

PART 1

PORT SHEPSTONE HOSPITAL NEW PSYCHIATRIC WARD

(WIMS 044044)

AUTOMATIC SPRINKLER PROTECTION INSTALLATION AND FIRE HOSEREEL/ HYDRANT INSTALLATION

PARTICULAR TECHNICAL SPECIFICATIONS

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public works

Department:
Public Works
PROVINCE OF KWAZULU-NATAL

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TWO : PARTICULAR TECHNICAL SPECIFICATION

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PART 2

PARTICULAR TECHNICAL SPECIFICATION

1.1 STANDARD TECHNICAL SPECIFICATION

This part of the specification takes precedence over Part 1 (Standard Technical specification) in respect of any discrepancies in the description of equipment or materials. Standard specification is available in electronic format upon request from the Engineer.

1.2 SITE DESCRIPTION

Site Description

- 1.2.1.1 The site is located in the Port Shepstone hospital at 7 Bazley Street, Port Shepstone, Hibiscus Coast, 4240.

1.2.2 Site Conditions

Site conditions are as follows:

- (a) Altitude: Sea level
- (b) Electrical Supply 400 Volts (+/-10%), 3 phase, 50 Hz, 4 wire
- (c) Design summer outdoor air condition: 35.0°C db/80%RH

Fault levels for Switchboards:

- (a) Switchboards – 5kA

All equipment selected must be capable to operate safely at a voltage supply of 220V or 400V with +/-10% fluctuation.

1.3 SCOPE OF CONTRACT

The scope of this contract includes supply, installation, commissioning and maintaining a complete new ordinary hazard 5mm/min sprinkler installation to protect the basement parking level.

It will be required to design the sprinkler installation to SANS 10287 and ASIB requirements, coordinate, supply, install, fully commission and hand over of a complete automatic sprinkler, the extent of which is indicated on the tender drawing.

The tenderer must be A.S.I.B. accredited installer.

All material and labour required to complete the works and handover in a safe, effective and operating condition shall be allowed for in this contract.

The drawings are generally of a conceptual nature. The tenderer shall make allowance for deviations from this concept drawings, that may be required to meet the design and ASIB requirements, as well as, that which may be required to accommodate building structures and other services.

The main sprinkler supply piping from the pump room up to the sprinkler valve station, and from the valve station to design points as indicated on the drawing and in the bills of quantities is measured in bill as per meter rate. The sprinkler installation downstream of this point, inclusive of distribution and range piping, sprinkler heads, remote test legs, etc., is measured as per sprinkler head. This rate per head shall be inclusive of painting, hangers

and brackets. Valve station shall be priced separately. Piping between the pumps and the tank shall be priced as a lump sum price.

The tenderer shall allow for the design, supply, erection, testing, planning, coordinating, making of shop and as-built drawings, producing of operating and maintenance manuals, and maintaining the system for a period of 12 months.

1.4. **TENDER DRAWINGS**

The following drawings form part of this specification and must be read in conjunction with it:

M652/SPK/01 (REV O) – Sprinkler layout – Basement Plan

1.5 **MAINTENANCE AND GUARANTEE**

All plant and equipment supplied under this contract shall be guaranteed and serviced for a period of twelve (12) calendar months from the date of handover or beneficial use of the installation, whichever occurs first.

1.6 **Progress Payments**

The Contractor shall submit his claim timeously to allow for the Engineer at least 5 working days to process and submit his payment certificate to the Professional Quantity Surveyor.

1.7 **SHOP DRAWINGS AND SYSTEM DESIGN**

It shall be the responsibility of the appointed Sprinkler Contractor under this contract to design and install a system that is in compliance with the following applicable codes of, and make allowance for;

- Health and Safety Act July 2003 including amendments,
- The National Building regulations - SAN 10400
- Automatic Sprinkler Installations for Fire Fighting Purposes - SANS 10287,
- The by-laws and Regulations of the applicable Local Authority,
- The Automatic sprinkler Inspection Bureau (ASIB),
- IEC Standards and codes of practice,
- British Standards and Specifications.

The contractor shall within 7 days of being appointed, produce and submit to the Engineer, hydraulic calculations and three copies of shop drawings, complete with building works requirements for his acceptance. Plan layout and section details shall be produced.

The Contractor shall check design of all the layouts and pipe sizes to ensure that the installation complies.

These drawings shall be adjusted and re-submitted should they be red-lined by the Engineer.

The acceptance of shop drawings by the Engineer shall in no way relieve the Contractor of his/her responsibilities, such as accurate dimensioning of builder's works, providing correct size and strength of supporting structures, location of plants, fittings and access panels for adequate access for servicing and maintenance, and adherence to all applicable regulations, generally accepted good practice, and the technical specification and drawings.

The Contractor must draw to the Engineer's attention, in good time, if any part of the design he believes to be not correct.

Drawings shall be produced using a reputable drawing package, and compatible with AutoCad.

1.8 **ORDERING OF MATERIALS AND EQUIPMENT**

The Contractor shall be responsible to ensure that the contract programme is adhered to and that no delays are caused by late deliveries of equipment and materials.

Other activities which must precede placing of orders must be taken into account when the Contractor schedules his activities.

1.9 **AS-BUILT DRAWINGS**

The Contractor shall provide a complete set of as-built drawings with each operating and maintenance manual and one full set on a memory stick in AutoCad or compatible format.

The provision of complete and approved as-built drawings shall be a prerequisite to final payment.

1.10 **MAINTENANCE AND OPERATING MANUALS**

Four hard copies of maintenance and operating manuals are required for this installation. Each hard copy shall also contain an electronic copy of the full document on a memory stick. . The manuals must include the following items;

- a. List of contents.
- b. Client's, Consultant's and Contractor's details including name, contact person telephone and fax numbers, etc.
- c. Full description of installation and operating features.
- d. Full set of hydraulic calculations.
- e. Where applicable, Description of automatic control system, accompanied by control schematics.
- f. Step-by-step instructions for testing of the system
- g. List of equipment suppliers names and addresses.
- h. Names and addresses of firms from whom spare parts can be obtained if different from the above.
- i. Spare parts lists.
- j. Commissioning data (water flow quantities, etc.,)
- k. Manufacturers data, brochures, etc.
- l. Full maintenance and servicing schedules (as recommended by equipment suppliers and including schedules attached to this document)
- m. Full set of as-built installation drawings, piping schematics, circuit diagrams, etc.,

Each manual must be bound in a hard covered ring file or similar, with the project title and the client's names and type of installation printed permanently on the face of the manual.

The provision of complete and approved set of Operating and Maintenance Manuals shall be a prerequisite to first delivery or beneficial handover.

1.11 **POWER SUPPLY FOR SITE WORKS**

Power and Water supply to site works shall be as per the main contract. The main contractor will charge for provision of these services. Power requirements for welding and cutting purposes shall be allowed for under this contract.

Where three phase power supply or heavier current supply is required, then the sprinkler contractor shall make allowance for a generator.

1.12 CONTRACTS MANAGEMENT

Upon appointment, the contractor shall allocate to this project a suitably qualified and experienced Contracts Engineer registered with ASIB and a site foreman with 5 years of sprinkler installation experience who shall at all times be in full control of, and able to report expediently to the Consulting Engineer and the client's management team on all aspects of the Sprinkler Contract.

1.14 BUILDER's WORKS

Unless otherwise stated, all builder's works shall be carried out by the main contractor to the Sprinkler/fire contractors' requirements and specifications. Allowance shall be made for marking up of openings on site, where necessary, as well as preparing of drawings giving details of builder's works information.

1.15 AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEM

The attached tender drawings show the extent of the works.

The system design shall be for an extra high hazard classification, with 5.0mm/min density of discharge with electrically driven pumps and water storage tanks.

Sprinkler heads:

Sprinkler heads shall be of latest design "Viking" make.

Sprinkler heads under ceiling slabs shall be uncoated 20mm brass type rated for 141deg C Temperature.

Sprinkler on ceiling shall be with white epoxy coated cover plates.

Sprinkler control/alarm valves:

Automatic Sprinkler alarm valves shall be atleast 100mm diameter "Viking" make complete with automatic alarm gongs, check-valves, twin booster connections, flow verification gauge with a orifice plate, etc., as per A.S.I.B requirements. Geared isolating valves before and after the alarm valves shall be provided.

The valve station shall be provided with a pressure/flow testing facility, complete with gauge and orifice plate.

25mm test pipes shall be fitted on distribution main with valves positioned at head level.

1.16 FIRE PUMP SPECIFICATIONS

1.16.1 General

- a. Two electrically driven main pumps and a jockey pump shall be provided for the sprinkler system. These pumps, including controls panel, triple start piping shall be installed in the pump room. The installation will be powered by essential supply from via the hospital's standby generator supplied and installed by others.
- b. All pumps shall be in compliance with SANS 0287, and robust in design.
- c. Pumps shall be single stage, single take-off with non-overloading characteristics.
- d. Pumps shall be supplied complete with steel base, flexible drive couplings, matching flanges and lifting lugs.

- e. Pumps shall be designed to handle at least 1.5 times the pressure at the delivery side of the pumps..
- f. The tenderer shall be responsible for the selection of the pumps, to ensure that the operating characteristics of the pumps are suitable for the system requirements, that the pumps are suitable for the HPSH of each system and that the drive is adequate for the full pump characteristics and not limited to the specified duties.
- g. Pumps shall be aligned after installation as per the recommendations of the supplier. The tenderer shall obtain a confirmation from the supplier that the pumps have been correctly aligned on site.
- h. Dedicated controllers shall be provided for each pump, with pressure switches forming an integral part of the automatic starting arrangement.
- i. Pump technical details:

	Pumps
Main Sprinkler Pumps	
Make	KSB/WILO
Pressure rating	16 Bar
Din rating.	24255
Pump bearings	Ball/roller
Lubrication	oil bath
Glands/ packing	Bronze/high grade graphite cotton
Pump casing	Cast iron
Impeller	bronze
Shaft and shaft sleeve	Stainless steel
Coupling type	Fenner rubber tyre
Mating flanges	Din 2533
Base plate	Hot dip galvanised
Drip tray	Hot dip galvanised

1.16.2 **Provisional Pump Duties**

Actual duties to be verified by the appointed contractor.

System	Pressure and Flowrate
Sprinkler System	Q Max: 1100L/min P Max: 400kPa

1.16.3 **Jockey Pumps**

- a. Sprinkler system shall each be provided with a single stage jockey pump, sized to maintain any normal leakage rate.
- b. In order to prevent excessive flowrate, the pumps shall have a steep pressure-flow characteristics.
- c. The jockey pump shall be set to automatically start, when the pressure in the system has fallen to a value of not less than 85% of the pressure in the system and to shut off automatically when the system pressure has reached the jockey pump churning pressure. Operating range shall not be less than the pressure switch setting to start the pump.
- d. The drive shall be sized to prevent overloading.

- e. Jockey pump shall have a cast iron casing with bronze internal components and stainless steel shaft and sleeve.

1.17 FIRE BRIGADE BOOSTERS

Fire brigade boosters shall be provided at each valve station for sprinkler system. Allowance shall also be made to provide same on the sprinkler and hydrant mains at the existing building. The booster connections shall be provided with a glycerine filled pressure gauge with siphon and stop cock, with a max. reading of 2500kPa.

Each valve station shall be provided with automatic alarm gongs, check-valves, twin booster connections, etc., as per A.S.I.B requirements.

1.18 WATER STORAGE TANKS

- 1.18.1 Two pressed steel galvanised closed sectional tanks shall be supplied and installed under this contract, complete with internal division, access doors, vents, internal and external ladders, level indicators, vents, and flanged stubs for connections of drains, suction, returns, in fill, overflow, interconnecting equalizing piping, etc.,
- 1.18.2 The overall **minimum** dimension of the sectional steel tanks shall be as indicated in the pricing schedule. Panels shall be a minimum 5mm thick.
- 1.18.3 Tank panels shall be hot dipped galvanized to SANS 121. All bolts and nuts shall be stainless steel.
- 1.18.4 Concrete bases shall be built by other trades. 8mm thick galvanised steel capping over these bases shall be allowed for under this contract.
- 1.18.5 All necessary fittings, infill level control valves, vortex inhibitors, etc. shall be allowed for in this Fire subcontract.
- 1.18.6 The level control valve shall be of the "INBAL" 24volt energized type, or equal and approved.
- 1.18.7 The vortex inhibitor shall be hot dipped galvanized, with stainless steel bolts and nuts.

1.19 ELECTRICAL SWITCHBOARD PANEL, ALARM PANEL AND RELATED ELECTRICAL WORKS

- 1.19.1 Power supply cable shall be provided to the control panel in the pump room by others. The control panel and all other electrical works leading from this panel to pumps, level switches, flow switches, other control apparatus, repeater alarm panel, valve position monitoring switches, etc., to make the system complete and operational shall form part of this subcontract.
- 1.19.2 Low and high voltage wiring inside the panel shall be run in separate trunking.
- 1.19.3 All work shall be of the highest quality, and comply with all applicable regulations and authority requirements.
- 1.19.4 The Fire subcontractor shall confirm specifications for power supply requirements within two weeks of appointment.
- 1.19.5 Each pump shall be provided with a dedicated controller.
- 1.19.6 Controls shall allow for delay starting, to accommodate Municipal and standby power supply.
- 1.19.7 Water level control systems for each of the two storage tanks shall be allowed for.

- 1.19.8 The Pump room control panel shall be wall mounted.
- 1.19.9 An alarm panel shall be provided in the pump room, to monitor the sprinkler pumping system as well as status of flow switches and valve monitoring switches located on valve room as well as at takeoffs on each floor.

The following signals shall be incorporated with respect to the pumping system;

- power failure to pump panel
- High and low levels for tank No.1
- High and low levels for tank No.2
- Jockey pump running per system
- Pump running per system

The panel design shall be based on electronic solid state technology with programmable controllers.

Allowance shall be made for approved sirens, beacons, bells and hooters.

Field cables shall run in heavy duty galvanized cable trays, and field wiring in galvanized conduits.

1.20 **PIPEWORK AND FITTINGS**

The contractor shall ensure that no services are concealed until the Engineer has been given the opportunity to inspect and approve.

All pipework laid in ground shall be either HDPE, to SANS 533, or mild steel wrapped with Denso tape with at least 25mm overlap.

The roof purlins and trusses are steel. Allowance shall be made for the utilisation of suitable proprietary clamps to fit over roof members for bracketing of pipe supports.

No drilling through any roof member will be allowed.

Where pipework passes through wet trade walls, floors, etc., these shall be wrapped with Denso tape to 50mm on either side of wall or floor. Where pipework passes through new walls, these shall be provided with PVC sleeves under this contract and handed over to builder to build into the walls.

Braided steel flexible hoses shall be provided where any pipework passes over building expansion joints. Rates for piping must be inclusive of this cost.

All threaded joints shall be reamed before connecting and sealed using high density, high quality PTFE thread tape.

Where this specification is in conflict with the requirements of the local municipalities requirements, then this shall be brought to the Engineer's attention, prior to the submission of tender price.

a. Sprinkler Piping

All aboveground and underground pipework shall be seamless medium quality mild steel, to SANS 62. Aboveground piping shall be painted with a primer coat, and an undercoat and a final coat of gloss paint.

Steel piping laid in ground shall be wrapped with Denso tape with at least 25mm overlap.

No galvanized fittings or piping shall be used

b. Sprinkler fittings, Hangers and Supports

Material of fittings shall be as follows;

Up to and including 150mm dia. fittings - cast iron fittings threaded in accordance with SANS 1109/ BS 21.

Where joints are necessary for removal of equipment, flanges to BS4504 Table 16/3 or coupling joints shall be used.

All hangers and support brackets shall be hot dip galvanised. Cut edges shall be cold galvanised. Threaded rods shall be painted with a primer and two coats of matt paint to marine grey colour or as indicated by the Engineer.

1.21 CONTROL VALVES AND FITTINGS

The control valves shall be approved by the National Fire Protection Association, and shall be arranged in accordance with A.S.I.B. and SANS 10287. Test points shall be provided where necessary.

All isolating valves shall be provided with chain and pad locks with master key.

1.22 SIGNAGE

Signage shall be provided in accordance with regulations. This shall be of high quality, aluminium embossed.

1.23 DRAIN PIPEWORK

Drain pipework from control valve assemblies and alarms shall be run to outside of the building. Rate for sprinkler piping per head shall be inclusive of test valve and drain piping.

1.24 TESTING & COMMISSIONING

Testing shall generally be done in accordance with the ASIB and SABS 10287 requirements.

A minimum test pressure for the entire system shall be 1500kPa.

The sprinkler contractor shall timeously arrange for ASIB certification. Practical Handover will only be taken upon receipt of an ASIB certificate or letter of approval.

1.25 LABELLING

Allowance must be made to provide ivorene labels with lettering of not less than 40mm high for each equipment, such as tanks, pumps and panels.

All valves shall have a metal tag with a reference number, which shall correspond to that on drawings and schedule of valves, forming part of the operating and maintenance manuals.

1.26 PAINTING AND CORROSION PROTECTION

All steel piping shall be painted with a primer coat, and an undercoat and a final coat of gloss paint. The paint finish shall be smooth with a consistent thickness to ensure complete coverage of the pipe surface or paint layer below.

All mounting brackets and hangers shall be hot dipped galvanized and shall be primed and painted marine grey.

Preparation and painting shall be done in accordance with the Standard Specifications and to the paint suppliers instruction, whichever, is more stringent. Paints shall be Dulux or Plascon make.

The contractor shall take into consideration, that the installation is in a corrosive climatic zone ensure that all works is done to protect against the corrosive environment.

1.27 **SERVICING AND MAINTENANCE**

Allowance shall be made for regular servicing and maintenance of the entire sprinkler installation, over the 12-month guarantee period.

Maintenance shall include, but not be limited to the following;

Function	Frequency (minimum but not less than recommended by equipment manufacturers/Suppliers)
• Check for entire installation for leaks	Monthly
• Check Switchboard/Control Board for correct operation	Monthly
• Check Signage is in position	Monthly
• Check motor for correct operation	Bi monthly
• Run pressure/flow test and record pressures	Bi monthly
• Check triple start functionality	Six monthly
• Check and record motor amps per pump	Six monthly
• Lubricate pump/motor where applicable	Six monthly
• Check and tighten terminals in Switchboard/Control Board and on motors	Six monthly

The contractor shall provide monthly job cards which shall be signed by the hospital technical representative. The contractor shall email monthly a copy of the signed job card to the Engineer.

1.28 **SPARE NOZZELS**

Allowance shall be made for the provision of sprinkler heads and spanner at each Valve station, in accordance with ASIB and SANS . These shall be stored in a wall mounted cabinet also provided under this Contract.

1.29 INFORMATION SCHEDULE

1.29.1 Electrically Driven Sprinkler pump

Make and model of Motor	
Make and model of pump	
Capacity of Pump Flowrate(L/min & mH ₂ O head)	
Motor kW	

1.29.2 Jockey Pump

Make and model of pump	
Motor kW	
Capacity of Pump Flowrate(L/min & mH ₂ O head)	

1.29.3 Sprinkler Control Valve

Make	
Size (Diameter mm)	

1.29.4 Sectional Steel Tank

Manufacturer of tank	
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PART 2

PORT SHEPSTONE HOSPITAL NEW PSYCHIATRIC WARD

AUTOMATIC SPRINKLER PROTECTION INSTALLATION AND FIRE HOSEREEL/ HYDRANT INSTALLATION

(WIMS 044044)

STANDARD TECHNICAL SPECIFICATIONS

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PART FOUR : STANDARD TECHNICAL SPECIFICATION

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PART FOUR : STANDARD TECHNICAL SPECIFICATION

1A. GENERAL REQUIREMENTS FOR WORKMANSHIP, MATERIALS AND CONTRACT ADMINISTRATION

1A.1 GENERAL

1A.1.1 The Subcontractor will be required to provide all labour, materials, equipment and services and perform all operations required for the complete installation of all Fire Protection work as shown on the relevant drawings or specified herein, and in accordance with all applicable requirements of the Sprinkler Subcontract Documents.

1A.1.2 The work shall be in full conformity with the latest edition of the Rules of the Automatic Sprinkler Inspection Bureau and all authorities having jurisdiction and shall be approved by the A.S.I.B. on completion.

1A.2 DEFINITIONS AND ABBREVIATIONS

1A.2.1 DEFINITIONS OF TERMS USED HEREIN:-

1A.2.1.1 “Provide” To supply, install, connect and hand over complete and ready for safe and regular operation of particular work referred to unless specifically indicated otherwise.

1A.2.1.2 “Install” To erect, mount and connect, complete with all related accessories

1A.2.1.3 “Supply” To purchase, procure, acquire and deliver, complete with all related accessories.

1A.2.1.1 “Work” All labour, materials, equipment, apparatus, controls, accessories and other items required for correct and complete installation.

1A.2.1.5 “Piping” Pipe, tube, fittings, flanges, valves, controls, strainers, hangers, supports, accessories, drains, insulation and all related items

1A.2.1.6 “Wiring” Conduit, fittings, wire, junction and outlet boxes, switches, cut-outs, socket outlets and all related items.

1A.2.1.7 “Concealed” Embedded in masonry or other construction installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosed spaces

1A.2.1.8 “Exposed” Not installed underground or concealed as defined above.

1A.2.1.9 “Indicated”,
“Shown” As indicated, shown or noted on drawings
or “Noted” and/or specifications.

1A.2.1.10 “Similar” or “Equal” Of approved manufacture, equal in weight, size.

1A.2.1.11 “Approved”, “Satisfactory”,
directed “Accepted” or “Directed” As approved, satisfactory, accepted or
by or to the Consulting Engineer

1A.2.2 ABBREVIATIONS

“SABS”	South African Bureau of Standards.
“BSS”	British Standards Specifications
“WWP”	Water Working Pressure
“A.S.I.B.”	Automatic Sprinkler Inspection Bureau

1A.3 QUALITY, GAUGES, WEIGHTS AND MEASURES OF MATERIAL

- 1A.3.1 New, best quality and free from defects.
- 1A.3.2 Materials and/or apparatus used for similar purposes shall be of the same manufacturer.
- 1A.3.3 Materials and apparatus in electrical system to be in accordance with relevant SABS or BSS standards.
- 1A.3.1 Secure approval of all Authorities, as required, for materials, equipment and installation.
- 1A.3.5 Thickness of wire and metal: International metric series.
- 1A.3.6 All weights and measures shown or mentioned shall be taken to be in accordance with the Systems International duties.

1A.1 COOPERATION AND COORDINATION WITH OTHER TRADES

- 1A.1.1 Render full cooperation to other trades. Provide any information necessary to permit work of all trades to be installed satisfactorily and without interference or delay.
- 1A.1.2 Where work is to be installed in close proximity to work of other trades, or where there is evidence that work may interfere with work of other trades, assist in working out space conditions to make satisfactory adjustment. Refer to other divisions of these specifications for coordinated layouts and/or composite drawing requirements.

1A.5 SUPERVISION

- 1A.5.1 Supply services of an experienced and competent Site Project Manager to be in constant charge of work at site. Such Site Project Manager shall have had experience in responsible field positions of this trade, including that of Site Project Manager on a project of similar scope and technical nature. Changes in Site Management should not be undertaken without sound reasons.

1A.6 ACCESSIBILITY

- 1A.6.1 Install work so as to be readily accessible for operation, maintenance and repair. Minor deviations from drawings may be made to accomplish this, but changes of magnitude or which involve extra cost shall not be made without prior approval.

1A.7 STORAGE OF MATERIALS

In addition to the requirements of the Conditions of Tender and Conditions of this Subcontract, the following shall apply:-

- 1A.7.1 Materials permitted to be stored within building shall be safely stacked and shall not overload floor construction beyond the legal permissible floor loading.
- 1A.7.2 Combustible materials shall not be stored on premises longer than minimum period necessary for execution of work. Provide fire protective measures as directed by Architect or Engineer.

1A.8 APPROVALS

- 1A.8.1 All the equipment offered and the entire installation shall have the full approval of the Automatic Sprinkler Inspection Bureau.
- 1A.8.2 All equipment offered must agree in every aspect with the officially approved standard samples. All Tenderers must supply documentary proof of their equipment approvals. Any deviation from this will render their offer null and void.

1A.9 SHOP DRAWINGS, AS - BUILT DRAWINGS AND LOCATION PLANS

1A.9.1 SHOP DRAWINGS

- 1A.9.1.1 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 engineer for approval as stated below, and such work shall not be performed by the subcontractor until such approval has been given.
- 1A.9.1.2 As soon as approval has been given, the subcontractor shall furnish the from shop drawings and / or catalogues not stamped with the engineer's
- 1A.9.1.3 The subcontractor shall be responsible for dimensions, design of adequate connections, details for the satisfactory construction of all work and the
- 1A.9.1.1 The Engineer will check drawings for design only and approval of the drawings, schedules and catalogues by the Engineer shall not be constructed as a complete check and 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 relieved of the responsibility for executing the work in accordance with the requirements of this subcontract.
- 1A.9.1.5 Corrections of shop drawings by the Engineer are not intended to change the scope of work. Should any such corrections constitute a change of scope of work, the Subcontractor shall notify the Engineer in writing within not more than seven calendar days of such change and shall not proceed with the fabrication until so authorised by the Engineer. Claims for change of scope, made after performance of the work constituting the claimed change of scope, will not be considered.

1A.9.2 “AS-BUILT” DRAWINGS

1A.9.2.1 This clause is applicable only where specifically called for under Part Two Detailed Specification — for the works. The Subcontractor shall provide the Engineer with a complete signed transparent set of “as-built” drawings as a prerequisite to final payment; and the Engineer shall turn the set over to the Owner after having established their correctness. The “as-built” set shall include all mechanical and electrical work.

1A.9.2.2 Where possible, a transparent copy of Architects drawings shall be used for the purpose, and the Engineer shall then furnish the Subcontractor with necessary transparencies. If “as-built” variations cannot be clearly shown thereon, then the Subcontractor shall prepare supplementary transparent drawings that will properly impart the necessary information. Manufacturers and Subcontractors shop drawings shall be corrected to correspond with the “as-built” drawings, and two copies of each shall also be furnished to the Engineer.

1A.9.2.3 “As-built” drawings shall be maintained on a current basis as work progresses, with all deviations in work as actually installed accurately entered each Monday on paper prints of design drawings affected, with such prints kept available at the site for the inspection of the Engineer. On the last day of each month, the record for four previous weeks, properly identified by notes, shall be transferred in ink to transparencies by competent draughts men. Within seven days after end of each bi-monthly period, submit to Engineer one paper print of each drawing affected showing latest corrections.

1A.9.3 WIRING DIAGRAMS

1A.9.3.1 Although covered under clause 1A.9.1, specific mention is made of the provision of wiring diagrams.

1A.9.3.2 Apart from submitting comprehensive wiring diagrams for approval prior to the commencement of control board manufacture, the Subcontractor is to provide on completion, “as-built” wiring diagrams for all electrical work forming part of this Subcontract.

1A.9.3.3 Copies of these diagrams and those for manufactured equipment are to be included in the Operating and Maintenance Instruction Manuals (refer to section headed MAINTENANCE AND GUARANTEES of this Specification) and a copy of each is to be framed, mounted behind glass and hung in a location to be agreed on site.

1A.9.1 LOCATION PLANS

1A.9.1.1 The Subcontractor shall provide and install, in the area housing the main control valves, a plan of the reticulation indicating main stop valves, zoned areas, etc.

1A.9.1.2 The plan shall be fully legible and shall be in a location where it can be readily seen by firemen and others responding to a fire alarm. Final location of this plan shall be approved by the Engineer.

- 1A.9.1.3 In addition the Subcontractor shall supply and install outside the area containing the main control valves, a location plate. This plate shall bear the following words in raised letters “SPRINKLER STOP VALVE INSIDE”. These words shall be in letters of at least 35 mm, and the word “INSIDE” shall be at least 25 mm in height —letters shall be painted white on black background.

1A.10 MUNICIPAL WATER SUPPLIES

- 1A.10.1 Where required, the Subcontractor shall arrange with the local water authority for the water connections, kerb valves, service valves etc., and shall pay the required connection charges.

1A.11 STRUCTURAL REQUIREMENTS

- 1A.11.1 It shall be noted that openings through the structure, beams, walls, slabs, etc., have been provided where deemed necessary.
- 1A.11.2 It shall be the responsibility of the Subcontractor to study structural drawings during preparation of shop drawings. Any additional structural requirements shall be approved by Engineer before implementation.

1A.12 MAINTENANCE AND GUARANTEES

1A.12.1 OPERATING AND MAINTENANCE MANUALS

- 1A.12.1.1 On completion of the installation and before requesting acceptance, submit to the Engineer three (3) bound sets of Operating and Maintenance Instructions for the entire system as well as for each item of equipment.
- 1A.12.1.2 The manuals shall also contain the following:
- 1A.12.1.2.1 Names and addresses of suppliers of each item of equipment.
- 1A.12.1.2.2 Performance data for each item of equipment.
- 1A.12.1.2.3 Spare parts list for each item of equipment.
- 1A.12.1.2.1 Detailed description of system operation and performance procedure.
- 1A.12.1.2.5 Complete colour coded wiring diagram for all equipment.
- 1A.12.1.3 A complete set of “as-built” drawings shall be included in each manual. In addition, a set of reproducible (sepia) “as-built” drawings shall be submitted for record purposes.

1A.12.2 MAINTENANCE AND GUARANTEE

- 1A.12.2.1 The complete sprinkler system shall be guaranteed by the appointed Subcontractor for a period of twelve months from the date of completion of the system. During this period the system shall be serviced free of charge in accordance with the requirements of the bodies specified under the paragraph headed “Approvals” but not less than four times.

1B EQUIPMENT

1B.1 SPRINKLER HEADS

- 1B.1.1 All sprinkler heads shall be selected to suit the installation hazard rating as indicated in the Detailed Specification and shall conform to the regulations as

set out by the Automatic Sprinkler Inspection Bureau in the latest edition of the rules for automatic sprinkler installations.

- 1B.1.2 Sprinkler heads are to be installed in the positions indicated on the drawings. The Subcontractor shall check the tender drawings for compliance with A.S.I.B. rules. Any point of conflict between A.S.I.B. rules and the requirements of this Specification shall be brought to the attention of the Engineer at the time of tender. The Tender price is to be given for a system in full compliance with A.S.I.B.
- 1B.1.3 Sprinkler heads installed in exposed piping shall be cast brass with quartzoid bulb and of the conventional pattern.
- 1B.1.1 In areas of hung ceilings, piping shall be concealed and sprinkler heads shall be chromium plated with quartzoid bulb and approved type escutcheon plates.
- 1B.1.5 Heads to have ordinary temperature rating (68°C). However, heads subjected to abnormally high temperatures are to have a sufficiently high temperature rating to prevent their accidental discharge when no fire is present.
- 1B.1.6 Provide heavy wire guards for heads placed where liable to be accidentally damaged in normal course of events. Unless clearly indicated on the drawings this item shall be covered by a Provisional Sum.
- 1B.1.7 Provide enameled steel cabinet containing extra sprinkler heads as required by the A.S.I.B. The cabinet is to be placed in a position approved by the Engineer. Also to be included are all necessary implements for installing the replacement sprinkler heads.
- 1B.1.8 Heads for drenching systems shall be open type with orifice size as indicated. The head shall provide a 165° fan shape flat directional water flow to provide a protective sheet of water.
- 1B.2 ALARMS
- 1B.2.1 Unless otherwise called for in this Specification allowance shall be made for the following alarm systems
- 1B.2.2 Each set of sprinkler control valves shall be equipped with an alarm valve, approved by A.S.I.B. The alarm valve shall be installed in the main supply pipe immediately after the main stop valve, before any connection is taken off to feed part of the sprinkler system.
- 1B.2.3 Alarm valves shall be designed to pass water under flow conditions to a water motor alarm gong. One alarm gong shall be provided for each set of control valves.
- 1B.2.1 Alarm gongs shall be mounted in an agreed position in the vicinity of and less than 6 m above the control valves.
- 1B.2.5 Pressure switches (approved by A.S.I.B.) shall be provided to sense a drop in pressure in the main supply pipe after each set of control valves. A drop in pressure shall initiate an alarm on a remote fire alarm panel if called for under the Detailed Specification (Part Two).
- 1B.2.6 In multiple floor installations, approved type flow switches shall be provided in the main supply pipe feeding each floor, or zone where called for in Part Two — Detailed Specification. These flow switches shall initiate zone alarms on the remote

fire alarm panel.

1B.3 ALARM PANEL

1B.3.1 Where called for in Part Two — Detailed Technical Specification, an alarm panel and remote auxiliary panels are to be installed in the positions indicated.

1B.3.2 The panels are to give an indication of the system status including the following:—

1B.3.2.1 Power on

1B.3.2.2 Power off

1B.3.2.3 Pump running (indication for each pump)

1B.3.2.1 Zone fire alarm

1B.3.2.5 General fire alarm

1B.3.3 Each panel shall incorporate an audible and visual alarm as approved by the Engineer. An alarm accept and alarm cancel facility shall be provided.

1B.3.1 Panel shall be designed for surface or flush mounting as indicated elsewhere and shall be finished in baked enamel with silk-screen or screw on “Ivorine” labels.

1B.1 JOCKEY PUMP

1B.1.1 Where required the Subcontractor shall provide an automatic jockey pump to maintain the pressure in the system.

1B.1.2 The pump is to have a capacity greater than any normal leakage rate.

1B.1.3 The pressure/flow characteristic of the pump shall be in accordance with the Rules of the A.S.I.B. and shall be approved by the Engineer before installation.

1B.5 CENTRIFUGAL PUMPS

1B.5.1 A centrifugal fire pump or pumps as called for in Part Two —Detailed Specification are to be installed to ensure the correct pressure and flow characteristic required for the sprinkler installation.

1B.5.2 Unless otherwise indicated in the particular specifications, the pumps are to be of the multistage centrifugal type and shall have a characteristic curve as laid down for the particular installation by the A.S.I.B.

1B.5.3 The pump shall have a cast iron casing, bronze impeller and case wear rings and stainless steel shaft and shall be approved before installation.

1B.5.1 Where the pump constitutes the primary source of supply, it shall be driven by an engine of the compression ignition type. When the pump constitutes a duplicate supply, it shall be driven by an electrical motor or compression ignition engine as specified.

1B.5.5 Pump and drive shall be direct coupled by means of a “Fennerflex” coupling and shall be mounted on an integral cast iron or fabricated base plate. Base plate shall be bolted rigidly to a concrete foundation with a mass double that of the pump and drive.

1B.6 COMPRESSION IGNITION ENGINE

1B.6.1 The engine shall conform with the requirements of the A.S.I.B. in all respects and shall include all spare parts and tools as laid down.

1B.6.2 The normal and automatic starting of the engine shall be by means of a battery powered electric starter.

1B.6.3 The battery is to be on a constant trickle charge and a charging rate meter as well as Volt and amp meters are to be provided.

1B.6.1 Cooling of the engine shall be by means of an air cooled radiator, the capacity of which shall not be less than that recommended by the engine manufacturer.

1B.6.5 The power of the engine shall be sufficient for the pump requirements and rated for the site altitude.

1B.6.6 The engine exhaust shall be fitted with a suitable silencer. The exhaust shall be led to outside the pump room and arranged in a manner that no moisture can return into the engine.

1B.6.7 The engine shall be capable of operating on full load for a minimum period of six hours.

1B.6.8 A fuel tank shall be provided and installed above the engine fuel pump. The tank shall be of sufficient capacity for six hours operation but not less than 300 litres. The tank shall be provided with an inspection hole, fuel level gauge, air vent and sludge and sediment trap. A filter shall also be provided in the pipework between the tank and fuel pump.

1B.6.9 The engine shall be provided with a means of starting manually with a crank handle.

1B.7 ELECTRIC MOTOR

1B.7.1 The electric motor shall be 3 phase suitable for 50 Hertz supply and shall be of the totally enclosed fan cooled (T.E.F.C.) type.

1B.7.2 The speed of rotation and power shall match the requirements of the pump being driven.

1B.7.3 The motor shall conform with the requirements of the A.S.I.B.

1B.7.1 Power to the motor control panel will be provided by others. All wiring within the panels and to the equipment will form part of this Subcontract.

1B.7.5 Wiring shall be in accordance with all bodies having jurisdiction. Where these specifications are in conflict, this is to be brought to the attention of the Engineer who will direct the Subcontractor on the course he is to follow.

1B.8 SUCTION TANK

1B.8.1 Where required in terms of the Detailed Specification, Part Two the Subcontractor shall provide a suction tank with an effective capacity in accordance with the A.S.I.B. rules.

- 1B.8.2 In order to ensure maximum effective capacity of the tank, a suction sump may be incorporated.
- 1B.8.3 Tanks shall be provided complete with centre partition, access ladders, access manholes, drip pans and all indicated or required connections.
- 1B.8.1 Tanks shall be of the sectional bolted construction type, having suitable bracing to withstand internal pressure unless otherwise specified.
- 1B.8.5 Bottom and sides of sectional bolted construction tanks shall be constructed of 6 mm galvanised mild steel plates. Lid or covers shall be at least 1 mm galvanised mild steel plates and shall be bolted to the top of the tanks with MS bolts at 1510 mm centres. Covers shall be provided with a suitable number of access manholes to facilitate cleaning and maintenance of valves. All bolts shall be galvanised.
- 1B.8.6 Tank sections shall be bolted and made watertight by the use of an approved jointing and sealing compound.
- 1B.8.7 Tank bases shall be installed by the Principal Contractor to details supplied by the Sub-Contractor.
- 1B.8.8 Access ladders into and on the outside of each tank shall be provided. The ladders shall be of galvanised mild steel with sides 32 mm x 15 mm flat bar and rungs 20 mm round bar at 300 mm centres.
- 1B.8.9 Water level in each section shall be indicated by separate indication on the side of the tank.
- 1B.8.10 The water level shall be controlled by an approved float operated full flow valve. The valve shall be arranged to prevent water hammer on closing. Valve shall be Clayton or equal and approved.

1B.9 PIPEWORK

1B.9.1 PIPING AND FITTINGS

- 1B.9.1.1 Drawings are generally diagrammatic and indicative of work to be installed. The run and arrangement of piping shall be approximately as indicated, and shall be subject to modifications as required to suit building conditions, to avoid interference with work of other trades, or for proper convenient and accessible location of all parts of piping systems. Due to small scales of drawings, all required offsets, fittings, valves, drains, etc., are not indicated.

Tender shall include for all fittings which may reasonably be required to install the piping following the basic routes indicated on the drawings. Allowance shall be made for any offsets which may be required to achieve the accurate centering of sprinkler heads. Drawings shall be prepared taking full cognizance of the structure and other Mechanical and Electrical services in the building.

- 1B.9.1.2 Run piping in wall chases, recesses, pipe shafts and hung ceilings where same are provided. Do not permanently close up, fur in or cover piping before examination and testing.
- 1B.9.1.3 Run piping as straight and direct as possible in general forming right angles with or parallel to walls or other piping and neatly spaced, with risers erected plumb and true. Install piping so that there is clearance of at least 25 mm between piping and also between fitting hubs and

adjoining work. Hang piping at or in ceiling from construction above, as close as possible to bottom of slabs, beams, etc., maintaining maximum headroom at all times.

- 1B.9.1.1 Run no piping in elevator machine rooms; telephone rooms containing telephone equipment, relays and terminal strips, and electric rooms and closets containing exclusively equipment such as transformers, switchgear, motor control centres, panelboards or similar items of equipment, and in Emergency Generator Rooms and Computer Rooms.
- 1B.9.1.5 Provide control valves where noted or required for complete regulating control of all systems. Valves: accessible, but no valves installed with handles pointing down.
- 1B.9.1.6 All piping required to connect to apparatus shall be complete and ready for regular and safe operation. Unless otherwise noted, connect all apparatus and equipment in accordance with manufacturers standard details as approved.
- 1B.9.1.7 Consult drawings and specifications to determine number or requirements of all items of equipment requiring piping connections. Provide accessory piping, such as vent, drain, relief, etc., wherever equipment is provided with connections for such piping.
- 1B.9.1.8 Cut pipe accurately to measurements established at building. Work into place without springing or forcing, and to properly clear windows, doors, and other openings. Ream all piping after cutting.
- 1B.9.1.9 Pipes above ground shall be medium grade steel tube to BSS 1387. Piping subjected to alternate wetting and drying (e.g. water motor gong piping) shall be galvanised.
- 1B.9.1.10 All pipework laid below ground or built into concrete shall be prefabricated, flanged and hot dip galvanised.
- 1B.9.1.11 The digging and back filling of all trenches shall be done by the Subcontractor, unless otherwise specified. The trenches shall be of such a depth that when pipes are laid, at least 750 mm shall cover the top of the pipe.
- 1B.9.1.12 Underground piping shall be laid on clean soft soil. When backfilling, the trench shall firstly be filled to at least 150 mm above the pipe with a clean soft sand and then compacted after which the final filling is to be made and again compacted.
- 1B.9.1.13 In all instances care shall be taken to accommodate all thermal movement of the piping. Concrete thrust blocks or anchors shall be provided where applicable.
- 1B.9.1.11 Adequate protection shall be provided to all pipework below roads, etc. Methods of protection shall be approved by the Engineer.
- 1B.9.1.15 Fittings on all pipes shall be wrought iron to BS 1710.
- 1B.9.1.16 Use eccentric fittings at changes in pipe size, top level for horizontal piping. No bushings shall be used in lieu of reducing fittings.
- 1B.9.1.17 Welded joints are permitted provided that joints are fabricated and welded in the Subcontractors workshop. No welding shall be permitted on site. Only welding meeting the SABS qualifying tests for strength welds in pressure piping are to be permitted to make welded joints. Furnish copies of certificates of competence of each welder before he commences work.
- 1B.9.1.18 Flanges shall be of correct pressure class conforming to BS 1501.

1B.9.1.19 Piping to be screwed to BS 21. Screwed joints shall be screwed up tightly using an approved jointing compound such as P.T.F.E. tape. Hemp joints will not be accepted.

1B.9.1.20 During construction, temporarily close open ends of pipes with sheet metal caps to prevent debris from entering piping systems.

1B.9.1.21 Support piping independently at all equipment so that equipment is not stressed by piping weight or expansion.

1B.9.2 ACCESSORIES

1B.9.2.1 Provide unions, or flanged connections, as required and at connections to all equipment, apparatus and specialties requiring disconnection for repairs or replacement. Locate unions between shut-off valves and equipment.

1B.9.2.2 Provide shut-off valves where indicated and for individual equipment units at inlet and outlet, to permit unit removal for repairs without interfering with remainder of system.

1B.9.2.3 Arrange piping for maximum accessibility for maintenance and repair; locate valves for easy access and operation. No valves shall be installed with handles pointing down.

1B.9.3 PIPEWORK SUPPORTS

1B.9.3.1 All piping shall be adequately supported by means of galvanised hangers unless otherwise specified. No branch pipe longer than 750 mm will be allowed to be suspended without supports.

1B.9.3.2 All supports shall make adequate provision for any thermal expansion and contraction of the pipework.

1B.9.3.3 Piping shall be supported, and hanger rod sizes shall be at least as set out as follows:—

<u>Nominal Pipe Size</u>	<u>Minimum Spacing</u>	<u>Rod Diameter</u>
15 mm dia. — 20 mm dia.	1,5m	6 mm dia.
25 mm dia.	2,0 m	6 mm dia.
32 mm dia. — 65 mm dia.	2,5 m	6 mm dia.
80 mm dia. — and over	3,0 m	10 mm dia.

1B.9.1 CONTROL VALVES

1B.9.1.1 Valves 50 mm and smaller shall be threaded bronze rising stem gate valves of 10 bars WWP Class.

1B.9.1.2 Valves 65 mm and larger shall be flanged BSS 1501 cast iron rising stem gate valves of 10 bar WWP Class.

1B.9.1.3 Valves for sprinkler work shall be sealed in correct position and provided with approved type metal tag indicating purpose of the valve. The tags are to be fastened to the valves by means of brass chain.

1B.9.1.1 All valves shall be approved by A.S.I.B.

1B.9.5 ANGLE AND GLOBE VALVES

1B.9.5.1 Sprinkler drain and test valves, and other angle or globe valves, as required, shall be bronze composition disc of 10 bars WWP Class.

1B.9.6 CHECK VALVES

1B.9.6.1 Bronze regrind disc swing check valves as approved by the A.S.I.B.

1B.9.7 TESTS

1B.9.7.1 Test piping and prove tight for 2 hours, as specified and/or required by Authorities having jurisdiction in presence of the Engineer and said authorities, who shall be given ample notice before tests are made. Make preliminary test and prove satisfactory before requesting witnessing of final test. Make tests in stages if so ordered by Engineer to facilitate work of others. Repair defects disclosed by tests or, if required by the Engineer,

1B.9.7.2 Be responsible for existing building and work of other trades disturbed or damaged by tests or repair and replacement of work and cause work so disturbed or damaged to be restored to its original condition at own expense.

1B.9.7.3 Unless otherwise indicated in Part 5, test sprinkler piping with water at the highest point of the section being tested. 200 kPa above the normal operating pressure at such point. The testing pressure at any point shall never be less than 800 kPa.

1B.9.7.1 The entire sprinkler pipework reticulation shall be properly cleaned out after erection by introducing flushing connections at the extremities of the distribution pipes.

1B.9.8 SLEEVES

1B.9.8.1 Provide sleeves large enough to accommodate pipe and passing entirely through floors, ceilings, walls or partitions. Pack sleeves through firewalls or slabs in accordance with Underwriters requirements.

1B.9.8.2 Provide cast iron or steel pipe sleeves for pipes passing through floors specified above with continuously welded centre flange buried in construction.

1B.9.8.3 Except as otherwise noted, 0,7 mm galvanised sheetmetal sleeves for pipes passing through interior floors, ceilings, walls or partitions, unless framed opening is provided in general construction.

1B.10 BAFFLE PLATES

1B. 10.1 Where sprinklers are located closer than 2 metres apart baffle plates shall be provided.

1B. 10.2 Baffle plates shall be 200 mm wide and 150 mm high and constructed of galvanised sheet metal, located midway between sprinklers. Top of the baffles should extend above the sprinkler head deflectors by 150 mm minimum.

1C FINISHING, TESTING AND COMMISSIONING

1C.1 PAINTING AND FINISHING

1C.1.1 All paint shall be delivered to site in the manufacturers original sealed containers, and all paint shall be of the highest quality, applied strictly in accordance with the manufacturers directions.

1C.1.2 All metal surfaces, whether painted in the workshop, factory or on site, shall be cleaned and wire brushed to remove all dirt, rust, grease or other foreign matter before the application of the priming coat.

1C.1.3 Hangers, including rods and inserts, shall be painted with one coat of Zinc Plumbate Primer unless galvanised. Galvanised hangers and steelwork shall be left unpainted, unless otherwise specified.

1C.1.1 All piping and equipment shall be delivered to site with a factory prime coat.

1C.1.5 All piping and equipment shall be painted as follows:—
Two Coats self etching primer using Palscoprime 183 Zinc Phosphate 60 and 90 microns D.F.T. respectively.

1 Coat SABS 681 Universal Undercoat — 30 micron D.F.T.

1 Coat Acid/Alkali Resistant Enamel — 25 micron D.F.T.

1C.1.6 All equipment delivered to site pre-painted shall be spot coated on all damaged areas. The equipment will be completely repainted if necessary by the Engineer to achieve a satisfactory finish.

1C.2 TESTING AND COMMISSIONING

1C.2.1 The installation shall be equipped with the necessary test facilities at pumps and control valves, to establish the satisfactory operation of the system.

1C.2.2 The Subcontractor shall arrange for the inspection and approval of the entire installation, prior to handover, by the inspection authorities.

1C.2.3 Provision shall be made at the remote end of each system for the installation of a 32 mm diameter gate valve and pressure gauge connection to ascertain the flow and pressure conditions at the design point of each system.