केनरा बैंक Canara Bank
भारत सरकार का उपक्रम A Government of India Undertaking
सिंडिकेट Syndicate

CIRCLE OFFICE: AHMEDABAD

SPECIAL CONDITIONS OF CONTRACT

GENERAL:

These special conditions are meant to amplify the specifications and General Conditions of Contract. If any discrepancy is noticed between General Conditions of contract, specification, Bill of Quantity and Drawings, the most stringent of the above shall apply.

The scope of this section is to describe materials and systems for fire fighting installations within the building which form together with the project documents, a complete volume of work and quality description.

All fire fighting installations shall be of high quality, safe, complete and fully operational including all necessary items and accessories whether or not specified in details. All fire fighting works shall be completed in accordance with the regulations and standard to the specification, the general provisions, special provisions and general requirements apply to all items of this specification.

The work shall be carried out simultaneously with Interior work, civil work, etc. and shall be continued till it is completed satisfactorily along with the completion of essential portions of the all services works.
During the progress of work, completed portion of the area may be occupied and be put to use by bank but the contractor will remain fully responsible for the maintenance of Fire Protection System installations till the entire work covered by this contract is satisfactorily completed by him and handed over to bank.

ACCOMPANIMENT TO TENDER:

The tendered will attach to the Tender, at the time of submission, a statement containing information on the following points on separate pro forma.

List of all the confirmation of materials to be used as per specification along with manufacturer's name, catalogue and other technical details. Any deviation from the specifications shall be separately pointed out.

INTENT:

It is the intention of the specification and drawings to call for finished work, tested and ready for operation, whenever the words “Supply” or “Provide” are used. It shall mean delivery of material as specified in an assembled manner, ready for installation. Any apparatus, material or work not shown on drawings but mentioned in the specification or vice versa, or any incidental accessories necessary to make the work complete and perfect in all respects and ready for operation, even if not particularly specified, shall be furnished, delivered and installed by the contractor without additional expenses to AUTHORITY. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work and in the contract.

INTERPRETATION OF PROJECT DOCUMENTS:

The Specification, Drawings, and Bill of quantity shall be interpreted in accordance with good installation practice defined in the appropriate regulations and standards whether specifically referred to or not. If there is any discrepancy or shortfall in the application of the regulations to any aspect of this contract or the contractor considers there is anything detrimental to the standards or inconsistent with his obligations and guarantees, AUTHORITY shall be informed prior to signing the contract and shall thereafter inform the contractor in writing the course to be followed. Where the drawings are to a small scale or are expressed in symbolic terms or are in the form of a diagram, then exact location of items shall not be inferred and in all cases, the work shall be fully integrated with the work of other trades and with the fabric of the building. The contractor shall appraise the duties of all plants and equipments taking account of any additions or variations and shall inform the AUTHORITY of any matters which may affect the design. In all cases the equipment installed shall be of appropriate rating for the duty it performs.

The Specifications and Bill of quantity shall be considered as part of this contract and any work or material shown on BOQ and not called for in the specification or vice versa, shall be executed as if specifically called for in both. The Drawings indicate the extent and general arrangement of the Fire Pumps, Fire Hydrants & Sprinkler system layout etc. and are essentially diagrammatic.

The work shall be installed as indicated on the drawings, however, any minor changes found essential to coordinate the installations of this work with other services shall be made without any additional cost to the Authority. The drawings are for the guidance of the contractor, exact locations, distances and levels will be governed by the building. The contractor shall examine all structural and Fire Protection system drawings before starting the work, and report to Bank or its representative, any discrepancies which in his opinion appear on them, and get them clarified.

SCOPE OF WORK :

The work to be carried out under this contract comprises of the Fire Fighting work for the proposed project called for in the documents. The work covered under this contract comprises of supply (wherever called for), installation, connection, testing and commissioning the Fire Fighting work commencing from point of fire brigade inlet or fire water storage within the project/site as per specifications, relevant to TAC, NFPA, NBC, Indian standards, Local Fire Rules and Code of practice

The contractor shall carry out and complete the said work under this contract in every respect and in conformity with the current rules and regulations of the local Fire Authority, the Indian Standards and with the directions of and to the satisfaction of the Consultant and Authority. The Contractor shall furnish all labour and install all materials, appliances, equipment (except those items which will be supplied by the Authority to the contractor at site), necessary for complete provision and testing of the whole fire fighting installation as specified herein and shown on the drawings. This also includes any material, appliances, equipment not specifically mentioned herein or noted on the drawing as being furnished or installed but which are necessary and customary to make

complete installation and to make the fire fighting system shown in the schedule or described herein, properly connected and in working order.

The work shall include all incidental jobs connected with Fire Fighting installation such as foundation block for pump-motor sets, excavation for pipe trenches and back filling, cutting/drilling holes through walls/floors and grouting, fixing of sprinklers with necessary civil work , supports & hangers for hydrant / pipes, etc.

In general, the work to be performed under this contract shall comprise of supply, installation, testing & commissioning of the following:-

External & Internal Hydrant system & Hose reel Sprinkler System with Alarm Valve System Pipes with all fittings & flanges, valves, hangers, supports, Isolation valves Portable Fire Extinguishers & Accessories

All qualities mentioned in the Bill of quantity are approximate and the contractor shall not be eligible for any claim due to any variation in / or omission of any item.

Any extra item shall be calculated on the rate analysis basis approved by bank.
It is the responsibility of the contractor to co-ordinate with Local Fire Authority, Fire Officer and fulfils all the documents, drawings & any other requirement of them at no extra cost.

MODE OF MEASUREMENTS:

GI pipes shall be measured per linear meter of the finished length and shall include all fittings, welding, jointing, clamps for fixing to walls or hangers, anchor fasteners and testing.

Sluice valves with orifice flanges, check valves and full way valves shall be measured by numbers and shall include all items necessary and required for mixing and as given in the Specifications/Bill of Quantities.

Landing valves, hose cabinets, rubberized fabric linen fire hose pipes. First-aid fire hose reels (with gunmetal port way valves) and gunmetal branch pipes shall be measured by numbers and shall include all items necessary and required for fixing as given in the Specifications/Bill of Quantities.
Suction and delivery headers shall be measured per linear meter of finished length and shall include all items as given in the Bill of Quantities. Painting shall be included in the rate of headers. Painting of pipes shall be included in the rate for pipes and no separate payment shall be made.

No additional payment shall be admissible for cutting holes or chases in walls or floors, making connections to pumps, equipment and appliances.

FEES, PERMITS AND TESTS:

The Contractor shall pay for any and all fees and obtain permits required for the fire fighting work. On completion of the work the contractor shall obtain and deliver to the AUTHORITY, certificates of final inspection and approval by the local fire Authority and the Fire inspector.

UTILITY SUPPLY:

It is the responsibility of the contractor to co-ordinate with various utility agencies, the exact location of such Hook-Up Point and mode of connection. Further the contractor shall co-ordinate with such utility agencies to provide necessary drawings, documents, get their approval, make the necessary arrangement for the payments and arrange the utilities supply at no extra cost.

ACTUAL ROUTE OF PIPE:

The location of the hydrant pipe is only indicative, therefore, the actual route may differ from the plans according to the details of the building construction and the conditions of executions of the installations.

The contractor shall supply and install at his expense all secondary materials and special fittings found necessary to overcome the interference and to supply the modifications on the route of pipe and fittings that are found necessary during the work, to the complete satisfaction of the Authority's representative.

MATERIAL AND EQUIPMENT:

All material and equipment shall conform to the relevant standards and shall be of the approved make and design. The materials and equipment shall conform to relevant Indian Standards. The Contractor shall be responsible for the safe custody of all the materials and shall insure them against theft, damage by fire, earthquake etc. A list of items of materials and equipment, together with sample of each shall be submitted to the bank within 10 days of the award of the contract. Any item which is proposed as a substitute, shall be accompanied by all technical detail giving sizes, particulars of materials and the manufacturer's name and shall be submitted along with the tender or bid offer. At the time of the submission of proposed substitute the Contractor shall state the credit, if any due to the Authority. In the event the substitution is approved, all changes and substitutions shall be requested in writing and approvals obtained in writing from AUTHORITY. Authority's decision in the matter shall be final.

All materials of the same kind of service shall be identical and made by the same manufacturers. Any deviation to this rule shall be approved by the Consultant. Top priority shall be given to the products that have a permanent agent providing spare parts and maintenance facilities in the same city where the project is situated.

The make of fire equipments, components, accessories, etc. has been mentioned in the tender. In case if the make is not given for the equipment / component / accessories, the

contractor shall get approval for sample of that particular equipment / component / accessories from the Client / Consultants before any procurement.

MANUFACTURERS:

Where manufacturers have furnished specific instructions relating to the materials used in this job, covering points not specifically mentioned in these documents, these instructions shall be followed in all cases.
Where manufacturer's names and/or catalogue numbers are given, this is an indication of the quality, standards and performance required.

When interfacing occurs, equipment shall be mutually compatible in all respects.

RATING:

Rating of all items shall be appropriate for the conditions on the particular site on which the items will be used. All the equipment shall be fit for continuous work under the worst conditions of site and shall be rated for the following ambient condition.

>Outdoor temperature 50° C.
> Corrosive and humid

INSPECTION AND TESTING:

Bank's representative reserves the right to request inspection and testing at manufacturer's works at all reasonable times during manufacture of items for this contract. Tests on site of completed works shall demonstrate, among other things:

That the equipment installed complies with specification in all particulars and is of the correct rating for the duty and site conditions.

That all items operate efficiently and quietly to meet the specified requirements. That all circuits are correctly fused and protected and that protective devices are properly coordinated.
That all non-current carrying metal work is properly and safely grounded in accordance with the specifications.

The contractor shall provide all necessary instruments and labour for testing, shall make adequate records of test procedures and readings, shall repeat any tests requested by the bank and shall provide test certificates signed by a properly authorized person. Such test certificates shall cover all works.

If tests fail to demonstrate the satisfactory nature of the installation or any part thereof then no claims for the extra cost of modifications, replacements or re testing will be considered. bank's decision as to what constitutes a satisfactory test shall be final.

The above general requirements as to testing shall be read in conjunction with any particular requirements specified elsewhere.

PRICE DETAILS:

At anytime and at the request of Authority, the contract shall provide details or breakdown of costs and prices of any part or parts of the works.

TEST CERTIFICATES:

The contractor shall submit test certificates for all the material/system installed. These shall be issued by a government recognized inspection office certifying that all equipment, materials, construction and functions are in agreement with the requirements of these specifications, ISI and when ISI is not applicable other approved certifying agencies.

INSTRUCTION MANUAL:

The contractor shall prepare and produce instruction, operation and maintenance manuals in English for the use, operation and maintenance of the supplied equipment and installations, and submit 3 sets to Authority, at the time of handing over.

SAMPLES AND CATALOGUES:

Before ordering the material necessary for this work, the contractor shall submit to Authority for approval, a sample along with the catalogues.

For big items such as Pump, Prime Mover, Valves, Hydrants, Pipe, the submission of catalogues shall be enough. Prior to ordering any firefighting equipment/material/system, the contractor shall submit to AUTHORITY, the catalogues, along with the samples, at least from three different manufacturers. After the selection of manufacturer by AUTHORITY, the contractor shall arrange inspection and testing at the manufacturer's factory or assembly shop for final approval. No material shall be procured prior to the approval of the Authority.

VENDOR AND SHOP DRAWINGS:

The contractor shall prepare and submit to Authority, for his approval, two sets of vendor detailed drawings of all distribution boards, switch boards, outlet boxes, special pull boxes, and other likewise material, equipment to be fabricated by the contractor, or other vendor within 15 days of signing of the contract.

Before starting the work, the contractor shall submit to Authority for his approval in the prescribed manner, the shop/execution drawings for the entire installation, specially the main connections and junctions, the route of conduits and cables, no. and size of wires drawn through the conduits, location of all the outlet points, and switch boards and distribution boards and any other information required by Authority . Authority reserves the right to alter or modify these drawings if they are found to be insufficient or not complying with the established technical standards or if they do not offer the most satisfactory performance or accessibility for maintenance.

AS BUILT DRAWINGS:

At the completion of work and before issuance of certificate of virtual completion the contractor shall submit to Authority, three sets of layout drawing drawn at appropriate

scale indicating the complete Fire Protection system "as installed". These drawings must provide (in plan, elevation and section)

Location and details of Fire Pumps, Prime Movers and Panels, Location of Wet Risers, Internal Hydrants & hose details. Location of Fire Brigade inlets & fire storage tank.

GUARANTEE:

At the close of the work and before issuance of final certificate of virtual completion by Authority , the contractor shall furnish written guarantee indemnifying Authority against defective materials and workmanship for a period of one year after completion. The contractor shall hold himself fully responsible for reinstallation or replacement, free of cost to Authority, the following:
Any defective work or material supplied by the contractor.

Any material or equipment supplied by Authority which is damaged or destroyed as a result of defective workmanship by the contractor.

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

SAFETY OF MATERIALS:

The contractor shall provide proper and adequate, storage facilities to protect all the materials and equipment including those issued by Authority against damage from any cause whatsoever.

COMPLETION CERTIFICATE:

On completion of the Fire Protection System installation (or an extension to an installation) a certificate shall be furnished by the contractor countersigned by the licensed supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local supply Authority. The contractor shall be responsible for getting the approval by the local concerned authorities.

DEFECTS LIABILITY:

Defects liability period shall mean 12 calendar months after Authority have issued certificate of completion of the whole work. The certificate of completion shall be issued after the necessary tests have been carried out to the satisfaction of Authority and the required drawings are submitted.

The contractor shall make good at his own cost and to the satisfaction of Authority, all defects or other faults arising in the opinion of Authority out of bad workmanship or faulty materials not in accordance with the drawings, NBC or TAC and the Rules and Regulations under which it may appear within twelve months after completion of the work.

STAFF:

The contractor shall employ a competent fully licensed qualified, full time erection engineer to direct the work of erection in accordance with the drawings and

specifications. The engineer shall be available all times at site to receive instructions from Authority, in the day to day activities throughout the duration of contract. The engineer shall correlate the progress of the work in conjunction with all the relevant requirements of the supply Authority.

REINSTATING AND FINISHING OF CIVIL DAMAGES:

For erection of equipment / cables etc., if any civil structure is required to be broken, the same shall be done, restated and finished as original by the tendered without any extra cost.

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TECHNICAL SPECIFICATIONS

Fire-fighting system work inclusive of water hydrant system, piping, sprinklers etc. including testing and commissioning of the system, but excluding fire detection and fire alarm system. The Contractor is required to completely furnish all the specialized services as described hereinafter and as specified in the schedule of quantities and/or shown on the drawings. Without restricting to the generality of the foregoing, the work shall include the following:

FIRE FIGHTING SERVICES

Work under this sub-head consists of furnishing all Labour, Materials, equipment and accessories necessary and required to completely install the Fire Fighting equipment etc., specified hereinafter and given in the Schedule of Quantities.

Without restricting to the generality of the foregoing the work of Fire Fighting System shall include the followings:

a) Providing GI steel pressure pipe line main including Valves, Fire Hydrants, Excavation for Pipe, Laying of pipe, Painting of pipe and Making Connection to supply system.
b) GI Pipe, Mains Laterals, Branches, Valves, Hangers and Appurtenances.
c) Hose Reels, Rubberized fabric lined hose pipes, Hose cabinets, Sprinkler heads and Landing Valves.
d) Portable Fire Extinguishers
e) Fire Fighting Pumps, panels and all connected accessories including suction & delivery pipes.
f) Testing Commissioning and giving live demonstrations to the various Inspection Authorities and Obtain their "No Objection Certificate" (NOC) for occupation of the building.

g) GENERAL REQUIREMENTS

All materials shall be of the best quality conforming to the Specifications and subject to the approval of the Engineer-in-Charge.

Pipes and Fittings shall be fixed truly Vertical, Horizontal or in slopes as required in a neat workman like manner.

Pipes shall be fixed in a manner so as to provide easy accessibility for repair and maintenance and shall not cause any obstruction in shaft, passage etc.

Pipes shall be securely fixed to walls and ceiling by suitable clamps at intervals specified. Only approved type of anchor fasteners shall be used for RCC ceilings.

Valves and other appurtenance shall be so located that they are easily accessible for operation, repairs and maintenance.

GENERAL SPECIFICATIONS:-

Entire installation shall be carried-out as per latest relevant regulations both statutory and those specified by Bureau of Indian Standards related to the works covered by the Specifications. In particular the equipment and installation shall comply with the following:-

1.04

a) NFPA Standards (Latest Edition)
b) Fire Protection Manual issued by TAC
c) Rules of TAC for Automatic Sprinkler Installations
d) Regulations under Indian Electricity ACT 1910
e) Fire Insurance Regulations
f) National Building Code of India, 2005
g) Indian Standard Specifications
h) Workman's Compensation Act
i) Explosive and Smoke
j) C.P.W.D. Specifications, for electrical works
k) Any other applicable rules

CONTRACTOR'S DRAWINGS:-

Drawings provided to the CONTRACTOR:-
The CONTRACTOR will receive from the ENGINEER-IN-CHARGE / CONSULTANT the documents and drawings listed together with any further drawings issued under conditions of contract and other relevant documents.

Workshop Drawings:-
The CONTRACTOR and any SUB-CONTRACTORS, shall provide workshop drawings for his own trades, where applicable, or when requested by the ENGINEER-IN-CHARGE / CONSULTANT. The workshop drawings shall clearly show all dimensions, details, specifications, connections, or joints to other trades, incorporation of the work of other trades, etc.

Builder's Work Drawings:-
The CONTRACTOR shall provide drawings showing the exact dimensions and locations of all holes, ducts, recesses, access points, etc. These drawings shall also specify all necessary Builder's Work in connection with movement precaution, sound and thermal protection etc.

Manufacturers' Drawings:-
The CONTRACTOR shall provide manufacturer's drawings of his own trades, where applicable, or when requested by the CONSULTANT / ENGINEER-IN-CHARGE. The manufacturer's drawings shall clearly, show all dimensions, details, specifications, connections or joints to other trades, incorporation of the work of other trades etc. During the currency of the Contract the CONTRACTOR shall arrange for manufacturers to prepare and submit for approval by the CONSULTANT two copies of manufacturer's drawings of major items of equipment such as Distribution Boards, switchgear, starter panels, etc. In addition they shall also provide workshop drawings of any portions of the

work which the CONSULTANT may require to be shown in greater detail then that indicated on the manufacturer's drawings.

As Built Drawings and Working and Maintenance Instruction Manuals:-
The CONTRACTOR shall provide to the ENGINEER-IN-CHARGE / CONSULTANT prior to the time of completion of the works as defined in the Conditions of Contract. As Built Drawings and Working and Maintenance Instruction Manuals for all elements within the scope of work. Immediately on completion of any relevant works the CONTRACTOR shall prepare six sets of "As Built" drawings of such works for their approval by ENGINEER-IN-CHARGE. These drawings shall be a complete record of the works showing the positions and dimensions of all elements executed within the CONTRACTOR'S scope of work with soft copy.

The CONTRACTOR shall provide the ENGINEER-IN-CHARGE / CONSULTANT for approval six bound sets of Working and Maintenance Instruction Manual for all services, installations and equipment installed. The Working and Maintenance Instruction Manuals shall contain all manufacturer's operating and maintenance instructions, and detailed drawings of all equipment supplied. The detailed drawings do not require to be specially prepared, and can comprise copies of the Manufacturer's workshop drawings with suitable titles and reference numbers added. The exact scope and details of the Operating Instructions shall be agreed with the ENGINEER-IN-CHARGE / CONSULTANT.

After approval by the ENGINEER-IN-CHARGE / CONSULTANT the CONTRACTOR shall forward to the CONSULTANT four copies of the approved "AS BUILT DRAWINGS" & Working and Maintenance Instructions Manuals and four prints and one re-producible copy of each drawing. Drawing files on computer disk shall also be forwarded.

Submission & Approval of Drawings:-

All drawings prepared by the CONTRACTOR shall be submitted within two weeks time to the AUTHORITY / CONSULTANT by the CONTRACTOR and this will be the only accepted and contractual method. The AUTHORITY / CONSULTANT shall check and approve these drawings in a reasonable time and issue them to the CONTRACTOR as "Approved for Construction". Such approval shall not relieve the CONTRACTOR of responsibility for any discrepancies, errors or omissions in their submittals.

If the AUTHORITY / CONSULTANT instruct the re-drawing, alteration or amending of any of the submitted drawings which, in his sole opinion, do not properly interpret the intent of the Contract or for any reason do not comply with good Engineering practice, then the CONTRACTOR shall ensure the carrying out of the AUTHORITY'S / CONSULTANT's instructions and no claim for extra payment shall be allowed for any reason in this respect.
Should the AUTHORITY / CONSULTANT instruct the alteration or amending of any drawing prepared by CONTRACTOR / Manufacturer, then the CONTRACTOR shall ensure that this is done immediately in order to avoid any delay to the construction programme and no claim for extra payment or extension of time for completion of the works shall be allowed for any reason in this respect.

The CONTRACTOR shall prepare a detailed programmer for the production of the drawings and information required immediately upon receipt of the AUTHORITY / CONSULTANT'S order to commence the works. The programmer, which will be subject to the scrutiny of the AUTHORITY / CONSULTANT who may alter or amend it as he sees fit, shall be compatible with the programmer for the construction works. The programmer shall show the following in detail:
Dates on which the CONTRACTOR shall commence the drawings/material supply to site/manpower deployment date wise.

Dates on which the CONTRACTOR shall submit the drawings to the AUTHORITY / CONSULTANT.
Reasonable period for the AUTHORITY / CONSULTANT to check and approve the submitted drawings.

Date of commencement of the relevant work on site.All trades and / or elements as appropriate in their proper sequence. Key approval dates for long delivery items.Any other information the AUTHORITY / CONSULTANT may request.

No related manufacture or installation shall be taken-up in hand until & unless co-ordination drawings, together with any explanatory literature, are approved in writing by the CONSULTANT / AUTHORITY.
The detailed programme shall reflect the requirements for production of information to permit timely co- ordination with all trades and other agencies working at site.

NOTE:- The CONTRACTOR's failure to comply with the provisions of this clause shall be deemed to constitute a default of his obligations under the contract.

Others: -

All drawings shall be produced using AUTOCAD and a disk file copy shall be submitted in addition to any prints specified at each stage of approval. Drawings by the CONTRACTOR shall be prepared in a clear and proper manner, with adequate size so that the drawings will be easily legible even when reproduced on a reduced scale. They shall be drawn in black ink on a white background to facilitate printing bearing at the bottom right corner the approval, Contract reference, Scale; title block and number etc.

All drawings by the CONTRACTOR shall be orientated to match the design drawings and shall have a key plan identifying the location or area of the Works to which they apply. They shall also bear indication and make reference to the geographical co-ordinates of the Site.

When a drawing is revised, the particulars of the current revision shall be clearly marked or circled, to facilitate checking. All prior revision numbers and references of drawings possibly superseded by the current issue shall also be clearly shown.

When drawings are submitted for approval without complying with these requirements, they may be rejected.

The CONTRACTOR shall submit to the AUTHORITY / CONSULTANT a disk copy and two prints of each drawing or document. If the drawing or document is approved, one print will be returned to the CONTRACTOR bearing the "Approved for Construction" Mark which may also bear the provision "Subject to ... " The CONTRACTOR shall then submit a further disk copy, four prints and onereproducible copy of the approved drawing or document to the AUTHORITY / CONSULTANT. If the drawing is not approved, one copy will be returned to the CONTRACTOR, bearing the "Not Approved" mark for re-submission.

Re-submission of drawings not approved shall be made using the same procedures as in the original submission.

The CONTRACTOR shall ensure that drawings etc., submitted for approval are forwarded in sufficient time to allow the AUTHORITY / CONSULTANT a reasonable time to examine them and to meet the approved drawing production programme.

The CONTRACTOR shall ensure that drawings are submitted at regular intervals, on an even flow basis, with sufficient and reasonable time prior to the date required for approval to permit amendments to be made.

If during the course of construction, revisions to approved details are required, the CONTRACTOR shall amend all Drawings affected and resubmit for approval, following the procedure described above, ensuring that the working drawings are at all times an accurate reflection of work on site.

Note: - The provision of the above Working and Maintenance Instruction Manuals shall form part of the Contract obligations, which shall not be deemed to be complete until they are received and approved by the AUTHORITY / CONSULTANT.

EXECUTION: - The works shall be carried out in accordance with the Fire Fighting Drawings read along with Consultantural Drawings and Structural Drawings, to be issued by AUTHORITY / ENGINEER-IN-CHARGE as "GOOD FOR CONSTRUCTION". The Fire Fighting Drawings, Structural Drawings and Consultantural Drawings shall have to be properly Co-related before executing the works. In case of any difference noticed between Consultantural and Fire Fighting Drawings, the fact shall be immediately brought to the notice of ENGINEER-IN-CHARGE / CONSULTANT / AUTHORITY whose decision in writing shall be obtained by the CONTRACTOR. CONTRACTOR's shall maintain a register of daily deployment of Electrician, Skilled / Unskilled Labour etc. on various activities and get it signed from ENGINEER-IN-CHARGE on daily basis and shall produce before the AUTHORITY as and when asked for.

QUALITY OF MATERIALS & GENERAL STANDARDS OF WORK:-The CONTRACTOR under this contract commits himself to use first class materials and assumes full responsibility for the quality of all materials incorporated or brought for incorporation in the work. The work shall be executed in accordance with the best Engineering practice and as per directions of ENGINEER-IN- CHARGE. CONTRACTOR to obtain prior approval of make / model No. and Technical particulars of each item from the CONSULTANT before the material is supplied.

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BAR CHART FOR EXECUTION OF WORK:-The CONTRACTOR shall submit within one week of the acceptance of the tender, a BAR Chart to AUTHORITY, which shall indicate the planning for the execution of the entire work under the contract within the stipulated time given for completion. This shall be scrutinized by the AUTHORITY. The mutually agreed BAR-CHART shall be binding on the CONTRACTOR for progress of the work & for completion by the due date. The CONTRACTOR shall during the entire tenure of site work, provide accurate monthly reviews of BAR- CHART showing work targets & completed works for discussions with the CONSULTANT &AUTHORITY.

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PARTICULAR SPECIFICATIONS

PIPES

PIPE FITTINGS.
Pipe fittings means tees, elbows, couplings, flanges, reducers etc. And all such connecting devices that are needed to complete the piping work in its totality.
Fabricated fittings shall not be permitted for pipe diameters 50 mm and below.
When used, they shall be fabricated, welded and inspected in workshops whose welding procedures have been approved by the TAC as per TAC rule 4102 for sprinkler system and applicable to hydrant and sprinkler system. The inspection shall be supervised by authorised representative of the AUTHORITY..

JOINTING
a) Screwed (50 mm dia. pipes and below):Joint for black steel pipes and fittings shall be metal-to-metal thread joints. A small amount of red lead may be used for lubrication and rust prevention. Joints shall not be welded or caulked. (With screwed VS forged fittings) with hole tight.
b) Welded (65 mm dia. and above):Joints between M.S. pipes and fittings shall be made with the pipes and fittings having "V" groove and welded with electrical resistance welding in an approved manner. All pipes will be subject to X- Ray test from an approved agency as per the TAC norms at the cost of contractor. (With welded M.S. fittings heavy class with V-Groove). The welding machine shall be 3 Phase of required current and capacity With approved welding rod along with DP Test.
c) Flanges:Flanged joints shall be provided on;
Straight runs not exceeding 30 m on pipelines 80 mm dia. and above
Both ends of any fabricated fittings e.g. bends, tees etc. of 65 mm dia. or larger diameter
For jointing all types of valves, appurtenances, pumps, connections with other type of pipes, to water tanks and other places necessary and required as good for engineering practice.
d) Flanges shall be as per I.S.6392-1971, Table 17/18 with appropriate number of G.I. nuts and bolts, half threaded of GKW make or equivalent with 3 mm insertion neoprene gasket complete.
e) Unions:Approved type of dismountable unions on pipes lines 65 mm and below in similar places as specified for flanges shall be provided.

PIPE PROTECTION
a) All pipes above ground and in exposed locations shall be painted with one coat of Zinc chromate primer and two or more coats of Synthetic Enamel Paint of approved shade.
b) All black steel pipes under floors or below ground shall be provided with protection against corrosion by application of 100/ 150 mm wide and 4mm thick layer of PYPKOTE/ MAKPOLYKOTE over the pipe, as per manufacturers specifications Checking with holiday testing machine.

PIPE SUPPORTS

a) All pipes shall be adequately supported from ceiling or walls from existing/new inserts by Structural clamps fabricated from G.I Structural e.g. Rods, Channels, Angles and Flats as per details given in drawings and specifications. All clamps shall be painted with one coat of red lead and two coats of black/ approved shade Enamel paint of pre-approved brand.
b)Where inserts are not provided, the Contractor shall provide anchor fasteners. Anchor fastener shall be fixed to walls and ceilings by drilling holes with Electrical drill in an approved manner as recommended by the manufacturer of the fasteners (HILTI/FISHER).

PIPE TESTING
All pipes in the system shall be tested to a hydraulic pressure of 1.5 times of the working pressure or minimum of 11 Kg/Cm2 without drop in the pressure for at least 2 - 4 hours. Rectify all leakages, make adjustment and retest as required.

ANCHOR BLOCK Contractor shall provide suitable cement concrete, anchor blocks of ample dimensions at all bends, tee connection and other places required and necessary for overcoming pressure thrusts in pipes. Anchor blocks shall be of cement concrete 1:2:4 mix (1 cement: 2 coarse sand: 4 stone aggregate 20 mm nominal size).

VALVES

a) Valves, gauge and orifice plates
i) Sluice Valves above 65 mm shall be of Cast Iron body and Bronze/Gunmetal seat. They shall conform to type PN 1.6 of IS:780-1980, valves up to 65mm shall be of Gunmetal Full way Valve with wheel tested to 20 Kg./cm class-II as per I.S: 778-1971. Valve wheels shall be of right hand type and have an arrow head engraved or cast thereon showing the direction for turning open and closing. All exposed or above ground valves of 65mm dia. & above shall be slim-seal butterfly valves marked IS: 13095 with matching flanges.
ii) Non-return valves shall be of Cast Iron body and Bronze/Gunmetal seat. They shall conform to class of IS: 5312 and have flanged ends. They shall be swing check type in horizontal runs and lift check type in vertical runs of piping. They shall not be spring-loaded type.

EXTERNAL YARD HYDRANTS
The Contractor shall provide External Fire Hydrant in the Ring or on External Fire Line, as per specifications as specified in Schedule of Quantities and as shown in drawings. The spacing of the hydrants and the distance from the building shall be maintained as per relevant requirements of latest relevant codes, unless specified here with. The distance between two hydrant shall be 30-45mts.
Each External Fire Hydrant shall be provided with an External Fire Hose Cabinet as specified in Schedule of Quantities of size 76.8 x 61.44 x 25.80 cm, as approved by the Consultant to equip 2 nos. of 63 mm dia. controlled percolating hose and accessories as required. The cabinet shall be installed near the Hydrant as per details, approved by the Engineer-in-Charge/Consultant.

INTERNAL HYDRANTS

The Internal Hydrant outlet shall comprise "Single Headed Single Outlet SSLanding Valve" conforming to type 'A' of IS: 5290-1977. Separate valve on the head shall form part of the landing valve construction.
A cap with chain is provided on one head of the outlet. The hydrant will have an instantaneous pattern female coupling for connecting to Hose Pipe.

The Landing Valve shall be fitted to a Tee connection on the wet riser at the landing. With G.I. nut, bolt & double washer.

BRANCH PIPES AND NOZZLES Hose pipes

Branch pipes
Branch pipe shall be of Stainless Steel as given in BOQ 63 mm dia and be complete with male instantaneous spring lock type coupling for connection to the hose pipe. The branch pipe shall be externally threaded to receive the nozzle.

Nozzle
The nozzle shall be of Stainless Steel, as specified in BOQ 20 mm in (internal) diameter. The screw threads at the inlet connection shall match with the threading on the branch pipe. The inlet end shall have a hexagonal head to facilitate screwing of the nozzle on to the branch pipe with nozzle spanner.
End Couplings, Branch pipe, and Nozzles shall conform to IS: 903 - 1985.

The hose tubing shall be 20 mm dia. and 36.5m long. The G.M nozzle 5mm and globe valve shall be of 20 mm size.
The fixing bracket shall be of swinging type, with G.I. support Operating instructions shall be engraved on the assembly. This heavy duty mild steel and cast iron brackets shall be conforming to IS: 884 - 1969. The first- aid hose reel shall be connected directly to the M.S. pipe riser taken independently from ring.

PORTABLE FIRE EXTINGUISHER
Portable fire extinguishers shall be provided as per Bill of Quantities and shall confirm to IS: 15683
Dry Chemical powder type - 6 Kg. Capacity as per I.S:15683
CO_2 type - 4.5 Kg. capacity as per I.S:15683.
Foam type - 9 Ltrs. capacity as per I.S:15683.

SPRINKLER HEADS
Sprinkler heads shall be provided at approximate spacing to cover 12 m^2 per Sprinkler head. The spacing shall however, be in conformity with the drawings and properly coordinated with Electrical Fixtures, Ventilation Ducts and Grills and other services along the ceiling.
Sprinkler heads shall be Chrome finished Brass/Gunmetal with quartz bulb with a temperature rating of 68°C. Sprinkler heads shall be of type and quality approved by the local fire brigade Authority. The inlet shall be screwed with Teflon tape. Sprinkler heads shall be pendent, recessed or special application side wall Sprinkler types as shown in

drawings. All Sprinklers should have the Specifications, as far as maximum possible as per NFPA requirements and shall be UL/FM approved.
Contractor shall supply spare Sprinkler Heads of each type as per requirement and one Spanner for each type of sprinkler neatly installed in a steel box with glass shutters at locations approved by the Engineer- in-Charge.

CABLES

a) Contractor shall provide all power control cables from the motor control centre to various motors, level controllers and other control devices.
b) Cables shall conform to IS: 1554 and carry ISI mark.
c) Wiring cables shall conform to IS 694.
d) All power and wiring cables shall be copper conductor PVC insulated armoured and PVC sheathed of 1100 volts grade.
e) All control cables shall be copper conductor PVC insulated armoured and PVC sheathed 1100 Volt grade.
f) All cables shall have stranded conductors. The cables shall be in drums as far as possible and bear manufacturer's name.
g) All cables joints shall be made in approved manner as per standard practice.
h) The cable jointing shall be Crimping type.

CABLE TRAYS

a) Contractor shall provide G.I. perforated cable trays at locations as shown on the drawings and of sizes as given in the bill of quantities, with G.I. sheet thickness of 1.5mm.
b) Cable trays shall be supported from the bottom of the slab at intervals of 60cms at both ends by ort rods with insert plates OR Anchor fasteners.
c) Cost of clips, bolts, nuts, support rods and any other materials required to fix the trays in proper manner shall be included in the rate for trays.

VIBRATION ELIMINATORS

All suction and delivery lines shall be provided with double flanged reinforced neoprene flexible pipe connectors. Connectors should be suitable for a working pressure of each pump. Length of the connector shall be as per manufacturer's details. Flexible connectors shall be as manufactured by Relay Corp., New Delhi.

COMMISSIONING

After successful testing of the different items in parts, the Contractor shall provide all facilities including necessary piping, labours, tools and equipments etc. for carrying out testing and commissioning of the entire fire fighting system complete as per requirement in the presence of Client representative and during the visit of the Fire Officer whenever and as may be required. Generally, the following test/inspection has to be carried out:-
(a) For the automatic operation of the main fire pump and pressurise pump as per the sequences required.
(b) For checking the pressure available at the farthest and highest point in the fire ring and for the wet riser system.

(c) For the automatic operation of the Sprinkler System either by a dummy fire below a sprinkler head by using the Inspection Test Valves. In this case, the annunciation panel indicating the particular zone and mechanical Gong valve should work.

GUARANTEE

a) The contractor shall submit a warranty for all equipment, materials and accessories supplied by him against manufacturing defects, malfunctioning or under capacity functioning.

b) The form of warranty shall be as approved by the Engineer-in-charge.

c) The warranty shall be valid for a period of one year from the date of commissioning and handing over With virtual certificate.

d) The warranty shall expressly include replacement of all defective or under capacity equipment. Engineer- in-charge may allow repair of certain equipment if the same is found to meet the requirement for efficient functioning of the system.

e) The warranty shall include replacement of any equipment found to have capacity lesser than the rated capacity as accepted in the contract. The replacement equipment shall be approved by the Engineer-in- charge.

f) The contractor shall include in his rates the operation of all mechanical equipment for a period of six months from the date of commissioning. No separate payment will be made on this account.

g) Contractor has to complete all fire safety items, execution work according to tender specification and he has to take NOC from S.M.C. Fire Department and he should get final approval for fire safety system of this building.

IS CODE AND APPROVED MAKE LIST FOR FIRE FIGHTING SYSTEM

Sr. No.	Item	Specifications	MAKE
1	Pipe	Galvanised Iron, heavy, Class 'C'. Upto 150 NB as per IS 1239 Part I & 200 NB and above to IS 3589 6.35 mm thick.	Jindal / Tata
2	Fittings	Buttweld type to IS 1239 Part II	
3	Motors	Horizontal centrifugal type, electric operated	Kirloskar / Crompton Eqv.
4	Pumps	Cast Iron	Kirloskar
5	Sluice Valve	Rising spindle type. Cast Iron to PN 16	Sant / Kartar/ Eqv.
6	Strainer / Footvalve	Heavy duty	Sant / Eqv.
7	Butterfly Valve	Cast Iron to PN 16	Audco / Maxflow / Etc.
8	Hydrant Valve	Single headed, Oblique type, Stainless Steel to IS 5290 mark	Newage / SBJ / Winco
9	Fire Hose	To IS 636 type A externally coated with internal EPDM layered with SS Coupling, heavy duty to IS 903	Newage / CRC
10	Branchpipe	St..Steel to IS 903	Newage / SBJ / Winco
11	Hose Reel	To IS 884, 30 mtr. length 19mm dia. Rubber hose complete with isolation valve.	Newage / SBJ / Winco
12	M S Box	Made from 16 swg. M S powder coated.	
13	Sprinkler	Pendent type	HD / Tyco / Reliable

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14	Non Return valve	Dual Plate type to PN 16	Advance / Sant
15	Fire Extinguisher's	To IS 15683 with squeeze grip nozzles	Safex / Kanex / Eversafe
16	Painting	Two coats of Zinc Primer and 2 coats of enamel paint each 75 microns thick. Shade shall be of PO red.	Asian Paints / ICI / Berger
17	Coating & Wrapping	Wrapping & Coating as per IS 10221. Single coat of 4mm thick.	IWL
18	Control Panel	Standard as per requirement	
19	Fire Alarm	Conventional type	Honeywell / Siemens / Edward

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FIRE PREVENTION SYSTEM

Item No.1:-Providing, laying, testing and commissioning of 'C' class heavy duty GI pipe conforming to IS:1239 including fittings like elbows, tees, flanges, tapers, nuts, bolts, gaskets etc fixing the pipe on the wall/ ceiling with suitable clamps and painting with two or more coats of synthetic enamel paint of post office red clour complete as required of following dia. (1) Size : 80 mm (2) Size : 65 mm (3) Size : 40 mm (4) Size : 25 mm

1.1 Galvanised mild steel tubes of specified dia nominal bore shall conform to I.S. 1239-1968. For Pipe 200 mm dia. and above IS 3589 of thickness specified.

1.2. The galvanised fittings, clamps, etc. required for specified dia. bore pipes shall be of best quality and makes as approved by the Engineer-in-charge.

Workmanship

2.1. Cutting, Laying & Jointing

2.1.1. When the tubes are to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore in offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S. 554-1955 with pipe dies and taps carefully in such a manner that it will not result in slackness of joints when the two pieces are screwed together.

2.1.2. The taps and dies shall be used only for straightening screw threads which have becoming bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the watertight joint. The screw threads for tube and fitting shall be protected form edge until they are fitted.

2.1.3. In jointing the tubes, the inside of the socket and the screwed end of the tubes shall be oiled and smeared with white or red lead and wrapping around with a few turns of fine spun yarn round the screwed end of the tube. The end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all times free from dust, and dirt during fixing. Burr from the joints shall be removed after screwing. After laying the open ends of the pipes shall be temperately plugged to prevent access of water, soil, or any other foreign matter.

2.1.4. Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anti-corrosive paint to prevent corrosion.

2.2. Fixing of tube fittings to wall ceiling & floors.

2.2.1. In case of fixing of tubes and fittings to the walls or ceilings, these shall run on the surface of the wall, or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps keeping the pipes about 15 mm. clear of the wall. When it is found necessary to pattern, holder clamps keeping the pipes about 15 mm. clear of the .wall. When it is found necessary to conceal the pipes and when specified so, chasing may be adopted or pipe fixed inducts or recesses etc. provided that there is sufficient space to work on the pipe with usual tools. The pipe shall not ordinarily be buried in walls or solid floors, where unavoidable, pipe may be buried for short distances provided that adequate protection is given against damage and where so required joints are not buried. Where required M.S. tube sleeve shall be fixed at a place a pipe is peasant through a wall or floor for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime. Under the floors, the pipe shall be laid in layer of sand filling.

2.2.2. All pipes and fittings shall be fixed truly vertical and horizontal unless unavoidable. The pipes shall be fixed to walls with standard pattern clamps of required size and shape, one end of which shall be properly plugged or cemented into walls with cement mortar 1:3 (1 cement : 3 coarse sand) and the other tightened round the pipes to hold it securely. These clamps shall be spaced at regular intervals in straight lengths at 2 MC/C interval in horizontal run and 2.5 m. interval in vertical run. For pipe of 15 mm. dia. up to 25 mm. dia the holes in the walls and floors shall be made by drilling with chisel or jumper and not by dismantling the brick work or concrete. However for bigger diameter pipes the holes shall be carefully made cement : 3 coarse sand), and properly finished to match the adjacent surface.

2.2.3. Pipes to be laid over ground shall be supported on supports. Support details shall have to be approved by Engineer in charge.

2.3. Testing of joints :

2.3.1. After laying and jointing, the pipes and fillings shall be inspected under working conditions of pressure and flow. Any joints found liken shall be redone, and ail leaking pipes removed and replaced without extra cost.

2.3.2. The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg./Sq cm. The pipe shall be slowly and carefully charged with water allowing all air to escape and avoiding all shocks and water hammer. The draw off takes and stop cock shall then be closed and specified hydraulic pressure shall be applied gradually The pressure gauge must be accurate. The pipes and fittings shall be tested in sections as the work laying proceeds, keeping, the joints exposed for inspection during the testing.

3.0. Mode of measurements and payment

3.1. The description of e, item shall, unless otherwise stated be held to include where necessary. conveyance, and delivery, handling, unloading, storing fabrication, hoisting, all labour for finishing to required shape and size, setting, fitting in position straight, cutting and waste return of packing etc.

3.2. The length shall be measured on running meter basis of finished work. The length shall be taken along the centre line of the pipe and fittings. The pipes fixed to wall, ceiling. floors etc shall be measured and paid under this item.

3.3. All the work shall be measured in decimal system as fixed in its place, subject to tolerance given below unless otherwise stated.

(i) Dimension shall be measured to the nearest 0 01 meter. (ii) Area shall be worked out to the nearest 0.01 sq. meter.

3.4. All measurements of cutting shall unless otherwise stated by held to include the consequent waste

3.5. In case of fitting of unequal bore, the targets bore shall be measured for the test.

3.6. Testing of pipe lines fittings, and joints include for providing all plant appliances necessary for obtaining access to the work to be tested an carrying out the tests

3.7. The rate includes galvanised steel tubing with .screwed socket joints. to gather with all fittings (such as bends, sockets springs, elbows, test, crosses, short pieces, clamps and plugs, unions etc.) and fixing complete with clamping wall hooks, wooden plug etc. and also curing, screwing and waste and for making forged (or hand made) bends on piping as required. Connector shall be inserted where required or directed. The rate also includes cutting through walls, floors etc. and their making good and painting exposed threads with anti-corrosive paint as above and testing where tubes are to be fixed to wall ceiling and flooring, the rates shall not include painting of pipes, providing sleeves and sand filling under floor for which separate payment shall be made.

The rate shall be for a unit of Rmt.

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Item No. 2 :- Supplying, fixing, testing and commissioning of butterfly valve PN 1.6, bronze/ Gun metal seat duly ISI marked complete with Nuts, Bolts, washers, gaskets, conforming to IS 13095 of following sizes of following dia.Size : 80 mm

The rate shall be for a unit of one No.

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Item No. 3 Providing and fixing Sprinkler's , 68 Deg. C with piping, support, etc.Sprinkler heads shall be provided at approximate spacing to cover 12 m^2 per Sprinkler head. The spacing shall however, be in conformity with the drawings and properly coordinated with Electrical Fixtures, Ventilation Ducts and Grills and other services along the ceiling.

Sprinkler heads shall be Chrome finished Brass/Gunmetal with quartz bulb with a temperature rating of 68°C. Sprinkler heads shall be of Pendent type and quality approved by the local fire brigade Authority. The inlet shall be screwed with Teflon tape. Sprinkler heads shall be pendent, recessed or special application side wall Sprinkler types as shown in drawings. All Sprinklers should have the Specifications, as far as maximum possible as per NFPA requirements and shall be UL/FM approved.

Contractor shall supply spare Sprinkler Heads of each type as per requirement and one Spanner for each type of sprinkler neatly installed in a steel box with glass shutters at locations approved by the Engineer- in-Charge.

The rate shall be for a unit of one No.

Item No. 4 Providing and fixing Fire Extinguisher's, ISI marked as following.

(a)Supply, Filling and Fixing of following type of approve make fire extinguishers Dry powder type, Capacity 6 Kg. (conforming to IS:2171 with cylinder fully charged).

The Dry powder type fire extinguisher with fully charged cylinder shall have Capacity of 6 Kg. and shall conforming to IS:15683 complete with powder and charged including with fixing brackets, fitted with gun metal cap and discharge hose and squeeze grip nozzle.

The consolidated item shall be carried out as directed by Engineer in charge. The rate shall be for a unit of one No.

(b)Supply and installation, testing and commissioning of CO2 type fire extinguisher with 4.5 kg. Capacity complete with installation brackets confming to IS15683 with ISI mark

The CO2 type fire extinguisher shall be ISI mark with initial charge with high pressure cylinder, complete with wheel type valve, internal discharge tube, with high pressure discharge hose with horn and suspension brackets. The extinguisher shall have ISI mark of 15683 and Capacity shall be 4.5 Kg. The consolidated item shall be carried out as directed by Engineer in charge.

The rate shall be for a unit of one No.

Item No. 5 Providing and fixing Signages on SS Sheet

This item is executed as per instruction of engineer in charge. This item is measured in Sq inch.

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(6) Supply and installation, testing and commissioning of of Intelligent addressable manual call point (MCP) & Hooter Flasher unit .

Item should be executed as per directed by Engineer-in-charge. Item should be paid on No basis.

Item No. 7 Supply & Fixing Gun Metal Single Ball acting air realease valve with isolation ball valvev 25 NB

This item is executed as per instruction of engineer in charge The rate shall be for a unit of one No. The offered valve is made from stainless steel material suited for protecting fire protection systems from air lock

Item No. 8 Supply & Installation of crossman Flush /Drain Ball Valve arrangements with 25 NB.

System The standard Flush drain Valves consists of one higher size flange for Tank Bottom Mounting in case of flanged designed and size to size in case of welded design Flush Bottom Valves with Quarter turn Pneumatic Rotary Actuator and accessories optionally selected as Solenoid Valve. Position Indicator for on-off, with 3-position system for coarse and fine filling and system hook-up with E/P positioner for controlled process flushing

Item No. 9 Supply installation testing and commissioning of 150NB sprinkler alarm valve with isolation butterfly valve and all necessary trim set and alarm gang .

150 NB Sprinkler Alarm Valve with water motor gong bell and trims as required, pressure gauges, drain valves, ball valves, check valves, strainers etc. Alarm valve shall be UL Listed.(nationally recognized Standards) having features of Automatic Function

Item No. 10 Supply Installation Testing & commissioning of 100 nb zone control valve assembly with gear operated butterfly valve pressure guage Test Drain Ball Valve & flow switch for future connection

Zone Control Valve is a system designed to separate the area in case of maintenance and to get the indication of fire zone on a combination of Butterfly valve, Flow Switch, Pressure Gauge and Test & Drain Valves.

Item No. 11 Supply, Installation, testing & commissioning of 100 mm dial size 0 to 16 Kg/cm2 range, pressure gauges with all accessories like niddle valve etc. As per IS:3624

Item No. 12 Supply, Installation, testing & commissioning of Pressure Switches for pressure range of 0 to 16 Kg/cm2 with all accessories like niddle valve etc.

FIRE ALARM SYSTEM

1.4 GENERAL INSTRUCTIONS

a) Protect from moisture by using appropriate coverings. Store at dry interior locations.

b) Sequence work to avoid interferences with building finishes and installation of other products.

c) Supply as maintenance stock, consumable devices, components as recommended by Supplier, but shall not be less than two units of each type/ rating of installed consumable material/ component/ device.

d) For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for #18 to #12 AWG wire. Terminal blocks that are permanently fixed are not acceptable.

1.5 WARRANTY

A. ***The fire alarm control panel, voice panels and any head-end equipment shall have a manufacturer's warranty of a minimum of 12 months.***

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1.6 APPLICABLE STANDARDS AND PRODUCT APPROVALS

A. The specifications and standards listed below form a part of this specification. The system

shall fully comply with the latest issue of these standards, if applicable.

B. National Fire Protection Association (NFPA) - USA:

NFPA 12	Extinguishing Systems (low and high)
NFPA 12A	Halon 1301 Extinguishing Systems
NFPA 13	Sprinkler Systems
NFPA 15	Water Spray Systems
NFPA 16	Foam / Water Deluge and Spray Systems
NFPA 17	Dry Chemical Extinguishing Systems
NFPA 17A	Wet Chemical Extinguishing Systems
NFPA 2001	Clean Agent Extinguishing Systems
NFPA 70	National Electric Code
NFPA 90A	Air Conditioning Systems
NFPA 92A	Smoke Control Systems
NFPA 92B	Smoke Management Systems in Malls, Atria, Large Areas
NFPA 72	National Fire Alarm Code
NFPA 101	Life Safety Code

C. Underwriters Laboratories Inc. (UL) - USA:

UL 268, 7th Edition	**Smoke Detectors for Fire Protective Signaling Systems**
UL 864, 10th Edition	**Control Units for Fire Protective Signaling Systems**
UL 2572	Mass Notification Systems
UL 217	Smoke Detectors, Single and Multiple Station
UL 228	Door Closers - Holders for Fire Protective Signaling Systems
UL 268A	Smoke Detectors for Duct Applications
UL 521	Heat Detectors for Fire Protective Signaling Systems
UL 464	Audible Signaling Appliances
UL 38	Manually Actuated Signaling Boxes
UL 1481	Power Supplies for Fire Protective Signaling Systems
UL 346	Waterflow Indicators for Fire Protective Signaling Systems
UL 1076	Control Units for Burglar Alarm Proprietary Protective Signaling Systems
UL 1971	Visual Notification Appliances
UL 2017	Standard for General-Purpose Signaling Devices and Systems
UL60950	Safety of Information Technology Equipment

D. Factory Mutual – USA

E. Local and State Building Codes.

F. All requirements of the Authority Having Jurisdiction (AHJ).

G. The system shall be certified for seismic applications in accordance with the International Building Code (IBC). The basis for qualification of seismic approval shall be via shake table testing.

H. The System shall be FM 6320 (Factory Mutual) approved as a Gas Detection system when employed with the 4-20 monitor module and industry standard 4-20 mA gas detectors.

PART 2.0 PRODUCTS

2.1 MAIN FIRE ALARM CONTROL PANEL OR NETWORK NODE:

A. Main FACP or network node shall contain a microprocessor based Central Processing Unit (CPU) and power supply. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. In conjunction with intelligent Loop Control Modules and Loop Expander Modules, the main FACP shall perform the following functions:

1. Supervise and monitor all intelligent addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions.
2. Supervise all initiating signaling and notification circuits throughout the facility by way of connection to addressable monitor and control modules.
3. Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed.

Features

• Certified for seismic applications when used with the appropriate seismic mounting kit.
• Approved for Marine applications when used with listed compatible equipment.
One isolated intelligent Signaling Line Circuit (SLC) Style 4, 6 or 7.
• Up to 159 detectors and 159 modules per SLC; 318 devices maximum. –
Detectors can be any mix of ion, photo, thermal, or multi-sensor; wireless detectors are available for use with the FWSG. – Modules include addressable pull stations, normally open contact devices, two-wire smoke detectors, notification, or relay; wireless modules are available for use with the FWSG.
• Optional FWSG Wireless SWIFT Gateway supports wireless SLC devices.
• Standard 80-character display.
• Network options: – High-speed network for up to 200 nodes
– Standard network for up to 103 nodes . Up to 54 nodes when DVCEM is used in network paging.
• A power supply with four Class A/B built-in Notification Appliance Circuits (NAC). Selectable System Sensor, Wheelock, or Gentex strobe synchronization.
• Built-in Alarm, Trouble, Security, and Supervisory relays. • VeriFire® Tools online or offline programming utility. Upload/ Download, save, store, check, compare, and simulate panel databases. Upgrade panel firmware.
• Auto programming and Walk Test reports.
• Multiple central station communication options: – Standard UDACT – Internet – Internet/GSM • 80-character remote annunciates (up to 32).
• EIA-485 annunciates, including custom graphics. • Printer interface (80-column and 40-column printers). • History file with 800-event capacity in nonvolatile memory, plus separate 200-event alarm-only file.
System Capacity and General Operation

System Capacity and General Operation

A. The FACP shall can communicate on a peer-to-peer, inherently regenerative

communication format and protocol. The network shall support communication speed up to 100 Mbps and support up to 200 panels / nodes per network.

B. The control panel shall be capable of expansion via up to 10 SLC loops. Each loop shall support minimum 300 analog/addressable devices for a system capacity of 3000 points. The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit 600-character liquid crystal display, individual, color coded system status LEDs, and a QWERTY keypad for the control of the fire alarm system. Said LCD shall also support graphic bit maps capable of displaying the company name and logo of either company.

C. All programming or editing of the existing program in the system shall be achieved without interrupting the alarm monitoring functions of the fire alarm control panel.

D. The FACP shall be able to provide the following software and hardware features:

1. Pre-signal and Positive Alarm Sequence: The system shall provide means to cause alarm signals to only sound in specific areas with a delay of the alarm from 60 to up to 180 seconds after start of alarm processing. In addition, a Positive Alarm Sequence selection shall be available that allows a 15-second time period for acknowledging an alarm signal from a fire detection/initiating device. If the alarm is not acknowledged within 15 seconds, all local and remote outputs shall automatically activate immediately.
2. Smoke Detector Pre-alarm Indication at Control Panel: To obtain early warning of incipient or potential fire conditions, the system shall support a programmable option to determine system response to real-time detector sensing values above the programmed setting. Two levels of Pre-alarm indication shall be available at the control panel: alert and action.
3. Alert: It shall be possible to set individual smoke detectors for pre-programmed pre-alarm thresholds. If the individual threshold is reached, the pre-alarm condition shall be activated.
4. Action: If programmed for Action and the detector reaches a level exceeding the pre-programmed level, the control panel shall indicate an action condition. Sounder bases installed with either heat or smoke detectors shall automatically activate on action Pre-Alarm level, with general evacuation on Alarm level.
5. The system shall support a detector response time to meet world annunciation requirements of less than 3 seconds.
6. Device Blink Control: Means shall be provided to turn off detector/module LED strobes for special areas.
7. NFPA 72 Smoke Detector Sensitivity Test: The system shall provide an automatic smoke detector test function that meets the sensitivity testing requirements of NFPA 72.
8. Programmable Trouble Reminder: The system shall provide means to automatically initiate a reminder that troubles exist in the system. The reminder will appear on the system display and (if enabled) will sound a piezo alarm.
9. On-line or Off-line programming: The system shall provide means to allow panel programming either through an off-line software utility program away from the panel or while connected and on-line. The system shall also support upload and download of programmed database and panel executive system program to a Personal Computer/laptop. A single change to one CPU database shall not require a database download to other CPUs.
10. History Events: The panel shall maintain a history file of atleast last 5000 events, each with a time and date stamp. History events shall include all alarms, troubles, operator actions, and programming entries. **The control panels shall also maintain**

a 1000 event Alarm History buffer, which consists of the 1000 most recent alarm events from the 5000 event history file.

11. Smoke Control Modes: The system shall provide means to perform Fire Smoke Control Station mode. This mode controls all dampers, smoke extraction fan, fresh air supply fans, etc during Fire condition. Smoke Control to meet NFPA-92A and 90B and HVAC mode to meet NFPA 90A.
12. **The system shall provide means for all SLC devices on any SLC loop to be auto programmed into the system by specific address.** The system shall recognize specific device type ID's and associate that ID with the corresponding address of the device.
13. Passwords and Users: The system shall support two password levels, master and user. Up to 9 user passwords shall be available, each of which may be assigned access to the programming change menus, the alter status menus, or both. Only the master password shall allow access to password change screens.
14. Block Acknowledge: The system shall support a block Acknowledge for Trouble Conditions
15. Sensitivity Adjust: The system shall provide Automatic Detector Sensitivity Adjust based on Occupancy schedules including a Holiday list of up to 15 days.
16. Environmental Drift Control: The system shall provide means for setting Environmental Drift Compensation by device. When a detector accumulates dust in the chamber and reaches an unacceptable level but yet still below the allowed limit, the control panel shall indicate a maintenance alert warning. When the detector accumulates dust in the chamber above the allowed limit, the control panel shall indicate a maintenance urgent warning.
17. Custom Action Messages: The system shall provide means to enter up to 100 custom action messages of up to 160 characters each. It shall be possible to assign any of the 100 messages to any point.
18. Local Mode: If communication is lost to the central processor the system shall provide added survivability through the intelligent loop control modules. Inputs from devices connected to the SLC and loop control modules shall activate outputs on the same loop when the inputs and outputs have been set with point programming to participate in local mode or when the type codes are of the same type: that is, an input with a fire alarm type code shall activate an output with a fire alarm type code.
19. Read status preview - enabled and disabled points: Prior to re-enabling points, the system shall inform the user that a disabled device is in the alarm state. This shall provide notice that the device must be reset before the device is enabled thereby avoiding activation of the notification circuits.
20. Custom Graphics: When fitted with an LCD display, the panel shall permit uploading of a custom bit-mapped graphic to the display screen.
21. **Group Decision Making by Smoke Detectors: The system shall provide means to link one detector with minimum two more detectors in group decision making. The group of minimum three detectors shall work in tandem to take fast and genuine alarm decision mitigating the risk of false alarm. There shall be no requirement of cross zoning or mandatory sequential address setting in the detectors to achieve this function. This shall be a built-in intelligence in the system to take fast & reliable decision on genuine alarm triggering. The alarm event shall be a result of group of detector chamber readings considered as a consolidated alarm signal.**
22. ACTIVE EVENT: The system shall provide a Type ID called FIRE CONTROL for purposes of air-handling shutdown, which shall be intended to override normal operating automatic functions. Activation of a FIRE CONTROL point shall cause the control panel to (1) initiate the monitor module Control-by-Event, (2) send a message to the

panel display, history buffer, installed printer and annunciators, (3) shall not light an indicator at the control panel, (4) Shall display ACTIVE on the LCD as well a display a FIRE CONTROL Type Code and other information specific to the device.

23. NON-FIRE Alarm Module Reporting: A point with a type ID of NON-FIRE shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display a message at the panel LDC. Activation of a NON-FIRE point shall activate control by event logic but shall not cause any indication on the control panel.
24. Mass Notification Override: The system shall be UL 2572 listed for Mass Notification and shall be capable, based on the Risk Analysis, of being programmed so that Mass Notification/Emergency Communications events take precedence over fire alarm events.
25. Security Monitor Points: The system shall provide means to monitor any point as a type security.
26. One-Man Walk Test: The system shall provide both a basic and advanced walk test for testing the entire fire alarm system. The basic walk test shall allow a single operator to run audible tests on the panel. All logic equation automation shall be suspended during the test and while annunciators can be enabled for the test, all shall default to the disabled state. During an advanced walk test, field-supplied output point programming will react to input stimuli such as Control By Event and logic equations. When points are activated in advanced test mode, each initiating event shall latch the input. The advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device and wiring operation/verification.
27. Control By Event Functions: CBE software functions shall provide means to program a variety of output responses based on various initiating events. The control panel shall operate CBE through lists of zones. A zone shall become listed when it is added to a point's zone map through point programming. Each input point such as detector, monitor module or panel circuit module shall support listing of up to 10 zones into its programmed zone map.
28. Permitted zone types shall be general zone, releasing zone and special zone. Each output point (control module, panel circuit module) can support a list of up to 10 zones including general zone, logic zone, releasing zone and trouble zone. It shall be possible for output points to be assigned to list general alarm. Non-Alarm or Supervisory points shall not activate the general alarm zone.
29. 1000 General Zones: The system shall support up to 1000 general purpose software zones for linking inputs to outputs. When an input device activates, any general zone programmed into that device's zone map will be active and any output device that has an active general zone in its map will be active. It shall also be possible to use general zone as arguments in logic equations.
30. **1000 Logic Equations**: The system shall support up to 1000 logic equations for AND, OR, NOT, ONLY1, ANYX, XZONE or RANGE operators that allow conditional I/O linking. When any logic equation becomes true, all output points mapped to the logic zone shall activate.
31. 100 trouble equations per device: The system shall provide support for up to 100 trouble equations for each device, which shall permit programming parameters to be altered, based on specific fault conditions. If the trouble equation becomes true, all output points mapped to the trouble zone shall activate.
32. Control-By-Time: A time based logic function shall be available to delay an action for a specific period of time based upon a logic input with tracking feature. A latched version shall also be available. Another version of this shall permit activation on specific days of the week or year with ability to set and restore based on a 24 hour time schedule on any day of the week or year.

33. Multiple agent releasing zones: The system shall support up to 10 releasing zones to protect against 10 independent hazards. Releasing zones shall provide up to three cross-zone and four abort options to satisfy any local jurisdiction requirements.
34. Alarm Verification, by device, with timer and tally: The system shall provide a user-defined global software timer function that can be set for a specific detector. The timer function shall delay an alarm signal for a user-specified time period and the control panel shall ignore the alarm verification timer if another alarm is detected during the verification period.

E. Central Processing Unit

1. The Central Processing Unit shall contain and execute all control-by-event (including Boolean functions including but not limited to AND, OR, NOT, ANYx, and CROSSZONE) programs for specific action to be taken if an alarm condition is detected by the system. Such control-by-event programs shall be held in non-volatile programmable memory, and shall not be lost with system primary and secondary power failure.
2. The Central Processing Unit shall also provide a real-time clock for time annotation, to the second, of all system events. The time-of-day and date shall not be lost if system primary and secondary power supplies fail.
3. The CPU shall be capable of being programmed on site without requiring the use of any external programming equipment. Systems that require the use of external programmers or change of EPROMs are not acceptable.
4. The CPU shall provide an RS-232 interface between the fire alarm control panel and the UL Listed Electronic Data Processing (EDP) peripherals.
5. The CPU shall provide two RS-485 ports for the serial connection to annunciation and control subsystem components.
6. The RS-232 serial output circuit shall be optically isolated to assure protection from earth ground.
7. In the event of CPU failure, all SLC loop modules shall fallback to **degrade mode**. **Systems not offering degrade mode shall offer Redundant CPU**. Such degrade mode shall treat the corresponding SLC loop control modules and associated detection devices as conventional two-wire operation. Any activation of a detector in this mode shall automatically activate associated Notification Appliance Circuits.

F. Display

1. The system display shall provide a **80-character** backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide eleven Light-Emitting-Diodes (LEDs) that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM, SECURITY, SUPERVISORY, SYSTEM TROUBLE, OTHER EVENT, SIGNALS SILENCED, POINT DISABLED, CONTROLS ACTIVE, and CPU FAILURE.
2. **These characters shall be only for fire alarm / trouble information and not for Logo or other purpose. It shall be UL Listed. Repeater panel displays in FACP is not allowed unless until approved by UL**
3. The system display shall provide a QWERTY keypad for ease of operation.
4. The keypad shall have control capability to command all system functions, entry of any alphabetic or numeric information, and **field programming without the use of any external equipment or laptop**. Two different password levels with up to ten (one Master and nine User) passwords shall be accessible through the display interface assembly to prevent unauthorized system control or programming.

2.4 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices – General

Addressable smoke and thermal detectors shall provide dual alarm and power/polling bi-colour LEDs. Both LEDs shall flash green under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady red illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.

SLC LOOP:
• Two-wire SLC loop connection
• Unit uses base for wiring
• Compatible with FlashScan® and CLIP protocol systems
• Stable communication technique with noise immunity
ADDRESSING: • Addressable by device
• Rotary, decimal addressing
ARCHITECTURE: • Sleek, low-profile, stylish design
• Unique single-source design to respond quickly and dependably to a broad range of fires • Integral communications and built-in device-type identification
• Built-in tamper resistant feature
• Remote test feature from the panel
• Walk test with address display
• Built-in functional test switch activated by external magnet
• Removable cover and insect-resistant screen for simple field cleaning
• Expanded color options
OPERATION: •
Designed to meet UL 268 7th Edition
• Factory preset at 1.5% nominal sensitivity for panel alarm threshold level
• LED "blinks" when the unit is polled (communicating with the fire panel) and latches in alarm.
• Low standby current
MECHANICALS:
• Sealed against back pressure •
SEMS screws for wiring of the separate base
• Designed for direct-surface or electrical-box mounting • Plugs into separate base for ease of installation and maintenance

1. Addressable devices shall provide an address-setting means using **rotary decimal switches**. Addressable devices that require the address be programmed using a programming utility are not an allowable substitute.
2. Addressable devices shall use simple to install and maintain decade, decimal address switches.
3. Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute. Addressable devices that require the address be programmed using a special tool or programming utility are not an allowable substitute.
4. Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel Signaling Line Circuits.**Addressable smoke and thermal detectors shall provide dual alarm and power/polling bi-colour LEDs.** Both LEDs shall flash green under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady red illumination by the control panel, indicating that an alarm

condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.

7. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. The panel on a time-of-day basis shall automatically adjust sensitivity.
8. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72.
9. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base options shall include a sounder base with a built-in (local) sounder rated at 85 DBA minimum, a relay base and an isolator base designed for Style 7 applications. The system shall also support an intelligent programmable sounder base, the programmable sounder base shall be capable of providing multiple tones based on programming and at a minimum be capable of providing a Temp-4 tone for CO (Carbon Monoxide) activation and a Temp-3 tone for fire activations and be capable of being synchronized with other programmable sounder bases and common area notification appliances; 85 DBA minimum.
10. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (PHOTO, THERMAL).
11. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.
12. Addressable devices shall store an internal identifying code that the control panel shall use to identify the type of device.
13. A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.
14. Addressable modules shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box. An optional surface mount Lexan enclosure shall be available.
15. **Detectors / Bases with connection terminals exposed to Ceiling / False Ceiling shall be provided with Protective Insulation of the same make as of Detectors.**

B. Addressable Manual Call Point (Break Glass / Pull Down Type)

1. Addressable manual call point shall send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual fire alarm boxes shall be constructed of Lexan / ABS Plastic with clearly visible operating instructions provided on the cover. The word FIRE / Fire Sign shall appear on the front of the stations.
4. Voltage 220-360 V
5. Frequency 50-60 Hz
6. Power 550 W

E. Intelligent Multi Criteria Detector

The intelligent multi-criteria detector shall be an addressable device that is designed to monitor a minimum of photoelectric and thermal technologies in a single sensing device. The detector design shall allow a wide sensitivity window, 0.5 to 4.0% per foot obscuration. This detector shall utilize advanced electronics that react to slow smoldering fires and thermal properties all within a single sensing device.

1. **Designed to meet UL268, 7th Edition**
2. The microprocessor design shall be capable of selecting the appropriate sensitivity levels based on the environment type it is in (office, manufacturing, kitchen etc.) and then have the ability to automatically change the setting as the environment changes (as walls are moved or as the occupancy changes).
3. The intelligent multi criteria detection device shall include the ability to combine the signal of the thermal sensor with the signal of the photoelectric signal in an effort to react hastily in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a false alarm condition by examining the characteristics of the thermal and smoke sensing chambers and comparing them to a database of actual fire and deceptive phenomena.

F. Intelligent Thermal Detectors

The intelligent thermal detectors shall be addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. **A high heat thermal detector rated at 190 degrees Fahrenheit (87.8 degrees Celsius) shall also be available.** The thermal detectors shall connect via two wires to the fire alarm control panel signaling line circuit.

1. Modern profile with White color for improved aesthetics.
2. Advanced thermal technology for fast response.
3. Fixed temperature model factory preset to 135°F
4. Rate of Rise model preset to 15°F/min
5. High temperature model factory preset to 190°F
6. Low standby current. 200 micro Amps @ 24 VDC
7. Two-wire SLC connection.
8. Rotary, decimal addressing
9. Dual bi-color LED design providing 360° viewing angle.LEDs blink green in normal condition and illuminate steady red on alarm
10. Remote test feature from the panel.
11. Walk test with address display
12. Built-in functional test switch activated by external magnet.
13. Built-in tamper-resistant feature.
14. Sealed against back pressure.
15. Optional relay, isolator, and sounder bases.

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs.
2. The IDC zone shall be suitable for Class A or Class B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

L. Two Wire Detector Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device)
2. The IDC zone may be wired for Class A or B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

M. Addressable Control Module

1. Addressable control modules shall be provided to supervise and control the operation of one conventional circuit of compatible Notification Appliances, 24 VDC powered, polarized audio/visual notification appliances
2. The control module NAC may be wired for Class A/B with a current rating of 2 Amps
3. Audio/visual power shall be provided by a separate supervised circuit from the main fire alarm control panel or from a supervised UL listed remote supply.

N. Addressable Releasing Control Module

1. An addressable releasing module shall be available to supervise and control compatible releasing agent solenoids
2. The module shall operate on a redundant protocol for added protection.
3. The module shall be configurable for Class A/B and support one 24 volt or two 12 volt solenoids.

Features:

- SEMS screws for easing wiring
- Panel controlled status LED
- Analog communications
- Rotary address switches
- Low standby current
- Mounts in standard 4″ junction box

. Addressable Two-In / Two-Out Monitor/Relay Module

1. An addressable Two-In / Two-Out module shall be available.
2. The two-in/two-out module shall provide two Class B/Style B dry-contact input circuits and two independent Form-C relays rated at up to 3 Amps resistive and up to 2.0 Amps inductive.

R. Isolator Module

Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building.

1. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit

(disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.

2. The isolator module shall not require address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
3. The isolator module shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.
4. **If Isolator Bases are proposed, Vendor needs to consider Isolator base for all detectors**

U. Advance Speaker Strobes

1. The Speaker Strobe appliance shall be listed to UL 1971 and UL 1480 and be approved for fire protective signaling systems. It shall be a dual-voltage transformer speaker strobe capable of operation at 25.0 or 70.7 nominal Vrms. The speaker shall have a frequency range of 400 to 4,000 Hz and shall have an operating temperature between 32°F and 120°F. It shall mount to a 4 x 4 x 2 1/8-inch back box.
2. A universal mounting plate shall be used for mounting ceiling and wall speaker strobe products. The notification appliance circuit and amplifier wiring shall terminate at the universal mounting plate. Also, Advance speaker strobes shall be powered from a non-coded notification appliance circuit output and shall operate on a nominal 12 or 24 volts (includes fire alarm panels with built in sync). 12-volt rated notification appliance circuit outputs shall operate between 8.5 and 17.5 volts; 24-volt rated notification appliance circuit outputs shall operate between 16.5 to 33 volts.
3. Speaker strobes shall be plug-in and shall have the ability to check wiring continuity via a shorting spring on the universal mounting plate. The shorting spring shall also provide tamper resistance via an open circuit if the device is removed. Speaker strobe design shall isolate speaker components to reduce ground fault incidents.
4. The speaker strobe shall have power taps (from ¼ watt to 2 watts) and voltage that are selected by rotary switches. All models shall have a maximum sound output of 86 dB at 10 feet and shall incorporate an open back construction. The strobe shall consist of a xenon flash tube with associated lens/reflector system and operate on either 12V or 24V. The strobe shall also feature selectable candela output, providing options for 15 or 15/75 candela when operating on 12V and 15, 15/75, 30, 75, 110, or 115 when operating on 24V. The strobe shall comply with NFPA 72 and the Americans with Disabilities Act requirement for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range.
5. All notification appliances shall be backward compatible.
6. Strobe lights shall meet the requirements of the ADA, UL Standard 1971and be fully synchronized

<u>Features</u>

- Mounting plate included for compatibility with a wide range of back box sizes
- Three field selectable candela settings: 15, 75, and 115
- Easy to use rotary dials for selection of candela and horn settings
- Built in synchronization feature keeps strobes in sync for up to 30 minutes
- Strobes Listed to UL 1638; Horns Listed to UL 464
- Horn settings on the horn strobe model include high and low volume, continuous or temporal 3 tone • Round trim ring available for ceiling mount applications
- Universal Fire symbol is language independent
- Trim plate allows mini horn to mount to a variety of backboxes and fit aesthetically with the horn strobe and strobe