



INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE
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NIT NO : - IACS/ELECT/2018-19/ 66

DATE: -14/11/2018

NOTICE INVITING TENDER

Sealed Item Rate tenders are invited from bonafide, resourceful and eligible contractors for the work of **“Supply, Installation, Testing & Commissioning of conventional type Fire Detection and alarm system, PA system, for the ground floor of Centenary Building, at IACS, Jadavpur, Kolkata”**. The estimated cost of the work is **Rs. 4,79,942/- (Rupees Four lakh seventy nine thousand nine hundred forty two only)**. The estimate however, is mentioned as rough guideline. The tender will comprise of the items like *Earnest Money Deposit in proper form & shape, copy of eligibility documents (i.e. Credential), copy of PAN Card, copy of valid Electrical Contractor's license, copy of valid Electrical Supervisor's license, copy of valid trade license, copy of GST Registration Certificate, Bank A/C details, other commercial details, Company profile and any other document in support of technical capability along with quoted price with respect to the Bill of Quantities (BOQ) provided with the tender document.*

The minimum eligibility criteria for the contractors will be as follows:

- (1) Completion of one similar work of value not less than 80% of the estimated cost put to tender under Government, Semi-Government, PSU or Govt. funded Autonomous Body, private organization of repute in the last 7 (seven) years to be reckoned from the date of issue of NIT.
- (2) Completion of two similar work each of value not less than 60% of the estimated cost put to tender under Government, Semi-Government, PSU or Govt. funded Autonomous Body private organization of repute in the last 7 (seven) years to be reckoned from the date of issue of NIT.
- (3) Completion of three similar work each of value not less than 40% of the estimated cost put to tender under Government, Semi-Government, PSU or Govt. funded Autonomous Body private organization of repute in last 7 (seven) years to be reckoned from the date of issue of NIT.

Similar work shall mean, Supply & installation of Fire detectors, Response indicators, Main fire control panel, Repeater panel, Manual call point, Hooter, Public Addressing system, Programming of the Main fire control panel/repeater panel etc.

The Earnest Money Deposit of Rs. 9,599/- (Rupees Nine thousand five hundred ninety nine only) is required to be submitted with the tender in the form of **Demand Draft/Banker's Cheque/Pay Order** of a scheduled Bank to be drawn in favor of **“Indian Association for the Cultivation of Science”** payable at Kolkata, failing which the tender shall be treated as canceled.

The stipulated **time of completion of this work is 60 (Sixty) days** which will be reckoned from the **date of handing over of site.**

Cost of Tender Form The tender paper may be purchased from the Workshop Department of IACS, Jadavpur against payment of **Rs. 500/- + 5% GST = Rs.526/-** (CGST & SGST @ Rs.12.50 rounded to Rs.13.00 for each) per set (non refundable) in cash. However, the firms who will submit downloaded tender from our website (www.iacs.res.in) should deposit Rs. 526/- (non-refundable) in the form of Demand **Draft/Pay order/Banker's cheque** (non-refundable) of a scheduled Bank, with their tender, in a separate envelope without which their tender will be summarily rejected.

Tender Notice No.	NIT NO: IACS/WS/ELEC/2018-19/66 Date : 14-11-2018
Tender issue date and time	15/11/18 to 30/11/18 (up to 2.00PM on each working day)
Last date and time of application for physical sale	30/11/18 (up to 1.00 PM). Application should be made on printed letter head of the firm mentioning the NIT no. and name of work.
Last date & time of submission of tender	30/11/18 (up to 3.00PM).
Date & time schedule of site visit	28/11/2018 (from 3 p.m. to 4 p.m.)
Date and time of Opening tender	30/11/18 at 4.00 PM
Place of Opening Tender	Workshop conference room
Contact No.	Tel. +9133 2473 4971 (Extn. 1700/1730)

Complete tender form along with EMD in a sealed envelope super scribing the name of the work, NIT no. and due date of opening on the top of the envelope, address to the Registrar , IACS,Jadavpur,Kolkata-700032 to be submitted to the receiving /dispatch section of IACS.

Acceptance of Tender : IACS authority is not bound to accept the lowest Tender and reserves the right to reject any or all the tenders without assigning any reason thereof.

Other terms & conditions:

The EMD shall be treated as a part of the security deposit for the successful bidder. Tender submitted without EMD or EMD not in proper form & shape shall be summarily rejected. The Security Deposit will be released after six months from the date of successful completion of work. The EMD for unsuccessful bidders will be refunded on demand after finalization of tender.

Deviation limit for individual item, trade and contract as a whole is **25% (twenty five percent)**. However, the department reserves the right to execute in part or whole and can drop any item of the "schedule of work" of the tender. No claim whatsoever will be entertained in this regard.

If the contractor fails to maintain the required rate of progress or to complete the work and clear the site on or before the contract or extended date of completion, he shall without prejudice to any other right or remedy available under the law, pay compensation the amount calculated at the rates stipulated below or such smaller amount as the Director may decide (whose decision in writing shall be final and binding) on the amount of the tendered value of the work for every completed day / week (as applicable) that the progress remains below or that the work remains incomplete.

- i. Completion period not exceeding 3 months (stipulated) @1% per week or part thereof provided always that the total amount of compensation for delay to be paid under this condition shall not exceed 5% of the tendered value of work.

- ii. The Engineer in Charge may without prejudice to his any other rights or remedy against the contractor in respect of any delay, inferior workmanship, any claims for damages and / or any other provisions of this contract or otherwise, and whether the state of completion has or has not elapsed, by notice in writing absolutely determine the contract in any of the following cases.
- iii. if the contractor fails to rectify/replace the defects in spite of written notice by Engineer – in-Charge
- iv. If the contractor suspends the progress of work so that in the opinion of the Engineer-in-Charge he will be unable to secure completion of the work by the date of completion and do not improve performance even after written notice.
- v. If the contractor neglects to carry out his obligation under the contract and / or commits defaults in complying with any of the terms and conditions and does not remedy if even after written notice.

When the contractor has made him liable for action under any of the aforesaid cases, the Engineer-in-Charge on behalf of IACS shall have powers

- a. To determine or rescind the contract. Upon such rescission, the full security deposit recoverable under the contract shall be liable to be forfeited and shall be absolutely at the disposal of IACS.
- b. After giving notice to the contractor to measure up the work done by him, get the balance work done by another contractor. Any expenses which may be incurred in excess of the sum which would work had been executed by him, shall be borne and paid by the original contractor and may be deducted from any of his dues.

Complete Tender Document will also be available at www.iacs.res.in and can be downloaded for submission. **Conditional tender including conditional rebates shall be summarily rejected. The quoted rate shall be inclusive of all taxes & duties, levies, cess etc i/c GST also.** Nothing extra will be paid to the Contractor except the accepted rate. In case of any discrepancies, the office copy of the tender document will be referred and shall be binding to the contractor.

ACTING REGISTRAR

TENDER

I/We have read and examined the notice inviting tender, schedule of quantities, terms and conditions and all other contents of the tender document.

I/We hereby tender for execution of the work as per schedule of quantities, specification, drawing and instructions.

I/We agree to keep the tender open for Sixty days from the date of submission for acceptance and not to make any modifications in its terms and conditions.

A sum of Rs. _____ is hereby forwarded in the form of Demand Draft/ Bankers cheque/PAY Order of a Scheduled Bank as earnest money deposit which shall be retained by IACS as a part of security Deposit.

I/We agree that if I/We fail to commence the work as specified in the schedule of quantities, an amount equal to the amount of the earnest money mentioned above shall be absolutely forfeited to the IACS without prejudice to any other right or remedy available in law.

Date _____

Signature of Contractor

Postal address _____.

Witness _____

Address/Occupation _____

Acceptance

The above tender is accepted by me for and on behalf of Indian Association for the Cultivation of Science for a sum of Rs. _____.
(Rupees _____). The letters referred to below shall form part of this contract agreement.

a) _____

b) _____

Date : _____ For and on behalf of
Indian Association for the Cultivation of Science

Signature

Designation

TECHNICAL SPECIFICATIONS & SPECIAL CONDITIONS OF CONTRACT FOR ELECTRICAL WORKS

CHAPTER 1

SPECIAL CONDITIONS OF CONTRACT

1.1 General

- 1.1.1 These Special Conditions of Contract supplement the General Instructions. General Conditions of Contract, Bill of Quantities and basic rates and Technical Specifications and tender drawings enclosed thereto, and shall be considered as part of the Tender Papers. Where the provisions of these Special Conditions of Contract are at variance with General Conditions of Contract, the Provisions of these Special Conditions of Contract shall prevail.
- 1.1.2 The several documents forming the tender are to be taken as mutually complementary to one another. Detailed drawings shall be followed in preference to small scale drawings and figured dimensions in preference to scaled dimensions.
- 1.1.3 If there are varying or conflicting provisions in the documents forming part of the contract, the Engineer-In-Charge shall be the deciding authority with regard to the intentions of the provisions and his decision shall be final and binding on the contractor.
- 1.1.4 The Employer reserves the right to exclude any of the Schedule items on reasons of the rates not being reasonable or subsequent change of design for evaluation of tender and deciding the contract during execution or work.
- 1.1.5 The Contractor may be required to carry out any addition or alteration work other than the specified in the schedule of work / bill of quantities as and when required, by the 'Employer' within the completion period of the project.

1.2 Scope of Work

- 1.2.1 The works to be governed by this contract shall cover delivery and transportation up to destination, safe custody at site, insurance, erection, testing and commissioning of the entire Electrical works.
- 1.2.2 The works to be under taken by the contractor will inter-alia include the following:
- i) Preparation of detailed 'AS BUILT' drawings of electrical wiring installation, cable laying, erection/fixing of switchgear etc.
 - ii) Pre-commissioning tests as per relevant standard specifications, code of practice, Acts and Rules.
 - iii) Warranty obligation for Circuit Breaker, CT, Cables, Capacitor etc to be supplied by the Contractor.
 - iv) All other earthwork and masonry works required to be done in connection with the electrical works.

1.3 Execution of work

- 1.3.1 All the works to be carried out as per the approved drawing and direction of the Engineer- In-Charge.
- 1.3.2 Water & Power supply: - It will be provided by IACS free of cost for the beneficial use of IACS only. However, the contractor shall have to arrange for utilizing the same at their cost and risk.

1.4 Period of Completion

- 1.4.1 Time is the essence of contract. Therefore, timely completion of project is very important. Normally no extension of time will be given. However, on account of delay if any, for the reason beyond the control of the contractor, necessary time extension may be granted if applied for by the contractor prior to the expiry of schedule time of completion.
- 1.4.2 No price variations shall be admissible on the contract rate for any item during the entire period of contract including extension periods. *The Contractor shall not have any claim whatsoever in this regard except statutory variation of duties and Taxes imposed by the Govt. of India/State Govt subsequent to submission of tender by the contractor.*

1.5 Quality of materials and works

All the materials to be used in the execution of the contract shall be of the approved quality and of the class most suited for the purpose specified. The work shall also conform to the following Acts, Rules and Orders:

- i) Indian Factories Act
- ii) Indian Electricity
- iii) National Building Code
- iv) National Electrical Code
- v) Indian Standard Specifications

1.5.1 All erection work shall be of the best workmanship & quality to the entire satisfaction of the Employer. The Contractor shall ensure that the equipment and services under the scope of this contract whether manufactured or performed within the Contractor's premises or at his subordinate's premises or at the work site or at any other place are strictly in accordance with the provisions of this contract. For this purpose, if necessary the Contractor shall adopt necessary quality assurance programme to control such activities at all stages.

1.6 Electrical License

1.6.1 The work shall be carried out only by a Contractor holding a valid license issued by the State Government for carrying out the installation work of a voltage classes involved, under the direct supervision of the persons holding valid certificates issued or recognized by the State Government. **The tenderer should furnish with his tender the particulars of the license with validity period held by him. The successful tenderer shall furnish the names and particulars of certificates of competency of supervisors and workmen to be engaged for carrying out this work.**

1.6.2 **The contractor shall not be allowed to engage sub-contractor directly or indirectly unless it is officially permitted by IACS.**

1.7 Inspection

1.7.1 The Contractor shall provide without any extra cost to the Employer all materials, equipment, tools, labor and maintenance of every kind which the Employer's Inspecting Engineer may consider necessary for any test and examination to be made at the Contractor's or the Sub-Contractor's (if approved) premises and at site and shall pay all cost attended thereon.

1.7.2 All the equipment and materials shall be tested / inspected by the Employer or its authorized Inspecting Engineer and approved before they are installed / used in the execution of the works covered in the contract. If the Contractor uses any equipment / materials without the prior approval of Employer, those are liable to be rejected. The Contractor shall furnish, as and when demanded by the Engineer-in-Charge the T.C. (Test Certificate) and G.C (Guarantee Card) for verification of quality and make of the materials.

1.7.3 The Inspecting Engineer or his authorized Representative shall have at all times access to the Contractor's premises and shall have the power to

- i) Inspect and examine the materials and workmanship of the work at any time at the site of erection
- ii) Reject any part of the work submitted by the Contractor as not being in accordance with the contract.
- iii) Reject the whole of the work including equipment tendered for inspection if after the inspection of such portion as he may, in his discretion think fit he is justified that the same is unsatisfactory.
- iv) Mark the rejected equipment with a rejection mark so that the same may be easily identified
- v) Re-inspect at the time of erection at site any equipment both previously inspected and approved by the inspecting Engineer at the Contractor or Sub-contractor's (if approved) premises. Notwithstanding any approval given earlier, the Contractor shall make good such rejections made based on such re-inspection at site to the satisfaction of the Engineer.
- vi) The decision of the Inspecting Engineer as regards to the acceptance or rejection of equipment / work shall be final and binding to the Contractor.

1.7.4 Consequence of Rejection

On the equipment / assemblies being rejected by the Inspecting Officer of the Employer at destination of the Contractor shall replace such rejected equipment/assemblies of the forthwith but in any event not later than a period of 2 (two) weeks in the case of minor equipment and 4(four) weeks in case of a major equipment from the date of rejection. The Contractor shall bear all the costs of replacement including freight, etc., but without being entitled to any extra time on this account. The decision as to whether the equipment is to be classified as Minor or Major for the purpose of this clause shall be that of an Engineer and is not questionable.

1.8 Installation

- 1.8.1 All works connected with and inclusive of installation and erection under this contract shall be done in accordance with the standard and established methods of installation and erection of electrical equipment and shall comply with relevant Indian Electricity Rules, National Electrical Code, BIS Codes of Specifications and Standards. The work shall also be strictly carried out in accordance with the instructions / recommendations of the manufacturers. **The equipment shall be leveled carefully before being fixed finally in position. All fragile and sensitive equipment shall be protected adequately and handled carefully during installation and erection.**

1.9 Commissioning Tests

- 1.9.1 As soon as the installations are ready for commissioning, the Contractor shall arrange for all the tests/ inspection as required by the relevant ISS and / or IE Rules and advise the Employer and others concerned. Employer shall depute their Inspecting Officer for witnessing the tests and to carry out inspection independently and also jointly with other concerned agencies where ever necessary and only after the installation passes the required tests and inspection, it should be commissioned / energized. **The contractor shall arrange all testing equipments/apparatus/instruments** as will be required for conducting the tests without any extra cost. **Test reports are required to be submitted before commissioning of the new installation.**
- 1.9.2 Visual Inspection shall include checks for satisfactory workmanship, all connections, painting, cleanliness of all fittings etc., and compliance with Indian Electricity Rules.
- 1.9.3 The ammeters, voltmeters and energy meters shall be checked for their calibration, scale, accuracy, etc. for compliance with the specified requirement. Routine tests certificates are required to be submitted on demand.
- 1.9.4 All cables shall be tested at manufacturer's works in compliance with relevant ISS. All cables and connections after erection shall be tested as required by the employer for :
- i) Pressure Test
 - ii) Insulation Resistance Test
- 1.9.5 Earth resistance shall be measured separately for each earth electrode and when they are connected together and to the equipment should be recorded.
- 2.0 **Warranty:** - The contractor shall stand guarantee that all the equipments and the works executed under this contract shall be free from all defects and faults in materials, design, workmanship and manufacture and shall be acceptable standards for the contracted works and in full conformity to the technical specifications, drawings and other contract stipulations for a period of 12 months from the date of completion of the project or 15 months from the date of supply of materials whichever is earlier.
- 3.0 **Completeness of tender:** - All sundry fittings, assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections as required, and all other sundry items which are useful and necessary for proper assembly and efficient working of the various component of the work shall be deemed to have been included in the tender whether such items are specifically mentioned in the tender documents or not.

4.0 Works to be done by the Contractor: - Unless and otherwise mentioned in the tender documents, the following work shall be done by the contractor, and therefore, their cost shall be deemed to be included in their tender cost

- i) **Cutting and making goods all damages** caused during installation and restoring the same to their original finish.
- ii) Sealing of all floor openings provided by him for pipes and cables from fire safety point of view after laying of the same
- iii) Painting at site of all exposed metal surfaces of the installation other than pre-painted items like switch-gear, transformer etc. damages to finished surfaces of these items while handling and erection shall however be rectified to the satisfaction of the Engineer In-Charge.

5.0 Tools for handling and erection: - all tools and tackles required for handling of equipments and materials at site of works as well as for their assembly and erection and also necessary testing instruments shall be responsibility of the contractor.

6.0 Care of Building:

Care shall be taken by the Contractor to avoid damage to the building during execution of his part of the work. He shall be responsible for repairing of all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of his work from the site.

7.0 Structural Alterations to Buildings

- i) No structural member in the building shall be damaged / altered, without prior approval of the competent authority through the Engineer-in-charge.
- ii) Structural provisions like openings, cutouts, if any, provided by the department for the work, shall be used. Where these require modifications, or where fresh provisions are required to be made, such contingent works shall be carried out by the Contractor at his cost.
- iii) All such openings in floors provided by the Department shall be closed by the Contractor after installing the cables / conduits / rising mains etc. as the case may be, by any suitable means as approved by the Engineer-in-charge without any extra payment.
- iv) All chases required in connection with the electrical works shall be provided and filled by the Contractor at his own cost to the original architectural finish of the buildings.

8.0 Any concealed work must be given enough opportunity for inspection by the employer and after clearance of the said work concealment can be done

GENERAL TERMS AND CONDITIONS

1. Submission of a tender/quotation by a tenderer/ quotationer implies that they have inspected and examined the site and its surroundings and satisfied themselves as to the nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves, obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their tender.
2. The tenderer shall be responsible for arranging and maintaining at his own cost all materials, tools and plants, water electricity, access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract document.
3. The tender/quotation for the work shall remain open for acceptance for a period of sixty days from the date of opening of tender/quotation. If any tenderer withdraws his tender before the said period or makes any modifications in the terms and conditions of the tender which are not acceptable to IACS, then IACS shall without prejudice to any other right or remedy be at liberty to forfeit 50% of the said earnest money as aforesaid.
4. All conditions/terms listed under "Terms and conditions" are applicable for all tenders/ quotations.
5. The successful tenderer /contractor, on acceptance of his tender by the accepting Authority, shall, within 7 days from the stipulated date of start sign this contract/agreement.
6. The Director, Indian Association for the Cultivation of Science (IACS) does not bind himself to accept the lowest or any tender and reserves to himself the authority to reject any or all tenders received without the assignment of any reason.

General Rules and Directions

1. The tenderer shall fill in the rates both in words and figures. The amount against each item is also to be filled in. In case of any discrepancy, the rates quoted by contractor in words shall be taken as correct.
2. Canvassing whether directly or indirectly in connection with tenders is strictly prohibited and the tender submitted by the contractor who resorts to canvassing will be liable to rejection.
3. The contractor whose tender is accepted will be required to furnish by way of Security Deposit for the fulfillment of his contract, an amount equal to 10% of the tendered value of the work. The Security Deposit will be collected by deductions from the running bills and Final bill of the contractor at the rates mentioned above and the earnest money if deposited in cash at the time of tenders will be treated as part of the Security Deposit.
4. On acceptance of tender, the name of the accredited representative of the contractor who would be responsible for taking instructions from the Engineer in Charge shall be communicated in writing to the Engineer in Charge.
5. All the works shall be carried out as per CPWD specification corrected up to date and Indian Electricity rule. Where CPWD specification is silent Indian standard specifications of B.I.S. / Specification laid down by IACS is to be followed.
6. The time allowed for execution of the work or the extended time in accordance with these conditions shall be the essence of the contract.
In case of any event causing delay for which the contractor is not responsible, the contractor shall immediately give notice thereof in writing to the Engineer in charge but shall nevertheless make best endeavors to prevent or make good the delay.
The Director, IACS may consider the notice and allow suitable extension of time for completion of work.
7. The contractor shall submit "running account bill" and final bill in triplicate supported by detailed measurements and shall provide necessary assistance, Labour and tools for checking the measurement and quality of work.
8. The contractor shall execute the whole and every part of the work in the most substantial and workman like manner both as regards materials and otherwise in every respect in accordance with specifications. Unless otherwise given in the Contract documents the specification will mean standard specification of Central Public Works Department corrected up to date, Bureau of Indian Standard Specifications, and/or any other published standard or code.
9. The Engineer in Charge shall have the power to make alteration in, omission from, additions to, or substitutions for the original specifications drawings, design and instructions that may appear to him to be necessary or advisable.

The rates for such altered, additional or substituted work shall be determined by the Engineer in Charge as under.

- (i) Rate entered in the schedule of rates mentioned in the award letter Plus/minus the percentage by which the tendered amount of the works awarded is higher or lower than the corresponding estimated amount.
 - (ii) Market rates.
- 10. Deviation limit for individual item, trade and contract as a whole, is 25% (twenty five percent). No claim whatsoever will be entertained in this regard.
- 12. The contractor shall provide all necessary superintendence during execution of work and as along there after as may be necessary for proper fulfilling of the obligations under the contract.
- 13. Security deposit will be refunded to the contractor if no complaint is pending on Record till after 6 (six) months after completion of the work and no labour Complaint is pending against the contractor in respect of the work.
- 14. The contractor shall pay their workers as per the provisions of Minimum wages Act fixed and notified by the Government from time to time.
 - (i) No person below the Age of 14 years shall be employed to act as a workman.
 - (ii) First AID Box shall be made available by the contractor at all work sites.
 - (iii) The contractor shall provide all safety measures to his workmen like working platform, suitable scaffolding, gangways, ladder, helmets, gumboots, gloves safety belts, insurance coverage etc. according to the situation and nature of work.
 - (iv) In every case where compensation is to be paid to a workman employed by the contractor, as per provisions of Workmen's Compensation Act. The contractor shall arrange to pay such compensation in full and IACS will recover the same from the dues and/or security deposit of the contractor and make arrangement to pay the same to the concerned.
- 15. In case of any dispute arising out of this contract during the progress of the work or after the cancellation, termination, completion or abandonment, the decision of the Director, IACS, shall be final and binding on the contractor.

It is also a term of the contract that if the contractor does not raise any claim in writing within 90 days from the date of cancellation, termination, completion or abandonment, the claim of the contractor shall be deemed to have been waived and absolutely barred and IACS shall be discharged and released of all its liabilities under the contract in respect of these claims.

CHAPTER 2

TECHNICAL SPECIFICATION

1.0 Conformity to IE Act, IE Rules, and Standards:

- i) All electrical works shall be carried out in accordance with the provisions of Indian Electricity Act, 1910 and Indian Electricity Rules, 1956 amended up to date.
- ii) The works shall also conform to relevant Indian Standard Codes of Practice (COP) for the type of work involved.
- iii) In all electrical installation works, relevant safety codes of practice shall be followed.
- iv) **Unless otherwise specified, the work shall be carried out as per CPWD General Specifications for Electrical Works (Internal & external) as applicable as per the instruction of the Engineer-in-Charge or his authorized representative.**

2.0 Workmanship :

- i) Good workmanship is an essential requirement to be complied with. The entire work of manufacture / fabrication, assembly and installation shall conform to sound engineering practice involving highly skilled workers.
- ii) The work shall be carried out under the direct supervision of a highly experienced licensed SUPERVISOR, i.e. a person holding a certificate of competency issued by the State Govt. for the type of work involved, employed by the contractor, who shall rectify the defects pointed out by the Engineer-in-charge during the progress of work.

3.0 General requirements and components: -

- i) Quality of Materials: -
 - a) All the materials and equipments supplied by the contractor shall be new. They shall be of such design, size and materials as to satisfactorily function under the rated condition of operation and to withstand the environmental conditions at site.
 - b) All the components shall conform to relevant IS specification wherever existing. Materials with ISI certification marked shall be preferred if not otherwise mentioned the tender.
 - c) For items of materials for which makes are approved by the Dept., only such approve makes shall be permitted in the work in accordance to the preference of the Engineer-in-Charge of the employer.

- d) **Commissioning on completion:** Before the workman leaves the work finally, the contractor must be sure that the installation is ready for commissioning after due testing.

4.0 Completion plan and completion certificate

- i) For all the works, completion Certificate after completion shall be submitted to the Engineer In-Charge.
- ii) 'As built' drawing to be submitted along-with Test/completion certificate which is an essential part for consideration of final bill.

5.0 Testing & Installation: -

On completion of installation, the following tests shall be carried out: -

- i) Insulation Resistance Test by appropriate class of Megger
- ii) Smoke test of Detectors, Simulation of RIs
- iii) Simulation test of main fire control panel/Repeater panel.

Testing shall be carried out for the completed installation in presence of the Engineer-in-Charge or his authorized representative to their satisfaction. All test result shall be recorded and submitted to the Dept. All necessary test instruments for the test shall be arranged by the Contractor if so required by the E-in-C. Calibration certificates may require to be produced on demand by the E-in-

SPECIFICATIONS

DETECTORS:

- The detector shall be plug-in type facilitating easy removal and installation. The detector should be of solid state type
- The detectors should be photo electric type, Suitable for operating voltage range of 15-30 volts DC when the system voltage is 24 V, DC.
- Each detector must have LED for indication of fire.
- Each detector should have the facility for extension of connection to the response indicator.
- The detector should have the provision of protection from reverse polarity.
- The body of the detector should be fabricated out of such material, which can sustain fire for reasonable period.
- The temperature range of the heat detector for its activation should be 55° C to 60° C.
- The detectors shall have phosphor bronze spring held under tension by fusible soldered link in order to achieve fixed temperature sensing features.
- Each detector should be marked with zone number and detector number, which can easily be observed from a convenient place. For example- Z-5 / 7

indicate s that the detector belongs to zone 5 and it is at serial no 7 in that zone.

- Heat detector shall confirm to IS-2175-1988 or BS-5445(EN-54) part -5-1977(Vds/LPCB approved or NFPA72 (UL/ULC/FM approved) or amended up to date.
- Smoke detector shall confirm to IS-11360-1985 or BS-5446 part-1:1977 & part-VII-1985 (Vds/LPCB approved or NFPA72 (UL/ULC/FM approved) or amended up to date.

Response indicator

- It should be housed in cubicle box having the normal size of 3 inch x 4 inch x 2 inch fabricated out of M.S.
- There should be two LEDs in response indicator.
- Mounted to facilitate its viewing from an angle of 60 degree minimum.
- Zone number should be marked on the R.I. on front plate.

MANUAL CALL POINT / PILL BOX:

- Made out of M.S. sheet / cast aluminum & powder coated.
- Size- approximately 3 inch x 4 inch.
- Mounting height shall be 1.2 m above floor level. It must have hammer & chain and gasket to make it vermin & dust proof.
- Glass front cover shall have write up " BREAK GLASS IN CASE OF FIRE"
- Once the glass is broken the alarm shall sound on the floor and the control panel as well.
- It shall be located in such a way that, no person in the premises needs to travel more than 30 meters to reach a manual call point. To give an alarm.

HOOTERS:

- The hooters shall be of electronic solid state type speakers cum siren having interrupted tone for 'Alert' & 'continuous tone' for evacuation alarm. The interrupted tone shall be ON for 3 seconds & OFF for 1 second.
- The hooters shall be suitable for an audible range. The sound level shall be at least 65 dB (A) or above any other noise likely to persists for a period of longer than 30 seconds at any part of the building. Sounders with greater than 120 dB (A) shall not be provided.
- The frequency of sound from sounders shall lie in the range of 500Hz to 1000Hz frequency band..
- The hooter output shall be approximately 4 Watts.
- The hooters shall be suitable for single / dual tone audible alarm & public address.
- The hooters shall also be suitable for wall mounting incorporating hooter cards & speaker inside a metallic box.
- 'Fault alarm' and 'Fire alarm' in a panel sounder shall be distinctly different.

Silencing switch

- Silencing switch shall be in the form of a switch or push button.
- This shall be located on the panel, whose panel sounder is to be silenced.
- Operation of a silencing switch shall neither affect any visual indication nor the output of fire alarm sounders in the building.
- Operation of a silencing switch shall not prevent the receipt of alarm from any sector/Zone as the case maybe, not already in alarm condition.

CONTROL PANEL

- The panel shall be constructed with cold rolled sheet metal & minimum thickness 2mm.
- It shall be spray painted with approved paints. Colour shall be provided with Grey Shade No. 631 as per IS 5. Two coats of primer shall be applied after proper cleaning and degreasing grease, followed by two coats of final painting. Painting shall be redone after installation as necessary.
- It shall be wall mounted type with provision of cable entry at the top, bottom and back sides as required for site condition.
- The power supply shall be made from the master control panel (common for all panels) which arrangement shall be fed from normal and emergency condition with auto-charge over as detailed afterwards.
- The whole area is divided into two Zones with two (2) zone cards. There shall be one indicator for "Fire" and one for "Fault" on the CP for each zone. All the detectors in one zone shall be associated with one indicator on the panel. The "Fire" and "Fault" indicators shall consist of two separate LED/Bulbs in parallel. Red & Yellow indication shall used for "Fire Signal" and "fault Signal" respectively. These will flash at abnormal condition along with audio alarm. The entire fire alarm and detection system shall conform to IS 2189-1976 and its latest revision.
- Separate annunciators for fire and faults shall be provided on the panels. Continuous audible alarm shall indicate "Fault". The "Fire" tone shall always override the "Fault" tone.
- The panel shall consist of all solid state electronic circuitry and plug in printed circuit boards. The tenderer shall submit the following documents for the panels in requisite numbers.
 - a) Annunciation PCB card details.
 - b) Pin details of each card.
 - c) Input /output details of annunciator.
 - d) Basic trouble shooting chart.
 - e) Ordering instructions of PCB's.
 - f) Pin connection details between card to card.
 - g) Block diagram of annunciation scheme.
- "Fault" detector circuit shall indicate
 - i) Open circuit fault.
 - ii) Short Circuit fault.
 - iii) Earth fault.
- Repeat alarm actuation for connection to Master Control Panel shall be provided such that these are not affected during operation from Local Panel.

- A facility shall be provided for deliberate isolation of each zone inside the panel and is not easily assessable for unauthorized persons. This facility is needed to keep the system operating in other parts of the floor while any repair/testing work is being done in any zone with visual indication on panel and shall have potential free changeover contact operated through each zone card for automatic shuttering off A.C. units. The necessary interlocking wiring from CP to AC units shall be done by the FAD contractor and demonstrated to the employer as per requirement.

ALARM SYSTEM & INDICATORS

The sequence of operation of the alarm system shall be

Sequence	Hooter	Indication	Remarks
Normal	OFF	OFF	-
Abnormal	ON	SLOW FLASHING	Preliminary Alart Alarm which will be 2 second On & 1 Second OFF.
Reset	OFF	OFF	If the system comes back to normal
Abnormal	ON	SLOW & FAST FLASHING	If fault/alarm persists, flashing will be faster after 1 minute from occurrence of fault.
Reset	OFF	FAST FLASHING	During abnormal stage.
Reset	OFF	OFF	If systems comes to normal.

The reset push button shall be lockable type, to avoid unauthorized reset of audio-visual indication.

- There shall be separate audio-visual indication for ‘normal power supply failure’ and ‘battery voltage low’/standby supply failure’.
- There shall be indication of the “System ON”, “Standby ON” etc.
- There shall be a system and lamp test button. The hooter and all indicators will be “ON” when this button is pressed.
- A facility shall be provided for deliberate isolation of each zone inside the panel and is not easily accessible for unauthorized persons. This facility is needed to keep the system operating in other parts of the floor while any repair/testing work is being done in any zone with visual indication to panel.
- A fault warning shall be given in the event of failure/disconnection of any of the followings
 - i) Normal Supply
 - ii) Standby Supply
 - iii) Battery charging equipment.
 - iv) Leads to the detectors
 - v) Fuse/Protective Device
 - vi) Any other item
 - vii) Earth Fault

- viii) Failure or disconnection of Battery Charging equipment.
 - ix) Connection of battery with reverse polarity.
- Indication
 - The circuit & mechanical design of the apparatus shall be such that operation of one indicator does not prevent proper & separate operation of other indicators. Each fire/fault indicator shall be clearly labelled with the floor address from which the call originates.
- All the components of fire alarm system i.e. manual call point, detector etc. solid state circuitry, shall have same 'nominal operating voltage'/'
- The provision of voltmeter and ammeter in the front panel shall be provided in CP for both AC and DC supplies.
- Toggle switch to actuate alarm from the CP.
- Failure of any indicator circuit should not prevent the fire alarm from sounding nor acknowledgement/silencing of alarm from one floor should prevent another alarm coming from other floor.
- Test facility to check fire alarm circuit, indicators should be provided.
- Pulse timer should be provided calibrated to sound the alarm if not acknowledged within 60 seconds and thereafter if not acknowledged from the floor of alarm within 3/4/5 minutes.
- The manual operation of silence switch/button shall automatically result in giving a distinct audible & visual signal on the panel until the system is reset. The audible alarm shall be of low power and distinct from the fire alarm and should use separate sounder.
- The operation of any fire alarm sounder or the transmission of signal to main control panel in the control room does not depend upon the operation of the indicator and is not stopped by any defect/failure in the indicator.
- Besides 'system on', 'standby on', 'system on test' indicators should be provided.
- Test facilities should be provided to test alarm circuit, sounder, indicator etc.
- The following should be provided – acknowledge button, fire alarm cancel button, fire alarm cancel indicator, re-set button, pulse timer, related fuses/protective devices etc.
- Local control panel shall be provided with voltage appropriate to the rating of the interconnected manual call point and shall incorporate overload cut out device to protect external circuit against excess current. The voltage drop in the cable risers should be taken into account. To solve this problem consideration may be given to operate main console at slightly higher voltage, with solid state voltage adjuster and stabilizer circuits in the main and local control panels.

POWER SUPPLY

- The control panel shall be provided with a complete charger unit, rectifier & distribution system. The charger shall be provided with auto charge over system from normal to emergency supply in case of failure or normal power supply. The emergency power shall be derived from a battery which shall be included in the offer. The unit shall rechargeable maintenance free dry have provision of protection against overload.
- Only 230V, 1-ph, 50Hz AC power supply shall be made available to the control panel from the nearest available power source. The cabling from the permanent supply source to the control panel and the cabling from control panel to the respective areas and to the individual sensing items external hooter are to be included in the offer.

- The control panels or any other panels requiring power supply for its operation shall be provided with “power supply healthy “ON” “indication” “Fuse Blown”, “charge ON”, “supply in EM power” etc. indications.
- The battery bank shall be such that all the equipment will work at its “final voltage”.
- The battery charging equipment shall incorporate automatic control features which should match the output with the limits, specified by the battery manufacturer taking into consideration the quiescent load of the system.
- Low battery voltage condition shall be monitored and indicated on CP by visible and audible alarm.
- Each battery of the secondary calls when charged by its normal charging arrangements for a period of 24 hours from the fully discharged condition shall then

Have sufficient power to supply quiescent load together with fault signal resulting from disconnection for a period of 24 hours. Thereafter, it shall have enough supply to cope with additional load resulting in an alarm originating in all zones for 30 minutes. If utilized to sound emergency evacuation alarm it shall supply additional power for at least 10 minutes.

- There shall be provision of protection against earth leakage current. All panels / equipment's shall be effectively earthed whenever required to satisfy statutory & system requirements.
- A suitable anti-corrosive insulating rack shall be provided for the battery bank.

PUBLIC ADDRESS SYSTEM

- It will constitute a part of the master control panel and shall consist of
 - a) Control console with microphone etc. (being integral part of Main Control Panel).
 - b) Amplifier in amplifier rack etc.
 - c) External speaker and connecting cable etc.

The speech will be fed from microphone, through the preamplifiers and amplifiers to combination speakers on various floors.

- The amplifier shall have solid state circuitry, properly tropicalized and capable of AC/DC operation and capable to drive the external speakers used for installation, it shall have provision of 3 channels namely (i) Alert (ii) Evacuate and (iii) Speech.
- It will not be possible to switch off the PA system manually so long the fire alarm system remains switched on. There will be an auto manual change over selector switch. In manual mode of operation it will energize the amplifier, which will then act as a Public Address Amplifier. There should be zone switches for selection where communication is to be made. Under normal condition, Auto/manual switch shall be in auto mode. In the event of fire in a particular floor, the speaker-cum-hooter connected to that floor will start producing an ‘Alert Tone’, if it is necessary to warn other floors or all places there shall be zone switches as well common switches through, which it can be done. If it is required to evacuate people from any of the areas Evacuate Switch is to be pressed to create Evacuate Tone. For accounting purposes, a speech switch is to be operated so that quality voice can be generated which will be optically indicated through LED. There shall be provision for adjustment of tone and volume in each case from the panel.
- PA system enclosure shall be fabricated sheet metal constitution and consisting the following switches and controls.

- a) One goose neck type moving coil/cardoid/hyper cardoid or equivalent microphone and one hand set to speak from any floors through manual call point telephone socket whenever necessary.
 - b) Arrangement for speaking to each floor separately or all floors together.
 - c) Provision for playing pre-recorded/tapped instructions or otherwise as necessary through the speakers.
 - d) Pre-amplifier, monitor loudspeaker, and other accessories.
 - d) Testing arrangements and provisions.
- Amplifier rack has the following
 - a) Amplifier mounting rails.
 - b) Lockable steel doors with proper ventilations slot for heat dissipations.
 - c) Proper cable entry arrangements and terminal blocks.
- Design Requirements
- Speakers shall be connected in parallel and correctly phased.
- System should be designed for high impedance and impedance matching between microphones and pre-amplifier, amplifier and speakers on floor shall be done, impedance of long length of cables also shall be considered.
- The system shall be properly earthed to avoid unwanted distortion in the system.
- System installation diagram giving details of cables routing, speaker installation, junction boxes etc. and circuit diagrams for PA system simplifier etc. shall be given by the contractor.

GENERAL REQUIREMENTS

- All equipment's and panels shall be rugged in design. It shall be reliable in design and should have long service life.
- Equipment shall be designed to operate continuously on a maximum ambient temperature of 45 degree C and the temperature rise shall be within the allowable limit. It shall also be so designed that it should work in local vibration and impacts, if arises at any time in the locality during use.
- The internal circuits shall be so designed that due to failure of any part/component or malfunction it should not give any false fire alarm signals at any time. It should instead may give rise to fault alarm signals only.
- There shall be no easily accessible normal controls, e.g. switches off – main/standby power supply etc. to the unauthorized person.
- All manual controls, indicators, switches etc. shall be clearly labeled to indicate their proper function/services. All manual controls shall be robust in construction positive in action and so located that no accidental operation can take place.
- All equipment's and components shall be designed, manufactured and selected to work satisfactorily against deterioration due to temperature, humidity , corrosion etc. resulting from the atmospheric condition existing in the vicinity. The equipment's and components shall be of first class good quality materials for its reliability. The cubicle type Master control panels shall be dust and vermin proof and to prevent ingress of moisture. Protective painting shall be provided after installation of the panels and equipments wherever required.
- The selection of the power supply unit and the cables shall be such that no appreciable voltage drop takes place. There shall be provision of protection against over load.
- All the electrical/electronic components covered under this specification, shall conform to the following

- i) Components shall conform to the ISI specification or to BS specification where no IS specification exists.
- ii) Alarm indication lamps may have signals or double filaments to suit the requirement and it should be having longer life. The intensity of the indications shall be clearly visible from a distance at 10 meters in normal condition. LED may be used wherever it suits to have low power consumption.
- iii) Double lamps should be used to avoid confusion/inattention in case of one lamp blows off.
- iv) All frictional contact surfaces should be plated/flushed with double metals or equipment's.

GURANTEE:

- The Smoke cum heat detectors. / Response indicators. Etc. shall be guaranteed by the manufacturers / suppliers for a period of 12 months from the date of acceptance testing. The contractor executing fire detection work has to produce guarantee card from manufacturers for free replacement / rectification of defective components within this period. However, firm executing the work shall be responsible for overall guarantee of all equipments.