IFCI LIMITED
आई एफ सी आई लिमिटेड
(A Government of India Undertaking)
(भारत सरकार का उपक्रम)

TENDER

FOR

Name of Work: (i) Restoration, up-gradation/modification of Fire Protection System, Ventilation & Exhaust System and Plumbing System at IFCI Tower, Nehru Place, New Delhi including Multilevel Car parking.
(ii) Restoration, up-gradation/modification of Fire Protection System at IFCI Colony, Paschim Vihar, New Delhi.

Tender No. IFCI/Security/Fire-Upgradation/2017-18/06 Dated 28/03/2018

The General Manager (Security Department)
IFCI LIMITED
(A Government of India Undertaking)
Regd. Office: IFCI Tower, 61 Nehru Place, New Delhi-110019
Website: www.ifciltd.com
Telephone- 011-26487444/41732000

Name of work: Restoration and modification of Fire Protection system, HVAC system and plumbing system at IFCI Building and multilevel Car parking area.

Tender No. IFCI/Security/Fire -Upgradation/2017-18/06 Dated 28/03/2018

Index of Tender Document

IFCI INTRODUCTION

IFCI Ltd., (IFCI) the first Development Financial Institution of India (DFI), set up in 1948, having its Registered Office at IFCI Tower, 61 Nehru Place, New Delhi-110019 with pan-India presence across many key locations. IFCI is a Government of India Undertaking under the Ministry of Finance.

(A) INSTRUCTION TO BIDDERS (ITB)

Name of Work: (i) Restoration, up-gradation/modification of Fire Protection system, Exhaust & Ventilation System and Plumbing System at IFCI Tower, Nehru Place, New Delhi including multilevel Car Parking.
(ii) Restoration, up-gradation/modification of Fire Protection system at IFCI Colony, Paschim Vihar, New Delhi.

1. IFCI Ltd. (IFCI) invites bids by E-tender system in two bid system (Technical & Financial Bid) from experienced and reputed Contractors, agencies/firms engaged in Restoration, up-gradation/modification of Fire Protection system having minimum five years of experience in the field, as under:

Tender No. IFCI/Security/Fire -Upgradation/2017-18/06 Dated 28/03/2018		
Ser. No.	**Type**	**Description/Schedule**
(i)	Name of Work	(i) Restoration, up-gradation/modification of Fire Protection System, Ventilation & Exhaust System and Plumbing System at IFCI Tower, Nehru Place, New Delhi including multilevel Car parking area. (ii) Restoration, up-gradation/modification of Fire Protection System at IFCI Colony, Paschim Vihar, New Delhi.
(ii)	Earnest Money Deposit(EMD)	₹ 5,00,000/- (Rs. Five lakh)
(iii)	Site Inspection	(i) For IFCI Tower, Nehru Place, New Delhi Between 04.04.2018 to 18.04.2018 from 11:30 Hrs. to 16:30 Hrs. except Saturday/Sunday/ Holidays. (ii) On any-day between 04.04.2018 to 18.04.2018 from 11:30 Hrs. to 16:30 Hrs. at IFCI Colony, Paschim Vihar, New Delhi.
(iv)	Pre Bid Meeting	Thursday, 12.04.2018 at 11:30 Hrs. at IFCI Tower, Nehru Place, New Delhi.
(v)	Last Date of Depositing EMD in original	**01.05.2018 up-to 14:30 Hrs. except Saturday/Sunday/Holidays at:** The General Manager (Security Department) IFCI Limited, IFCI Tower, 7th Floor, 61 Nehru Place New Delhi-110 019 Tel.: 011-26487444/41732000
(vi)	Last Date of downloading of tender document	30.04.2018 up-to 17:30 Hrs. from https://ifci.etenders.in.
(vii)	Last date and time of submission of electronic bid	**01.05.2018 up-to 15:00 Hrs.** on https://ifci.etenders.in
(viii)	Opening of Technical Bids	**02.05.2018 at 11:30 Hrs.**
(ix)	Opening of Financial Bid	To be intimated separately to the technically qualified Bidders.

The bids are to be submitted online in electronic format on website https://ifci.etenders.in. The Bidders may download Tender Document along-with terms and conditions from IFCI website www.ifciltd.com home page by clicking e-tendering portal https://ifci.etenders.in. The Bidders are requested to submit their bids prior

to the last date of submission to avoid any technical or other difficulty respulting in non-submission of their bids due to non-availability of website at last moment and or any reason whatsoever. Neither IFCI nor the E-Tendering service provider shall be responsible for any issues such as internet connectivity or non-compatibility internet browser etc. The last date and time of submission of bids will not be extended due to the hanging of the system or congestion due to internet in the last moment of submission of bid by the Bidders. Bids not submitted online will not be entertained. **IFCI reserves the right to reject all or any Bid wholly or partly without assigning any reason whatsoever.**

2. Bidders who wish to participate in this tender will have to register on line https://ifci.etenders.in. Bidders will have to procure Digital Signature Certificate (Type-II or Type-III) as per information Technology Act-2000 using which they can sign their electronic bids. Bidders can procure the same from any CCA approved certifying agency etc. or they may contact IFCI E-tender service provider M/s Nextenders India (P) Ltd., Contact No.: 9657518050/8743042801(Help Desk 09:30 AM to 05:30PM on all working days.) email : prateek.parashar@nextenders.com, sanjay.kumar@nextenders.com.

Bidders who already have a valid Digital Certificate do not need to procure a new Digital Certificate. **The Bidders are requested to read the user manual available on website https://ifci.etenders.in before initiating the process of E-Tendering**.

3. **Downloading of Bid document from the website**

The Bidder may download Tender Document along-with terms and conditions from IFCI website www.ifciltd.com home page by clicking e-tendering portal https://ifci.etenders.in website. Bidder must keep track of any corrigendum and/ or addendum or any change in the schedule or any other relevant information issued in respect of the subject tender by IFCI.

4. Bidders shall submit their offers online in an electronic format for "Technical" and "Financial bid" both. However, Bidders will have to submit Earnest Money Deposit (EMD) physically as prescribed, in the form of Demand Draft/Pay Order (PO) in original in the office of The General Manager (Security Department), IFCI Ltd., IFCI Tower, 61 Nehru Place, New Delhi -110019 on working days during working hours before the last date and time of submission of bid and obtain a receipt thereof. The scanned copy of the receipt, will have to be uploaded along-with Technical Bid.

5. **Earnest Money Deposit(EMD):** Bidder should pay specified amount towards Earnest Money deposit as follows:

5.1 ₹ 5,00,000/-(₹ Five Lakh Only) in the form of Demand Draft drawn on any Nationalized /Scheduled Bank in favour of "IFCI Ltd." Payable at New Delhi.

5.2 EMD will not carry any interest.

5.3 EMD will be returned to the unsuccessful bidders after opening of the Financial Bids. EMD of successful bidder shall be released after execution of Contract Agreement and **submission of Security Deposit.**

5.4 The Earnest Money Deposit submitted by the Bidder may be forfeited without prejudice to any other right or remedy if,

a) Successful Bidder fails to execute a Contract Agreement within specified time as per intimation/request of the IFCI.

b) Successful Bidder withdraws his tender or backs out after acceptance,

c) Successful Bidder does not furnish Security Deposit within the prescribed period.

d) Bidder withdraws his tender before the expiry of validity period stipulated in the bidding document,

e) Bidder violates any of the terms and conditions of the tender,

f) Bidder revises any of the items quoted during the validity period,

g) Bidder is found to have indulged in fraudulent practices in the bid submission process.

6. **On Line submission of bids/ Data to be Enclosed**: The online bids will have to be digitally signed and submitted within the time specified **(01 May, 2018 up-to 1500 hours)** on website https://ifci.etenders.in in the following manner:

6.1 **TECHNICAL BID:** Scanned Copies to be uploaded (.pdf)

The technical information has to be prepared very carefully as indicated in the tender document since it will be the basis for determining the pre- qualification of Bidders. Only relevant and to the point information/document (s) should be uploaded. Failure to provide any required information may lead to the rejection of the offer. Bidders must read the tender document very carefully before signing.

6.1.1 The bidder shall upload the scanned copy of receipt as proof of depositing EMD along-with technical bid. Otherwise the bid in electronic form will not be considered.

6.1.2 The bidder shall be required to submit all the **Annexures except Annexure '18'** (Annexure '18' is to filled & submitted separately with Financial bid) of this document duly signed & stamped by the authorized signatory along-with date as token of acceptance of having read and understood the entire tender document and its Scope of Work, BOQ, Technical Specifications Terms & Conditions etc.

6.1.3 A copy in favor of person signing the document in support of authorization /Power of Attorney, whichever is applicable should be uploaded by the Bidder.

6.1.4 A copy of **Electrical License** issued in the name of the participating Bidder.

6.2 Other Data to be enclosed along-with Technical Bid

Full information shall be given by the Bidder in respect of the following. Non-submission of this information may lead to rejection of the offer.

a) Income Tax Permanent Account Number: Certified copies of Permanent Account Numbers as allotted by Income Tax Department for the Company/Firm/Individual Partners, Tender Acceptance Letter etc. shall be furnished along-with tender.
b) GSTN Details: The participating Bidder should be GST registered. Bidders will have to upload GSTN details along-with his technical bid. Non submission of GSTN details will lead to the rejection of the Bid.
c) Organization Chart: The organization chart of the Bidder's organization, including names, addresses and contact information of the Directors/Partners may be furnished along-with the offer.
d) An attested copy of the Power of Attorney/Authorization letter, in case the tender is signed by an individual other than the sole proprietor.
e) Proof of Turnover of last three financial years as on March 31st, 2017.
f) Evidence of minimum Five years' of relevant experience.
g) In Case of Individual Tender: His/her full name, address and place & nature of business.
h) In Case of Partnership Firm: The names of all the partners and their addresses. A copy of the partnership deed/instrument of partnership duly certified by the Notary Public shall be enclosed.
i) In Case of Companies: Date and place of registration including date of commencement certificate in case of Public Companies (certified copies of Memorandum and Articles of Association are also to be furnished) Nature of business carried on by the company and the provisions of the Memorandum relating thereof.
j) Details of cases pending with any Court of Law, if any, status thereof, to be submitted

7. PROCEDURE FOR SUBMITTING FINANCIAL BID:

The Bidders are required to quote the rates in the format provided in online Price Bidding System which is categorized into **Five Parts** as under:

7.1 Price-Bid Part-I: Fire Detection & Fire Fighting Systems at IFCI Tower, Nehru Place, New Delhi.

7.2 Price-Bid PART-II: Plumbing System at IFCI Tower, Nehru Place, New Delhi.

7.3 Price-Bid PART-III: HVAC SYSTEM (Exhausht & Ventilation System) at IFCI Tower, Nehru Place, New Delhi.

7.4 Price-Bid PART-IV: Fire Detection & Fire Fighting Systems at IFCI Colony, Paschim Vihar, New Delhi.

7.5 Price-Bid PART-V: Consolidated Rates of Part I-Part IV

Every part contains multiple rows & columns containing 'BOQ'. The Bidder shall have to fill-up item-wise Unit Rates of New Items as well Buyback Items in figures in all the four parts from Part-I to Part-IV. Thereafter, the Bidders shall fill the Consolidated Rates of New as well as Buyback Items of each part in figures in Price Bid Part-V in the format as given in the online Financial Bid. No Section or Part of the Financial Bid which is mandatory, is to be left unfilled, otherwise the bid shall be liable to be rejected summarily. Bidders shall take utmost care while filling the Buyback value wherever applicable. For items where Buyback value is not applicable, the bidder shall fill the same with Zero in the columns against such items for the purpose of calculation. The Bidders are advised to save the data in the Financial Bid frequently while filling the bid to avoid loss of time due to any system error.

All the rates in the 'Financial Bid' must be exclusive of all the taxes and inclusive of all other charges including the incidental charges which shall be incurred towards completion of work. The Bidder must check prices/amount carefully before submitting financial bid. The Bidder must ensure that She/He has read the entire Tender Document and the 'BOQ' carefully before quoting and submitting the 'Financial Bid'. The bidder shall be solely responsible for error, if any made while quoting the rates. IFCI, shall not consider any request in this regard in any circumstance whatsoever. Canvassing in any form in the 'BOQ', shall be viewed seriously and shall be the sufficient basis for rejection of the bid as well as initiation of legal action against the defaulter.

8. Language

a) The Bidder shall quote the rates in English language and international numerals. These rates shall be entered in figures as well as in words. For the purpose of the tenders, the metric system of units shall be used.

b) All entries in the tender wherever applicable, shall either be typed or written legibly in ink. Erasing and over-writing is not permitted and may render such tenders liable for rejection. All cancellations and insertions shall be duly attested by the Bidder.

9. Amendment to Bid documents

At any time prior to the deadline for submission of Bids, IFCI may, for any reason, whether at its own initiative or in response to a clarification sought by any prospective bidder, modify the bidding document by amendment/addendum/corrigendum. The corrigendum/amendment will be issued/published in website https://ifci.etenders.in only. The Bidders shall be solely responsible to check the website for the amendment issued in the shape of Corrigendum and/or Addendum up to last date of submission of the bid.

10. Clarification on Bids

a) To assist in the examination, evaluation and comparison of the technical bids, IFCI may at its discretion, ask the Bidder for a clarification on its bid. No change in price of the bid shall be sought, offered or permitted. IFCI reserves the right to ask the Bidders to submit supplementary documents in support of the documents already submitted by them.

b) IFCI reserves the right to conduct joint post bid discussion after opening the technical bids, for clarification on technical bid and may amend the technical bid requirements so as to bring all the Bidders onto a common platform. In case of any alteration in the technical bid requirements, all the Bidders shall be given equal opportunity to submit supplementary price offers for that item in which alterations have been made. The supplementary offer must indicate the amount which shall be added to or subtracted from the original price offered for that item. In such case, both the original and the supplementary offer shall be evaluated jointly.

11. Before electronically submitting the tenders, it should be ensured that all the required tender papers as mentioned above are digitally signed by the Bidders.

12. **Manual bids shall not be accepted.** The offers submitted by Telegram/Fax/email/Post/Courier shall not be considered. No correspondence will be entertained in this regard.

13. Bidder/Bidders having business relationship shall not submit more than one tender. Under no circumstance will father and his son(s) or other close relations who have business relationship with one another (i.e. when one or more partner(s)/director(s) are common) be allowed to bid for the same contract as separate competitor. A breach of this condition will render the tenders of both parties liable to rejection.

14. **Pre-bid Meeting:** For any clarification on the Bidding Document, a pre bid meeting will be held on **Thursday**, **12 April, 2018 at 11:30 Hrs.** at IFCI Tower, Nehru Place, New Delhi.

15. **Site Inspection:** Before submission of the offer, the Bidders are advised to inspect the site of work and the environment and be well acquainted with the actual working and other prevalent conditions, systems, equipment, facilities available, position of material and labour, means of transport and access to site, etc. No claim will be entertained later, on the grounds of lack of knowledge of any of these conditions.

16. **Opening of Technical Bids:** Technical bids will be opened by the Tender Committee on **Wednesday, 2nd May 2018 at 11:30 Hrs**. on https://ifci.etenders.in. IFCI shall evaluate the technical bids to determine pre-qualification of the Bidders.

17. **Opening of Financial Bids:** The date and time for opening of Financial Bids shall be communicated through official email address given in the bid document to the technically qualified Bidders. A list of technical qualified bidders will also be uploaded on the E-tendering portal.

18. Preference may be given to the MSE Bidders, who are registered as MSE in any of the recognized body as specified by the Ministry of Micro, Small & Medium Enterprises (MSME) as per the provisions of the Public Procurement Policy for MSEs Order, 2012 issued by the Ministry of Micro, Small & Medium Enterprises, Govt. of India at the time of finalization of the bid. MSE Bidders are exempted from EMD, provided they submit necessary certificate for benefit of exemption of EMD. However, the final decision of IFCI for selection of bidder shall be binding upon the bidders and no request from the bidders in this regard shall be entertained by IFCI for any reason whatsoever.

19. **CRITERIA FOR PRE-QUALIFICATION (TECHNICAL CRITERIA):**

The eligibility criteria for pre-qualification of bidders is as under:

a) Average Annual financial turnover in the last 3 years, ending March 31st, 2017 should be at least Rs. 2.00 Crore.

AND

b) Experience of having successfully completed similar works in the last 5 years as on Feb 28, 2018 amongst any of the following:

i) Three similar works completed/awarded and costing not less than Rs. 75 lakh per work including one completed work in high-rise building having minimum 01 basement and 04 floors.

OR

ii) Two similar works completed/awarded and costing not less than Rs. 125 lakh per work including one completed work in high-rise building having minimum 01 basement and 04 floors.

OR

iii) One similar work completed and costing not less than Rs. 250 lakh in high-rise building having minimum 01 basement and 04 floors.

AND

c) BIDDER SHALL BE APPROVED IN CLASS 'B' CATEGORY OR ABOVE WITH MES /CPWD/RAILWAYS. COPY OF REGISTRATION NEEDS TO BE ENCLOSED ALONG-WITH TECHNICAL BID.

20. IMPORTANT NOTE:

a) The bidder shall submit authenticated documentary proof in support of financial turnover certificates/annual certified reports of last 3 years ending March 31st, 2017 certified by Chartered Accountant.

b) "**Similar work"** means Supply, Erection, Testing and Commissioning of Fire Protection System. The bidder shall submit signed and scanned copy (ies) of POs/Work orders/Completion/Performance Certificate issued by the client in support of satisfactory completion of similar works in the last 05 years as on **28 Feb 2018**.

c) **The bidder should submit signed and scan copy of detailed profile of the Organization, (giving list of works in hand and carried out during the last 5 years, names & addresses of the clients, value of work, number of manpower deployed and such other details in respect of works, along with testimonials and other relevant documents, i.e. Proof of Organization, ESI/PF Registration Code (if applicable), Company Registration No., VAT Clearance Certificate, ITR and PAN etc.)**

d) The bidder should submit signed and scan copy of partnership firm/partnership deed, if any.

e) Bidder should have an **Electrical License** of his own and should submit a copy of the same along-with technical bid.

f) The Bidder should be having adequate manpower, equipment etc. to smoothly execute the work.

g) The contractor should have a Registered Office/Branch in Delhi/NCR.

h) Manufacturers (OEMs) or their Authorized Distributors of firefighting equipment having authority letter to participate in said tender should only submit their bids.

i) The contractor should also intimate official E-mail address and telephone no. for all communication in order to avoid loss of time. All communications from IFCI shall be sent by E-mail/speed post.

j) The contractor may also submit 'Quality Plan'.

k) Integrity Pact (IP) shall also be applicable.

l) Offers of Bidders who are under suspension/banned/black-listed by any PSU/Govt. Department /PSU Banks/ or otherwise shall not be considered. Further, if any of the partners/directors of the contractor's organization /firm is blacklisted or having any criminal case against him, his tender shall not be considered. An Undertaking to this effect should be submitted.

m) IFCI reserves the right to request for any further documents/certificate/clarification from the bidder/contractor relevant to above qualifying criteria and the same must be submitted within stipulated time of receipt of any such communication from IFCI, failing which suitable action shall be taken by IFCI.

n) After opening of Technical bids, if a firm/Company fulfils the technical criteria, its financial bid will be opened. Exact date and time for opening of Financial Bids shall be communicated through official E-mail address given in the checklist of Annexure-1.

o) The bidder may be summarily disqualified in case of non-submission of required documents.

21. **Evaluation of Bids**

a) Technical bids submitted by the Bidders will be opened first and evaluated for fulfilling the Pre-qualification criteria and other conditions in Notice Inviting Tender (NIT)/Tender document, based on documentary evidences submitted along-with the bid.

b) In case, the same qualifying experience is claimed by more than one agency, then the agency who has executed the work as per documentary evidence submitted, shall only be qualified. The entire Scope of qualifying work should be with the agency who has executed the work and in case it is only labour, consumables without tools & plants (T&P), then the responsibility of execution is assigned to the first agency and not to the agency who has executed only as labour supply Contractor. Further, IFCI reserves the right to ask for further proofs including submission of TDS certificates for the said job.

c) In case the qualifying experience is claimed by private organizations based on work order and completion certificates from another private organization, IFCI reserves the right to ask for further proofs including submission of TDS certificates for the said job.

d) Assessing Bidder's capacity for executing the current tender shall be as per Notice Inviting Tender.

e) Financial bids of shortlisted Bidders qualified in technical bid, shall only be opened through e-financial bid opening.

f) Financial bids of technically unqualified Bidders shall not be opened.

g) Conditional bids shall be rejected by IFCI. The technical evaluation shall be made strictly on the basis of the documents submitted by the Bidders in support of their eligibility, the technical and commercial response. All the required information shall be furnished strictly in prescribed schedules/Annexure only. Any information indicated other than prescribed schedules/Annexure shall not be entertained. The financial evaluation shall be made on the basis of the total quoted price as indicated in the schedule of rates/ financial bid. IFCI is not bound to accept the lowest quoted offer. Conditions if any, on any document enclosed with financial Bid shall not be considered. IFCI's decision in this regard shall be final and binding.

22. In case no bid or single bid is received, or any other reason whatsoever, IFCI may at its sole discretion cancel the whole tendering process or extend the last date and time of submission of the bid.

23. Any separately submitted discount letter on the financial price shall not be considered by IFCI and shall be a ground for disqualification. Evaluation of financial bid shall be considered only on the quoted price in the financial bid submitted by the Bidders.

24. **Contact Person:** In case of any query, you may contact any of the following officials:

a) Shri Inderjeet Singh, AGM at New Delhi (011-41732146) & E-mail: services.dept@ifciltd.com
b) Shri Gurpreet Singh, Manager (Security) at New Delhi (011-41732176) & E-mail: services.dept@ifciltd.com

(B) SCOPE OF WORK AND SERVICES

1. **General**

The scope of work of the Contractor shall include design, engineering, supply, fabrication/ manufacture/erection, dismantling of existing system/ equipment, assembly, inspection, shop testing, piping, transportation, receipt at site storage, installation, painting, testing and commissioning including restoration and modification of existing fire protection systems, heating & ventilation system, obtaining statutory approvals and demonstration of integrated performance of all equipment required for fire protection system which broadly includes pumps overhauling, motors, diesel engines overhauling, fire detection cum alarm system, accessories, NOVEC System, Water Mist/Emulsifier System and other hand appliances at various locations (detail of which mentioned elsewhere in the specification) for IFCI Tower and IFCI Colony as per the indicative list of items mentioned along-with tentative quantities. The scope of work and services to be rendered by the Contractor for installation/modification/up-gradation of fire-fighting system shall include but shall not be limited to the following activities:

1.1 Design, engineering, manufacture/fabrication, assembly, shop testing and shop painting, sequential packing, delivery for site, unloading, unpacking, storage at site, site handling, preparation of erection drawings, erection as per approved drawings, site testing, painting, commissioning and fulfilment of guarantee of fire protection systems, sub-systems and integrated systems as described above and also covered under this tendering specification including Restoration and Modification of existing fire protection systems.

1.2 **Miscellaneous materials and services**, if not otherwise specifically asked for, shall include the following:

1.2.1 Constructing site office, covered store, open storage at designated place including supply of construction material and removal of the same on completion of work.
1.2.2 Dismantling of existing systems/equipment, restoration/modification, supply, installation, testing, commissioning of fire-lines, sprinkler lines, panels, diesel engines overhauling, electrical & instrumentation work, accessories, fire-fighting appliances and all associated facilities.
1.2.3 Civil works including demolishing/breaking any part of the building/site and restoration to its original shape to the satisfaction of IFCI.
1.2.4 All piping integral to or between any equipment furnished under this specification, except as otherwise specified.
1.2.5 Site cleaning, removal and disposal of debris, maintaining clean condition in and around the working place and as instructed by the Fire Consultant/IFCI.
1.2.6 All necessary isolation valves fitting at the tapping points and branch pipes.
1.2.7 Coupling guards for all exposed shafts and couplings.
1.2.8 Base plates, thrust blocks, duck-foot bends, matching flanges, supporting materials and shims.
1.2.9 All necessary instruments, power and control wiring integral to any equipment furnished under this specification.
1.2.10 All erection accessories, consumables and miscellaneous materials, though not specifically indicated in this specification, but actually required for completing the job in all respects.
1.2.11 Erection, testing and commissioning of materials and system as a whole.
1.2.12 Preparation of Drawings (Working/Structural/Detailed etc.) and layout as copies thereof to IFCI as per requirements.
1.2.13 Submitting the proper Bar Chart (s) incorporating all the activities required for the completion of the work well in time.
1.2.14 All necessary fixtures, supports and incidental works.

2. **Dismantling/Replacing of un-serviceable piping/connecting piping/fittings of water Supply /Plumbing system with new CPVC pipe and fitting.**

3. **Dismantling/Designing/Erecting/Restoration/Replacement/Modification** of existing Ventilation & Exhaust System at IFCI Tower including Car Parking, Nehru Place, New Delhi.

4. **Obtaining/Renewal of No Objection Certificates (NOCs)/Fire Clearance Certificates** from Delhi Fire Services Department/Local Authorities for the completed system in consultation with the Fire Consultant (appointed by IFCI) in respect of:

(i) IFCI Tower, 61 Nehru Place, New Delhi -110019.
(ii) IFCI Car Parking, IFCI Tower, 61 Nehru Place, New Delhi -110019.
(iii) IFCI Colony, Paschim Vihar, New Delhi- 110063

Note: The selected bidder shall be fully responsible for liaising with Delhi Fire Services Department and/or other statutory bodies and payment of fee and fulfilment of statutory requirements on behalf of IFCI Ltd. till renewal/fulfilment of Statutory Compliances/NOCs/Fire Clearance etc. IFCI shall not be liable for making any payment in this regard for any reason whatsoever.

5. The bidder shall furnish two years maintenance and operational spares along-with the list of commissioning of systems/equipment, complete details of all spare parts, their relation to the equipment and their itemized prices will have to be furnished as and when asked by the Fire Consultant/IFCI.

6. **Formats for Work Permit System:** The Contractor shall be responsible to follow strictly the Work Permit System in consultation with the Fire Consultant.

7. **Fire Protection Impairment Program:** The Contractor (selected bidder) shall be responsible for planning and implementing the "Fire Protection Impairment Program" in co-ordination with the existing contractor, who is responsible for operation & maintenance of existing Fire Protection System at IFCI Tower, Nehru Place and IFCI Colony, Paschim Vihar, New Delhi. The selected bidder will have to prepare for planned impairment of the Fire Systems and equipment in advance and shall apprise IFCI for the necessary approvals. IFCI shall not make additional payment for preparing and implementing the Fire Protection Impairment Program.

8. **Deployment of Site Engineer/Fire Tenders:** The selected Vendor shall be required to deploy the following manpower during execution of the work at each site:

8.1 Site Engineer: A well-qualified Site Engineer/Supervisor with Diploma/Degree in Mechanical/Fire Engineering having a minimum of 05 years of experience in handling fire-fighting installation, monitored/supervised execution of up-gradation/modification/ restoration of Fire Protection System works in high rise/modern buildings. S/he should be dedicated and seasoned Fire Safety Engineer with the highest commitment to public safety. He should have strong background in team supervision and direction. S/he should have innovative proponent of technological options for fire and safety regulation. The Site Engineer shall be responsible for liaising & maintaining all the standard fire-safety norms till completion of the work. He shall also be responsible to:

- Work in close co-ordination with the Fire Consultant and the prevailing Fire Fighting and Security teams.
- Adhere to all the safety/security guidelines issued by the Consultant and Fire Maintenance Contractor.
- Report all break-down to IFCI immediately and rectified without loss of time.
- Take charge of the movement/activities of other staff working under him/her at the site.
- Quick disposal of dismantled material/proper record of the incoming/outgoing material at site.

8.2 Fire Tender/Watch-keeper: The Contractor shall be required to deploy sufficient number of Fire Tender/Watch-keepers (at-least 02) in addition to the manpower directly involved in execution of the up-gradation work. They will have:

- To be well understood and experienced in fire-fighting installations/equipment.
- Well trained in combating fire-emergency/other emergency/medical First Aid.
- To closely vigil the work and to constantly patrol the site under the supervision of the Site Engineer and the Fire Consultant.
- Well-equipped by the Contractor (selected bidder) with the sufficient Fire-Safety clothing and fire-fighting equipment.
- To closely monitor the site while Hot Work/Fabrication Work is in progress plus 04 hours after completion of the work and will leave only when directed by the Site Engineer/IFCI.

Note: In case, the Contractor plans to execute work at both the sites simultaneously i.e. IFCI Tower & IFCI Colony both, then the Contractor shall have to deploy additional Site Engineer/Supervisor/Fire-Tenders for each site.

9. **Buyback of Dismantlable/Removable/Unserviceable/Replaceable Material or Items:** The selected bidder shall have to buyback the unserviceable/replaceable/removable systems or equipment or accessories or pipelines of the existing Fire-Protection Systems, Plumbing System and Exhaust & Ventilation System of IFCI Tower, Nehru Place, New Delhi and IFCI Colony, Paschim Vihar, New Delhi. The bidders are required to quote the value of such equipment/accessories as per online format given in the Financial Bid **wherever applicable**. The buyback value shall be subtracted from the total price quoted by the bidder (s) based on the '**BOQ**' for selection of the bidder. However, IFCI reserves the right whether to consider the Buyback Value towards finalisation of the bid (s) or not. IFCI also reserves the right to change or amend the terms of the buyback as and when felt necessary prior to or after submission of bids and the same shall be binding upon the bidder(s).

Note: Bidders shall take utmost care while filling the Buyback value wherever applicable. For items where Buyback value is not applicable, the bidder shall fill the same with Zero in the columns against such items for the purpose of calculation.

10. **Guarantee/Warranty:** All equipment/accessories shall be warrantied/guaranteed for One year from the date of completion against unsatisfactory performance or breakdown due to defective design, manufacture and/or installation. The installation shall be covered by the conditions that the whole installation or any part thereof found defective within one year from the date of completion. The same shall be replaced or repaired as the case may be, by the Contractor free of cost at the direction of the Fire Consultant or IFCI or both.

The Guarantee/Warranty shall cover the following:

a) Quality, strength and performance of materials used.
b) Safe mechanical and electrical stress on all parts under all specified conditions of operation.
c) Satisfactory operation during the guarantee period.
d) Performance figures and other particulars as specified by the tenderer

(C) GENERAL CONDITIONS OF CONTRACTS (GCC)

1. **Validity of Offer:** The rates in the Tender shall be kept open for acceptance for a minimum period of 90 (ninety days) from the last date of submission of offer (including extension, if any). In case, IFCI calls for negotiations, such negotiations shall not amount to cancellation or withdrawal of the original offer which shall be binding on the tenders.

2. **Abnormal Rates:** The bidder is expected to quote rate after careful analysis of cost involved considering all specifications and conditions of contract. In case, it is noticed that the rates quoted by the bidders are unusually high or unusually low, it will be a sufficient ground for rejection of the tender unless the reasonableness of the rates is convincing. For scrutiny, the analysis for such rates is to be furnished by the bidder on demand.

3. **Award of Work:** IFCI shall award the work on the basis of Net Quoted Rates which will be arrived at by subtracting the Buyback Value from the Total Quoted Rates (Total Quoted Rates- Buyback Value) as per format given in the online Financial Bid. However, IFCI reserves the right whether to consider or not to consider the Buyback Value towards finalisation of the bid (s) or to accept/reject the buyback value quoted by the bidder (s). In case, IFCI decide to award the Contract at Total Quoted Rates, then such rates shall be treated as Net Quoted Rates wherever the term 'Net Quoted Rates' appears in the Tender Document. The decision of IFCI in this regard shall be final and binding upon the bidders. IFCI also reserves the right to split the job into two or more parts and to award the work to separate agencies/bidders subject to the work experience and fulfilment of other terms & conditions/specifications to the suitability of IFCI. Further, IFCI shall not be bound to award the work to the lowest bidder.

4. **Execution of Contract Agreement:** The successful bidder's responsibility under this contract commences from the date of issue of the Letter of Intent/work order by IFCI. The selected bidder shall submit an unqualified acceptance to the Letter of Intent/Work order within the period stipulated therein. The successful bidder shall be required to execute an agreement in the prescribed form, on a non-judicial stamp paper of Rs.100/- within 15 days from the issue of LOI/Work Order. The Contract Agreement shall be valid till completion of the work plus 12 months from the date of completion of the work in full i.e. obtaining of NOCs. The Contract Agreement shall be signed by a person duly authorized/empowered by the selected bidder. The selected bidder shall pay for all stamps duty and legal charges, incidental expenses, if any. The entire Tender Document including General and Special Conditions shall form part of the Contract Agreement. Bidders are advised to study the tender document carefully.

5. **Completion Period**: The Contractor shall be required to complete the work including obtaining of Fire Clearance Certificates/NOCs and fulfilment of other statutory requirements of all the sites mentioned in the Tender Document in twelve (12) months from the date of award of work/LOI. The maximum period for completion of installation of equipment/systems and subsequent testing/commissioning for all locations must not exceed nine months (09 months) from the date of award of work. Further, a maximum of three months (03 months) will be allowed for getting NOCs/Fire Clearance Certificate (s) from the Delhi Fire Services Department/any other such statutory body.

6. **Security Deposit:** Upon acceptance of Tender, the successful Bidder will be required to deposit an amount equivalent to 10% of the contractual value (total contractual value – buyback value) as Security Deposit. The Security Deposit should be furnished within 15 days by the Contractor after award of the LOI/Work Order (before commencement of the work). Security Deposit may be furnished in any one of the following forms:

a) FDR/Pay Order/Bank Guarantee in favour of IFCI Ltd. payable at New Delhi.

b) Bank Guarantee from Scheduled Banks only.

c) The Security Deposit shall not carry any interest.

d) The validity of Bank Guarantees towards Security Deposit shall be up-to the completion period as stipulated in the Letter of Intent/Work Order plus one year, (i.e. 24 months) and the same shall be kept alive/valid by way of renewal or furnishing fresh Security Deposit if the contract is extended or the completion of the work is delayed or any other reason whatsoever. In any case, the Bank Guarantee shall have to be kept alive by at-least one year after completion of the work i.e. after obtaining the NOCs/Fire Clearance Certificate.

e) IFCI reserves the right of forfeiture of Security Deposit in addition to other claims and penalties in the event of the Contractor's failure to fulfill any of the contractual obligations or in the event of termination of contract as per terms and conditions of contracts with IFCI.

f) **Return of Security Deposit:** Security Deposit shall be refunded/released to the Contractor upon deducting all the expenses/other amounts, if any due to IFCI, after one year of completion of the work in all respects to the satisfaction of IFCI including obtaining NOC.

7. **Bank Guarantees:** Wherever Bank Guarantees are to be furnished / submitted by the Contractor, the following shall be complied with:

a) Bank Guarantees shall be from Scheduled Banks incorporated under Banking Regulation Act, 1949/Banking Companies Act, 1956/ Banking Companies Act, 1970 only.

b) It is the responsibility of the Bidder to get the Bank Guarantees revalidated/extended for the required period as advice by IFCI. IFCI shall not be liable for issue of any reminders on expiry of the Bank Guarantees. IFCI shall not be liable for issue of any reminders on expiry of the Bank Guarantees.

c) In case the Bank Guarantees are not extended before the expiry date, IFCI reserves the right to invoke the same by informing the concerned Bank in writing, without any advance notice/communication to the concerned Bidder/Contractor.

d) Bidders to note that any corrections to Bank Guarantees shall be done by the issuing Bank only through and amendment in an appropriate non judicial stamp paper.

The Original Bank Guarantee may be sent directly by the Bank to IFCI under Registered Post (Acknowledgement Due), addressed to the General Manager (Security Department), IFCI Ltd., IFCI Tower, 61-Nehru Place, New Delhi-110019.

8. **Performance Guarantee:** In addition to the Security Deposit, ten percent (10%) of the Net Quoted Rates (Total Quoted Rates – Buyback Value) shall be kept on hold by IFCI till completion of the work, which shall be treated as 'Performance Guarantee'. The same shall be released only after completion of the work in full and obtaining of NOCs/Fire Clearance Certificate/fulfilment of other statutory compliances by the Contractor to the satisfaction of IFCI.

9. **Payment Terms:** The payments for part work (after stipulated and statutory deductions) as assessed by the Fire Consultant for the applicable items in the contract, shall be payable at part rates not exceeding the percentage indicated against the stages of work below. The payment shall be released to the Contractor on pro-rata basis as and when the bill is produced before IFCI. The Contractor must ensure that bill (s) is duly assessed and certified by the Fire Consultant i.e. M/s Alpha Pacific Systems Pvt Ltd. whenever produced before IFCI for payment. However, IFCI reserves the right to re-examine the works completed and get the bill (s) scrutinized again at IFCI's level and to recover the amount at any time before or after releasing the payment.

9.1 **Stages of Work Percentage of Rate for Part Work**

a) On initial inspection of materials and delivery at site	70 %
b) On completion of pro-rata installation & measurement	20 %
c) On completion of Testing and commissioning & approval of	10 %

of installation by the Fire Consultant/IFCI

9.2 **Other Terms & Conditions** IFCI shall accept the bills for the work/part work from the Contractor only once every month. The Contractor shall manage the work in such a way that the bill/consolidated bills are produced before IFCI only once a month duly certified by the Fire Consultant.

9.3 **The payment shall be made on submission of the following documents:**

a) The Contractor will furnish a certificate along-with each bill to the effect that all statutory obligation/ requirements including the Environmental Laws etc. have been duly complied with. IFCI will not assume any responsibility thereto. The Contractor shall remit the payment directly in Bank A/C of the workers as per latest guidelines of the Labour Department and shall be responsible to adhere to prevailing guidelines of such statutory bodies in future as well until the Contractor is engaged with IFCI.

b) Guarantee/Warranty Certificate of the equipment/material used/installed/repaired to the satisfaction of IFCI.

c) Details of the work executed.

In addition to the above, IFCI may ask the Contractor to furnish other certificates/details as and when required.

10. **Bill of Quantities/Variation in BOQ:** The bidder should physically inspect the entire systems/equipment which are mentioned in the Tender Document (to be covered under contract) and make an assessment of the average consumption of consumables/spares etc., before quoting its rates. The **'BOQ'** has been prepared with due diligence, however the actual quantity given in the **'BOQ'** may vary at the time of execution of work depending upon the requirement of the systems/equipment to be upgraded or modified or replaced. IFCI may also direct the Contractor to alter or modify or install a particular system/equipment to match its requirement or to fulfil requirement of the Delhi Fire Services Department which may or may not be part of the 'BOQ'. Accordingly, payment to the Contractor shall be made by IFCI on actual consumption basis. The Contractor will have to get the equipment/material measured and certified by the Fire Consultant at site first before submitting the bill (s) to IFCI for payment after installation/usage. IFCI shall not release the payment to the Contractor without measurement and certification/verification by the Fire Consultant.

11. **Additional Work:** In case, a new system or equipment is required to be installed which is not covered under this tender/BOQ, it shall be treated as additional work and the Contractor shall be responsible to execute such work (s). The Contractor shall be asked to give/quote the rates for such system or equipment separately. However, IFCI reserves the right to decide the rates of such equipment in-consultation with the Fire Consultant taking the prevailing market rates into consideration.

12. **Penalty for Delay in Completion of Work:** In case, the selected Contractor doesn't complete the work of installation of equipment/systems including testing/commissioning in time i.e. within 09 months from the date of award of work/LOI, the following shall be applicable on the Contract:

a) Deduction of 5% of the Performance Guarantee (Please refer **Para '8' of GCC** above), if delayed by more than one month but not exceeding three months in total.

b) Deduction of 20% of the Performance Guarantee, if delayed further but not exceeding six months in total.

c) Forfeiture of 100% of the Performance Guarantee and/or partial or full deduction from Bank Guarantee(Security Deposit), if delayed by more than six months in total.

Note: The above deductions, if required to be made at any time during the contract or due to delay in completion of the work, the same shall be adjusted from the Performance Guarantee (see Para '8' of the GCC above). In case, no bill is received from the Contractor after delay in completion of the work, IFCI shall recover such deductible amount from the Security Deposit submitted by the Contractor. Further, extension of time for completion of work may be provided without any penalty, if the delay has occurred due to unforeseen reasons but after careful judgment and at sole discretion of IFCI.

13. **Rejection of Tender and Other Conditions**

a) Conditional bids, unsolicited bids, bids which are incomplete or not in the form specified herein or defective or have been materially altered or not in accordance with the tender conditions, specifications etc., are liable to be rejected.

b) Bid is liable to be rejected in case of unsatisfactory performance of the Bidder in the past. IFCI reserves the right to reject the Bid in case it is observed that the bidder may not be in position to execute this job as per the required schedule. The decision of IFCI will be final in the regard.

c) If a Bidder, who is a proprietor and expires after submission of his offer or after acceptance of his bid, IFCI may at its discretion, cancel such tender and similarly, if a partner of a firm expires after submission of his tender or after acceptance of his tender, IFCI may then cancel such tender at its discretion, unless the firm retains its character.

d) If the Bidder gives wrong information in his tender, IFCI reserves the right to reject such tender at any stage or to cancel the contract, if awarded and may forfeit the Earnest Money/Security Deposit/any other money due.

e) Canvassing in any form in connection with the bid submitted by the Bidder shall make his offer liable to rejection.

f) IFCI reserves the right to accept or reject the bids without assigning any reason whatsoever.

g) In case the proprietor, Partner or Director of the Company/Firm submitting the Tender, has any relation with any person employed in IFCI, the authority inviting the Tender shall be informed of the fact as per specified format as per relevant annexure attached along-with offer. If at any stage of the tendering process or later during the currency of the contract, it comes to the notice of IFCI that the Contractor has any relationship with any of staff employed with IFCI and the same is not reported to IFCI by the Contractor, such bid/contract shall be liable to be rejected and EMD/Security of such Bidder/Contractor shall be forfeited.

h) The Tender submitted by a techno commercially qualified Bidder shall become the property of IFCI who shall be under no obligation to return the same to the Bidder. However, unopened financial bids and late tenders may be returned to the Bidders.

i) Discount letter, if any on financial price shall not be considered by IFCI.

j) IFCI shall not be liable for any expenses incurred by the Bidder in preparation of the tender irrespective of whether the tender is accepted or not.

14. **Termination or Cancellation of the Contract in Full or in Part:** Notwithstanding anything contained herein, IFCI shall have the right to terminate the Contract at any time or cancel the Contract in full or in part during its currency by giving one month notice to the Contractor without assigning any reason thereof, If the Contractor:

a) At any time makes default in proceeding with the works with negligence and continues to do so even after a notice in writing or through email/post from the IFCI Ltd.; or
b) Commits default in complying with any of the terms and conditions of Contract and does not remedy it or take effective steps to remedy it within 07 days after a notice in writing is given to him in that behalf by the IFCI Ltd.; or
c) Fails in performance evaluation carried out by the Fire Consultant/IFCI;
d) Violates any of the terms and conditions stipulated in the agreement/tender document.

Note: The Contractor will also have the right to terminate the Contract by giving notice of one month notice in advance to IFCI. However, the Contractor shall not have the right to cancel the contract in part and shall be required to execute the complete work. In case, the Contract is terminated or cancelled partly, IFCI shall be entitled to recover any money/amount/charge becoming due, from the Contractor under the prevailing Contract Agreement.

15. **Law Governing the Contract and Court Jurisdiction:** The contract shall be governed by the law for the time being in force in India. The civil court having original civil jurisdiction at New Delhi shall have an exclusive jurisdiction in regard to all claims in respect of the Contract. No other civil court shall have jurisdiction in case of any dispute, under this contract.

16. **Issue of Notice**

a) Service of notice on Contractor: Any notice to be given to the Contractor under the terms of the contract shall be served by sending the same **by Registered Post/Speed Post/E-mail** to or leaving the same at the Contractor's last known address of the principal place of business (or in the event of the Contractor being a company, to or at its Registered Office). In case of change of address, the notice shall be served at changed address as notified in writing by the Contractor to IFCI. Such posting or leaving of the notice shall be deemed to be good service of such notice and the time mentioned to the condition for doing any act after notice shall be reckoned from the date so mentioned in such notice.

b) Service of notice on IFCI: Any notice to be given to IFCI under the terms of the Contract shall be served by sending the same by post and copy of the same can emailed to IFCI seperately.

17. **Use of Office Space:** No space belonging to IFCI shall be occupied by the Contractor without written permission of IFCI.

18. **Rights of IFCI:** IFCI reserves the following rights in respect of this contract during the original contract period or its extensions if any, as per the provisions of the contract, without entitling the Contractor for any compensation.

a) To terminate the contract without assigning any reason whatsoever by giving one month notice to the Contractor.

b) To effect recovery from any amounts due to the Contractor under this or any contract or in any other forms, the moneys IFCI is statutorily forced to pay to anybody due to Contractor's failure to fulfil any of his obligations. IFCI shall levy overheads of 5% on all such payments.

c) To get any part of the work done through other agency or deploy IFCI's own/hired or otherwise arranged resources, at the risk and cost of the Contractor after giving due notice period of two weeks to the Contractor in the event of:

(i) Contractor's continued poor progress
(ii) Withdrawal from or abandonment of the work before completion of the work
(iii) Contractor's inability to complete the work as stipulated in the contact
(iv) Poor quality of work
(v) Any corrupt act of the Contractor
(vi) Insolvency of the Contractor
(vii) Persistent disregard to the instructions of IFCI
(viii) Assignment, transfer, sub-letting of contract without IFCI's written permission
(ix) Non fulfilment of any contractual obligations
(x) In the opinion of IFCI, the Contractor is overloaded and is not in a position to execute the job as per required schedule
(xi) If at any stage during contract period, any complex issue arises as a result of major shift in Central/State Govt. Rules & Regulations/notifications and if solution to such issues is not rendered herein or such issues which do not find stable solutions for the contractual

period within terms & conditions of the Tender/Contract Agreement, IFCI shall have the right to terminate such contract or amend terms and conditions of the Contract to ensure smooth execution of the work.

d) **Acceptance/Rejection of Bid:** IFCI reserves the absolute right to reject any or all the Bids at any stage solely based on the past unsatisfactory performance by the Bidder(s) if the bid document is not up-to the expectation of IFCI. The decision of IFCI regarding the same shall be final and conclusive.

19. **Price Discrepancy:** In case, there is any difference observed between the rates given by the Bidder in words and figures or in amount worked out by him at the time of opening of financial bid, the following procedure for evaluation and award shall be followed:

"In case of lump-sum/consolidated price, if there is any difference between the amount in figures and in words, the amount quoted in words by the Bidder shall be treated as correct." However, the decision of IFCI shall be final and binding to the bidders in this regard.

20. **Responsibilities of the Contractor:** The Contractor may sub-contract part of the work but not in full detailed in the tender document with prior permission of the Fire Consultant and IFCI. IFCI will not be bound by any further assignment of work/sub-contracted work by the Contractor subsequent to execution of the Contract. The following are the responsibilities of the Contractor in respect of observance of local laws, employment of personnel, payment of taxes etc.:

a) The Contractor at all times during the continuance of this contract shall, in all his dealings with local labour for the time being employed on or in connection with the work, have due regard to all local festivals and religious and other customs.

b) The Contractor shall be responsible for all the prevailing necessary permissions, if any to be obtained from the statutory bodies such as Delhi Fire Services Department, MCD, DDA & Labour Commissioner etc. whether prior to starting of the work or during the work or after the work.

c) The Contractor shall comply with all the prevailing applicable State and Central Laws, Statutory Rules, Regulations etc. such as Payment of Wages Act, Minimum Wages Act, Workmen Compensation Act, Employer's Liability Act, Industrial Dispute Act, Employers Provident Act and Miscellaneous Provisions Act, 1952 EPF, Employees State Insurance Act/Scheme, 1948 (ESI), Contract Labour (Regulation and Abolition) Act 1970 Central Rules, 1971/Industrial Disputes Act, 1947 and Central Rules 1957,, Payment of Bonus & Gratuity Act and other Acts, Rules and Regulations for labour as may be enacted by the Government during the tenure of the Contract and having force or jurisdiction at Site. The Contractor shall also give to the local Governing Body, Police and other relevant Authorities all such notices/information as may be required by the Law.

d) The Contractor shall be responsible to follow prevailing Environmental (Protection) Act 1986, Environment (Protection) Rules, 1986. Further, the Contractor shall be responsible to follow Hazardous waste (Management, Handling and Trans-boundary movement rules,2008), take steps to handle hazardous waste management, selling/disposal of hazardous waste, maintenance & record of hazardous waste handled, packing, labelling and transport of hazardous waste, reporting to state pollution control board in case of accident occurs, obtain no objection certificate from pollution control board whenever required, submit statutory/necessary compliance /annual returns/other obligations to state pollution control board on behalf of itself/IFCI. The Contractor shall submit the necessary compliance certificate.

e) If required, the Contractor shall obtain independent License under the Contract Labour (Regulations and Abolition Act, 1970) as required from the concerned Authorities based on the certificate (Form-V) issued by the Principal Employer/Customer.

f) The Contractor shall pay all taxes, fees, license charges, deposits, tolls, royalties, commission or other charges which may be liable on account of his operations in executing the contract.

g) Contactor shall be responsible for provision of Health and Sanitary arrangements (more particularly described in Contract Labour Regulation & Abolition Act), Safety precautions etc. as may be required for safe and satisfactory execution of contract.

h) The Contractor shall be responsible for proper accommodation including adequate medical facilities like First Aid Kit etc. for personnel employed by him.

i) The Contractor shall ensure that no damage is caused to any person/property of other parties working at site. If any such damage is caused, it will be the responsibility of the Contractor to make good the losses or compensate for the same.

j) The Contractor shall arrange, coordinate his work in such a manner as to cause no hindrance to other agencies working in the same premises.

k) All safety rules and codes applied by the IFCI at site shall be observed by the Contractor without exception. The Contractor shall be responsible for the safety of the equipment/material and works to be performed by him and shall maintain all light, fencing guards, slings etc. or other protection necessary for the purpose. The Contractor shall also take such additional precautions as may be indicated from time to time by the Engineer with a view to prevent pilferage, accidents, fire hazards. Due precautions shall be taken against fire hazards and atmospheric conditions. Suitable number of staff, watch and ward, store keepers to take care of equipment/materials and construction tools and tackles may be posted at site by the Contractor till completion of work under this contract.

l) The contactor shall arrange for such safety devices as are necessary for the works to be executed and carry out requisite site tests of handling equipment, lifting tools, tackles etc. as per prescribed standards and practices.

m) Contractor has to ensure the implementation of Health, Safety and Environment (HSE) standards as required by the related statutory laws or as per requirement of IFCI/Customer. The Contractor has to assist in HSE audit by IFCI/Fire Consultant and submit compliance Report. The Contractor has to generate and submit record/reports as per HSE plan/activities as per instruction of IFCI/ Fire Consultant.

n) The Contractor will be directly responsible for payment of wages to his workmen. A pay roll sheet having details of all the payments given to the workers duly singed by the Contractor should be furnished to IFCI as and when asked by IFCI for record purpose.

o) In case of any class of work for which there is no such specification as laid down in the NIT/contract, such work shall be carried out in accordance with the instructions and requirements of IFCI/Fire Consultant.

p) The Contractor shall ensure hassle-free services to IFCI at all times. All complaints have to be attended to in minimum agreed time as per industry norms/practice, failing which, IFCI will be at liberty to get the work done on its own/another agency and to recover the costs incurred from your running bills/security deposit.

21. IFCI will not be responsible for any lapse on part of the Contractor in enforcing of provisions of any statutory compliance (s). The Contractor shall be solely liable for any dispute that might arise in any matter in future for violation/non-compliance of Labour Laws/regulations and other statutory compliances. IFCI will have no responsibility, whatsoever in this regard. Receipt of any complaints on this ground shall be viewed seriously.

22. This being a pure works contract, the personnel engaged and deployed by the Contractor at IFCI Office/Residential Premises will be in no way be deemed as working under the employment of IFCI and there shall exist no employer-employee relationship between IFCI and the Contractor or his personnel deployed by him. It is expressly understood that there shall be no legal relationship of whatsoever subsists between IFCI and such personnel employed by the Contractor.

23. The Contractor or his personnel shall have nothing to do with IFCI either in respect of wages/salary or such other statutory benefits or compensation etc. under the Labour Laws and other related Laws in force or introduced at any time during the currency of the Contract by the State/Central Government. The Contractor shall obtain an appropriate/adequate Policy i.e. Contractor All Risks (CAR) Policy so as to meet any obligation in any eventuality.

24. The employees of the Contractor will work strictly under the direction and administrative control of Manager/Supervisor/Site Engineer designated by the Contractor. However, the Contractor's supervisory staff will have to execute the work through their employees according to the requirement, need and/ instructions of the designated officers of IFCI and/or in consultation with the Fire Consultant.

25. The employee of the Contractor will ensure strict discipline and behavior and diligent performance of their duties most befitting to the décor of the most modern mechanized building of IFCI and they shall not in any manner cause any interference, annoyance, nuisance etc. to IFCI staff or its business or working or tenants and will be liable for immediately replacing/relocating the individual employee if the services rendered by him are not found to be satisfactory.

26. The Contractor shall be liable for indemnifying IFCI from any liability on account of his employees and/or meeting any Statutory Obligations required under labour Laws of the Central/State Government(s). IFCI will therefore not assume any responsibility thereto. The Contractor shall also fully indemnify IFCI against any claims of whatsoever nature arising due to the failure of the Contractor in discharging any of his responsibilities

27. Thorough checking/frisking of employees of the Contractor's staff/material during entry/exit shall be done by security staff of IFCI. Therefore, the Contractor shall ensure his/her staff deployed at site co-operate with security at any time during the Contractual period.

28. **Penalty**: After completion of the contract, the Contractor shall be responsible for smooth handing over of entire systems/equipment to the Maintenance Contractor selected/appointed by IFCI within 30 days to the satisfaction of IFCI. During the process of Handing Over-Taking Over, if any fault is observed by IFCI/Fire Consultant/Maintenance Contractor, the same should be rectified within a period of 30 days. In case, the defect is not rectified within 30 days, IFCI shall be at liberty to get the defect rectified through other resources and the cost of such works/repair(s) shall be recovered from the Contractor's balance of payments/security deposit/performance guarantee and Contractor will have no objection to such deeds.

29. **Strikes & Lockout:** The Contractor will be fully responsible for all disputes and other issues connected with his labour/work at site. In the event of the Contractor's labour resorting to strike or the Contractor resorting to lockout and if the strike or lockout is not settled within a period of one month, IFCI shall have the right to get the work executed through any other agencies and the cost so incurred by IFCI shall be deducted from the Contractor's bills/security deposits. Further, IFCI reserves the right to terminate the contract in case of any strike/lockout of the Contractor.

30. **Force Majeure:** The following shall amount to Force Majeure:

a) Acts of God, act of any Government, War, Sabotage, Riots, Civil commotion, Police action, Revolution, flood, Fire, Cyclones, Earth quake and Epidemic and other similar causes over which the Contractor has no control.

b) If the Contractor suffers delay in the due execution of the contractual obligation due to delays caused by force majeure as defined above, the agreed time of completion of the job covered by this contract or the obligations of the Contractor shall be extended by a period of time equal to period of delay, provided that on the occurrence of any such contingency, the Contractor immediately reports to IFCI in writing the causes of delay and the Contractor shall not be eligible for any compensation.

31. **Arbitration & Reconciliation**

a) In case amicable settlement is not reached in the event of any dispute of difference arising out of the execution of the contract or the respective rights and liabilities of the parties or in relation to interpretation of any provision by the Contractor in any manner touching upon the contract, such dispute or difference shall (except as to any matters, the decision of which is specifically provided for therein) be referred to the sole arbitration of the arbitrator appointed by the CEO& MD of IFCI.

b) The award of the Arbitrator shall be binding upon the parties to the dispute.

c) Subject as aforesaid, the provisions of Arbitration and Reconciliation Act 1996 (India) or statutory modifications or reenactments thereof and the rules made there under and for the time being in force shall apply to the arbitration proceedings under this clause. The venue of the arbitration shall be held at Delhi and the language of the proceedings shall be in English. Subject to the above, the Courts at Delhi alone shall have the jurisdiction to deal any disputes between the Parties pertaining to the contract.

d) The cost of arbitration shall be borne equally by both the parties.

e) Work under the contract shall be continued during the arbitration proceedings.

f) Failure to comply with any of the above conditions can result in termination of the contract, forfeiture of the security deposit, penalty as may be decided by IFCI and future blacklisting of the Contractor.

32. **Dispatch Instructions**

Any submission in tender shall always be deemed to have been done after careful study and examination of the tender document and with the full understanding of the implications thereof. In case, the Bidder have any doubt about the meaning of any portion of the Tender Specification or finds discrepancies or omissions in the 'Scope of Work' or the tender document issued is incomplete or requires clarification on any of the technical aspect, the 'Scope of Work', the terms & conditions, Technical Specifications, BOQ etc., the Bidder shall at once, contact the authority inviting the tender well in time (so as not to affect last date of submission) for clarification before submission of the tender. Bidder's request for clarification shall be with reference to Sections and Clause numbers given in the tender documents. The specifications and terms and conditions shall be deemed to have been accepted by the Bidder in its offer. Non-compliance with any of the requirements and instructions of the tender enquiry may result in rejection of the tender.

(D) SPECIAL CONDITIONS OF CONTRACTS (SCC)

1. **Commencement of Work:** The Contractor shall commence the work within 15 days from the date of Letter of Intent/Work Order issued by IFCI and shall proceed with the same with due expedition without delay. If the Contractor fails to start the work within stipulated time, IFCI will have the right to cancel the contract fully or partly and the Earnest Money and/or Security Deposit with IFCI will stand forfeited without any further reference to the Contractor and without prejudice to any and all of IFCI's other rights in this regard. All the work shall be carried out under the direction and to the satisfaction of IFCI.

2. **Manpower:** The Contractor shall deploy the stipulated manpower in the Scope of Work of the tender document at all sites of IFCI having requisite qualifications, professional competency and work experience in respective areas of their duties as outlined in 'Scope of Work' to the satisfaction of IFCI. IFCI reserves the right to modify requirement of personnel or material on need basis from time to time.

3. **Insurance:** IFCI will not be responsible for any injury/death caused to the employees deployed by the Contractor at IFCI. It will be the responsibility of the Contractor to abide with the all the provisions of the Workmen Compensation Act, 1923 and no compensation, whatsoever shall be paid by IFCI in this regard. The workforce deployed by the Contractor should be adequately covered under Personal Accident Insurance Plan and proof will be submitted with IFCI by the Contractor.

a) It is the sole responsibility of the Contractor to insure his materials, equipment, workmen, etc. against accidents and injury while at work and to pay compensation, if any, to workmen as per Workmen's compensation Act. The work be carried out in protected area and all the rules and regulations of the IFCI in the area of project which are in force from time to time will have to be followed by the Contractor.

b) The Contractor will take necessary precautions and due care to protect the material while in his custody from any damage/loss due to theft or otherwise until the same is handed over successfully to IFCI. The Contractor will submit necessary documents for lodging/processing of insurance claim. In case of any theft of material under Contractor's custody, matter shall be reported to Police by the Contractor immediately and copy of FIR and subsequently Police investigation report shall be submitted to IFCI for taking up with insurance. However this will not relieve the Contractor of his contractual obligation for the material in his custody.

c) The selected bidder will be liable to indemnify IFCI against all damages/losses, if any occurs during the process of up-gradation of Fire-fighting/Plumbing Systems in IFCI Tower, Nehru Place and IFCI Colony, Paschim Vihar, New Delhi. If due to negligence and or non-observation of safety and other precautions by the contactors, any accident/injury occurs to the property/manpower belonging to third party, the Contractor shall have to pay necessary compensation and other expense, if so by the appropriate authorities.

4. Shut Downs: No routine shut down shall be permitted during office hours without the prior permission of IFCI. The Contractor shall be allowed to carry out works on weekdays/weekly offs/holidays and after office hours subject to prior permission of IFCI.

5. In case of any damage/theft/injury to IFCI's people/tenants/premises/property/assets/ installations due to negligence of his workers for which Contractor is accountable, the Contractor will be liable to pay the compensation to IFCI as decided and advised by IFCI.

6. **Registers and Forms:** The Contractor shall maintain the following records and log books during the contract period:

a) Necessary records of the services\work carried out will be maintained and the same has to be countersigned by the Fire Consultant and has to be produced before IFCI whenever asked.

b) The Contractor shall be responsible to maintain the registers/forms as required under the prevalent labour and/or other statutory laws in force from time to time. The Contractor shall maintain the above neatly, completely and legibly for inspection by various statutory authorities and the company officials even at short notice.

7. **Drawing & Design**: The Contractor is required to prepare drawings viz., Fire Plan/Floor Evacuation Plan for both the sites, or Integrated Fire Alarm System, Scheme drawing or any other related drawing in AutoCAD as per existing fire-fighting systems and equipment in the building, or if any changes take place due to repair/up-gradation/modernization/replacement of the system/equipment during the period of contract. The Contractor shall submit the drawings in Hard as well in soft to IFCI.

8. After completion of the said contract period, it will be the responsibility of the Contractor to depute his representative for a minimum period of 30 days to Handover the Charge and/or to demonstrate the systems/equipment repaired/replaced/installed during execution of the work to the Fire maintenance staff.

9. IFCI at its discretion can ask the Contractor to arrange for carrying out **Third Party Inspection (TPI)** during execution of the work or on completion of the entire work/contract. Contractor will be responsible for carrying out third party inspection by the vendor/agency/firm of the similar type. IFCI may arrange third party inspection of the fire systems/equipment at its own, if it is felt to do so, at the expense of the Contractor. IFCI may also ask the Contractor to submit the names of at-least two firms/vendors (who are engaged in similar field) for third party inspection. The Contractor shall be required to submit the names within 15 days as and when instructed by IFCI and upon submission of the names, IFCI will decide the name of final vendor for TPI. The cost of third party inspection shall be borne by the Contractor.

10. **GST Clause**

(i) The Contract value should be exclusive of all applicable Indirect taxes, levies, duties, cesses and surcharges. Any Indirect Tax (such as service tax, VAT/ CST, entry tax, customs duty, excise duty or any other tax or GST) will be charged and recovered over and above the agreed consideration. C-DEC may be provided by IFCI upon request of the Contractor.

(ii) In case any credit, refund or other benefit is denied or delayed to IFCI due to any non-compliance by the Contractor (such as failure to upload the details of the sale on the GSTN portal, failure to pay GST to the Government) or due to non-furnishing or furnishing of incorrect or incomplete documents/ invoice prescribed under Law by the Contractor, the Contractor shall reimburse IFCI the loss including but not limited to, the tax credit loss, interest and penalty.

11. **Inspection and Testing:** The contractor shall provide all necessary facilities for inspection of equipment. The contractor shall also furnish the routine test certificates for the materials /equipment / accessories to be used in this work to the satisfaction of Fire Consultant/IFCI.

12. **Completion Plan:** Completion plan indicating the Piping and Equipment layout of the Fire-fighting, Plumbing & Exhaust & Ventilation installations for all the floors of the building and External hydrant layout.

13. A list of persons deployed along-with qualification, experience, photograph, and duly completed KYC of all personnel have to be submitted to IFCI at the time of commencement of the contract or whenever change/replacement of any person (s) takes place during the period of the contract. Any subsequent changes in the deployment of personnel shall be notified in advance. IFCI may ask to furnish the details of personnel deployed by the Contractor at any time during the period of contract.

14. The Contractor has to arrange for the latest Police verification from the parental Police station of the employee as well as from the present residential address Police station of the persons deployed within thirty days (30) from the date of Award of Work.

(E) TECHNICAL SPECIFICATION FOR FIRE FIGHTING, FIRE ALARM, VENTILATION & EXHAUST SYSTEM AND PLUMBING SYSTEM

(I) Fire Suppression System and Plumbing System at IFCI Tower

1. General

a) This section specifies the manufacture, installation and material requirements of pipe work Systems. Areas of commonality to all pipe work systems are described first, followed by the specific requirements for particular pipe work materials and applications.
b) Standards
c) Relevant Codes and Standards

2. Common Standards

a) ANSI B16.9: Factory-Made Wrought Steel Butt welding Fittings
b) ANSI B16.21: Nonmetallic Gaskets for Pipe Flanges
c) ANSI B16.1: Cast Iron Pipe Flanges and Flanged Fittings
d) ANSI B16.5: Pipe Flanges and Flanged Fittings

3. Standards for Plumbing Pipe work

a) IS:554 Dimensions for pipe threads where pressure tight joints are required on the threads.
b) IS:782 Specification for caulking lead.
c) IS:800 Code of Practice for general construction in steel.
d) IS:1367 Technical Supply conditions for threaded steel fasteners: (Part I) Introduction and general information.
e) IS:1367 Technical supply conditions for threaded steel fasteners: (Part 2) Product grades and tolerance
f) IS:3114 Code of practice for laying of cast iron pipes (Pipe work)
g) IS:4111 Code of practice for ancillary structures in sewerage system: (Part-I) Manholes.
h) IS:5329 Code of practice for sanitary pipe work above ground for Buildings.
i) IS:12251 Code of Practice for drainage of building basements.
j) BS:6700 Specification for design, installation, testing and maintenance of Services, Supplying water for domestic use within buildings and their cartilages.
k) BS:8301 Code of practice for building drainage.
l) IS:458 Specification for precast concrete pipes (with and without reinforcement)
m) IS:1239 Mild steel tubes, tubular and other wrought steel fittings: (Part 1) Mild steel tubes
n) IS:1239 Mild steel tubes, tubular and other wrought steel fittings: (Part 2) Mild steel tubular and other wrought steel pipe fittings.
o) IS:1536 Centrifugally cast (spun) iron pressure pipes for water, gas and sewage
p) IS:1537 Vertically cast iron pressure pipes for water, gas and sewage
q) IS:1538 Cast iron fittings for pressure pipes for water, gas and sewage
r) IS:1879 Malleable cast iron pipe fittings
s) IS:3468 Pipe nuts
t) IS:4.0889 Steel pipes for water and sewerage (168.3 mm to 2540 mm outside diameter)
u) IS: 3989 centrifugally cast (Spun) iron spigot and socket soils waste and ventilating pipes, fittings and accessories.
v) IS:14333 High Density Polyethylene pipes for sewerage pipes

4. TECHNICAL AND INSTALLATION REQUIREMENTS

a) Installation- General

(i) Design and construction of pipelines shall be in accordance with relevant British, Indian and other standards, as specified. Water pipes, soil and waste pipes below 50mm shall be of galvanized pipes

(ii) The installation shall be neat and tidy, with accurate spacing between pipes, valves and joints, whether running in straight routes or turning through bends.

(iii) Particular care shall be taken that all pipe work is erected and secured truly parallel with the building structure, clear of obstructions, preserving headroom and keeping passageways clear and that all vertical drops are plumb.

(iv) No bends or curves in any pipe shall be made so as to diminish the waterway or alter the internal diameter of the pipe.

(v) Wherever possible, horizontal pipes shall be fixed to 'fall' to aid venting and draining down of the pipe work. Eccentric reducing sockets shall be used on horizontal runs of pipe to prevent the formation of air pockets. On vertical pipes, concentric reducing sockets shall be used.

(vi) Drain outlets shall be provided at all low points of the system to enable emptying and to facilitate maintenance of the pipe work.

(vii) Automatic or manual air vents shall be placed at each high point of each water line and discharge pipe shall be terminated at 50 mm above floor drain.

(viii) All pipes shall be fitted clear of the floor to permit cleaning beneath the pipes. Where possible, a 125 mm clearance shall be provided between the underside of the pipe and the finished level of the floor and in no case shall the pipe be less than 100 mm clear of the floor.

(ix) All pipe runs when not buried underground shall be concealed as far as possible by careful positioning or shall be chased into walls, or laid in screeds except inside plant rooms. All pipes which are to be concealed shall be tested and Approved before being covered.

(x) All pipes passing through the roof shall be provided with at least 2.00 mm lead flashing sandwiched between the layers of waterproofing roofing membrane, and secured to the pipe with a galvanized spring clip.

(xi) Pipe work shall rest freely upon supports and be carefully aligned prior to final connection.

(xii) The Engineer reserves the right to reject any material deemed to be unsuitable for installation and such material shall be removed from the Site and be replaced with approved material by the contractor at his own cost.

(xiii) Site welding shall be applied with pipe work unrestrained and each joint hydraulically tested at 1.5 times working pressure plus 4.080 kPa for 60 minutes without loss of pressure

(xiv) Followed by application of appropriate protective coating, both internally and externally, prior to final installation.

(xv) Following the welding and hydro testing the complete Fire Protection Piping
System shall be wire brushed and applied with two coats of red oxide primer and then painted with 2 coats of Post office Red enamel paint. The fittings will have wall thickness not less than those of the pipes.

b) Cleaning Procedures

(i) Precautions shall be taken to avoid introducing foreign matter such as welding beads and slag or dirt into the piping system. Completed welds shall be hammered to loosen debris. Prior to assembly, all piping, valves and fittings shall be internally cleaned of oil, grease and dirt by wire brush and swabs.

(ii) Following fabrication and installation, all piping of 150 mm and smaller shall be cleaned by flushing with clean water, run to waste, until thoroughly free of all dirt, oil etc. Generally, each size of pipe shall be flushed separately before being joined with larger size piping.

(iii) Piping of 200 mm and larger shall be cleaned by pulling through a steel brush for the entire length of each pipe size, followed by fibre brush or swabs. Brushes and swabs shall be slightly larger than the inside diameter of pipe being cleaned.

(iv) All cleaning operations shall be continuous throughout the piping system, except at joints required for final jointing of various sections of cleaned piping. After cleaning and until final joints are made, the end of sections of piping shall be tightly sealed off to prevent any dirt, water and other foreign matter from entering the pipes.

c) **Gaskets**

(i) Gaskets shall be suitable for the temperature, service and pressure of the system and shall be, installed in accordance with the manufacturer's recommendations. Made up flanged joints shall be fabricated from one-piece ring gaskets, 3 mm thick, neoprene rubber.

(ii) For flanged joints between dissimilar metals or insulating flange joints; insulating gaskets, sleeves and washers between flanges, bolts and nuts respectively shall be used. Insulating material shall be "Teflon" or approved equivalent material.

(iii) Joint rings and gaskets shall comply with the requirements of BS 7874 but other materials may be used if they have been proved to be more suitable for their duty as recommended by the manufacturer, and approved by the Engineer.

d) **Jointing-Particular**

(i) Where flanged joints are required for jointing galvanized steel pipes, galvanized steel screwed boss flanges complying with IS: 6392 shall be used.

(ii) Screw joints shall be made with tapered threads properly cut. Joints shall be made tight with a stiff mixture of litharge and glycerin, or poly tetra fluoro ethylene tape, or other Approved thread joint compound applied to the male threads only. Not more than three threads shall show after the joint is made up.

(iii) Welded joints shall be fusion-weld in accordance with ANSI B 31.1, unless otherwise stated. Welded fittings shall be used when changing direction of piping. Mitering or notching pipe to form elbows and tees or other similar construction will not be permitted.

(iv) Branch connections shall be made with welding tees or forged welding branch outlets.

(v) Site and shop bevels shall be in accordance with the recognized standards and shall be carried out by mechanical means or flame cutting. Where work is carried out by flame cutting, the metal surfaces shall be cleaned of scale and oxidation prior to welding.

(vi) Before welding, the component parts to be welded shall be aligned so that no strain is placed on the weld when finally positioned. Align the height so that no part of the pipe wall is offset by more than 20 % of the wall thickness. Flanges and branches shall be set true.

(vii) Alignment shall be preserved during the welding operation.

(viii) All defective welds shall be removed and replaced at no additional cost to the Employer. Repairing of defective welds by adding new material over the defective welds or by peeling will not be permitted.

(ix) Electrodes shall be stored in a dry area and kept free of moisture or dampness. During fabrication operations the electrodes shall be stored in a heated container. Electrodes that have lost part of their coating shall not be used.

(x) Flanges and unions shall be faced true. Flanges with Approved gaskets shall be provided and made square and tight. Union or flange joints shall be provided in each line immediately preceding the connection to each place of equipment or material requiring maintenance such as pumps, control valves, and other similar items. Gaskets shall conform to ANSI B16.21 and ASTM D 2000.

(xi) Flanges

(xii) Welded piping: Steel, welding neck pattern, 150 (104.08 kPa) or 300 (2070 kPa) WSP class, complying with ASME B-16.5, ASTM A 181 Grade 1, or BS 4504 shall be used.

(xiii) Screwed piping; Flanges and flanged fittings on screwed and wrought iron piping shall be cast iron, standard weight, complying with ASME B-16.1.

e) **Supports General**

(i) Unless otherwise specified or indicated, all brackets, stays, frames, fixed and roller supports and hangers necessary to carry and support all pipes and valves shall be provided.

(ii) Structural steel required for proper installation shall be provided. All pipe supports shall be steel, adjustable for height and hot dipped galvanized.

(iii) Supports shall only be attached to structural framing members. Where supports are required between structural framing members, a suitable intermediate metal framing shall be provided.

(iv) Piping shall be supported independently from all equipment so that equipment is not stressed by the weight of the pipe or expansion.

(v) Valves or other heavy items of pipe work equipment shall be fitted as near as practicable to a point of support, or fitted with their own supports.

(vi) Hangers, supports, guides and anchors shall be designed to allow expansion and contraction within stress limits of codes for pressure piping in accordance with Section 1 on Power Piping of ANSI B

(vii) Supports shall be located to ensure that pipe work branches of fittings are not restrained by the support during expansion or contraction of the pipe work service.

(viii) Contact of dissimilar materials shall be avoided. Steel piping shall have steel supporting member actually in contact with the pipe. Pipes shall be supported on either side of changes of direction and pipeline mounted equipment.

(ix) Vertical piping shall be guided or supported in the centre of each riser with Approved brackets to prevent swaying, sagging, vibration and resonance. Strain that causes lines to shake or buckle between supports or anchors shall be avoided.

(x) Where piping is subject to a vertical movement due to thermal expansion of 3 mm or more, hangers shall be of variable spring design. Variation of hanger force during operation shall range between 85 % and 120 % of the actual load.

(xi) Pipes fixed to walls or floors both vertically and horizontally shall be supported by bracket fixed to walls or supported from the floor. All pipes in ducts shall rest on rollers and chairs, or hangers and be suitably arranged and supported to allow for expansion and contraction. All supports shall be fixed so that the full thickness of lagging can be applied in all places.

(xii) Pipe work supports and hangers shall be in accordance to relevant IS codes. Details of all supports, hangers and accessories shall be submitted for approval before installation.

(xiii) In general, all supports, hangers, anchors and fixing accessories shall be hot-dipped galvanized.

(xiv) Design of the hangers shall be compatible with pipe or tubing to be supported.

(xv) The supports shall be of sound construction and shall be adequate for the weight to be carried and shall permit free expansion and good appearance and also permit piping runs to be readily dismantled where appropriate.

(xvi) Generally supports shall be equally spaced. Unless otherwise specified, pipe supports shall be provided at intervals in accordance with the following table:

(a) Steel Pipe (Black or galvanized)

Size of pipe (mm.)	**Maximum Interval for Vertical Run (m.)**	**Maximum Interval for Horizontal Run (m.)**
15	2.5	1.8
20-25	3.0	2.4
32	3.0	2.7
40-50	3.6	3.0
65-80	4.5	3.6
100	4.5	4

150 and above	55	4.5

(b) Ductile Iron Pipe

Size of pipe (mm.)	**Maximum Interval for Vertical Run (m.)**	**Maximum Interval for Horizontal Run (m.)**
All	3.0	1.75

Also for each length of pipe minimum 2 supports should be provided.

f) **Hanger Rods**

(i) Hanger rods of steel, threaded and fitted with two removable nuts at each end for positioning rod and hanger and locking each in place shall be provided
(ii) Unless otherwise specified, hanger rods shall be of the following sizes :

Size of Pipe(mm.)	**Single Rod Dia. (mm)**	**Double Rod Dia.(mm)**
15 to 50, Inclusive	10	10
65 and 80	13	10
100 and 125	15	13
150	20	15
200,250 and 300	22	20

(iii) Secure hangers from metallic inserts cast into concrete. When these inserts are not available, attachment by anchor bolts to be placed with fast setting high strength grout shall be used.
(iv) Hanger shall be placed close to the point of change of direction of a pipe in either a horizontal or vertical plane.
(v) Supports and hangers for galvanized iron pipe shall be placed as close as possible to joints. When hangers or supports are not within 300mm or a branch line fitting, additional hangers or supports shall be provided at the fitting.

g) **Protective Coatings and Linings**

(i) For buried pipes complying with BS EN 598, / IS10211 bituminous coating against corrosion shall be provided for the pipes .
(ii) Pipes and fittings shall be coated by either dipping in a bath containing a composition having a tar base or dipping in a bath containing a cold solution consisting of a mixture of natural bitumen with a suitable hardener and natural asphalt.
(iii) The external surface of all pipes and fittings for surface water pumping systems, including pipes and fittings shall be coated with a bituminous compound.

h) **Pipe Materials for Plumbing and Drainage Systems**

The following pipe work material shall be used for systems listed below:

SYSTEM	**DIAMETER OF PIPE(mm)**	**PIPE WORK MATERIALS**
Flushing	Feed pipe to sump/tank	Galvanized iron
	Flushing supply distribution pipe	Galvanized iron
	Vent for water tank	Galvanized iron
	Overflow and warning	Galvanized iron
Cold water / clearing water	Feed pipe to sump / tank	MDPE
	Feed pipe to sump / tank	MDPE
	Supply pipe	MDPE

	Vent for water tank	MDPE
Waste	Overflow and warning pipe	MDPE
	25mm -50mm	MDPE
	Above 50mm	MDPE
	Pipe concealed in structure	Galvanized Iron / Cast Iron
Soil / combined soil 7 waste	65-300	Cast Iron
Vent	All size	Cast Iron
External down take	150-900	RCC(NP-4)
Rainwater down take pipe	100-150	MDPE / Cast Iron
Embedded see page water pipe	80-200	HDPE

Note: Water Pipes shall not pass through ASS, TSS, Electrical panel room, DB Room, SCR, Equipment rooms. Pipes also as far as possible shall not pass through public areas at concourse level and platform level. In case pipes have to pass through public areas, they shall be suitably covered by appropriate boxing.

i) **Pipe Materials for Fire Fighting & Suppression Systems**

The following pipe work material shall be used for systems listed below:

SYSTEM	DIAMETER OF PIPE (mm)	PIPE WORK MATERIALS	
Hose Reel Pipes	25mm	Mild Steel to IS 1239 Class C (For all size)	**Or** GI Pipes of Class C (Heavy Class) ISI marked and of approved make hot dip galvanized to Grade 1 of IS: 4736-1968, including accessories such as MS bracket, U Clamps with Anchor fasteners, hot dipped tees/elbows/reducers/couplings/unions/ bends/ flanges etc. & laying on the surface including painting with two coats of anti-corrosive primer, two coats of approved red enamel paint after laying & testing to 13.5 Kg/sq.cm hydraulic pressure after installation etc. as per specifications complete as required.
Wet Main Pipe	Up to 200mm	Mild Steel to IS 1239 Class C (For all size)	
Sprinkler Pipe	25mm – 200mm dia	Mild Steel Class C to IS 1239	
Clean Gas Piping	Downstream of pressure reducer	Carbon Steel Pipes A106 Grade – B Schedule 40	
	Upstream of pressure reducer	Carbon Steel Pipes A106 Grade – B Schedule 40	
Underground Pipes	All Size	Ductile Iron Cement Lined BS EN 545 Class K12	

(i) Pipe joints for fire system

(ii) For steel pipe work all joints up to and including 50mm diameter shall be made by means of screwed socket connections. Pipes above 50mm diameter shall be joined by means of mechanical groove coupling.

(iii) All pipe works within pump rooms shall be of flanged joints or mechanical groove coupling only. Joints shall not be closer than 3000mm except where necessitated by fittings. Flanges shall be

wrought iron or annealed steel, machined full face, suitable for the working pressures to which they will be subjected. Flanges shall conform to the relevant ANSI Standard and pressure rating.

j) **Gaseous Suppression Pipe Work**

(i) Gaseous suppression pipe work shall be threaded to satisfy relevant ASTM requirements as per table above. Piping shall be of non-combustible material having physical and chemical characteristics such that its integrity under stress can be predicted with reliability. The thickness of the pipe wall shall be calculated in accordance with the relevant standard.

(ii) Flexible tubing or hoses (including connections) shall be of approved materials and shall be suitable for service at the anticipated extinguishing pressure and maximum and minimum temperatures

5. Piping Ancillaries General

a) This Section specifies the manufacture and installation requirements for gate valves, check valves, butterfly valves, motorized valves, gauge cocks, automatic air valves, strainers, stopcocks, pressure reducing valves, ball float valves, safety and pressure relief valves, pressure gauges, pipe sleeves, expansion loops, expansion joints, pipe anchors, gaskets for pipe separation and water closet connector.

b) All valves, taps and cocks shall be of the types and working pressures suitable for the systems to which they are connected and shall be approved by the Engineer. Valves shall be rated to withstand the system hydraulic test pressure.

c) Brass, bronze or cast iron valves shall generally be of 16 bar working pressure rating type. In addition, all valves at discharge side of transfer water pumps shall be of minimum 16 bar pressure rating.

d) Where valves are provided at the discharge side of 2 or more pumps, each valve shall be so selected to withstand effectively the anticipated system pressure under the worst case scenario.

e) All valves shall comply with Indian Standards and where I.S not available, refer British Standards in respect of tests and working pressures, dimensions and materials of construction.

f) Wheel head valves shall be arranged for clockwise operation of the handle to close the valve.

g) Screwed valves shall have taper threads to BS 21. Flanged valves shall have dimensions and bolting in accordance with BS 4504: 3.1.

h) Connections shall be made between each valve and the adjoining pipe work or equipment with flanges for 65mm size pipe work and above. Flanges shall be selected to suit working pressure and temperature.

i) Screwed connections shall be made between each valve and the adjoining pipe work or equipment for 50 mm size pipe work and below. A union shall be fitted on each side of all screwed valves.

j) All valves shall be suitably located in accessible positions for operation and maintenance purposes.

k) All drain outlets and manual air vents shall have connection pipes leading to the nearest drain.

l) Valve packing shall be suitable for the service intended. Valve packing consisting of asbestos or asbestos based materials shall not be used.

m) Inverted mounting of valves shall not be permitted without prior approval of Engineer in-charge.

n) All valves provided for manual operation shall have a hand wheel or other suitable device which shall be fixed to the valve. Hand wheels shall be rotated clock-wise to close the valves and shall be clearly marked with the words "OPEN" and "CLOSE" and arrows pointing in the appropriate directions. The rims of hand wheels shall be machined to a smooth finish.

o) Valves of identical make, size, type and duty shall be fully interchangeable.

6. Standards

Relevant Codes and Standards:

(i) BS 21: Pipe Threads for Tubes and Fittings where Pressure-Tight Joints are made on the Threads (Metric Dimensions)
(ii) BS 1010: Draw off Taps and Stop valves for Water Services (Screw down Pattern)
(iii) BS 1212: Float Operated Valves (Excluding Floats)
(iv) BS 2456: Floats (Plastics) for Floated Operated Valves for Cold Water Services
(v) BS 5150: Cast Iron Gate Valves / Sluice valve
(vi) BS EN 13789:2002: Cast Iron Globe and Globe Stop and Check Valves for General purposes.
(vii) BS 5154: Copper Alloy Globe ,Globe Stop and Check, Check and Gate Valves
(viii) BS 5155: Butterfly Valves
(ix) BS 2879: Draining Traps (Screw Down Pattern)
(x) BS 4504: Circular Flanges for Pipes, Valves and Fittings (PN Designated)
(xi) BS 5163: Predominantly Key – Operated Cast Iron Gate Valves for Water Work purposes.
(xii) BS EN 1982: Copper and Copper alloy ingots and casting.
(xiii) API-594: Double Plate Check Valve

7. Technical Specifications

7.1 Globe Valves

(i) Globe valves generally shall be used on service pipe work as specified.
(ii) Globe valves up to and including 50 mm nominal diameter shall be generally rated, manufactured and tested to BS 5154. Valves over 50 mm nominal diameter shall be to BS EN 13789:2002. Valves shall be of the same nominal bore as the pipe work in which they are installed.
(iii) Bronze bodied valves shall be cast to BS EN 1982. Valves with cast iron bodies shall be made to BS EN 1561. The bodies shall be of an even thickness throughout, clean and free from scale and flaws. Generally, valves up to and including 50 mm nominal bore shall have bronze bodies and valves of 65 mm bore and larger shall have cast iron bodies, though bronze bodied valves may be used at any size.
(iv) Globe valves when used for circuit regulation shall have characterized plug discs. The discs shall be free to rotate, readily removable from the valve stem and renewable. Discs may be manufactured using proprietary composition type materials if approved.
(v) Valves shall have packed stuffing boxes or alternatively shall be fitted with 'O' rings.
(vi) Valves up to and including 50mm nominal bore shall have BS 21 taper screwed ends, valves of 65 mm nominal bore and larger shall have BS 4504:3.1 flanged connections.
(vii) Regulating valves shall be fitted with a lockable indicator on the spindle to show the proportional opening.

7.2 Gate Valves

(i) Gate valves generally shall be used on service pipe work, and shall be fitted a necessary. Valves shall be rated, designed and tested in accordance with BS 5154 for bronze valves and BS 5150 or BS 5163 for those of cast iron manufacture. Valves shall be of non-rising stems and same size as the nominal bore of pipeline in which they are installed.
(ii) Bronze bodied valves shall be cast to BS EN 1982. Valves with cast iron bodies shall be made to BS EN 1561. The bodies shall be of an even thickness throughout, clean and free from scale flaws. Valves up to and including 50 mm nominal bore shall be bronze bodied, 65 mm nominal bore and larger may be bronze or cast iron.

(iii) Valve wedges may be of cast iron, bronze, nickel alloy or stainless steel. Cast iron wedges shall have bronze trim and seating. Slide valves shall be fitted with stainless steel springs. Wedges shall be renewable and free to rotate on the valve spindle.

(iv) Valves shall have packed stuffing boxes, or alternatively shall be fitted with 'O' rings.

(v) Gate valves of 80 mm nominal bore and above for use in water supply system shall be of cast iron body with nickel alloy faces and stainless steel spindle or with nitrite resilient facing wedge gate and aluminum bronze stem and shall be entirely suitable for use with sea water.

(vi) Gate valves shall be tested as follows at the place of manufacture prior to dispatch to site:

Body Test: With both ends closed and the gate in the open position, the body shall be tested to 1.5 times the maximum working pressure for a minimum of 30 minutes. There shall be no visible leakage.

Seat Test: With one end open to the atmosphere and the gate in the closed position, the seat of the valve shall be tested for tightness when 1.5 times the maximum working pressure is applied to the other end of the valve for a minimum of 30 minutes. The seat test shall be carried out in both directions. There shall be no visible leakage past the gate.

7.3 Check Valves

(i) Check Valves shall be installed in the specified locations. Care shall be taken to ensure that the valves provided are suitable for installation in the plant required. In general, double plate check valve conforming to API 594 Specifications shall be used unless otherwise specified. Disc shall be centre guided and operated with stainless steel spring and trim to ensure smooth, positive opening and closing of valves with minimal pressure drop. Check valves shall not be installed in vertical pipes with downward flow.

(ii) Check valves generally shall be of 16 bar nominal pressure rating (working pressure).

(iii) Bronze bodied valves shall be cast to BS EN 1982. Valves with cast iron bodies shall be made to BS EN 1561. The bodies shall be of an even thickness throughout, clean and free from scale and flaws. Valves up to and including 50 mm nominal bore shall be of bronze. Valves on 65 mm nominal bore and larger shall be of cast iron.

(iv) Check valves shall be tested as follows at the place of manufacture prior to dispatch to site:-

Body Test

With both ends closed the body shall be tested to 1.5 times the maximum working pressure for a minimum of 30 minutes. The pressure shall be applied to the inlet side of the body. There shall be no visible leakage.

Seat Test

With the inlet open to atmosphere, the seat of the valve shall be tested for tightness when 1.5 times the maximum working pressure is applied to the outlet end of the valve for a minimum of 30 minutes. There shall be no visible leakage.

(v) Inverted mounting of valves shall not be permitted without prior Approval by the Engineer.

(vi) Valves of identical make, size, type and duty shall be fully interchangeable.

7.4 Butterfly Valve

(i) General: 16 Bar tight closing, wafer type, with resilient seats. Provide seats that cover inside surface of body and extend over body ends; or provide O-rings so that the valve body may be bolted and sealed between raised faced flanges with minimum bolt loading and without additional gaskets; or provide integral pipe ends to suit piping used, with pipe end faces concentrically grooved to seal against concentric protrusions in seat.

(ii) Butterfly valves shall comply with BS 5155.

(iii) Bodies: Ductile iron, cast steel, aluminum, or cast iron.

(iv) Seats: Material EPDM and shall be suitable for the temperature rating of the systems served. Discs: Ductile iron or stainless steel grade 316 for fresh water.

(v) Shaft Stems: Stainless Steel to ASTM A167, Type 316 for fresh water.

(vi) Control Handles / Levers: Suitable for locking in any position, or with 10 degree or 15 degree notched throttling plates to hold valve in selected position. Provide worm gear operators with large sized hand wheels for size 150 mm and larger.
(vii) A short piece of pipe work with flanged ends shall be coupled to the butterfly valve to facilitate future isolation and dismantling of equipment for servicing.

7.5 Gauge Cocks

(i) Gauge instruments shall be fitted with a gauge cock between the instrument and the service pipe.
(ii) Gauge cocks bodies shall be constructed from bronze and have a polished finish.
(iii) Gauge cocks shall be of the straight pattern ground plug type with lever handle.
(iv) All gauge cocks shall be of the 3 port type with the pipework on the drain / vent port extended to discharge clear of all equipment and insulation.
(v) Gauge cock connections shall be in accordance with BS 21.

7.6 Automatic Air Vents

(i) Automatic air vents shall be provided at all high points of the system as directed by the Engineer or as indicated on the Drawing. Connections to the service pipes shall be made at the highest point to ensure complete venting. Automatic air vents shall be mounted so that the inlet connection is in an exact vertical plane. A lock shield valve shall be located between the service pipe and the automatic air vent.
(ii) Automatic air vents for water systems shall have bodies of brass, gunmetal or malleable iron, non-ferrous or stainless steel floats and guides, and non-corrodible valves and rubber seats.
(iii) All automatic air vents shall be 20 mm diameter unless otherwise specified and shall be of the single large-orifice type suitable for the release or admission of air during system filling or draining. Automatic air vents bodies shall be constructed of cast iron to BS 1452 Grade 14 and float guides from grade 316 stainless steel. Connections to the pipe work shall be via a screwed BSP connection.
(iv) A gate valve shall be provided between the automatic air vent and the connected pipe work to enable isolation of the automatic air vent for maintenance.
(v) Units shall be designed to facilitate dirt removal while in service.
(vi) Automatic air vents shall be designed to open to discharge air or air / fluid mixture and to close firmly against fluid.

7.7 Strainers

(i) Strainers shall be provided in pump suction pipes, water tank outlets and in the locations specified in the drawing. Strainers shall be of the same nominal bore as the pipeline in which they are fitted. Strainers shall be installed in a plane to ensure that filtered matter is retained within the screen.
(ii) Strainers shall be full line size, "Y" or "BASKET" type as specified and readily removable for cleaning.
(iii) Strainers of up to and including 50 mm shall be bronze bodied and have screwed end caps with a brass drain plug. Strainers of 65 mm and over shall be cast iron bodied to the requirements of BS 1452 with cast iron cover and mild steel stud bolts. The cover shall be complete with a 25 mm bronze drain valve, the outlet of which shall be capped with a brass plug.
(iv) Strainer connections shall be as for the pipeline in which they are installed.
(v) Screens and baskets shall be of brass or stainless steel to suit the service intended. The total free area of the installed screen shall not be less than 5 times of the internal cross sectional area of the inlet pipe. Openings in the screen or basket shall be less than 1.2 mm in diameter.
(vi) Strainers for flushing water systems shall be of cast iron body and filtering medium of the strainer of stainless steel grade 316.
(vii) Strainers shall be of adequate strength to withstand the working pressure.

(viii) Strainers at the pump suction inlet shall be fitted with removable channel magnets, secured to the screen or basket by stainless steel retaining lugs and threaded rods, and placed to provide a continuous magnetic field around the entire circumference of the screen. They shall be fitted with a breech-locking arrangement to maintain the screen in place when removing the cover plate. The screen cover plate shall be bolted using studs with hexagonal headed nuts and shall be fitted with a special hinge. Initially each strainer shall be fitted with mesh lined baskets, reinforced on both sides with an open bottom. After initial cleaning, the baskets shall be replaced with a standard basket, suitable for the service required. All Y type strainers shall be complete with screw plug for drain or blow-off.

8 Paint Finish Schedule

Unless otherwise specified in the particular specification, a paint finish to a color to be approved by the Engineer and shall be applied to all exposed services including but not limited to supporting rods and brackets, cable ladders, cable trays, trunking, paperwork, surface conduits and accessories and other equipment installed in the building areas. The requirements of paint finish shall be as follows:-

(i) There shall be at least one coat of corrosion resistant primer, one undercoat and two finish coats to suit the intended duty and operating requirements. Details of pretreatment shall be submitted to the Engineer for approval prior to application.
(ii) If damage to paint is found during transportation, storage or installation, the contractor shall repaint the whole equipment without extra cost.
(iii) Replace all damaged parts or components and repaint the whole equipment without extra cost if rust is found on any equipment due to inadequate painting material or poor workmanship or incorrect handling during transportation, storage or installation. Removal of all the existing paint, chemical cleaning, rinsing and other necessary pretreatment shall be included in repainting before applying primer, undercoats and top coats. Details shall be submitted to the Engineer for approval.

8.1 Materials

(i) Primer Paint
(ii) For synthetic finishing paints on internal and external metalwork, paint shall be zinc Chromate primer or metallic zinc-rich primer to BS 4652, Type 2.
(iii) For synthetic or non-toxic paints on galvanized metal, use an etching primer with a zinc chromate base.

8.2 Undercoat Paint

(i) For metal work installed internally, paint shall be a linseed oil modified alkyd based undercoat highly pigmented to appropriate shade.
(ii) For metal work installed externally and exposed to weather, paint shall be a polyamide epoxy pigmented with titanium oxide.

8.3 Finish Paint

(i) For metal work installed internally paint shall be a linseed oil modified alkyd with glossy finish and fungus resistant characteristics.
(ii) For metal work installed externally and exposed to weather, paint shall be a polyamide epoxy.

8.4 Identification Colors

All finish coat color shall be to BS 381C and hall be agreed with the Engineer.

8.5 Valves

All valves shall be painted as the same colour as the pipe to which it is fixed.

9 Air Vessel

The air vessel shall be fabricated from MS plate conforming to IS: 2002 grade 2A with minimum 8 mm thickness for the shell and the dished ends and suitable supporting legs. The air vessel shall be provided with a 100 mm diameter, flanged connection from the fire pump, one 25 mm diameter drain with valve, 15 mm diameter sockets for Pressure switches and pressure gauge. The vessel shall of suitable size as specified in Bill of Quantities. The vessel shall be designed, fabricated & tested as per IS: 2825.

10 Technical Specifications for Water Gel Fire Blanket

(a) General Properties

(i) Heat Shield burn therapy & Firefighting blankets shall have pure wool base soaked in sterile protective water based gel.
(ii) The blankets shall be non-toxic & non-irritant having positive anti-bacterial action.
(iii) Sizes are: 96" x 72" and 72" x 60"
(iv) Shelf life: 4 years (min).
(v) Each blanket shall be packed in sturdy plastic barrels having handled for easy portability.

(b) Healing/Medical Properties

(i) The blanket shall give relief to a burn victim through its cooling, moistening and trauma reducing properties.
(ii) The blanket shall be impregnated with sterile water based gel. Gel should not be harmful.
(iii) For the first three years it could be utilized for both medical First Aid and fire-fighting purposes. For next one year it can be utilized for Fire Fighting only.
(iv) The technical literature / leaflets provided shall mention above properties.

(c) Approvals

(i) The item offered shall be approved by at least one of the following agencies :-
(ii) Defense Institute of Fire Research (DIFR),
(iii) Directorate General of Health Services (DGHS).

(d) Packing

(i) Necessary information regarding usage and operation should be pasted on the container.
(ii) Each Water Gel Blanket container should be packed separately, suitably for transportation by sea.

11 Automatic clean gas total flooding system fully integrated with analogue addressable fire alarm system

11.1 General

11.1.1 This Section specifies the construction and installation of automatic gas flooding system.
11.1.2 The automatic gas flooding system shall be complete with gas storage cylinders, extinguishing agent, pipe work, discharge heads, valves, control equipment and cables and all necessary accessories and fittings to form a complete and working installation to protect the specified area to the approval of the Engineer.
11.1.3 The type of clean gas selected shall have the following characteristics:
11.1.4 Zero ozone depletion potential.
11.1.5 Minimum global warming potential.
11.1.6 Suitable for use in human occupied rooms i.e. the gas at its designed fired concentration shall be safe to human in the fired room.

11.1.7 The gas is widely used and around the world.
11.1.8 The clean gas total flooding system shall be Modular cylinder bank system.
11.1.9 Pressure monitoring device shall be provided to monitor leakage at all the cylinders and send status signals to the nearest CGP / SAPs / MAP.
11.1.10 Unless otherwise specified, automatic gas flooding systems shall be of the total flooding type with open-ended piping installation on the distribution side. The automatic gas release mechanism shall be operated by means of fire detection units in the protected compartment or manually by a pull handle or push button as described below and / or shown on the Drawings. Clean Inert Gas based Clean Agent system shall conform to NFPA 2001-2008 for total flooding systems. Selected gas agent shall have past proven references.
11.1.11 The installation shall fully comply with NFPA Code 2001.
11.1.12 Enclosure Integrity
11.1.13 All total flooding systems shall have the enclosure examined and tested to locate and then effectively seal any significant air leaks that could result in a failure of the enclosure to hold the concentration level for the specified holding period.

11.2 Standards

11.2.1 Relevant Codes and Standards
11.2.2 US Deptt. of Transportation or Canadian Transport Commission - Requirements for Transportable Gas Containers.
11.2.3 NFPA-70, BS 6387, BS 5839 Part 8: Performance Requirements for Cable Required to Maintain Circuit Integrity Under Fire Condition.
11.2.4 NFPA-72: Fire Alarm Code, 2010 Edition.
11.2.5 NFPA 2001: Clean Agent Fire Extinguishing Systems
11.2.6 Codes and regulations of Delhi Fire Services and latest National Building Code of India.
11.2.7 The whole gas flooding system shall be provided by a single FM / UL listed manufacturer.
11.2.8 Locally assembly system shall not be accepted.

11.3 Technical and Installation Requirements (Approval to be taken from IFCI before placing the Purchase Order)

11.3.1 **Quality Control:** System Pressure:- The system pressure for the automatic clean gas total flooding system shall be as per NFPA -2001.

11.3.2 **Design Requirements:** Total gas flooding systems shall be, unless otherwise specified, designed to achieve retained required Oxygen concentrations conforming to NFPA-2001.

11.3.3 **Design Calculations**

(i) The Contractor shall justify the selection of components and pipe sizes for the system and shall submit full calculation for approval. Where computer program is used, but does not show all calculation steps, it will be necessary for the Contractor to submit evidence that the computer program produces a design that will perform in accordance with the specification as indicated by UL listing or approved by any similar widely recognized independent regulatory body. The same must be approved by Engineer.
(ii) The calculation shall be based on the equipment offered. Valves, distribution valves as well as bends and junctions shall be represented in the calculations as equivalent lengths of pipe. The actual size and location of pipes and nozzles and the number of nozzles shall be designed on the basis of the calculated flow rates and terminal pressures required to ensure successful operation. The calculation or computer programme shall provide all the information necessary to complete the installation including the quantity of gas used to flood to the required concentration, the allowance for losses, the total quantity required, the flow rate, start and end pressure of each section of pipe and the orifice size for each nozzle.

(iii) Gas cylinders, distribution pipework, valves, nozzles and fittings shall be manufactured to withstand the maximum pressure of stored agent allowing for variations in ambient temperature.

11.4 **System Operation and Equipment**

The system shall be operated automatically and manually, and shall comprise the following equipment:-

(i) Control panel with built-in maintenance free battery, trickle charger, visible warning indicator and supervisory buzzer;
(ii) Interface with Smoke / Heat detectors;
(iii) Audible warning - alarm bells and hooters;
(iv) Visible warning - flashing and warning signs;
(v) Manual release units;
(vi) Discharge nozzle and pipework;
(vii) Automatic / Manual control unit;
(viii) Time delay unit;
(ix) Gas bottles, associated equipment and accessories.
(x) The installation shall operate on a 24 V DC source connected to the control panel.

11.5 Safety Features

The system shall incorporate the following safety features so as to protect persons entering the protected areas:-

(a) Suitable sign plates and warning labels in English, Hindi and Kannada shall be installed at the entrance door.

(b) A visible warning indication lock - off device shall be provided at the entrance of the protected area showing the following status of the system:

(a)

Green Lamp	-	System on manual control with automatic control lock off. (Safe to enter).
Amber Lamp	-	System on automatic control. (Not safe to enter).
Red Lamp	-	System being operated. (Danger - do not enter, gas discharged).

11.6 **Control Panel**: The control unit shall include the following:-

(a) "Mains On" indication;
(b) "System Fault" indications;
(c) Separate "Zone Fire / Fault" indications;
(d) Indication of "Gas Discharge";
(e) Power unit;
(f) Battery and charger; and
(g) Switches for bell silencing, testing and resetting of the system.

11.7 **Battery Charger and Batteries:**

11.7.1 A 24 V DC trickle type battery charger and batteries shall be provided with the following components:-

1 Trickle and boost charger assembly;
2 Rotary type selector switch;
3 One incoming double pole control fuse; and
4 Maintenance Free batteries.

11.7.2 The unit shall be suitable for use on single phase supply voltage as specified in the General and Technical specifications and shall automatically maintain the 24 V batteries in a state approximate to full charge and at the same time compensate for the standing load.

11.7.3 Batteries shall be of maintenance free sealed Ni-Cd type requiring no maintenance throughout the normal life of the battery and shall be of capacity capable of maintaining the system in normal working condition for at least 24 hours without recharging and subsequently to operate in the "alarm" condition continuously for at least one hour.

12 Smoke Detectors/ Heat Detectors

Refer to Section 4.08.0 for "Fire Alarm and Detection System" of this Technical Specification.

13. Discharge Nozzle: The discharge nozzles shall be conical type made of hot pressed stainless steel bodies with chromium plated finish complying with BFS requirements. A sample of the nozzle shall be submitted for approval prior to ordering the equipment. The orifice size of each nozzle shall be carefully calculated and submitted for approval before ordering. Nozzles shall be furnished with ceiling plate if they are installed under false ceilings.

13.1 Manual and Automatic Operation Mechanism:

13.1.1 The unit shall be of flush pattern, consisting of manual mode, automatic mode and discharge mode, operated by key switch together with indicating lights for the following:-

" Red" - System being operated
"Green" - System in manual mode
"Amber"- System in automatic mode

13.1.2 A manual release unit shall be provided in a suitable position outside each entrance to the protected compartment. The manual release unit shall consist of a pull handle or push button mounted in a box with "break glass" cover. The box shall be so designed that its glass front may be readily replaced and that its front cover can be opened with a key for the purpose of operating the switch without breaking the glass.

13.1.3 An emergency release handle with direct mechanism shall be provided in an accessible position at or near the gas cylinders. The emergency release shall require no power supply to operate and it shall be provided with a removable pin to prevent accidental release of gas. Provision shall be made for operation of the emergency release to activate the relays or Electro Thermal Link (ETL) to cause simultaneous shutdown of ventilation, air-conditioning equipment etc. and to sound the alarms.

13.1.4 The operation of the gas release mechanism shall require minimum power from an external electrical, pneumatic or mechanical source and shall preferably be operated by a falling weight device. No springs shall be used in any position where their failure or fracture would prevent the correct operation of the gas release mechanism or cause the inadvertent release of the gas.

13.1.5 All release devices and mechanisms shall be designed for the designed working conditions and shall not readily be rendered inoperative or susceptible to accidental operation. The system shall be properly designed against mechanical, chemical or other damage that would render them inoperative.

13.1.6 Flashing Sign / Warning Sign: Flashing sign and warning sign shall be of flush pattern complete with red indicating light together with clear indications in English, Hindi and Kannada characters. The flashing sign shall carry the following messages: "DANGEROUS, DO NOT ENTER" and "EVACUATE IMMEDIATELY". A sample of this sign shall be submitted for approval before ordering. The sign shall be installed above exit sign level. At the entrance of the

protected area, a notice shall be posted on the door with the following message:-" Warning: Inert gas flooding system in operation, switch to manual mode before entering."

13.1.7 Warning Notice and Instruction Plate: Suitable warning notices and instruction plates shall be put up at doorway position and within the gas protected area and store to give warning to maintenance personnel. Full details of system operation, reset procedure and procedure to follow during an emergency situation shall be displayed. Warning notices and instruction plates shall be in the form of red perspex sheet of minimum 4 mm thick, with letters and characters engraved in white. The main gas identification symbol shall be spray painted.

14. Gas Storage Bottle

(i) Provide a battery of gas cylinders suitable for both automatic and manual control. The cylinders shall conform to BS 5045 and shall be supported securely in frames bolted to the wall. The mounting of the cylinders shall be such that all external parts can be readily inspected.

(ii) Each cylinder shall be fitted with an automatic pressure release device which shall function when the pressure of the liquid within the cylinder exceeds a predetermined value, which shall be less than the test pressure defined in BS 5045.

(iii) Inert Gas cylinders shall be constructed in accordance with the appropriate parts of BS 5045 and must have CCOE's approval. Test pressure for 200 bar cylinders would be 250 bar as conforming to NFPA 2001-2008 standard. The Test Certificates shall be submitted for the approval of the Engineer.

(iv) Each cylinder shall be complete with gas valve / actuator, pressure gauge, flexible hose, check valve and all other necessary accessories.

(v) Means shall be provided to prevent gas discharging into empty containers and to prevent loss if the gas is released when any of the cylinders is disconnected.

(vi) Safety latches shall be provided in each bank of gas cylinders to prevent accidental discharge of gas during maintenance. Safety latches shall incorporate a set of contacts to initiate a warning at the control panel that the system has been locked off.

(vii) Gas cylinders shall be painted signal red as specified in BS 381C. The type of extinguishing agent, tare weight, gross weight etc. shall be clearly painted on each cylinder with white paint.

15. System of Wiring

The system wiring shall be of Fire Survival Circuit Integrity Armored Cables of 600/1000V rated with **Aluminium** Circular conductors having Glass Mica (Fire barrier) tape covered by an extruded layer of crosslinkable halogen free insulation and LSZH inner & outer sheath. Basic design as per BS 7846 for copper cables, IEC-60502-1 for aluminium cables. Should retain circuit integrity as per Category-3 of BS: 8519. Type test reports of each lot from 3rd party inspection agency required prior to despatch.

16. Pipe work

(a) All the pipe work, fittings and the associated works for the gas flooding system shall conform to the relevant sections of this Technical Specification.

(b) Pipe shall be pressure tested after erection by means of nitrogen gas to 90 bar for 30 minutes. Pressure loss of more than 3% of the initial pressure will not be acceptable. Test certificate issued by an approved surveyor shall be submitted for record. Only Teflon tape shall be used as sealant for threaded joints.

(c) All the pipe work shall be purged by means of compressed air before installation.

(d) All the pipe work and conduit for this system shall be painted with the colour as specified by the Engineer after installation is completed.

(e) The whole gas discharge system including cylinders, pipework and nozzles shall be securely fixed to the structure with saddles or brackets correctly spaced so that all components will remain in

place when subjected to the pressures and forces produced during discharge. Fixings shall allow for movement due to thermal expansion.

(f) The system shall be guarded so that it shall be impossible to obstruct the operation of any moving parts.

17. Quality of Extinguishing Agents

(i) Inert Gas used shall be of good commercial grade, free of water and other contaminants that might cause container corrosion or interfere with free discharge through nozzle orifices. Its purity should meet with the requirements of NFPA-2001:2008.

(ii) Special Note: The bidder shall be of an Authorized agent or distributor or installer of the OEM and the bidder need to submit the copy of the document along with the tender for this compliance.

18. Fire Alarm and Detection System components

18.1 Multi-Sensor Detectors

18.1.1 The multi sensor detector shall be a microprocessor based and operate on light scattering principle, containing an emitter and photo sensor. The scattered light reaching the photo sensor shall be proportional to the smoke density inside the detection chamber. It will combine both optical smoke and heat detector technology to detect clear burning fire products, which hitherto could only be easily detected by ion-chamber detectors. The detectors will not operate on a rate of rise of temperature alone. It shall meet the UL 862 9 th edition and comply with BS EN: 54 Part 15.

18.1.2 The detector shall utilize advanced algorithms with time based analysis to provide early warning and an accurate analysis of alarm situations.

18.1.3 Under normal ambient conditions, the optical detector will behave as a normal optical detector. Only when a rapid rise in temperature is detected, the sensitivity of the detector shall increase together with the presence of smoke shall confirm a fire condition, which will be transmitted as a fire alarm level.

18.1.4 The detector will be fully compensated for temperature, humidity and barometric changes in the environment. All electronic components shall be hermetically sealed to prevent their operation from being impaired by dust, dirt, humidity, corrosion or mechanical shock. All circuitry must be protected against typical electrical transients and electromagnetic interference according to BS 6667: Part 3. The detector will be fully operable between -20oC and + 70oC and up to 95% relative humidity non-condensing.

18.1.5 The Sensitivity shall be adjustable by means of a pre-set control only accessible by use of a special tool. Built-in wind-shields will be provided to ensure that air velocity of up to 10 meters / second do not affect the proper operation of the detector. The Combined Optical smoke & Heat detectors will be installed in the Mechanical Plant room areas.

18.2 Heat Detectors

18.2.1 Heat detector shall be an analogue addressable type designed to raise an alarm when the temperature is at a rate-of-rise of 8 °C per minute or higher or at a fixed alarm temperature of 57 °C. It shall comply with BS 5445: Part 5 Grade 1, UL 862, 9th Edition listed and Bangalore Fire and Emergency Services approved.

18.2.2 The detector shall employ two matching thermal sensing elements in a bridge configuration to give a response, which depends both on absolute temperature and rate of change of temperature. The reference and sensing thermal sensors shall be fabricated under identical conditions to ensure good matching and tracking with both temperature and ageing.

(II) TECHNICAL SPECIFICATION FOR HVAC SYSTEM (EXHAUST & VENTILATION SYSTEM) AT IFCI TOWER, NEHRU PLACE, NEW DELHI

A. AXIAL FLOW FAN

The Exhaust air Blower shall be Tube Axial Fans connected to the duct & shall be of floor/ Ceiling /wall mounted type as specified in the Bill of Quantities / GFC Drawings. The Capacity of Tube Axial Fan, diameter, maximum motor H.P. & Static Pressure etc. shall be according to Schedule of equipment & Bill of quantities. The Noise Level of Axial fan shall be less than 85 dBA at a distance of 3.0 mtr from the fan.

Axial Flow Fan shall be **AMCA Certified** (FEG Grade) for Air and Sound Performance in accordance to **AMCA 210 and AMCA 300.**

The cylindrical casing shall be made from MS/GI welded carbon steel sheet. The Length of of casing shall be long to accommodate motor within the casing. Casing thickness shall be minimum 2mm up to 800 mm dia. and 3 mm thick from 900 to 1250 mm dia. & 4 mm thick above 1300 mm dia. the Inlet & Outlet of the casing shall be fitted with flanges for ductwork connection & other accessories as required. The casing shall be coated with minimum 2 coats of rust proof primer and enamel paint thereafter or to be powder coated after phosphating process. The Blade of Axial flow fan shall be made of die cast aluminum alloy. The blade angle shall be set at manufacturing place & shall be adjusted at site. The Hub shall consists of two half hubs pressed in carbon steel &the centre boss shall be made of die -cast aluminum alloy. The Blade feet shall be locked in two half-hubs. The design shall facilitate the alteration of blade angle without disconnecting the hub from the motor shaft. The fan shall be directly driven by TEFC Sq. Cage induction motor. The fan motors shall be 415 +10%volts 50HZ+5%, 3 Phase TEFC Sq. Cage Induction motor. The motor shall be specially designed for quiet operation & Motor RPM shall be as given in Bill of Quantities.

Complete Fan with motor shall withstand 300 °C temperature for 2Hours & shall work satisfactorily at this temperature. Motors selected for this application shall be UL Recognized.

Complete Fan assembly for Smoke extraction application (Fan Impeller, Fan Casing, Motor Base frame along with motor) shall be tested and approved by UL in accordance with "Power Ventilators for Smoke control systems" for 300 degree Celsius temperature for 2Hours of operation.

All fans shall be subject to test requirements as given below. The contactor shall be responsible for conducting all tests at site after erection. Test certificates for all fans shall be submitted.

The performance of the fan motor unit shall be tested by operating at design conditions. The following parameters will be tested vis-à-vis the approved performance curves

a. Air flow capacity.
b. BHP requirement
c. Vibration and noise level

B. INLINE EXHAUST FANS

Inline fan shall incorporate SISW direct driven Centrifugal Fan with TEFC motor. The fan assembly shall be encased in a sheet metal housing of GSS and with necessary inspection cover with proper gasket assembly. Flanges shall be provided on both sides of the Inline fan to facilitate easy connection. Flexible anti-vibration joints shall be provided to arrest vibration being communicated to other equipment connected to the Inline fan. Motor shall be single phase/three phase as per duty conditions. All single phase fans shall be provided with speed regulators while all three phase fans shall be provided with opposed blade damper in GSS construction at fan outlet for air balancing.

C. SHEET METAL WORKS AND ACCESSORIES

1.0 SCOPE

This specification covers the general design, materials, construction features, manufacture, shop inspection and testing at manufacturer's works, delivery at site, installation, testing, commissioning and carrying out performance test at site of Air Distribution system. Ducts shall be Factory fabricated and 5% to 10 % site fabricated. The accepted factories are listed in the approved vendor list.

2.0 CODES and STANDARDS

The design, materials, construction features, manufacturer, inspection, testing and performance of air distribution system shall comply with all currently applicable statues, regulations, codes and standards in the locality where the system is to be installed. Nothing in this specification shall be construed to relieve the Contractor of this responsibility. In particular, the air distribution system shall conform to the latest edition of following standards.

IS 277 Galvanized Steel Sheet (Plain and corrugated).
IS 655 Metal Air Ducts.
IS 737 Wrought Aluminium and Aluminium Alloy sheet and strip for general engineering purposes.
SMACNA HVAC Duct construction standards – Metal and Flexible.
SMACNA HVAC Air duct leakage test manual.
SMACNA HVAC systems – Testing, adjusting and balancing.
ASHRAE 70 Method of testing for rating the performance of Air Outlets and inlets.

3.0 MATERIAL REQUIREMENT

a) Ducting shall be fabricated from Galvanized steel sheet (GSS) as specified.
b) GSS duct shall be of lock forming grade, zinc coated conforming to IS: 277 coating grade 120 GSM or better.
c) AL sheets shall be of grade 31000 as per IS: 737.

4.0 CONTRUCTION FEATURES

Fabrication details shall be generally in accordance with the details given here under

5.0 RECTANGULAR DUCT

5.1 For Low Pressure System (up to Fan external static pressure of ± 75mm WC).

LARGER SIDE OF DUCT mm	THICKNESS OF SHEET mm/G		TYPE OF TRANSVERSE JOINT	TYPE OF REINFORCEMENT
	GSS / SS			
Upto 250	0.63 / 24		Rolamate/ TDF	As per SMACNA
251 to 750	0.63 / 24			
751 to 1000	0.80 / 22			
1001 to 1500	0.80 / 22	1.00 / 20		
1501 to 2100	1.00 / 20	1.25 / 18		
2101 to 2400	1.25 / 18	1.50 / 16		
Greater than 2401	1.25 / 18	1.50 / 16		

For Factory fabricated ducts (for all sizes), the transverse joint shall be Rolamate / TDF flange only. C&S and C&SS type flanges are not acceptable for any size of ducting. Ducts to be brought to site as Box sections including flanges. No longitudinal joints and flange assembly at site allowed.

5.2 Longitudinal seams shall be Pittsburgh lock type at corners as shown on sheet. Longitudinal joints shall not be provided for rectangular ducting at locations other than corners, except where larger side of duct exceeds 2500mm. longitudinal joints of ducting having side larger than 2500mm other than corner shall be grooved or standing seam as shown. If specified, sealing of the longitudinal seams shall be accomplished-using Dow corning RTV 732 Silastic or equivalent.

5.3. All circumferential joints shall be MS angle flanged joints.

5.4 Flanges used for transverse joints shall be joined with each other with Galvanized Steel (GS) bolts, washers and nuts. The bolts shall be of minimum M8 size and the spacing between bolts shall be maximum 150 mm for low-pressure system and 100 mm for high-pressure system. OR hanging arrangement of suitable strength fastener, wire rope, angle for duct supporting or hanging

5.5. For transverse angle flanged joints, neoprene gasket (3mm uncompressed thickness and width equal to flange face) adhered to the flange face shall be used. The bolt holes in gasket shall be the same as bolt diameter and shall be punched prior to insertion of gaskets.

5.6. All flanges shall be applied with two coats of zinc-chromate, silver or zinc paint. (Red oxide is prohibited)
5.7. Angles shall have welded corners and shall be riveted to the ducts at 300mm centres. (Maximum).

5.8 For SS ducts all related appurtenances such as transverse joint angles, reinforcement angles, fasteners, turning vanes, access doors, etc. shall be of the same material as of duct.

6. DUCT SUPPORTS and HANGERS

6.1 Rectangular Ducts shall rest on supporting 14 G GI Slotted channel and this supporting slotted channel shall be supported by full threaded GI rod from ceiling.

Supporting details for low-pressure system shall be as given below.

LARGER SIDE OF DUCT mm	SUPPORTING ANGLE mm	VERTICAL ROD DIAMETER mm	MAXIMUM SPACING BETWEEN SUPPORTS mm
Upto 900	40x40x6	8	2400
901 to 1500	40x40x6	10	2400
1501 to 2400	40x40x6	10	2400
2401 and above	65x65x6	12	2400

6.2 Duct supports shall be qualified and sized for seismic forces, if specified in Data Sheet.

7. DAMPERS

7.1 At the junction of each branch duct with main duct and split of main duct, volume control dampers must be provided. Dampers shall be rigid in construction to the passage of air.

7.2 The volume dampers shall be of an approved type, lever operated and complete with suitable level links & quadrants, locking devices which will permit the dampers to be adjusted and locked in any position.
7.3 The dampers shall be of opposed blade or louver type. The damper blade shall not be less than 1.25 mm (18) gauge and shall not be over 225 mm wide. Automatic and manual volume opposed

blade dampers shall be complete with frames and bronze bearings as per drawings. Damper frames shall be constructed of 16 gauge steel

7.4 After completion of the duct work, dampers are to be adjusted and set to deliver the required amount of air as specified in the drawings.

8. ACCESS PANEL

A hinged and gasketed access panel shall be provided on ductwork before each control device that may be located inside the ductwork. Doors shall be provided with neoprene rubber gaskets. Angle joints shall be provided with neoprene rubber gaskets for leak tightness of the joints. Access door/panels shall be provided:-

a) Near each smoke sensor

b) Any other place specifically mentioned in the drawing or if asked by Owner/Consultants during execution stage.

9. MISCELLANEOUS

9.1 Sponge rubber gaskets also to be provided behind the flange of all grills.

9.2 Each shoot from the duct, leading to a grille, shall be provided with an air deflector to divert the air into the grille through the shoot.

9.3 Inspection doors measuring at least 450 mm x 450 mm are to be provided in each system at an appropriate location, as directed by Engineer-in-Charge.

9.4 Diverting vanes must be provided at the bends exceeding 600 mm and at branches connected into the main duct without a neck.

9.5 Proper hangers and supports should be provided to hold the duct rigidly, to keep them straight and to avoid vibrations. Additional supports are to be provided where required for rigidity or as directed by Engineer-in-Charge.

9.6 All duct supports, flanges, hangers and damper boxes etc. Shall be given 2 coats of red oxide paint before installation and one coat of aluminium paint after the erection, at no extra cost.

9.7 All angle iron flanges are to be welded electrically and holes to be drilled.

9.8 All the angle iron flanges are to be connected to the GSS ducts by rivets at 100 mm centres.

10. SUPPLY AIR GRILLS / REGISTERS

10.1 The air velocity in the supply air grill shall be restricted to 4 m/s.

10.2 Supply air grills/registers shall be of in extruded aluminum construction. These shall be single louvered type, with powder coated volume control dampers.

10.3 All registers shall have a soft, continuous rubber/foam gasket between the periphery of the register and the surface on which it has to be mounted. The effective area of the registers shall not be less than 80%.

10.4 Bar longer than 450 mm shall be reinforced by a set-back vertical member.

11. PAINTING

11.1 All grilles and diffusers shall be powder coated in colour as approved by Architect/Consultant before installation.

11.2 All ducts immediately behind the grilles/diffusers etc. Are to be given two coats of black paint in Matt finish.

12. TESTING

12.1 After completion, all duct system shall be tested for air leakage.

12.2 The entire air distribution system shall be balanced to supply the air quantity as required in various areas and the final balance of air quantity through each outlet shall be submitted to the engineer-in-charge for approval. Measured air quantities at fan discharge and at various outlets shall be identical to or less than 5% in excess of those specified and quoted. Branch duct adjustments shall be permanently marked after air balancing is completed so that these can be restored to their correct position if disturbed at any time.

D. AIR-REGISTERS – SPECIFICATIONS

1. SCOPE

The scope of this section includes supply, installation, testing, balancing and commissioning of various air distribution products as specified here under. All air distribution products shall have guaranteed performance rating as regards to air quantities, throw, noise level and pressure drop etc. Contractor has to provide section curves at the time of supply.

2. SUPPLY AND RETURN AIR REGISTERS AND CEILING TERMINALS

Supply and return air registers and ceiling terminals shall be made of Powder coated extruded aluminum as specified in BOQ. The registers/terminals shall be either anodized or powder coated in finish as given in BOQ. Supply air registers/terminals shall be provided with screw operated opposed blade volume control device of balck painted MS. The registers shall be suitable for fixing arrangement concealed or visible screw as approved by architect/consultant.

All registers shall be selected as per selection curved and in consultation with architect/ consultant. All registers shall have soft continuous rubber/foam gasket between the periphery of the registers/terminals and the surface on which it has to be mounted.

3. LINEAR FIXED BAR REGISTERS

Linear continuous supply or return air registers shall be Powder coated extruded aluminum construction with fixed horizontal bars at 0o to 15o inclination with one way or two way deflection and flanges on both sides. The thickness of fixed bar louvers shall be 5 min in front and the flange shall be 20 mm wide with round edges. The register shall be suitable for concealed fixing and horizontal bars of the register shall be mechanically crimped from the back to hold them. Volume control device of MS construction shall be provided in S.A duct collars.

4. FRESH AIR INTAKE LOUVERS

Fresh air intake louvers 50 mm deep wherever required as per shop drawing will be made of extruded aluminum construction duly anodized of power coated. Bird/insect screen will be provided with the intake louvers. The blades are inclined at 45o on a 40-50 mm blade pitch to minimize water ingress. The lowest blade of the assembly shall extend out slightly to facilitate disposal of rain water without falling in door/wall on which it is mounted.

Wherever specified, the intake louvers shall be provided with factory fitted all aluminum construction volume control dampers in mill finish.

5. STORM PROOF LOUVERS:

50 mm deep wherever required as per shop drawing will be made of extruded aluminum construction. The blades are inclined at 45 degree on 45 mm blade pitch to minimize water ingress. The lowest blade of the assembly shall extend out slightly to facilitate disposal of rain water without falling in door/wall on which it is mounted.

6. **GRAVITY LOUVRS**

Easy operation heavy duty back draft GI frame blade, with full length pivoting, vinyl Jacketing extended full length adjustable blade edge seal ,14 gauge arm mill finished gravity louvers.

7. **INSTALLATION**

7.1 All register and grills shall be provided with soft continuous rubber gaskets between their periphery and the surface on which these have to be mounted.

7.2 After completion the entire air distribution system shall be tested for air leaks and balanced in accordance with the specification.

8. **BALANCING**

8.1 The air distribution system shall be tested/ balanced by Vendor so that the requisite air flow is maintained throughout the space to be ventilated.

8.2 All instruments required for testing balancing the air distribution system shall be provided by Vendor.

E. ELECTRICAL WORK SPECIFICATION

1. GENERAL

These specifications cover all types of motors used for pumps, air handling units, machines etc. The motor installation, wiring, control shall be carried out strictly in accordance with the specification hereinafter laid down.

2. MOTORS

a) Rating

The ratings of the motors shall be as indicated in the equipment schedule or bill of quantities,. However, the rating shall be selected on the basis of driven equipment bhp, motor efficiency, ambient temperature and allowable maximum temperature rise as specified.

b) **Standards**

All motors shall comply with IS:325:1978, in respect of general requirements and performance.

c) In general all the motors above 1 hp. shall be 3 phase unless otherwise specified. FHP motors may be either 3 phase or single phase as required.

d) Motors shall run at all loads without appreciable noise or hum. Motors shall be one of the following designs as specified in equipment schedule:

i. Squirrel cage,
ii. Totally enclosed
iii. Totally enclosed, fan cooled.

Winding of motors shall be class `F/H' insulated and fully tropicalised.

e) Motors shall be rated for continuous duty as defined in IS:325: 1978. All motors shall have suitable torque characteristics as required by the duty of driven equipment. Motors shall be suitable for operation of 415 ± 10% volts, 3 phase, 50-HZ, AC supply (or 230 volts single phase 50 HZ AC supply if required).

f) Motors shall be provided with a cable box to suit the required number of runs of aluminium conductor, PVC insulated, PVC sheathed and steel wire armored cable.

h) Motors, except fractional horse power motors of 1/8 hp and below, shall be provided with running over current protection generally by means of a bimetallic thermal overload protective device incorporated in the starter panel.

i) The type of starter to be used shall be as follows:
   (a) Squirrel cage motors up to & including 7.5kW -Automatic Direct on line starters.
   (b) Squirrel cage motors of 7.5kW above -Automatic Star/Delta Starters.

The starting current of the motors shall be limited by using the above mentioned starters, as required.

3. MOTOR STARTERS -STAR DELTA AND DIRECT ON LINE TYPE

a) Motor starters shall be in accordance with IS-13947 (Para 4 Section 1):1993. The starters shall be totally enclosed, metal clad, dust and vermin proof construction. The starters shall be of continuous rating and shall be of automatic type. All starters shall be suitable for 415 volts, 3 phase, 50 HZ, A.C. supply.

b) Contactors shall have the number of poles as required for appropriate duty. The making capacity of the contactors shall be as per AC23 of ISS.

c) Unless other specified, all starters shall have integral start/stop push buttons. Start push buttons shall be coloured green and shall be shrouded to prevent inadvertent operation. Stop push buttons shall have mushroom heads and shall be coloured red. All push buttons operated contractors shall be provided with a hold-on/running contact.

d) All remote control circuit connected to be starters shall operate at 230 volts or lower voltage.

e) Motor starters shall be provided with thermal overload relay with adjustable settings, one each phase for three phase motors. Single phasing preventers shall be provided for all three phase motors.

f) Terminal block with integral insulating barriers shall be provided for each starter.

g) All the starter shall be provided with a schematic diagram on a durable material fixed permanently within each lid or cover.

h) Starters shall be provided with sufficient extra N/O contacts for interlocks, indicating lamps, etc.

i) Automatic Star/Delta starters shall be provided with adjustable timers.

j) Starters for wound rotor motors shall be rotor resistance type and shall be oil/air immersed, metal clad construction with combination of drum type rotor resistance starter and starter switch. Rotor starter shall be used for starting only. The starter switch shall be of heavy duty, with trip free mechanism. The tripping mechanism shall not reset until the starter handle is in "OFF' position.

4. INSTALLATION OF MOTORS:

a) Installation of the motors shall be in accordance with IS: 900:1992. Motors shall be mounted on a common foundation with the driven machine or equipment coupled through a flexible coupling or through belt drive. The drive arrangement shall be provided with a safety guard.

b) The motor along with its driven machine or equipment shall be provided with vibration isolation arrangement. Motors shall generally be provided with slide rails fixed to the base with nuts and bolts to facilitate belt installation and subsequent belt tensioning.

c) Motors shall be wired as per the detailed specification and drawings. All motor frame shall be earthed with 2 Nos. earthing conductors of size not less than 8 SWG. Schedule of wiring cables and earthing conductors has been shown on the relevant drawings.

d) Motors shall be tested at works in accordance with the relevant Indian Standard Specifications and test certificates shall be furnished in triplicate. Motors shall be tested at site after erection for insulation resistance.

e) All the motors and frames shall be painted with two coats of synthetic enamel paint.

5. SWITCHBOARD

5.1 STANDARDS AND CODES

Following Indian Standard Specifications and Codes of Practice as amended upto date shall apply. In addition the relevant clauses of the Indian Electricity Act 1910 and Indian Electricity Rules 1956 as amended upto date shall also apply. Wherever appropriate Indian Standards are not available, relevant British and/or IEC Standards shall be applicable.

Marking of Switchgear bus bars	IS 11353 : 1985
Degree of Protection of Enclosures for low voltage switchgear	IS 2147 : 1962
Electrical relays for power system protection	IS 3231 : 1986
Code of Practice for installation and maintenance of switchgear not exceeding 1000 volts	IS 10118 : 1982
General requirements for switchgear and control gear for voltages not exceeding 1000 volts	IS 4237 : 1982
Specifications for factory built assemblies of switchgear and control gear for voltages upto and including 1000 volt ac or 1200 volt dc	IS 8623 : 1980

5.2 MOULDED CASE CIRCUIT BREAKERS

i) Molded case circuit breakers (MCCB) or fuse free breakers, incorporated in switchboards wherever required, shall conform to IS 13947 : 1993 in all respects. MCCBs shall be suitable either for single phase 240 Volts or 3 Phase 415 Volts AC 50 HZ supply.

ii) MCCB cover and case shall be made of high strength heat resisting and flame retardant thermosetting insulating material. Operating handle shall be quick make/break, trip - free type. Operating handle shall have suitable ON, OFF and TRIPPED indicators. Three phase MCCBs shall have a common handle for simultaneous operation and tripping of all the three phases. Suitable arc extinguishing device shall be provided for each contact. Tripping unit shall be of thermal/magnetic type provided on each pole and connected by a common tripe bar such that tripping of any one pole causes three poles to open simultaneously. Thermal/magnetic tripping device shall have IDMT characteristics for sustained over loads and short circuits.

iii) Contact tips shall be made of suitable arc resistant sintered alloy.

iv) Terminals shall be of liberal design with adequate clearances.

v) MCCBs shall be provided with following accessories, if specified in drawings/schedule of quantities :

- Under voltage trip
- Shunt trip
- Alarm switch
- Auxiliary switch

MCCBs shall be provided with following interlocking devices for interlocking the door of switch board.

- Handle interlock to prevent unnecessary manipulations of the breaker.
- Door interlock to prevent door being opened when the breaker is in ON position
- De interlocking device to open the door even if the breaker is in ON position.

MCCBs shall have rupturing capacity as specified in drawings/schedule of quantities.

5.3 Metering, Instrumentation and Protection.

Ratings, type and quantity of meters, instruments and protective devices shall be as per drawings and schedule of quantities.

6. CURRENT TRANSFORMERS

(a) C/Ts shall conform to IS 2705 (part -I, II and III) in all respects. Only resin cast C/Ts shall be provided. All C/Ts used for medium voltage application shall be rated for 1 kV. C/Ts shall have rated primary current, rated burden and class of accuracy as specified in schedule of quantities/drawings. Rated secondary current shall be 5A unless otherwise stated. Minimum acceptable class for measurement shall be class 0.5 to 1 and for protection class 10. C/Ts shall be capable of withstanding magnetic and thermal stresses due to short circuit faults of 31 MVA on medium voltage. Terminals of C/Ts shall be paired permanently for easy identification of poles. C/Ts shall be provided with earthing terminals for earthing chassis, frame work and fixed part of metal casing (if any). Each C/T shall be provided with rating plate indicating :

- Transformation ratio
- Rated burden
- Rated voltage
- Accuracy class

C/Ts shall be mounted such that they are easily accessible for inspection, maintenance and replacement. Wiring for C/T shall be with copper conductor PVC insulated wires with proper termination works and wiring shall be bunched with cable straps and fixed to the panel structure in a neat manner.

(b) MEASURING INSTRUMENTS

Direct reading electrical instruments shall conform to IS 1248 or in all respects. Accuracy of direct reading shall be 1.0. Meters shall be suitable for continuous operation between -10 deg C and +50 deg C. Meters shall be flush mounting and shall be enclosed in dust tight housing. The housing shall be of steel or phenolic mould. Design and manufacture of meters shall ensure prevention of fogging of instrument glass. Pointer shall be black in color and shall have Zero position adjustment device operable from outside. Direction of deflection shall be from left to right. Selector switches shall be provided for ammeters and volt meters used in three phase system.

(c) AMMETERS

Ammeters shall be of moving iron type. Moving part assembly shall be with jewel bearings. Jewel bearings shall be mounted on a spring to prevent damage to pivot due to vibrations and shocks. Ammeters shall be manufacture and calibrated as per IS 1248. Ammeters shall normally be suitable for 5 A secondary of current transformers. Ammeters shall be capable of carrying substantial over loads during fault conditions.

(d) VOLTMETERS

Voltmeters shall be moving iron type range of 3 phase 415 volt voltmeters shall be 0-500. Volt meters shall be provided with protection fuse.

7. MEDIUM VOLTAGE SWITCH BOARDS

7.1 GENERAL

- All medium voltage switchboards shall be suitable for operation at three phase/three phase 4 wire, 415 volt, 50 Hz, neutral grounded at transformer system with a short circuit level withstand of 31 MVA at 415 volts or as per schedule of quantities.
- The Switch Boards shall comply with the latest edition with upto date amendments of relevant Indian Standards and Indian Electricity Rules and Regulations.

7.2 SWITCH BOARD CONFIGURATION

- The Switch Board shall be configured with Air Circuit Breakers, MCCB's, and other equipment as called for in the Schedule of Quantities.
- The MCCB's shall be arranged in multi-tier formation whereas the Air Circuit Breakers shall be arranged in Single or Double tier formation only to facilitate operation and maintenance.
- The Switch Boards shall be of adequate size with a provision of 15% spare space to accommodate possible future additional switch gear. .

7.3 EQUIPMENT SPECIFICATIONS

All equipment used to configure the Switch Board shall comply to the relevant Standards and Codes of the Bureau of Indian Standards and to the detailed technical Specifications as included in this tender document.

7.4 CONSTRUCTIONAL FEATURES

- The Switch Boards shall be metal enclosed, sheet steel cubicle pattern, extensible, dead front, floor mounting type and suitable for indoor mounting.
- The Switch Boards shall be totally enclosed, completely dust and vermin proof. Synthetic rubber gaskets between all adjacent units and beneath all covers shall be provided to render the joints dust and vermin proof to provide a degree of protection of IP 54. All doors and covers shall also be fully gasketed with synthetic rubber and shall be lockable.
- The Switch Board shall be fabricated with CRCA Sheet Steel of thickness not less than 2.0 mm and shall be folded and braced as necessary to provide a rigid support for all components. The doors and covers shall be constructed from CRCA sheet steel of thickness not less than 1.6 mm. Joints of any kind in sheet metal shall be seam welded and all welding slag ground off and welding pits wiped smooth with plumber metal.

- All panels and covers shall be properly fitted and square with the frame. The holes in the panel shall be correctly positioned.

- Fixing screws shall enter holes tapped into an adequate thickness of metal or provided with hank nuts. Self threading screws shall not be used in the construction of the Switch Boards.

7.5 SWITCHBOARD DIMENSIONAL LIMITATIONS

- A base channel 100 mm x 5 mm thick shall be provided at the bottom.
- A minimum of 200 mm blank space between the floor of switch board and bottom most unit shall be provided.
- The overall height of the Switch Board shall be limited to 2300 mm
- The height of the operating handle, push buttons etc shall be restricted between 300 mm and 2000 mm from finished floor level.

7.6 SWITCH BOARD COMPARTMENTALIZATION

The Switch Board shall be divided into distinct separate compartments comprising

- A completely enclosed ventilated dust and vermin proof bus bar compartment for the horizontal and vertical bus bars.
- Each circuit breaker, and MCCB shall be housed in separate compartments enclosed on all sides.
- Sheet steel hinged lockable doors for each separate compartment shall be provided and duly interlocked with the breaker/switch fuse unit in "on" and "off" position.
- For all Circuit Breakers separate and adequate compartments shall be provided for accommodating instruments, indicating lamps, control contactors and control fuses etc. These shall be accessible

for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker, bus bars and connections.

- A horizontal wire way with screwed cover shall be provided at the top to take interconnecting control wiring between vertical sections.
- Separate cable compartments running the height of the Switch Board in the case of front access Boards shall be provided for incoming and outgoing cables.
- Cable compartments shall be of adequate size for easy termination of all incoming and outgoing cables entering from bottom or top.
- Adequate and proper support shall be provided in cable compartments to support cables.

7.7 SWITCH BOARD BUS BARS

- The Bus Bar and interconnections shall be of electrolytic Copper/Aluminium and of rectangular cross sections suitable for full load current for phase bus bars and half rated current for neutral bus bar. The maximum current density for copper shall be 1.6 amps per sq. mm. and for Aluminium shall be 1 amp per Sq. mm. and suitable to withstand the stresses of a 31 MVA fault level or at 415 volts for 1 second or as per schedule of quantities.
- The bus bars and interconnections shall be insulated with insulation tape/ fiber glass.
- The bus bars shall be extensible on either side of the Switch Board.
- The bus bars shall be supported on non-breakable, non-hygroscopic insulated supports at regular intervals, to withstand the forces arising from a fault level of 25 MVA at 415 volts for 1 second.
- All bus bars shall be colour coded.
- All bus bar connections in Switch Boards shall be bolted with brass bolts and nuts. Additional cross section of bus bars shall be provided wherever holes are drilled in the bus bars.

7.8 SWITCH BOARD INTERCONNECTIONS

- All connections between the bus bars/Breakers/cable terminations shall be through solid aluminium strips of adequate size to carry full rated current and PVC/fiber glass insulated.
- For unit ratings up to 100 amps PVC insulated copper conductor wires of adequate size to carry full load current shall be used. The terminations of all such interconnections shall be crimped.

7.9 INSTRUMENT ACCOMMODATION

- Instruments and indicating lamps shall not be mounted on the Circuit Breaker Compartment door for which a separate and adequate compartment shall be provided and the instrumentation shall be accessible for testing and maintenance without danger of accidental contact with live parts of the Switch Board.
- For MCCB's instruments and indicating lamps can be provided on the compartment doors.
- The current transformers for metering and for protection shall be mounted on the solid copper/aluminium bus bars with proper supports.

7.10 WIRING

All wiring for relays and meters shall be with PVC insulated copper conductor Fire Survival Cables. The wiring shall be coded and labeled with approved ferrules for identification. The minimum size of copper conductor control wires shall be 1.5 sq. mm.

7.11 CABLE TERMINATIONS

- Knockout holes of appropriate size and number shall be provided in the Switch Board in conformity with the location of incoming and outgoing conduits/cables.
- The cable terminations of the Circuit Breakers shall be brought out to terminal cable sockets suitably located at the rear of the panel.
- The cable terminations for the MCCB's shall be brought out to the rear in the case of rear access switchboards or in the cable compartment in the case of front access Switch Boards.
- The Switch Boards shall be complete with tinned brass cable sockets, tinned brass compression glands, gland plates, supporting clamps and brackets etc for termination of 1100 volt grade aluminium conductor PVC/PVCA cables.

7.12 EARTHING

A main earth bar of G.I. as required shall be provided throughout the full length of the Switch Board with a provision to make connections to the sub-station earths on both sides.

7.13 SHEET STEEL TREATMENT AND PAINTING

- Sheet Steel materials used in the construction of these units should have undergone a rigorous rust proofing process comprising of alkaline degreasing in dilute sulphuric acid and a recognized phosphate process. The steel work shall then receive two costs of oxide filler primer before final painting. Castings shall be scrupulously cleaned and fettled before receiving a similar oxide primer coat.
- All sheet steel shall after metal treatment be spray or powder painted with two coats of shade 631 or as required by Employers to IS 5 on the outside and white on the inside. Each coat of paint shall be properly stoved and the paint thickness shall not be less than 50 microns.

7.14 NAME PLATES AND LABELS

Suitable engraved screw on type white on black name plates and identification labels of metal for all Switch Boards and Circuits shall be provided. These shall indicate the feeder number, feeder designation and feeder rating.

7.15 INSTALLATION

The foundations prepared as per the manufacturers drawings shall be leveled, checked for accuracy and the Switch Board installed. All bus bar connections shall be checked with a feeler gauge after installation. The cable end boxes shall be sealed to prevent entry of moisture. The main earth bar shall be connected to the sub-station earths.

A 15 mm thick rubber matting of approved make shall be provided in front of and along the full length of the Switch Board. The width of the matting shall be 1000 mm. The rubber mat shall withstand 15 KV for 1 minute and leakage current shall not exceed 160 mA/sq. metre.

After installation the Switch Board shall be tested as required prior to commissioning.

8. ELECTRICAL CABLING

8.1 STANDARDS AND CODES

Fire Survival Circuit Integrity Armoured Cables: Fire Survival **armoured** cable of 600/1000V rated with **Aluminum/Copper** Circular conductors having Glass Mica (Fire barrier) tape covered by an extruded layer of cross linkable halogen free insulation and LSZH inner & outer sheath. Basic design as per BS 7846 for copper cables, IEC-60502-1 for aluminum cables. Should retain circuit integrity as per Category-3 of BS:8519. Type test reports of each lot from 3rd party inspection agency required prior to despatch.

8.2 P.V.C. Cables

For Fire Alarm & Detection, Public Address/Emergency Annunciation System/Emergency Lighting etc.

Fire Survival Circuit Integrity Unarmoured Cables: Providing & fixing of 2c x 1.5 Sq. mm Fire Survival Circuit Integrity Unarmoured Cable of 300/500V rated, twisted with Class-2 annealed stranded copper conductor having crosslinkable low smoke zero halogen ceramified Silicon insulation as per BS EN-50363 along-witn uninsulated circuited protective ATC conductor of 1.5 Sq. mm, aluminium tape screening and LSZH outer sheath. Should comply to EN 61034-2 & EN 60754-1. LPCB-FPC certificate required. Should meet Fire Performance Circuit Integrity Test as per BS EN 50200 & BS 6387 CWZ (950 degree Celsius for 180 minutes).

Current ratings shall be based on the following conditions.

Ambient air temperature	45 deg C

Ground temperature	30 deg C
Depth of laying	1000 mm

Cables have been selected considering conditions of maximum connected loads, ambient temperature, grouping of cables and allowable voltage drop. However, the contractor shall recheck the sizes before cables are fixed and connected to service.

- **Laying of Cables**

Cables shall be so laid that the maximum bending radius is twelve times the overall diameter of the cable. Cables shall be laid in indoor trenches, directly on walls/cable trays or in outdoor trenches as specified below.

8.3 IN INDOOR TRENCHES

Wherever so specified, cables shall be laid in indoor masonry/RCC trenches to be provided by owners. Cables shall be laid on MS supports fabricated from minimum 38mm x 38mm x 6mm painted / galvanized angle iron supports grouted in trench walls at intervals not exceeding 600 mm. If required, cables shall be arranged in tier formation inside the trench. Suitable clamps, hooks and saddles shall be used for securing the cables in position and dressing properly so that the clear spacing between the cables shall not be less than the diameter of the cable. Trenches shall be provided with chequered plate/RCC covers. Wherever so specified, trenches shall be filled with fine sand.

8.4 ON TRAYS/WALLS

Wherever so specified, cables shall be laid along walls/ceiling or on cable trays. Cable shall be secured in position and dressed properly by means of suitable clamps, hooks, saddles etc. such that the minimum clear spacing between cables is diameter of the cable. Cable trays, of sizes as per schedule of quantities and drawings shall be of ladder, trough or channel design. The cable trays shall be fabricated from minimum 2 mm thick perforated sheet steel and shall be complete with tees, elbows, risers, and all necessary hardware. Trays shall be galvanized or painted as specified. The cable trays shall be erected properly to present a neat and clean appearance and shall comply with the following:

- Trays shall have suitable strength and rigidity to provide proper support for all contained cables.
- Trays shall not have sharp edges, burrs or projections injurious to cable insulation.
- Trays shall include fittings for changes in direction and elevation.
- Trays shall be installed as a complete system. Trays shall be supported adequately from the building structure by means of MS structural members secured to the structure by dash fasteners or by grouting. The entire cable tray system shall be rigid.
- Each run of cable tray shall be completed before laying of cables.
- Cable trays shall be exposed and accessible.

8.5 CRIMPED CABLE TERMINATION

- Soldered termination shall be avoided. Solder less termination by using crimping tools shall be provided for all PVCA cables. All such terminations shall be made by using Dowell crimping tools and suitable lugs for solder less termination.

- In the case of aluminium conductors, it is to be ensured that the conductor oxidation is cleaned by means of emery paper and then a thin coat of tin is applied before pinching into any equipment.

8.6 TESTING OF CABLES

Test shall be conducted for insulation between phases and between phase and earth for each length of cable, before and after jointing. On completion of cable laying work, the following tests shall be conducted in the presence of the Employers.

a) Insulation Resistance Test (Sectional and Overall)
b) Continuity resistance test

c) Sheathing resistance test
d) Earth Test

All tests shall be carried out in accordance with relevant Standards, Codes of Practice and Electricity Rules. The Contractor shall provide necessary instruments, equipment and labour for conducting the above tests and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Employers.

F. SCHEDULE OF TECHNICAL DATA

THE SCHEDULE OF TECHNICAL DATA SHALL BE FURNISHED, AS ASKED ACCORDING TO PRESCRIBED FORMS BELOW.

AIR HANDLING UNITS

General

Axial Fans

a)	Make	
b)	Air quantity	CFM/CMH
c)	Static Pressure	MM
d)	Fan Speed	RPM
e)	BHP / BKW required	H.P/KW
f)	Fan size & material	MM
g)	Fan outlet velocity	FPM/M.P.S.
h)	Balancing-Static & Dynamic	
i)	Size	MM
j)	Weight with motor & accessories	KG
k)	Efficiency	Percent
l)	Noise level	DB
m)	Accessories Provided	
n)		

Fan motor

a)	Rating	KW
b)	Make	
c)	Speed	RPM
d)	Class of Insulation	
e)	Electrical characteristics	
f)	Type & make of starter	

G.I Ducting

a)	Make	
b)	Grade	
	Grills	
a)	Make & material	
b)	Type and material of damper	

(III) TECHNICAL SPECIFICATIONS OF FIRE SUPPRESSION SYSTEM AT IFCI COLONY, PASCHIM VIHAR, NEW DELHI

1. FIRE SUPPRESSION SYSTEM -GENERAL

This section specifies the manufacture, installation and material requirements of pipe work systems. Areas of commonality to all pipe work systems are described first, followed by the specific requirements for particular pipe work materials and applications, relevant Codes and Standards.

2. Common Standards

ANSI B16.9:	Factory-Made Wrought Steel Butt welding Fittings
ANSI B16.21:	Nonmetallic Gaskets for Pipe Flanges
ANSI B16.1:	Cast Iron Pipe Flanges and Flanged Fittings
ANSI B16.5:	Pipe Flanges and Flanged Fittings

3. Standards for Plumbing Pipe work

IS:554 Dimensions for pipe threads where pressure tight joints are required on the threads.
IS:782 Specification for caulking lead.
IS:800 Code of Practice for general construction in steel.
IS:1367 Technical Supply conditions for threaded steel fasteners: (Part I) Introduction and general information.
IS:1367 Technical supply conditions for threaded steel fasteners: (Part 2) Product grades and tolerance
IS:3114 Code of practice for laying of cast iron pipes (Pipe work)
IS:4111 Code of practice for ancillary structures in sewerage system: (Part-I) Manholes.
IS:5329 Code of practice for sanitary pipe work above ground for Buildings.
IS:12251 Code of Practice for drainage of building basements.
BS:6700 Specification for design, installation, testing and maintenance of Services, Supplying water for domestic use within buildings and their cartilages.
BS:8301 Code of practice for building drainage.
IS:458 Specification for precast concrete pipes (with and without reinforcement)
IS:1239 Mild steel tubes, tubular and other wrought steel fittings: (Part 1) Mild steel tubes
IS:1239 Mild steel tubes, tubular and other wrought steel fittings: (Part 2) Mild steel tubular and other wrought steel pipe fittings.
IS:1536 Centrifugally cast (spun) iron pressure pipes for water, gas and sewage
IS:1537 Vertically cast iron pressure pipes for water, gas and sewage
IS:1538 Cast iron fittings for pressure pipes for water, gas and sewage
IS:1879 Malleable cast iron pipe fittings
IS:3468 Pipe nuts
IS:4.0889 Steel pipes for water and sewerage (168.3 mm to 2540 mm outside diameter)
IS: 3989 centrifugally cast (Spun) iron spigot and socket soils waste and ventilating pipes, fittings and accessories.
IS:14333 High Density Polyethylene pipes for sewerage pipes

4. TECHNICAL AND INSTALLATION REQUIREMENTS

4.1 Installation- General

4.1.1 Design and construction of pipelines shall be in accordance with relevant British, Indian and other standards, as specified. Water pipes, soil and waste pipes below 50mm shall be of galvanized pipes.

4.1.2 The installation shall be neat and tidy, with accurate spacing between pipes, valves and joints, whether running in straight routes or turning through bends.

4.1.3 Particular care shall be taken that all pipe work is erected and secured truly parallel with the building structure, clear of obstructions, preserving headroom and keeping passageways clear and that all vertical drops are plumb.

4.1.4 No bends or curves in any pipe shall be made so as to diminish the waterway or alter the internal diameter of the pipe.

4.1.5 Wherever possible, horizontal pipes shall be fixed to 'fall' to aid venting and draining down of the pipe work. Eccentric reducing sockets shall be used on horizontal runs of pipe to prevent the formation of air pockets. On vertical pipes, concentric reducing sockets shall be used.

4.1.6 Drain outlets shall be provided at all low points of the system to enable emptying and to facilitate maintenance of the pipe work.

4.1.7 Automatic or manual air vents shall be placed at each high point of each water line and discharge pipe shall be terminated at 50 mm above floor drain.

4.1.8 All pipes shall be fitted clear of the floor to permit cleaning beneath the pipes. Where possible, a 125 mm clearance shall be provided between the underside of the pipe and the finished level of the floor and in no case shall the pipe be less than 100 mm clear of the floor.

4.1.9 All pipe runs when not buried underground shall be concealed as far as possible by careful positioning or shall be chased into walls, or laid in screeds except inside plant rooms. All pipes which are to be concealed shall be tested and Approved before being covered.

4.1.10 All pipes passing through the roof shall be provided with at least 2.00 mm lead flashing sandwiched between the layers of waterproofing roofing membrane, and secured to the pipe with a galvanized spring clip.

4.1.11 Pipe work shall rest freely upon supports and be carefully aligned prior to final connection.

4.1.12 The Engineer reserves the right to reject any material deemed to be unsuitable for installation and such material shall be removed from the Site and be replaced with approved material by the contractor at his own cost.

4.1.13 Site welding shall be applied with pipe work unrestrained and each joint hydraulically tested at 1.5 times working pressure plus 4.080 kPa for 60 minutes without loss of pressure.

4.1.14 Followed by application of appropriate protective coating, both internally and externally, prior to final installation.

4.1.15 Following the welding and hydro testing the complete Fire Protection Piping System shall be wire brushed and applied with two coats of red oxide primer and then painted with 2 coats of Post office Red enamel paint. The fittings will have wall thickness not less than those of the pipes.

4.2 Cleaning Procedures

4.2.1 Precautions shall be taken to avoid introducing foreign matter such as welding beads and slag or dirt into the piping system. Completed welds shall be hammered to loosen debris. Prior to assembly, all piping, valves and fittings shall be internally cleaned of oil, grease and dirt by wire brush and swabs.

4.2.2 Following fabrication and installation, all piping of 150 mm and smaller shall be cleaned by flushing with clean water, run to waste, until thoroughly free of all dirt, oil etc. Generally, each size of pipe shall be flushed separately before being joined with larger size piping.

4.2.3 Piping of 200 mm and larger shall be cleaned by pulling through a steel brush for the entire length of each pipe size, followed by fibre brush or swabs. Brushes and swabs shall be slightly larger than the inside diameter of pipe being cleaned.

4.2.4 All cleaning operations shall be continuous throughout the piping system, except at joints required for final jointing of various sections of cleaned piping. After cleaning and until final joints are made, the end of sections of piping shall be tightly sealed off to prevent any dirt, water and other foreign matter from entering the pipes.

4.3 Gaskets

4.3.1 Gaskets shall be suitable for the temperature, service and pressure of the system and shall be, installed in accordance with the manufacturer's recommendations. Made up flanged joints shall be fabricated from one-piece ring gaskets, 3 mm thick, neoprene rubber.

4.3.2 For flanged joints between dissimilar metals or insulating flange joints; insulating gaskets, sleeves and washers between flanges, bolts and nuts respectively shall be used. Insulating material shall be "Teflon" or approved equivalent material.

4.3.3 Joint rings and gaskets shall comply with the requirements of BS 7874 but other materials may be used if they have been proved to be more suitable for their duty as recommended by the manufacturer, and approved by the Engineer.

4.4 Jointing-Particular

4.4.1 Where flanged joints are required for jointing galvanized steel pipes, galvanized steel screwed boss flanges complying with IS : 6392 shall be used.

4.4.2 Screw joints shall be made with tapered threads properly cut. Joints shall be made tight with a stiff mixture of litharge and glycerin, or poly tetra fluoro ethylene tape, or other Approved thread joint compound applied to the male threads only. Not more than three threads shall show after the joint is made up.

4.4.3 Welded joints shall be fusion-weld in accordance with ANSI B 31.1, unless otherwise stated. Welded fittings shall be used when changing direction of piping. Mitering or notching pipe to form elbows and tees or other similar construction will not be permitted.

4.4.4 Branch connections shall be made with welding tees or forged welding branch outlets.

4.4.5 Site and shop bevels shall be in accordance with the recognized standards and shall be carried out by mechanical means or flame cutting. Where work is carried out by flame cutting, the metal surfaces shall be cleaned of scale and oxidation prior to welding.

4.4.6 Before welding, the component parts to be welded shall be aligned so that no strain is placed on the weld when finally positioned. Align the height so that no part of the pipe wall is offset by more than 20 % of the wall thickness. Flanges and branches shall be set true.

4.4.7 Alignment shall be preserved during the welding operation.

4.4.8 All defective welds shall be removed and replaced at no additional cost to the Employer. Repairing of defective welds by adding new material over the defective welds or by peeling will not be permitted.

4.4.9 Electrodes shall be stored in a dry area and kept free of moisture or dampness. During fabrication operations the electrodes shall be stored in a heated container. Electrodes that have lost part of their coating shall not be used.

4.4.10 Flanges and unions shall be faced true. Flanges with Approved gaskets shall be provided and made square and tight. Union or flange joints shall be provided in each line immediately preceding the connection to each place of equipment or material requiring maintenance such as pumps, control valves, and other similar items. Gaskets shall conform to ANSI B16.21 and ASTM D 2000.

4.4.11 Flanges

4.4.12 Welded piping: Steel, welding neck pattern, 150 (104.08 kPa) or 300 (2070 kPa) WSP class, complying with ASME B-16.5, ASTM A 181 Grade 1, or BS 4504 shall be used.

4.4.13 Screwed piping; Flanges and flanged fittings on screwed and wrought iron piping shall be cast iron, standard weight, complying with ASME B-16.1.

4.5 Supports General

4.5.1 Unless otherwise specified or indicated, all brackets, stays, frames, fixed and roller supports and hangers necessary to carry and support all pipes and valves shall be provided.

4.5.2 Structural steel required for proper installation shall be provided. All pipe supports shall be steel, adjustable for height and hot dipped galvanized.

4.5.3 Supports shall only be attached to structural framing members. Where supports are required between structural framing members, a suitable intermediate metal framing shall be provided.

4.5.4 Piping shall be supported independently from all equipment so that equipment is not stressed by the weight of the pipe or expansion.

4.5.5 Valves or other heavy items of pipe work equipment shall be fitted as near as practicable to a point of support, or fitted with their own supports.

4.5.6 Hangers, supports, guides and anchors shall be designed to allow expansion and contraction within stress limits of codes for pressure piping in accordance with Section 1 on Power Piping of ANSI B

4.5.7 Supports shall be located to ensure that pipe work branches of fittings are not restrained by the support during expansion or contraction of the pipe work service.

4.5.8 Contact of dissimilar materials shall be avoided. Steel piping shall have steel supporting member actually in contact with the pipe.. Pipes shall be supported on either side of changes of direction and pipeline mounted equipment.

4.5.9 Vertical piping shall be guided or supported in the centre of each riser with Approved brackets to prevent swaying, sagging, vibration and resonance. Strain that causes lines to shake or buckle between supports or anchors shall be avoided.

4.5.10 Where piping is subject to a vertical movement due to thermal expansion of 3 mm or more ,hangers shall be of variable spring design. Variation of hanger force during operation shall range between 85 % and 120 % of the actual load.

4.5.11 Pipes fixed to walls or floors both vertically and horizontally shall be supported by bracket fixed to walls or supported from the floor. All pipes in ducts shall rest on rollers and chairs, or hangers and be suitably arranged and supported to allow for expansion and contraction. All supports shall be fixed so that the full thickness of lagging can be applied in all places.

4.5.12 Pipe work supports and hangers shall be in accordance to relevant IS codes. Details of all supports, hangers and accessories shall be submitted for approval before installation.

4.5.13 In general, all supports, hangers, anchors and fixing accessories shall be hot-dipped galvanized.

4.5.14 Design of the hangers shall be compatible with pipe or tubing to be supported.

4.5.15 The supports shall be of sound construction and shall be adequate for the weight to be carried and shall permit free expansion and good appearance and also permit piping runs to be readily dismantled where appropriate.

4.5.16 Generally supports shall be equally spaced. Unless otherwise specified, pipe supports shall be provided at intervals in accordance with the following table:-

(i) Steel Pipe (Black or galvanized)

Size of pipe (mm.)	**Maximum Interval for Vertical Run (m.)**	**Maximum Interval for Horizontal Run (m.)**
15	2.5	1.8
20-25	3.0	2.4
32	3.0	2.7
40-50	3.6	3.0
65-80	4.5	3.6
100	4.5	4
150 and above	55	4.5

Also for each length of pipe minimum 2 supports should be provided.

4.6 Hanger Rods

4.6.1 Hanger rods of steel, threaded and fitted with two removable nuts at each end for positioning rod and hanger and locking each in place shall be provided

4.6.2 Unless otherwise specified, hanger rods shall be of the following sizes :

Size of Pipe(mm.)	**Single Rod Dia. (mm)**	**Double Rod Dia.(mm)**
15 to 50, Inclusive	10	10
65 and 80	13	10
100 and 125	15	13
150	20	15
200,250 and 300	22	20

4.6.3 Secure hangers from metallic inserts cast into concrete. When these inserts are not available, attachment by anchor bolts to be placed with fast setting high strength grout shall be used.

4.6.4 Hanger shall be placed close to the point of change of direction of a pipe in either a horizontal or vertical plane.

4.6.5 Supports and hangers for galvanized iron pipe shall be placed as close as possible to joints. When hangers or supports are not within 300mm or a branch line fitting, additional hangers or supports shall be provided at the fitting.

4.7 Protective Coatings and Linings

4.7.1 For buried pipes complying with BS EN 598,/ IS10211 bituminous coating against corrosion shall be provided for the pipes .

4.7.2 Pipes and fittings shall be coated by either dipping in a bath containing a composition having a tar base or dipping in a bath containing a cold solution consisting of a mixture of natural bitumen with a suitable hardener and natural asphalt.

4.7.3 The external surface of all pipes and fittings for surface water pumping systems, including pipes and fittings shall be coated with a bituminous compound.

4.8 Pipe Materials for Plumbing and Drainage Systems

The following pipe work material shall be used for systems listed below:

SYSTEM	DIAMETER OF PIPE(mm)	PIPE WORK MATERIALS
Flushing	Feed pipe to sump/tank	Galvanized iron
	Flushing supply distribution pipe	Galvanized iron
	Vent for water tank	Galvanized iron
	Overflow and warning	Galvanized iron
Cold water / clearing water	Feed pipe to sump / tank	MDPE
	Feed pipe to sump / tank	MDPE
	Supply pipe	MDPE
	Vent for water tank	MDPE
Waste	Overflow and warning pipe	MDPE
	25mm -50mm	MDPE
	Above 50mm	MDPE
	Pipe concealed in structure	Galvanized Iron / Cast Iron
Soil / combined soil 7 waste	65-300	Cast Iron
Vent	All size	Cast Iron
External down take	150-900	RCC(NP-4)
Rainwater down take pipe	100-150	MDPE / Cast Iron
Embedded see page water pipe	80-200	HDPE

Note: Water Pipes shall not pass through ASS, TSS, Electrical panel room, DB Room, SCR, Equipment rooms. Pipes also as far as possible shall not pass through public areas at concourse level and platform level. In case pipes have to pass through public areas, they shall be suitably covered by appropriate boxing.

4.9 Pipe Materials for Fire Fighting & Suppression Systems

The following pipe work material shall be used for systems listed below:

SYSTEM	DIAMETER OF PIPE (mm)	PIPE WORK MATERIALS
Hose Reel Pipes	25mm	Mild Steel to IS 1239 Class C (For all size)
Wet Main Pipe	Up to 200mm	Mild Steel to IS 1239 Class C (For all size)
Sprinkler Pipe	25mm – 200mm dia	Mild Steel Class C to IS 1239
Clean Gas Piping	Downstream of pressure reducer	Carbon Steel Pipes A106 Grade – B Schedule 40
	Upstream of pressure reducer	Carbon Steel Pipes A106 Grade – B Schedule 40
Underground Pipes	All Size	Ductile Iron Cement Lined BS EN 545 Class K12

4.9.1 Pipe joints for fire system

4.9.2 For steel pipe work all joints up to and including 50mm diameter shall be made by means of screwed socket connections. Pipes above 50mm diameter shall be joined by means of mechanical groove coupling.

4.9.3 All pipe works within pump rooms shall be of flanged joints or mechanical groove coupling only. Joints shall not be closer than 3000mm except where necessitated by fittings. Flanges shall be wrought iron or annealed steel, machined full face, suitable for the working pressures to which they will be subjected. Flanges shall conform to the relevant ANSI Standard and pressure rating.

5. PIPING ANCILLARIES

5.1 General

5.1.1 This Section specifies the manufacture and installation requirements for gate valves, check valves, butterfly valves, motorized valves, gauge cocks, automatic air valves, strainers, stopcocks, pressure reducing valves, ball float valves, safety and pressure relief valves, pressure gauges, pipe sleeves, expansion loops, expansion joints, pipe anchors, gaskets for pipe separation and water closet connector.

5.1.2 All valves, taps and cocks shall be of the types and working pressures suitable for the systems to which they are connected and shall be approved by the Engineer. Valves shall be rated to withstand the system hydraulic test pressure.

5.1.3 Brass, bronze or cast iron valves shall generally be of 16 bar working pressure rating type. In addition, all valves at discharge side of transfer water pumps shall be of minimum 16 bar pressure rating.

5.1.4 Where valves are provided at the discharge side of 2 or more pumps, each valve shall be so selected to withstand effectively the anticipated system pressure under the worst case scenario.

5.1.5 All valves shall comply with Indian Standards and where I.S not available, refer British Standards in respect of tests and working pressures, dimensions and materials of construction.
5.1.6 Wheel head valves shall be arranged for clockwise operation of the handle to close the valve.
5.1.7 Screwed valves shall have taper threads to BS 21. Flanged valves shall have dimensions and bolting in accordance with BS 4504: 3.1.
5.1.8 Connections shall be made between each valve and the adjoining pipe work or equipment with flanges for 65mm size pipe work and above. Flanges shall be selected to suit working pressure and temperature.
5.1.9 Screwed connections shall be made between each valve and the adjoining pipe work or equipment for 50 mm size pipe work and below. A union shall be fitted on each side of all screwed valves.
5.1.10 All valves shall be suitably located in accessible positions for operation and maintenance purposes.
5.1.11 All drain outlets and manual air vents shall have connection pipes leading to the nearest drain.
5.1.12 Valve packing shall be suitable for the service intended. Valve packing consisting of asbestos or asbestos based materials shall not be used.
5.1.13 Inverted mounting of valves shall not be permitted without prior approval of Engineer In-charge.
5.1.14 All valves provided for manual operation shall have a hand wheel or other suitable device which shall be fixed to the valve. Hand wheels shall be rotated clock-wise to close the valves and shall be clearly marked with the words "OPEN" and "CLOSE" and arrows pointing in the appropriate directions. The rims of hand wheels shall be machined to a smooth finish.
5.1.15 Valves of identical make, size, type and duty shall be fully interchangeable.

5.2 Standards

Relevant Codes and Standards

5.2.1 BS 21: Pipe Threads for Tubes and Fittings where Pressure-Tight Joints are made on the Threads (Metric Dimensions)
5.2.2 BS 1010: Draw off Taps and Stop valves for Water Services (Screw down Pattern)
5.2.3 BS 1212: Float Operated Valves (Excluding Floats)
5.2.4 BS 2456: Floats (Plastics) for Floated Operated Valves for Cold Water Services
5.2.5 BS 5150: Cast Iron Gate Valves / Sluice valve
5.2.6 BS EN 13789:2002: Cast Iron Globe and Globe Stop and Check Valves for General purposes.
5.2.7 BS 5154: Copper Alloy Globe ,Globe Stop and Check, Check and Gate Valves
5.2.8 BS 5155: Butterfly Valves BS 2879: Draining Traps (Screw Down Pattern) BS 4504: Circular Flanges for Pipes, Valves and Fittings (PN Designated) BS 5163: Predominantly Key – Operated Cast Iron Gate Valves for Water Work purposes.
5.2.9 BS EN 1982: Copper and Copper alloy ingots and casting.
5.2.10 API-594: Double Plate Check Valve

5.3 TECHNICAL SPECIFICATIONS

Globe Valves

5.3.1 Globe valves generally shall be used on service pipe work as specified.
5.3.2 Globe valves up to and including 50 mm nominal diameter shall be generally rated, manufactured and tested to BS 5154. Valves over 50 mm nominal diameter shall be to BS EN 13789:2002. Valves shall be of the same nominal bore as the pipe work in which they are installed.
5.3.3 Bronze bodied valves shall be cast to BS EN 1982. Valves with cast iron bodies shall be made to BS EN 1561. The bodies shall be of an even thickness throughout, clean and free from scale and flaws. Generally, valves up to and including 50 mm nominal bore shall have bronze bodies and valves of 65 mm bore and larger shall have cast iron bodies, though bronze bodied valves may be used at any size.

5.3.4 Globe valves when used for circuit regulation shall have characterized plug discs. The discs shall be free to rotate, readily removable from the valve stem and renewable. Discs may be manufactured using proprietary composition type materials if approved.

5.3.5 Valves shall have packed stuffing boxes or alternatively shall be fitted with 'O' rings.

5.3.6 Valves up to and including 50mm nominal bore shall have BS 21 taper screwed ends, valves of 65 mm nominal bore and larger shall have BS 4504:3.1 flanged connections.

5.3.7 Regulating valves shall be fitted with a lockable indicator on the spindle to show the proportional opening.

5.4 Gate Valves

5.4.1 Gate valves generally shall be used on service pipe work, and shall be fitted a necessary. Valves shall be rated, designed and tested in accordance with BS 5154 for bronze valves and BS 5150 or BS 5163 for those of cast iron manufacture. Valves shall be of non-rising stems and same size as the nominal bore of pipeline in which they are installed.

5.4.2 Bronze bodied valves shall be cast to BS EN 1982. Valves with cast iron bodies shall be made to BS EN 1561. The bodies shall be of an even thickness throughout, clean and free from scale flaws. Valves up to and including 50 mm nominal bore shall be bronze bodied, 65 mm nominal bore and larger may be bronze or cast iron.

5.4.3 Valve wedges may be of cast iron, bronze, nickel alloy or stainless steel. Cast iron wedges shall have bronze trim and seating. Slide valves shall be fitted with stainless steel springs. Wedges shall be renewable and free to rotate on the valve spindle.

5.4.4 Valves shall have packed stuffing boxes, or alternatively shall be fitted with 'O' rings.

5.4.5 Gate valves of 80 mm nominal bore and above for use in water supply system shall be of cast iron body with nickel alloy faces and stainless steel spindle or with nitrite resilient facing wedge gate and aluminum bronze stem and shall be entirely suitable for use with sea water.

5.4.6 Gate valves shall be tested as follows at the place of manufacture prior to dispatch to site:-

Body Test

With both ends closed and the gate in the open position, the body shall be tested to 1.5 times the maximum working pressure for a minimum of 30 minutes. There shall be no visible leakage.

Seat Test

With one end open to the atmosphere and the gate in the closed position, the seat of the valve shall be tested for tightness when 1.5 times the maximum working pressure is applied to the other end of the valve for a minimum of 30 minutes. The seat test shall be carried out in both directions. There shall be no visible leakage past the gate.

5.5 Check Valves

5.5.1 Check Valves shall be installed in the specified locations. Care shall be taken to ensure that the valves provided are suitable for installation in the plant required. In general, double plate check valve conforming to API 594 Specifications shall be used unless otherwise specified. Disc shall be centre guided and operated with stainless steel spring and trim to ensure smooth, positive opening and closing of valves with minimal pressure drop. Check valves shall not be installed in vertical pipes with downward flow.

5.5.2 Check valves generally shall be of 16 bar nominal pressure rating (working pressure).

5.5.3 Bronze bodied valves shall be cast to BS EN 1982. Valves with cast iron bodies shall be made to BS EN 1561. The bodies shall be of an even thickness throughout, clean and free from scale and flaws. Valves up to and including 50 mm nominal bore shall be of bronze. Valves on 65 mm nominal bore and larger shall be of cast iron.

5.5.4 Check valves shall be tested as follows at the place of manufacture prior to dispatch to site:-

Body Test

With both ends closed the body shall be tested to 1.5 times the maximum working pressure for a minimum of 30 minutes. The pressure shall be applied to the inlet side of the body. There shall be no visible leakage.

Seat Test

With the inlet open to atmosphere, the seat of the valve shall be tested for tightness when 1.5 times the maximum working pressure is applied to the outlet end of the valve for a minimum of 30 minutes. There shall be no visible leakage.

5.5.5 Inverted mounting of valves shall not be permitted without prior Approval by the Engineer.

5.5.6 Valves of identical make, size, type and duty shall be fully interchangeable.

5.6 Butterfly Valve

5.6.1 General: 16 Bar tight closing, wafer type, with resilient seats. Provide seats that cover inside surface of body and extend over body ends; or provide O-rings so that the valve body may be bolted and sealed between raised faced flanges with minimum bolt loading and without additional gaskets; or provide integral pipe ends to suit piping used, with pipe end faces concentrically grooved to seal against concentric protrusions in seat.

5.6.2 Butterfly valves shall comply with BS 5155.

5.6.3 Bodies: Ductile iron, cast steel, aluminum, or cast iron.

5.6.4 Seats: Material EPDM and shall be suitable for the temperature rating of the systems served. Discs: Ductile iron or stainless steel grade 316 for fresh water.

5.6.5 Shaft Stems: Stainless Steel to ASTM A167, Type 316 for fresh water.

5.6.6 Control Handles / Levers: Suitable for locking in any position, or with 10 degree or 15 degree notched throttling plates to hold valve in selected position. Provide worm gear operators with large sized hand wheels for size 150 mm and larger.

5.6.7 A short piece of pipe work with flanged ends shall be coupled to the butterfly valve to facilitate future isolation and dismantling of equipment for servicing.

5.7 Strainers

5.7.1 Strainers shall be provided in pump suction pipes, water tank outlets and in the locations specified in the drawing. Strainers shall be of the same nominal bore as the pipeline in which they are fitted. Strainers shall be installed in a plane to ensure that filtered matter is retained within the screen.

5.7.2 Strainers shall be full line size, "Y" or "BASKET" type as specified and readily removable for cleaning.

5.7.3 Strainers of up to and including 50 mm shall be bronze bodied and have screwed end caps with a brass drain plug. Strainers of 65 mm and over shall be cast iron bodied to the requirements of BS 1452 with cast iron cover and mild steel stud bolts. The cover shall be complete with a 25 mm bronze drain valve, the outlet of which shall be capped with a brass plug.

5.7.4 Strainer connections shall be as for the pipeline in which they are installed.

5.7.5 Screens and baskets shall be of brass or stainless steel to suit the service intended. The total free area of the installed screen shall not be less than 5 times of the internal cross sectional area of the inlet pipe. Openings in the screen or basket shall be less than 1.2 mm in diameter.

5.7.6 Strainers for flushing water systems shall be of cast iron body and filtering medium of the strainer of stainless steel grade 316.

5.7.7 Strainers shall be of adequate strength to withstand the working pressure.

5.7.8 Strainers at the pump suction inlet shall be fitted with removable channel magnets, secured to the screen or basket by stainless steel retaining lugs and threaded rods, and placed to provide a continuous magnetic field around the entire circumference of the screen. They shall be fitted with a breech-locking arrangement to maintain the screen in place when removing the cover

plate. The screen cover plate shall be bolted using studs with hexagonal headed nuts and shall be fitted with a special hinge. Initially each strainer shall be fitted with mesh lined baskets, reinforced on both sides with an open bottom. After initial cleaning, the baskets shall be replaced with a standard basket, suitable for the service required. All Y type strainers shall be complete with screw plug for drain or blow-off.

5.8 Paint Finish Schedule

5.8.1 Unless otherwise specified in the particular specification, a paint finish to a color to be approved by the Engineer shall be applied to all exposed services including but not limited to supporting rods and brackets, cable ladders, cable trays, trunking, paperwork, surface conduits and accessories and other equipment installed in the building areas

5.8.2 The requirements of paint finish shall be as follows:-

5.8.3 There shall be at least one coat of corrosion resistant primer, one undercoat and two finish coats to suit the intended duty and operating requirements. Details of pretreatment shall be submitted to the Engineer for approval prior to application.

5.8.4 If damage to paint is found during transportation, storage or installation, the contractor shall repaint the whole equipment without extra cost.

5.8.5 Replace all damaged parts or components and repaint the whole equipment without extra cost if rust is found on any equipment due to inadequate painting material or poor workmanship or incorrect handling during transportation, storage or installation. Removal of all the existing paint, chemical cleaning, rinsing and other necessary pretreatment shall be included in repainting before applying primer, undercoats and top coats. Details shall be submitted to the Engineer for approval.

6. Materials

6.1 Primer Paint

6.1.1 For synthetic finishing paints on internal and external metalwork, paint shall be zinc Chromate primer or metallic zinc-rich primer to BS 4652, Type 2.

6.1.2 For synthetic or non-toxic paints on galvanized metal, use an etching primer with a zinc chromate base.

6.2 Undercoat Paint

6.2.1 For metal work installed internally, paint shall be a linseed oil modified alkyd based undercoat highly pigmented to appropriate shade.

6.2.2 For metal work installed externally and exposed to weather, paint shall be a polyamide epoxy pigmented with titanium oxide.

6.3 Finish Paint

6.3.1 For metal work installed internally paint shall be a linseed oil modified alkyd with glossy finish and fungus resistant characteristics.

6.3.2 For metal work installed externally and exposed to weather, paint shall be a polyamide epoxy.

6.4 Identification Colors: All finish coat color shall be to BS 381C and hall be agreed with the Engineer.

7. Air Vessel

The air vessel shall be fabricated from MS plate conforming to IS: 2002 grade 2A with minimum 8 mm thickness for the shell and the dished ends and suitable supporting legs. The air vessel shall be provided with a 100 mm diameter, flanged connection from the fire pump, one 25 mm diameter drain with valve, 15 mm diameter sockets for Pressure switches and pressure gauge. The vessel shall of suitable size as specified in Bill of Quantities. The vessel shall be designed, fabricated & tested as per IS: 2825.

(F) TENDER FORMS

Annexure-1

BIDDER INFORMATION

Date: _____

S. No.	Particulars	Information
1	Name of the Bidders/Firm	
2	Communication Address	
3	Telephone No. Office	
	Mobile	
	Fax	
	E-Mail	
	Website	
4	Authorized Person- Name	
	Designation	
	Mobile	
	E-Mail ID	
5	Alternate Authorized Person- Name	
	Designation	
	Mobile	
	E-Mail ID	
6	Employee's PF & Miscellaneous Provision Act, 1952, (if registered)	
7	ESI Number & Date	
8	PAN	
9	TIN No.	
10	VAT No.	
11	GST No.	
12	Company Registration No.	
13	Service Tax Registration No.	
14	Income Tax Return for last 3 years.	
15	Beneficiary Bank Details	
	Bank Account No	
	IFSC/NEFT Code	
	Name of Bank	
	Address of Branch	
16	Particular of Earnest Money Deposit (EMD)	
	Amount	₹
	(DD/PO) No.	
	Date	
	Name of the Bank	
	Address of Bank	
17	The details of registered office in Delhi/NCR	
18	The Bidder should have Average Annual Turnover of at-least ₹ 2 crores in last 3 years ending March, 31st 2017.	
19	Furnish the names with address & telephone nos. of three responsible persons who will be	

	in a position to certify about the services/quality as well as the past performance of your organization.	
20	Whether, MSME, if yes, attach valid copy of certificate.	
21	Whether you accept all the terms and conditions of the tender; Yes/No	

(Fill up the above table & Enclose legible copies of the supporting documents)

Date:
Place:

Signature of authorized person
Full Name & Designation:
Company's Seal

Annexure-2

A. Details of Similar Experience: Restoration, up-gradation/modification of Fire Protection System in last five years.

S. No.	Name & Address of the client, Concerned Person and contact/ Mobile No	Name and Location of work & No. of Floors of the Building where worked	Value of Work (In lakh Rs.)	Contract Period (from__To__)	Completion / Performance Certificate enclosed 'Yes' or 'No'	Any other information you would like to give
1	2	3	6	7	8	9

(Fill up the above table & Enclose legible copies of the supporting documents)

B. Details of Technical and skilled manpower

Ser. No.	**Name and Designation**	**Qualification**	**Experience**	**Any Other Information**
1	**2**	**3**	**4**	**5**

C. Financial Capability: Average Annual Turn Over of the bidder during the last 3 years

Ser. No.	**Financial Year**	**Turnover (Rs. in lakh)**
1	2014-15	
2	2015-16	
3	2016-17	
	Average	

(Fill up the above table and Enclose copy of Turn over certificates, profit/loss statement certified by any Chartered Accountant.)

Date:
Place:

Signature of authorized person
Full Name & Designation:
Company's Seal

Annexure -3

OFFER FORWARDING LETTER/TENDER SUBMISSION LETTER

(To be typed and submitted in the Letter Head of the Company/firm of Bidder)

Offer Reference No…… Dated:……..

To,

The General Manager
Security Department
IFCI Limited
IFCI Tower
61 Nehru Place
New Delhi -110 019

Dear Sir,

Sub: Submission of Offer against Tender Specification No:……..

I/We hereby offer to carry out the work detailed in the Tender Specification issued by IFCI Limited, ……, in accordance with the terms and conditions thereof.

I/We have carefully perused the following listed documents connected with the Tender documents and shall abide by the same.

i) Amendments/Clarifications/Corrigenda/Errata/etc. issued in respect of the Tender Document by IFCI.
ii) Notice Inviting Tender (NIT)/ (Technical Bid)
iii) Financial Bid
iv) Documents referred to in the Tender Document
v) Forms and Procedures

Should our Offer be accepted by IFCI for Award, I/we further agree to furnish 'Security Deposit' for the work as provided in the Tender Conditions within the stipulated time as may be indicated by IFCI.

I/We further agree to execute all the works referred to in the said Tender Document/Corrigendum, upon the terms and conditions contained or referred to therein and as detailed in the appendices annexed thereto.

I/We have deposited/depositing herewith the requisite Earnest Money Deposit (EMD) as per details furnished in the tender document.

Authorized Representative of Bidder

Signature:
Name:
Address:

Place:
Date:

Annexure -4

DECLARATION BY AUTHORIZED SIGNATORY OF BIDDER

(To be typed submitted in the Letter Head of the Company/firm of Bidder)

To,

The General Manager
Security Department
IFCI Limited
IFCI Tower
61 Nehru Place
New Delhi -110 019

Dear Sir,

Sub: **Declaration by Authorized Signatory**

Ref: i) NIT/Title of the work. Name of Tender No……..,
ii) All other pertinent issues till date

I/We hereby certify that all the information and data furnished by me/us with regard to the above Tender Specification are true and complete to the best of my/our knowledge. I have gone through the specifications, condition, stipulations and other pertinent issues till date, and agree to comply with the requirements and Intent of the specification.

I/We further certify that I/We am/are authorized to represent on behalf of my/our company/firm for the above mentioned tender and a valid Power of Attorney/Authorization letter to this effect is also enclosed.

Yours faithfully,

(Signature, Date & Seal of Authorized Signatory of the Bidder)

Date:

Enclosed: Power of Attorney/Authorization letter

Annexure -5

DECLARATION CONFIRMING KNOWLEDGE ABOUT SITE CONDITIONS

(To be typed submitted in the Letter Head of the Company/firm of Bidder)

To,

The General Manager
Security Department
IFCI Limited
IFCI Tower
61 Nehru Place
New Delhi -110 019

Dear Sir,

Sub: **Declaration confirming knowledge about Site conditions**

Ref: i) NIT/Tender No……..,
ii) All other pertinent issues till date

I/We _____hereby declare and confirm that I/we have visited the site as referred in IFCI Tender Specifications and acquired full knowledge and information about the site conditions including Wage structure, Industrial Climate, the Law & Order and other conditions prevalent at and around the site (s). I/We further confirm that the above information is true and correct and I/we shall not raise any claim of any nature due to lack of knowledge of Site conditions.

I/We, hereby offer to carry out works as detailed in above mentioned Tender Specification, in accordance with Terms & Conditions thereof.

Yours faithfully,

(Signature, Date & Seal of Authorized Representative of the Bidder)

Date:
Place:

Annexure -6

NO DEVIATION CERTIFICATE

(To be typed submitted in the Letter Head of the Company/firm of Bidder)

To,

The General Manager
Security Department
IFCI Limited
IFCI Tower
61 Nehru Place
New Delhi -110 019

Dear Sir,

Sub: **Declaration by Authorized Signatory**

Ref: i) NIT/Tender No……..,
ii) All other pertinent issues till date

I/We hereby confirm that I/we have not changed/modified/materially altered any of the tender documents as downloaded from the website/issued by IFCI and in case of such observance at any stage, it shall be treated as null and void and my/our tender shall deemed to be withdrawn.

I/We also hereby confirm that I/we have neither set any Terms and Conditions and nor I/we have taken any deviation from the Tender conditions together with other references applicable for the above referred NIT/Tender Specification.

I/We further confirm our unqualified acceptance to all Terms and conditions, unqualified compliance to Tender Conditions, Integrity Pact and acceptance to Reverse bidding process.

I/We confirm to have submitted offer in accordance with tender instructions and as per aforesaid reference.

Thanking you,

Yours faithfully,

(Signature, Date & Seal of Authorized Signatory of the Bidder)

Date:
Place:

Annexure -7

DECLARATION OF RELATION IN IFCI

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder failing which the offer of Bidder is liable to be summarily rejected)

To,

The General Manager
Security Department
IFCI Limited
IFCI Tower
61 Nehru Place
New Delhi -110 019

Dear Sir,

Sub: Declaration for relation in IFCI

Ref: NIT/Tender No._____

I/We hereby submit the following information pertaining to relation/relatives of Proprietor/Partner (s)/Director(s) employed in IFCI

Tick(√) any one as applicable:

1. The Proprietor, Partner(s), Director(s) of our Company/Firm DO NOT have any relation or relatives employed in IFCI

OR

2. The Proprietor, Partner(s), or Director(s) of our Company/Firm have relation/relatives employed in IFCI and their particulars are as below:

   (i)

   (ii)

Signature of the Authorized Signatory

Note:

1. Attach separate sheet, if necessary.
2. If IFCI Management comes to know at a later date that the information furnished by the Bidder is false, IFCI reserves the right to take suitable action against the Bidder/Contractor.

Annexure -8

NON DISCLOSURE UNDERTAKING (INTEGRITY PACT)

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

I/We understand that IFCI Ltd. is committed to Information Security Management System as per their Information Security Policy.

Hence, I/We M/s_____,
who are submitting offer for providing services to IFCI Ltd. against Tender No. _____ hereby undertake to comply with the following in line with Information Security Policy/Fire Safety & Security Policy of IFCI _____, _____.

- To maintain confidentiality of documents & information which shall be used by the Contractor/selected bidder during the period of the Contract.
- The documents & information shall not be revealed to or shared with any third party.

(Signature, date & seal of Authorized Signatory of the Bidder)

Date:

Place:

Date:

Annexure -9

DECLARATION

(TO BE TYPED ON A LETTER HEAD OF THE COMPANY/ FIRM)

The General Manager
Security Department
IFCI Limited
IFCI Tower,
61 Nehru Place
New Delhi -110 019

Ref: 1) NIT/Tender No._____

Dear Sir,

1. We have carefully read and understood all the terms and conditions of the tender and hereby convey our acceptance to the same.

2. The information / documents furnished along with the above offer are true and authentic to the best of my knowledge and belief. We are well aware of the fact that furnishing of any false information / fabricated document would lead to rejection of our tender at any stage besides liabilities towards prosecution under appropriate law.

3. We have apprised our self fully about the job to be done during the currency of the period of agreement and also acknowledge to bear consequences to of nonperformance or deficiencies in the services on our part.

4. We have no objection, if enquiries are made about the work listed by us.

5. We have not been blacklisted by IFCI or any other organization/PSU where we have worked. Further, if any of the partners/directors of the organization /firm is blacklisted or having any criminal case against them, our bid shall not be considered. At any later point of time, if this information is found to be false, IFCI may terminate the assigned contract immediately.

6. We have not been found guilty by a court of law in India for fraud, dishonesty or moral turpitude.

7. We agree that the decision of IFCI in selection of Bidders will be final and binding to us.

Date:
Place:

Signature of authorized person
Full Name & Designation:
Company's Seal:

N.B: The above declaration, duly signed and sealed by the authorized signatory of the company, should be enclosed with Technical Bid.

Annexure -10

DECLARATION OF PRESENT STATUS

(TO BE TYPED ON A LETTER HEAD OF THE COMPANY/ FIRM)

The General Manager
Security Department
IFCI Limited
IFCI Tower,
61 Nehru Place
New Delhi -110 019

Ref: 1) NIT/Tender No. _____

Dear Sir,

8. I/We have carefully read and understood all the terms and conditions of the tender and hereby convey my/our acceptance to the same.

9. The information/documents furnished along-with the above offer are true and authentic to the best of my/our knowledge and belief. I/We am/are well aware of the fact that furnishing of any false information/fabricated document shall lead to rejection of my/our tender at any stage besides liabilities towards prosecution under appropriate law.

10. I/We have apprised ourselves fully about the job to be done during the currency of the period of agreement and also acknowledge to bear consequences of nonperformance or deficiencies in the services on our part.

11. I/We have no objection, if enquiries are made about the work listed by me/us.

12. I/We have not been blacklisted by IFCI or any other organization/PSU where I/we have worked. Further, if any of the partners/directors of the organization/firm is blacklisted or having any criminal case against them, my/our bid shall not be considered. We have not been found guilty by a court of law in India/Abroad for fraud, dishonesty or moral turpitude. IFCI may terminate the assigned contract immediately, if at any later point of time, this information is found to be false.

13. I/We agree that the decision of IFCI in selection of Bidders will be final and binding to me/us.

Signature of authorized person
Date: Full Name & Designation:
Place: Company's Seal:

N.B: The above declaration, duly signed and sealed by the authorized signatory of the company, should be enclosed with Technical Bid.

Annexure -11

(On Company Letter Head)

Ref No. Dated: _____

The General Manager
Security Department
IFCI Limited, IFCI Tower,
61 Nehru Place
New Delhi -110 019

CERTIFICATE OF UNDERTAKING- PAYMENT OF WAGES

It is certified that all the dues of personnel deployed at IFCI Site, for the said contract, have been paid up-to……. by us, in accordance with the latest rates of Minimum Wages, as fixed by the State Govt./Delhi Administration Wages Act/State Regulation Order. All the statutory obligations/requirements have been compiled with, in regard to payment of wages, contribution to PF/ESI/Gratuity/Bonus etc. and any other dues have been met and IFCI will not assume any responsibility thereto. The Contract Labour (Regulation & Abolition) Act, 1970 and (Central) Rules, 1971 have also been complied with.

Further, certified that the consolidated monthly payment challans to ESI & PF authorities include the contributions deducted from all personnel deployed at IFCI Tower.

Regards

Signature
(Name of the Concerned Person)

For & on behalf of (Name of Company)

Seal of the Company

Annexure-12

UNDERTAKING- SAFETY OF SYSTEM/EQUIPMENT/PREMISES

(To be executed on Company letter head)

We ……(Name & Address of the Bidder/Contractor) undertake that as we have accepted and offered the prices for execution of the work i.e. Restoration, up-gradation/modification of Fire Protection System at IFCI Tower and IFCI Colony, New Delhi including Plumbing and Exhaust & Ventilation System at IFCI Tower, New Delhi in the submitted bid, If any equipment or its related parts or machinery or property of IFCI gets damaged/unserviceable/the loss of any items/ equipment/asset, we shall be fully responsible for rectification of defect/interrupted system and indemnifying IFCI for the same.

2. We also undertake that we will replace/repair the faulty equipment/property immediately. The make of replace item/equipment shall be similar to the existing items or reputed make as agreed by IFCI.

Signature of Authorized Person:
Name:
Date: Address:
Place: Company Seal

Annexure-13

(On Company Letter Head)

Ref No. Dated: _____

The General Manager
Security Department
IFCI Limited
IFCI Tower,
61 Nehru Place
New Delhi -110 019

CERTIFICATE OF COMPLIANCE- HEALTH, SAFETY & ENVIRONMENT LAWS

It is certified that, we……(Name and Address of Contractor) have complied with provision of (tick √as applicable)

a) Environmental (Protection) Act 1986 and Environment (Protection) Rules,1986
b) Waste/Hazardous waste (Management, Handling and Trans-boundary movement rules,2008).
c) Batteries (Management and Handling) Rules,2001.
d) Delhi Fire Services Act, 2007.
e) All of the above.
f) None of the above.

Yours faithfully,

Signature
(Name of the Concerned Person)
For & on behalf of (Name of Company)
Seal of the Company

Annexure-14

LOI/AWARD LETTER/WORK ORDER FROMAT

No. Date:

To

Dear Sir,

Re: Name of Work

This has reference to the following:-

a) Our invitation of bids, NIT/Tender Notice No. ……dated ……..
b) Tender Document on the above subject.
c) Your bid reference No. …… dated ……..
d) Opening of Technical Bid on …… at …….at IFCI Tower, Nehru Place, New Delhi
e) Opening of Financial Bid on …… at ……. at IFCI Tower, Nehru Place, New Delhi
f) IFCI Ltd. (IFCI) and …….. (……/The Contractor)

2. In this connection, IFCI is pleased to award …… (Name of Work) at Registered Office IFCI Tower, 61-Nehru Place, New Delhi-110019, from …….. to …… at contract value of Rs……/- (Rupees …….. Only) plus applicable taxes.

3. You are required to start the work within 15 days from the date of award of this letter. Further, you are required to complete the work in all respects within one year from the date of LOI/Work Order.

4. The 'Scope of Work', ITB, General/Special terms and conditions as per the tender, corrigendum/addendum if any, various declarations submitted as part of the bid, as more specifically defined in the Tender, shall always be deemed part of the contract. You will provide and maintain highest standards of performance during the period of the contract.

5. You are required to furnish a Security Deposit equivalent to 10% of the Net Quoted Rates i.e. Rs……../- (Rupees …….. only) in the form of FDR/Pay Order/ Bank Guarantee (as per prescribed proforma) valid up-to 24 months before signing the contract agreement with all the agreed terms and conditions of the contract.

6. You are required to execute a contract agreement for the said work as per the prescribed proforma on a non-judicial stamp Paper of ₹ 100/- within 15 days from the date of LOI/Award Letter/Work Order. You will pay for all stamp duties and legal charges, incidental expenses, if any.

7. During the period of the above said contract, in case your services are found to be un-satisfactory and breach of any terms & conditions observed, IFCI may terminate the aforesaid contract as per the terms of the tender document and your company will be disqualified from participation in future tenders/bids of IFCI.

8. Please return the duplicate copy of this letter duly signed by your authorized signatory as a token of your unconditional acceptance.

Yours faithfully,
(Signature of issuing officer)

Annexure-15

CONTRACT AGREEMENT FORMAT

(To be executed on Non-judicial Stamp Paper of ₹ 100/-)

This agreement made this day of ….. day of ……, 2018 between IFCI Limited, a Company incorporated under the Companies Act, 1956, having its Registered Office at IFCI Tower, 61, Nehru Place, New Delhi-110019, (hereinafter referred to as "IFCI", which expression shall unless repugnant to the context and meaning thereof includes its successors and assigns) of the ONE PART.

AND

M/s ……Name and address of Contractor…….. (hereinafter referred as "Contractor") of the SECOND PART which expression shall unless repugnant to the context and meaning thereof includes its successors and permitted assigns) of the SECOND PART.

AND WHEREAS

A. IFCI is desirous of availing the services for ……..(Name of work)…… hereinafter referred to as "(The work)" at its Registered Office at IFCI Tower, 61, Nehru place, New Delhi-110019 (hereinafter referred to as "IFCI Tower");

B. The Contractor has represented that the Contractor is sufficiently equipped to carry out and possesses extensive experience in the field of (……Name of work……) in accordance with the terms and conditions prescribed in this regard;

C. In response to an invitation of NIT/Tender No. …… dated …….. issued by IFCI for …… (Name of Work)……., the Contractor submitted his/their offer dated …….. and whereas IFCI relying upon the representation of the Contractor has accepted the offer to work as Contractor on the terms and conditions specified in the Letter of Intent No./Award Letter/Work Order No. …… dated ……. read with the reference cited therein and also the terms and conditions laid down in the NIT issued/ published in the newspapers and mentioned in IFCI website www.ifciltd.com and or https://ifci.etenders.in.

D. The tender documents including the notice letter, inviting tender, instruction to Bidder, General Conditions of Contract, Special Conditions of Contract, Bill of Quantities (BOQ)/Price schedules, General obligation, Specifications, Drawings, Plans, Time schedule of completion of jobs, corrigendum/addendum if any, Acceptance of Letter of Intent/Award letter/Work order and any statement of agreed variations, if any, shall be read as "Mutatis Mutandis" form part of this Contract though separately set out herein and are included in the expression " the Contract" wherever herein used.

NOW THEREFORE, THIS AGREEMENT WITNESS AS FOLLOWS:

1 This Agreement shall come into force with effect from …… and shall remain in force till ……..

2 That the Contractor shall carry out/ execute the work of (…name of work…) more particularly described in the Tender specifications of NIT- ……..(….name of work…..) read with 'Scope of Work', ITB, special/general terms and conditions as per the tender, various declarations submitted as part of bid by the Contractor which form a part of the Contract.

Name of work: Restoration and modification of Fire Protection system, HVAC system and plumbing system at IFCI Building and multilevel Car parking area.

3 The Contractor has furnished to IFCI Security Deposit equivalent to 10% of the Net Contract Value (Net Quoted Value) in the form of FDR/Pay Order/Bank Guarantee for a sum of Rs……../-, towards satisfactory performance and completion of the Contract.

4 That in consideration of payments to be made to the Contractor by IFCI in accordance with LOI /Work order dated …….. given by IFCI prior to this agreement, the Contractor hereby covenants and undertakes with IFCI that the Contractor shall execute and carry out the work in conformity, in all respects with the terms and conditions specified in this Agreement and the documents submitted by him, governing the same.

5 That the Contractor had already carefully examined the works and the workload specified in the tender document, this Agreement and the documents submitted/governing the same and also to have satisfied himself as to the nature and character of work to be executed buy him.

6 That the Contractor shall carry out the services of the said work to the complete satisfaction of IFCI and/or the officer nominated by IFCI for this purpose.

7 That IFCI shall be entitled to deduct from the Contractor's running bills or otherwise income tax or such other taxes as provided in the Income Tax or law of land.

8 That it is hereby agreed by and between the parties that non-exercise, forbearance or omission of any of the powers conferred on IFCI and/ or any of its authorities will not in any manner constitute waiver of the conditions hereto contained in these presents and the liability of the Contractor with respect to compensation payable to IFCI or Contractor's obligations shall remain unaffected.

9 The Contractor shall duly comply in all respects, with the provisions of all statues, rules and regulations applicable to it and/or its employees including but not limited to the Minimum Wages Act, Employees Provident Fund and Miscellaneous Provisions Act, Employees State Insurance Act, Payment of Bonus Act, Contract Labour (Regulation & Abolition) Act, Environment Act or other statutory rules, regulations, bye-laws as applicable or which become applicable in future.

10 That the payments made to the Contractor's employees or otherwise, under statutory obligations, on behalf of the Contractor, shall be liable to be adjusted /recoverable from the payments accrued to the Contractor.

11 That the Tender Document and all the documents signed/submitted/agreed upon by the Contractor specified in the 'Scope of Work', ITB, special/general terms and conditions as per the tender, Bill of Quantities, Technical Specifications and various declarations submitted as part of the bid, will form part of this Contract.

12 That the Contractor shall pay to the workers deployed by him at IFCI as proposed in the offer referred above.

13 The Contractor shall at all times be solely responsible and/or liable to issue and maintain adequate insurance for the life and safety of its employees and shall ensure that the said insurance policies do not lapse.

14 The Contractor shall indemnify and keep indemnified IFCI against all claims, demands, suits and proceedings whatsoever that may be brought or made against IFCI by or behalf of any person, body, authority, whomsoever and all penalties, levies, taxes, losses, damages, costs, charges and expenses and all other liabilities of whatever nature which IFCI may now hereafter be liable to pay or sustain by virtue of or as a result of the performance or non-performance by the Contractor of any of the terms and conditions of this Agreement or applicable laws.

Name of work: Restoration and modification of Fire Protection system, HVAC system and plumbing system at IFCI Building and multilevel Car parking area.

15 The Contractor hereby agrees that He/She shall not assign or transfer or sub-contract this Agreement in full to any third party as per terms of the Tender Document.

16 Notwithstanding anything contained herein above, IFCI shall have the right to terminate this Agreement at any time during its currency by giving one month notice to the Contractor without assigning any reason and recover any money becoming due under this Agreement from the Contractor.

17 Any dispute or difference of any nature whatsoever regarding any right, liability, act, omission of either of parties hereto arising out of or in relation to this agreement or any matter incidental thereto shall be referred to the arbitration of a single arbitration as per the provisions of the Arbitration & Conciliation Act, 1996. The Arbitrator shall be appointed by the CEO & MD of IFCI and the parties shall bear the costs of such arbitration in equal shares. Such arbitration shall be held at Delhi and the courts at Delhi alone shall have the jurisdiction to deal with the arbitration proceedings and the awards in accordance with law and language shall be English.

In witness hereof, the parties hereto have respectively set their signatures in the presence of:

Signed by: _____	Signed by: _____
For and on behalf of the Contractor or by an authorized person or holding a valid Power of Attorney in the presence of _____	for and on behalf of IFCI Ltd. in the presence of _____
1. Witness:_____	Witness:_____
Name: _____	Name: _____
Address:_____	Address:_____
Date: _____	Date: _____
2. Witness:_____	Witness:_____
Name: _____	Name: _____
Address:_____	Address:_____
Date: _____	Date: _____

Annexure-16

BANK GUARANTEE FORMAT FOR SECURITY DEPOSIT
(To be executed on Non-judicial Stamp Paper of ₹ 100/-)

To
IFCI Limited
IFCI Tower, 61 Nehru Place
New Delhi-110019

Bank Guarantee No.:
Date:
Amount:
Valid upto:

THIS DEED OF GUARANTEE made this ____Day of ____, 2018, by The Name of Bank _____, a banking company incorporated under Banking Regulation Act, 1949/Banking Companies Act, 1956/ Banking Companies Act, 1970 having its Head Office at _____ and having Branch at _____ (hereinafter called the Bank, which expression shall unless repugnant to the context and meaning thereof includes its successors).

In favour of

M/s. IFCI Limited, a company incorporated under the Companies Act, 1956, having its Registered Office at IFCI Tower, 61, Nehru Place, New Delhi-110019, India (hereinafter called "**IFCI**", which expression shall unless repugnant to the extent and meaning thereof includes its successors and assigns).

WHEREAS IFCI and **M/s (Name of the Contractor/_____,** having their Registered Office at **(Address of the Contractor_____** (hereinafter called "**the Contractor**", which expression shall unless repugnant to the extent and meaning thereof includes its successors and assigns) have issued Award Letter/LOI No. ……. dated …… whereby the Contractor has agreed to carry out the workof "**(Name of work _____" subject** to the terms therein contained.

AND WHEREAS in accordance with the terms and conditions of the Agreement, the Contractor has agreed to furnish a Bank Guarantee to IFCI in the form acceptable to IFCI, for a sum of **₹ _____(Rupees_____)** to ensure timely and satisfactory performance by the Contractor of its obligations under the Agreement.

AND WHEREAS the Bank has at the request of the Contractor agreed to furnish an irrevocable guarantee in favor of IFCI to secure the performance by the Contractor of its obligations under the Contract on the terms and conditions contained herein.

NOW THIS DEED WITNESSETH AS FOLLOWS:

1. The Bank hereby unconditionally and irrevocably guarantees the due and punctual performance and observance of and compliance by the Contractor of the covenants, agreements, conditions and provisions expressed or implied on the part of Contractor to be performed, observed or complied with under the Agreement in accordance with the terms thereof and in the event of Contractor's non-performance, non-observance and non-compliance of the same for any reasons, the Bank shall absolutely, irrevocably and unconditionally without any right of set off or counter claim, forthwith upon receipt of a written demand by IFCI and without demur or protest and without reference to the Contractor pay to IFCI a sum not exceeding **₹ _____.** A demand so made by IFCI shall be final and binding on the Bank and the Bank shall be obliged to pay the amount demanded forthwith to the Employer.

2. The Bank's liability under this Guarantee is restricted to **₹ _____/-**

3. The decision of IFCI, for the time being in force, or at any time thereafter as to the non-performance, non-observance and non-compliance by the Contractor of the covenants, agreements, conditions and provisions expressed or implied, of the part of the Contractor, to be observed, performed or complied with

under the Agreement shall be final, conclusive and binding upon the Bank and shall not in any circumstances be questioned by the Bank.

4. Any demand for payment under the Guarantee shall be made on the Bank by IFCI in writing at **The Name of Bank _____with address _____** and shall be deemed to have been sufficiently made by IFCI if the writing containing the demand is sent by the Bank by registered post to the address as aforesaid or sent to the Bank by hand delivery at such address and written acknowledgement obtained to such delivery.

5. The guarantee obligations of the Bank hereunder shall continue in force and effect and be binding on the Bank in accordance with its terms up to .....

6. As between the Bank and IFCI (but without affecting the Contractor's obligations) the bank shall be liable under this Guarantee as if it were the Principal Debtor. The bank's liability hereunder shall not be discharged nor shall its liability be affected by:

(i) Any time, indulgence, waiver or consent at any time given by IFCI to the Contractor;
(ii) Any amendment to the Agreement;
(iii) The making or the absence of any demand by IFCI on the Contractor or any other person for payment;
(iv) The enforcement or absence of enforcement of the Agreement or of any security or other guarantee or indemnity;
(v) The illegality, invalidity or unenforceability of any defect in any provision of the Agreement or of any of the Contractors obligations there under;
(vi) The dissolution, amalgamation, reconstruction or reorganization of appointment of any Administrative receiver of the Contractor.

Provided that nothing contained hereinabove extends or enlarges the liability of the bank under this guarantee.

7. The Guarantee herein contained shall not be determined or in any way prejudiced or affected by any change in the constitution of the Bank or by any merger or amalgamation or reconstruction or the Bank but shall be enforceable against the merged, amalgamated or reconstructed body.

8. The Bank hereby expressly and irrevocably waives all claims of waiver, release, surrender or compromise, defenses, setoffs, counter claims, recoupment, reductions, limitation and impairments.

9. IFCI shall be at liberty to vary, and alter or modify any of the terms and conditions of the Agreement including without limitation to extend from time to time the time for the performance of the Agreement by the Contractor or to postpone from time to time any of the powers exercisable by IFCIs against the Contractor, to forbear or to enforce any of the terms and conditions of the Agreement, without in any manner affecting this Guarantee and without notice to or assent of the Bank provided that nothing contained hereinabove extends or enlarges the liability of the Bank under this guarantee.

10. The Bank waives any right requiring IFCI to proceed first against the Contractor or requiring IFCI to first enforce any other security or any other guarantee.

11. The Bank agrees and confirms that its obligation to make payment to IFCI on demand hereunder and discharge of such obligation shall not be delayed, exercised or avoided by reason of any act or omission on the part of IFCI the legal consequence of which may be the discharge of the Bank as guarantor.

12. The Bank declares and confirms that the Bank has taken all necessary corporate action to authorize the execution delivery and performance of this Guarantee in accordance with the terms hereof and that the bank has full power to enter into and performance and discharge its obligations undertaken hereunder and

this his Guarantee constitutes legal, valid and binding obligation of the Bank, enforceable in accordance with its terms.

13. This guarantee shall be governed by and construed in all respects according to the laws of the India and shall be subject to the jurisdiction of the court in New Delhi.

14. All notices, demands or communications required or permitted to be given hereunder shall be in writing and shall be valid and sufficient if dispatched or acknowledged as received as follows:

IF to the Bank:

The Branch Manager

The Name of Bank and Address

_____

IF to IFCI:

IFCI Limited
IFCI Tower
61, Nehru Place,
New Delhi-110019.

Any party hereto may change its address by a notice given to the other party hereto in the manner set forth above, All notices, demands and other communications shall be deemed to have been duly given (i) on the expiry of immediately after the date of transmission with confirmed answer back if transmitted by e-mail, telex, cable or facsimile, whichever shall first occur.

15. Any forbearance or indulgence on the part of IFCI in the enforcement of the covenants, agreements, conditions and provisions express or implied on the part of the Contractor to be performed, observed or complied with by the Contractor under the Agreement shall in no way relieve the Bank of its liability under the Guarantee provided that nothing contained hereinabove extends or enlarges the liability of the bank under this guarantee.

16. Terms and expression defined in the Agreement and used herein shall have the meanings assigned to them therein save and except where the context otherwise require.

Notwithstanding anything contained herein above

(i) Our liability under this guarantee shall not exceed ₹ _____

(ii) The Bank guarantee shall be valid up to **24 months** and

(iii) It is a condition to our liability for payment of the guaranteed amount or part any thereof arising under this bank guarantee that we receive a valid written claim or demand for payment under this bank guarantee on or before **till expiry date**_____ , failing which, our liability under this bank guarantee will automatically cease.

IN WITNESS WHEREOF THE BANK HAS SET ITS HAND AND SEAL THE DAY AND YEAR FIRST ABOVE WRITTEN.

For Name of Bank_____

Manager

Place: New Delhi
Date: _____

Annexure -17

TENDER ACCEPTANCE LETTER
(To be given on Company Letter Head)

To,

The General Manager
Security Department
IFCI Limited
IFCI Tower
61 Nehru Place
New Delhi -110 019

Sub: Acceptance of Terms & Conditions of Tender.

Tender Reference No: _____

Name of Tender/Work: Operation & Maintenance of Fire-fighting Systems/Equipment at IFCI Tower, 61 Nehru Place, and IFCI Colony, Paschim Vihar, New Delhi.

Dear Sir,

1. I/We have downloaded/obtained the tender document(s) for the above mentioned 'Tender/Work' from the web site(s) namely: https://ifci.etenders.in and /or www.ifciltd.com as per advertisement, given in the above mentioned website(s).

2. I/We hereby acknowledge that I/we have read the entire terms and conditions of the tender documents of all the pages (including all documents like annexure(s), schedule(s), etc.,), which form part of the contract agreement and I/we shall abide hereby by the terms & conditions/clauses contained therein.

3. The corrigendum(s) issued by department/organization too has also been taken into consideration, while submitting this acceptance letter.

4. I/We hereby unconditionally accept the tender conditions of above mentioned tender document/ corrigendum(s) in its totality/entirety.

5. I/We do hereby declare that our Firm has not been blacklisted/ debarred by any Govt. Department/Public sector undertaking/Private organization.

6. I/We certify that all information furnished by our Firm is true & correct and in the event that the information is found to be incorrect/untrue or found violated, then IFCI may, without giving any notice or reason therefore summarily reject the bid or terminate the contract, without prejudice to any other rights or remedy including the forfeiture of the full said Earnest Money Deposit or Security deposit or both absolutely.

Date:
Place:

Signature of authorized person
Full Name & Designation:
Company's Seal

Annexure-18

(G) FINANCIAL BID (BILL OF QUANTITIES)

S. No.	Item Description	Qty.	Unit	Unit Rate	Total Rate
PART-I.	**FIRE DETECTION & FIRE FIGHTING SYSTEMS AT IFCI TOWER, NEHRU PLACE, NEW DELHI**				
1	Supply and installation of Fire Blanket of size 6"x4" as per EN-1869:1997 featuring Fiber glass yarn with increase the temperature protection and give it a itching free finish. **Make:** Ceasefire/Minimax/Omex	25	Nos.		
2	Replacing of Nut & bolts for the Hose reel flanged joint inside the hose cabinet for existing 63 mm dia. landing valve with hose reel. The dismantled nut bolt (if any) shall remain part of contractor only.	44	Set		
3	Providing, fixing, testing and commissioning, the following size: MS Pipe confirming to IS 1239, Part-1, heavy grade with upto date amendment i/c fixing the pipe on wall/ ceiling with suitable MS clamp or bracket including jointing by welding, providing accessories such as MS bracket, U clamps with Anchor fasteners, / elbows / reducers / bends / flanges etc. as required, and laying on surface and painting with two coats of anticorrosive primer and two coats of approved red enamel paint after laying and testing to 13.5 Kg/Sq.cm hydraulic pressure after installation etc. as per specifications complete as required. The work includes dismantling and removal of existing pipe from the Pipe shaft of the building and from the terrace and disposal of the same as per the instruction of the Engineer.				
a)	150 mm dia.	312	Mtrs.		
b)	200 mm dia. 6.5 mm thick	36	Mtrs.		
4	Supply and installation of Air vessel of size 200NB x 1.2 mtr. height complete with air release valve with pick up tube inside to expel the air below the preset level, the vessel shall be fabricated from 8mm thick shell and 10mm thick Dished end and externally painted with red enamel paint and internally painted with epoxy paint. The work includes the dismantling and disposal of the existing Air vessel at the terrace.	1	Nos.		
5	Supply, erection, testing and commissioning of Non- rising spindle type Sluice valve 150 mm dia. of CI body and bronze internals of PN 1.6 rating suitable for holding pressure of shut off head of the fire water pumps.	15	Nos.		

6	Supply and installation of addressable type Smoke detector of Multi sensor type with base & fixing screws etc. as required for completing the work. The new devices shall be compatible with the existing panel of EST make.	14	Nos.		
7	Supply and installation of Response indicator with base & fixing screws etc. as required for completing the work. The new devices shall be compatible with the existing panel of EST make.	38	Nos.		
8	Supply and installation of Evacuation Plan as per the layout to be provided ,with self-glow type sheet engraved the floor plan with the exit route marked the sheet shall be of minimum A3 Size with fixing arrangement.	57	Nos.		
9	Supply erection and commissioning of Modular type Fire extinguisher with silk screen marking having capacity 9.0 Kg complete with mounting bracket, Pressure gauge etc. duly filled with FE 36 extinguishing with manufacturer's Certificate.	45	Nos.		
10	Conducting Integrity testing of the lobbies/rooms provided with fire doors.	19	Nos.		
11	Supply, Installation, Testing and Commissioning of NOVEC 1230 based Total flooding system as per the technical specification. Complete with CCoE approved cylinder and valve, electric actuator .bend, Discharge manifold, Discharge pipe and Nozzle etc complete in all respects with integration with existing Fire Alarm Panel.				
a)	For Server Room of size 3x2.5x3.5mtr,	1	Set		
b)	For UPS Room of size 7.0x 2x3.5mtr, at Upper basement	1	Set		
12	Supply erection testing and commissioning of Emulsifier system complete with the Quick opening Deluge valve, Isolation and Bypass valve Y Type Strainer, Discharge.				
12.1	M.S. ERW pipe as per IS:1239 Part-I, Hvy Gr. / IS:3589, Gr Fe 410 (6.35mm thk. for 200NB and above)				
a)	100 NB	24	Mtrs.		
12.2	Providing, fixing, testing and commissioning, of the following sizes of flange jointed / screwed / welded, GI pipes of Class C (heavy class) ISI marked and of approved make, hot dip galvanized to Grade 1 of IS : 4736-1968, including accessories such as MS bracket, U clamps with Anchor fasteners, GI hot dipped tees / elbows / reducers / couplings / unions / bends / flanges etc., and laying on the surface including painting with two coats of anticorrosive primer and two coats of approved red enamel paint after laying and testing to 13.5 Kg/Sq.cm hydraulic pressure after installation etc. as per specifications complete as required.				

a)	100 mm dia.	12	Mtrs.		
b)	80 mm dia.	12	Mtrs.		
c)	65 mm dia.	48	Mtrs.		
d)	50 mm dia.	64	Mtrs.		
e)	25 mm dia.	160	Mtrs.		
12.3	SITC of HVW spray Nozzle, Brass K26 x 100 deg.	48	Nos.		
12.4	SITC of CI Deluge valve with wet Pilot Trim, water motor gong				
a)	100 mm dia.	2	Nos.		
12.5	SITC of C.I gate valve as per IS:14846, PN-1.6				
a)	100 mm dia.	6	Nos.		
12.6	SITC of M. S Y-Strainer with SS element				
a)	100 mm dia.	2	Nos.		
12.7	SITC of 25 NB GM gate valve	2	Nos.		
12.8	SITC of Pressure switch range 0-7 Kg/cm2	2	Nos.		
12.9	SITC of Solenoid valve, 15NB, 24V DC	2	Nos.		
12.10	SITC of DV local control panel (IP-55)	2	Nos.		
13	SITC of Manually operated Medium velocity Water/Foam spray system for Diesel engine of Gens set 2 Nos and Diesel engine of Fire water stand by Pump set.				
13.1	Providing, fixing, testing and commissioning, of the following sizes of flange jointed / screwed / welded, GI pipes of Class C (heavy class) ISI marked and of approved make, hot dip galvanized to Grade 1 of IS : 4736-1968, including accessories such as MS bracket, U clamps with Anchor fasteners, GI hot dipped tees / elbows / reducers / couplings / unions / bends / flanges etc., and laying on the surface including painting with two coats of anticorrosive primer and two coats of approved red enamel paint after laying and testing to 13.5 Kg/Sq.cm hydraulic pressure after installation etc. as per specifications complete as required.				
a)	80 mm dia.	12	Mtrs.		
b)	65 mm dia.	18	Mtrs.		
c)	50 mm dia.	64	Mtrs.		
d)	25 mm dia.	30	Mtrs.		
13.2	SITC of MVW spray Nozzle, Brass K30 x 120 deg.	30	Nos.		
13.3	SITC of C.I gate valve as per IS:14846, PN-1.6				
a)	80 mm dia.	3	Nos.		
13.4	SITC of M. S Y-Strainer with SS element				

a)	80 mm dia.	3	Nos.		
13.5	SITC of 25 NB GM gate valve	3	Nos.		
14	**NOVEC 1230 In Panel Flooding System**				
a)	SITC of 10 LB capacity NOVEC 1230, DLP Assembly with automatic valve, push in connector for tube, 10 LB NOVEC 1230 gas, mounting bracket, End of Line adopter and low pressure switch for monitoring system activation.	3	Set		
b)	SITC of Linear pneumatic heat Detection Tube with all necessary fittings & supports. (6mm dia x 3.0 mtr long)	3	Lot		
c)	SITC of Master Control Unit with Audio Visual Alarm with wiring to make complete system operational. The Control Panel should have provision for integration with Fire Alarm/SCADA/BMS System.	3	Nos.		
15	Supply erection testing and commissioning of 10 Zone Annunciation panel for suitable for operating at 24 V DC, complete with Annunciation windows ,test, acknowledge & reset Push buttons, Hooter, indication lamps for Main power supply and DC power etc.	1	Nos.		
16	Providing & fixing swinging type First Aid hose reel in red color with 36 mtrs. long and 20 mm dia IS: 444 marked Type II heavy duty rubber water hose, 20 mm dia. ball valve stop cock, terminating with stainless steel coupling & nozzle of 20mm dia. outlet with shut off valve confirming to IS 8090 - 1976 complete with drum and brackets for fixing on wall, bolts & nuts conforming to 15.884-1969 complete as required.	8	Nos.		
17	Supply of FM 200 gas filled with 20 kg gas CCoE Approved cylinder with electrical actuator as stand by for the system installed.	1	Nos.		
18	Supply and installation of Fire Blanket of size 6"x4" as per EN-1869:1997 featuring Fiber glass yarn with increase the temperature protection and give it a itching free finish.)	5	Nos.		
19	SITC of of Fire Check Door of rated for 2.0 Hrs Fire resistant of size 2.1x 1.2 mtr. approved by CBRI Roorkee. Complete with the Vision Glass and automatic door closer etc. as required.	1	Nos.		
20	Supply fabrication and installation of Spigot type D.I Pipe with fittings of following sizes complete with Excavation of backfilling Preparation of sand bed around the pipe at least 150mm thick around the pipe ,PCC pedestal and Thrust Block etc. the pipe shall be laid minimum 1500mm below the local ground level				
a)	150 mm dia.	154	Mtrs.		
b)	80 mm dia.	16.5	Mtrs.		

21	Painting on exposed piping & Valves with enamel red paint	3500	Sq.Mtrs.		
22	Supply & Installation of Fire-Safety Informative Markings & Signages (in Sun-board material having thickness 5mm) of the following sizes:				
22.1	3feet x 2.5 feet	40	Nos.		
22.2	2 feet x 1.5 feet	30	Nos.		
22.3	1 feet x 1 feet	10	Nos.		
23	Safety Cones with Safety Chains/blocks (Chain length approx. 200 meters in total)	30	Nos.		
24	S/f of Stored pressure ISI 15683 marked fire extinguishers of ABC Dry Chemical powder typewith silk screen marking having 6 Kg capacity made of high pressure steel cylinder complete with wheel type valve, internal discharge tube, 1 mtr. long high pressure wire braided discharge hose, pressure gauge and fully charged with MAP 90 ABC powder. **(Make**: Cease Fire/ Minimax/ Omex/ New Age)	85	Nos.		
25	S/f of CO2 Type Fire Extinguisher with silk screen marking having 22.5 Kg Capacity ISI Mark IS 2878 fitted with 5 Mtr. Hose Horn & Trolley Handle Complete in all respect. (**Make**: Cease Fire/ Minimax/ Omex/ New Age)	4	Nos.		
26	S.f of Fire Bucket Stand having Hanging Capacity for 4 Buckets for Transformer & other buildings including 4 buckets. (**Make**: Cease Fire/ Minimax/ Omex/ New Age)	2	Set		
27	S/f of First Aid Box (Make of Material: Cease Fire/ Minimax/ Omex/ New Age)	6	Nos.		
28	**EMERGENCY ESCAPE MASK**				
28.1	Emergency Escape Mask with face protection, flame resistant hood having durability/breakthrough time of at-least 30 minutes and should be **CE 1437/EN403:2004 certified** and must be able to resist CO, HCN, HCL, Toxic Smoke and Harmful Smoke. **Make:** N&M/Omex/Vintex Fire	160	Nos.		
28.2	Wall hanging Storage Box with front transparent openable wall/glass (easy to identify) and with three side metal walls for storing Emergency Escape Masks with a storage capacity of **04 masks** along-with all the accessories like clamps and closing lid. **Make:** N&M/Omex/Vintex Fire	55	Nos.		
				TOTAL FOR PART-I	
PART-II. PLUMBING SYSTEM AT IFCI TOWER, NEHRU PLACE (All fittings ISI Marked only)					

1	Supply, fabrication and laying of CPVC Pipeline 2.5" dia complete with fittings, supporting clamps etc. including dismantling and disposal of the existing GI pipe as per the instruction of the engineer.	245	Mtrs.		
2	Supply, fabrication and laying of CPVC Pipeline 1.5" dia complete with fittings, supporting clamps etc. including dismantling and disposal of the existing GI pipe as per the instruction of the engineer	152	Mtrs.		
3	SITC of MT Mainpipe	60	Nos.		
4	SITC of MT SubLine	200	Nos.		
5	SITC of Gun metal Gate Valve 21/2 inch dia with screwed ends tested at 20Kg/cm2	2	Nos.		
6	SITC of Gun metal Gate Valve 1 1/2 inch with screwed ends tested at 20Kg/cm2	80	Nos.		
7	SITC of Gun metal Non return valve of 2.5" dia with screwed ends tested at 20kg/cm2	2	Nos.		
8	Making hole and flaged leakproof 2.5" dia connection in the Existing Fire water tank and connecting new CPVC pipe.	2	Nos.		
				TOTAL FOR PART-II	
PART-III. HVAC SYSTEM (EXHAUSHT & VENTILATION SYSTEM)					
1	**Section-1: FANS**				
1.1	Supply, installation, testing and commissioning of ceiling mounted Tube Axial flow fans with adjustable pitch blade, MS long casing (2mm thick up to 800 mm dia. fan, 3 mm thick from 900 to 1250 mm dia. & 4 mm thick above 1300 mm dia) , cast aluminium alloy impeller complete with TEFC Sq. Cage Induction motor suitable for 415 volts ± 10%, 50Hz ± 3 %, three phase A.C with support, mountings, vibration isolators, fire retardant flexible canvass connector 150 mm deep (Inlet & Outlet as required), bird screen (Inlet & Outlet as required) etc & of following capacity. The complete fan along with motor shall be suitable for 300 °C temperature rated for 2 hours. Motors selected for this application shall be UL Recognized. Fan & Fan motor KW given below are for guideline & actual Dia / KW shall be as per manufacturer selection.				
	Axial Fan shall be AMCA certified for Air and Sound performance in accordance to AMCA 210 and AMCA 300. Complete certified model appearing on AMCA web site shall be accepted. Complete Fan shall be tested and approved by UL in accordance with "Power Ventilators for Smoke Control Systems" for 300 °C for 2 hours.				
	Manufacturer shall furnish AMCA Test Certificate for air & sound performance along with UL fire test certificate (Latest) for each fan sourced from that particular factory.				

a)	Air Qty. = 16000 CFM LIFT PRESS.				
	Static Pressure = 20mm Wg				
	Fan Speed = Not exceeding 1450 rpm				
	Tube Axial Fans as described above.	**4**	**Nos.**		
b)	Air Qty. = 14000 CFM LIFT PRESS.				
	Static Pressure = 20mm Wg				
	Fan Speed = Not exceeding 1450 rpm				
	Tube Axial Fans as described above.	**3**	**Nos.**		
c)	Air Qty. = 6000 CFM LOBBY PRESS.				
	Static Pressure = 20mm Wg				
	Fan Speed = Not exceeding 1450 rpm				
	Tube Axial Fans as described above.	**18**	**Nos.**		
d)	Air Qty. = 30000 CFM BASEMENT EXHAUST				
	Static Pressure = 25mm Wg				
	Fan Speed = Not exceeding 950 rpm				
	Tube Axial Fans as described above.	**8**	**Nos.**		
				SUBTOTAL FOR SECTION-1	
2	**SECTION-2: AIR DISTRIBUTION**				
2.1	DUCTS				
	Supplying, fabricating, installing and testing of G.I. Sheet metal ducts and flanges complete with supports, Vanes, dampers, links, levers and quadrants etc. as per specifications and drawings. The rates shall include all materials and labour for suspension and supporting arrangement of galvanised steel for Plenums, Ducts, complete with fire retardant factory fabricated. Flexible connection as per required specifications, etc. complete as required.				
a)	24 G (0.63 mm)	750	Sqm		
b)	22 G (0.8 mm)	450	Sqm		
c)	20 G (1.0 mm)	50	Sqm		
d)	18 G (1.25 mm)	20	Sqm		
	Supporting structure for duct mounting as required.				
2.2	Supply, installation & testing of Powder coated Al grills as per specification & drawings etc complete as required.				
a)	Powder coated Al grills without damper	9	Sqm		
b)	Powder coated Al grills with damper	4	Sqm		
2.3	Supply, Installation and testing of GI back draft gravity damper for fan in accordance with the approved shop floor drawings and specifications, and shall also confirm to the BIS specifications etc. complete as required.	10	Sqm		

2.4	Providing, fixing, testing and commissioning of air louvers 50 mm deep of powder coated extruded aluminium construction as per specifications and approved shop drawings etc complete as required.	10	Sqm		
2.5	Supply, Fabrication, installation and fixing of MS Bird screen for axial fan fencing complete with supporting MS frame work angles, flats and 10 swg weld mesh including painting etc complete as required.	10	Sqm.		
2.6	Acoustic Lining of Ducts				
	SITC of Acoustic lining inside ducts using Non Fibrous fire retardant cross-linked polyethylene foam of 30+/- 3 Kg/m3 density & thickness of 12mm having porous surface on one side & a flat surface on other side using Synthetic rubber based Adhesive preferably Low VOC & high strength characteristic(Initial portion of ducting and main plenum) as per specifications etc complete as required.				
a)	12 mm thick.	20	Sqm		
				SUBTOTAL FOR SECTION-2	
SECTION-3 ELECTRICAL WORK					
3	**Electrical Panel**				
	Design, fabrication, supply, installation, testing and commissioning of LT Panel/Sub-distribution panels fabricated out of 2mm thick for structural members (Load bearing members) and 1.6mm thick for door and covers (Non load bearing members) CRCA sheet in cubicle compartmentalize free standing floor mounted, dust and vermin proof with reinforcement of suitable size angle iron, channel 'T' 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 zinc chromate primer and final approved shade of enameled paint. 2 Nos. earthing terminals shall be provided for all distribution panels. Panels shall be suitable for 415V, 3-phase, 4-wire, 50Hz supply system and with 15% spare space, lifting hooks shall also be provided in case of large panels. outdoor panel shall be IP-55 ingres protection and indoor panel shall be IP 52.				
	Approval shall be taken for each panel before fabrication. Galvanized hardwares with zinc passivation shall be used in fabrication of panels.				
3.1	a) Main Distribution Panel				
	Incomer (1 No.):				
	400A, TPN MCCB (35 KA)				

	b) Metering:				
	0-500 Volts, digital Voltmeter and shall be protected by 2Amps MCBs.				
	0-400Amps digital Ammeter and 400/5A, 15VA, CL-1 CTs and selector switch.				
	Phase indicating lamps and shall be protected by 2Amps MCBs.				
	c) Bus Bars:				
	500 Amps TP Aluminium busbars, colour coded with heat shrinkable insulation sleeves				
	4) Outgoing:				
	2Nos. TP+N MCCB 100 A (25 KA) For Basement ventilation fan				
	1Nos. TP+N MCCB 100 A (25 KA) Lift well pressurization Fan				
	18Nos. TP MCB 25 A (10 KA) For each floor lift lobby pressurization	1	Set		
3.2	**FLOOR SMOKE EXHAUST PANEL**				
	1Nos. TPN MPCB with Dol starter with contactor, O/L relay with single phase preventor suitable for 3.7 KW Fan with ON/OFF/Trip indication lamps and push buttons, potential free contacts for remote operation in each feeder and Auto Manual Selector Switch as required including auxiliary contacts for smoke signal.	18	Set		
3.3	a) LIFT PRESS PANEL				
	Incomer (1 No.):				
	100A, TPN MCCB (25 KA)				
	b) Metering:				
	0-500 Volts, digital Voltmeter and shall be protected by 2Amps MCBs.				
	0-125Amps digital Ammeter and63/5A, 5VA, CL-1 CTs and selector switch.				
	Phase indicating lamps and shall be protected by 2Amps MCBs.				
	c) Bus Bars:				
	150Amps TP Aluminium busbars, colour coded with heat shrinkable insulation sleeves				
	d) Outgoing:				
	7Nos. TPN MPCB with Dol starter with contactor, O/L relay with single phase preventor suitable for 5.5 KW Fan with ON/OFF/Trip indication lamps and push buttons, Digital ammeter with CTs and selector switch, potential free contacts for remote operation in each feeder and Auto Manual Selector Switch as required including auxiliary contacts for Fire signal etc as required.	1	Set		

3.4	a) BASEMENT VENTILATION PANEL				
	Incomer (1 No.):				
	100A, TP+N MCCB (25 KA)				
	b) Metering:				
	0-500 Volts, digital Voltmeter and shall be protected by 2Amps MCBs.				
	0-100Amps digital Ammeter and100/5A, 5VA, CL-1 CTs and selector switch.				
	Phase indicating lamps and shall be protected by 2Amps MCBs.				
	c) Bus Bars:				
	125Amps TP Aluminium busbars, colour coded with heat shrinkable insulation sleeves				
	d) Outgoing:				
	4Nos. TPN MPCB with Dol starter with contactor, O/L relay with single phase preventor suitable for 11 KW Fan with ON/OFF/Trip indication lamps and push buttons, Digital ammeter with CTs and selector switch, potential free contacts for remote operation in each feeder and Auto Manual Selector Switch as required including auxiliary contacts for smoke signal etc as required.	2	Set		
4	**Cabling:**				
	<u>For Smoke Extraction Fans, Fire Pumps, Lifts etc.</u> Supplying, laying & testing of Fire Survival armoured Cable of 600V/1000V with Aluminum Circular Conductors having glass Mica (Fire Barrier) tape covered by an extruded layer of cross linkable halogen free insulation and LSZH inner and outer sheath. Basic design as per BS 7846 for copper cables, IEC-60502-1 for aluminum cables. Should retain integrity as per Category '3' of BS:8519. Type test reports of each lot from 3rd party inspection agency required prior to despatch. **(up-to 6 sq.mm copper, above 6 sq.mm aluminum)**				
a)	3.5C x 95 Sq.mm cable.	150	Rmt.		
b)	3.5C x 50 Sq.mm cable.	10	Rmt.		
c)	3.5C x 35 Sq.mm cable.	15	Rmt.		
d)	4C x 25 Sq.mm cable.	1000	Rmt.		
e)	4C x 16 Sq.mm cable.	300	Rmt.		
f)	4C x 10 Sq.mm cable.	450	Rmt.		
g)	4C x 6 Sq.mm cable.	100	Rmt.		
h)	4C x 4 Sq.mm cable.	35	Rmt.		
5	**Cable tray**				

	Supplying and installing following size of perforated pre-painted 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.				
a)	100 mm width x 50 mm depth x 1.6 mm thickness.	10	Mtrs.		
b)	150 mm width x 50 mm depth x 1.6 mm thickness.	15	Mtrs.		
6	**Earthing System:**				
	Supply, installation, testing and commissioning of following sizes of G.I. strip/wire clamped to walls, cable trays, bus ducts, cables in recess or surface etc. for equipment / System / Lightning protection earthing complete as required including inter connection between length at joints, all fixing accessories saddles, clamps etc. and other fixing hardware material as required for proper installation.				
a)	GI earth strip 25mm x 3mm	200	Rmt.		
b)	8 SWG GI wire	500	Rmt.		
				SUBTOTAL FOR SECTION-3	
				TOTAL FOR PART-III (SECTION 1+ SECTION 2 + SECTION 3)	
PART IV. FIRE FIGHTING SYSTEMS AT IFCI COLONY, PASCHIM VIHAR, NEW DELHI					
1	Providing. laying, jointing and testing of following sizes of pipes conforming to IS-1239 part 1/1974 and part 11/1979 with all accessories like fittings with welded joint shall be used like tees, elbows, reducers, flanges, rubber gaskets, GI nuts bolts, washer. And fixing the pipe on floor / wall /ceiling with suitable size clamps, hangers and M.S. pipe sleeve to be provided wherever the pipes are crossing the walls/floors and sealing the sleeves with fire proof material Including cutting holes and chases in brick, R.C.C work and making good the same to original conditions complete in all respects. duly painted with enamel red paint. (Make of Material: Tata/ Jindal Hissar/ Prakash)				
a)	100NB	220	Mtrs.		
b)	80NB	30	Mtrs.		
c)	25NB	50	Mtrs.		

2	Providing, fixing, testing and commissioning of Stainless Steel 304 with Al die casting wheel fire hydrant single landing valve with 80 NB flanged inlet, brass spindle controlled 63 mm dia. female instantaneous outlet type. Stainless steel coupling, blank cap, chain, twist release type lug & all accessories Conforming to IS:5290. Including fixing with anchor fastener and flanged tapping from wet riser arid providing pressure gauge with stainless steel ball valve with all accessories, nuts, bolts, gaskets, painting complete as required. **(Make**: Cease Fire/ Minimax/ Omex/ New Age)	7	Nos.		
3	Providing & fixing swinging type First Aid hose reel in red color with 36 mtrs. long and 20 mm dia IS: 444 marked Type II heavy duty rubber water hose, 20 mm dia. ball valve stop cock, terminating with stainless steel coupling & nozzle of 20mm dia. outlet with shut off valve confirming to IS 8090 - 1976 complete with drum and brackets for fixing on wall, bolts & nuts conforming to 15.884-1969 complete as required. **(Make**: Cease Fire/ Minimax/ Omex/ New Age)	34	Nos.		
4	Providing and fixing weather proof cabinet of size not less than 0.75 x 0.60x 0.3 mtr. made out of M.S sheet not less than SWG16 thick with M.S angle framing having central opening and 4 mm thick glazed glass doors (Two Nos.) suitably marked on the outside 'with the letters "FIRE HOSE" including necessary locking arrangement and powder coating in red signal color suitable to accommodate external yard hydrant valve, 2 Nos 15 mtr long Hose pipe, branch pipe Rate to include MS angle stand fixed to ground complete as required. (Make of Material: Cease Fire/ Minimax/ Omex/ New Age)	10	Nos.		
5	Providing & fixing non-percolating, rubber reinforced lined fire hose pipe (as per IS 636) of 63 mm dia and length as described below The hose shall be rated for burst pressure of 35.7 Kg/sq cm Hose shall be complete with ISI marked stainless steel male & female coupling (IS:903) bound & riveted to hose pipe with copper wire- 15mtr long. The RRL should be UL listed (IRS Approved Only) **(Make**: Cease Fire/ Minimax/ Omex/ New Age)	10	Nos.		
6	Providing, fixing, testing & commissioning of 63 mm dia instantaneous pattern branch short stainless steel pipe 304 grade with Aluminium die casting wheel, 16 mm dia. nozzle conforming to IS 903, suitable for inter connection to hoses coupling complete as required. **(Make**: Cease Fire/ Minimax/ Omex/ New Age)	10	Nos.		

7	Providing & fixing of butterfly valve suitable for pressure 10 Kg/Sqcm. with flanges, nut bolts & gaskets complete required. **(Make:** Kirloskar/Audco/Sant/ Kartar)				
a)	100 NB	14	Nos.		
b)	80 NB	7	Nos.		
8	Supply and Installation of Ball valve 25 NB (Make of Material: Kirloskar/ Advance/ Audco/ Sant/ Kartar/ Zoloto)	39	Nos.		
9	Providing and fixing of C.I. swing type check valve suitable for pressure 15 Kg/Sqcm with flanges. Nut, bolts & washers, painting etc complete as required. **(Make**: Kirloskar/ Audco/ Sant/ Kartar)				
a)	100NB	5	Nos.		
10	Supplying, Installation, Testing, & Commissioning of electric driven Terrace Pump suitable for automatic operation consisting of the following complete in all respects as required. End suction pump of cast iron body & bronze impeller with stainless steel shaft, mechanical seal and flow of following capacities and conforming to IS: 1520. Suitable HP Squirrel cage induction motor, TEFC, synchronous speed 2900 RPM, suitable for operation on 415 V, 3 phase 50 Hz, AC with IP 55 protection for enclosure, horizontal foot mounted type with class F insulation, conforming to IS:325. MS fabricated Common base plate, coupling, coupling guard, foundation bolts, anti-vibration pad, GI sheet cover hood for protection from rain complete etc. as required. Suitable cement concrete foundation duly plastered. (Using Terrace pump having discharge 450 LPM against 35 M Head) **(Make** of Material: Kirloskar/ Crompton/ Mather & Platt)	7	Nos.		
11	Fabrication, supplying, installation, testing & commissioning of MV electrical control panel, front operated, double door type with locking arrangement and of cubicle construction, floor / wall mounted type, fabricated out of 2 mm thick CRCA sheet, compartmentalized with hinged lockable doors, dust and vermin proof, powder coated with approved shade after 7 tank treatment process, mounted with following switchgears and accessories, internal power and control wiring, SMC terminal blocks, earth terminals, removable gland plates etc. complete as required.				
	(i) 32A TPN SDFU with DIN type HRC fuses 1 No (this unit shall have extended terminals)				

	(ii) DOL starter with over load protection, current sensing type single phase preventer complete with all accessories and internal wiring, suitable for automatic operation of terrace pumps described in item 1 above				
	(iii) Selector switch for Local/ remote, Auto / Manual / OFF operation, ON / OFF indication lamp etc. 2 Sets.				
	(iv) Digital MF (VAF) with inbuilt selector switch and suitably rated set of CTs - 1 set.				
	(v) 3 Phase indication lamps (LED type) with protection fuses - 1 set **(Make** of Material: CPRI Certified Manufacturer)	7	Nos.		
12	Supply installation testing and commissioning of system controller cum remote operation panel of the terrace pump, i/c all components like annunciation window for status indication incorporating sensors, relays, timers, annunciator module, logic circuitry for the functions, low intensity hooter etc., and fabricated of 1.6 mm thick CRCA sheet duly powder coated (PO red color), and labeled as fire pump panel, earthing etc. complete as required.				
	(i) 'ON' and "OFF" illuminated push buttons for remote operation of terrace pumps - 2 sets (control cabling will be paid under a separate item) (Make of Material: CPRI Certified Manufacturer)	7	Nos.		
13	P/f of Pressure switches for automation of the pumps. **(Make**: System Sensor/ Danfoss/ Indfoss)	7	Nos.		
14	P/f of Pressure Gauges 100 mm dia (Make of Material: HGuru/ Danfoss/ Indfoss)	14	Nos.		
15	S/f of ABC Type Fire Extinguisher Modular Type Fire Extinguisher with silk screen marking having 10 Kg. capacity filled with MAP 90% ABC Powder complete in all respect. **(Make**: Cease Fire/ Minimax/ Omex/ New Age)	27	Nos.		
16	S/f of Stored pressure ISI 15683 marked fire extinguishers of ABC Dry Chemical powder type with silk screen marking having 6 Kg capacity made of high pressure steel cylinder complete with wheel type valve, internal discharge tube, 1 mtr. long high pressure wire braided discharge hose, pressure gauge and fully charged with MAP 90 ABC powder. **(Make**: Cease Fire/ Minimax/ Omex/ New Age)	10	Nos.		
17	S/f of CO2 Type Fire Extinguisher with silk screen marking having 22.5 Kg Capacity ISI Mark IS 2878 fitted with 5 Mtr. Hose Horn & Trolley Handle Complete in all respect. **(Make:** Cease Fire/ Minimax/ Omex/ New Age)	2	Nos.		

18	S.f of Fire Bucket Stand having Hanging Capacity for 4 Buckets for Transformer & other buildings including 4 buckets. **(Make:** Cease Fire/ Minimax/Omex/ New Age)	5	Set		
19	S/f of First Aid Box (Make of Material: Cease Fire/ Minimax/ Omex/ New Age)	6	Nos.		
20	S/f of Air Release Valve. **(Make**: Cease Fire/ Minimax/Omex/ New Age)	9	Nos.		
21	Fire Survival **armoured** cable of 600/1000V rated with **Aluminium** Circular conductors having Glass Mica (Fire barrier) tape covered by an extruded layer of cross linkable halogen free insulation and LSZH inner & outer sheath. Basic design as per BS 7846 for copper cables, IEC-60502-1 for aluminium cables. Should retain circuit integrity as per Category-3 of BS:8519. Type test reports of each lot from 3rd party inspection agency required prior to despatch.				
a)	4 x 16 sq. mm	100	Mtrs.		
b)	4 x 25 sq. mm	250	Mtrs.		
22	Supply & testing of LPCB certified fire survival armoured cable (600/1000V) with class-2 Copper conductor having halogen free ceramified silicon insulation as per BS EN 50363 and low smoke zero halogen (LSZH) inner & outer sheath. Should comply to EN 61034-2 & EN 60754-1. LPCB-FPC certificate to be submitted. The cable should meet fire performance circuit integrity test as per BS EN 50200. Outer sheath should be in red colour including end terminators, saddles, clamps with screws etc for fixing on wall/ceiling or on cable trays complete as required				
a)	3 x 2.5 sq. mm	500	Mtrs.		
23	Supply & testing of Fire Survival Circuit Integrity unarmoured cable of 300/500V rated, twisted with class-2 annealed stranded Copper conductor having cross linkable, low smoke, halogen free ceramified silicon insulation as per BS EN 50363 along-with uninsulated circuit protective ATC conductor of 1.5 sq.mm, aluminium tape screening LSZH outer sheath. Should comply to EN 61034-2 & EN 60754-1. LPCB-FPC certificate required. The cable should meet fire performance circuit integrity test as per BS EN 50200 & BS6387 CWZ (950 deg. C for 180 minutes).				
a)	2 x 1.5 sq. mm (Control Cable)	70	Mtrs.		
24	Providing and fixing 4 mm G.I wire on surface or in recess for connections etc. as reqd.	100	Mtrs.		
				TOTAL FOR PART-IV	

Name of work: Restoration and modification of Fire Protection system, HVAC system and plumbing system at IFCI Building and multilevel Car parking area.

GRAND TOTAL FOR PART I + PART II + PART III + PART IV (IN RUPEES)	**(A)**	**In Figures**	
		In Words	
Credit of items/equipment/ accessories to be dismantled/removed and disposed off as mentioned against annexure '18' **(CONSOLIDATED BUYBACK VALUE) (IN RUPEES)**	**(B)**	**In Figures**	
		In Words	
NET QUOTED RATES (A- B) (IN RUPEES)	**(C)**	**In Figures**	
		In Words	

Note:

1. Evaluation of Financial bids will be based on Net Quoted Rates subject to approval of IFCI. However, IFCI reserves the right whether to consider Buyback Value for finalization of the bid or not.
2. Submission in any other format may result in cancellation of the offer.

MAKE OF MATERIAL (FIRE PROTECTION & PLUMBING)

Sl No	Item Description	Name of Manufacturer
1	Fire Blanket	Minimax/ Cease Fire/ Omex
2	G.I. / M.S. Pipes (IS : 1239 / IS : 3589) (ISI marked)	Tata Steel/ Jindal (Hissar)/ Prakash Surya
3	Forged Steel Fittings (ISI marked)	Jainsons Industries/ VS Engineering/ JK Forging
4	Gun Metal / Forged Brass Valve/ Gate Valve (ISI Marked)	Kirloskar/ Sant/ Zoloto
5	Butterfly/Sluice/NR Valve (ISI marked)	Audco/ Advance/ Kirloskar/ Sant
6	Check Valve/ Non Return Valve(ISI marked)	Sant/ Kirloskar/ Audco/ Advance
7	Paints	Asian Paints/ Berger/ Nerolac
8	Multi sensor addressable type Smoke detector/ Response Indicator	Notifier/ Bosch/ Edward (EST)
9	Evacuation Plan/ Signage	Glo-Line/ 3M/ Fight Fire
10	Modular type Fire extinguisher	Minimax/ Cease Fire/ Omex
11	FM200/Novec based Total flooding system	Kidde/ Chemtron/ Minimax/ Ansul (Tyco)
12	Deluge System	HD/ Tyco/ FireTek
13	HVW/ MVW Spray Nozzle	HD/ Tyco/ FireTek
14	Deluge Valve	HD/ Tyco/ FireTek
15	Solenoid Valve	Avcon/ Rotex/ Techno
16	Panel for Deluge System	ADLEC/TRICOLITE/ADVANCE CONTROL (MUNDKA)/BSPL
17	Pressure Switch (ISI marked)	System Sensor/ Indfoss/ Danfoss/ Switzer
18	Pressure Gauge (ISI marked)	H Guru/ Feibig/ Dwyer/
19	RRL Hose Pipe (SS 304) (ISIMarked)	Minimax/ New Age/ Omex
20	Fire Check Door	Godrej/ Radiant/ Sehgal
21	10 Zone Annunciation panel/ Master Control Unit	Notifier/ Bosch/ Edwards/ Safe Zone/APS
22	D.I Pipe	Tata Metaliks /Jindalsaw/ /Electrosteel
23	CPVC Pipe	Astral/ Prince/ Supreme
24	Emergency Escape Mask	N&M/Omex/Vintex

MAKE OF MATERIAL (HVAC)

S. No	Item Description	Name of Manufacturer
1	AXIAL FANS	SYSTEM AIR/AIRFLOW/SOLER & PALAU
2	INLINE FANS	OSTBERG/AIRFLOW/SYSTEM AIR
3	MOTORS (250 C FOR 2 HRS)	ABB/ HAVELLS- LAFERT/BALDOR
4	AIR DISTRIBUTION/DUCTING GI SHEETS	SAIL /TATA/JINDAL/BHUSHAN
5	FACTORY FABRICATED DUCT	ZECO/DUCTOFAB/WAVES
6	GRILLS AND DIFFUSERS	GREENHECK/TROX/ASTAR/GLENSTORMS
7	GRAVITY LOUVERS	GREENHECK/TROX/ASTAR/GLENSTORMS
8	INSULATION	SUPREME/PARAMOUNT/TROCELLENE
9	VIBRATORS ISOLATORS	RESISTOFLEX / FLEXIONICS (USA)
10	FASTNERS /HANGING ARRANGEMENT	HILTI/ GRIPPLE/FISHER/N&M
11	PAINT	ASIAN/ BERGER
12	SWITCH GEAR	SCHNEIDER/L&T/SIEMENS
13	PANEL	ADLEC/TRICOLITE/ADVANCE CONTROL (MUNDKA)/BSPL
14	CABLES	AFW/INDIA-IMPEX/PRYSMIAN/RADOX
15	CABLE TRAY	SLOTCO/ PILCO/ NEEDO/N&M