

TROMPSBURG SPECIAL SCHOOL

FIRE PROTECTION

SPECIFICATION

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TROMPSBURG SPECIAL SCHOOL

FIRE PROTECTION SPECIFICATION

1 GENERAL SPECIFICATION

GENERAL

The drawings form part of the project specification and shall be read in conjunction with the project specification.

Conflicts, errors or discrepancies found in this specification, corresponding bills of quantities or drawings shall be brought to the Engineer's attention for resolution. Where required the contractors design shall be used for discrepancies in the bill quantities or where sum items are allowed.

Any deviations from the specifications, bills of quantities drawings and/or equipment specified shall be listed together with the alternatives offered and shall be submitted as part of the tender. If no deviations are listed, it will be assumed that the Tenderer comply with all the relevant technical parts of this specification.

All installations shall be complete in all respects and the Contractor shall allow for the completion and successful operation of the complete installation, irrespective of whether every separate item is specified or not.

The contractor shall design and price the domestic pumpset system to adhere to the following:

The building is to be equipped and protected by means of conventional fire protection installation designed, supplied, installed, tested and commissioned in accordance with in the relevant SANS requirements and the requirements of the Local Authority having Jurisdiction. The remainder of the fire safety services installation (**statutory fire signage and fire stopping**) is to be designed, supplied, installed, tested and commissioned in accordance with in the relevant SANS requirements and the requirements of the Local Authority having Jurisdiction.

This specification sets out the minimum technical requirements for quality and workmanship for all necessary engineering, design, management and co-ordination, supply of all drawings, manuals and documents, supply of materials plant and labour for the manufacture, construction, erection, installation, testing and commissioning of the conventional fire protection, fire storage tank and fire booster plant system required for this project.

2. SITE AND SITE INSPECTION

The site is situated in Trompsburg Special School-Hostel in Johannesburg

Tenderers are advised to visit the site and acquaint themselves with the nature and extent of the work involved before submitting their tenders.

3. NOTES ON THIS SPECIFICATION

This specification must be read in conjunction with the specification provided by the Civil Engineer for all underground piping. This specification provides guidelines for underground piping networks but does not supersede the requirements of the Civil Engineer or their relevant specification. Where underground piping is specified this must be installed with the relevant guidelines outlined in the Civil Engineer's specification.

The standard specifications included define the standard of equipment and materials as well as the quality of the services required for the various sections of the installation.

Not all the clauses in this section of the standard specification shall necessarily be applicable on this project. Refer to the detailed or material specification for materials and equipment to be used and the Civil Engineer's specification where applicable.

The contractor shall at all times adhere to this specification unless otherwise specified on the drawings and/or in this detailed specification.

In instances where this specification differs on any way or form from the engineering drawings this must be brought to engineer's attention during tender stage and be clarified immediately.

Failing this. It shall be at the engineer's discretion which form of documentation to proceed with without any further consequence to the project or pricing.

The engineers' drawings show broad principles of design, general arrangements and when read together with the specifications and the drawings of other disciplines and other contractors, they carry sufficient information to enable the contractor to determine how the installation is to be installed, operated, services and maintained.

Pipe sizes and possible positions are shown on the engineers' drawings strainers etc must adapt to these pipe sizes.

The contractor shall submit workshop drawings, samples, catalogues, performance characteristics etc., on all equipment, except when specifically included by the engineer.

The contractor shall take in situ measurements for installation of the equipment of the system and produce complete workshop drawings for fabrication and installation. These drawings shall be co-ordinated by the contractor with all other relevant equipment and services. Dimensions given on the engineers' drawings shall be adapted to suit the relevant measurements of the specific fittings and/or equipment.

4. DEFINITIONS AND ABBREVIATIONS

4.1 DEFINITIONS OF TERMS USED HEREIN:

"Provide": to supply, install and connect up, complete and ready for safe and regular operation particular work referred to unless specifically indicated or specified otherwise.

"Install" : to erect, mount and connect complete with all related accessories.

"Supply": to purchase, procure, acquire and deliver complete with all related accessories.

"Work": all labour, materials, equipment, apparatus, controls, accessories and other items required for proper and complete installation.

"Concealed": embedded in masonry or other construction, installed in furred spaces within double partitions or hung ceiling, in trenches, in crawl spaces or in enclosures.

"Exposed": not installed underground or "concealed" as defined above.

"Indicated", "Shown" or "Noted": as indicated, shown or noted on drawings and/or specifications.

"Similar" or "Equal": of approved manufacture, equal in materials, weight, size, design and efficiency of specified product.

"Approved", "Satisfactory", "Accepted" or "Directed": as approved, satisfactory, accepted or directed by the Engineer.

4.2 ABBREVIATIONS:

SANS 306-4: 2003	"Fire Extinguishing Installations and Equipment on Premises: Part 4 Specifications for Carbon Dioxide Systems"
SANS 347:2007	"Categorization and conformity assessment criteria for all pressure equipment"
SANS 10400	"The Application of National Building Regulations"
TWIN BOOSTER	Twin booster connection is for the fire brigade to boost the water supply in the event of a fire.
ICV	Inspection Control Valve
FHR	Fire Hosereel
FH	Fire Hydrant
FE	Fire Extinguisher
FIRE SHUTTER	Fire shutter is a closing gate /device to prevent the spread of fire by cutting off an area.
BMS	Building Management System
BGU	Break glass unit
Fixed Fire Protection	Fire hosereels, Fire hydrants, Fire extinguishers, statutory signage.

5. COMPLETION DATE

Completion dates are stipulated in the preliminaries included in this document. The Contractor will be required to keep up with the main contract in accordance with the main contractor's program and to complete the mechanical installation concurrently with the main contract.

6. PROGRAM

Direct after acceptance of this tender, the Contractor shall submit time schedules for each activity for which he is responsible to the main contractor, for the inclusion thereof in the main contractor's program. This must be done by keeping in mind site conditions as per site visit

A copy of the program (and revisions thereto) shall be submitted to the Engineer well within time and at regular intervals.

The following items shall be programmed in consultation with the Main Contractor:

- Working drawings
- Approval of working drawing
- Equipment detail submission for approval
- Ordering of material
- Piping installation
- Approval of first fix
- Plant equipment installation
- Second fix
- Commissioning and testing
- Final inspection

7. FINISHING AND TIDYING

In view of the intense concentration of construction activities likely to be experienced during the contract period, progressive and systematic finishing and tidying will form an essential part of this contract. On no account, must spoil, rubble, materials, equipment or unfinished operations be allowed to accumulate in such a manner as to unnecessarily impede the activities of other and in the event of this occurring, the Employer shall have the right to withhold payment for as long as may be necessary in respect of the relevant works in the area(s) concerned without prejudicing the rights of others to institute claims against the Contractor on the ground of unnecessary obstruction.

Finishing and tidying must be done on a daily basis and not simply be left to the end of the contract. All finishing and tidying shall be carried out to the best advantage of the project as a whole.

8. SCAFFOLDING AND PLANT

All plant required for the execution of the contract shall be supplied by the Contractor under this contract.

The Contractor shall provide his own scaffolding and plant equipment. For installation purposes the Tenderer shall allow for his own lifting equipment, cranes etc. which may be necessary to complete the installation as none of these facilities will be available on site.

7. SUPERVISORY STAFF AND IDENTIFICATION

At all times while on the premises, all artisans and labour members of the mechanical contractors and subcontractor's staff will wear clothing adequately marked with the relevant contractor's name.

The work shall be done by, or at all times be under the personal supervision of a qualified artisan (or qualified technician) in the respective trade. Details of this operation and prospective work shall be given at the time of tendering in a covering letter.

8. QUALITY OF MATERIALS AND WORKMANSHIP

All materials shall be new, undamaged and free from rust or other defects. Only material of the best quality, which has been approved by the Engineer, shall be used.

The Contractor shall, upon the request of the Engineer, furnish him with documentary proof to his satisfaction that the material is of the quality specified. Samples of materials for testing, if required, shall be supplied by the Contractor, free of charge.

Where applicable, all material shall be in accordance with the relevant standard specifications of the South African Bureau of Standards and the British Standard Specifications.

The installation shall be carried out according to the latest modern engineering practices.

The Engineer reserves the right to reject any work or part thereof that, according to his judgement, does not meet the highest standards of material and workmanship and to enforce replacement of the work at the expense of the Contractor.

9. RATING OF EQUIPMENT

The Contractor shall supply the sizes and rating of all the equipment offered to the Engineer for approval prior to purchasing or ordering such equipment.

All equipment offered shall operate well within the manufacturer's ratings, and equipment to be operated beyond these limits will not be considered.

10. SPACE REQUIREMENTS AND ACCESS

Tenderers shall ensure that the equipment offered by them can be installed in the available space as shown on the drawings. Should it be found at a later stage that the equipment offered does not fit, all costs arising from the rectification of this problem shall be for the Contractor's account.

The equipment shall be installed in such a manner that complete access is provided for operating and maintenance purposes.

Tenderers shall also ensure that the equipment offered by them will pass through available building openings. Large equipment shall be made up in sections and each section shall be small enough for access through doors and other building openings. All additional costs involved for the modification of equipment or to change the maker of equipment in order to allow access shall be for the account of the Contractor.

11. REGULATIONS AND STANDARDS

The equipment, installation, commissioning and maintenance shall in all respects comply with the following authorities and regulations:

12. CODES, STANDARDS, SPECIFICATIONS AND REGULATIONS

The works shall comply with all the requirements and bylaws of the relevant local authorities. Where the proposed layouts, or any of the materials specified, etc., do not comply with the regulations, the matter shall immediately be brought to the attention of the Engineer in writing.

We confirm that the SANS 10400, SANS 52056, and SANS 10252 standard must be used as the basis for our rational wet services design.

The following design standards, codes, guidelines, norms and statutory requirements are to be utilised:

- Local Authority statutory requirements, codes and by-laws.

- The SANS 10252-Part 1:2016, Water supply installation for buildings.
- SANS 10400 – Parts P, T & W Code of Practice.
- SANS 1128, Part 1:2010, Components of underground and above-ground hydrant systems, as amended.
- SANS 543:2004, Fire hose reels (with semi-rigid hose). The SANS 10105-1 and SANS 1475-1 & 2, SANS 1086, SANS 11910, SANS 1475, SANS 10105-2 and SANS 1151, as amended.
- SANS 1200 PSL, Medium Pressure Pipelines.
- The SANS 1200 DB, Earthworks (Pipe Trenches).
- The SANS 1200 LB, Bedding (Pipes).
- Dolomite Conditions and allowance to comply with SANS 1936
- Statutory Fire Signage in accordance with SANS 1186-1. SANS 1186-3, SANS 1186-5 and installed in accordance with SANS 10400.
- Fire Stopping allowed and installed in accordance with SANS 10400.
- The Machinery and Occupational Safety Act of 1984.
- The National Fire Protection Association (NFPA) No. 12
- The SANS code of practice No 0142, Wiring of Premises, as amended.
- The Application of the National Building Regulations, SANS 10400, as amended.
- The Occupational Health and Safety Act, Act 85 of 1993, as amended.
- The appropriate South African National Standards governing building regulations.
- This detailed specification forming part of the tender documents.

All losses, costs or expenditures, which may arise as a result of negligence to comply with any regulation applicable to this service as specified above, shall be for the account of the Contractor.

Where trade names and references to catalogues are found in the specification, the intention is to set a particular standard of equipment. Where “other approved” equipment is specified, the Tenderer shall obtain written approval from the Engineer before he may deviate from the specified equipment. This approval must be obtained at tender stage.

The Contractor shall work strictly according to this specification and shall ensure that only the best quality material is used, and that the installation is handed over as a complete working system.

13. DRAWINGS

The dimensions and positions of equipment shown on the Engineer’s drawings are schematic and for tender purposes only. The drawings are not suitable for manufacturing purposes. The responsibility for dimensional and layout accuracy remains with the Contractor. The exact positions will be pointed out on site where necessary.

The following drawings shall be submitted by the Contractor to the Engineer for approval, within four (4) weeks of acceptance of the tender:

14. BUILDER’S WORK DRAWINGS

All building requirements are to be indicated on these drawings to meet the dimensional requirements of the equipment and materials to be installed by the Contractor.

15. MECHANICAL DRAWINGS

These are workshop and equipment layout drawings required for the manufacture and installation of equipment, showing detailed dimensions.

16. ELECTRICAL DRAWINGS

These include switchboard layouts, circuit diagrams, interconnection diagrams, and cable and equipment schedules.

Any work done by the Contractor without an approved drawing shall be at the Contractor's own risk, and any changes required to conform with the contract documents or co-ordinate his work with other trades, shall be for the account of the Contractor.

The approval of drawings by the Engineer shall not relieve the Contractor of his responsibilities to carry out the work in terms of the contract documents.

The mechanical and electrical drawings shall be updated during the contract period and shall be included in the operation manual at the end of the contract period as "as built" drawings.

17. OPERATION MANUALS AND MAINTENANCE INSTRUCTIONS

The Contractor shall submit three (3) copies of operation and maintenance manuals to the Engineer.

Manuals shall consist of:

- I. Comprehensive literature of the different components of the installation.
- II. Paper prints of all approved drawings and diagrams where applicable.
- III. Start-up and shutdown procedures.
- IV. Commissioning data of all equipment in tabulated form.
- V. Prescriptions for routine tests, which shall be performed by the user together with the time when such tests shall be, performed (e.g. pressure tests).
- VI. Schedule of apparatus and equipment complete with model numbers, optional extras, modifications, electrical requirements, etc.
- VII. Detailed daily, weekly, monthly, quarterly, bi-annual or annual preventative maintenance procedures where applicable.
- VIII. Manufacturer's catalogues.
- IX. List of spares for all equipment.
- X. Suppliers telephone numbers and addresses.
- XI. Wiring diagrams.
- XII. Test certificates.

The operation manuals shall be sturdily bound in a strong hard cover. Material in the manual shall be clear, legible and well-arranged and provided with an index.

In addition to the manuals the sub-contractors shall also provide a very simple operational instruction with areas/zones affected, on A4 or A5 paper sheet size, framed and mounted in sprinkler cabinets and adjacent to control console to which it pertains. This is to enable a non-technical person to operate the system. It shall give clear instructions of how to stop and start the plant/system, the use of the auxiliary/standby equipment, etc.

The above manuals shall be available three weeks before first handover / practical completion of the installation and no handover shall be considered without these manuals.

18. MAINTENANCE AND GUARANTEE

All equipment supplied and work done as part of this contract shall be maintained and guaranteed for a period of three years from date of practical completion.

The Contractor is responsible for all material and labour during this period.

The Contractor shall visit the installation uninterrupted and do the scheduled maintenance as prescribed in the operating instructions. On completion of the monthly visit a full report shall be prepared and submitted to the Engineer within seven (7) days from the visit.

In case of a breakdown, the Contractor shall react within reasonable time and repair the installation to the satisfaction of the Engineer. Should the Contractor, in the discretion of the Engineer, not react within reasonable time, the Engineer shall commission another Contractor and the cost thereof shall be recovered from the defaulting Contractor.

19. PAYMENT CLAIMS

- In addition to the conditions of contract, the Contractor shall attach to his application for payment an explanation of material cost and labour cost. The following information is required with respect to material and labour:
- Estimated percentage delivered/completed at date of the previous claim.
- Estimated percentage delivered/completed at date of current claim.
- Total cost claimed at date of previous claim.

20. PAINTING

Where applicable the following painting specifications shall apply:

Iron and steel surfaces shall be properly cleaned by removing all dirt, oil, scale and rust by brushing and sanding until a clean shiny surface is obtained. Hereafter a metal primer shall be applied.

Galvanized surfaces shall be cleaned with a galvanizing cleaning agent and then washed with clean water to remove the factory applied protection against white rust. Hereafter a calcium plumbate primer shall be applied, followed by an undercoat between 24 and 72 hours after application of the primer.

Other surfaces shall be cleaned by removing all dirt and a primer as specified by the paint supplier for the particular surface shall be applied.

The primer coat shall be followed by a matt undercoat and a final topcoat of high gloss enamel of an approved colour. Each layer of paint shall be clearly distinguishable from each other by means of different colours and each layer shall be properly sanded before the following coat is applied.

All paint shall at least be of SABS quality for industrial use and shall be approved by the Engineer. Equipment shall be painted according to the National Colour Standards, SANS 1091.

21. DAMAGE AND PROTECTION OF WORKS

The Contractor shall take all precautions necessary for the protection of life, equipment and property in connection with the works during installation.

The Contractor shall be held completely responsible for any damage of equipment during transport and installation, as well as any damage to the building and shall repair any such damage at his own expense. Where equipment cannot be repaired to an "as new" condition, it will be completely replaced at the expense of the Contractor.

Equipment delivered to site shall be stored in a well-protected area where it cannot be damaged by either the weather or other trades.

22. WELDING

Welding shall be carried out in accordance with the current edition of SANS 10044 Parts 1 to 2 where applicable. All welding shall be performed according to the latest technology and where exposed, it shall be smoothly finished off.

23. BUILDING WORK AND REMOVAL OF EQUIPMENT

The following work shall be carried out by the builder/main Contractor.

- Drilling and cutting of necessary holes in the concrete, brickwork, ceilings and wooden doors, including making good to match finish.
- Concrete plinths for installation of equipment.
- Waterproofing of roof penetrations and plinths.
- Provide drain points where required.

24. TESTING

The piping shall be tested and operated to meet the performance figures and duties specified. All safety features and interlocks shall be tested.

Pressure tests for water and piping shall be done at a test pressure of 1.5 times the maximum working pressure at the lowest point in the system, but not less than 700 kPa. All instrumentation, which could be damaged during the test, shall be removed from the pipe system.

The relevant system shall be filled with water and all high points shall be vented at least 24 hours before the test. The duration of the pressure test shall be 2 hours, after which no water leaks shall be visible and no pressure drop shall occur after corrections have been made for changes in ambient temperature during the test period.

Pressure tests shall be completed prior to insulating or covering piping. If leaks are found, welded connections shall be cut out and re-welded. Rectified piping shall be retested.

25. COMMISSIONING

The installation shall be commissioned in accordance with the relevant codes and recognised commissioning procedure or code approved by the consulting engineer:

The Contractor shall submit a commissioning program to the Consulting engineer at least two weeks prior to the commencement of commissioning and at the same time shall notify the consulting engineer of the code or procedure to which the plant/equipment will be commissioned.

The results of all checks and measurements shall be recorded in writing during the commissioning period. Commissioning records shall be handed over to the Consulting engineer prior to the first acceptance of the plant. The commissioning records shall also be included in the operation manuals.

26. STAFF TRAINING

The Contractor shall be responsible for the training of the Client's site staff after the commissioning has been completed. The site staff shall receive enough instructions to ensure that they are fully conversant with the equipment concerned. The operating manuals shall be used during training. Upon completion of the training exercise the contractor is to obtain the client's representative's written acceptance of this handover tuition, thus acknowledging his complete understanding of the operational procedures for this installation. Site staff shall be instructed on:

- the general operating method of the plant;
- starting and stopping instructions;
- stopping the plant in an emergency and warning against restarting after an emergency;
- positions and normal settings of control equipment;
- safety measures;
- operational checks on gauges, flow switches, indicator lights, etc.;
- name, address and telephone number of competent person responsible for the maintenance of the plant.

27. DIAMETERS OF PIPES

All diameters of pipes given are the nominal bore or external diameters in accordance with the normal conventions of the materials being used.

28. CODES OF PRACTICE, LAWS AND STANDARDS

All workmanship and materials used in the execution of the works shall be of the highest class and, where not fully covered by the Specification, shall be carried out in conformity with best modern practice, as determined by the Engineer.

It shall be the contractor's responsibility to ensure that the with all relevant requirements of governmental and Local Authorities whose jurisdiction embraces the location of the Site of the Works and the equipment provided for those installations which shall comply in every respect with the National Building Regulations and Building Standards Act, Act 103 of 1975 and the Occupational Safety Act, Act N°6 of 1983, both as amended to date, excepting only where exemption from any such regulations has first been obtained in writing from the said authorities, provided that the approval of the Engineer has been given prior to application for any exemption.

All materials and equipment supplied and installed shall carry the SABS or BS mark of approval unless otherwise specified or agreed to in writing by the engineer. Where alternatives are offered, the submission is to include full details of the item together with tests and compliances with any other standards.

All electrical wiring shall comply fully with the latest edition of the Standard Regulations for the wiring of Premises, SABS 0142 and the additional requirements of any local authority who has jurisdiction over the Site of Works, as well as being in accordance with best modern practice.

Wherever relevant, this Specification shall be understood to be amplified to embrace Codes of Practice and Standards promulgated by recognised authorities in the field of Plumbing and Drainage Technology and all other branches of engineering science applicable to this project.

It shall be assumed that the contractor is conversant with the abovementioned requirements. Should any requirement, bye-law, or regulation, which contradicts the requirements of this document, apply or

become applicable during the erection of the installation, such requirement, bye-law, or regulation shall overrule this document and the contractor shall immediately inform the Engineer of such a contradiction. Under no circumstances shall the contractor carry out any variations to the installation in terms of such contradictions without obtaining written permission to do so from the Engineer.

It shall be the responsibility of the contractor to make the necessary arrangements at this own expense with the local supply authority and to supply the labour, equipment and means to inspect, test, commission and to hand over the installation.

The Subcontractor shall supply and install all Notices and Warning signs that are required by the appropriate laws, regulations and/or by this document.

29. ORGANISATION AND STAFF CONTRACT

In addition to the site supervisor and/or foreman, the contractor shall employ as many competent and experienced persons as may be necessary for the purpose of the contract and shall be bound to remove from the contract works any person to whom the employer or his agent or the principal contractor may reasonably object by reason of any failure, neglect, incompetence or substandard work execution by or under the supervision of such person.

The duties and responsibilities of the contractor's management not be limited to the following:

- I. Selection of equipment and components into working assemblies in conformance with the design concept in the subcontract specification.
- II. Submission of equipment and installation drawings for approval in accordance with the required procedure.
- III. Programming and planning of the work to fit in with the programme.
- IV. Attendance at routine site progress meetings and programme monitoring meetings organised by the principal contractor.
- V. Conducting of all tests required.
- VI. Expediting of the work.
- VII. Directing his employees to ensure efficient, timely and safe execution of the work, and co-operation with the principal contractor and other trades to ensure such execution.
- VIII. Attendance at meetings from time to time with the engineer in order to discuss any technical matters that need clarification.

30. CO-ORDINATION WITH OTHER TRADES

The contractor shall acquaint himself with the general arrangement of all other services and ensure that in fixing the work it will not obstruct the fixing or future maintenance of the contract works or other services.

He shall also fully co-operate with other trades and take all reasonable precautions to ensure that he does not impede the progress of, or damage their work.

31. TEST AND INSPECTION PRIOR TO COMPLETION

Except where otherwise provided in the contract, the contractor shall provide all labour, materials, power, fuel, accessories and properly calibrated and certified instruments necessary to carry out such tests.

Arrangements for such tests shall be made by the contractor and he shall give at least 72 hours' notice to the engineer, in writing, of the test prior to commencement.

In the event of the plant or installation not passing the test, the employer shall be at liberty to deduct from the contract price all reasonable expenses incurred by himself or his agents attending the repeated tests.

Whenever any installation or equipment is operated for testing or adjusting as provided, the contractor shall operate the entire system for as long a period as may be required to prove satisfactory performance at all times in the occupied space served by that system for up to twenty-four hours a day continuously until the system is handed over.

The contractor shall provide all labour and supervision required for such operation and the employer may assign operating personnel as observers but such observation time shall not be counted as instruction time.

After complete installation of the system all equipment shall be tested, adjusted and readjusted until it operates to the satisfaction and approval of the engineer and the client.

The contractor shall submit certificates of tests carried out to prove all equipment and also certificates to be obtained from all relevant authorities and statutory bodies etc.

32. SHOP DRAWINGS

The subcontractor shall prepare at his own expense and shall submit copies of shop drawings for all fabricated work, working or setting out drawings, shop details and schedules to the Owner's representative for approval and no installation shall not be performed by the subcontractor until such approval has been given.

As soon as approval has been given the subcontractor shall forward representative two prints of the approved shop drawings, setting out drawings and schedules. The subcontractor shall also furnish to the Works as many prints of the approved shop drawings and schedules as are required. No work shall be performed from shop drawings and/or catalogues not stamped with the Original approval stamp of the engineer. All approvals, and such stamped drawings and/or catalogues shall be kept available at the job site as evidence of such approval.

The subcontractor shall be responsible for dimensions, design of adequate connections, details for the satisfactory construction of all work and the furnishing of materials for work required by the subcontract even if not indicated on the submissions that have been approved by the Owner's representative.

The Owner's representative will check drawings for design on drawings, schedules and catalogues by the Owner's representative as a complete check but shall not relieve the subcontractor of his responsibility as above stated. If the submissions differ from the requirements of the subcontract, the subcontractor shall make specific mention of each difference in his letter of transmission, with a request for substitution, together with his reasons for same, in order that, if acceptable, suitable action may be taken by Otherwise, the subcontractor will not be relieved of the responsibility for executing the work in accordance with the requirements of this subcontract.

Corrections of shop drawings by the Owner's representative are scope of work. Should any such corrections constitute a change of scope of work, the subcontractor shall notify the Owner's representative in writing within 7 calendar days of such change and shall not proceed with the fabrication until so authorised by the Owner's representative. Claims for change of scope, work constituting the claimed change of scope, will not be considered.

33. "AS-BUILT" DRAWINGS AND MANUFACTURERS INFORMATION

The Subcontractor shall provide the Engineer with a complete signed transparent set of "as-built" drawings together with stored drawings in DXF electronic format as a pre-requisite to final payment; and

the Engineer shall hand the set over to the Owner after having established their correctness. The "as-built" set shall include all mechanical and electrical work.

Where possible, a transparent copy of Architects or Engineers drawings shall be used and the subcontractor may purchase copies of the necessary transparencies from the relevant party. If "as-built" variations cannot be clearly shown thereon, then the Subcontractor shall prepare supplementary transparent drawings that will properly impart the necessary information. Manufacturer's and Subcontractor's shop drawings shall be corrected to correspond with the "as-built" drawings and copies of each shall also be furnished to the Engineer.

"As-built" drawings shall be maintained on a current basis as work progresses, and all deviations in work as actually installed accurately entered, at least once a week, on paper prints of design drawings affected, with such prints kept available at the site for the inspection of the Engineer. At the end of each month, the record for the month, properly identified by notes, shall be transferred to the original drawings by competent draughtsmen. Within seven days after the end of each monthly period, submit to the Engineer one paper print of each drawing affected showing the latest corrections.

34. QUALITY ASSURANCE SYSTEM

The contractor shall institute an approved Quality Assurance system (QA) which shall be submitted to the engineer for his approval. The records of this QA system shall be kept throughout the duration of the contract and shall be submitted to the engineer at regular intervals as required by the engineer.

35. OPERATING AND COMMISSIONING OF PLANT AND INSTALLATION

The completed system shall be put into operation after all tests and adjustments have been carried out to the satisfaction of the engineer. The contractor shall run and operate the system for a period of time as specified by the engineer and train the staff of the client to operate and maintain the system for a period as required by the engineer, which will not exceed one month.

Logging of the operation of the installations shall commence immediately upon start-up. The contractor shall submit a full commissioning report.

36. MAINTENANCE OF THE INSTALLATION DURING THE PERFORMANCE GUARANTEE PERIOD

The contractor shall furnish, free of charge, all maintenance on the entire equipment supplied by him for the guarantee period. Maintenance shall include systematic examination and adjustment of all this equipment at least every 3 months. The contractor shall, in the course of such maintenance or on call during the maintenance period, repair or replace defective parts as required and shall use only genuine standard parts produced by the manufacturer of the original part, Renewals or repairs resulting from misuse of air wear and tear, however, shall not be made at the expense of the contractor where certified as such by the engineer. Specified spares shall not be used during this period. If any spaces are used due to operational necessity and with the engineer's permission, such spares shall be replaced in full by the contractor. The maintenance period shall only begin with completion of the Main Contract and when the engineer has certified the contract works as completed, unless otherwise specified.

37. COMPLETION OF CONTRACT WORKS

Completion of the contract works will only occur after the following procedure has been certified by the engineer as having been carried out in accordance with the specification.

Physical completion of all systems has been reported to the principal contractor by the contractor, and all defects made good. The principal contractor to satisfy himself that all work has been completed satisfactorily before reporting to the engineer.

Acceptance tests have successfully taken place as specified and test results have been witnessed (where required), recorded and approved by the engineer.

"As-built" drawings, commissioning reports and maintenance manuals have been submitted to and approved by the engineer.

The employer's nominated operator(s) has received instruction of the contract works by the contractor.

The installation or part of the installation shall only be deemed handed over when completed, tested and fully commissioned and then signed off by the Engineer.

38. TECHNICAL SPECIFICATION

38.1 CONVENTIONAL FIRE PROTECTION

- a) This standard specification covers the standards, materials and code of practice for the supply and installation of conventional fire protection systems for the building services trade.
- b) This specification shall form an integral part of the contract document, and shall be read in conjunction with the schedule of quantities, drawings and additional and particular specifications compiled as part of this document.
- c) This specification shall act as a guideline to the particular specification, where in conflict the particular specification shall take precedence.
- d) The Contractor shall at all times adhere to this specification unless otherwise specified in the particular specification.

38.2 PRESSURE TEST

- a) All pipes shall be pressure tested before taken into use. The Engineer shall witness this pressure test.
- b) The Contractor shall provide two pressure tests to the entire system. The first test shall consist of a compressed air test to a minimum pressure of 1000 kPa. The second pressure test shall consist of a water test to a minimum pressure of 1600 kPa and shall only be performed once the complete system has been installed and inspected and approved by the Engineer. The water to be used for the water pressure test shall be sterilized. On completion and approval of the water pressure test the system shall be drained and flushed and only filled with approved water from the completed water supply system on approval from the Engineer.
- c) For water tests completed sections of the pipe installation shall be filled with water after all outlets have been plugged, sealed or closed. The section of pipe shall be hydraulically pressure tested by means of a suitable manually operated or mechanically driven pressure pump. A pressure of at least 1,5 times the working pressure of the class rating of pipes or fittings, with a minimum pressure of 1600 kPa shall be applied for a period of time specified in the specifications or as recommended by the manufacturers.
- d) Tests should not be performed against closed valves.
- e) Leakages that occur shall be measured and calculated and checked against the allowable losses.
- f) For underground pipe installations if the completed section of pipe complies with all specifications and passes the tests and inspection, it could be approved and the Contractor may be instructed to

backfill the open sections of trench at the joints and connections, where applicable. The Contractor shall then proceed to build all the valve chambers, inspection chambers, etc. All this is to be done in compliance with SANS 1936.

38.3 FLUSHING OF FIRE WATER SYSTEMS

- a) Before any pipeline is taken into use, it shall be flushed over its complete length and including the fittings. The pipe shall be filled with potable water or similar approved water sources. The pipeline shall be filled for flushing in such a manner that no air is trapped in the pipeline.
- b) At least 14 days prior to the commencement of flushing the Contractor shall submit full details of the proposed method of flushing the pipeline to the Engineer for his approval.
- c) The cost of water for filling the pipeline for flushing shall be covered by the Contractor.
- d) The Contractor shall provide all necessary materials, tools, equipment and labour necessary to flushing the pipeline. After flushing the pipeline the Contractor shall, at no extra cost, empty the pipeline and dispose of the water in a manner approved by the Engineer.

39. REQUIREMENTS FOR CONVENTIONAL FIRE PROTECTION

All conventional fire protection installations shall adhere to the technical and particular specifications and shall include the following general requirements:

- a) Piping shall conform to applicable British Standards. Reference to a Specification from recognized authorities to establish basis of quality shall mean current edition at date of Tender.
- b) Routes of pipes in roof spaces are shown on the drawings as a guide only and the Contractor must ensure that no pipes are placed in positions impeding on access routes and entrances and other services.
- c) All pipes are to be carefully examined for defects and flaws before installation and shall be neatly fitted.
- d) The ends of all pipes are to be cleaned, free from burrs and rough edges and joined together tightly. An approved pipe joint compound may be sparingly used with best quality hemp. All surplus or exposed hemp is to be thoroughly cleaned off joints before the painting of pipes.
- e) All vertical pipes must be securely fixed with brackets and supports of an approved type, securely fixed into the wall not more than 40 mm from the wall. These fixings must be strictly adhered to.
- f) Pipes installed in service ducts and ceiling voids are to be perfectly plumbed and to be secured by approved brackets securely fixed at distances not exceeding the specified distances and not more than 40 mm away from the face of the walls or soffits. Pipes inside buildings and where specified shall be chased into walls, wrapped with building paper and properly secured and covered. Pipes must be free to move in the brackets.
- g) Pipes passing through the walls and concrete floors are to be provided with suitable pipe sleeves extending 10 mm beyond finished floor or wall surfaces. All pipe fixings and throughways shall be free to allow movement for expansion, and contraction. Any pipe fitting feeding a pipe, which is rigidly secured to a structural element, shall be securely anchored to prevent any stress developing between the fitting and the structural element.
- h) Chromium or nickel-plated metal covering plates are to be provided and fixed securely to pipes passing through the ceilings and walls. This is not applicable for concrete floors and ceilings.

- i) Pipes passing through the ceilings or floors shall be offset from the wall to the front of the cornice with sufficient clearance to allow for the clear fixing of a ceiling plate. Pipes installed directly through the cornice will not be allowed. The same shall apply in multi-storey buildings where wall thicknesses vary.
- j) All offsets shall be evenly and symmetrically set, the offsets are to be as high and as near the ceiling as possible.
- k) Pipes shall be installed in such a manner as to allow for contraction and expansion.
- l) Fire hydrants, hose reels and fire extinguishers shall be placed in position as indicated on drawings, provided that the relevant coverage distances and areas as required by the relevant codes and regulations shall be adhered to. The equipment to be placed in such a position that the approach to these units is not obstructed.
- m) During construction all pipe ends shall be kept plugged to prevent any ingress of dirt, rubble, etc.

40. FIRE WATER PIPEWORK

40.1 COPPER PIPE INSTALLATION

- a) The installation of copper piping systems shall be done in accordance with the manufacturer's code of practice and all relevant codes, standards and regulations.
- b) Copper pipes shall only be installed downstream of galvanized mild steel pipes when applicable.
- c) Where dissimilar metals are joined, di-electric- or isolating couplings shall be used. This is not required where copper and brass dezincified alloys join.
- d) Copper pipes shall be of the hard drawn type to BS 2871 Part 1 Table X and shall be joined by means of capillary soldered type fittings. No compression type fittings shall be allowed, unless otherwise specified.
- e) Copper capillary soldered type fittings shall be used in accordance with ISO 2016, DIN 2856 or BSS 864.
- f) The soldering flux to be used shall be water based and easily flushed out and be able to withstand temperatures above 240°C and shall contain no ammonia. The flux shall be non-toxic when dissolved in water.
- g) The solder to be used shall consist of a material containing 97% tin and 3% copper. Solders containing lead, resin core and acid core shall not be used.
- h) The heat source to be used shall be propane gas with induction air, at a temperature not higher than 240°C. The pipe ends and fittings shall be cleaned and waxed with an approved solder flux, before soldering. The pipe and fittings shall then be fitted together and heated to the correct temperature before the solder is applied. Care must be taken not to add too much or too little solder to the joint. Immediately after setting of the solder the joint shall be wiped clean with a wet cloth. Pipes shall be washed out as soon as possible after jointing and all traces of flux shall be removed.
- i) All bronze or brass equipment and fittings shall be of the dezincified type.
- j) Copper pipes and fittings shall be installed strictly to the manufacturers specification, including:
- k) No labour bends.

- l) Provision for thermal contraction and expansion of pipes.
- m) Pipe brackets shall be installed at appropriate positions where pipes are installed on surface level.
- n) Pipes hangers and brackets shall be of copper, copper alloy or non-conductive materials. No piece of copper pipe shall be in touch with any other conductive surface. Brackets shall be designed to structurally support and fix the pipe system, and shall allow sufficient clearance from walls, soffits, etc. to enable insulation of hot water pipes and maintaining of equipment.
- o) Pipe hangers and brackets shall be installed according to the manufacturers specification on the following maximum spacing:

PIPE DIAMETER (mm)	HORIZONTAL (metre)	VERTICAL (metre)
15	1,3	1,9
22 & 28	1,9	2,5
35 & 42	2,5	2,8
54	2,5	3,9
67 – 108	2,8	3,9

- p) Steel sleeves or a structurally designed cover shall protect all copper pipes open to structural damage.
- q) All pipe work shall be tested and sterilised to the Engineer's specifications.
- r) Where flanged fittings are used cadmium-plated bolts, nuts and spring washers shall be used to join these flanges.
- s) All pipes shall be marked in accordance with the requirements of the Local Authority or as specified by the Engineer.

40.2 GALVANISED MILD STEEL PIPE INSTALLATION

- a) All galvanized steel pipes shall be medium gauge mild steel screwed and socketed pipes to BS 1387 and shall be normalized and marked as such by the manufacturer. Pipes shall be hot dipped galvanized.
- b) All fittings shall be malleable cast iron fittings.
- c) All 80mm O./ and larger pipes shall be joined with Class 16 flanged couplings. The bolts, nuts and spring washers to be used on these joints shall be cadmium plated.
- d) In pipe ducts and elsewhere pipes shall be fixed onto walls, soffits etc. with approved type of supports, holderbats, clamps, etc. Brackets shall be designed to structurally support and fix the pipe system and shall have sufficient clearance from walls, soffits, etc. to enable insulation of hot water pipes and maintaining of equipment.
- e) Pipes shall be supported according to the manufacturers specifications at the following maximum intervals:
- f) Pipes shall be installed in such a manner as to prevent airlocks. A minimum rise of 1:250 shall be maintained to high points, which shall be fitted with suitable air release valves.

- g) All pipes shall be marked according to the Local authority requirements or as specified by the Engineer. All surface pipes shall be painted to the required colour as specified by the Principal Agent.
- h) Pipes shall be installed flush unless otherwise instructed by the Engineer.
- i) Provision shall be made for thermal contraction and expansion.
- j) The type of pipe joint compound shall be approved by the Engineer and sparingly used with good quality hemp. For pipes larger than 80 mm Ø a jointing compound such as Epedermix 32 shall be used.
- k) Any pipe buried shall have at least 900 mm cover and be coated and wrapped and tested in the presence of the Engineer.
- l) All pipe-work and fittings shall be pressure tested and sterilized to the Engineers specifications.

PIPE SIZE (mm)	HORIZONTAL (mm)	VERTICAL (mm)
15 Ø to 20 Ø	1200	1830
32 Ø to 40 Ø	1830	2450
50 Ø to 150 Ø	2450	3050

AREA	MINIMUM COVER (mm)	BEDDING TYPE	MAIN FILL
Vehicle traffic	1100	Flexible pipe bedding	Soilcrete
Under surface bed	600		Soilcrete
Other areas	900		90 % MOD AASHTO

40.3

UNDERGROUND PIPE INSTALLATION

UPVC

- a) Unless otherwise specified all underground pipe-work > 50 mm Ø shall be Class E uPVC with rubber ring type joints.
- b) All bends shall be uPVC Class E type fittings with rubber ring joints.
- c) All other fittings such as T-pieces, Reducers, Flanges, etc. shall be bitumen dipped cast iron rubber ring jointed fittings.
- d) No solvent weld type fittings will be allowed.
- e) All cast iron fittings shall be coated and wrapped.
- f) All pipes shall be laid on a 100 mm sand-bedding cradle and covered with 300 mm sand before backfilling.
- g) All backfilling shall be to the Engineers specification and approval.
- h) Pipe trenching and bedding:

- i) All thrust blocks shall be cast between the pipe and the undisturbed trench material.
- j) No concrete shall come into direct contact with the uPVC pipe. At the thrust blocks the bend shall be wrapped with a "Densopol 80 HT Tape" or similar approved.
- k) All pipes shall be laid with at least 900mm cover to the top of the pipe.
- l) Marker blocks shall be installed at all tees or changes of directions.
- m) HDPE pipe connections to uPVC pipes up to 50mm Ø can be done by means of SG Iron manufactured saddles with the appropriate gaskets and cadmium plated bolts and nuts.
- n) All pipe crossings under traffic areas shall be backfilled with soilcrete and compacted as specified.
- o) All pipework shall be pressure tested with all joints uncovered, to the satisfaction of the Engineer.
- p) Suitably sized air release valves built into valve chambers shall be installed at all high points of the pipeline.

40.4 HDPE UNDERGROUND PIPE INSTALLATIONS

- a) Unless otherwise specified all underground pipe work smaller than 50mm Ø shall be PN12 HDPE pipe SDR 11.
- b) All fittings shall be of "Plasson" compression type, conforming to ISO/DIS 3458.
- c) All pipes shall be laid on a 100 mm sand-bedding cradle and covered with 300 mm of sand or selected material.
- d) All backfilling shall be to the Engineer's specification and approval.
- e) Pipe trenching and bedding:

AREA	MINIMUM COVER (mm)	BEDDING TYPE	MAIN FILL
Vehicle traffic	1100	Flexible pipe bedding	Soilcrete
Under surface bed	600		Soilcrete
Other area	900		90 % MOD AASHTO

- f) No concrete shall come into direct contact with the HDPE pipe. At these points the fittings shall be wrapped with a "DENSOPOL 80 HT TAPE" or similar approved.
- g) Marker blocks shall be installed at all tees or changes of directions.
- h) All pipe crossings under traffic areas shall be backfilled with soilcrete and compacted as specified.
- i) All pipe work shall be pressure tested with all joints uncovered to the satisfaction of the Engineer.
- j) Suitably sized air release valves built into valve chambers shall be installed at all high points of the pipeline.

40.5 JOINTING OF PIPES

All pipes shall be laid, installed, joined, etc., in strict accordance with the manufacturers' recommendations.

40.6 ANCHORS AND THRUST BLOCKS

Anchors shall be provided between expansion points or changes in direction of the pipes to ensure freedom of movement due to expansion of the pipes away from these anchor points and/or at the positions as shown on the drawings.

Underground pipe anchors or thrust blocks shall be in accordance with the manufacturer's recommendations. Alternatively the Contractor may request the Structural or Civil Engineer to provide thrust block details.

40.7 ESCUTCHEON (COVER) PLATES

Where pipes pass through ceilings, walls and floor slabs, and are visible from occupied spaces, circular plates shall be fitted around the pipe and fixed to the building to ensure a neat appearance.

41. FIRE PROTECTION EQUIPMENT SPECIFICATIONS

41.1 FIRE HYDRANT

Fire hydrants to be installed shall be of the type as approved by the local authority and shall be installed as indicated and detailed on the relevant drawings. The Hydrants shall comply with SANS 1567. The hydrants shall be installed inside purpose-manufactured cabinets as approved by the Architect and Local Authority. Hydrants shall be of the 65 mm bore instantaneous female coupling type conforming to SANS with single-lug twist release. The valve shall be fitted with a blank cap fixed to a chain and each hydrant valve cabinet shall be equipped with a 30-meter long 65 mm dia. canvas hose and nozzle if specified. The nozzle must be equipped with the following three settings:

- **Jet**
- **Fog**
- **Stop**

Where the supply pressure is higher than 5.2 bars a pressure-limiting device shall be installed inside the cabinet before the Hydrant.

41.2 FIRE HOSEREEL

The fire hose reels shall be supplied and installed in accordance with SANS 543.

Each hose reel shall be of the recessed, swinging pattern with automatic operation after unwinding a short length of hose.

The hose reel shall be suitable for working pressures of up to 10 bars.

The hose shall be of the 25 mm dia. (ID) rubber fire hose reinforced with double braiding and 30 meters in length. The hose reel shall be fully equipped with nozzle and stop cock.

The hand wheel shall be marked with an arrow and the words "OPEN" to indicate direction of opening.

The hose reel shall be securely fixed to the hose reel cabinet or structure if installed separately. The hose reel cabinet shall be of the 12 SWG steel cabinet fabricated type for surface mounted or recessed mounted. The cabinet is to be fitted with doors in accordance with the Architects and Local authority requirements. The cabinet shall be clearly marked "HOSE REEL".

Where the supply pressure is higher than 5.2 bars a pressure-limiting device shall be installed inside the cabinet before the Hose reel.

41.3 FIRE EXTINGUISHER

Fire extinguishers shall be supplied and installed on a correctly sized and secured bracket as indicated and detailed on the drawings. The fire extinguisher shall be installed in accordance with SANS 1910, or other relevant SANS standard.

Fire Extinguishers shall be installed inside each fire cabinet and where elsewhere indicated on the drawings.

Fire extinguishers shall have the following capacities:

- a) DCP (Dry Chemical Powder) 4 kg
- b) CO² 5 kg
- c) DCP (Dry Chemical Powder) -4.5 kg

41.4 LABELLING OF VALVES

- a. All main stop valves, control valves, etc. shall be labelled by means of rust free metal tags indicating their purpose and the section they isolate, if isolating valves.
- b. The tags shall be securely fixed to the valve and shall be clearly legible.
- c. All letters on labels shall be engraved or punched. No painted or plastic embossed labels will be accepted.
- d. Alternatively, 12 mm wide stainless steel tape embossed labels, may be used, fixed with copper wire to the relevant valves.

41.5 COLOUR CODING OF PIPES

- a. Identification of the contents of a pipeline shall be by means of applying a colour code on the specific pipe in the colours as specified by the Local Authorities.
- b. Generally, the primary colour shall be applied to the entire length of pipework.
- c. However, where short lengths of pipe run through occupied areas and in plant rooms, the primary colour shall be applied to their entire length.

41.6 DIVISION OF WORK SCHEDULE

The following work related to this Contract shall be provided by others to the Subcontractor's requirements.

Principal Building Contractor

All openings in the structure, brick walls, bulkheads and partitions.

Building-in of pipe sleeves.

All plinths.

Electrical Subcontractor

A power supply to maintenance isolators for the false alarm (jockey) pumps inside the Fire plant room.

General lighting and power in Fire plant room.

Fire detection interface modules for flow switches, alarm signals, and fault signals.

42. CONVENTIONAL FIRE PROTECTION SYSTEM

The fire protection reticulation system design for is based on utilising the fire water storage and pump plant for the conventional fire protection reticulation system. The conventional fire protection system only provides fire water to fire hydrants and fire hose reels.

The wet pipe fire hydrant and hose reel installation to these building shall be fitted with a flow (or pressure) switch and two-way breeching inlet twin booster connection situated at the entrances.

Design, supply and install fire hydrant reticulation and hose reel reticulation throughout entire premises in accordance SANS 10400 Part T. The fire protection plant system will be required to deliver a minimum of 20L/s at 350kPa to a fire hydrant and 0.5L/s at 350kPa to a fire hose-reel on the complex.

All external fire hose reel is to be housed in cabinet similar to figure 2, indicated below.

FIGURE 2



The fire protection reticulation will be provided to all firefighting equipment within the building. The fire protection reticulation system shall be designed, supplied and installed in accordance with the respective SANS codes.

Portable Fire Extinguishers will be of the Portable Dry Chemical Powder (DCP) and Carbon Dioxide (CO²) type. Fire extinguishers will be provided throughout in accordance with the NBR and relevant requirements of SANS 1910 regulations.

Fire Extinguishers shall be installed inside each fire cabinet and where elsewhere indicated on the drawings. Fire extinguishers shall have the following capacities:

- DCP - 4.5 kg
- CO² - 5 kg

All external fire extinguishers is to be housed in cabinet similar to figure 3, indicated below.

FIGURE 3



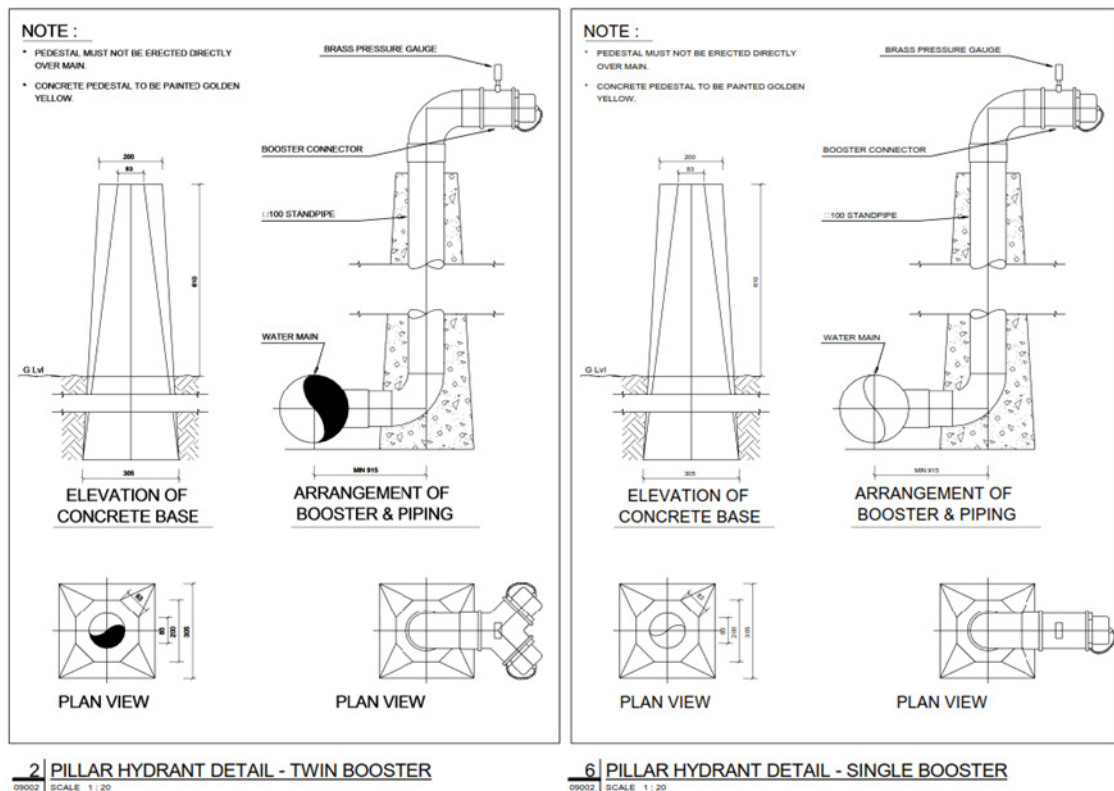
All exposed pipework forming part of the fire protection reticulation system is to be equipped with two (2) coats of High Gloss Enamel.

The complete scope of work as described further in this document, but not be limited to, the supply and installation of the conventional fire protection systems, including:

- Fire Water Storage Tank
- Fire Booster Pump Set
- Fire services water reticulation piping
- Hydrants
- Hose reels
- Portable fire extinguishers (incl. mounting brackets)
- Pillar Type Hydrants
- Flow switches and supervisory switches.
- Fire Shutters

See figure 4 of a typical pillar type twin hydrant booster and Hydrant connection below:

FIGURE 4



43 STATUTORY FIRE SYMBOLIC SIGNAGE

The Statutory Fire Symbolic Signage design for is based on utilising the photoluminescent statutory symbolic fire signs to the entire Trompsburg Special School Chromadek statutory symbolic fire signs to outside areas of the entire Trompsburg Special School.

All statutory symbolic fire signage to bear the SANS stamp of approval and to be installed in accordance with SANS 1186-1, 1186-3 and 1186-5. All fire signage must be mechanical fixed.

44 FIRE STOPPING

Fire stopping to be provided in strict accordance to SANS Part T guidelines and be tested in accordance to SANS requirements. Fire stopping fire rating must be confirmed on test certificate in the appropriate application of use and the orientation of use.

Careful check will have to be made on the fire stopping of any inaccessible concealed spaces. Where concealed spaces of more than 5m in any dimension are identified, space will have to be fire stopped at regular intervals of not less than 5m measured horizontally or vertically within any non-combustible building element or every 3m within any combustible building element.

44.1 APPLICATION

Fire Barriers are used to stop the spread of fire through openings in fire resistant walls and floors where these are used for the passage of building and communications services.

44.2 GENERAL DESCRIPTION

The automatic fire curtain consists of woven glass fibre fabric. The fabric is tested to withstand temperatures of up to 1000°C for a period of 120 minutes, this is wound onto a steel tube, each of which will incorporate a 24 volt DC. motor, a sealed heavy duty ball bearing assembly, and an electronic control circuit. The automatic roller assembly, incorporating the fabric, is housed in galvanised mild-steel head box which is normally bolted to the fabric of the building.

The lower edge of the curtains incorporates a twin inverted mild steel angle which acts as a weight bar to enable the curtain to unwind upon receipt of a signal from the fire alarm panel or total mains and battery failure.

Metal side guides with a fabric retaining system shall be installed to provide a seal between the curtain fabric and the building construction.

44.3 CONTROL SYSTEM

Operation of the curtains is via the control panel which can either be mounted adjacent to the fire curtain head box within the ceiling void, allowing access for maintenance, or mounted in a remote position from the curtain. The panel requires a local 240v ac supply rated at 3 amps via an un-switched fused spur on a maintained supply installed by others. For operational purposes the control panel must be connected to a normally-closed volt-free contact within the fire alarm control panel configured to open on fire and fail safe.

Each control panel to include battery back-up which will maintain the curtains in their retracted position for a period of three hours during a mains failure. It is also possible to manually operate the curtains for twenty cycles during this period.

Should the battery voltage fall below a predetermined limit, a low voltage cut off circuit will activate the curtain, which will descend in a controlled manner under the power of gravity.

The roller motors, should be 24 volt DC. Must be wired from the control in a ring main using suitably sized cable to ensure a voltage of 24v DC -10%.

The curtains automatically descend upon receipt of a signal from the fire-alarm panel and automatically retract when the signal is removed. During ascent the motors are controlled via a synchronised speed circuit to ensure all curtains are raised at similar rates. The curtains descend under the power of gravity at all times, including total mains and battery backup failure.

Limit switches are not to be used to control the upper and lower positions of the curtain.

Manual key operation from control panel to facilitate override.

(a) Period of Fire Resistance

- i. 120 minutes integrity at 1000 °C (1832°F)

(b) Classification

- i. E120 Class "0"

(c) Product certification, performance and / or testing:

- i. Complete assemblies shall be tested for fire resistance to BS EN 1634-1
- ii. Complete assemblies shall be required to provide gravity fail safe

- iii. Motors within the assemblies must be tested to operate at temperatures up to 300 °C
- iv. Fabric in the assembly is tested to BS476-6+A1
- v. Fabric in the assembly is tested to BS476-7

(d) Product Performance:

- i. Complete product tested to BS EN1634-1:2008 and achieved a rating of DA (1000° C for 60minutes) and is ASB 1 and 3 classified.
- ii. Designed to operate for 1500 cycles at normal ambient temperatures.

The fabric has a class 1 surface spread of flame when tested to BS 476: Part 7 and a fire propagation index I =3.2 when tested to BS 476: Part 6. It is therefore rated Class 0 to the UK Building Regulations Approved Document B 1991.

System carries enhanced “S” designation for smoke seal when tested to EN1634-3 with guides and additional smoke protection.

The table is as follows for all underground Fire Protection Reticulation services:

Range to Main Building	Pipe Material – Fire Water Supply
<5m	HDPE in HDPE sleeve
5m<15m	HDPE in HDPE sleeve
>15m	HDPE (no sleeve)

Service	Pipe Material – Fire Water Supply
Fire Water Reticulation	All pipework already HDPE, however where the pipeline lies within a 15 m radius of the building footprint, the pipes will need to be sleeved with inspection chambers.

For a D3 site “Precautionary measures in addition to those pertaining to the prevention of concentrated ingress of water into the ground, in accordance with the relevant requirements of SANS 1936-3, are required” Table 5 in SANS 1936:2012 - 3 gives the specification and requirements for a D2 and D3 site. This also specifies the joint requirements. Additional precautionary measures for D3 must be followed

as stated in section 6.4 (SANS 1936:2012 - 3). Section 6.4 point a states "The preferred pipe type for all wet engineering services, and the sleeve systems for such services, on dolomite area designation D3 sites are polyethylene (PE) pipes and fittings that comply with the material manufacturing requirements of the relevant of parts 1, 2, 3 and 5 of SANS 4427, with a material designation of PE 100 and that are supplied in straight lengths of 12 m, or rolls of 50 m or 100 m with joints made by means of butt-fusion or electrofusion fittings".

45 FIRE PROTECTION INSTALLATION

45.1 FIRE PROTECTION PIPING ABOVE GROUND

These pipes and fittings shall, where specified, be of medium black mild steel SABS 62/BS 1387. All sealant, paint and pipe primers which are proposed to be applied to the fire protection systems shall have a low volatile organic compound.

45.2 FIRE PROTECTION PIPING UNDER GROUND

These pipes and fittings shall, where specified, be of HDPE PN 12,5 SDR 11. All pipes are to be sleeve in accordance with SANS 1936 and sleeves to be HDPE PN10 SDR 13,5.

45.3 FIRE WATER PLANT

The following items are expected to be influenced by the commissioning under the Subcontractor, as applicable to the Project:

- **Fire Protection Water Systems Plant**
 - a) Fire Water Tanks complete with inlets and outlets.
 - b) Water level settings in water storage and header tanks.
 - c) Fire Booster Pump complete with control panel and valve arrangements.
 - d) Operational control settings (flow rates, time schedules, supply and demand capacities, sequence of operations with regards to potable water make-up)

The above work equipment shall be of new high quality material, design and manufacture, suitable for providing an efficient, reliable and trouble free service.

The work to be carried out under this contract shall include, but not be limited to the following:

- a) Conventional fire water system including landing valves and fire hose reels inside the building.
- b) Portable fire extinguishers.
- c) **Central fire water pump installation caring SANS approval, consisting out of the following:**
 - o 2 off Main fire pumps sets - one diesel driven main pump
 - o one electrical driven main pump
 - o Jockey pump set - one electrical driven jockey pumps.
 - o Electrical control panels including electric, diesel, jockey pumps and annunciator control panels.
 - o All associated pipe work.
 - o All electrical controls and cabling.
 - o fire water storage tanks ancillary equipment, including vortex inhibitors, cat ladders, level indicators, tank fill points and tank suction points, automatic fill valves and associated pipe work to and from reinforced concrete fire water storage tanks.
 - o Flow switches and supervisory switches.

- Flashing strobe and siren.
- d) Fire hoses and streamers.
- e) Testing of the complete fire water systems including fire pump room installation.
- f) Co-ordination of the complete fire water system relative to other services including the mechanical, electrical and plumbing services, as well as structure.
- g) Painting of all fire water piping and equipment.
- h) Fire stopping devices
- i) Statutory fire signage as indicated on the relevant drawings
- j) Installation and shop drawings for approval by the Engineer and Local Authority.
- k) Certification of the complete installation as complying with Local Authority requirements and all relevant codes and regulations as highlighted in this document.
- l) Supplying of operating and maintenance manuals for all systems and components of this installation.
- m) Training of client's maintenance and operating personnel in operating, servicing and maintaining the systems and components forming part of this installation.
- n) Commissioning and handing over of complete systems to the satisfaction of the Engineer.
- o) Maintaining and servicing of complete installations during the warranty period.

46. MATERIALS AND EQUIPMENT WHICH MIGHT BE PROCURED, SUPPLIED AND INSTALLED UNDER THIS CONTRACT

The tenderer shall provide the following information completed in BLACK INK at tender stage.

FIRE PROTECTION INSTALLATION

1 Butterfly valves > 50 mm dia.	
Manufacturer	
Type	
Model	
Country of origin	
Valve body material	
Butterfly material	
Rated working pressure (kPa)	

2 Globe valves ≤ 50 mm dia.	
Manufacturer	
Type	
Model	
Country of origin	
Valve body material	
Wedge material	
Rated working pressure (kPa)	

3 Strainers	
Manufacturer	
Type	
Model	
Country of origin	
Body material	
Strainer element material	
Rated working pressure (kPa)	

4 Non-Return valves	
Manufacturer	
Type	
Model	
Country of origin	
Valve body material	
Type of check and material	
Rated working pressure (kPa)	

5 Pressure gauges	
Manufacturer	
Type	
Model	
Country of origin	
Pressure range	
Rated working pressure (kPa)	

6 Fire Department Booster Connection	
Manufacturer	
Country of Origin:	
Model Nr:	
Number of Inlets	
Type	
Size:	

7 Piping > 50 mm dia	
Manufacturer	
Type	
Code and class	
Country of origin	
Method of jointing	
Rated working pressure (kPa)	

8 Pressure Switches

Manufacturer :	
Type :	
Model :	
Country of origin :	
Rated voltage :	
Type of contacts :	
Operating range :	

9 Storage Tank Equipment

Type of water level indicator :	
Make :	
Model :	
Size :	
Vortex inhibitor :	
Make :	
Model :	
Size :	
Automatic filling valve	
Make :	
Model :	
Type:	
Capacity:	
Size :	

47. CONVENTIONAL FIRE PROTECTION INSTALLATION

1 Fire Extinguisher (DCP)

Manufacturer:	
Country of Origin	
Model:	
Size:	

2 Fire hose reels	
Manufacturer:	
Country of Origin:	
Model Nr:	
Hose length:	
Hose material:	
Nozzle type & size:	

3 Internal Fire Hydrants	
Manufacturer:	
Country of Origin:	
Model Nr:	
Hose length:	
Type	
Size:	

4 External Fire Hydrants	
Manufacturer:	
Country of Origin:	
Model Nr:	
Hose Connection Type	
Type	
Size:	

5 Fire Hoses	
Manufacturer:	
Country of Origin:	
Model Nr:	
Type	
Size:	

6 Nozzles

6 Nozzles	
Manufacturer:	
Country of Origin:	
Model Nr:	
Type	

7 Valves > 50 mm dia.

7 Valves > 50 mm dia.	
Manufacturer	
Type	
Model	
Country of origin	
Valve body material	
Butterfly material	
Rated working pressure (kPa)	