inlet & outlet with fittings including nut, bolts, packing etc.Cost for Antivibration arrangement of cushy foot mountings is deemed to be included in this item cost. Vendor to submit proposed pump model with duty curve. The entire work shall be complete as per specifications & as per directions of E-I-C. Irrigation water hydropneumatic system as follows: No. of pumps 2 (1 Working + 1 Standby) Water Flow Rate 2.0 LPS each Head 50 MR PM 2900	1	Set
467	Submersible Centrifugal Non-clog Drainage PumpSupply, installation, testing and commissioning of continuous duty submersible centrifugal single stage single suction non-clogging drainage mono block pumps with stator frame of cast iron casing, bronze or equivalent non -clogging impeller, high tensile stainless steel shaft complete with 3 phase tottaly water & dust proof motor suitable for operation 400/440 volts, 3 phase, 50 Hz, 2900 rpm, class -F isulation, IP 68 protection as per IS 2147 of electric motor with efficiency class of min. IE-3 (tested for leak proof operation) with all necessary protection and double mechanical seal, gland packed etc. complete with all ancillaries including float type level controllers, float switch, electrical control panels fabricated from 14 gauge CRCA sheet volt meter ammeter with selector switch, TPMCB, 5 VA CL : CTs, phase indicating lamps protected by 2 amp SP MCB, DOL starter of suitable capacity (H.P), necessary wiring, cable alleys, nclusive of all terminations, earthing, interlocking, starter with Automatic float type level controller, providion of high level alarm, sequence timer, potential free contact to starter for connection to BAS, both pumps may run simultaneously at pre determind level. (1Working + 1Standby). The submersible pump shall be protected for dry run operation & with suitable foundation. The pump shall be suitable for auto/ manual operation.Flow rate : 4.0 LPS eachHead : 7 Mts Solid Handling : 10 – 12 MMLocation : Plumbing & Fire Plant RoomNo. of pumps : 2 (1 set=1 Working + 1 Standby)	1	Set
468	Submersible Centrifugal Non-clog Drainage Pump (Spec same as above) with following requirement:- Flow rate : 4.0 LPS each Head : 7 Mts Solid Handling : 10-12 MM Location : Basement Purpose : Basement Drainage (ramp-1 & 2) No. of pumps : 2 (1 set=1 Working + 1 Standby)	2	Set
469	Submersible Centrifugal Non-clog Drainage Pump (Spec same as above) with following requirement:- Flow rate : 4.0 LPS each Head : 7 Mts Solid Handling : 10-12 MM Location : Basement Purpose : Basement Drainage for AHU area No. of pumps : 2 (1 set=1 Working + 1 Standby)	1	Set

470	Submersible Centrifugal Non-clog Drainage Pump (Spec same as above) with following requirement:- Flow rate : 15.0 LPS each Flow rate : 4.0 LPS each Head : 10 Mts Solid Handling : 10-12 MM Location : Basement Purpose : Basement Drainage No. of pumps : 2 (1 set=1 Working + 1 Standby)	1	Set
471	Supplying, installing, testing and commissioning of annunciation and indication panel with interlocking arrangement complete in accordance to specification with level controller (In Fire Water, Raw Water, Treated Water and Flushing Water Tank : High / Low Level Controller) etc with control cabling from field to MCC as required. The system shall be complete to ensure automatic quotation of pump in accordance to water level in respective tanks.	1	Lot
472	Providing & fixing level controllers for water pumps to start/stop the pump at set level. Including wiring, cabling from pump to panel & all other accessories as required to operate the system automatically.	6	No.
473	Providing & fixing pressure switch for water pumps to start/stop the pump at set pressure. Including wiring, cabling from pump to panel & all other accessories as required to operate the system automatically.	3	No.
474	Providing & fixing full way lever operated forged brass ball valve of brass body with forged brass hard chrome-plated steel ball tested to a pressure not less than 15 Kg / sq.cm with threaded / flanged joints complete with nuts, bolts, gaskets, washers etc.32mm nominal bore	10	No.
475	BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating as specified 40 mm dia	10	No.
476	BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating as specified 50 mm dia	3	No.
477	BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating as specified 65 mm dia	2	No.
478	BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating as specified 80 mm dia	2	No.
479	Y - STRAINER of Ductile CI Body flanged ends with stainless steel strainer for chilled / hot water circulation including insulation as specified. suction). 40 mm dia	2	No.
480	Y - STRAINER of Ductile CI Body flanged ends with stainless steel strainer for chilled / hot water circulation including insulation as specified. suction). 80 mm dia	1	No.
481	Providing & fixing flanged ends CI horizontal lift check valve tested to a pressure of PN-16. Including rubber gasket, flanges, union, nuts, bolts, washers & painting complete as required 32 mm dia	6	No.
482	Providing & fixing dual plate CI wafer type check valve tested to a pressure of 15 Kg/sqcm. Including rubber gasket, flanges, union, nuts, bolts, washers & painting complete as required 50 mm dia	2	No.
483	Providing and fixing Heavy class GI header complete for pump suction / discharge manifold comprising of flanges, unions, check nuts, expansion bellows, tee elbow and two coat enamel painting,etc. including all flanged connections as per drawing / site requirement. Supports from wall, floor and ceiling etc. Including dead end flanged connection complete as required. The header size shall also include tee connections with blank flanges for the future connections. 32 mm dia	70	RM

484	Providing and fixing Heavy class GI header complete for pump suction / discharge manifold comprising of flanges, unions, check nuts, expansion bellows, tee elbow and two coat enamel painting,etc. including all flanged connections as per drawing / site requirement. Supports from wall, floor and ceiling etc. Including dead end flanged connection complete as required. The header size shall also include tee connections with blank flanges for the future connections. 40 mm dia	50	RM
485	Providing and fixing Heavy class GI header complete for pump suction / discharge manifold comprising of flanges, unions, check nuts, expansion bellows, tee elbow and two coat enamel painting,etc. including all flanged connections as per drawing / site requirement. Supports from wall, floor and ceiling etc. Including dead end flanged connection complete as required. The header size shall also include tee connections with blank flanges for the future connections. 50 mm dia	10	RM
486	Providing and fixing Heavy class GI header complete for pump suction / discharge manifold comprising of flanges, unions, check nuts, expansion bellows, tee elbow and two coat enamel painting,etc. including all flanged connections as per drawing / site requirement. Supports from wall, floor and ceiling etc. Including dead end flanged connection complete as required. The header size shall also include tee connections with blank flanges for the future connections. 65 mm dia	10	RM
487	Providing and fixing Heavy class GI header complete for pump suction / discharge manifold comprising of flanges, unions, check nuts, expansion bellows, tee elbow and two coat enamel painting,etc. including all flanged connections as per drawing / site requirement. Supports from wall, floor and ceiling etc. Including dead end flanged connection complete as required. The header size shall also include tee connections with blank flanges for the future connections. 80 mm dia	20	RM
488	Providing & fixing heavy duty double flanged flexicon rubber expansion joint (suitable for system test pressure) of standard length as per manufacturers specs including rubber gaskets, flanges, nuts, bolts and washers complete as required.32 mm dia	6	RM
489	Providing & fixing heavy duty double flanged flexicon rubber expansion joint (suitable for system test pressure) of standard length as per manufacturers specs including rubber gaskets, flanges, nuts, bolts and washers complete as required. 40 mm dia	6	RM
490	Providing & fixing heavy duty double flanged flexicon rubber expansion joint (suitable for system test pressure) of standard length as per manufacturers specs including rubber gaskets, flanges, nuts, bolts and washers complete as required. 50 mm dia	2	RM
491	Providing & fixing heavy duty double flanged flexicon rubber expansion joint (suitable for system test pressure) of standard length as per manufacturers specs including rubber gaskets, flanges, nuts, bolts and washers complete as required. 65 mm dia	2	RM
492	Supply, installation, testing and commissioning of sight tube (of 3.5 to 4 m length) with isolation valve at top / bottom, demarcation on tube for making the installation of level indication on the RCC water tank complete.	4	No
493	Providing & fixing Electric control panel to operate a 24 V DC, 50Hz Solenoid to open / close the solenoid valve at low / high water level through level controller in over head water tanks. Including wiring, level controller probes, solenoid valves, float valves & other accessories as required to operate the system automatically.	2	Each
494	Providing and fixing electronic type level indicator for water tanks mounting in panel with the following features, level display, alarm when water level is low or high, full range from one level to four level display and manual reset for alarm etc. with electrical wiring conduit supports from wall & ceiling probs and all other accessories complete as required.	4	No.

495	Supply, installation, testing and commissioning of the UV unit consisting of reactor, cabinet housing, cabinet cooling, treatment chamber, electrical panel, temperature safety control, lampout alert, UV radiometer along with UV monitoring system and UV monitoring readout panel. The UV Dosage should be > 30,000 uW – Sec / sq.cm. The lamps should be selected based upon the flow requirement of respective unit. The unit shall be complete with temperature safety control, lamp out alert circuit & UV radiometer with 4 – 20 mA output.The treatment chamber shall be SS3162 Flowrate : 1.0 LPS	1	No.
496	Providing and fixing MS structural work fabricated from structural steel sections M.S. rounds, angles, channels, tees, square bars, plates including cutting to size, drilling, welding fixing and welding to insert plates in RCC structural works, as directed by Architects. M.S. ladders and tank covers & frame etc. cutting and making good the wall and floor where ever required including two coats of synthetic enamel paint / epoxy paint over a coat of primer.	800	Kg.
497	Providing & complete testing kit with all chemicals complete suitable for conducting test on water quality. The test kit shall be suitable to measure TDS, pH, Hardness, Iron content and other parameters (Make:Ion Exchange).	1	No.
498	Supply, installation, testing and commissioning of tanker inlet connection complete with 100 mm dia GI (heavy) inlet piping, hose inlet connection, MS cabinet enclosure (epoxy painted after fabriction), pad locking arrangement, inlet flexible hose complete with all necessary arrangement.	1	No.
499	**LT PANELS & DISTRIBUTION BOARDS** Main LT Panel shall be conform to relevant IEC 61439 and manufactured by OEM authorized franchise, necessary authorization certificate/letter to be provided (Refer Technical Specifications before quoting)	Set.	1
500	**MAIN HVAC PANEL (TERRACE FLOOR)MAIN HVAC PANEL (TERRACE FLOOR) Panel described as Below**Incomer comprising of :630 TPN MCCB with Microprocessor release for over current, short circuit & earth fault protection etc. - 2 SetMultifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 600/5 15 VA, CL 0.5, 3 No. CTs- 2 SetON / OFF / TRIP indicating lights with control MCB -2 SetPhase indicating light protected by 2 amps MCB's - 2 Set.Bus Bar comprising of :800 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 setBus Coupler630 TPN MCCB with Microprocessor release for over current, short circuit & earth fault protection etc. - 1 SetOutgoing comprising of :250 TPN MCCB with Microprocessor release for over current, short circuit & earth fault protection etc. - 5 Set63 amps 4 Pole MPCB - 8 Set16 amps 4 Pole MPCB - 7 SetNotes:-All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.All breakers shall be minimum 10 kA rating with Icu = Ics.All incoming breakers shall be electrically/ mechanically interlocked.Design, fabrication, assembling, wiring and supply, installation, testing and commissioning of LT Panel, Distribution Panels, fabricated out of (load bearing member of 2mm and non load bearing member 1.6 mm thick) CRCA sheet steel in cubicle compartmentised modular 3b construction, free standing floor mounted with bottom cable entry, dust and vermin proof with reinforcement of suitable size angle iron, channel, `T' sections and / or flats wherever necessary. 3 mm thick cable gland plates shall be provided on top as well as at the bottom of the panels. Panels shall be treated with all anticorrosive process before powder coating as per specifications and final approved shade. 2 Nos. earthing terminals shall be provided for all distrtibution panels. Panels shall be suitable for 415V, 3 phase, 4 wire, 50 HZ supply system. Lifting hooks shall also be provided in case of large panels. Approval shall be taken for each panel in the form of shop drawings before fabrication. Galvanised hardwares with zinc passivation shall be used in fabrication of panels.	Set.	1

501	**315 kVAR Capacitor Panel (LT Panel Room) described as BelowIncomer comprising of :**630 TPN MCCB with Microprocessor release for over current, short circuit & earth fault protection etc. - 1 SetMicroprocessor APFC controller shall continuously monitor all three phases and displays various Electrical Parameters like voltage, input current, capacitive current, KVA demand, KW, Power Factor, self diagnostic error code indication with printout facility of the above with RS 232C port. Controller should mounted on the front side of the panel. It shall have data logging for minimum 2 months, it shall provide output for maximum 8 stages.Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 630/5 15 VA, CL 0.5, 3 No. CTs- 1 SetBreaker ON / OFF / TRIP indicating lights with control MCB - 1 SetPhase indicating light protected by 2 amps MCB's. - 1 Set**Bus Bar comprising of :**800 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set**Outgoing comprising of :**50 kVAR Capacitor Bank - 5 Set each comprising of following:125 Amps TPN MCCB - 1 SetAHF duty 525 volts 50Hz Thyrister for online control - 1 Set"ON" /"OFF" push buttons and indicating lamps. - 1 Set50 kVAR, 525 volts capacitor unit as specified - 1 Set25 kVAR Capacitor Bank - 2 Set each comprising of following:80 Amps TPN MCCB - 1 SetAHF duty 525 volts 50Hz Thyrister for online control - 1 Set"ON" /"OFF" push buttons and indicating lamps. - 1 Set25 kVAR, 525 volts capacitor unit as specified - 1 Set15 kVAR Capacitor Bank - 1 Set each comprising of following:40 Amps TPN MCCB - 1 SetAHF duty 525 volts 50Hz Thyrister for online control - 1 Set"ON" /"OFF" push buttons and indicating lamps. - 1 Set15 kVAR, 525 volts capacitor unit as specified - 1 SetNotes:All incoming and outgoing breakers shall be minimum 25 kA rating with Icu = Ics.Heavy duty exhaust fans to be provided for cooling Capacitors, Thyristers & AHF.LED indication for number of capacitor banks 'ON'.LED indication of Power Factor lagging or leading.APFC system shall comprise of following:i. Over Voltageii. Voltage Imbalanceiii. Earth Leakage50% Active & 50% Passive Harmonic filter Capacity shall be computed by vendor as per Manufacturer standard and requirement as per feeder load requirement.	Set.	1
502	**Lighting, Power & AHU MDB Panel LGF-1 (Lower Ground Floor) Incomer comprising of :** 160 amps 4 Pole MCCB with Thermal magnetic release for SC and OL protections - 1 Set Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 160/5 15 VA, CL 0.5, 3 No. CTs- 1 Set ON / OFF / TRIP indicating lights with control MCB -1 Set RYB Phase indicating light protected by 2 amps MCB's - 1 Set. **Bus Bar comprising of :** 200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set **Outgoing comprising of :** 63 amps 4 Pole MCB - 4 Set 40 amps 4 Pole MCB - 2 Set 32 amps 4 Pole MCB - 4 Set **Notes:-** All breakers shall be minimum 10 kA rating with Icu = Ics. Lighting, Power & AHU MDB Panel LGF-1 (Lower Ground Floor) described as above	Set.	1

503	**MDB-VENT.-GF/1 (Ground Floor) (Ventilation Panel)**Incomer comprising of :250 TPN MCCB with Microprocessor release for OL, SC & EF protection etc. - 1 SetMultifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 250/5 15 VA, CL 0.5, 3 No. CTs- 1 SetON / OFF / TRIP indicating lights with control MCB -1 SetPhase indicating light protected by 2 amps MCB's - 1 Set.Bus Bar comprising of :630 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 setOutgoing comprising of :63 amps TPN MCCB with Thermal magnetic release for SC and OL protections - 1 Set63 amps 4 Pole MCB - 16 Set40 amps 4 Pole MCB - 8 Set32 amps 4 Pole MCB - 3 SetNotes:-All breakers shall be minimum 16 kA rating with Icu = Ics.**MDB-VENT.-GF/1 (Ventilation Panel) described as above**	Set.	1
504	**MDB-VENT.-2F/1 Ventilation Panel** **Incomer comprising of :** 250 TPN MCCB with Microprocessor release for over current, short circuit & earth fault protection etc. - 1 Set Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 250/5 15 VA, CL 0.5, 3 No. CTs- 1 Set ON / OFF / TRIP indicating lights with control MCB -1 Set Phase indicating light protected by 2 amps MCB's - 1 Set. **Bus Bar comprising of :** 300 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set **Outgoing comprising of :** 63 amps 4 Pole MCB - 8 Set 32 amps 4 Pole MCB - 6 Set **Notes:-** All breakers shall be minimum 10 kA rating with Icu = Ics. MDB-VENT.-3F/1 Ventilation Panel described as above	Set.	1
505	**MDB-VENT.-4F/1 Ventilation Panel** **Incomer comprising of :** 125 TPN MCCB with Thermal magnetic based release for OL & SC protection etc. - 1 Set Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 120/5 15 VA, CL 0.5, 3 No. CTs- 1 Set ON / OFF / TRIP indicating lights with control MCB -1 Set Phase indicating light protected by 2 amps MCB's - 1 Set. Bus Bar comprising of : 200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set Outgoing comprising of : 63 amps 4 Pole MCB - 6 Set 25 amps 4 Pole MCB - 3 Set Notes:- All breakers shall be minimum 10 kA rating with Icu = Ics. **MDB-VENT.-4F/1 Ventilation Panel described as above**	Set.	1

506	Main Lift Power Panel (Lift Machine Room) Incomer comprising of :125 amps TPN MCCB with Thermal magnetic release for SC and OL protections - 2 SetMultifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 120/5 15 VA, CL 0.5, 3 No. CTs- 2 SetON / OFF / TRIP indicating lights with control MCB - 2 SetPhase indicating light protected by 2 amps MCB's - 2 Set.125 amp 4pole contactor - 2sets **Bus Bar comprising of :**200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set**Outgoing comprising of :**63 amps 4 Pole MCCB with Thermal magnetic release for SC, OL protection - 6 Set40 amps 4P MCB - 3 Set**Notes:-**All breakers shall be minimum 16 kA rating with Icu = Ics.All incoming breakers shall be electrically/ mechanically interlocked. Main Lift Power Panel (Lift Machine Room) described as above	Set.	1
507	**UPS Input Panel (Ground Floor) (Elec. ROOM) Incomer comprising of :** 100 amps 4 Pole MCCB with Thermal magnetic release for SC, OL protection - 2 Set Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 100/5 15 VA, CL 0.5, 3 No. CTs- 2 Set ON / OFF / TRIP indicating lights with control MCB -2 Set Phase indicating light protected by 2 amps MCB's - 2 Set. 100 amp 4 pole contactor - 2 Set Bus Bar comprising of : 200 Amps TPN Copper Bus Bar with colour coded heat shrinkable sleeves Outgoing comprising of : 63 amps 4 Pole MCCB with Thermal magnetic release for SC, OL protection - 5 Set **UPS Input Panel (Ground Floor) (Elec. ROOM) described as above** 63 amps 4 Pole MCB - 1 Set Notes:- All breakers shall be minimum 16 kA rating with Icu = Ics. All incoming breakers shall be electrically/ mechanically interlocked.	Set.	1
508	**MDB-E1 EMERGENCY LIGHTING PANEL (LOWER GROUND FLOOR) Incomer comprising of :**63 amps 4 Pole MCCB with Thermal magnetic release for SC and OL protections - 2 SetMultifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 60/5 15 VA, CL 0.5, 3 No. CTs- 2 SetON / OFF / TRIP indicating lights with control MCB -2 SetPhase indicating light protected by 2 amps MCB's - 2 Set.Bus Bar comprising of :100 Amps TPN Copper Bus Bar with colour coded heat shrinkable steeve - 1 setOutgoing comprising of :25 amps 4 Pole MCB - 25 SetNotes:-**All breakers shall be minimum 10 kA rating with Icu = Ics.MDB-E1 EMERGENCY LIGHTING PANEL (LOWER GROUND FLOOR) described as above**	Set.	1

509	**MDB- GYM EQUIPMENTS PANEL (ELEC. ROOM) GROUND FLOOR** **Incomer comprising of :** 160 amps 4 Pole MCCB with Thermalmagnetic release for SC and OL protections - 2 Set Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 160/5 15 VA, CL 0.5, 3 No. CTs- 1 Set ON / OFF / TRIP indicating lights with control MCB -1 Set Phase indicating light protected by 2 amps MCB's - 1 Set. Bus Bar comprising of : 200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set Outgoing comprising of : 63 amps 4 Pole MCCB with Thermalmagnetic release for SC and OL protections - 2 Set 40 amps 4 Pole MCB WITH 40 amp RCCB 30mA - 2 Set 32 amps 4 Pole MCB WITH 40 amp RCCB 30mA - 2 Set 25 amps 4 Pole MCB WITH 25 amp RCCB 30mA - 4 Set 63 amps 4 Pole MCB - 2 Set Notes:- All breakers shall be minimum 10 kA rating with Icu = Ics. **MDB- GYM EQUIPMENTS PANEL (ELEC. ROOM) GROUND FLOOR described as above**	Set.	1
510	**MDB- KITCHEN/CAFE PANEL (ELEC. ROOM) GROUND FLOORIncomer comprising of :**100 amps 4 Pole MCCB with Thermalmagnetic release for SC and OL protections - 2 SetMultifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 200/5 15 VA, CL 0.5, 3 No. CTs- 1 SetON / OFF / TRIP indicating lights with control MCB -1 SetPhase indicating light protected by 2 amps MCB's - 1 Set.Bus Bar comprising of :200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 setOutgoing comprising of :63 amps 4 Pole MCCB with Thermalmagnetic release for SC and OL protections - 4 Set40 amps 4 Pole MCB WITH 40 amp RCCB 30mA - 2 Set25 amps 4 Pole MCB WITH 25 amp RCCB 30mA - 18 Set63 amps 4 Pole MCB - 3 SetNotes:-All breakers shall be minimum 10 kA rating with Icu = Ics.MDB- KITCHEN/CAFE PANEL (ELEC. ROOM) GROUND FLOOR described as above	Set.	1
511	**LIGHTING,POWER & AHU PANEL-GF1 (GROUND FLOOR)** **Incomer comprising of :** 125 amps TPN MCCB with Thermalmagnetic release for SC and OL protections - 1 Set Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 100/5 15 VA, CL 0.5, 3 No. CTs- 1 Set ON / OFF / TRIP indicating lights with control MCB -1 Set Phase indicating light protected by 2 amps MCB's - 1 Set. Bus Bar comprising of : 200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set Outgoing comprising of : 63 amps 4 Pole MCB - 3 Set 32 amps 4 Pole MCB - 3 Set 25 amps 4 Pole MCB - 3 Set Notes:- All breakers shall be minimum 10 kA rating with Icu = Ics. **LIGHTING,POWER & AHU PANEL-GF1 (GROUND FLOOR) described as above**	Set.	1

512	**LIGHTING,POWER & AHU PANEL-1F1 (1ST FLOOR) Incomer comprising of :**125 amps TPN MCCB with Thermalmagnetic release for SC and OL protections - 1 SetMultifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 120/5 15 VA, CL 0.5, 3 No. CTs- 1 SetON / OFF / TRIP indicating lights with control MCB -1 SetPhase indicating light protected by 2 amps MCB's - 1 Set.Bus Bar comprising of :200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 setOutgoing comprising of :63 amps 4 Pole MCB - 4 Set32 amps 4 Pole MCB - 5 Set25 amps 4 Pole MCB - 6 SetNotes:-All breakers shall be minimum 10 kA rating with Icu = Ics.**LIGHTING,POWER & AHU PANEL-1F1 (1ST FLOOR) described as above**	Set.	1
513	**LIGHTING,POWER & AHU PANEL-2F1 (2ND FLOOR) Incomer comprising of :** 200 amps TPN MCCB with Thermalmagnetic release for SC and OL protections - 1 Set Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 200/5 15 VA, CL 0.5, 3 No. CTs- 1 Set ON / OFF / TRIP indicating lights with control MCB -1 Set Phase indicating light protected by 2 amps MCB's - 1 Set. Bus Bar comprising of : 300 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set Outgoing comprising of : 63 amps 4 Pole MCB - 6 Set 40 amps 4 Pole MCB - 3 Set 32 amps 4 Pole MCB - 6 Set 25 amps 4 Pole MCB - 3 Set Notes:- All breakers shall be minimum 10 kA rating with Icu = Ics. LIGHTING,POWER & AHU PANEL-2F1 (2ND FLOOR) described as above	Set.	1
514	**LIGHTING,POWER & AHU PANEL-3F1 (3RD FLOOR) C16:C17Incomer comprising of :**125 amps TPN MCCB with Thermal magnetic release for SC and OL protections - 1 SetMultifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 120/5 15 VA, CL 0.5, 3 No. CTs- 1 SetON / OFF / TRIP indicating lights with control MCB -1 SetPhase indicating light protected by 2 amps MCB's - 1 Set.Bus Bar comprising of :200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 setOutgoing comprising of :63 amps 4 Pole MCB - 3 Set32 amps 4 Pole MCB - 5 Set25 amps 4 Pole MCB - 5 SetNotes:-All breakers shall be minimum 10 kA rating with Icu = Ics.**LIGHTING,POWER & AHU PANEL-3F1 (3RD FLOOR) described as above**	Set.	1

515	**LIGHTING,POWER & AHU PANEL-4F1 (4TH FLOOR) Incomer comprising of :** 250 amps TPN MCCB with Thermalmagnetic release for SC and OL protections - 1 Set Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 250/5 15 VA, CL 0.5, 3 No. CTs- 1 Set ON / OFF / TRIP indicating lights with control MCB -1 Set Phase indicating light protected by 2 amps MCB's - 1 Set. Bus Bar comprising of : 300 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set Outgoing comprising of : 63 amps 4 Pole MCB - 7 Set 32 amps 4 Pole MCB - 5 Set 25 amps 4 Pole MCB - 3 Set Notes:- All breakers shall be minimum 10 kA rating with Icu = Ics. **LIGHTING,POWER & AHU PANEL-4F1 (4TH FLOOR) described as above**	Set.	1
516	**LIGHTING,POWER & AHU PANEL-5F1 (5TH FLOOR) Incomer comprising of :** 125 amps TPN MCCB with Thermalmagnetic release for SC and OL protections - 1 Set Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 120/5 15 VA, CL 0.5, 3 No. CTs- 1 Set ON / OFF / TRIP indicating lights with control MCB -1 Set Phase indicating light protected by 2 amps MCB's - 1 Set. Bus Bar comprising of : 200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set Outgoing comprising of : 63 amps 4 Pole MCB - 4 Set 32 amps 4 Pole MCB - 4 Set 25 amps 4 Pole MCB - 3 Set Notes:- All breakers shall be minimum 10 kA rating with Icu = Ics. LIGHTING,POWER & AHU PANEL-3F1 (3RD FLOOR) described as above	Set.	1
517	**LIGHTING,POWER & AHU PANEL-6F1 (6TH FLOOR) Incomer comprising of :**160 amps TPN MCCB with Thermalmagnetic release for SC and OL protections - 1 SetMultifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 160/5 15 VA, CL 0.5, 3 No. CTs- 1 SetON / OFF / TRIP indicating lights with control MCB -1 SetPhase indicating light protected by 2 amps MCB's - 1 Set.Bus Bar comprising of :200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 setOutgoing comprising of :63 amps 4 Pole MCB - 8 Set40 amps 4 Pole MCB - 2 Set32 amps 4 Pole MCB - 4 Set25 amps 4 Pole MCB - 3 SetNotes:-All breakers shall be minimum 10 kA rating with Icu = Ics.**LIGHTING,POWER & AHU PANEL-6F1 (6TH FLOOR) described as above**	Set.	1

518	**MDB -PRESUREIZATION PANEL (TERRACE)** **Incomer comprising of :** 100 amps TPN MCCB with Thermalmagnetic release for SC and OL protections - 1 Set Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 100/5 15 VA, CL 0.5, 3 No. CTs- 1 Set ON / OFF / TRIP indicating lights with control MCB -1 Set Phase indicating light protected by 2 amps MCB's - 1 Set. Bus Bar comprising of : 200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set Outgoing comprising of : 63 amps 4 Pole MCB - 3 Set 25 amps 4 Pole MCB - 6 Set Notes:- All breakers shall be minimum 10 kA rating with Icu = Ics. LIFT & PRESUREIZATION PANEL described as above	Set.	1
519	**PLUMBING PUMP PANEL** **Incomer comprising of :** 100 amps TPN MCCB with Thermalmagnetic release for SC and OL protections - 1 Set Multifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 100/5 15 VA, CL 0.5, 3 No. CTs- 1 Set ON / OFF / TRIP indicating lights with control MCB -1 Set Phase indicating light protected by 2 amps MCB's - 1 Set. Bus Bar comprising of : 200 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 set Outgoing comprising of : 6.3 - 10 amps TPN MPCB with 25 amp contactor - 7 Set 2.5 - 4 amps TPN MPCB with 12 amp contactor - 3 Set 11 - 18 amps TPN MPCB with 25 amp contactor - 1 Set Notes:- All breakers shall be minimum 10 kA rating with Icu = Ics. PLUMBING PUMP PANEL described as above	Set.	1
520	**FIRE PUMP PANEL (LOWER GROUND FLOOR)Incomer comprising of :**400 TPN MCCB with Microprocessor release for over current, short circuit & earth fault protection etc. - 2 SetMultifunction meter for VAF, PF, Power & eneregy with RS - 485 port with 400/5 15 VA, CL 0.5, 3 No. CTs- 2 SetON / OFF / TRIP indicating lights with control MCB -2 SetPhase indicating light protected by 2 amps MCB's - 2 SetBus Bar comprising of :600 Amps TPN Aluminium Bus Bar with colour coded heat shrinkable steeve - 1 setBus Coupler400 TPN MCCB with Microprocessor release for over current, short circuit & earth fault protection etc. - 1 SetOutgoing comprising of :160 amps TPN MCCB with Thermalmagnetic release for SC and OL protections - 3 Set40 amps TPN MPCB with 70 amp contactor - 2 Set25 amps TPN MPCB with 40 amp contactor - 2 SetNotes:-All Outgoing feeders shall be provided with ON/OFF/TRIP Indications and shall be protected by 2 amps SP MCBs.All breakers shall be minimum 10 kA rating with Icu = Ics.All incoming breakers shall be electrically/ mechanically interlocked.FIRE PUMP PANEL (LOWER GROUND FLOOR) Panel described as above	Set.	1
521	**DISTRIBUTION BOARD** Supplying & fixing miniature circuit breakers on existing MCB distribution boards using necessary fixing materials and 'C' Type curve, indicator ON/OFF, energy cross-3 with Short circuit breaking capacity of 10K and complete wiring as required confirming to IEC 60898. 6-32 A SP	No	1462

522	**DISTRIBUTION BOARD** Supplying and fixing regular MCB distribution boards on wall/ood board / flush mounting using required clA, bolts, nuts etc., with provision for fixing suitable type capacity MCB's single phase/3 phase/single door with powder coated painting Made out of 14 SWG MS enclosure. I - Single Door 8 Way SP & N	No	2
523	**DISTRIBUTION BOARD** Supplying and fixing regular MCB distribution boards on wall/ood board / flush mounting using required clA, bolts, nuts etc., with provision for fixing suitable type capacity MCB's single phase/3 phase/single door with powder coated painting Made out of 14 SWG MS enclosure. I - Single Door 12 Way SP & N	No	6
524	**DISTRIBUTION BOARD** Supplying and fixing regular MCB distribution boards on wall/ood board / flush mounting using required clA, bolts, nuts etc., with provision for fixing suitable type capacity MCB's single phase/3 phase/single door with powder coated painting Made out of 14 SWG MS enclosure. 6 Way SP & N	No	4
525	**DISTRIBUTION BOARD** Supplying and fixing regular MCB distribution boards on wall/ood board / flush mounting using required clA, bolts, nuts etc., with provision for fixing suitable type capacity MCB's single phase/3 phase/single door with powder coated painting Made out of 14 SWG MS enclosure. 8 Way SP & N	No	8
526	**DISTRIBUTION BOARD**Supplying and fixing regular MCB distribution boards on wall/ood board / flush mounting using required clA, bolts, nuts etc., with provision for fixing suitable type capacity MCB's single phase/3 phase/single door with powder coated painting Made out of 14 SWG MS enclosure.III - Double Door8 Way TP & N	No	26
527	**DISTRIBUTION BOARD** Supplying and fixing regular MCB distribution boards on wall/ood board / flush mounting using required clA, bolts, nuts etc., with provision for fixing suitable type capacity MCB's single phase/3 phase/single door with powder coated painting Made out of 14 SWG MS enclosure. III - Double Door 12 Way TP & N	No	28
528	Supplying, fixing and wiring Residual current circuit breaker (RCCB) 240/450V upto 300mA sensitivity on existing wood/ panel board. 32-40A 4 pole	No	78
529	Supplying, fixing and wiring Residual current circuit breaker (RCCB) 240/450V upto 300mA sensitivity on existing wood/ panel board. 63 A 4 pole	No	81
530	Supplying, fixing and wiring Earth Leakage Miniature Circuit Breaker (ELMCB) 240/450V upto 300mA sensitivity on existing wood/panel board. 16-25 A 2 pole	No	20
531	Supplying and fixing following rating, four pole, 415 V, isolator in the existing MCB DB complete with connections, testing and commissioning etc. as required. 40A	No.	26

532	Supplying and fixing following rating, four pole, 415 V, isolator in the existing MCB DB complete with connections, testing and commissioning etc. as required. 63A	No.	28
533	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 3.5 core 300 sq.mm Al arm.	RM	610
534	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 3.5 core 240 sq.mm Al arm.	RM	290
535	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 3.5 core 150 sq.mm Al arm.	RM	270
536	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 3.5 core 185 sq.mm Al arm.	RM	410
537	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 3.5 core 95 sq.mm Al arm.	RM	210
538	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 3.5 core 70 sq.mm Al arm.	RM	180
539	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 3.5 core 50 sq.mm Al arm.	RM	50
540	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions.4 core 25 sq.mm Al arm.	RM	70
541	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 4 core 16 sq.mm Cu arm.	RM	2100
542	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 4 core 10 sq. mm. Cu arm.	RM	700
543	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 4 core 6 sq.mm Cu arm.	RM	1500
544	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 4 core 4 sq.mm Cu arm.	RM	1600
545	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 3 core 6 sq.mm Cu arm.	RM	50
546	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement. 3.5 core 240 sq.mm Al arm.	RM	150

547	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement.3.5 core 185 sq.mm Al arm.	RM	70
548	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement. 3.5 core 120 sq.mm Al arm.	RM	30
549	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement. 3.5 core 95 sq.mm Al arm.	RM	90
550	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement. 3.5 core 70 sq.mm Al arm.	RM	90
551	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement. 3.5 core 50 sq.mm Al arm.	RM	260
552	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement. 4 core 25 sq.mm Al. arm.	RM	720
553	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement. 4 core 10 sq.mm Cu. arm.	RM	1485
554	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement. 4 core 6 sq.mm Cu arm.	RM	565
555	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement.4 core 4 sq.mm Cu arm.	RM	420
556	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement. 3 core 4 sq.mm Cu arm.	RM	2100
557	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement. 1 core 16 sq.mm Cu Unarm. for UPS Connectivity	RM	320
558	Supplying of following sizes of 600V/1000V Grade Fire Survival galvanised steel wire Armoured cable in the strandard aluminium/Copper conductor,constructed / designed as per BS 7846.as required complete in all respect as per site requirement. 2 core 10 sq.mm Cu Unarm. for UPS Connectivity	RM	130
559	Laying and fixing of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size on cable tray as required. Upto 35 sq. mm (clamped with 1mm thick saddle)	RM	11210
560	Laying and fixing of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size on cable tray as required. Above 35 sq. mm and upto 95 sq. mm (clamped with 25x3mm MS flat clamp)	RM	860
561	Laying and fixing of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size on cable tray as required. Above 95 sq. mm and upto 185 sq. mm (clamped with 25/40x3mm MS flat clamp)	RM	780

562	Laying and fixing of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size on cable tray as required. Above 185 sq. mm and upto 400 sq. mm (clamped with 40x3mm MS flat clamp)	RM	900
563	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size direct in ground including excavation and refilling the trench etc as required, but excluding sand cushioning and protective covering. Above 35 sq. mm and upto 95 sq. mm (clamped with 25x3mm MS flat clamp)	RM	20
564	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size direct in ground including excavation and refilling the trench etc as required, but excluding sand cushioning and protective covering. Above 95 sq. mm and upto 185 sq. mm (clamped with 40x3mm MS flat clamp)	RM	100
565	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size direct in ground including excavation and refilling the trench etc as required, but excluding sand cushioning and protective covering. Above 185 sq. mm and upto 400 sq. mm (clamped with 40x3mm MS flat clamp)	RM	90
566	Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. 3½ X 300 sq. mm (70mm)	No.	40
567	Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. 3½ X 240 sq. mm (62mm)	No.	10
568	Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. 3½ X 185 sq. mm (50mm)	No.	12
569	Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. 3½ X 150 sq. mm (45mm)	No.	6
570	Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required.3½ X 95 sq. mm (45mm)	No.	6
571	Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. 3½ X 70 sq. mm (38mm)	No.	8
572	Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. 4 X 25sq. mm (28mm)	No.	2
573	Supplying and making end termination with brass compression gland and aluminium lugs for following size of PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. 3½ X 50 sq. mm (38mm)	No.	2
574	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured cables of 1100 volt grade including supplying and fixing of bimettalic crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 4 core 16 sq.mm Cu arm.	No.	72
575	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured cables of 1100 volt grade including supplying and fixing of bimettalic crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 4 core 10 sq. mm. Cu arm.	No.	22

576	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured cables of 1100 volt grade including supplying and fixing of bimettalic crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 4 core 6 sq.mm Cu arm.	No.	72
577	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured cables of 1100 volt grade including supplying and fixing of bimettalic crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 4 core 4 sq.mm Cu arm.	No.	44
578	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured cables of 1100 volt grade including supplying and fixing of bimettalic crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 3 core 6 sq.mm Cu arm.	No.	2
579	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 3.5 core 240 sq. mm Al arm.	No.	4
580	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions.3.5 core 185 sq. mm Al arm.	No.	4
581	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 3.5 core 120 sq. mm Al arm.	No.	2
582	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions.3.5 core 95 sq. mm Al arm.	No.	2
583	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 3.5 core 70 sq. mm Al arm.	No.	2
584	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 3.5 core 50 sq. mm Al arm.	No.	6
585	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 4 core 25 sq.mm Al. arm.	No.	22
586	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 4 core 10 sq.mm Al. arm.	No.	42

587	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 4 core 6 sq.mm Cu arm.	No.	16
588	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 4 core 4 sq.mm Cu arm.	No.	10
589	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 3 core 4 sq.mm Cu arm.	No.	80
590	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 1 core 16 sq.mm Cu Unarm. for UPS Connectivity	No.	12
591	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured fire returant cables of 1100 volt grade including supplying and fixing of bimettalic crimping flame proof lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 1 core 10 sq.mm Cu Unarm. for UPS Connectivity	No.	6
592	Supplying and installing following size of perforated painted with powder coating M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required.50 mm width X 50 mm depth X 1.6 mm thickness	RM	1080
593	Supplying and installing following size of perforated painted with powder coating M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required. 150 mm width X 50 mm depth X 1.6 mm thickness	RM	1650
594	Supplying and installing following size of perforated painted with powder coating M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required. 300 mm width X 50 mm depth X 1.6 mm thickness	RM	870
595	Supplying and installing following size of perforated painted with powder coating M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required. 450 mm width X 50 mm depth X 2.0 mm thickness	RM	290
596	Supplying and installing following size of perforated painted with powder coating M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required. 600 mm width X 50 mm depth X 2.0 mm thickness	RM	22
597	Supplying and installing following size of perforated painted with powder coating M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required. 750 mm width X 75 mm depth X 2.0 mm thickness	RM	150

598	Supplying and installing following size of perforated painted with powder coating M.S. cable trays with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required. 900 mm width X 75 mm depth X 2.0 mm thickness	RM	35
599	Supplying and installing following size of perforated painted with powder coating M.S. cable trays bends with perforation not more than 17.5%,, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required. 100 mm width X 50 mm depth X 1.6 mm thickness	No.	100
600	Supplying and installing following size of perforated painted with powder coating M.S. cable trays bends with perforation not more than 17.5%,, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required. 300 mm width X 50 mm depth X 1.6 mm thickness	No.	40
601	Supplying and installing following size of perforated painted with powder coating M.S. cable trays bends with perforation not more than 17.5%,, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required. 450 mm width X 50 mm depth X 2.0 mm thickness	No.	15
602	Supplying and installing following size of perforated painted with powder coating M.S. cable trays bends with perforation not more than 17.5%,, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required.600 mm width X 50 mm depth X 2.0 mm thickness	No.	3
603	Supplying and installing following size of perforated painted with powder coating M.S. cable trays bends with perforation not more than 17.5%,, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, painting suspenders etc as required. 900 mm width X 75 mm depth X 2.0 mm thickness	No.	2
604	Supplying and installing following size of perforated painted with powder coating M.S. cable trays Tee with perforation not more than 17.5%, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, paintingsuspenders etc as required. 100 mm width X 50 mm depth X 1.6 mm thickness	No.	20
605	Supplying and installing following size of perforated painted with powder coating M.S. cable trays Tee with perforation not more than 17.5%, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, paintingsuspenders etc as required. 300 mm width X 50 mm depth X 1.6 mm thickness	No.	20
606	Supplying and installing following size of perforated painted with powder coating M.S. cable trays Tee with perforation not more than 17.5%, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, paintingsuspenders etc as required. 450 mm width X 50 mm depth X 2.0 mm thickness	No.	8
607	Supplying and installing following size of perforated painted with powder coating M.S. cable trays Tee with perforation not more than 17.5%, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, paintingsuspenders etc as required. 600 mm width X 50 mm depth X 2.0 mm thickness	No.	2
608	Supplying and installing following size of perforated painted with powder coating M.S. cable trays Tee with perforation not more than 17.5%, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, paintingsuspenders etc as required. 750 mm width X 75 mm depth X 2.0 mm thickness	No.	3

609	Supplying and installing following size of perforated painted with powder coating M.S. cable trays Tee with perforation not more than 17.5%, joined with connectors, suspended from the ceiling with M.S. suspenders including bolts & nuts, paintingsuspenders etc as required. 900 mm width X 75 mm depth X 2.0 mm thickness	No.	4
610	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required.150 mm width X 50 mm depth X 1.6 mm thickness	RM	30
611	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required. 300 mm width X 50 mm depth X 1.6 mm thickness	RM	20
612	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray (Galvanisation thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required. 450 mm width X 50 mm depth X 2.0 mm thickness	RM	20
613	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray "bends" (galvanisation not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required. 150 mm width X 50 mm depth X 1.6 mm thickness	No.	5
614	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray "bends" (galvanisation not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required. 300 mm width X 50 mm depth X 1.6 mm thickness	No.	4
615	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray "bends" (galvanisation not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required. 450 mm width X 50 mm depth X 2.0 mm thickness	No.	3
616	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray "Tee" (galvanisation not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required. 150 mm width X 50 mm depth X 1.6 mm thickness	No.	2
617	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray "Tee" (galvanisation not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required.300 mm width X 50 mm depth X 2.0 mm thickness	No.	2
618	Supplying and installing following size of perforated Hot Dipped Galvanised Iron cable tray "Tee" (galvanisation not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with G.I. suspenders including G.I. bolts & nuts, etc. as required. 450 mm width X 50 mm depth X 2.0 mm thickness	No.	3
619	Providing, laying and fixing following dia RCC pipe NP2 class (light duty) in ground complete with RCC collars, jointing with cement mortar 1:2 (1 cement : 2 fine sand) including trenching (75 cm deep) and refilling etc as required. 300mm dia	RM	440

620	**Earthing System**:Supply, Testing & Commissioning, fixing of following bare Copper / GI tapes / wires including all necessary fixing accessories, insulators and effecting connections as per specifications. 32 x 6 mm thick Copper tape with heat shrinkable sleeves	RM	132
621	Providing and fixing 25 mm X 5 mm Copper. strip on surface or in recess for connections etc. as required.	RM	88
622	Supply, Testing & Commissioning, fixing of following bare Copper / GI tapes / wires including all necessary fixing accessories, insulators and effecting connections as per specifications. 50 x 6 mm thick GI tape	RM	400
623	Supply, Testing & Commissioning, fixing of following bare Copper / GI tapes / wires including all necessary fixing accessories, insulators and effecting connections as per specifications. 50 x 10 mm thick GI tape	RM	90
624	Supply, Testing & Commissioning, fixing of following bare Copper / GI tapes / wires including all necessary fixing accessories, insulators and effecting connections as per specifications. 32 x 6 mm thick GI tape	RM	90
625	Providing and fixing 25 mm X 5 mm G.I. strip on surface or in recess for connections etc. as required.	RM	1364
626	Providing and fixing 6 SWG dia G.I. wire on surface or in recess for loop earthing along with existing surface/ recessed conduit/ submain wiring/ cable as required.	RM	1100
627	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size in the existing RCC/ HUME/ METAL pipe as required. Upto 35 sq. mm	RM	50
628	Providing and fixing Earth Bus of 50mm X 5mm copper strip on surface for connections etc. as required.	RM	10
629	Earthing with G.I. earth plate 600 mm X 600 mm X 6 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 metre long etc. with charcoal/ coke and salt as required.	No.	22
630	Earthing with copper earth plate 600 mm X 600 mm X 3 mm hick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 metre long etc. with charcoal/ coke and salt as required.	No.	10
631	Providing, laying and fixing following dia RCC pipe NP2 class (light duty) in ground complete with RCC collars, jointing with cement mortar 1:2 (1 cement : 2 fine sand) including trenching (75 cm deep) and refilling etc as required. 100mm dia	RM	10
632	Providing, laying and fixing following dia RCC pipe NP2 class (light duty) in ground complete with RCC collars, jointing with cement mortar 1:2 (1 cement : 2 fine sand) including trenching (75 cm deep) and refilling etc as required. 150mm dia	RM	20
633	**Lightning Protection System**:Supply, Installation, testing & Commissioning of interception Aluminium Rod of 3 mtr length including bi-metallic connection witth the strip with all accessories as required complet in all respects.	Each	3
634	Jointing copper / G.I . Tape (with aother copper / G.I tape ,base of the final or any other mettalic object) by riveting / nut bolting / sweating and soldering etc as required.	Each	10
635	Providing and fixing G.I Tape 20 x 3 mm thick on Parapet or surface of wall for lightning conductor complete as required(for horizental run)	RM	525
636	Providing and fixing G.I Tape 32 x 3 mm thick lightning conductor complete as required(For Vertical run)	RM	210
637	Providing and fixing testing joint,made of 20 mm x 3 mm thick G.I strip,125 mm long with 4 nos of G.I bolts,nuts,chuck nuts and spring washers etc.complete as required.	Each	12
638	Earthing with G.I. earth plate 600 mm X 600 mm X 6 mm thick including accessories, and providing masonry enclosure with cover plate having locking arrangement and watering pipe of 2.7 metre long etc. with charcoal/ coke and salt as required.	No.	8
639	Providing, laying and fixing following dia RCC pipe NP2 class (light duty) in ground complete with RCC collars, jointing with cement mortar 1:2 (1 cement : 2 fine sand) including trenching (75 cm deep) and refilling etc as required. 100 mm dia	m	10

640	Providing, laying and fixing following dia RCC pipe NP2 class (light duty) in ground complete with RCC collars, jointing with cement mortar 1:2 (1 cement : 2 fine sand) including trenching (75 cm deep) and refilling etc as required. 150 mm dia	m	40
641	Providing, laying and fixing following dia RCC pipe NP2 class (light duty) in ground complete with RCC collars, jointing with cement mortar 1:2 (1 cement : 2 fine sand) including trenching (75 cm deep) and refilling etc as required. 250 mm dia	m	10
642	Providing, laying and fixing following dia RCC pipe NP2 class (light duty) in ground complete with RCC collars, jointing with cement mortar 1:2 (1 cement : 2 fine sand) including trenching (75 cm deep) and refilling etc as required. 300 mm dia	m	200
643	Wiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable in surface / recessed steel conduit, with modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable etc. as required. Group C	No.	351
644	Wiring for group controlled (looped) light point/fan point/exhaust fan point/ call bell point (without independent switch etc.) with 1.5 sq. mm FRLS PVC insulated copper conductor single core cable in surface/ recessed steel conduit, and earthing the point with 1.5 sq. mm FRLS PVC insulated copper conductor single core cable etc. as required. Group C	No.	1264
645	Wiring for lighting/power circuit using one of FRLS PVC insulated 1100V grade, multistrand copper wire with low conductor resistance single core in open or concealed system of wiring with specified IS-694:confirming to latest amendments. 1.5 mm2	RM	1820
646	Wiring for lighting/power circuit using one of FRLS PVC insulated 1100V grade, multistrand copper wire with low conductor resistance single core in open or concealed system of wiring with specified IS-694:confirming to latest amendments. 2.5 mm2	RM	1400
647	Wiring for lighting/power circuit using one of FRLS PVC insulated 1100V grade, multistrand copper wire with low conductor resistance single core in open or concealed system of wiring with specified IS-694:confirming to latest amendments.4 mm2	RM	1650
648	Wiring for lighting/power circuit using one of FRLS PVC insulated 1100V grade, multistrand copper wire with low conductor resistance single core in open or concealed system of wiring with specified IS-694:confirming to latest amendments. 6 mm2	RM	350
649	Supplying 6A flush type socket and 6 A flush type SP switch either surface/flush mounting in existing gang box or in 4mm thick plastic sheet and fixing over a flush mounted wooden box and wiring using necessary capacity wires as required as per IS1293 and IS 36546A 2 Way	No.	40
650	Supplying and mounting 2 Nos. of 2Way 6 A flush type switches either surface/flush mounted on existing gang box or in 4mm thick plastic sheet and mounted on a flush mounted wooden box and wiring as per IS 1293	No.	2
651	Supplying and flush mounting powder coated / galvanized metal box suitable for mounting modular switch plates. The box should be firmly flush mounted after due groove cutting in wall Brick/Stone/C.C 1-3 Way	No.	50
652	Supplying and flush mounting powder coated / galvanized metal box suitable for mounting modular switch plates. The box should be firmly flush mounted after due groove cutting in wall Brick/Stone/C.C 4-5 Way	No.	30

653	Supplying and flush mounting powder coated / galvanized metal box suitable for mounting modular switch plates. The box should be firmly flush mounted after due groove cutting in Brick/Stone/C.C wall 6 Way	No.	30
654	Supplying and flush mounting powder coated / galvanized metal box suitable for mounting modular switch plates. The box should be firmly flush mounted after due groove cutting in Brick/Stone/C.C wall 8 Way	No.	20
655	Supplying and flush mounting powder coated / galvanized metal box suitable for mounting modular switch plates. The box should be firmly flush mounted after due groove cutting in Brick/Stone/C.C wall 10-12 Way	No.	50
656	Supplying and fixing superior quality modular switch mounting polycarbonate plate with necessary supporting back plate with required nos. of machine screws, bolts nuts etc., complete on the existing metal/PVC box. 1 to 3 Module	No.	100
657	Supplying and fixing superior quality modular switch mounting polycarbonate plate with necessary supporting back plate with required nos. of machine screws, bolts nuts etc., complete on the existing metal/PVC box. 4 Module	No.	70
658	Supplying and fixing superior quality modular switch mounting polycarbonate plate with necessary supporting back plate with required nos. of machine screws, bolts nuts etc., complete on the existing metal/PVC box. 6 Module	No.	60
659	Supplying and fixing superior quality modular switch mounting polycarbonate plate with necessary supporting back plate with required nos. of machine screws, bolts nuts etc., complete on the existing metal/PVC box. 8 Module	No.	20
660	Supplying and fixing superior quality modular switch mounting polycarbonate plate with necessary supporting back plate with required nos. of machine screws, bolts nuts etc., complete on the existing metal/PVC box. 10-12 Module	No.	10
661	Supplying and fixing of modular switch & connected accessories on existing modular switch plate as per IS 3854 and IS 1293.6A One Way Switch	No.	48
662	Supplying and fixing of modular switch & connected accessories on existing modular switch plate as per IS 3854 and IS 1293. 6A Three Way socket	No.	48
663	Supplying and fixing of modular switch & connected accessories on existing modular switch plate as per IS 3854 and IS 1293.16A One Way Switch	No.	237
664	Supplying and fixing of modular switch & connected accessories on existing modular switch plate as per IS 3854 and IS 1293. 32A DP Switch	No.	3
665	Supplying and fixing of modular switch & connected accessories on existing modular switch plate as per IS 3854 and IS 1293. 6/16A Universal Socket	No.	237
666	Supplying and fixing of modular switch & connected accessories on existing modular switch plate as per IS 3854 and IS 1293. TV/Telephone Socket	No.	3
667	Supplying and fixing of modular switch & connected accessories on existing modular switch plate as per IS 3854 and IS 1293. RJ45/I.O Outlet Cat-6	No.	15

668	Supplying and fixing 32A security and energy saving DP switch with key tag suitable to operate on 230 V, 50Hz AC supply & completely wired on existing box.	No.	2
669	Supplying and fixing suitable size GI box with modular plate and cover infront on surface or in recess, including providng and fixing 2 nos. 3 pin 5/6 A modular socket outlet and 2 nos. 5/6 A modular switch, connections etc. as required. (For light plugs to be used in non residential buildings).	No.	3
670	Supplying and fixing of metal clad industrial plugs and sockets. 2pole+earth 250V PLUG 10A	No.	3
671	Supplying and fixing of metal clad industrial plugs and sockets. 2pole+earth 250V PLUG 20A	No.	10
672	**Internal lighting fixtures**: Supplying of .....feet -PVC Batten with integrated LED tube .... W with high quality diffuser with Life of 25000 burning hours & 70% lumen maintenance with CRI > 80. Power Input: 220-240V@ 50/60Hz & Power factor >0.9 along with CE approved. 2 years Warranty against any manufacturing defect working under standard electrical condition. LED light fitting 1 x 2' - 9/10 W	No.	92
673	Supplying of .....feet -PVC Batten with integrated LED tube .... W with high quality diffuser with Life of 25000 burning hours & 70% lumen maintenance with CRI > 80. Power Input: 220-240V@ 50/60Hz & Power factor >0.9 along with CE approved. 2 years Warranty against any manufacturing defect working under standard electrical condition. LED light fitting 1 x 4' - 20/22 W	No.	91
674	Supplying of .....feet -PVC Batten with integrated LED tube .... W with high quality diffuser with Life of 25000 burning hours & 70% lumen maintenance with CRI > 80. Power Input: 220-240V@ 50/60Hz & Power factor >0.9 along with CE approved. 2 years Warranty against any manufacturing defect working under standard electrical condition. LED light fitting 1 x 4' - 36/40 W	No.	30
675	Supplying of recess mounting non integrated type LED down light..... W luminaire comprising of pressure decast/ extruded aluminium housing, with spring loaded false ceiling clA, LED of Power/COB with CCT 6500 degree K, CRI> 70%. efficacy >100 lumen per W, 120degree beam spread, life> 25000 burning hours and Compliance to IS10322/IEC 60598, LM 79 & LM 80. The lamp compartment is enclosed with anti glare opal diffuser which enhances the lighting level. LED's are driven by HF electronic driver integrated in a separate control gear assembly., with PF > 0.95, power loss should< 5% of lamp Wage, short circuit & open circuit protection to be integrated in the circuit, THD less than 20%, Life as per LM 79. The operating input voltage should be between 130 to 275 V. BIS Approved and Tested by NABL/CPRI accredited laboratory with 2 years Warranty against any manufacturing defect working under standard electrical condition. 10-12W	No.	150

676	Supplying of recess mounting non integrated type LED down light..... W luminaire comprising of pressure decast/ extruded aluminium housing, with spring loaded false ceiling clA, LED of Power/COB with CCT 6500 degree K, CRI> 70%. efficacy >100 lumen per W, 120degree beam spread, life> 25000 burning hours and Compliance to IS10322/IEC 60598, LM 79 & LM 80. The lamp compartment is enclosed with anti glare opal diffuser which enhances the lighting level. LED's are driven by HF electronic driver integrated in a separate control gear assembly., with PF > 0.95, power loss should< 5% of lamp Wage, short circuit & open circuit protection to be integrated in the circuit, THD less than 20%, Life as per LM 79. The operating input voltage should be between 130 to 275 V. BIS Approved and Tested by NABL/CPRI accredited laboratory with 2 years Warranty against any manufacturing defect working under standardelectrical condition.15-18W	No.	1043
677	10 Watt Bulkhead LED light fixture with minimum luminaire system efficacy of 100 lm/w having a color temperature of 5700K and housing should made up of pressure die cast aluminium with high efficiency diffuser with driver, accessories wiring etc.	No.	60
678	Volley Ball court light Supply, Installation, Testing and Commissioning of 195W LED Flood light made of High Pressure Die Cast Aluminium Alloy hosuing with anti-dust exposed lenses. High power LED with efficacy of 120lm/w at source and lumen output upto 24000 lumen. The product should come with Compnay LOGO Engraved, Corelated Color Temp 5700k, CRI≥70,Maintenance of lumen L70 (Hrs) 50K@L70,Ambient temperature (Ta) 35Degree, the product should be AMB. Protection of Fixture:- IP66,IK08, servicability Class B, power factor≥0.95, THD≤10%. The driver should be equipped with protection like 440V (P2P) Protection for 8 Hrs., High cut off @ 325±15V, Auto Restart, Surge protection 4KV internal and 10KV external. Manufacturer shall have inhouse lab approved by NABL or ministry of science of govt of India. LM 79 and LM80 reports need to be submitted from a NABL/UL accredited lab to verify above parameters. Both the fixture and Driver should have separate BIS approval.	No.	32
679	Badminton Court, Basketball Court Supply, Installation, Testing and Commissioning of 175W LED Flood light made of High Pressure Die Cast Aluminium Alloy hosuing with anti-dust exposed lenses. High power LED with efficacy of 120lm/w at source and lumen output upto 21000 lumen. The product should come with Compnay LOGO Engraved, Corelated Color Temp 5700k, CRI≥70,Maintenance of lumen L70 (Hrs) 50K@L70,Ambient temperature (Ta) 35Degree, the product should be AMB. Protection of Fixture:- IP66,IK08, servicability Class B, power factor ≥0.95, THD≤10%. The driver should be equipped with protection like 440V (P2P) Protection for 8 Hrs., High cut off @ 325±15V, Auto Restart, Surge protection 4KV internal and 10KV external. Manufacturer shall have inhouse lab approved by NABL or ministry of science of govt of India. LM 79 and LM80 reports need to be submitted from a NABL/UL accredited lab to verify above parameters. Both the fixture and Driver should have separate BIS approval.	No.	96
680	Badminton Court Supply, Installation, Testing and Commissioning of led Light 4 feet, 108W fixer badminton court with clamps. Length: 1220 mm Width: 260 mm Height: 62 mm Lumen: 120LM/W CRI > 80 PF: >0.9 CCT: 6000K Rated Volt: AC85-240V Frequency: 50-60HZ	No.	59

681	Entrance Porch LightingSupply, Installation, Testing and Commissioning of Suspended Light 15W made of Pressure die-cast aluminium heat sink for effective thermal management, sturdiness and excellent corrosion resistant fitted in white/Black finish Powder coated housing. PC Clear diffuser for glare free uniform light distribution along with Aluminum reflector to enhance the lumen output of the fixture. Powered by built-in, isolated, electronic LED driver (SMPS based constant current supply) with Output Short-circuit protection, Surge Voltage protection & other safety test as per IS:15885Part 2/Sec 13. Operating voltage range: 140 V - 270 V, Average life L70B50: 35000 hours, UGR<19@CCT 4000K. Beam angle 36Deg, Suystem Lumen 1200Lm, Dia 75MM, Height 150MM.	No.	10
682	Supply, Installation, Testing and Commissioning Lobby & Seating area Downlighter of LED indoor surface downlighter suitable for general lighting. Luminaire should have pressure die-cast Al housing with diffused optics. The luminaire should have CRI ≥ 80 and CCT of 6500K. The luminaire shall be compliant with IP20, IK02 classification.The fixture should have a minimum system efficacy of 110 lumen/Watt and a minimum system lumen output of 1500 lumens and maximum system wattage of 14 Watts. The luminaire shall be designed so as to ensure lumen depreciation of up to 30% over 30k burning hours @ design ambient temp 45 deg C. The electronic driver used shall have a power factor≥0.95 , THD ≤10%. Luminaire manufacture shall provide LM79 report from NABL/UL accredited lab & LM80 report issued by LED manufacturer. Both the fixture and Driver should be of same make & must have separate BIS approval.	No.	590
683	Supply of LED indoor surface downlighter suitable for general lighting. Luminaire should have pressure die-cast Al housing with diffused optics. The luminaire should have CRI ≥ 80 and CCT of 6500K. The luminaire shall be compliant with IP20, IK02 classification.The fixture should have a minimum system efficacy of 110 lumen/Watt and a minimum system lumen output of 1500 lumens and maximum system wattage of 14 Watts. The luminaire shall be designed so as to ensure lumen depreciation of up to 30% over 30k burning hours @ design ambient temp 45 deg C. The electronic driver used shall have a power factor≥0.95 , THD ≤10%. Luminaire manufacture shall provide LM79 report from NABL/UL accredited lab & LM80 report issued by LED manufacturer. Both the fixture and Driver should be of same make & must have separate BIS approval. Approved Make: Signify, cat ref. no. Sleek Surface Pro SM296C LED15S 6500 or equivalent.	No.	420
684	Reccessed Downlighters Supply, Installation, Testing and Commissioning recessed mounted 12W Round Shape Downlighter with high performance LEDs, suitable for mounting with Armstrong/Grid ceiling. pressure die-cast aluminium heat sink & PC diffuser in white powder coated finish with integral electronic low THD (<10%) LED driver. High efficiency long life LED package in integral module with lumen efficacy of >110 lm/W. Powered by an integrated driver, SELV Output electronic LED driver (SMPS based constant current supply) with Output Short-circuit protection, Surge protection & other reliability test. . CRI >80, SDCM<5, Color temperature 4000K, PF >0.95, IP20, IK03. Life class of 50,000 hrs @ L70, Operating Temperature: -10 TO +45 DEG.C; Input Supply Voltage Range:140-270 V, Frequency :50-60 HZ; Internal Surge Protection:3.5 KV; Protection: Reverse Polarity, Open & Short Circuit. DRIVER SAFETY REQUIREMENT STANDARDS: IS 15885-2-13, TEST REPORT TO BE SUBMITTED; PHOTO BIOLOGICAL SAFETY NORMS: IS 16108, TEST CERTIFICATE TO BE SUBMITTED; CERTIFICATION: LM 79 FOR LUMINAIRE LM 80 FOR LED SOURCE	No.	50
685	Reccessed 2' x 2' panel Supply, Installation, Testing and Commissioning of 36w 2x2 Panel recess mounting luminaire with high performance LEDs, suitable for Armstrong/Grid ceiling.CRCA powder coated white after phosphochromate treatment and High transmittance polystyrene opal diffuser.High efficiency long life LED package in integral module with System lumen efficacy of >115 lm/W and viewing angle of 120° to ensure better uniformity.Powered by an independent Isolated, SELV Output electronic LED driver (SMPS based constant current supply) with Output Short-circuit protection, Surge protection & other reliability test. Lumen Output of 4100 lm lumens.CRI >80, Color temperature 5700K, THD <10%, SDCM<5 and PF >0.95,IP20,Life class of 50,000 hrs @ L70, Operating Temperature:-10 TO +40 DEG.C; Input Supply Voltage Range:140-270 V, Frequency :50-60 HZ; Internal Surge Protection:3 KV; Protection : Reverse Polarity, Open & Short Circuit. DRIVER SAFETY REQUIREMENT STANDARDS :IS 15885-2-13 & CISPR15, TEST REPORT TO BE SUBMITTED; PHOTO BIOLOGICAL SAFETY NORMS: IS 16108, TEST CERTIFICATE TO BE SUBMITTED; CERTIFICATION: LM 79 FOR LUMINAIRE LM 80 FOR LED SOURCE.	No.	579

686	Surface mounted 2'x 2 panelSupply, Installation, Testing and Commissioning of 36w 2x2 Panel Surface mounting luminaire with high performance LEDs, suitable for Armstrong/Grid ceiling.CRCA powder coated white after phosphochromate treatment and High transmittance polystyrene opal diffuser.High efficiency long life LED package in integral module with System lumen efficacy of >100 lm/W and viewing angle of 120° to ensure better uniformity.Powered by an independent Isolated, SELV Output electronic LED driver (SMPS based constant current supply) with Output Short-circuit protection, Surge protection & other reliability test. Lumen Output of 4100 lm lumens.CRI >80, Color temperature 5700K, THD <10% and PF >0.95,IP20,Life class of 50,000 hrs @ L70, Operating Temperature:-10 TO +40 DEG.C; Input Supply Voltage Range:140-270 V, Frequency :50-60 HZ; Internal Surge Protection:3 KV; Protection : Reverse Polarity, Open & Short Circuit. DRIVER SAFETY REQUIREMENT STANDARDS :IS 15885-2-13 & CISPR15, TEST REPORT TO BE SUBMITTED; PHOTO BIOLOGICAL SAFETY NORMS: IS 16108, TEST CERTIFICATE TO BE SUBMITTED; CERTIFICATION: LM 79 FOR LUMINAIRE LM 80 FOR LED SOURCE	No.	600
687	Suspended Lighting Supply, Installation, Testing and Commissioning Pendent mounted Dayspace LED sidelit 2X2 panel with hollow space,made of CRCA housing with high efficiency single piece PC Diffuser. LED Used shall be SMD type and fixture should have minimum efficacy at System level ≥=90 lumens/watt with Minimum system Lumens 3600 & System wattage of 40W, Life of fixture : 50000 burning Hrs. @ L70B50 Lumen maintenance, CCT of 6500K (SDCM≤=5), CRI Ra ≥=80, THD≤10%, PF ≥0.95. Manufacturer shall have inhouse lab approved by NABL or ministry of science of govt of India. The product should be able to integrate into the ceiling to deliver soft and etheareal yet brilliant environment with very good vertical illuminance.The product should have provision of customizable back plate for creative freedom if required. LM 79 and LM80 reports need to be submitted from a NABL/UL accredited lab to verify above parameters. Both the fixture and Driver should have separate BIS approval.	No.	50
688	Squash court light Supply, Installation, Testing and Commissioning 36W LED with Linear with, minimum 3800 lumens Downligher luminaire made of Aluminum extruded housing in white powder coated finish and snap fit plastic moulded end caps, High transmittance PMMA opal profiled diffuser, control gear accessible and serviceable from bottom, suitable for standalone and continuous row mounting for endless line of light, High efficiency long life LED package in integral module with lumen efficacy > 110 Lm/W and viewing angle of 120° to ensure better uniformity.Powered by an integral isolated low THD electronic LED driver (SMPS based constant current supply) with output short circuit protection, surge protection. Fixture Efficacy> 100Lm/W, CRI >80, Color temperature 5700K, THD <10% and PF >0.90,IP20,IK03.Life class of 50,000 hrs @ L70, Operating Temperature:-10 TO +45 DEG.C; Input Supply Voltage Range:140-270 V, Frequency :50-60 HZ; Internal Surge Protection:3.5 KV; Protection : Reverse Polarity, Open & Short Circuit. DRIVER SAFETY REQUIREMENT STANDARDS :IS 15885-2-13, TEST REPORT TO BE SUBMITTED; PHOTO BIOLOGICAL SAFETY NORMS: IS 16108, TEST CERTIFICATE TO BE SUBMITTED; CERTIFICATION: LM 79 FOR LUMINAIRE LM 80 FOR LED SOURCE.	No.	113
689	Snooker Suspended lightSupply, Installation, Testing and Commissioning Wide 120mm x 33mm height Suspended 4ft continuous LED Channel Fixture Flatline Linear in rectangle form with hollow curved edges & high efficiency diffuser. LED Used shall be SMD type with Minimum system Lumens 2200 @19W/4ft length & efficacy upto 120lm/W,Life of fixture : 50000 burning Hrs. @ L70B50 Lumen maintenance, CCT of 4000K (SDCM≤=5), CRI Ra ≥=80, PF ≥0.95, UGR≤19, an Operating working temp range - 0°C ≤ Ta ≤ 45°C & operating Voltage Range of 140-270 V AC. Minimum Internal Surge Protection 4.0KV. The fixture design should be with flicker free operations ripple ≤5%, comply to IEC61000-3-2 ed.3.2, 2009 for Harmonics, IEC61347 -2 -13, 2006 in Conjunction with IEC61347-1 ed.2.0, 2007 for Electrical Safety, IEC62384 ed.1.1, 2011 for performance and IEC61547 ed.2.0, 2009, CISPR-15 for EMI/EMC. Manufacturer shall have inhouse lab approved by NABL or ministry of science of govt of India. LM 79 and LM80 reports need to be submitted from a NABL/UL accredited lab to verify above parameters. Both the fixture and Driver should have separate BIS approval. Dimension should be LBH = Multiple of 1200mm (As per design reqiurement) x 120mm x 33mm	No.	10
690	Installation, testing and commissioning of pre-wired, fluorescent fitting / compact fluorescent fitting of all types, complete with all accessories and tube/lamp etc. directly on ceiling/ wall, including connections with 1.5 sq. mm FRLS PVC insulated, copper conductor, single core cable and earthing etc. as required.	No.	72
691	supply ,installation, testing and commissioning of 1200 mm dia BLDC fan	Nos	30

692	Supplying installation,testing and commissioning of Passive Infrared(PIR) technology based occupancy sensor having high preformance, non regulating programmable type, suitable for connected load upto 10Amp, for mounting height up to 2.8 mtr and for 5 m diameter coverage area along with necessary fixing arrangements Vc programming at site etc. complete as required.	No.	20
693	**Data, voice & TV system**: Supplying and fixing of following sizes of steel conduit along with accessories in surface/recess including painting in case of surface conduit, or cutting the wall and making good the same in case of recessed conduit as required. 25mm	RM	200
694	Supplying and fixing of following sizes of steel conduit along with accessories in surface/recess including painting in case of surface conduit, or cutting the wall and making good the same in case of recessed conduit as required. 32mm	RM	100
695	Supplying and drawing UTP-CAT 6E LAN cable.	RM	5500
696	Supplying and fixing following size/ modules, GI box alongwith modular base & cover plate for modular switches in recess etc. as required. 1 or 2 Module (75 mmX75 mm)	No.	50
697	Supplying and drawing PVC flexible one pair telephone unarmoured tinned copper cable. 2 Pair	RM	150
698	Supplying fixing of Network Switches 24 Port 10/100 Switch	No.	1
699	Supplying fixing of Network Switches 8 Port 10/100 Switch	No.	1
700	Supplying & Fixing of Patch panel for LAN cabling 24 Port 101100 patch panel	No.	1
701	Supply, laying, including termination testing & commissioning of RG-11 co-axial cable of approved make for TV in existing conduit complete in all respect as required.	RM	180
702	**Fire Alarm System:** Supply, install, test and commissioning of addressable peer to peer Networkable analogue addressable type fire alarm control panel with minimum 1500 Character / 240X64 Pixel / 7inch Touchscreen graphic LCD display. The panel should be equipped with sufficient numbers of loop with 20% spare capacity, with each networkable intelligent fire alarm Control Panel having SLC with capacity of min 126 /240 detectors/ devices in any combination with key pad, dual flash-based microprocessor technology, inbuilt USB Port for upload and down load the configuration tools, RS232 serial port for direct PC or modem connection, inbuilt NAC's, min 20 programmable Zonal LEDs and operates on 240V AC + 10% with 50 Hz with built in charger. The panel shall have fire, fault relays, option of BMS integration MODBUS/ BACKNET, graphical software for provision of TCP/ IP modules, Remote Access, Class 'X' wiring with provision of both class 'A' and class 'B' wiring in the SLC circuit, user friendly with communication facility to monitor & control the FACPs from a single window. The panel shall be suitable for minimum of 5000 event record facility, event fetch from FACP facility and the single panel shall be suitable for min 2000 fire zones and 200 Panels/ Nodes in one network with all other accessories required to successfully run the system. (The System cost shall be included of all necessary cards, modules, Panel enclosure, CPU and associated accessories to complete the system design). Approval: VDS/UL/EN-54 Std.	No.	1
703	Supply, Installation , Testing & Commissioning† of Network Active Repeater Panel with 1500 Character / 240X64 Pixel / 7inch Touchscreen. The LCD shall Display all events / detectors, devices status of complete systems in the networked.† Approval: UL/VDS/EN54.	No.	3
704	Supply, install, test and commissioning of† analogue addressable Smoke Sensor detector and standard base (For Detectors/Device without inbuilt isolator, Fault Isolator or Isolator base to be provided with each detector/device) Approval: VDS/UL/EN54.	No.	300
705	Supplying, installation, testing & commissioning of fault isolator complete with base as required.	No.	28

706	Supply, install, test and commissioning of analogue addressable dual heat detector and standard base, It shall have multiple modes with min five different heat sensitivity adjustment from 57 Degree to 90 Degree for static response while working on Rate of Rise response. 360° Visible Tri-coloured led for Normal, Fault and alarm condition, addressing shall be by means of Soft addressing or dip switches or decade switches, or suitable punched cards. (For Detectors/Device without inbuilt isolator, Fault Isolator or Isolator base to be provided with each detector/device) Approval: UL/VDS/EN54.	No.	5
707	Supplying, installation, testing & commissioning of addressable beam detector with short circuit isolator (inbuilt or seperate) complete with emitter and receiver including connections with remote test features etc complete as required.	No.	8
708	Supplying, installation, testing & commissioning of addressable fire control module complete as required.	No.	55
709	Supply, install, test and commissioning of Analogue addressable Manual Call Point (Resettable Type) with inbuilt† isolator and LED indicator, designed for IP44 requirements and approved to operate in –10°C to +55°C temperature, complies with the essential requirement of the EMC Directive to be supplied with Barriers, Junction Box, Glands and other mounting accessories for proper installation. (For Detectors/Device without inbuilt isolator, Fault Isolator or Isolator base to be provided with each detector/device) Approval: VDS.	No.	40
710	Supply, Installation, Testing & Commissioning of Analogue Addressable loop powered Sounder & Beacon† with inbuilt isolator and† having Min 15 distinct sound patterns/ multitone to indicate Exit doors and direct occupants for safe and fast evacuation and 100dB output with minimum 1Hz Frequency flash rate designed for IP65 requirements and approved to operate in –10°C to +55°C temperature, complies with the essential requirement of the EMC Directive to be supplied with Junction Box, Glands and other mounting accessories for proper installation. (For Detectors/Device without inbuilt isolator, Fault Isolator or Isolator base to be provided with each detector/device) Approval: VDS/UL/EN54.	No.	40
711	Supplying, installation, testing & commissioning of fire fighter telephone handset complete as required.	No.	40
712	Supplying, installation, testing & commissioning of 1.5/3/6W metal box ceiling/wall speakers complete as required.	No.	400
713	Supplying & laying of 2x1.5 sqmm fire survival armoured cable, 600/1000V rated with annealed copper conductor having glass mica fire barrier tape covered by an extruded layer of Cross Linkable Ethylene Propylene Rubber (EPR) insulation and LSZH inner bedding, steel wire armouring & LSZH outer sheath complete as required.	RM	5,500
714	Supply & Laying of Speaker Cable 2 Pair ,2core -1.5Sqmm	RM	4,000
715	Supplying and fixing 25 mm dia MS flexible pipe with PVC coating along with all ancillaries and accessories like coupler etc. as required.	RM	1,000
716	Supply, installation, testing and commissioning of the Analog addresable Photoelectric Multicriteria detector with mounting based LED, address switch to programme the detectors complete as required.	No.	5
717	Supply, install, test and commissioning of Analogue addressable Monitor Cum Control (Input/Output) module (1+1) with inbuilt relay and isolator with LED indicator, approved to operate in –10°C to +55°C temperature, complies with the essential requirement of the EMC Directive to be supplied with Junction Box, Glands and other mounting accessories for proper installation. In case of Manufacturer with single Input or Output module need to supply One quantity of each for line item. (For Detectors/Device without inbuilt isolator, Fault Isolator or Isolator base to be provided with each detector/device) Approval: EN54.	No.	50
718	**UPS System**: Supplying, erecting, testing & commissioning of ON-LINE UPS system suitable for operation on 230V, 50Hz, A/C supply, with isolation transformer all accessories complete and Excluding batteries and wiring complete. 10 kVA ON LINE UPS	Set	4
719	Supplying, installation, testing & commissioning of 12V DC, AH batteries in poly propylene container for U.P.S. Sealed maintenance free batteries. 26 AH capacity	Set	32
720	Supplying, installation, testing & commissioning of 12V DC, AH batteries in poly propylene container for U.P.S. Sealed maintenance free batteries. 42 AH capacity	Set	40

721	**External and facade lighting system: Projector Light** The housing in light weight, made of high strength die cast aluminium and coated by static powder making it weather resistant.Protection screen in clear tempered glass with high impact resistance 25-30W, LED,3000k, IP 66. High precision dial ensures precision angle adjustment.Premium thermal management by high heat conductivity aluminum alloy and thermal fins. Pure Polyester powder coating in Standard Grey Colour. Precise structure and multi-protection silicon rubber seal guarantees the fixture IP66 rated. Height – 122mm, Dia.-170mm, Weight - 2Kgs. Power LED Module with high efficacy LED's,on Printed Circuit Board with metal core plate.,Electronic Power Supply for LED Module,which offers Protection against Short Circuit, Over- Voltage & Over- Current, with in-built surge protection.Lens made of PC which should offer wide range of narrow,medium & wide beam angles. Estimated LED Lifetime is L70-100,000 hours minimum.LM80 report from LED Manufacturer should be submitted. BIS test report with Name of Manufacturer should be same as the brand proposed,as per IS10322 from Intertek/UL lab & BIS Certificate with Name of Manufacturer should be same as the brand proposed, should be submitted. Minimum Light fixture Lumen output is 2200Lumens. Sample Should be submitted for concerned engineer incharge for approval of light fixture.	Nos.	21
722	**Circular Ground Buried Uplight** Body made made of die cast aluminium using pressure die casting process.Protection screen in clear tempered glass with high impact resistance 15-20W,LED,3000k, IP 67. Pure Polyester powder coating in Standard Grey Colour. Precise structure and multi-protection silicon rubber seal guarantees the fixture IP67 rated. Dia.–210mm, Height.-120mm, Weight - 2.4Kgs. Power LED Module with high efficacy LED's, on Printed Circuit Board with metal core plate. Lens made of PC which should offer wide range of narrow,medium & wide beam angles. Estimated LED Lifetime is L70-50,000 hours minimum.LM80 report from LED Manufacturer should be submitted.Minimum Light fixture Lumen output is 1200Lumens. Sample Should be submitted for concerned engineer incharge for approval of light fixture.	Nos.	44
723	**Linear Wall Washer** The housing in light weight, made of high strength aluminium and coated by static powder making it weather resistant.Protection screen in clear tempered glass with high impact resistance 25-30W,LED,3000k, IP 66. High precision dial ensures precision angle adjustment. Pure Polyester powder coating in Standard Grey Colour. Precise structure and multi-protection silicon rubber seal guarantees the fixture IP66 rated. Length-1000mm,Height – 66mm, Width.-64mm, Weight - 3.95Kgs. Power LED Module with high efficacy LED's, on Printed Circuit Board with metal core plate. Lens made of PC which should offer wide range of narrow,medium & wide beam angles. Estimated LED Lifetime is L70-100,000 hours minimum.LM80 report from LED Manufacturer should be submitted.BIS safety test report with manufacturer name same as brand proposed, as per IS10322 from Intertek/UL lab & BIS Certificate with manufacturer name same as brand proposedshould be submitted. Minimum Light fixture Lumen output is 1600Lumens. Sample Should be submitted for concerned engineer incharge for approval of light fixture.	Nos.	40
724	**Landscape LightingPole Top Light**Light fixture body made of Die cast aluminium using pressure die-casting process 115-125W, Power Module LED, 3000K. Protective Screen in PC(IK08).Hole for coupling on pipes Ø 60 mm, for lateral installation.Pure Polyester Powder Coating in Grey Colour. Silicone gasket enusures the IP protection. IP Rating - IP 66. Height – 87mm,Length-567mm,Width - 233mm,Weight – 2.35Kgs. Power LED Module with high efficacy LED's on Printed Circuit Board with metal core plate.Colour Rendering Index: Ra > 70. Electronic Power Supply for LED Module, which offers Protection against Short Circuit, Over- Voltage & Over- Current, with in-built surge protection. Estimated LED Lifetime is L70 @ 100,000 hours@Ts 85°C minimum. LM80 report from LED manufaturer should be submitted.The Light fixture shall be in compliance with IEC 60598/IS 10322-Supporting Test Report from UL/UL Authorised/3rd party NABL aboratory should be submitted along with BIS Certificate with manufacturer name same as brand proposed.Light Fixture Sample should be submitted for approval from concerned engineer-in charge.	Nos.	15

725	**6M HEIGHT DOUBLE ARM ARCHITECTURAL POLE** 6M Height Twin arm pole made in combination of mild steel pipe sections of 89mm dia. and Bracket of 60mm dia with horizontal length of 500mm. The pole to be provided with a suitable size steel base plate. This mounting steel base plate along with foundation bolts of suitable size to be used for ensuring firm grouting into the specially designed RCC foundation. After Fabrication, Entire Pole is hot dip galvanized (60 microns Minimum) for the effective corrosion resistance. The hot dip Galvanised pole should be provided with an inbuilt junction box to fix 32A connectors and 6A MCB, at the bottom - the inbuilt box should have a flush door of suitable size. wind pressure calculation as per IS 875(part-3) & structural calculation report as per EN40 should be submitted to verify the pole strength. Entire pole shall be made to provide pleasing aesthetics as approved by Concerned Engineer in-charge. Pole & it's parts are painted in 3 layer coating(coating thickness-100 microns minimum) in which 1st layer with etch primer, 2nd layer with epoxy primer & 3rd final layer with PU paint.	Nos.	15
726	ARCHITECTURAL 4M POST TOP POLE 4M height post top Pole Made of mild steel pipe sections 114mm dia. & 76mm dia. Entire pole shall be made to provide pleasing aesthetics as approved by Concerned Engineer in-charge. After Fabrication, Entire Pole is hot dip galvanized(60 microns Minimum) for the effective corrosion resistance . The hot dip Galvanised pole should be provided with an inbuilt junction box to fix 32A connectors and 6A MCB, at the bottom - the inbuilt box should have a flush door of suitable size. The pole to be provide with suitable size base plate. This base plate along with foundation bolts of suitable size to be used for ensuring firm grouting into the specially designed RCC foundation. wind pressure calculation as per IS 875(part-3) & structural calculation report as per EN40 should be submitted to verify the pole design. Pole and its parts are painted in 3 layer coating(coating thickness-100 microns minimum) in which 1st layer with etch primer, 2nd layer with epoxy primer & 3rd final layer with PU paint - customised colour Metallaic NERI Grey. ARCHITECTURAL 4M POST TOP POLE/DW Windsor/GHM	Nos.	20
727	LIGHT FIXTURE 20-30W Power Module LED, 3000K Upper part in circular shape & Lower part in "V" shape,both are in single piece made of die-cast aluminum using pressure die casting process 20-30W Power Module LED, 3000K. manufacturer name/logo should be embosed on the body. Prismatic screen in Flat tempered glass. Pure polyester powder coating in customised colour Metallaic Grey. Silicone gasket ensures the IP Rating - IP 66. Height – 500mm,Diameter - 420mm,Weight -8Kgs., Area Exposed to Wind(S) - 0.08 m2 Power LED Module with Company /brand name printed on PCB with the metal core plate, in compliance with IEC 62031.LED Chips of CREE/NICHIA/OSRAM/LUMILEDS make- same should be supported by LED manufacturer's tech sheet . Colour Rendering Index: Ra > 70. Electronic Power Supply for LED Module, which offers Protection against Short Circuit, Over- Voltage & Over- Current, with in-built surge protection a minimum of 4kV (an additional surge protection device of 10kV also provided in-built the fixture). Optics with refractive lens in PMMA which offers Type II/III/IV/V distribtuion.LED Lifetime @L90 >1,00,000hours@Ts 85°C. LM 80 report & TM 21 calculation should be submitted to support the same.The Light fixture shall be in compliance with IEC 60598/IS 10322(Supporting Test Report from UL/UL Authorised/Intertek Laboratory should be submitted. Sample should be submitted for approval from concerned engineer-in charge.	Nos.	20
728	**BOLLARD-**The Bollard suitable for on ground installation,is made of 3mm thick(minimum) extruded aluminium pipe 10-15W,LED Module, 3000K, IP65. Top cover(156mm dia.,8mm thick & weight-0.7Kgs.) with company name/logo engraved is made of die cast aluminium in single piece. It's screen made of acrylic with high impact resistance,in single piece. Pure polyester powder coating in Standard Grey Colour. IP Rating - IP 65.Height – 1000mm, Dia - 127mm LED Module on Printed Circuit Board with metal core plate.Colour Rendering Index: Ra > 70.Electronic Power Supply for LED Module, which offers Protection against Short Circuit, Over-Voltage & Over- Current. Estimated LED Lifetime L80 @50,000 hours minimum.	Nos.	24
729	Wall Recessed Light, 8-10W,LED,3000k, Body-Die-casting aluminium Body with screen in tempered glass.Body colour-RAL 9005 Matt, Dimension-260mm(L)x245mm(H)x60mm(D),Weight-0.8kg. Electronic Driver which offers Protection against Short Circuit, Over-Voltage & Over- Current, IP 65 protection,CRI > 70,Estimated Lifetime-L70 @ 50,000hours minimum.LM80 report from LED Manufacturer should be submitted.Sample should be submitted for approval from concerned engineer-in charge.	Nos.	10

730	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 4 core 6 sq.mm Cu arm.	RM	200
731	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 3 core 6 sq.mm Cu arm.	RM	400
732	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 3 core 4 sq.mm Cu arm.	RM	150
733	Supplying of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification complete in all respect as required as per site conditions. 3 core 2.5 sq.mm Cu arm.	RM	350
734	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size in the existing RCC/ HUME/ METAL pipe as required. Upto 35 sq. mm	RM	1100
735	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured cables of 1100 volt grade including supplying and fixing of bimettalic crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 4 core 6 sq.mm Cu arm.	No.	15
736	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured cables of 1100 volt grade including supplying and fixing of bimettalic crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 3 core 10 sq.mm Cu arm.	No.	15
737	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured cables of 1100 volt grade including supplying and fixing of bimettalic crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 3 core 4 sq.mm Cu arm.	No.	20
738	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed Aluminium / copper conductor armoured cables of 1100 volt grade including supplying and fixing of bimettalic crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 3 core 2.5 sq.mm Cu arm.	No.	40
739	Providing, laying and fixing following dia RCC pipe NP2 class (light duty) in ground complete with RCC collars, jointing with cement mortar 1:2 (1 cement : 2 fine sand) including trenching (75 cm deep) and refilling etc as required. 100 mm dia	m	20

740	**Feeder Pillar (For External Landscape lighting)** IP 55 for outdoor ProtectionIncomer63 Amps 4 pole MCB, Photocell SensorBus Bars100 Amps TPN Aluminium bus bars with heat shrinkable insulation sleeve. - 1 SetOutgoing40 Amps 4 pole MCB incomer with 40 Amps TP contactor 0-24 hours timer auto / manual and outgoings including 10 No. 10/16/20 Amps SP MCB with 3 Nos. 32 Amps DP RCCB's of 30 mA leakage current with separate neutral link of each phase- 1 set (33%)40 Amps 4 pole MCB incomer with 40 Amps TP contactor 0-24 hours timer auto / manual and outgoings including 10 No. 10/16/20 Amps SP MCB with 3 Nos. 32 Amps DP RCCB's of 30 mA leakage current with separate neutral link of each phase- 1 set (33%)40 Amps DP MCB - 3 set63 Amps 4 Pole MCB - 3 setDesign, fabrication, assembling, wiring and supply, installation, testing and commissioning of Distribution Panels fabricated out of (load bearing member of 2mm and non load bearing member 1.6 mm thick) CRCA sheet steel in cubicle compartmentised modular 3b construction, free standing floor mounted with bottom cable entry, dust and vermin proof with reinforcement of suitable size angle iron, channel, `T' sections and / or flats wherever necessary. 3 mm thick cable gland plates shall be provided at the bottom of the panels with appropriate stand etc. Panels shall be treated with all anticorrosive process before powder coating as per specifications and final approved shade. 2 Nos. earthing terminals shall be provided for all distrtibution panels. Panels shall be suitable for 415V, 3 phase, 4 wire, 50 HZ supply system. Lifting hooks shall also be provided in case of large panels. Approval shall be taken for each panel in the form of shop drawings before fabrication. Galvanised hardwares with zinc passivation shall be used in fabrication of panels.	No.	1
741	Supply, installation, testing and commissioning of 63 Amps 4 Pole Industrial socket outlet with MCB including Outdoor duty Polycarbonate enclosure of approved make (IP 68).	No.	2
742	Supply, installation, testing and commissioning of 40 Amps DP Industrial socket outlet with MCB including Outdoor duty Polycarbonate enclosure of approved make (IP 68).	No.	2
743	**IP CCTV System:** Supply, installation, testing and commissioning of indoor UL Listed IP N/W colour dome camera, 1/3" CCD / CMOS sensor, 1.3 MP resolution, varifocal 3-10 mm lens, Auto Iris, Day Night cameras, Vandal Proof & Motion detection, POE, (high resolution cameras / 4CIF / 25 FPS) ONVIF compliant complete with IP 55 Dome Housing, Connectors, Lens, Camera Mounts, Power Supply, I/O and all Ancillary Equipment & all accessories.	No.	135
744	Supply, installation, testing and commissioning of Outdoor (IP 66) UL Listed IP PTZ type colour camera,1/3" CCD/CMOS sensor, 1.3 MP resolution, varifocal 3-10 mm lens , Auto Iris, Day Night cameras, Vandal Proof & Motion detection,ONVIF compliant POE, complete with IP 55 Dome Housing, Connectors, Lens, Camera Mounts, Power Supply, I/O and all Ancillary Equipment & all accessories.	No.	3
745	Supply, installation, testing and commissioning of Layer 2 managed switch with 24 ports (RJ-45), POE as to support all cameras 15% spare ports complete with supply. The switch shall have 1 GB port to communicate with other switches including Passive components inbuilt 2 SFP ports including SFP modules, POE compliant ports, rack mountable, SMPS power supply & other termination accessories (Like Pigtails/ LIUs/Convertors/Splicing equipment , Patch panel, Patch Cord Etc) complete as per specifications and as required.	No.	3
746	Supply, installation, testing and commissioning of Layer 3 managed switch with 24 ports (RJ-45), POE as to support all cameras 15% spare ports complete with supply. The switch shall have 1 GB port to communicate with other switches including Passive components inbuilt 2 SFP ports including SFP modules, POE compliant ports, rack mountable, SMPS power supply & other termination accessories (Like Pigtails/ LIUs/Convertors/Splicing equipment , Patch panel, Patch Cord Etc) complete as per specifications and as required.	No.	3
747	Supply, Installation, Testing and Commissioning of UL listed Network Video Recorder including data base server for recording real time audio - video and data applications for 140 Cameras, of suitable Raw Capacity, capability to eliminate Single Points of Failure, redundant Power Supplies, redundant fans, .The NVR storage should store all cameras at 1.3 MP resolution for minimum 30 days backup @25 FPS,complete as per specifications and as required. The NVR shall be compatible with ONVIF compliant cameras. the required hardware and the software with operating system, video management client viewing license for 3 User for monitoring of all camera simultaneously complete as per specifications and as required.	No.	1
748	Supply, installation, testing and commissioning 21" LCD Screen including all required accessories complete as per specifications and as required.	No.	10
749	Supply, installation, testing and commissioning of video management client workstations as required including 21" LCD, keyboard, mouse, and all required accessories complete as per specifications and as required. The licence support shall be for life time.	No.	2
750	Supply, laying, connecting , testing and commissioning of un-armoured 6C Single Mode Optic Fibre Communication Cable including required terminations, Junction Box, Connectors, LIU, SFP, Pigtails, Cable tie`s & Tags including MS conduit as per specification and as required.	RM	60

751	Supply and fixing of following sizes of steel conduit alongwith the accessories in surface/recess including painting in case of surface conduit or cutting the wall and making good the same incase of recessed conduit as required. 20mm dia	RM	500
752	Supply and fixing of following sizes of steel conduit alongwith the accessories in surface/recess including painting in case of surface conduit or cutting the wall and making good the same incase of recessed conduit as required. 25mm dia	RM	500
753	Supplying and drawing Flexible Multicore Cable manufactured with electrolytic grade flexible copper with low conductor confirming to IS 8130-1984 and (Virgin) PVC insulation sheathed suitable for working voltage upto 1100V as per IS-694:2010 2C X 1.5 mm2	RM	1800
754	**Solar PV Plant**: Supply, Installation, Testing and Commissioning of ongrid Solar Photovoltaic Power Plant conforming to MNRE specifications as amended, consisting of Mono/Poly Crystalline silicon solar cells, net metering facility, necessary protections, earthing, mounted on Aluminium/GI structure of suitable strength with following components complete as required:- a) Solar Photovoltaic Module of capacity 330 Wp or above , manufactured in India, conforming to IS 14286/IEC 61215, IS/IEC 61730-Part-1, IS/IEC 61730-Part-2. Solar Photovoltaic Module conversion efficiency shall not be less than 16.5%. PV modules used in solar power plants/ systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years. b) Power Conditioning Unit (PCU) of 350-800 V DC Input voltage range and 400 V AC, three phase, 4 wire, 50Hz +/- 2.5 Hz, output voltage suitable to generate AC Power with efficiency not less than 97%, total harmonic distortion less than 3% and suitable for ambient temperature from 0 to 50 degree C. The PCU shall adjust the voltage and frequency level to suit the Grid Voltage Frequency. c) Data Monitoring System complete with accessories. d) Fixing of Array junction box & Main junction box with IP 65 protection and termination arrangement for incoming and outgoing cable along with glands, lugs and other accessories etc. as required. e) Lightning and surge voltage protection. f) Connections & Interconnections by supplying & fixing required size XLPE insulated copper conductor 1.1 kV grade armoured power and control cables between solar modules, main power cable to grid supply PCU unit along with supplying & fixing of necessary channel/conduit lugs and other accessories etc. as required.	kWp	200
755	**Compact Substation (CSS)** for 1250 KVA Transformer Design, manufacture and supply, unloading and shifting to store, installation in correct aligned position, testing and commissioning of 11 / 0.415 KV compact package sub station comprising :- 1 No 11 KV 630 A compact SF6 RMU (2 No cable isolating switch & one tap off VCB)-1 No. **1250 kVA** 11 / 0.415 KV Dry type transformer, percentage impedance Z= 5%, copper wound with Dyn11 connection and neutral brought out for earthing. The transformer shall be provided with (–) 15% and (+) 5% OFF load tap changer with RTCC Panel on HT side. HT side cable termination box shall be suitable for 11 KV, 3C x 240mm2 XLPE cable and LT side terminal box shall be suitable for terminating cables / Busduct. The transformer shall be supplied all standard fitting viz dial type oil and winding temperature indicator, all alarm contacts, thermistors for Alarm and Trip, winding temperature relay unit with Alarm and trip, Provision for remote metering for winding temperature, indications for all units, lifting lugs, earthing studs and marshlling box including some spare parts etc. complete in all respect as required as per specification. Transformer's 'No load losses' & 'Full Load Losses" shall be as per latest ECBC.'-LT panel consisting of 1 no. 2000 Amp 4 Pole ACB as incomer Package sub-station shall be complete in all respect as required as per site requirements. Note : The rate shall also include the following :Supporting rigid frame work.All fixing accessories such as foundation bolts, nuts and bolts etc as required.Touching up all damaged paint with approved paint shade.Interlocking shall be provided between transformer and VCB HT breaker panel. When transformer open respective HT breaker shall be tripped.Degree of protection for transformer enclosure shall be outdoor dutyProvision shall be made to be hooked up with BAS for status indication. All protection relays shall be microprocessor based.	Set	1

756	**HT Cable:** Supplying of following 11 kV grade XLPE insulated Aluminium conductor armoured cables as per specifications complete in all respect as required as per site condition. 3 core 240 sq. mm Al arm (E)	RM	1000
757	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 11KV grade of following size direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc as required. 3 core 240 sq. mm Al arm (E)	RM	1000
758	Supplying and making indoor cable end termination with heat shrinkable jointing kit complete with all accessories including lugs suitable for following size of 3 core, XLPE aluminium conductor cable of 11 KV grade as required : 3 core 240 sq. mm Al arm (E)	Set	2
759	Supplying and making Straight Through cable Jointing with heat shrinkable jointing kit complete with all accessories including ferrules suitable for following size of 3 core, XLPE aluminium conductor cable of 11 KV grade as required : 3 core 240 sq. mm Al arm (E)	Set	2
760	Supplying and laying of following size DWC HDPE pipe ISI marked along with all accessories like sockets ,bends coupler etc. conforming to IS 14930 part II Complete with fitting & cutting ,jointing etc.direct in ground (75cm below ground level) including excavation and refilling the trench but excluding sand cushioning and protective covering etc complete as required (for HT Line 900mm below ground level & 20% extra cost included in DSR Rate) 200 mm Dia (OD -200mm & ID -175 mm nominal)	RM	1000
761	Supply, installation, testing and commissioning of 100AH capacity 24 volts DC hermetically sealed maintenance free lead acid batteries duly charged including battery charger unit with provisions of Boost Charing, and Float charging. Suitable for 240 V, including DC DB single phase + 10% AC, 50 Hz supply as per specifications .	Set	1
762	Supply & Laying of non skid Electro mat 1mtr wide and 2.5 mm thick 11KV grade IS 15652 as required including cutting to required length complete as per requirement of local electricity authorities.	RM	30
763	Supply and fixing in position the approved “Shock Treatment Charts” written in English and Local Language. These charts shall be framed in teak wood frame and covered with glass.	No.	20
764	Providing and fixing H.T. danger notice plate of 250 mm X 200 mm, made of mild steel, at least 2 mm thick, and vitreous enameled white on both sides, and with inscription in single red colour on front side as required.	No.	4
765	Supply and fixing position the approved single line diagram framed in 1000 x 100 mm size glass frame and installed in main LT Panel Room.	No.	1
766	Supply of tool kit, first aid box with all accessories required for operation and maintainence for 415 volt & 11 kV equipment with 1 pair 11 kV rubber hand gloves of approved make.	No.	1
767	Supply and fixing cable route marker with 10cm X 10cm X 5mm thick G.I plate with iscription there bolted / welded to 35mm X 35mm X 6mm angle iron, 60cm long and fixing same in ground as required	No.	25

768	**DG Set and Accesories**: Supplying, installing, testing and commissioning of Diesel Generator set **500 kVA/400 kW** with following specifications. Power rating as per standard reference condition as per-BS 5514/ISO 3046/ ISO 8528 & IS 1002/ISO 3046 Generator set specifications. Engine: Diesel generating set are rated at 1500RPM and conform to ISO 8528 specifications. The engines are radiator cooled, four stroke and multi cylinder, conforming to ISO 3046. The scope of supply includes: Electrical starter motor12V DC Battery charging alternator, Bosch fuel system with electronic governor, A1 Class. Spin-on lube oil filter, Spin-on dual fuel filter with water separator, Turbocharger, Charge air cooler, Silencer (Hospital grade), Dry type air cleaner, Shutoff coil, Flywheel and flywheel housing, First fill of lube oil and coolant, Safety for low lube oil pressure, Safety for high water temperature, Permissible overload of 10% for one hour in 12 hours of operation Capacity of Fuel Tank: Fuel tank suitable for 8 hours of operation Alternator: Alternator is suitable for operation at 1500 RPM, 415 V, 0.8 pf (lag) suitable for 50 Hz, 3 phase, 4 wire systems, conforming to IS/IEC 60034-1. The Alternator is brush less type, screen protected, revolving field, self excited, self regulated through an AVR. The alternator shall have± 1.0% Voltage regulation (max) in static conditions- IP: 23 protections with insulation class F&H. Mounting arrangement: Engine and alternator are mounted on a common MS fabricated base frame with AVM pads. Control Panel: The control panel is manufactured with 14/16 gauge CRCA sheet and is powder coated for weather-proof and long lasting finish. The control panel consists of the following parts:- PS0500 Controller, Aluminium bus bars with suitable capacity within/outgoing terminals, Indicating lA for 'Load On' and 'Set Running', Instrument fuses duly wired and ferruled, MCCB of suitable rating with overload and short circuit protections. Genset Controller: microprocessor based generator set monitoring and control system. The control provides a simple operator interface to the generator set, manual and remote start/ stop control, shutdown fault indication, and an LCD hour counter. The integration of all functions into a single control system provides enhanced reliability and performance compared to conventional generator set control systems. This control has been designed and tested to meet harsh environment in which gensets are typically applied. Features, Functions, protections 16 character x 2 line alphanumeric LCD display with LED Backlight Operator interface, Provide a record of most recent fault conditions. Fault history stored in the control non volatile memory, Provide Alternator Data. Voltage (1 ph or 3 ph line to line and line to neutral voltage, Current (1 ph or 3 ph), kVA (3 ph and total), Frequency, Provide Engine Data, Starting battery voltage, Engine running hours, Engine Temp, Engine oil pressure, Control includes provision for Service adjustment and calibration of DG control functions, Voltage, frequency selection, Configurable input and output set up, Meter calibration, Engine controls, Power Start operates on 12 V DC batteries,-Auto start mode accepts a ground signal from remote devices to automatically start the DG set The remote start will also wake up the control system from sleep mode. Engine Starting -The control system supports automatic engine starting, Primary and back up start disconnects are achieved by battery charging alternator feedback or main alternator output frequency. Controller provide configurable time delay of 0-300 sees to start after remote start signal and time delay of 0- 600secs prior to shut down after stop signal. Sleep mode increase battery life. Configurable current settings from low to minimize current draw when genset is not working. Engine Protective functions include, Configurable alarm output, Emergency stop: Annunciated whenever an emergency stop signal is received by the control. Low lube oil pressure warning and Shutdown, High engine water temp warning / Shutdown, Low .coolant temp warning, Sensor failure indication, Low and high battery voltage warning, Weak battery warning, Fail to start shut down, Cracking lockout: Control will not allow the starter to engage or to crank the running engine Cyclic cranking: Configurable for the number of starting cycle, (1 to 7) and duration of crank and rest periods. Alternator Protective functions includes, - High and Low AC voltage shut down, Under and Over frequency shutdown / warning, Loss of sensing voltage input shut down. Acoustic enclosure: The acoustic enclosure shall be made of 1.6 mm thick CRCA sheets in suitable approved shade and a structural/ sheet metal base frame painted in black. The walls of the enclosure are insulated with fire retardant foam so as to comply with the 75dBA at 1 m sound levels specified by Ministry of Environment & Forest The enclosure has the following features: Specially designed to meet stringent MOEF/CPCB norms of 75dBA @ 1 m at 75% load under free field conditions, Two point lifting for easy handling at customer site, Designed to have optimum serviceability, Air inlet louvers specially designed to operate at rated load made on special purpose CNC machines for consistency in quality and workmanship, Powder coated for long lasting service life and superior finish, With UV resistant powder coating, can withstand extreme environment, Use of special hardware for longer life, Insulation material meets exacting IS 8183 specifications for better sound attenuation, Flush styling - no projections, Fluid drains for lube oil and fuel, Fuel filling point inside the enclosure. The complete set shall have sufficient safety and adhere to NEC, NBC 2016, IEC, CPWD specifications, PCB norms and KSGEI Acts and Rules.	Set	1

769	Supplying, installing, testing and commissioning of Diesel Generator set **750 KVA/ 600 KW** with following specifications. Power rating as per standard reference condition as per-BS 5514/ISO 3046/ ISO 8528 & IS 1002/ISO 3046 Generator set specifications. Engine: Diesel generating set are rated at 1500RPM and conform to ISO 8528 specifications. The engines are radiator cooled, four stroke and multi cylinder, conforming to ISO 3046. The scope of supply includes: Electrical starter motor12V DC Battery charging alternator, Bosch fuel system with electronic governor, A1 Class. Spin-on lube oil filter, Spin-on dual fuel filter with water separator, Turbocharger, Charge air cooler, Silencer (Hospital grade), Dry type air cleaner, Shutoff coil, Flywheel and flywheel housing, First fill of lube oil and coolant, Safety for low lube oil pressure, Safety for high water temperature, Permissible overload of 10% for one hour in 12 hours of operation Capacity of Fuel Tank: Fuel tank suitable for 8 hours of operation Alternator: Alternator is suitable for operation at 1500 RPM, 415 V, 0.8 pf (lag) suitable for 50 Hz, 3 phase, 4 wire systems, conforming to IS/IEC 60034-1. The Alternator is brush less type, screen protected, revolving field, self excited, self regulated through an AVR. The alternator shall have± 1.0% Voltage regulation (max) in static conditions- IP: 23 protections with insulation class F&H. Mounting arrangement: Engine and alternator are mounted on a common MS fabricated base frame with AVM pads. Control Panel: The control panel is manufactured with 14/16 gauge CRCA sheet and is powder coated for weather-proof and long lasting finish. The control panel consists of the following parts:- PS0500 Controller, Aluminium bus bars with suitable capacity within/outgoing terminals, Indicating lA for 'Load On' and 'Set Running', Instrument fuses duly wired and ferruled, MCCB of suitable rating with overload and short circuit protections. Genset Controller: microprocessor based generator set monitoring and control system. The control provides a simple operator interface to the generator set, manual and remote start/ stop control, shutdown fault indication, and an LCD hour counter. The integration of all functions into a single control system provides enhanced reliability and performance compared to conventional generator set control systems. This control has been designed and tested to meet harsh environment in which gensets are typically applied. Features, Functions, protections 16 character x 2 line alphanumeric LCD display with LED Backlight Operator interface, Provide a record of most recent fault conditions. Fault history stored in the control non volatile memory, Provide Alternator Data. Voltage (1 ph or 3 ph line to line and line to neutral voltage, Current (1 ph or 3 ph), kVA (3 ph and total), Frequency, Provide Engine Data, Starting battery voltage, Engine running hours, Engine Temp, Engine oil pressure, Control includes provision for Service adjustment and calibration of DG control functions, Voltage, frequency selection, Configurable input and output set up, Meter calibration, Engine controls, Power Start operates on 12 VDC batteries,-Auto start mode accepts a ground signal from remote devices to automatically start the DG set The remote start will also wake up the control system from sleep mode. Engine Starting -The control system supports automatic engine starting, Primary and back up start disconnects are achieved by battery charging alternator feedback or main alternator output frequency. Controller provide configurable time delay of 0-300 sees to start after remote start signal and time delay of 0- 600secs prior to shut down after stop signal. Sleep mode increase battery life. Configurable current settings from low to minimize current draw when genset is not working. Engine Protective functions include, Configurable alarm output, Emergency stop: Annunciated whenever an emergency stop signal is received by the control. Low lube oil pressure warning and Shutdown, High engine water temp warning / Shutdown, Low .coolant temp warning, Sensor failure indication, Low and high battery voltage warning, Weak battery warning, Fail to start shut down, Cracking lockout: Control will not allow the starter to engage or to crank the running engine Cyclic cranking: Configurable for the number of starting cycle, (1 to 7) and duration of crank and rest periods. Alternator Protective functions includes, - High and Low AC voltage shut down, Under and Over requency shutdown / warning, Loss of sensing voltage input shut down. Acoustic enclosure: The acoustic enclosure shall be made of 1.6 mm thick CRCA sheets in suitable approved shade and a structural/ sheet metal base frame painted in black. The walls of the enclosure are insulated with fire retardant foam so as to comply with the 75dBA at 1 m sound levels specified by Ministry of Environment & Forest The enclosure has the following features: Specially designed to meet stringent MOEF/CPCB norms of 75dBA @ 1 m at 75% load under free field conditions, Two point lifting for easy handling at customer site, Designed to have optimum serviceability, Air inlet louvers specially designed to operate at rated load made on special purpose CNC machines for consistency in quality and workmanship, Powder coated for long lasting service life and superior finish, With UV resistant powder coating, can withstand extreme environment, Use of special hardware for longer life, Insulation material meets exacting IS 8183 specifications for better sound attenuation, Flush styling - no projections, Fluid drains for lube oil and fuel, Fuel filling point inside the enclosure. The complete set shall have sufficient safety and adhere to NEC, NBC 2016, IEC, CPWD specifications, PCB norms and KSGEI Acts and Rules.	Set	1
770	Supply, installation, testing and commissioning of following MS piping heavy duty, along with bends as per thickness mentioned for exhaust system as per IS: 3589 and 1239 (Part-I) amended and revised to date including all accessories as required at site. 200 mm NB ERW MS pipe Heavy duty type	RM	60
771	Supply, installation, testing and commissioning of following MS piping heavy duty, along with bends as per thickness mentioned for exhaust system as per IS: 3589 and 1239 (Part-I) amended and revised to date including all accessories as required at site. 300 mm NB ERW MS pipe Heavy duty type	RM	45
772	Supply and fixing of SS Bellows including flanges, nut, bolts as required for following sizes 200 mm dia	Nos	2
773	Supply and fixing of SS Bellows including flanges, nut, bolts as required for following sizes 300 mm dia	Nos	1

774	Supplying, laying, tesing & commissioning of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification in cable trays / ducts clamped to wall with suitable clamps including, saddles fixing bolts, connecting testing and commissioning complete in all respect as required as per site conditions. 12 core 2.5 sq.mm shielded Cu. Cable	RM	30
775	Supplying, laying, tesing & commissioning of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification in cable trays / ducts clamped to wall with suitable clamps including, saddles fixing bolts, connecting testing and commissioning complete in all respect as required as per site conditions. 4 core 2.5 sq.mm Cu arm.	RM	60
776	Supplying, laying, tesing & commissioning of following 1100 volt grade XLPE insulated PVC sheathed Aluminium/Copper conductor armoured/Unarmored cables as per specification in cable trays / ducts clamped to wall with suitable clamps including, saddles fixing bolts, connecting testing and commissioning complete in all respect as required as per site conditions. 2 core 4 sq.mm Cu arm.	RM	60
777	Laying and fixing of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size on cable tray as required.Upto 35 sq. mm (clamped with 1mm thick saddle)	RM	200
778	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed copper conductor armoured cables of 1100 volt grade including supplying and fixing of Copper crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 4 core 2.5 sq.mm Cu arm.	No.	10
779	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed copper conductor armoured cables of 1100 volt grade including supplying and fixing of Copper crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 12 core 2.5 sq.mm Cu arm.	No.	10
780	Supplying and making Cable end termination of the following XLPE insulated PVC sheathed copper conductor armoured cables of 1100 volt grade including supplying and fixing of Copper crimping lugs, double compression glands with earthing testing and commissioning complete in all respect as required as per site conditions. 2 core 4 sq.mm Cu arm.	No.	10
781	Supplying all the material for fabrication of 30 mtr High lattice tower for supporting 2 Nos. Chimmnies for 750 KVA & 500KVA DG Sets complete with suitable size M.S channel, M.S angle, nut, bolt etc. complete including 1 coat of red-oxide & 2 coat of enamel paint and other Accessories as required at the site of work. Lightning arrestor & 40 x 6 mm GI strip including 2 Nos. earthing stations with GI plate, also to be included in the item. Note :- supporting structure for horizontal exhaust pipes is included here. Lightening Arrstor Non steamer type-- 2 Nos. Aviation light 2 Nos. 25x3 mm GI strip 100 mtr. Isolator switch 2 Nos. Insualtors @ 0.5 mtrs 70 Nos. Chemical earthing 2 Nos. 50x6 mm GI strip 30 Mtr 30 mtr high supporting structure for DG chimnies described as above	kg	22000

782	**HVAC**:Supplying, installing, testing and commissioning of single/multi compressor AHRI Certified Water Cooled Screw Water Chilling Machines (along with VFD) The delivered capacity of each machine shall be 200 TR Actual at the specified conditions under Basis of Design and comprise of machine mounted motor with closed transition star delta starter, water cooled condenser, refrigerant piping and control wiring, first charge of refrigerant & oil and accessories including safety controls mounted in central micro-processor based console panel, sockets, flow switches, sensors, cable termination adopter box with suitable rating of 4 pole MCCB/ACB. Refrigerant used as shall be Ozone friendly HFC. vibration isolators shall be provided for the chiller and included in price. Evaporator shall be factory insulated with 25 mm Thick black cloth faced Nitrile Rubber/Elastomeric Foam as per OEM standard. Flow switch shall be provided at evaporator and condenser duly interlocked for safe operation of chiller.Condenser & Evaporator shell shall be constructed with ASME certifited rolled carbon steel.Unit mounted/Floor mounted VFD to be provided. In case of floor mounted VFD, the cost of cabling & cable trays from VFD to chiller shall be included in the chiller price. Sound level should not be more than 75 dB(A) at 6 m distance from the unit. Water marine boxes shall be provided at Condensers. Cable terminal box shall be suitable for receiving incoming Aluminium Cabling. Grooved coulping for chiller and condenser at inlet & outlet. BMS card shall be included in the price and vendor shall provide open protocol and suitable to connect with Modbus/ Lonwork/ Bacnet. Motor suitable for 415±10%, 50 cycles, 3 phase AC supply. a) Testing point at site/design Condition at any single point are following .1) 100 % Load 2) 50% Load 3) 25% Load 4) 100% Load (Design plus 5 Deg °F at condenser entering water temerature) Chiller should also be capable to run at minimum 60° F. condenser inlet temp.The Evaporator performance shall be as follows: Chilled Water Temperature- Inlet - 54 °F, Chilled Water Temperature- Outlet - 44 °F,Fouling factor- 0.0005 FPS Chilled water flow 480 USGPM, Pressure drop Max 10 ft, The Condenser performance shall be as follows:Condenser Water Temperature- Inlet - 80 °F Condenser Water Temperature- Outlet - 90 °F, Fouling factor - 0.001 FPS, Condenser water flow - 600 USGPM, Pressure drop - Max 15 ft, Chiller sequencing and operation should be designed in such a way that one chiller starts with minimum capacity initially and load to the maximum and enable the next chiller to start on demand through Building Management. Anti-freeze & communication card etc. Micro-processor based controls with alpha-numeric display in English for all operating parameters such as supply voltage, frequency, load current, chilled water inlet, chilled water outlet, condenser inlet and outlet temperature parameters, operating pressures etc., It should be compatible to be be integrated with BMS / chiller plant manager of any make communicating on any one of the standard protocols such as BACNET / MODBUS. The required hardware and software with all accessories complete for communication. Co-ordination with low side HVAC contractor for chiller commissioning, Power control termination, testing etc. The bidder shall submit a computerized selection sheet of the chiller offered as obtained from the manufacturer along with their offer from the latest AHRI listed software version. Non-submittal of the computerized selection sheet shall be liable for bid rejection. The cooler and condenser shall have applicable pressure code vessel stamping on the nameplate as a standard, without which the machines will be rejected. Clearing the goods including customs clearance for all items as described under supply Loading to the transport vehicle Local transport by road including transit insurance. Interaction and clearance at various local points Unloading at site Shifting of material to the point of installation including lifting using mechanical means to the designated area of Building Note : 1. Vendor to study the methodology to lift/shift the chillers to Plant Room and only consultant/client approval approved methodology to be adopted. 2. Necessary permissions from authorities to be taken by the contractor before lifting / shifting the chillers 3. Necessary Insurance for the workmen, material and third party liability. Installation, leveling, testing and commissioning charges including all consumables, tools and equipment. Any items and works not specifically mentioned above but as required for the works. (contractor to specify the nature of work / item)Minimum COP at AHRI conditions shall be as per ECBC Plus Maximum IkW/ TR at full load - 0.7 max, mini NPLV 0.38 Water Chilling Machines as described above	No.	3
783	Single testing point of Water Chilling Machine as described above (For one Chiller)	Set	1
784	Supplying, installation, testing and commissioning of Automatic Tube Cleaning System suitable for Chillers, capacity as mentioned above along with the following size of Condenser Nozzle connection and configuration of Chilling Unit(s).All above and as mentioned in Specifications.(200 mm for condenser)	Set	1
785	Supplying, installing, testing and commissioning of Long coupled Vertical Inline Pumps duly factory mounted on a base with electric motor. The pump motor shall be IE-3 efficiency (minimum 90%) and suitable for 415 +10% volts, 50 cycles, 3 phase power supply. Pumps will adhere to following performance characteristics : The pump performance shall meet the criterion laid down under ASHRAE 90.1-2019 and with minimum efficiency as specified. Thermal insulation & cladding of the chilled water pumps will be included. Secondary Pump shall operate through variable frequency drives. The rating of pumps shall be as follows: Primary Chilled Water Pumps- Water flow rate : 480 USGPM Head : 40 ft of water Motor HP not to exceed : 10 HP Efficiency : 75% or more Primary Chilled Water pump as described above including 1 No. standby.	No.	3

786	Supplying, installing, testing and commissioning of Long coupled Vertical Inline Pumps duly factory mounted on a base with electric motor. The pump motor shall be IE-3 efficiency (minimum 90%) and suitable for 415 +10% volts, 50 cycles, 3 phase power supply. Pumps will adhere to following performance characteristics :The pump performance shall meet the criterion laid down under ASHRAE 90.1-2019 and with minimum efficiency as specified.Thermal insulation & cladding of the chilled water pumps will be included. Secondary Pump shall operate through variable frequency drives.The rating of pumps shall be as follows:Secondary Chilled Water Pumps- Water flow rate : 480 USGPMHead : 80 ft of waterMotor HP not to exceed : 15 HPEfficiency : 75% or moreSecondary Chilled Water pump as described above including 1 No. standby.	No.	3
787	Supplying, installing, testing and commissioning of Long coupled Vertical Inline Pumps duly factory mounted on a base with electric motor. The pump motor shall be IE-3 efficiency (minimum 90%) and suitable for 415 +10% volts, 50 cycles, 3 phase power supply. Pumps will adhere to following performance characteristics : The pump performance shall meet the criterion laid down under ASHRAE 90.1-2019 and with minimum efficiency as specified. Thermal insulation & cladding of the chilled water pumps will be included. Secondary Pump shall operate through variable frequency drives. The rating of pumps shall be as follows: Condenser Water Pumps- Water flow rate : 600 USGPM Head : 70 ft of water Motor HP not to exceed : 25 HP Efficiency : 75% or more Condenser Water pump as described above including 1 No. standby.	No.	3
788	Supplying, installing, testing and commissioning of Variable Speed Pumping System (Sensor based) consisting of following: Variable Frequency Drive suitable for Secondary Chilled Water Pumps described above. Pump controller (micrprocessor based) with licensed software capable of operating the system with Modbus/Lon Works/Bacnet protocol. Quoted price shall include control/power wiring for daisy chain linking of pumps and providing signals at one point within the room. Pump controller shall be capable of controlling numbers of SCHW pumps mentioned above under item no. 2.4.2 Suitable No. Differential pressure sensor / transmitters control along with control cabling running in 25 mm dia MS conduit from sensor/transmitter to VFD Panel. Pressure sensing elements shall be installed at farthest end of zone circuit Digital display shall be provided on Pump Controller which will display all critical parameters. All wiring to complete the installation shall be included as part of this item. Secondary variable speed pumping system as described above	Set	1

789	Supplying, installing, testing and commissioning of 50 mm thick double skin construction Air Handling Units comprising of following: (Floor Mounted) Backward curved fan inside double skin housing with efficiency not less than 75% . Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM.All AHU with 6 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. All AHU shall be provided with mixing box & thermal break profile as per specifications. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Motor shall be suitable to operate on VFD.Fan shall be plug type Fan outlet velocity not exceeding 10 mps.Minimum 20-30 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. All AHU which is placed outside shall be provided with rain protection canopy. All AHU's will be with DOL or S/D starter, if VFD starter not mentioned.GeneralFrom electrical panel there shall be single input to Single AHU terminal box. All necessary internal wiring from Terminal Box to multiple direct drive motors provided by AHU vendor.Supply and Installation of 19 mm thick Neoprene Rubber Waffle Type Pads to be installed between the floor and the Air Handling Units. The neoprene pads shall be in accordance with the manufacturer's instructions for the size and weight distribution of the equipment supported. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen the AHU and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The rating shall be as follows:FM AHU 01,02, Capacity (CFM) - 25000, Required TR - 50, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 15	No.	2
790	Supplying, installing, testing and commissioning of 50 mm thick double skin construction Air Handling Units comprising of following: (Floor Mounted) Backward curved fan inside double skin housing with efficiency not less than 75% . Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM. All AHU with 6 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. All AHU shall be provided with mixing box & thermal break profile as per specifications. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Motor shall be suitable to operate on VFD. Fan shall be plug type Fan outlet velocity not exceeding 10 mps. Minimum 20-30 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. All AHU which is placed outside shall be provided with rain protection canopy. All AHU's will be with DOL or S/D starter, if VFD starter not mentioned. General From electrical panel there shall be single input to Single AHU terminal box. All necessary internal wiring from Terminal Box to multiple direct drive motors provided by AHU vendor. Supply and Installation of 19 mm thick Neoprene Rubber Waffle Type Pads to be installed between the floor and the Air Handling Units. The neoprene pads shall be in accordance with the manufacturer's instructions for the size and weight distribution of the equipment supported. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen the AHU and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The rating shall be as follows: FM AHU 03, Capacity (CFM) - 20000, Required TR - 40, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 11	No.	1

791	Supplying, installing, testing and commissioning of 50 mm thick double skin construction Air Handling Units comprising of following: (Floor Mounted) Backward curved fan inside double skin housing with efficiency not less than 75% . Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM.All AHU with 6 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. All AHU shall be provided with mixing box & thermal break profile as per specifications. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Motor shall be suitable to operate on VFD.Fan shall be plug type Fan outlet velocity not exceeding 10 mps.Minimum 20-30 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. All AHU which is placed outside shall be provided with rain protection canopy. All AHU's will be with DOL or S/D starter, if VFD starter not mentioned.GeneralFrom electrical panel there shall be single input to Single AHU terminal box. All necessary internal wiring from Terminal Box to multiple direct drive motors provided by AHU vendor.Supply and Installation of 19 mm thick Neoprene Rubber Waffle Type Pads to be installed between the floor and the Air Handling Units. The neoprene pads shall be in accordance with the manufacturer's instructions for the size and weight distribution of the equipment supported. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen the AHU and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The rating shall be as follows:FM AHU 04,05, Capacity (CFM) - 15000, Required TR - 30, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 7.5	No.	2
792	Supplying, installing, testing and commissioning of 50 mm thick double skin construction Air Handling Units comprising of following: (Floor Mounted) Backward curved fan inside double skin housing with efficiency not less than 75% . Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM. All AHU with 6 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. All AHU shall be provided with mixing box & thermal break profile as per specifications. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Motor shall be suitable to operate on VFD. Fan shall be plug type Fan outlet velocity not exceeding 10 mps. Minimum 20-30 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. All AHU which is placed outside shall be provided with rain protection canopy. All AHU's will be with DOL or S/D starter, if VFD starter not mentioned. General From electrical panel there shall be single input to Single AHU terminal box. All necessary internal wiring from Terminal Box to multiple direct drive motors provided by AHU vendor. Supply and Installation of 19 mm thick Neoprene Rubber Waffle Type Pads to be installed between the floor and the Air Handling Units. The neoprene pads shall be in accordance with the manufacturer's instructions for the size and weight distribution of the equipment supported. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen the AHU and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The rating shall be as follows: FM AHU 06, Capacity (CFM) - 12000, Required TR - 25, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 5.5	No.	1

793	Supplying, installing, testing and commissioning of 50 mm thick double skin construction Air Handling Units comprising of following: (Floor Mounted) Backward curved fan inside double skin housing with efficiency not less than 75% . Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM.All AHU with 6 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. All AHU shall be provided with mixing box & thermal break profile as per specifications. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Motor shall be suitable to operate on VFD.Fan shall be plug type Fan outlet velocity not exceeding 10 mps.Minimum 20-30 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. All AHU which is placed outside shall be provided with rain protection canopy. All AHU's will be with DOL or S/D starter, if VFD starter not mentioned.GeneralFrom electrical panel there shall be single input to Single AHU terminal box. All necessary internal wiring from Terminal Box to multiple direct drive motors provided by AHU vendor.Supply and Installation of 19 mm thick Neoprene Rubber Waffle Type Pads to be installed between the floor and the Air Handling Units. The neoprene pads shall be in accordance with the manufacturer's instructions for the size and weight distribution of the equipment supported. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen the AHU and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The rating shall be as follows:FM AHU 07 to 09, Capacity (CFM) - 10000, Required TR - 26, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 5.5	No.	3
794	Supplying, installing, testing and commissioning of 50 mm thick double skin construction Air Handling Units comprising of following: (Floor Mounted) Backward curved fan inside double skin housing with efficiency not less than 75% . Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM. All AHU with 6 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. All AHU shall be provided with mixing box & thermal break profile as per specifications. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Motor shall be suitable to operate on VFD. Fan shall be plug type Fan outlet velocity not exceeding 10 mps. Minimum 20-30 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. All AHU which is placed outside shall be provided with rain protection canopy. All AHU's will be with DOL or S/D starter, if VFD starter not mentioned. General From electrical panel there shall be single input to Single AHU terminal box. All necessary internal wiring from Terminal Box to multiple direct drive motors provided by AHU vendor. Supply and Installation of 19 mm thick Neoprene Rubber Waffle Type Pads to be installed between the floor and the Air Handling Units. The neoprene pads shall be in accordance with the manufacturer's instructions for the size and weight distribution of the equipment supported. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen the AHU and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The rating shall be as follows: FM AHU 10 to 12, Capacity (CFM) - 7000, Required TR - 14, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 3.0	No.	3

795	Supplying, installing, testing and commissioning of 50 mm thick double skin construction Air Handling Units comprising of following: (Floor Mounted) Backward curved fan inside double skin housing with efficiency not less than 75% . Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM.All AHU with 6 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. All AHU shall be provided with mixing box & thermal break profile as per specifications. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Motor shall be suitable to operate on VFD.Fan shall be plug type Fan outlet velocity not exceeding 10 mps.Minimum 20-30 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. All AHU which is placed outside shall be provided with rain protection canopy. All AHU's will be with DOL or S/D starter, if VFD starter not mentioned.GeneralFrom electrical panel there shall be single input to Single AHU terminal box. All necessary internal wiring from Terminal Box to multiple direct drive motors provided by AHU vendor.Supply and Installation of 19 mm thick Neoprene Rubber Waffle Type Pads to be installed between the floor and the Air Handling Units. The neoprene pads shall be in accordance with the manufacturer's instructions for the size and weight distribution of the equipment supported. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen the AHU and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The rating shall be as follows:FM AHU 13 to 17, Capacity (CFM) - 4000, Required TR - 10, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 2.2	No.	5
796	Supplying, installing, testing and commissioning of 50 mm thick double skin construction Air Handling Units comprising of following: (Floor Mounted) Backward curved fan inside double skin housing with efficiency not less than 75% . Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM. All AHU with 6 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. All AHU shall be provided with mixing box & thermal break profile as per specifications. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Motor shall be suitable to operate on VFD. Fan shall be plug type Fan outlet velocity not exceeding 10 mps. Minimum 20-30 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. All AHU which is placed outside shall be provided with rain protection canopy. All AHU's will be with DOL or S/D starter, if VFD starter not mentioned. General From electrical panel there shall be single input to Single AHU terminal box. All necessary internal wiring from Terminal Box to multiple direct drive motors provided by AHU vendor. Supply and Installation of 19 mm thick Neoprene Rubber Waffle Type Pads to be installed between the floor and the Air Handling Units. The neoprene pads shall be in accordance with the manufacturer's instructions for the size and weight distribution of the equipment supported. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen the AHU and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The rating shall be as follows: FM AHU 18, Capacity (CFM) - 3500, Required TR - 10, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 1.5	No.	1

797	Supplying, installing, testing and commissioning of 50 mm thick double skin construction Air Handling Units comprising of following: (Floor Mounted) Backward curved fan inside double skin housing with efficiency not less than 75% . Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM.All AHU with 6 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. All AHU shall be provided with mixing box & thermal break profile as per specifications. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Motor shall be suitable to operate on VFD.Fan shall be plug type Fan outlet velocity not exceeding 10 mps.Minimum 20-30 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. All AHU which is placed outside shall be provided with rain protection canopy. All AHU's will be with DOL or S/D starter, if VFD starter not mentioned.GeneralFrom electrical panel there shall be single input to Single AHU terminal box. All necessary internal wiring from Terminal Box to multiple direct drive motors provided by AHU vendor.Supply and Installation of 19 mm thick Neoprene Rubber Waffle Type Pads to be installed between the floor and the Air Handling Units. The neoprene pads shall be in accordance with the manufacturer's instructions for the size and weight distribution of the equipment supported. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen the AHU and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The rating shall be as follows:FM AHU 19 to 21, Capacity (CFM) - 3000, Required TR - 7, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 1.5	No.	3
798	Supplying, installing, testing and commissioning of 50 mm thick double skin construction Air Handling Units comprising of following: (Floor Mounted) Backward curved fan inside double skin housing with efficiency not less than 75% . Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM. All AHU with 6 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. All AHU shall be provided with mixing box & thermal break profile as per specifications. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Motor shall be suitable to operate on VFD. Fan shall be plug type Fan outlet velocity not exceeding 10 mps. Minimum 20-30 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. All AHU which is placed outside shall be provided with rain protection canopy. All AHU's will be with DOL or S/D starter, if VFD starter not mentioned. General From electrical panel there shall be single input to Single AHU terminal box. All necessary internal wiring from Terminal Box to multiple direct drive motors provided by AHU vendor. Supply and Installation of 19 mm thick Neoprene Rubber Waffle Type Pads to be installed between the floor and the Air Handling Units. The neoprene pads shall be in accordance with the manufacturer's instructions for the size and weight distribution of the equipment supported. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen the AHU and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The rating shall be as follows: FM AHU 22, Capacity (CFM) - 2500, Required TR - 5, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 1.1	No.	1

799	Supplying, installing, testing and commissioning of 25mm thick double skin construction Air Handling Units comprising of following: (Ceiling Mounted) Forward curved fan mounted inside double skin housing with efficiency not less than 65%Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM.All AHU with 4 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Fan shall be plug type Fan outlet velocity not exceeding 10 mps.SS 304 construction end plates to be provided.Hydrophilic coating shall be carried out on the chilled water coil.All AHU are ceiling suspended type complete with, vibration isolation & hanging arrangement with height as per the drawingsMinimum 15-20 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding.The desired rating of AHU shall be as follows:CS AHU 01 to 05, Capacity (CFM) - 2000, Required TR - 5, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 1.1	No.	5
800	Supplying, installing, testing and commissioning of 25mm thick double skin construction Air Handling Units comprising of following: (Ceiling Mounted) Forward curved fan mounted inside double skin housing with efficiency not less than 65% Pre filter (MERV 8) and bag filter (MERV-14) in supply air stream. Velocity across filter section shall not exceed 500 FPM. All AHU with 4 row deep cooling coil unless specified otherwise. SS 304 construction end plates to be provided. UVGI to be provided across the coil. Coil shall be provided with hydrophilic coating. TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Fan shall be plug type Fan outlet velocity not exceeding 10 mps. SS 304 construction end plates to be provided. Hydrophilic coating shall be carried out on the chilled water coil. All AHU are ceiling suspended type complete with, vibration isolation & hanging arrangement with height as per the drawings Minimum 15-20 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. The desired rating of AHU shall be as follows: CS AHU 06 to 10, Capacity (CFM) - 1500, Required TR - 4, Total static pressure(mmwg) - 40-50, Motor Rating (kW) - 1.1	No.	5
801	Supply, installing, testing and commissioning of wall mounted type Air Cooled Split AC Units (Inverter Type) as described in specifications. The unit shall be complete with Ductable type Indoor unit and external condensing unit, powered coated MS stand, gas charging and top up for extra copper length, complete in all respects, inclusive of copper refrigerant piping, PVC condensate drain piping, valves and insulation. Quoted price shall include cost of thermostat, wiring, control cooling thermostat, wiring, control wiring & earthing The unit capacities shall be after taking deration into account due to copper piping lengths. Unit shall be R407 C/ R 410a/ R-32 refrigerant based. Suitable rating Switch Socket shall be provided within 1.0 m of all IDUs (by others). The cost for Power Cable from the IDU to this Switch Socket and the power cable from the IDU to the ODU shall be included in the Quoted unit price. 1.5 TR Hi Wall type split units	Set	3

802	Supply, installing, testing and commissioning of wall mounted type Air Cooled Split AC Units (Inverter Type) as described in specifications. The unit shall be complete with Ductable type Indoor unit and external condensing unit, powered coated MS stand, gas charging and top up for extra copper length, complete in all respects, inclusive of copper refrigerant piping, PVC condensate drain piping, valves and insulation. Quoted price shall include cost of thermostat, wiring, control cooling thermostat, wiring, control wiring & earthing The unit capacities shall be after taking deration into account due to copper piping lengths. Unit shall be R407 C/ R 410a/ R-32 refrigerant based.Suitable rating Switch Socket shall be provided within 1.0 m of all IDUs (by others). The cost for Power Cable from the IDU to this Switch Socket and the power cable from the IDU to the ODU shall be included in the Quoted unit price. 2.0 TR Hi Wall type split units	Set	1
803	Supplying, installing, testing and commissioning of SILENT MIXED FLOW INLINE FANS suitable for installing in any position in vertical or horizontal ducts.Constructed with sheet steel with epoxy polyester paint, acoustic isulation within the outer shell. Two speed motor (IP 44 Rated) with removable fan body with two speed motor, single phase speed controlable class F external rotor motor with capacitor and thermal protection. All units shall be complete with duct flexible connector, speed regulator (with wiring of 3 m included between fan & regulator) and volume control damper and static pressure or to suit the system, shall be as follows: The sound level shall be measured at three metre distance. Actual static to be checked by the vendor during the shop drawings. 100-200 (Fan capacity-CFM) 35 Dba (Max Noise Level)	No.	2
804	Supplying, installing, testing and commissioning of SILENT MIXED FLOW INLINE FANS suitable for installing in any position in vertical or horizontal ducts.Constructed with sheet steel with epoxy polyester paint, acoustic isulation within the outer shell. Two speed motor (IP 44 Rated) with removable fan body with two speed motor, single phase speed controlable class F external rotor motor with capacitor and thermal protection. All units shall be complete with duct flexible connector, speed regulator (with wiring of 3 m included between fan & regulator) and volume control damper and static pressure or to suit the system, shall be as follows: The sound level shall be measured at three metre distance. Actual static to be checked by the vendor during the shop drawings. 201-500 (Fan capacity-CFM) 35 Dba (Max Noise Level)	No.	1
805	Supplying, installing, testing and commissioning of SILENT MIXED FLOW INLINE FANS suitable for installing in any position in vertical or horizontal ducts.Constructed with sheet steel with epoxy polyester paint, acoustic isulation within the outer shell. Two speed motor (IP 44 Rated) with removable fan body with two speed motor, single phase speed controlable class F external rotor motor with capacitor and thermal protection. All units shall be complete with duct flexible connector, speed regulator (with wiring of 3 m included between fan & regulator) and volume control damper and static pressure or to suit the system, shall be as follows: The sound level shall be measured at three metre distance. Actual static to be checked by the vendor during the shop drawings. 501-800 (Fan capacity-CFM) 35 Dba (Max Noise Level)	No.	3
806	Supplying, installing, testing and commissioning of direct driven PROPELLER FANS for exhaust air . Each fan shall be complete with permanent split capacitor or shaded pole motor, mounting plate, accessories like wire guard, bird screen and fixed louvers for weather protection as required. Fan selection arrangement and Electrical characteristics shall be as follows : 300 mm dia 900 RPM fan suitable for 220±6% volts 50 cycles, 1 phase AC supply.	No.	2
807	Supplying, installing, testing and commissioning of direct driven PROPELLER FANS for exhaust air . Each fan shall be complete with permanent split capacitor or shaded pole motor, mounting plate, accessories like wire guard, bird screen and fixed louvers for weather protection as required. Fan selection arrangement and Electrical characteristics shall be as follows : 230 mm dia 900 RPM fan suitable for 220±6% volts 50 cycles, 1 phase AC supply.	No.	10

808	Supplying, installing, testing and commissioning of FRP Induced draft Cooling Towers with VFD with built in PID controller, control panel(keypad and display) for air conditioning system. Each tower shall be complete with FRP basin, casing, distribution system, filling, louvers, HDG supporters, GI ladders, steel/masonary supporting structure, anti vibration mounting etc. (VFD is considered as a seperate item in the BOQ) Cooling tower approach should not be more than 5 °C at lower WBT. Software generated curves to be submitted by manufacturer.Motors shall be for outdoor application (IP55), suitable for 415±10% volt, 50 cycle's 3 phase power supply meeting criterion as per ASHRAE standard 90.1-2019 and high efficiency.Isolators at cooling tower enclosed in weather proof panel shall also be included.Performance required for cooling tower is minimum 50 gpm/hp when tested according CTI ATC-105 procedure. Foundation shall be under Civil Contractor's scope.Cooling tower suitable for - 200 TR Cooling CapacityInlet Condenser Water Temperature - 90 °FOutlet Condenser Water Temperature - 80 °FWet Bulb Temperture - 75 °FChilled Water Flow - 525 USGPMMotor HP - 1 No. 10 HP Cell Number - 1 No.Sound level - 76 dB at 3 meter distanceCooling Tower as described above	Set	2
809	Supply, installation, testing and commissioning of Closed type pressurized chilled water expansion tank with PN-16 rating complete with necessary connection for piping, vent, valves and accessories. The requirement shall be as follows: The total volume of water in chilled water pipes shall be worked out by HVAC contractor and contractor will work out the total volume. Below tank capacity are indicative for quotes, any change during the execution in Tank capacity. There will be no additional claim will be acceptable. Accessories like pumps in N+1 etc.shall be included in quoted price for satisfactory operation. The tank shall be nitrogen precharged steel expansion tank with replaceable heavy duty butyl rubber bladder. The tank shall have suitable sized inlet connection, drain alongwith valves for isolation/shutdown of system connection and drain and charging valve connection to facilitate the on site charging of the tank to meet system requirement. Chilled water Expansion tank of capacity- 800 litres	Set	1
810	Supply, installation, testing and commissioning of Centrifugal type Air Seperator complete with necessary connection for piping, vent, valves and accessories. The requirement shall be as follows: 200 mm dia Air Seperator	Set	1
811	Supplying, installing, testing and commissioning of double skin construction Fan sections (made out of 25mm thick panel) complete with internally mounted motor, fan belt drive, flexible connection, vibrations isolators and complete with following: TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met. Forward & Backward curved fan inside double skin housing with efficiency not less than 65-70%. Minimum 20-25 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. Height of the unit shall not exceed 550mm, contractor to select the no. of fans accordingly. Fan shall be provided with pre filters of MERV-8 . The rating of fan sections shall be as follows: FS 01 to 04(Toilet Ventilation), Capacity (CFM) - 12500, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 5.5, VFD-Yes	No.	4

812	Supplying, installing, testing and commissioning of double skin construction Fan sections (made out of 25mm thick panel) complete with internally mounted motor, fan belt drive, flexible connection, vibrations isolators and complete with following: TEFC Motors suitable for 415 ± 10% volts, 50 Hz, AC supply and IE 3 efficiency. The maximum rating is specified below and contractor can select a lower rating motor incase the desired performance is being met.Forward & Backward curved fan inside double skin housing with efficiency not less than 65-70%. Minimum 20-25 mm (WC) external static pressure shall be considered. However, actual total static pressure shall be calculated and confirmed by the vendor at the time of bidding. Height of the unit shall not exceed 550mm, contractor to select the no. of fans accordingly. Fan shall be provided with pre filters of MERV-8 . The rating of fan sections shall be as follows:FS 05 & 06 (Toilet Ventilation), Capacity (CFM) - 9000, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 5.5 , VFD- Yes	No.	2
813	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Smoke Exhaust air motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090] External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-01,02 , Capacity (CFM) - 36000, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 22 , VFD- No	No.	2

814	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Smoke Exhaust air motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090] External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-03,04 , Capacity (CFM) - 28000, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 15 , VFD- No	No.	2
815	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Smoke Exhaust air motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090] External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-05 , Capacity (CFM) - 26000, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 15 , VFD- No	No.	1

816	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Smoke Exhaust air motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090] External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-06 , Capacity (CFM) - 16000, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 7.5 , VFD- No	No.	1
817	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Smoke Exhaust air motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090] External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-07-09 , Capacity (CFM) - 12500, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 5.5 , VFD- No	No.	3

818	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Smoke Exhaust air motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090] External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-10-12 , Capacity (CFM) - 8500, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 3.0 , VFD- No	No.	3
819	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Smoke Exhaust air motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090] External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-13-14 , Capacity (CFM) - 6000, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 2.2 , VFD- No	No.	2

820	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Smoke Exhaust air motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090] External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-15-16 , Capacity (CFM) - 4500, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 2.2 , VFD- No	No.	2
821	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Smoke Exhaust air motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090] External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-17 , Capacity (CFM) - 2500, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 1.1 , VFD- No	No.	1

822	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Smoke Exhaust air motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090] External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-18-19 , Capacity (CFM) - 22000, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 11, VFD- No	No.	2
823	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Smoke Exhaust air motor shall be Class H rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%.Fan and casing shall be suitable for normal & smoke exhaust application.Motor shall be mounted inside the fan casing & thermally rated for 250 Deg C for 2 hour as per [BS-7346 Part-2 : 1090] External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-20-24 , Capacity (CFM) - 17000, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 7.5, VFD- No	No.	5

824	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-01 , Capacity (CFM) - 36000, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 22, VFD- No	No.	1
825	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-02,03 , Capacity (CFM) - 28000, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 15, VFD- No	No.	2

826	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-04 to 07, Capacity (CFM) - 18000, External static pressure(mmwg) - 20-25, Motor Rating (kW) - 7.5, VFD- No	No.	4
827	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-08 ,09, Capacity (CFM) - 6000, External static pressure(mmwg) - 20-25, Motor Rating (kW) -2.2, VFD- No	No.	2

828	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-10, Capacity (CFM) - 2500, External static pressure(mmwg) - 20-25, Motor Rating (kW) -1.1, VFD- No	No.	1
829	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-11(Chiller Plant Roon Exhaust), Capacity (CFM) - 11000, External static pressure(mmwg) - 20-25, Motor Rating (kW) -5.5, VFD- No	No.	1

830	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-12 (Chiller Plant Room Makeup), Capacity (CFM) - 11000, External static pressure(mmwg) - 20-25, Motor Rating (kW) -5.5, VFD- No	No.	1
831	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-13 (Pump Room Exhaust), Capacity (CFM) - 4000, External static pressure(mmwg) - 20-25, Motor Rating (kW) -2.2, VFD- No	No.	1

832	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-14 (Pump Room Makeup), Capacity (CFM) - 4000, External static pressure(mmwg) - 20-25, Motor Rating (kW) -2.2, VFD- No	No.	1
833	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-15 (STP Exhaust), Capacity (CFM) - 6500, External static pressure(mmwg) - 20-25, Motor Rating (kW) -3.0, VFD- No	No.	1

834	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-16 (STP Makeup), Capacity (CFM) - 6000, External static pressure(mmwg) - 20-25, Motor Rating (kW) -3.0, VFD- No	No.	1
835	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as follows Normal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor. General Supply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701. The fan capacities shall be as follows: AXF-17 (Equipment store Exhaust), Capacity (CFM) - 6000, External static pressure(mmwg) - 20-25, Motor Rating (kW) -3.0, VFD- No	No.	1

836	Supply, installation, testing & commissioning of Axial Flow Fans suitable for installing in both Horizontal or vertical position as per site requirement and complete with totally enclosed direct driven, motor mount, fire rated flexible connection and vibration isolators. The fan shall be equipped with mounting bracket. Fan capacity shall be as followsNormal application fan shall be selected for lower noise level and shall not exceed 72 DB (A) at 3 m distance from the fan. If required contractor to add sound attenuator to meet the desired noise level. Fan shall be selected for minimum efficiency of 60-70% and also these fan will operate through Starter delta or DOL starter in case of fire can be selected for higher outlet velocity as sound is not criteria while selecting. Total static pressure shall be check by vendor. Fan will be selected on the basis of best in-class efficiency. For Make up air motor shall be Class F rating and suitable for 415±10% volts 3 phase 50 cycles, AC supply. The motor selected shall be IE3 efficiency at full load. Fan shall be selected for minimum efficiency of 65%. External static pressure shall be 20-25 mm (WC) minimum and Total static pressure shall be check by vendor.GeneralSupply and Installation of spring hangers for all above mention Fans. The hangers should consist of a free-standing, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket with a Neoprene element at the top . The hanger bracket shall be designed to carry five times overload without failure and shall allow up to 30 degree rod misalignment without metal to metal contact. The spring should have a minimum deflection of 25 mm and Neoprene element minimum 4mm deflection. Supply and Installation of Fire Resistant Fabric Flexible Connection to be installed betweeen above mention all the Fans and the ducting to provide flexibilty of movement in case of a seismic event and to prevent transmission of vibration from the unit to the duct. The fabric should be of glassfiber with a silicon silicon coating and extruded metal flanges. The fabric should conform to BS 476 Part 7 Class 1 and NFPA 701.The fan capacities shall be as follows:AXF-18 (LT Panel Room Exhaust), Capacity (CFM) - 1500, External static pressure(mmwg) - 20-25, Motor Rating (kW) -1.1, VFD- No	No.	1
837	Supply, installing, testing and commissioning of VFD suitable for HVAC application with minimum IP 55 enclosures complying with the tender specifications and shall be complete in all respects and suitable for following motor rating and shall meet the following specifications : a) The VFD shall have a dual 5% impedance DC link reactor (Harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating. b) All the VFD's should have factory fitted IP 55 enclosure protection c) EMC filters, C1 Category, Drive should support at least 2 PID loops are required d) Panel space and wiring shall be included under Electrical Panel section e) 2 No. Pressure sensor and wiring shall be included in the cost. Equipment- Floor Mounted air handling unit , Motor kW- 1.1	No.	1
838	Supply, installing, testing and commissioning of VFD suitable for HVAC application with minimum IP 55 enclosures complying with the tender specifications and shall be complete in all respects and suitable for following motor rating and shall meet the following specifications : a) The VFD shall have a dual 5% impedance DC link reactor (Harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating. b) All the VFD's should have factory fitted IP 55 enclosure protection c) EMC filters, C1 Category, Drive should support at least 2 PID loops are required d) Panel space and wiring shall be included under Electrical Panel section e) 2 No. Pressure sensor and wiring shall be included in the cost. Equipment- Floor Mounted air handling unit , Motor kW- 1.5	No.	3

839	Supply, installing, testing and commissioning of VFD suitable for HVAC application with minimum IP 55 enclosures complying with the tender specifications and shall be complete in all respects and suitable for following motor rating and shall meet the following specifications :a) The VFD shall have a dual 5% impedance DC link reactor (Harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating.b) All the VFD's should have factory fitted IP 55 enclosure protection c) EMC filters, C1 Category, Drive should support at least 2 PID loops are requiredd) Panel space and wiring shall be included under Electrical Panel sectione) 2 No. Pressure sensor and wiring shall be included in the cost.Equipment- Floor Mounted air handling unit , Motor kW- 2.2	No.	5
840	Supply, installing, testing and commissioning of VFD suitable for HVAC application with minimum IP 55 enclosures complying with the tender specifications and shall be complete in all respects and suitable for following motor rating and shall meet the following specifications : a) The VFD shall have a dual 5% impedance DC link reactor (Harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating. b) All the VFD's should have factory fitted IP 55 enclosure protection c) EMC filters, C1 Category, Drive should support at least 2 PID loops are required d) Panel space and wiring shall be included under Electrical Panel section e) 2 No. Pressure sensor and wiring shall be included in the cost. Equipment- Floor Mounted air handling unit , Motor kW- 3.7	No.	4
841	Supply, installing, testing and commissioning of VFD suitable for HVAC application with minimum IP 55 enclosures complying with the tender specifications and shall be complete in all respects and suitable for following motor rating and shall meet the following specifications : a) The VFD shall have a dual 5% impedance DC link reactor (Harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating. b) All the VFD's should have factory fitted IP 55 enclosure protection c) EMC filters, C1 Category, Drive should support at least 2 PID loops are required d) Panel space and wiring shall be included under Electrical Panel section e) 2 No. Pressure sensor and wiring shall be included in the cost. Equipment- Floor Mounted air handling unit , Motor kW- 5.5	No.	4
842	Supply, installing, testing and commissioning of VFD suitable for HVAC application with minimum IP 55 enclosures complying with the tender specifications and shall be complete in all respects and suitable for following motor rating and shall meet the following specifications : a) The VFD shall have a dual 5% impedance DC link reactor (Harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating. b) All the VFD's should have factory fitted IP 55 enclosure protection c) EMC filters, C1 Category, Drive should support at least 2 PID loops are required d) Panel space and wiring shall be included under Electrical Panel section e) 2 No. Pressure sensor and wiring shall be included in the cost. Equipment- Floor Mounted air handling unit , Motor kW- 7.5	No.	2

843	Supply, installing, testing and commissioning of VFD suitable for HVAC application with minimum IP 55 enclosures complying with the tender specifications and shall be complete in all respects and suitable for following motor rating and shall meet the following specifications :a) The VFD shall have a dual 5% impedance DC link reactor (Harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating.b) All the VFD's should have factory fitted IP 55 enclosure protection c) EMC filters, C1 Category, Drive should support at least 2 PID loops are requiredd) Panel space and wiring shall be included under Electrical Panel sectione) 2 No. Pressure sensor and wiring shall be included in the cost.Equipment- Floor Mounted air handling unit , Motor kW- 10	No.	1
844	Supply, installing, testing and commissioning of VFD suitable for HVAC application with minimum IP 55 enclosures complying with the tender specifications and shall be complete in all respects and suitable for following motor rating and shall meet the following specifications : a) The VFD shall have a dual 5% impedance DC link reactor (Harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating. b) All the VFD's should have factory fitted IP 55 enclosure protection c) EMC filters, C1 Category, Drive should support at least 2 PID loops are required d) Panel space and wiring shall be included under Electrical Panel section e) 2 No. Pressure sensor and wiring shall be included in the cost. Equipment- Floor Mounted air handling unit , Motor kW- 15	No.	2
845	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 25000 CFM (Capacity)	No.	2
846	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 20000 CFM (Capacity)	No.	1
847	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 15000 CFM (Capacity)	No.	2
848	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 12000 CFM (Capacity)	No.	1

849	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 10000 CFM (Capacity)	No.	3
850	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 7000 CFM (Capacity)	No.	3
851	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 4000 CFM (Capacity)	No.	5
852	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 3500 CFM (Capacity)	No.	1
853	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 3000 CFM (Capacity)	No.	3
854	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 2500 CFM (Capacity)	No.	1
855	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 2000 CFM (Capacity)	No.	2

856	Supply, installation, testing and commissioning of Bipolar Air Ionizer combination of Needle point , Tube Type & Carbon Brush Type which produces a natural Bio Climate rich in equal amount of positive and negative ions. The ionizer shall be kill microorganism and pathogens, remove Odour, VOC and reduce dust particle. The Ionizer should be UL 2998 & UL 867 listed With Zero Ozone Emission.The housing material is 18G steel powder coated. Models accept 24V AC input, 120V AC to 12V DC wall pack, 120V/240V AC to 12V DC power supply and 241V/277V AC to 12V DC power supply. 1500 CFM (Capacity)	No.	2
857	Supply, Installation, Testing & commissioning of IAQ Monitor to remotely measure the levels of PM 2.5, VOCs, CO2, Temperature(In / Out), Humidity on a real time basis. The IAQ Monitor shall be capable of getting connected with Wi-Fi. The Monitor should be capable of sending the indoor air quality information on display Screen/Mobile/Browser as per Client's requirement. The Monitor should indicate the quality of air through changing the colours on the display screen as per the NAAQS standards and should meet the well building standards. This monitor should be a 3 tier architecture including sensor Hardware, secure cloud infrastructure, monitoring apps including dashboard, android/IOS. Quoted price shall be inclusive of all necessary arrangement as required to make the unit proper functional.	Set	1
858	Supplying, fixing, testing and commissioning of condenser water pipes of following sizes of MS 'C' class along with necessary clamps, vibration isolators, Rigid supports / Steel wire rope hangers and fittings such as bends,tees etc.but excluding valves, strainers, gauges etc. adequately supported on rigid supports duly painted/buried in ground excavation and refilling etc. as per specification and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 200 mm dia	RM	250
859	Supplying, fixing, testing and commissioning of condenser water pipes of following sizes of MS 'C' class along with necessary clamps, vibration isolators, Rigid supports / Steel wire rope hangers and fittings such as bends,tees etc.but excluding valves, strainers, gauges etc. adequately supported on rigid supports duly painted/buried in ground excavation and refilling etc. as per specification and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 150 mm dia	RM	80
860	Supplying, fixing, testing and commissioning of condenser water pipes of following sizes of MS 'C' class along with necessary clamps, vibration isolators, Rigid supports / Steel wire rope hangers and fittings such as bends,tees etc.but excluding valves, strainers, gauges etc. adequately supported on rigid supports duly painted/buried in ground excavation and refilling etc. as per specification and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 125 mm dia	RM	60
861	Supplying, fixing, testing and commissioning of condenser water pipes of following sizes of MS 'C' class along with necessary clamps, vibration isolators, Rigid supports / Steel wire rope hangers and fittings such as bends,tees etc.but excluding valves, strainers, gauges etc. adequately supported on rigid supports duly painted/buried in ground excavation and refilling etc. as per specification and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 100 mm dia	RM	70

862	Supplying, fixing, testing and commissioning of condenser water pipes of following sizes of MS 'C' class along with necessary clamps, vibration isolators, Rigid supports / Steel wire rope hangers and fittings such as bends,tees etc.but excluding valves, strainers, gauges etc. adequately supported on rigid supports duly painted/buried in ground excavation and refilling etc. as per specification and as required complete in all respect.Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.80 mm dia	RM	50
863	Supplying, fixing, testing and commissioning of condenser water pipes of following sizes of MS 'C' class along with necessary clamps, vibration isolators, Rigid supports / Steel wire rope hangers and fittings such as bends,tees etc.but excluding valves, strainers, gauges etc. adequately supported on rigid supports duly painted/buried in ground excavation and refilling etc. as per specification and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 65 mm dia	RM	20
864	Supplying, fixing, testing and commissioning of condenser water pipes of following sizes of MS 'C' class along with necessary clamps, vibration isolators, Rigid supports / Steel wire rope hangers and fittings such as bends,tees etc.but excluding valves, strainers, gauges etc. adequately supported on rigid supports duly painted/buried in ground excavation and refilling etc. as per specification and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 50 mm dia	RM	10
865	BUTTERFLY VALVE (MANUAL) with CI body SS disc nitrile sheet & O - ring & PN 16 pressure rating as specified Valves of 200 mm dia	No.	3
866	BUTTERFLY VALVE (MANUAL) with CI body SS disc nitrile sheet & O - ring & PN 16 pressure rating as specified Valves of 150 mm dia	No.	6
867	BUTTERFLY VALVE (MANUAL) with CI body SS disc nitrile sheet & O - ring & PN 16 pressure rating as specified Valves of 125 mm dia	No.	10
868	BUTTERFLY VALVE (MANUAL) with CI body SS disc nitrile sheet & O - ring & PN 16 pressure rating as specified Valves of 65 mm dia	No.	2
869	BUTTERFLY VALVE (MANUAL) with CI body SS disc nitrile sheet & O - ring & PN 16 pressure rating as specified Valves of 50 mm dia	No.	2
870	BUTTERFLY VALVE (MANUAL) with CI body SS disc nitrile sheet & O - ring & PN 16 pressure rating as specified Valves of 25 mm dia(Ball valve)	No.	2
871	Supplying, fixing, testing and commissioning of following sizes Motorized Butterfly Valve with CI Body, SS Disc, O - ring and minimum PN-16 pressure rating, conforming to BS 5155, IS 13095, with IP-55 actuator, capable of accepting upto 10V DC , and upto 20 mA electric signal and providing similar transduced feedback output to control system as required Valves of 150 mm dia	No.	6

872	Supplying, installing and fixing in position Balancing valves of PN 16 rating and suitable for following pipe sizes: Valves of 150 mm dia	No.	5
873	Supplying, installing and fixing in position Y Strainers of PN 16 rating and suitable for following pipe sizes. Strainers of 150 mm dia	No.	3
874	Non Return Valve with dual plate of CI Body SS Plates vulcanized NBR seal flanged end & PN 16 pressure rating as specified Valves of 150 mm dia	No	3
875	Supply, installing and fixing in position Flexible connections of required pressure rating (PN 16) installed at pump & chiller suction & discharge and at pipes crossing building expansion joints. Valves of 150 mm dia	No	6
876	Providing and fixing in position the industrial type pressure gauges with gun metal / brass valves complete as required)	No.	6
877	Providing & fixing in position the mercury in glass industrial type thermometres.	No.	6
878	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled / hot water piping inside the building (with necessary clamps, steel wire rope hangers/ vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / cu m density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive or Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil for as per given below pipe size. The joints shall be sealed with 50 mm x 1 mm thick self adhesive tape at the joints etc. & complete as per specifications including repairing of damage to building etc. and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 200 mm dia.(32 mm thick insulation)	RM	180
879	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled / hot water piping inside the building (with necessary clamps, steel wire rope hangers/ vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / cu m density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive or Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil for as per given below pipe size. The joints shall be sealed with 50 mm x 1 mm thick self adhesive tape at the joints etc. & complete as per specifications including repairing of damage to building etc. and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 150 mm dia.(32 mm thick insulation)	RM	130
880	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled / hot water piping inside the building (with necessary clamps, steel wire rope hangers/ vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / cu m density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive or Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil for as per given below pipe size. The joints shall be sealed with 50 mm x 1 mm thick self adhesive tape at the joints etc. & complete as per specifications including repairing of damage to building etc. and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 125 mm dia.(32 mm thick insulation)	RM	260

881	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled / hot water piping inside the building (with necessary clamps, steel wire rope hangers/ vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / cu m density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive or Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil for as per given below pipe size. The joints shall be sealed with 50 mm x 1 mm thick self adhesive tape at the joints etc. & complete as per specifications including repairing of damage to building etc. and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 100 mm dia.(32 mm thick insulation)	RM	200
882	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled / hot water piping inside the building (with necessary clamps, steel wire rope hangers/ vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / cu m density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive or Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil for as per given below pipe size. The joints shall be sealed with 50 mm x 1 mm thick self adhesive tape at the joints etc. & complete as per specifications including repairing of damage to building etc. and as required complete in all respect.Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.80 mm dia.(32 mm thick insulation)	RM	160
883	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled / hot water piping inside the building (with necessary clamps, steel wire rope hangers/ vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / cu m density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive or Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil for as per given below pipe size. The joints shall be sealed with 50 mm x 1 mm thick self adhesive tape at the joints etc. & complete as per specifications including repairing of damage to building etc. and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 65 mm dia.(32 mm thick insulation)	RM	80
884	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled / hot water piping inside the building (with necessary clamps, steel wire rope hangers/ vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / cu m density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive or Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil for as per given below pipe size. The joints shall be sealed with 50 mm x 1 mm thick self adhesive tape at the joints etc. & complete as per specifications including repairing of damage to building etc. and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 50 mm dia.(32 mm thick insulation)	RM	350

885	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled / hot water piping inside the building (with necessary clamps, steel wire rope hangers/ vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / cu m density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive or Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil for as per given below pipe size. The joints shall be sealed with 50 mm x 1 mm thick self adhesive tape at the joints etc. & complete as per specifications including repairing of damage to building etc. and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 40 mm dia.(32 mm thick insulation)	RM	100
886	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled / hot water piping inside the building (with necessary clamps, steel wire rope hangers/ vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / cu m density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive or Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil for as per given below pipe size. The joints shall be sealed with 50 mm x 1 mm thick self adhesive tape at the joints etc. & complete as per specifications including repairing of damage to building etc. and as required complete in all respect. Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above. 32mm dia.(19 mm thick insulation)	RM	180
887	Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled / hot water piping inside the building (with necessary clamps, steel wire rope hangers/ vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with following closed cell elastometric nitrile rubber of minimum 45 Kg / cu m density, thermal conductivity 0.037 W/MK or better at 20 deg mean temperature class 'O' insulation applied by suitable adhesive or Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil for as per given below pipe size. The joints shall be sealed with 50 mm x 1 mm thick self adhesive tape at the joints etc. & complete as per specifications including repairing of damage to building etc. and as required complete in all respect.Note:- The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.25mm dia.(19 mm thick insulation)	RM	400
888	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications. BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water/ hot eater circulation as specified Valves of 200 mm dia	No.	1
889	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications. BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water/ hot eater circulation as specified Valves of 150 mm dia	No.	18
890	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications. BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water/ hot eater circulation as specified Valves of 50 mm dia	No.	2

891	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications. Motorized Butterfly Valve with CI Body, SS Disc, O - ring and minimum PN-16 pressure rating, conforming to BS 5155, IS 13095, with IP-55 actuator, capable of accepting upto 10V DC , and upto 20 mA electric signal and providing similar transduced feedback output to control system as required Valves of 150 mm dia	No.	6
892	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications. AHU's Valves- BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water/ hot eater circulation as specified Valves of 80 mm dia	No.	8
893	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications. AHU's Valves- BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water/ hot eater circulation as specified Valves of 65 mm dia	No.	12
894	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications. AHU's Valves- BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water/ hot eater circulation as specified Valves of 50 mm dia	No.	18
895	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications.AHU's Valves- BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water/ hot eater circulation as specifiedValves of 40 mm dia	No.	6
896	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications. AHU's Valves- BUTTERFLY VALVE (MANUAL) with C I body SS Disc, Nitrile Rubber Seal & O- Ring PN 16 pressure rating for chilled water/ hot eater circulation as specified Valves of 32 mm dia	No.	22
897	Supplying, fixing, testing and commissioning of following valves, strainers, gauges in the chilled water plumbing duly insulated to the same specifications as the connected piping and adequately supported as per specifications. BALANCING VALVE WITH BUILT IN MEASURING FACILITY with C I body flanged construction with EPDM coated disc with long pitch with protected out pipe insulation & PN 16 pressure rating for chilled / hot water circulation as specified Valves of 150 mm dia	No.	6
898	Supplying, installing and fixing in position Y Strainers of PN 16 rating and suitable for following pipe sizes. Price shall include the cost of Insulation, material and external treatment will be same as of pipe: 150 mm dia	No.	6
899	Supplying, installing and fixing in position Y Strainers of PN 16 rating and suitable for following pipe sizes. Price shall include the cost of Insulation, material and external treatment will be same as of pipe: 80 mm dia	No.	4
900	Supplying, installing and fixing in position Y Strainers of PN 16 rating and suitable for following pipe sizes. Price shall include the cost of Insulation, material and external treatment will be same as of pipe: 65 mm dia	No.	6

901	Supplying, installing and fixing in position Y Strainers of PN 16 rating and suitable for following pipe sizes. Price shall include the cost of Insulation, material and external treatment will be same as of pipe: 50 mm dia	No.	9
902	Supplying, installing and fixing in position Y Strainers of PN 16 rating and suitable for following pipe sizes. Price shall include the cost of Insulation, material and external treatment will be same as of pipe: 40 mm dia	No.	3
903	Supplying, installing and fixing in position Y Strainers of PN 16 rating and suitable for following pipe sizes. Price shall include the cost of Insulation, material and external treatment will be same as of pipe: 32 mm dia	No.	11
904	Supply, Installation, Testing and Commissioning of following sizes electronic, self- alancing, pressure independent type dynamic balancing valve with integrated 2 way modualating control valve in a single body. The actuator shall be capable of accepting upto 10V DC and upto 20mA electric signal and shall provide similar transduced feedback output to control system. Maximum close off pressure shall not be less than 6 Bar for upto 50 mm valves and 7 Bar for 65 mm & above. Valves should have pressure rating of 25 Bar Minimum. The modulating valves cost included with Digital Thermostat alongwith necessary wiring. Valve suitable for 80 mm dia pipe	No.	4
905	Supply, Installation, Testing and Commissioning of following sizes electronic, self- alancing, pressure independent type dynamic balancing valve with integrated 2 way modualating control valve in a single body. The actuator shall be capable of accepting upto 10V DC and upto 20mA electric signal and shall provide similar transduced feedback output to control system. Maximum close off pressure shall not be less than 6 Bar for upto 50 mm valves and 7 Bar for 65 mm & above. Valves should have pressure rating of 25 Bar Minimum. The modulating valves cost included with Digital Thermostat alongwith necessary wiring. Valve suitable for 65 mm dia pipe	No.	6
906	Supply, Installation, Testing and Commissioning of following sizes electronic, self- alancing, pressure independent type dynamic balancing valve with integrated 2 way modualating control valve in a single body. The actuator shall be capable of accepting upto 10V DC and upto 20mA electric signal and shall provide similar transduced feedback output to control system. Maximum close off pressure shall not be less than 6 Bar for upto 50 mm valves and 7 Bar for 65 mm & above. Valves should have pressure rating of 25 Bar Minimum. The modulating valves cost included with Digital Thermostat alongwith necessary wiring.Valve suitable for 50 mm dia pipe	No.	9
907	Supply, Installation, Testing and Commissioning of following sizes electronic, self- alancing, pressure independent type dynamic balancing valve with integrated 2 way modualating control valve in a single body. The actuator shall be capable of accepting upto 10V DC and upto 20mA electric signal and shall provide similar transduced feedback output to control system. Maximum close off pressure shall not be less than 6 Bar for upto 50 mm valves and 7 Bar for 65 mm & above. Valves should have pressure rating of 25 Bar Minimum. The modulating valves cost included with Digital Thermostat alongwith necessary wiring. Valve suitable for 40 mm dia pipe	No.	3
908	Supply, Installation, Testing and Commissioning of following sizes electronic, self- alancing, pressure independent type dynamic balancing valve with integrated 2 way modualating control valve in a single body. The actuator shall be capable of accepting upto 10V DC and upto 20mA electric signal and shall provide similar transduced feedback output to control system. Maximum close off pressure shall not be less than 6 Bar for upto 50 mm valves and 7 Bar for 65 mm & above. Valves should have pressure rating of 25 Bar Minimum. The modulating valves cost included with Digital Thermostat alongwith necessary wiring. Valve suitable for 32 mm dia pipe	No.	11

909	NON - RETURN VALVE with duel plate of C I body SS plates vulcanized NBR seal flanged end & PN 16 pressure rating for chilled / hot water circulation including insulation as specified 150 mm dia (insulated)	No	6
910	Supply, installing and fixing in position flexible connections of required pressure rating (PN 16) installed at pump suction & discharge and at pipes crossing building expansion joints. Price shall include the cost of Insulation, material and external treatment will be same as of pipe Valves of 150 mm dia	No.	24
911	Supply, installation, testing and commissioning of Digital cooling thermostats to be installed for controllig air handling units & fan coil units as described elsewhere in BOQ. Proportional cooling thermostat for controlling AHU.	No.	33
912	Supplying, installing and fixing in position Auto air vents of PN 16 rating.	No.	60
913	Supplying, installing and fixing in position of Drain/Bleed Valves of PN 16 rating.	No.	80
914	Providing and fixing in position the industrial type pressure gauges with gun metal / brass valves complete as required	No.	100
915	Providing & fixing in position the mercury in glass industrial type thermometres.	No.	100
916	Supplying and fixing GI class 'B' pipes cut to required lengths and complete with threaded joints. Quoted price shall include providing and fixing in position fittings, elbows, tees, reducers, expanders, mating flanges & sockets for Building Automation System as required.. The pipes shall be of following sizes: GI pipes of 65 mm dia	Rm	20
917	Supplying and fixing GI class 'B' pipes cut to required lengths and complete with threaded joints. Quoted price shall include providing and fixing in position fittings, elbows, tees, reducers, expanders, mating flanges & sockets for Building Automation System as required.. The pipes shall be of following sizes: GI pipes of 50 mm dia	Rm	15
918	Supplying and fixing GI class 'B' pipes cut to required lengths and complete with threaded joints. Quoted price shall include providing and fixing in position fittings, elbows, tees, reducers, expanders, mating flanges & sockets for Building Automation System as required.. The pipes shall be of following sizes: GI pipes of 40 mm dia	Rm	50
919	Supplying and fixing GI class 'B' pipes cut to required lengths and complete with threaded joints. Quoted price shall include providing and fixing in position fittings, elbows, tees, reducers, expanders, mating flanges & sockets for Building Automation System as required.. The pipes shall be of following sizes: GI pipes of 32 mm dia	Rm	130
920	Supplying and fixing GI class 'B' pipes cut to required lengths and complete with threaded joints. Quoted price shall include providing and fixing in position fittings, elbows, tees, reducers, expanders, mating flanges & sockets for Building Automation System as required.. The pipes shall be of following sizes: GI pipes of 25 mm dia	Rm	40
921	Squar / Rectangular Ducting (Factory Fabricated) Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports/steel wire hangers etc. as per approved drawings and specifications of following sheet thickness complete as required. Thickness 0.63 mm sheet	Sqm.	4000

922	Squar / Rectangular Ducting (Factory Fabricated) Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports/steel wire hangers etc. as per approved drawings and specifications of following sheet thickness complete as required. Thickness 0.8 mm sheet	Sqm.	200
923	Squar / Rectangular Ducting (Factory Fabricated) Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports/steel wire hangers etc. as per approved drawings and specifications of following sheet thickness complete as required. Thickness 1.00 mm sheet	Sqm.	50
924	Square / Rectangular Ducting (Site Fabricated) Supply, installation, balancing and commissioning of fabricated at site GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required Thickness 0.63 mm sheet	Sqm.	200
925	Square / Rectangular Ducting (Site Fabricated) Supply, installation, balancing and commissioning of fabricated at site GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required Thickness 0.80 mm sheet	Sqm.	80
926	Square / Rectangular Ducting (Site Fabricated) Supply, installation, balancing and commissioning of fabricated at site GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as requiredThickness 1.00 mm sheet	Sqm.	10
927	Square / Rectangular Ducting (Site Fabricated) Supply, installation, balancing and commissioning of fabricated at site GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required Thickness 1.25 mm sheet	Sqm.	60
928	Supplying, Fixing,testing and commissioning of fire dampers in supply air duct/main branch and return air path as and where required of required sizes i/c control wiring,the damper shall be motorized and spring return so as to close the damper in the event of power failure automatically and open the same in case of power being restored. The spring return action shall be inbuilt mechanism and not externally mounted. The damper shall also be closed in the event of fire signal complete as required and as per specifications. Fire damper	Sqm.	30
929	Supplying, Fixing,testing and commissioning of fire dampers in supply air duct/main branch and return air path as and where required of required sizes i/c control wiring,the damper shall be motorized and spring return so as to close the damper in the event of power failure automatically and open the same in case of power being restored. The spring return action shall be inbuilt mechanism and not externally mounted. The damper shall also be closed in the event of fire signal complete as required and as per specifications. Actuator with control panel	No.	50
930	Supply, installation, testing and commissioning of Motorized (ON-OFF Type) duct mounted GI volume control damper with enthalpy sensor and necessary control wire (minimum 1.5 sq. mm) for integration within AHU room Dampers.	Sqm.	10

931	Supply, installation, testing and commissioning of Motorized (ON-OFF Type) duct mounted GI volume control damper with enthalpy sensor and necessary control wire (minimum 1.5 sq. mm) for integration within AHU room Actuator.	No.	22
932	Supply, installation and balancing of Extruded Aluminium construction Non return Damper. The NRD will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm.	5
933	Supplying & fixing of powder coated extruded aluminium Supply Air Grills with aluminium volume control dampers as per specifications.	Sqm.	30
934	Supply, installation and balancing of Extruded Aluminium construction Exhaust/Fresh Grilles without volume control dampers. The grilles will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications. The grilles may be double or single louvered, adjustable or fixed as required by Client	Sqm.	45
935	Supplying, fixing testing commissioning of supply air diffusers of powder coated aluminium with aluminium volume control dampers with anti smudge ring & removable core	Sqm.	15
936	Supplying, fixing testing commissioning of Return air diffusers of powder coated aluminium without volume control dampers with anti smudge ring & removable core..	Sqm.	15
937	Supplying & fixing of powder coated extruded aluminium Return Air Grills with louvers but without volume control dampers complete as required.	Sqm.	50
938	Supply, installation, testing and commissioning of GI volume control duct damper complete with neoprene rubber gaskets, nuts, bolts, screws linkages, flanges etc., as per specifications.	Sqm.	25
939	Supply, installation, testing and balancing of Powder coated/Anodised extruded aluminium construction inlet air louvers with bird screen for fresh air alongwith GI construction volume control damper.The louvers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm.	40
940	Supply, installation, testing and balancing of Powder coated/Anodised extruded aluminium construction exhaust air louvers with bird screen.The louvers will be powder coated in shade approved by Client and installed as per approved shop drawings and specifications.	Sqm.	30
941	Supply, installation, testing and balancing of Exhaust valves100mm Dia	No.	5
942	Supply, installation, testing and balancing of Exhaust valves 125mm Dia	No.	5
943	Supply, installation, testing & commissioning of thermal insulated flexible duct of following sizes duly supported at regular interval as per site requirement etc. complete as required as per specifications 200 mm dia	Rm	10
944	Supply, installation, testing and balancing of Pressure relief dampers as per the specifications Note:All exposed internal surfaces & duct shall be painted in black mat finish by the HVAC contractor. (applicable to internal ducts)	Sqm	40
945	Supply and fixing of acoustic lining of supply air duct and plenum with 25 mm thick resin bonded glass wool having density of 32 kg/m³, with 25 mm X 25 mm GI section of 1.25 mm thick, at 600 mm centre to centre covered with Reinforced Plastic tissue paper and 0.5 mm thick perforated aluminum sheet fixed to inside surface of ducts with cadmium plated nuts, bolts, stick pins, CPRX compound etc. or anti-microbial Chemically cross linked polyethlyne foam of class"O"(XLPE)complete as required and as per specifications. - DSR:16.21 15 mm thick acoustic lining	Sqm	600
946	Supplying and fixing of following thickness duly laminated aluminum foil of mat finish closed cell Nitrile rubber (Class "O") insulation on existing duct after applying suitable adhesive for Nitrile rubber. The joints shall be sealed with 50 mm wide and 3 mm thick self adhesive nitrile rubber tape insulation or anti-microbial Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil complete as per specifications and as required. - DSR:16.23 Insulation of 19 mm thickness	Sqm	3370

947	Supplying and fixing of following thickness duly laminated aluminum foil of mat finish closed cell Nitrile rubber (Class "O") insulation on existing duct after applying suitable adhesive for Nitrile rubber. The joints shall be sealed with 50 mm wide and 3 mm thick self adhesive nitrile rubber tape insulation or anti-microbial Chemically cross linked polyethlyne foam of class"O"(XLPE) with Aluminium PE foil complete as per specifications and as required. - DSR:16.23 Insulation of 25 mm thickness for sun exposed duct	Sqm	80
948	Supplying and fixing of 13 mm thick Nitrile rubber insulation on condensate drain piping/fittings includng valves, flanges, union etc.as per the approved shop drawings and specifications. Pipe shall be finished with cladding as per specifications. Condensate drain pipes of 65 mm dia- 13mm thick insulation	RM	20
949	Supplying and fixing of 13 mm thick Nitrile rubber insulation on condensate drain piping/fittings includng valves, flanges, union etc.as per the approved shop drawings and specifications. Pipe shall be finished with cladding as per specifications. Condensate drain pipes of 50 mm dia- 13mm thick insulation	RM	15
950	Supplying and fixing of 13 mm thick Nitrile rubber insulation on condensate drain piping/fittings includng valves, flanges, union etc.as per the approved shop drawings and specifications. Pipe shall be finished with cladding as per specifications. Condensate drain pipes of 40 mm dia- 13mm thick insulation	RM	50
951	Supplying and fixing of 13 mm thick Nitrile rubber insulation on condensate drain piping/fittings includng valves, flanges, union etc.as per the approved shop drawings and specifications. Pipe shall be finished with cladding as per specifications. Condensate drain pipes of 32 mm dia- 13mm thick insulation	RM	130
952	Supplying and fixing of 13 mm thick Nitrile rubber insulation on condensate drain piping/fittings includng valves, flanges, union etc.as per the approved shop drawings and specifications. Pipe shall be finished with cladding as per specifications. Condensate drain pipes of 25 mm dia- 13mm thick insulation	RM	40
953	Supplying & fixing of Underdeck insulation on RCC slab ceiling with approved sample of Class "O" closed cell Nitrile Rubber Insulation with 25 mm Thickness & density 40-55 Kg/Cum .Thermal Conductivity not exceeding 0.035 W/mK at an average Temperature of 0°C. Material shall have fire performance acc. to BS 476 Part 7 & Part 6, water vapour diffusion resistance (µ factor) shall be greater than 7000 & tested from third party for the parameteres.Insulation material shall be factory laminated with Aluminium Foil. 25mm thick	Sqm	1170

954	**MOTOR CONTROL CENTRE :**Design, manufacture, supply, installation, testing and commissioning of the following cubicle type 2 mm thick sheet steel enclosed separate compartment for each feeder, front operated, rear connections indoor type LT motor control panel, dust and vermin proof, drawout/hinged and lockable doors, complete with internal wiring, colour coding with ferrules, bonding to earth and painting. Quoted price for each panel & motor control centre shall include all associated control wiring and interlocking circuitary. Each MCC shall include cost of cable, cable trays,wiring, control wiring & inter locking between chillers, primary CHW pumps, condenser water pumps, motorized valves at chillers and condensers & flow switch installed in de-coupler by-pass line, in order to execute the required sequence of operation. A separate set of CTs to be provided for BAS and wiring from CT's and voltage transducers to be brought on to separate set of terminals.All outgoing shall be provided with Stop/Manual/ Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System. Motor Control Centre- Section 01 (415 V) bus section consisting of : 1 No. Incoming each consisting of the following : 1 No. 1000 amps 4 Pole ACB with microprocessor based complete with the following :0 - 500 volts 96 x 96 sq mm digital voltmeter with selector switch. -1Set, 0 - 1000 amps 96 x 96 sq mm digital ammeter with 3 No. 1000-/ 5 amps CT's and selector switch.-1SetPhase indicating lamps. TPN bus bars shall be of Aluminium and shall be sleeved. Phase bus bars shall be rated at 1250 amps and neutral bus bar shall be of 50% capacity.Bus Coupler # 1 Set -1 No. 1000 amps 4 Pole ACB without releases, Auxillary contacts with on/off/trip indicating lights # 1 Set,Control MCB # 1No.Outgoings 1, 2 No. 250 amps TPN MCCB with microprocessor based O/C, S/C protection release & ROM as outgoing to 2 No. 115 KW starter of chilling unit compressor motor. The MCCB compartment shall contain CT operated digital ammeter of 0-400 amps range with selector switch and an indicating lamp with MCB for 'ON' status of motor. 2 No. 40 amps MCCB Suitable rating MCCB Star Delta starter for 10 HP motor overloading relay with built in single phasing protection & outgoing feeder to Primary Chilled water pump motor. Each of these compartment shall contain CT operated digital ammeter of 0-100 amps range with selector switch and indicating lamp with MCB for 'ON / OFF' status of pump motors.2 No. 63 amps MCCB with outgoing feeders to variable Frequency Drive (VFD) panel of 20 HP outgoing feeders to Variable Flow Secondary Chilled Water pump motor. Each of these compartment shall contain CT operated digital ammeter of 0-100 amps range with selector switch and indicating lamp with MCB for 'ON / OFF' status of pump motors. VFD space provision shall be included.2 No. 63 amps MCCB with outgoing feeders to variable Frequency Drive (VFD) panel of 25 HP outgoing feeders to Variable Flow Condenser water pump. Each of these compartment shall contain CT operated digital ammeter of 0-100 amps range with selector switch and indicating lamp with MCB for 'ON / OFF' status of pump motors. 1 No. 40 amps MPCB with outgoing VFD feeders to 7.5 HP Cooling Tower Fan Moter. Each of these compartment shall contain CT operated digital ammeter of 0-63 amps range with selector switch and indicating lamp with MCB for 'ON / OFF' status of pump motors.VFD space provision shall be includedOutgoings -2, 1 No. 250 amps TPN MCCB with microprocessor based O/C, S/C protection release & ROM as outgoing to 1 No. 115 KW starter of chilling unit compressor motor. The MCCB compartment shall contain CT operated digital ammeter of 0-400 amps range with selector switch and an indicating lamp with MCB for 'ON' status of motor.1 No. 40 amps MCCB Suitable rating MCCB Star Delta starter for 10 HP motor overloading relay with built in single phasing protection & outgoing feeder to Primary Chilled water pump motor. Each of these compartment shall contain CT operated digital ammeter of 0-100 amps range with selector switch and indicating lamp with MCB for 'ON / OFF' status of pump motors.1 No. 63 amps Suitable rating MCCB with outgoing feeders to Variable Frequency Drive (VFD) panel of 20 HP outgoing feeders to Variable Flow Secondary Chilled Water pump motor. Each of these compartment shall contain CT operated digital ammeter of 0-100 amps range with selector switch and indicating lamp with MCB for 'ON / OFF' status of pump motors. VFD space provision shall be included.1 No. 63 ampsSuitable rating MCCB with outgoing feeders to Variable Frequency Drive (VFD) panel of 25 HP outgoing feeders to Variable Flow Condenser water pump. Each of these compartment shall contain CT operated digital ammeter of 0-100 amps range with selector switch and indicating lamp with MCB for 'ON / OFF' status of pump motors.1 No. 40 amps Suitable rating MPCB with outgoing VFD feeders to 7.5 HP Cooling Tower Fan Moter. Each of these compartment shall contain CT operated digital ammeter of 0-63 amps range with selector switch and indicating lamp with MCB for 'ON / OFF' status of pump motors.VFD space provision shall be included, Necessary cable alleys, space for spare switches, internal wiring, control wiring / cabling and copper earthing of all equipment shall be included. All switches and other components shall be motor duty rating. Spare feeder & space for following: 4 No. 25 HP Motor, Only Space for provision, internal switchgear will be installed as per future requirement. Blank space shall be provided. Motor Control Centre No. 1 as described above.	Set	1

955	CONTROL PANELS FOR AHU's (IP 65) Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels including anchoring into the wall, wiring, incoming, earthing & terminating into MCCB in each panel shall be provided by the electrical contractor. Space in Panel for mounting the VFD shall be included in the price All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System. The panel shall include the following components & accessories. a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA. b. DOL/SD starter as HP rating c. Terminal block for power distribution as required. d. Contactor, over load relay with built in single phasing protection. e. Phase indicating lights and indicating light for ON status. f. Digital voltmeter and digital ammeter. g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation. h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare. i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System. j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the AHU only. k. 220 / 24 V Transformer The number of control panels shall be as follows:Suitable rating MCB for 1.1 KW motor	No.	11
956	CONTROL PANELS FOR AHU's (IP 65)Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels including anchoring into the wall, wiring, incoming, earthing & terminating into MCCB in each panel shall be provided by the electrical contractor. Space in Panel for mounting the VFD shall be included in the priceAll outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System.The panel shall include the following components & accessories.a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA.b. DOL/SD starter as HP ratingc. Terminal block for power distribution as required.d. Contactor, over load relay with built in single phasing protection.e. Phase indicating lights and indicating light for ON status.f. Digital voltmeter and digital ammeter.g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation.h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare.i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System.j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the AHU only.k. 220 / 24 V Transformer The number of control panels shall be as follows: Suitable rating MCB for 1.5 KW motor	No.	4

957	CONTROL PANELS FOR AHU's (IP 65) Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels including anchoring into the wall, wiring, incoming, earthing & terminating into MCCB in each panel shall be provided by the electrical contractor. Space in Panel for mounting the VFD shall be included in the price All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System. The panel shall include the following components & accessories. a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA. b. DOL/SD starter as HP rating c. Terminal block for power distribution as required. d. Contactor, over load relay with built in single phasing protection. e. Phase indicating lights and indicating light for ON status. f. Digital voltmeter and digital ammeter. g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation. h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare. i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System. j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the AHU only. k. 220 / 24 V Transformer The number of control panels shall be as follows:Suitable rating MCB for 2.2 KW motor	No.	5
958	CONTROL PANELS FOR AHU's (IP 65)Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels including anchoring into the wall, wiring, incoming, earthing & terminating into MCCB in each panel shall be provided by the electrical contractor. Space in Panel for mounting the VFD shall be included in the priceAll outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System.The panel shall include the following components & accessories.a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA.b. DOL/SD starter as HP ratingc. Terminal block for power distribution as required.d. Contactor, over load relay with built in single phasing protection.e. Phase indicating lights and indicating light for ON status.f. Digital voltmeter and digital ammeter.g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation.h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare.i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System.j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the AHU only.k. 220 / 24 V TransformerThe number of control panels shall be as follows:Suitable rating MCB for 3.7 KW motor	No.	3

959	CONTROL PANELS FOR AHU's (IP 65) Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels including anchoring into the wall, wiring, incoming, earthing & terminating into MCCB in each panel shall be provided by the electrical contractor. Space in Panel for mounting the VFD shall be included in the price All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System. The panel shall include the following components & accessories. a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA. b. DOL/SD starter as HP rating c. Terminal block for power distribution as required. d. Contactor, over load relay with built in single phasing protection. e. Phase indicating lights and indicating light for ON status. f. Digital voltmeter and digital ammeter. g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation. h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare. i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System. j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the AHU only. k. 220 / 24 V Transformer The number of control panels shall be as follows: Suitable rating MCB for 5.5 KW motor	No.	4
960	CONTROL PANELS FOR AHU's (IP 65)Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels including anchoring into the wall, wiring, incoming, earthing & terminating into MCCB in each panel shall be provided by the electrical contractor. Space in Panel for mounting the VFD shall be included in the priceAll outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System.The panel shall include the following components & accessories.a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA.b. DOL/SD starter as HP ratingc. Terminal block for power distribution as required.d. Contactor, over load relay with built in single phasing protection.e. Phase indicating lights and indicating light for ON status.f. Digital voltmeter and digital ammeter.g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation.h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare.i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System.j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the AHU only.k. 220 / 24 V TransformerThe number of control panels shall be as follows: Suitable rating MCB for 7.5 KW motor	No.	2

961	CONTROL PANELS FOR AHU's (IP 65) Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels including anchoring into the wall, wiring, incoming, earthing & terminating into MCCB in each panel shall be provided by the electrical contractor. Space in Panel for mounting the VFD shall be included in the price All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System. The panel shall include the following components & accessories. a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA. b. DOL/SD starter as HP rating c. Terminal block for power distribution as required. d. Contactor, over load relay with built in single phasing protection. e. Phase indicating lights and indicating light for ON status. f. Digital voltmeter and digital ammeter. g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation. h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare. i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System. j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the AHU only. k. 220 / 24 V Transformer The number of control panels shall be as follows: Suitable rating MCB for 11.0 KW motor	No.	1
962	CONTROL PANELS FOR AHU's (IP 65)Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels including anchoring into the wall, wiring, incoming, earthing & terminating into MCCB in each panel shall be provided by the electrical contractor. Space in Panel for mounting the VFD shall be included in the priceAll outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System.The panel shall include the following components & accessories.a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA.b. DOL/SD starter as HP ratingc. Terminal block for power distribution as required.d. Contactor, over load relay with built in single phasing protection.e. Phase indicating lights and indicating light for ON status.f. Digital voltmeter and digital ammeter.g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation.h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare.i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System.j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the AHU only.k. 220 / 24 V TransformerThe number of control panels shall be as follows:Suitable rating MCB for 15.0 KW motor, Note: All exposed panel shall be provided with IP55 protection.	No.	2

963	CONTROL PANELS FOR AXIAL FANS/ FAN SECTIONS Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels, including anchoring into the wall, wiring terminating into MCCB and copper earthing, in each panel shall be provided by the electrical contractor.And space in Panel for mounting the VFD. All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System. The panel shall include the following components & accessories. a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA. b. DOL/SD starter as HP rating c. Terminal block for power distribution as required. d. Contactor, over load relay with built in single phasing protection. e. Phase indicating lights and indicating light for ON status. f. Digital voltmeter and digital ammeter. g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation. h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare. i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System. j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the fan only. k. 220 / 24 V Transformer The number of control panels shall be as follows- Suitable rating MPCB with DOL starter for upto 1.1 kW motor	No.	3
964	CONTROL PANELS FOR AXIAL FANS/ FAN SECTIONS Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels, including anchoring into the wall, wiring terminating into MCCB and copper earthing, in each panel shall be provided by the electrical contractor.And space in Panel for mounting the VFD.All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System.The panel shall include the following components & accessories.a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA.b. DOL/SD starter as HP ratingc. Terminal block for power distribution as required.d. Contactor, over load relay with built in single phasing protection.e. Phase indicating lights and indicating light for ON status.f. Digital voltmeter and digital ammeter.g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation.h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare.i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System.j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the fan only.k. 220 / 24 V TransformerThe number of control panels shall be as follows- Suitable rating MPCB with DOL starter for upto 1.5 kW motor	No.	2

965	CONTROL PANELS FOR AXIAL FANS/ FAN SECTIONS Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels, including anchoring into the wall, wiring terminating into MCCB and copper earthing, in each panel shall be provided by the electrical contractor.And space in Panel for mounting the VFD. All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System. The panel shall include the following components & accessories. a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA. b. DOL/SD starter as HP rating c. Terminal block for power distribution as required. d. Contactor, over load relay with built in single phasing protection. e. Phase indicating lights and indicating light for ON status. f. Digital voltmeter and digital ammeter. g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation. h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare. i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System. j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the fan only. k. 220 / 24 V Transformer The number of control panels shall be as follows- Suitable rating MPCB with DOL starter for upto 2.2 kW motor	No.	8
966	CONTROL PANELS FOR AXIAL FANS/ FAN SECTIONS Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels, including anchoring into the wall, wiring terminating into MCCB and copper earthing, in each panel shall be provided by the electrical contractor.And space in Panel for mounting the VFD.All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System.The panel shall include the following components & accessories.a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA.b. DOL/SD starter as HP ratingc. Terminal block for power distribution as required.d. Contactor, over load relay with built in single phasing protection.e. Phase indicating lights and indicating light for ON status.f. Digital voltmeter and digital ammeter.g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation.h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare.i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System.j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the fan only.k. 220 / 24 V TransformerThe number of control panels shall be as follows- Suitable rating MPCB with DOL starter for upto 3.7 kW motor	No.	6

967	CONTROL PANELS FOR AXIAL FANS/ FAN SECTIONS Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels, including anchoring into the wall, wiring terminating into MCCB and copper earthing, in each panel shall be provided by the electrical contractor.And space in Panel for mounting the VFD. All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System. The panel shall include the following components & accessories. a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA. b. DOL/SD starter as HP rating c. Terminal block for power distribution as required. d. Contactor, over load relay with built in single phasing protection. e. Phase indicating lights and indicating light for ON status. f. Digital voltmeter and digital ammeter. g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation. h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare. i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System. j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the fan only. k. 220 / 24 V Transformer The number of control panels shall be as follows- Suitable rating MPCB with DOL starter for upto 5.5 kW motor	No.	6
968	CONTROL PANELS FOR AXIAL FANS/ FAN SECTIONS Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels, including anchoring into the wall, wiring terminating into MCCB and copper earthing, in each panel shall be provided by the electrical contractor.And space in Panel for mounting the VFD.All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System.The panel shall include the following components & accessories.a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA.b. DOL/SD starter as HP ratingc. Terminal block for power distribution as required.d. Contactor, over load relay with built in single phasing protection.e. Phase indicating lights and indicating light for ON status.f. Digital voltmeter and digital ammeter.g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation.h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare.i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System.j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the fan only.k. 220 / 24 V TransformerThe number of control panels shall be as follows- Suitable rating MPCB with DOL starter for upto 7.5 kW motor	No.	10

969	CONTROL PANELS FOR AXIAL FANS/ FAN SECTIONS Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels, including anchoring into the wall, wiring terminating into MCCB and copper earthing, in each panel shall be provided by the electrical contractor.And space in Panel for mounting the VFD. All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System. The panel shall include the following components & accessories. a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA. b. DOL/SD starter as HP rating c. Terminal block for power distribution as required. d. Contactor, over load relay with built in single phasing protection. e. Phase indicating lights and indicating light for ON status. f. Digital voltmeter and digital ammeter. g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation. h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare. i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System. j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the fan only. k. 220 / 24 V Transformer The number of control panels shall be as follows- Suitable rating MPCB with DOL starter for upto 11 kW motor	No.	2
970	CONTROL PANELS FOR AXIAL FANS/ FAN SECTIONS Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels, including anchoring into the wall, wiring terminating into MCCB and copper earthing, in each panel shall be provided by the electrical contractor.And space in Panel for mounting the VFD.All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System.The panel shall include the following components & accessories.a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA.b. DOL/SD starter as HP ratingc. Terminal block for power distribution as required.d. Contactor, over load relay with built in single phasing protection.e. Phase indicating lights and indicating light for ON status.f. Digital voltmeter and digital ammeter.g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation.h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare.i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System.j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the fan only.k. 220 / 24 V TransformerThe number of control panels shall be as follows- Suitable rating MPCB with DOL starter for upto 15 kW motor	No.	5

971	CONTROL PANELS FOR AXIAL FANS/ FAN SECTIONS Design, manufacture, supply, installation, testing and commissioning of the following cubicle type, dead front, sheet steel, wall mounted control panels, including anchoring into the wall, wiring terminating into MCCB and copper earthing, in each panel shall be provided by the electrical contractor.And space in Panel for mounting the VFD. All outgoing shall be provided with Stop /Manual /Auto selector switch to facilitate operation through BAS. All starters shall be provided with potential free Contact for Connections to Building Automation System. The panel shall include the following components & accessories. a. MCCB as per the ratings given below, suitable for motor duty and able to withstand fault level of 20 KA. b. DOL/SD starter as HP rating c. Terminal block for power distribution as required. d. Contactor, over load relay with built in single phasing protection. e. Phase indicating lights and indicating light for ON status. f. Digital voltmeter and digital ammeter. g. For on/off/remote and local operation, 3 pole single throw switch shall be provided in each panel to facilitate override of the automatic operation. h. 3 No. of Single Pole MCB's Shall be provided at the incoming section of the starter panel for DDC Panel , fire damper actuator & as a spare. i. All starters shall be provided with suitable potential free contract for connections to the Building Automation System. j. The item includes providing emergeny stop button along with NO/NC contacts / control wiring or any other accessorries required to complete installation in all respects. The button shall be placed near the fan only. k. 220 / 24 V Transformer The number of control panels shall be as follows- Suitable rating MPCB with DOL starter for upto 22 kW motor Note: All exposed panel shall be provided with IP55 protection.	No.	3
972	**Lift**: Design, supplying, erecting testing and commissioning of - passenger/ Bed-cum-passenger hospital lift with speed of 1.5 mtr per second, variable voltage variable frequency drive, with or without machine room for the available well size, operating at 415 V 3 phase 50 cycles AC supply, powder coated / Stainless Steel car entrance doors enclosures with suitable colour vinyl flooring, LED car illumination, emergency light, intercom and fan as desired by the user, central opening / side opening door with or without attendant operation, 7 segment display buttons, call register indicator, fireman drive, SS handrails inside car, full length infrared curtain in car door, automatic rescue device with batteries, voice announcing in regional / international languages, Braille buttons with one year warranty and maintenance with necessary scaffolding and minor civil works like fixing of guide rail, counter weight etc.With Machine Room-SS Finish, 8 Passengers - 8 Stops	Nos.	1
973	Design, supplying, erecting testing and commissioning of - passenger/ Bed-cum-passenger hospital lift with speed of 1.5 mtr per second, variable voltage variable frequency drive, with or without machine room for the available well size, operating at 415 V 3 phase 50 cycles AC supply, powder coated / Stainless Steel car entrance doors enclosures with suitable colour vinyl flooring, LED car illumination, emergency light, intercom and fan as desired by the user, central opening / side opening door with or without attendant operation, 7 segment display buttons, call register indicator, fireman drive, SS handrails inside car, full length infrared curtain in car door, automatic rescue device with batteries, voice announcing in regional / international languages, Braille buttons with one year warranty and maintenance with necessary scaffolding and minor civil works like fixing of guide rail, counter weight etc. With Machine Room-SS Finish 20 Passenger - 8 Stops	Nos.	3

974	Design, supplying, erecting testing and commissioning of - passenger/ Bed-cum-passenger hospital lift with speed of 1.5 mtr per second, variable voltage variable frequency drive, with or without machine room for the available well size, operating at 415 V 3 phase 50 cycles AC supply, powder coated / Stainless Steel car entrance doors enclosures with suitable colour vinyl flooring, LED car illumination, emergency light, intercom and fan as desired by the user, central opening / side opening door with or without attendant operation, 7 segment display buttons, call register indicator, fireman drive, SS handrails inside car, full length infrared curtain in car door, automatic rescue device with batteries, voice announcing in regional / international languages, Braille buttons with one year warranty and maintenance with necessary scaffolding and minor civil works like fixing of guide rail, counter weight etc. With Machine Room-SS Finish 2 MT Goods Lift - 8 Stops	Nos.	1
975	**BMS:** BMS Computer System: Supply, installation, testing and commissioning of BMS operator workstation having intel i-5 Processor 10th Gen. with latest technology or Equivalent Server PC, 3.5 GHz, with 16 GB RAM, & 1 TB HDD, 10/100 Mbps Ethernet card, USB connection & internal modem, Microsoft(R) Windows(R) 10 OS Professional Enterprise, Web server software, with 32" colour graphics monitor as per Tender Specifications. Accessories included Mouse, Key Pad, Laserjet, Scanner colour A4 printer with the above BMS System configuration.	Lot	1
976	**BUILDING MANAGEMENT SYSTEM WEB-BASED SERVER SOFTWARE** SITC of minimum 3 user web based Server Software for Building Management System with dynamic Vector graphics. The software shall have minimum upto 3 simultaneous users. The Web-Based Server software shall have unlimited users capability. Software should have license point as per I/O Summary with minimum 10-15% spare points.Building Management Software with features like 3D vector dynamic graphics with Autocad import of plan with Zoom In & Zoom Out facility, Plant Viewer, Trend Viewer, Object Viewer, Report Viewer, Alarm viewer. The Web-Based Server software shall permit use of Standard Web-Browsers such as Microsoft Internet Explorer, Netscape Navigator, etc. The software shall be capable of integration third-party systems and should supports latest IP technology (IP V4). Software shall be B-OWS profile & support all open protocols natively such as BACnet, Modbus, Lontalk etc.The Management Stations shall match the BACnet Profile B-BC as per the BTL Listing shall be Rev. 14 and above.(Properitary Protocol shall not be accepted)	Set	1
977	**PROGRAMMABLE & APPLICATION SPECIFIC CONTROLLER (DDC) - UL LISTED (DDC controllers for Chiller Plant incl. Chillers, Primary Pumps, Secondary Pumps, Condenser Pumps & Cooling Towers)**Supply, Installation, Testing & Commissioning of Standalone, Intelligent, UL listed, BTL tested Rev.12 and above, ANSI/ASHRAE approved BACnet I/P, interoperable DDC as per the specification. All the controllers are UL/BTL tested & CE certified. The controller possesses Dual 32 Bit Microprocessor both for IO Management as well as communication. It should store trend logs and event buffer. DDC Controller shall have a resident real time clock with a battery back up. DDC must support trending & scheduling at Controller level. All trend data must be created and saved to the automation station to achieve gap-free trend documentation during communication failure. For AHU's Maximum of One Controller /2 AHU Shall be used. UL Listed BACnet(BTL) B-AAC controller and communication with Expansion units to Main Controller shall be on BACnet I/P. The field controller shall be able to connect in daisy chain , RSTP network, wherein it can support min. 30 controllers in RSTP network. Consider 20% Spare.Proprietry Protocol shall not be acceptedThe above shall be housed in a vandal proof, lockable & secure MS Cabinets to be supplied along with the Controllers	Nos.	1

978	**PROGRAMMABLE & APPLICATION SPECIFIC CONTROLLER (DDC) - UL LISTED (DDC for AHU Floor mounted (upto 2AHU /DDC))** Supply, Installation, Testing & Commissioning of Standalone, Intelligent, UL listed, BTL tested Rev.12 and above, ANSI/ASHRAE approved BACnet I/P, interoperable DDC as per the specification. All the controllers are UL/BTL tested & CE certified. The controller possesses Dual 32 Bit Microprocessor both for IO Management as well as communication. It should store trend logs and event buffer. DDC Controller shall have a resident real time clock with a battery back up. DDC must support trending & scheduling at Controller level. All trend data must be created and saved to the automation station to achieve gap-free trend documentation during communication failure. For AHU's Maximum of One Controller /2 AHU Shall be used. UL Listed BACnet(BTL) B-AAC controller and communication with Expansion units to Main Controller shall be on BACnet I/P. The field controller shall be able to connect in daisy chain , RSTP network, wherein it can support min. 30 controllers in RSTP network. Consider 20% Spare. Proprietry Protocol shall not be accepted The above shall be housed in a vandal proof, lockable & secure MS Cabinets to be supplied along with the Controllers	Nos.	6
979	**PROGRAMMABLE & APPLICATION SPECIFIC CONTROLLER (DDC) - UL LISTED (DDC for AHU Ceiling Suspended (upto 2AHU /DDC))** Supply, Installation, Testing & Commissioning of Standalone, Intelligent, UL listed, BTL tested Rev.12 and above, ANSI/ASHRAE approved BACnet I/P, interoperable DDC as per the specification. All the controllers are UL/BTL tested & CE certified. The controller possesses Dual 32 Bit Microprocessor both for IO Management as well as communication. It should store trend logs and event buffer. DDC Controller shall have a resident real time clock with a battery back up. DDC must support trending & scheduling at Controller level. All trend data must be created and saved to the automation station to achieve gap-free trend documentation during communication failure. For AHU's Maximum of One Controller /2 AHU Shall be used. UL Listed BACnet(BTL) B-AAC controller and communication with Expansion units to Main Controller shall be on BACnet I/P. The field controller shall be able to connect in daisy chain , RSTP network, wherein it can support min. 30 controllers in RSTP network. Consider 20% Spare. Proprietry Protocol shall not be accepted The above shall be housed in a vandal proof, lockable & secure MS Cabinets to be supplied along with the Controllers	Nos.	5
980	**PROGRAMMABLE & APPLICATION SPECIFIC CONTROLLER (DDC) - UL LISTED (DDC for Ventilation & Exhaust Fans (upto 5 Fans/DDC))**Supply, Installation, Testing & Commissioning of Standalone, Intelligent, UL listed, BTL tested Rev.12 and above, ANSI/ASHRAE approved BACnet I/P, interoperable DDC as per the specification. All the controllers are UL/BTL tested & CE certified. The controller possesses Dual 32 Bit Microprocessor both for IO Management as well as communication. It should store trend logs and event buffer. DDC Controller shall have a resident real time clock with a battery back up. DDC must support trending & scheduling at Controller level. All trend data must be created and saved to the automation station to achieve gap-free trend documentation during communication failure. For AHU's Maximum of One Controller /2 AHU Shall be used. UL Listed BACnet(BTL) B-AAC controller and communication with Expansion units to Main Controller shall be on BACnet I/P. The field controller shall be able to connect in daisy chain , RSTP network, wherein it can support min. 30 controllers in RSTP network. Consider 20% Spare.Proprietry Protocol shall not be acceptedThe above shall be housed in a vandal proof, lockable & secure MS Cabinets to be supplied along with the Controllers	Nos.	11

981	**PROGRAMMABLE & APPLICATION SPECIFIC CONTROLLER (DDC) - UL LISTED (DDC for Plumbing & Firefighting System)** Supply, Installation, Testing & Commissioning of Standalone, Intelligent, UL listed, BTL tested Rev.12 and above, ANSI/ASHRAE approved BACnet I/P, interoperable DDC as per the specification. All the controllers are UL/BTL tested & CE certified. The controller possesses Dual 32 Bit Microprocessor both for IO Management as well as communication. It should store trend logs and event buffer. DDC Controller shall have a resident real time clock with a battery back up. DDC must support trending & scheduling at Controller level. All trend data must be created and saved to the automation station to achieve gap-free trend documentation during communication failure. For AHU's Maximum of One Controller /2 AHU Shall be used. UL Listed BACnet(BTL) B-AAC controller and communication with Expansion units to Main Controller shall be on BACnet I/P. The field controller shall be able to connect in daisy chain , RSTP network, wherein it can support min. 30 controllers in RSTP network. Consider 20% Spare. Proprietry Protocol shall not be accepted The above shall be housed in a vandal proof, lockable & secure MS Cabinets to be supplied along with the Controllers DDC for Plumbing & Firefighting System	Lot	1
982	**PROGRAMMABLE & APPLICATION SPECIFIC CONTROLLER (DDC) - UL LISTED (DDC for Electrical system)** Supply, Installation, Testing & Commissioning of Standalone, Intelligent, UL listed, BTL tested Rev.12 and above, ANSI/ASHRAE approved BACnet I/P, interoperable DDC as per the specification. All the controllers are UL/BTL tested & CE certified. The controller possesses Dual 32 Bit Microprocessor both for IO Management as well as communication. It should store trend logs and event buffer. DDC Controller shall have a resident real time clock with a battery back up. DDC must support trending & scheduling at Controller level. All trend data must be created and saved to the automation station to achieve gap-free trend documentation during communication failure. For AHU's Maximum of One Controller /2 AHU Shall be used. UL Listed BACnet(BTL) B-AAC controller and communication with Expansion units to Main Controller shall be on BACnet I/P. The field controller shall be able to connect in daisy chain , RSTP network, wherein it can support min. 30 controllers in RSTP network. Consider 20% Spare. Proprietry Protocol shall not be accepted The above shall be housed in a vandal proof, lockable & secure MS Cabinets to be supplied along with the Controllers DDC for Electrical system	Lot	1
983	**NETWORK / SUPERVISORY CONTROLLERS** Supply, installation, testing and commissioning of Microprocessor based 32 Bit, UL Listed & BTL Listed B-BC profile Rev.14, Web Based Supervisory controller for connecting all field DDC controllers and 3rd party System Integration Units and for transferring data from field devices to BMS Server Software. The Network Controller shall support routing between BACnet/IP , BACnet/LonTalk and BACnet MS/TP, Modbus, Lontalk. The Router shall Supports BACnet/IP and Firmware update via Ethernet and USB Device. Proprietry Protocol shall not be accepted between Router and Management station. Supervisory controller shall be modular in nature, with dual IP. Network supervisory controller shall have cybersecurity features such as IP whitelisting, IP port disablement etc.	Lot	1
984	**SYSTEM INTEGRATION UNITS FOR 3RD PARTY SYSTEM SOFTWARE INTEGRATION - UL listed Controllers**Supply, Installation, Testing & Commissioning of System Integration unit consisting of microprocessor based controller units BTL & UL Listed for third party integration. The same should support operations/ monitoring via portable operator terminal. Third Party Integrator/ Gateway shall have cybersecurity features such as IP whitelisting, IP port disablement etc.The controller shall be Native BACnet type with communication via BACnet, LonTalk, Modbus over RS-485. Integration platforms and system controllers for third-party devices and systems via Modbus, J-Bus and other protocols into the automation level via BACnet. The same shall Support operation via local or network-compatible operator units. It should store trend logs and event buffer. Third Party make controller shall not be accepted.Chiller Panel, Automatic Tube Cleaning, Chemical Dosing systemAHU/CSU/DOAS EC Fans, Pump VFD, Transfer pumps, STP Pumps, UPS Integration, DG Integration, Energy Meters, Variable Air Volume Diffusers, Fire Alarm System, Lift Integration, IAQ SensorsIntegration unit as mentioned above	Lot	1
985	Supplying, installing, testing and commissioning of IP 65, NTC/PTC, RTD/Themister type immersion Temp. sensor, having accuracy of ±1 deg. C.	Nos.	4
986	Supplying, installing, testing and commissioning of IP54, 1 SPDT NO/NC Contact relay, DP Switch -Air, having setting range from 20-300 Pa	Nos.	73
987	Supplying, installing, testing and commissioning of IP 65, NTC/PTC RTD/Thermister type T+Rh Sensor for outdoor application	Nos.	1
988	Supplying, installing, testing and commissioning of IP 65, NTC/PTC RTD/Thermister type Temp Sensor- Duct type	Nos.	21

989	Supplying, installing, testing and commissioning of Duct Pressure Sensor	Nos.	11
990	Supplying, installing, testing and commissioning of Split core type Current Relay	Nos.	36
991	Supplying, installing, testing and commissioning of IP65, Bi-level Switch with 2 NO/NC for indicating high & Low water level in tanks	Nos.	12
992	Supplying, installing, testing and commissioning of IP65, PN16, Water Pressure Sensor, giving 0-10 VDC/4-20 mA output	Nos.	1
993	Supplying, installing, testing and commissioning of DC Voltage Transducers	Nos.	2
994	Supplying, laying, termination, testing and commissioning of signal cables. (2 core 1 mm2), PVC insulated, tinned copper conductor cable unarmoured cable.	Rmt	7656
995	Supplying, laying, termination, testing and commissioning of communication cables. CAT 6 STP cable- unarmoured cable.	Rmt	750
996	Supplying and laying of 25mm of Heavy Duty PVC conduit on surface/recess including cutting/filling chases along with conduit accessories etc. complete as required.	Rmt	6380
997	GI Flexible conduit for termination in the DDC Panels	Rmt	5104
998	Supplying, laying, termination, testing and commissioning of communication cables. (2 core 1 mm2), PVC insulated, shielded tinned copper conductor cable, unarmoured cable.	Rmt	1500
999	Supplying, installing, testing and commissioning of 2 mm thick GI perforated cable trays of the following sizes complete with angle iron supports/hanging arrangement etc 40 x 300 x 40	Rmt	500
1000	NETWORKING ACCESSORIES Supply, installation, testing and commissioning of 8/16/24 port Layer 2 unmanaged switch The switch shall communicate with other switches to build a network on CAT6 cable within the building complete as per specifications with all necessary accessories	Lot	1

Note: All the above mentioned items should be executed as per the direction of Engineer-in-Charge.