



FIRE SECURITY

SCHEMATIC DIAGRAM

FOR A FIRE PUMP

INSTALLATION

CONTROL OF THE ELECTRICAL AND DIESEL DRIVEN

FIRE FIGHTING PUMPS

The pumps shall be capable of operating in both manual and automatic modes, but under no circumstances must they be able to start up or run simultaneously. In both manual and automatic modes the pumps shall be protected from running without water by means of a low level float switch or electrode in the water storage reservoir.

In the manual mode starting and stopping of both pumps shall occur by means of pushbutton type switches mounted on the pump control panel in the pump house, with the necessary "no-water" protection as mentioned above.

In the automatic mode AUTO 2 or AUTO 3 may be selected (see schematic layout of control switches).

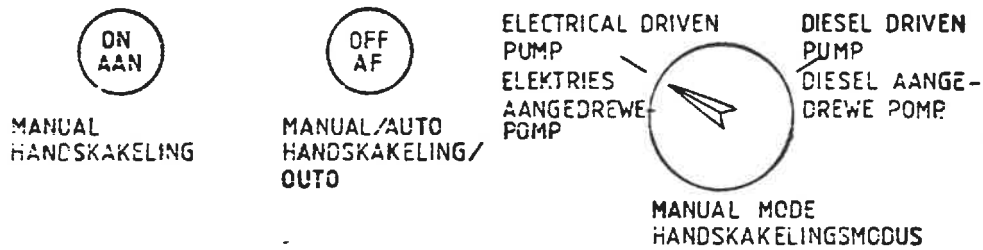
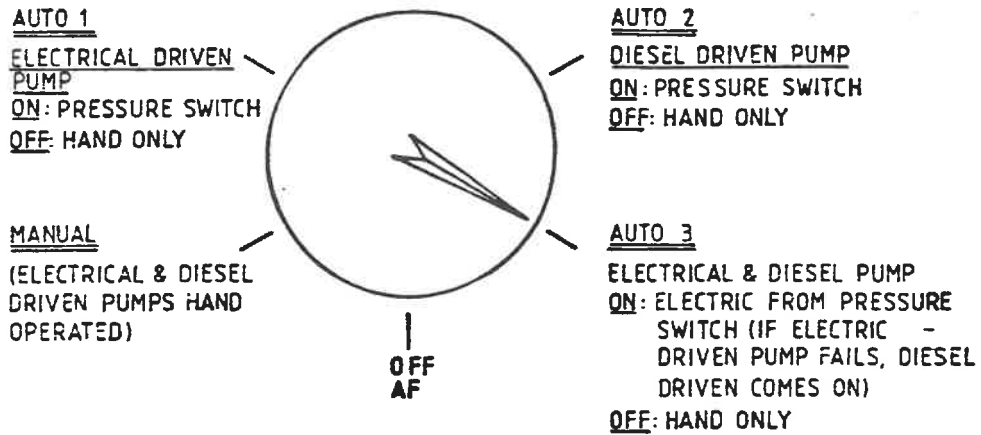
In the AUTO 3 position the electrical pump shall be activated by means of a pressure switch, incorporating an adjustable (between 0 and 30 seconds) time delay. However, in the case of the pump failing to operate or in case of a power failure or any other reason, the diesel driven pump must automatically start up. In die AUTO 1 or AUTO 2 position either the electrical pump or the diesel pump only, shall be activated by means of the pressure switch as mentioned above, also incorporating the "low-water" protection as mentioned above. In all three "AUTO" positions the pumps shall be stopped by hand only.

As it will be common practice to run the diesel and electrical fire pump at least once a week for a couple of minutes, and to prevent any damage to the pumps, a return pipe to the reservoir (sized for approximately 35% of the pump's duty-point flow) is to be provided. This return pipe is to be fitted with a hand operated valve, which will only be opened when running the pumps for testing purpose.

Under certain circumstances an automatic hydraulically controlled pressure relief valve (PRV) may be fitted in the return pipe as per attached DETAIL SHEET no F1001. If the flow in the line decreases due to a very low or no demand, this valve with a spring loaded pilot control will open, causing pressure relief and thus preventing damage to the pumps. The water will then circulate back to the reservoir. As soon as the flow increases and the pressure drops, the valve will close or partly close again and full flow or the required flow will be pumped into the reticulation.

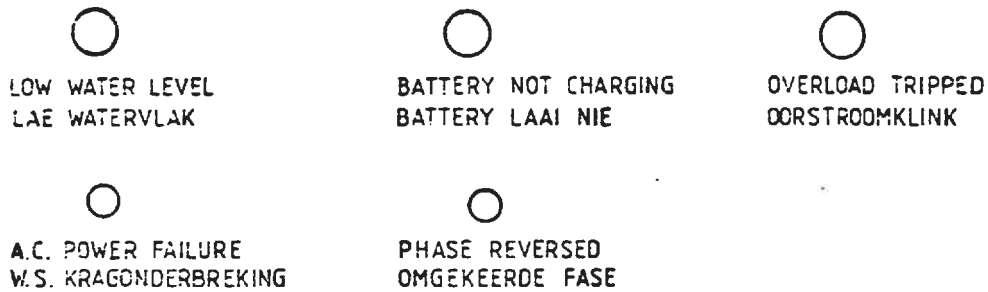
Whenever the fire pumps are in operation, an alarm and a red rotating light mounted in a convenient position should be activated.

CONTROL SWITCHES FOR PUMPS



EXTRA'S DISPLAYED ON SWITCHBOARD

LIGHTS - LIGTE



NOTE: THE WORDING ON THE SCHEMATIC LAYOUT MUST BE DISPLAYED ON THE SWITCH BOARD.

REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF PUBLIC WORKS



SUNDUMBILI MAGISTRATE COURT.
WCS: 044999

SUPPLEMENTARY TECHNICAL SPECIFICATION
FOR THE
SUPPLY, DELIVERY AND ERECTION
OF
FIRE FIGHTING EQUIPMENT INSTALLATIONS

(DPW OFFICE)

(2006)

SUPPLEMENTARY TECHNICAL SPECIFICATION

GENERAL

This supplementary specification consisting of six pages numbered consecutively is for the supply, delivery installation and commissioning of pump house, all piping, diesel and jockey pumps, hydrants, hose reels, extinguishers and signage, and is to read as forming part of the Department of Public Works Standard Specification for Fire Water storage, and Diesel pump Installations, and Conventional fire fighting equipment. The clauses referred to herein are clauses of the Standard Specification, relevant clauses not specifically mentioned shall also apply.

All equipment and installations detailed in this specification shall comply with the requirements of the Occupational Health and Safety Act 85 of 1993.

The Department's Standard Specification for Electrical Installations and Electrical Equipment pertaining to Mechanical Services, Issue IXa, December 1999, shall also apply to this contract.

Where conditions are at variance, this supplementary specification will have preference over both Standard Specifications and drawings.

Copies of the Standard specifications are obtainable from the Director-General: Public Works, Private Bag X 65, Pretoria, 0001. All Standard Specifications are also available on the Department's Website [www.publicworks.gov.za].

DRAWINGS

The drawings that accompany this specification are schematic and do not necessarily indicate the exact position, size or detail the construction of equipment. Tenderers must satisfy themselves that the equipment offered by them will fit into the available space and can be positioned so that access for maintenance, repair or removal is not encumbered.

NOTE: All final dimensions are to be verified on site prior to any equipment or material being ordered or manufactured.

Item No	Drawing No	Floor	Service
1	ME1234/SFP1	Basement floor	Fire Protection
2	ME1234/SFP2	Lower Ground Floor	Fire Protection
3	ME1234/SFP3	Ground Floor	Fire Protection
4	ME1234/SFP4	First Floor	Fire Protection
5	ME1234/SFP5	Second Floor	Fire Protection
6	ME1234/SFP6	Third Floor	Fire Protection

SCOPE OF WORK

This specification covers the installation of new conventional fire fighting equipment installations, fire storage and hydrant system and all signage.

PUMP ROOM

Pump room shall include the diesel pump, jockey pump, water pump, control panel, diesel tank, test piping manifold, UPS, motor soft starters, alarms and all equipment to make unit complete and functional.

The size of the all pumps and motors to be calculated by the tenderer and shall be in accordance with all ASIB and PWD standards and specifications.

DIESEL PUMP

End suction volute casing centrifugal pumps with cast iron impellers as specified in ASIB and PWD specs.

DIESEL ENGINE

The water cooled engine shall be a four stroke diesel engine having a continuous power rating to meet the requirements of the pump demand up to 2 500 m above sea level. The power-output of the engine shall exceed the maximum pump requirements by at least 25% under the worst flow conditions. Starting shall be by means of a 24 volt starter motor connected to a 24 volt battery with a 220 volt AC mains trickle-charger, all mounted neatly in an approved housing as part of the pump set. By this means the battery will be charged in situ from a standard 15 amp three point domestic plug power point.

The diesel engine shall be provided with an effective silencer.

DIESEL ENGINE/PUMP CHASSIS

A channel section sized at 200mmx100mm shall be used as a chassis for the diesel motor and pump. The chassis shall be galvanised after manufacturing and also painted in position.

JOCKEY PUMP

An electrical jockey pump which is suitable to supply the required volumes and pressures shall be installed complete with motor ,base ,coupling and guards.

DIESEL STORAGE TANK

The tank shall be made of mild steel hot-dipped galvanised and secured to the floor. The diesel tank on the unit shall be large enough for four hour's operation under full load. The tank shall be fitted with a level gauge and a lockable cap.

TEST PIPING MANIFOLD

Shall be installed as per PWD requirements.

FRAMED INSTRUCTIONS

Framed instruction panels shall be provided as set out in the SABS 0287 Clause 9.8

The diagrammatic instruction card indicating clearly the procedure for operation of the sprinkler valve, in both official languages, shall be framed in a strong teak or approved metal frame with glass front and neatly mounted.

The minimum design pressure of the system is to be indicated clearly on the instruction card.

FIRE WATER STORAGE TANK

Concrete water storage tank with a holding capacity of 316 kilolitres.(316m³)

Water supply from main water supply.
Water level control via ball float valve.

WELDING

On site welding will not be permitted. All welded joints shall be workshop fabricated and if not threaded in the orthodox manner, sections or fittings shall be installed by means of pipe sockets or flanges.

Torch or flame cutting of holes in pipes or the building structure for any purpose whatsoever, as well as flame cutting/trimming of brackets, ect, is not permitted. All welded pipe joints shall be hydraulically tested to 1500 kPa.

Welding shall be done using GTAW process and 10% of welds shall be x-rayed

PIPE SUPPORTS

All pipe supports, brackets, hanger rods, clips, etc. used shall be galvanised throughout the installation and painted as specified, (plating or spraying methods are not acceptable).

CONTROL PANEL

All steel control panel, in accordance with SANS 60439, is required. This is to incorporate:

- 3 way selector switch (pump 1/pump 2/auto).
- Voltmeter on incoming power with selector.
- Off/manual/auto selector for each pump
- Manual stop/start for each pump.
- Ammeter for each pump.
- Hour meter for each pump.
- Run/trip indicator lights for each pump.
- Suitably rated incoming isolator.
- Star-Delta starting switchgear for each pump.
- A suitably sized 3 phase circuit breaker for each pump,
- Level controls/ cut outs (as detailed below)
- Pressure switch controls for each pump.
- Low level alarm (siren and indicator light)
- Pump trip alarm (siren and indicator light)
- Fire in operation alarm.
- Alarm mute button
- All terminals to be numbered.
- A Laminated wiring diagram, a system schematic, and operating instructions are to be neatly framed and fixed to the plant room wall adjacent to the control panel.
- The small pump is to switch on when the line pressure is 350 kPa, and off when the line pressure is 450 kPa.
- The large pump is to switch on when the line pressure is 320 kPa and off when the line pressure is 700 kPa.
- A low level switch (and warning light on the panel) is to switch the pumps off when the water level is very low. A rubber encased mercury switch is required.
- A pressure sustaining valve, such as a "Bermad" or other approved, is to be fitted after the large pump. This valve is to provide a closed delivery for start-up, and open progressively as the pump speed, and thus pressure increases. At operating pressure this valve is to remain fully open.

U.P.S

A UPS suitable for the jockey pump shall be installed which is rated at a capacity of 5KW-220V

ALARMS

Suitable audible alarms shall be installed when the engine is activated

FIRE HYDRANTS

Hydrants to be installed as shown on drawings:

- ME1234/SFP2
- ME1234/SFP3
- ME1234/SFP4
- ME1234/SFP5
- ME1234/SFP6

FIRE HOSE REELS AND FIRE EXTINGUISHERS

Hose reels as stipulated in bill of quantities, complete with mounting brackets.
Hose reels must comply with SABS 543 in all respects.

Fire extinguishers must be rechargeable dry chemical powder fire extinguishers in accordance with SABS 810 with capacity of 9kg to be fitted complete with brackets and fittings.

ALL PIPING, VALVES AND FITTINGS

All piping fittings and valves shall be as required in bill of quantities.

HYDRAULIC TEST PRESSURE

The installation shall be tested to a hydraulic test pressure of 1500 kPa as set out in clause 10.1.2.2 SABS 0287.

RUNNING OF PIPES

Pipes shall be installed as per supplied drawings

SIGNAGE

The supply, delivery and positioning and fixing of all fire signage as required by regulation.
The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.

The fire alarm installation cards, indicating clearly in both official languages the procedure to be followed in the event of a "FIRE" alarm, are to be framed in approved glazed teak or non-ferrous material frames and neatly mounted where it can be clearly read, in a position that will be indicated on site.

GUARANTEE PERIOD

All mechanical equipment and installations are subject to a 12 month guarantee from date of first delivery. The guarantee shall cover the performance of the installations and any defects due to inferior materials and/or workmanship of the contractor, or any of his sub-contractors, fair wear and tear excepted, and the contractors shall repair any such defects without delay and at his own cost. This guarantee shall include malfunctions, leaks and adjustments. Should any part of the mechanical installation perform unsatisfactory so as to become detrimental to its functional use, the contractor shall replace any such part, or the complete installation, with equipment as prescribed by the engineer, without delay and at his own cost.



DEPARTMENT OF PUBLIC WORKS

FIRE SECURITY

**STANDARD TECHNICAL
SPECIFICATION**

FOR A

PUMP INSTALLATION

**FOR AUTOMATIC SPRINKLER FIRE EXTINGUISHING
SYSTEM**

REVISED: OCTOBER 1981
Ref. F.P.O/82/6E

**STANDARD TECHNICAL SPECIFICATION FOR A PUMP INSTALLATION FOR A
AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEM**

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STANDARD TECHNICAL SPECIFICATION

FOR A

PUMP INSTALLATION

FOR A

AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEM

1. GENERAL

This Standard Specification deals only with the general technical aspects of a pump installation for a automatic sprinkler fire extinguishing system. Tenderers are therefore referred to the Supplementary Specification of the particular scheme for specific technical requirements applicable to the site and the service.

Unless specified otherwise in the Supplementary Specification for the particular scheme a dual pumping plant shall be provided having one pump driven by a diesel engine and the other by an electric motor.

Where a single system is required, the pump is always to be driven by a diesel engine.

the pump installation shall include for a booster pump.

2. THE INSTALLATION

The complete installation shall conform to the Rules and Regulations (latest edition) as laid down by the Automatic Sprinkler Inspection Bureau (A S I B), hereinafter called the "Rules".

3. THE PUMPS

Where a dual pumping plant has been specified the two pumps shall be identical, irrespective of the driving process.

The pump shall be of sufficient capacity to deliver the required quantity of water at the necessary pressure for the particular fire hazard and the height of the uppermost sprinkler, as stated in the Rules.

Particulars of the type of fire hazard and the height of the uppermost sprinkler will be stated in the Supplementary Specification for the relevant scheme.

The pump shall be of such a type and design that it shall not be necessary to remove either the pump or the motor in order to gain access to the impeller, nor to remove the impeller from the pump casing.

4. THE DIESEL ENGINE

The diesel engine for the pump shall be of a type approved by the Automatic Sprinkler Inspection Bureau and the performance shall comply with the demands of the pump. Unless specified otherwise in the Supplementary Specification for the particular service, the engine may be either water or air-cooled.

If the engine is air-cooled, the contractor shall supply and install the necessary air duct to the engine. Unless specified otherwise, the building contractor will provide the necessary aperture in the wall, including the grill and sub-frame. The required size of the grill inlet shall be provided by the supplier of the engine.

Should the ventilation of the pump chamber appear to be insufficient for the operation of an air-cooled engine, the supplier shall advise the Department of any additional requirements, which are necessary.

The exhaust system of the engine shall be taken through the wall of the pump house. A sleeve shall be provided for this.

The method of starting the engine shall be according to the most recent requirements of the Automatic Sprinkler Inspection Bureau.

5. THE ELECTRICAL MOTOR

The electrical motor for the pump shall be of a type approved by the Automatic Sprinkler Inspection Bureau and the performance shall comply with the demands of the pump.

The motor shall be suitable for a power supply of 400 volt, 50 Hertz unless specified otherwise in the Supplementary Specification for the service.

Starting shall be by means of a star/delta starter only.

6. THE ALIGNMENT

The steel frame for the driving motor or the engine shall be bolted to a concrete base which, unless stated otherwise, will be supplied by others.

Detailed drawings of the combination bases shall be submitted to the Department for approval before the bases are cast. The building contractor will also be responsible for the grouting of the bases as well as the plastering and finishing of the concrete bases.

After foundation bolts have been finally screw up and all piping has been completed and coupled up, the alignment of the pump and motor shall be carefully checked and adjusted where necessary.

The radial and axial alignment as measured on the perimeter of the flexible coupling shall be not more than 0,075mm.

After the alignment has been checked and accepted by the Engineer the pump and motor or engine shall be fitted with two dowl pegs to ensure that the correct alignment will be maintained.

The contractor shall provide all equipment and accurate measuring instruments for the alignment of the pump and motor.

The flexible coupling mentioned above shall be provided with a removable sheet iron guard.

7. PRESSURE GAUGES

Two pressure gauges are required for each pumping installation. The gauges shall be at least 100mm in diameter and fitted with porcelain faces.

The one gauge shall be fitted on the suction side of the pump and the other on the delivery side so as to indicate pressures of - 100KPa to 150 KPa and 0 to 1500 KPa respectively. The gauges shall be mounted on a steel mounting as close as possible to the pumps, without limiting the working space around the pumps. The steel mounting shall be constructed of 120mm X 55mm X 13g/m channel iron and of such height that the face of the meter is just above the top of the relevant pipe. The mounting shall be bolted firmly to the floor of the pumphouse. The coupling between the pipes and the gauges shall be by means of a brass U-tube fitted with brass stopcocks, or other approved means, so that the gauges can be removed when the system is under pressure.

8. ELECTRICAL CONTROLS

The controls for both the diesel engine and the electric motor, if specified, shall conform to the requirements of the Automatic Sprinkler Inspection Bureau.

Over and above these requirements an ammeter shall be provide on each phase of the power supply to the motor. An automatic switch, which will stop both the engine and the motor, if the water supply tank is empty, is required. An additional alarm is required if any one of the two compartments of the water tanks has less than 2/3 of its volume.

The control equipment shall be mounted on separate bases at least 300mm in height.

9. FUEL TANK

Notwithstanding the contents of paragraph 2549.23.2 of the Rules the capacity of the fuel tank shall be sufficient for the engine to run at maximum output for at least the following periods:

Extra low risk	4 hours
Normal risk	6 hours
Extra high risk	8 hours

10. BOOSTER PUMP AND MOTOR

The booster pump, motor and control equipment shall conform to the requirements of the Rules. Notwithstanding the contents of paragraph 2541.22 of the Rules the output of the booster pump shall be not less than 10 L/ mm and capable of raising the pressure in the system to 850KPa, unless specified otherwise.

The booster pump and motor shall also be fitted with an hour meter.

11. LAYOUT OF PUMP ROOM

The layout of the pump room shall conform to the requirements of the diagrammatic layouts attached hereto for either a double or single pumping system.

12. SWITCHING-ON PRESSURE

The switching-on pressure for both the normal pump and the booster pump as well as the switching-off pressure for the latter are stated in the Supplementary Specification for this service.

13. BATTERIES

All batteries for the control and regulating systems, including the diesel engine, shall be of the nicklecadmium type.

The capacity of the battery for the starter of the diesel engine shall be sufficient for at least 15 starting cycles as described in paragraph 2549.36.6 of the Rules.

Tenderers shall provide a certificate from the supplier of the batteries in which he confirms that he is aware of the charging requirements of the batteries and is satisfied with the battery-charger, which is included in the offer.

14. TANKS

The pump installation shall include a pressed steel tank unless specified otherwise.

The tank shall be of sufficient size for the relevant fire-hazard and height of the uppermost sprinkler.

In the determination of the size of the tank it shall, unless specified otherwise, be assumed that there will be no inflow during a fire. If specific dimensions are stated, the contractor shall nevertheless ensure that the capacity conforms to the requirements of the Rules.

The tank shall be mounted on 230mm walls or on a steel frame. Unless stated otherwise in the Supplementary Specification, the mounting will be provided by others. The contractor for the pumps shall, in the case of a mounting on walls provide 6mm x 150mm steel plates between the tank and the walls for the full length of the tank. The tank shall conform to CKS 114 except that the plates may be somewhat larger than 1,2m x 1,2m. The contractor shall, immediately after the contract has been awarded to him, notify the Department what the actual dimensions of the plates are so that the mountings can be provided at the correct distances.

All the pipe connections to the tank shall be flanged. The tank shall have a dividing plate so that there are two equal compartments. The division plate shall be provided with 80mm diameter holes at 500 mm centres immediately above the waterline.

The sizes of the suction pipe outlets shall conform to the requirements of the Rules. Each outlet shall have an approved vortex inhibitor.

The tank shall have 4 manholes (two at each end) complete with 4 sets of inner and outer steel ladders (a total of 8 ladders). Each compartment of the tank shall be provided with two sets of ladders and the ladders shall be firmly fixed to the tank.

The ladders shall be galvanised as specified for the tank. Unless specified otherwise each half of the tank shall have an 80mm diameter inlet with approved ballvalve, 100mm overflow, 80mm flushing pipe and a water level indicator. Provision shall be made in the roof of the tank for two "tank empty" electrodes and two electrodes for switching off the

pumps when the tanks are almost empty unless the contractor envisages some other form of "no flow" switching off.

The roof shall consist of roofing plates with a minimum thickness of 3mm. The roofing plates shall be of such a height over the ball valves so as to allow for the movement of the ball and the arm.

The tank plates, roofing plates and connections shall be galvanised to SABS 763.

15. DRAINAGE

Unless there is a satisfactory drainage pump inside the pump room, all drain pipes from pump glands, the tank flush pipes, drain pipes from pumping equipment and the flow test pipe shall be taken through one of the external walls of the pump room.

16. PIPES AND VALVES IN THE PUMP CHAMBER

All piping up to 150mm diameter in the pump chamber shall, unless specified otherwise, be galvanised mild steel medium class, in accordance with SABS 62. Where the thread, after jointing, protrudes, this shall be given a prime coat followed by one coat of aluminium paint. Pipes larger than 150mm diameter shall be flanged and galvanised after manufacture. Gate valves shall be flanged and conform to SABS 664 Class 1A. The valves shall close clockwise with an indicator to show whether the valve is open or closed.

All valves shall be fitted with straps and padlocks.

Non-return valves shall be "Hydrostop" as supplied by Messrs. Steelmetals of Isando or of some other approved type.

Reducers on suction pipes shall be eccentric and fitted so as to obviate air pockets.

Reducers on delivery pipes shall be concentric. An approved coupling shall be provided adjacent to the suction of each pump.

All piping shall, as far as possible, be secured to walls. Where this is not possible, the pipes shall be firmly fixed to steel supports attached to the floor.

17. ELECTRICAL CONNECTION

Unless specified otherwise in the Supplementary Specification for this service, a 3 phase 4 core electrical connection will be provided by others as a supply to the control panel in the pump room where one or more of the pumps are to be driven by an electric motor.

The connections of the incoming cable to the switchboard, installation and connecting of all other cables shall be the responsibility of the sprinkler contractor.

The Department will also supply a single-phase 15-amp power plug and lights in the pump room. The nominal voltage of the power supply will be stated in the Supplementary Specification.

Where a motor for the pump is not required, only electric lighting and the standard 15-amp power plug will be provided.

18. ELECTRICAL WIRING AND EQUIPMENT

All electrical wiring and equipment shall conform to the Department's Standard Specification for Electrical Equipment and Installation of Mechanical Services except where it may be contrary to the requirements of the Automatic Sprinkler Inspection Bureau.

18.1 Special attention shall be given to complying with the following:

18.1.1 The Standard Regulations for the Wiring of Premises as amended.

18.1.2 The Factories, Machinery and Building Works Act of 1941, as amended.

18.1.3 The Mines and Industries Regulations, Government Notice No. R1609 dated 28 th. September 1962, as amended.

18.1.4 The local Municipal by-laws and regulations as well as the regulations of the local Supply Authority.

18.1.5 The local fire regulations.

18.1.6 The Post Office regulations, where applicable.

18.1.7 The regulations of the Gas Provisioning Authority where applicable.

18.2 Attention shall also be given to the Department's requirements in regard to:

18.2.1 Conduits.

18.2.2 Cable brackets and cable straps.

18.2.3 Cable and cablejointing.

18.2.4 Wiring.

18.2.5 Control boards. It is also, inter alia, a Departmental requirement that control boards shall be provided with a 20mm wide border on the front side and that no equipment shall protrude beyond this border. Unless otherwise specified, control boards shall be provided with hinged front panels.

18.2.6 All instruments and switches shall be clearly labelled.

18.2.7 All instruments shall be provided with fuses.

18.2.8 All electronic equipment shall be protected against voltage changes in the current.

18.2.9 The provision of final drawings and manuals on completion.
The attention of contractors is drawn to the fact that unless specified otherwise, all conduits and cable brackets shall be taken along the walls and the ceiling of the pump room and then dropped vertically to the desired point below.

19. **ALARMS**

Audible alarms and flashing lights shall be provided on the outside of the pump room or pump house and also at the caretaker's quarters.

Red flashing lights shall come into operation when the driving agent of the pump switches on. Amber flashing lights shall come into operation when the booster pump begins to operate.

Additional alarm points may be required, such requirements being described in the Supplementary Specifications.

The alarms for the water level warning shall be clearly distinguishable from the fire alarms.

20. **OPERATING INSTRUCTIONS**

Operating instructions in which the operating procedures and any emergency procedures is stated in English and another official language shall be framed under perspex in a robust 25mm kiat, metal or other approved frame and neatly secured to a wall in the pump room.

21. **INSTALLATION OPERATING AND MAINTENANCE INSTRUCTIONS**

Full installation operating and maintenance instructions shall be supplied in triplicate with each system and shall include schematics and detailed wiring drawings with a full component list indicating not only component values but sources of supply. Equipment will not be accepted until this information has been handed to the Department.

22. **INFORMATION REQUIRED WITH TENDER**

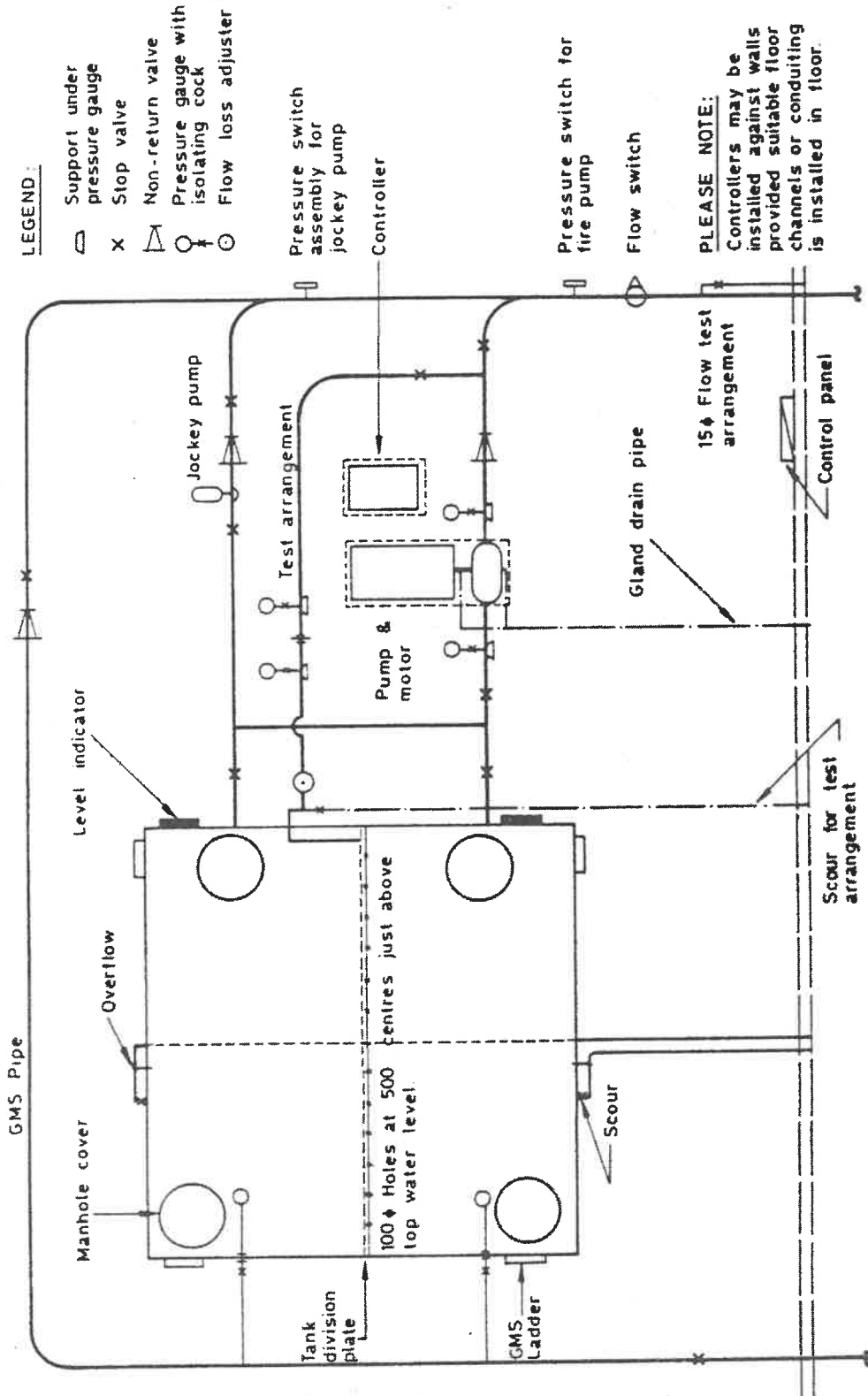
Tenderers shall supply the information as requested in the Schedule of Equipment and Materials which is attached to this specification as an annexure, together with their tender.

Should a Tenderer fail to do so his tender may be disqualified.

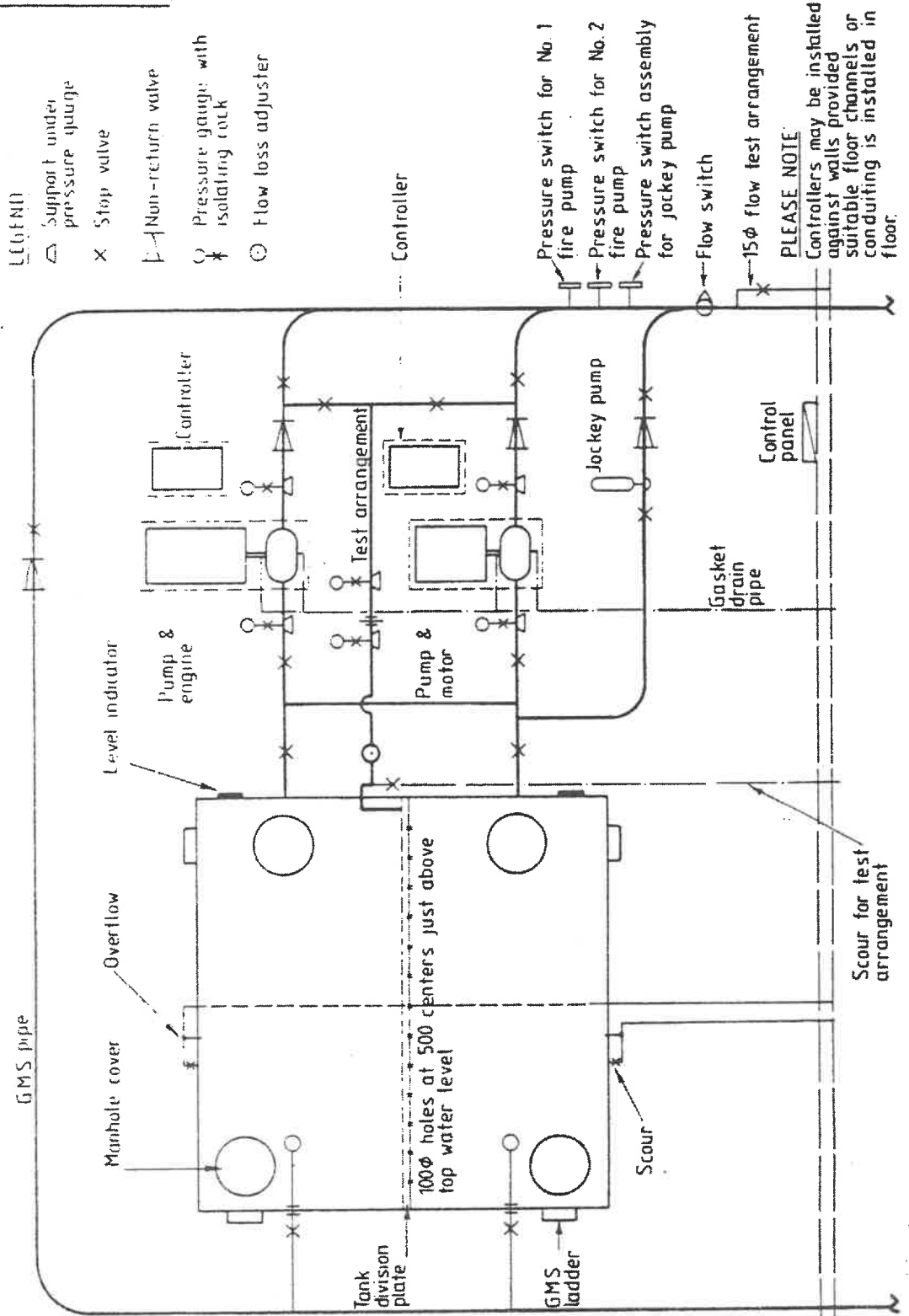
23. **MAINTENANCE CONTRACT**

After the completion of the required maintenance period the Department may insist on entering into a comprehensive maintenance contract with the installer for a period which may vary between one and five years at the sole discretion of the Department.

**ANNEXURE A TO THE STANDARD TECHNICAL SPECIFICATION
FOR A PUMP INSTALLATION FOR AN AUTOMATIC SPRINKLER
FIRE EXTINGUISHING SYSTEM : PUMP ROOM LAYOUT WITH A
SINGLE FIRE PUMP**



**ANNEXURE B TO THE STANDARD TECHNICAL SPECIFICATION
FOR A PUMP INSTALLATION FOR AN AUTOMATIC SPRINKLER
FIRE EXTINGUISHING SYSTEM : PUMP ROOM LAYOUT WITH
TWO FIRE PUMPS**



ANNEXURE C TO THE STANDARD TECHNICAL SPECIFICATION FOR A PUMP

INSTALLATION FOR AN AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEM

SCHEDULES OF EQUIPMENT AND MATERIALS

Item No, 1	Pump
------------	------

- (a) Make _____
- (b) Manufacturer's Model No _____
- (c) Country of Origin _____
- (d) Type of Pump _____
- (e) Diameter of suction pipe _____ mm
- (f) Diameter of delivery pipe _____ mm
- (g) Yield at specified delivery head _____ l/s
- (h) Power absorbed at spindle _____ kW
- (i) Efficiency of pump at rating stated above _____ %
- (j) Maximum delivery head with pump at rated operating speed and outlet valve closed kPa _____
- (k) Diameter of shaft _____ mm
- (l) Shaft material _____
- (m) Pump casing material _____
- (n) Number of impellers _____
- (o) Impeller material _____
- (p) impeller size _____
- (q) Does the pump have a horizontal split casing _____ Yes/no*
- (r) Type of bearings _____
- (s) Type of flexible coupling _____
- (t) Make of coupling _____
- (u) (W) Size of coupling _____ mm
- (v) Details of gland or bearings _____

Item No, 2	Engine for Fire Pump
------------	----------------------

- (a) Make _____
- (b) Manufacturer's Model No _____
- (c) Type of engine _____
- (d) Country of origin _____

- (e) Number of cylinders _____
- (f) Bore and Stroke of cylinder _____ mm
- (g) Rated power under specified conditions _____ kW
- (h) Speed _____ r p m
- (i) Method of cooling _____ water/air
- (j) Type of fuel filter _____
- (k) Full load efficiency of engine _____ %
- (l) Fuel consumption at full load _____ l/hr
- (m) Recommended fuel and oil _____
- (n) Type of regulator _____
- (o) Type of thermostatic valve _____
- (p) Type of oil pressure relief valve _____
- (q) Total mass of engine _____ kg
- (r) Fan V-belts _____
- (s) Number of V-belts _____
- (t) Are spare parts available in South Africa _____

Item No, 3 Control Equipment for Engine

- (a) Manufacturer _____
- (b) Size of base _____ m x _____ m
- (c) External dimension of cabinet _____ m x _____ m x _____ m

Item No, 4 Motor for Fire Pump

- (a) Make _____
- (b) Manufacturer's Model No _____
- (c) Type of motor _____
- (d) Country of origin _____
- (e) Driving speed _____ r p m
- (f) Rated power _____ kW
- (g) Amperage at full load _____ Amp
- (h) Total mass of motor _____ kg

Item No, 5

Control Equipment for Motor

- (a) Manufacturer _____
- (b) Size of base _____ m x _____ m
- (c) External dimensions of cabinet _____ m x _____ m x _____ m

Item No,6

Booster Pump and Motor

- (a) Make of pump _____
- (b) Country of origin of pump _____
- (c) Make of motor _____
- (d) Country of origin of motor _____
- (e) Type of motor and number of phases _____
- (f) Rated power of motor _____ kW
- (g) Pumping yield at 20m head _____ l/m
- (h) 25m head _____ l/m
- (i) Material of casing _____
- (j) Material of impeller _____
- (k) Type of glands _____
- (l) Type of bearings in pump and motor _____
- (m) Make and type of starter _____
- (n) Maximum starting current _____ amp
- (o) Amperage at full load _____ amp
- (p) Total mass of pump and motor _____ kg

Item No,7

Battery

- (a) Make _____
- (b) Battery type _____
- (c) Country of origin _____
- (d) Does the battery have a built in monostat? _____
- (e) Guarantee period _____
- (f) Number of batteries? _____

(g) Total capacity _____ Amp hr.

Item No,8

Battery Charger

- (a) Make _____
- (b) Country of origin _____
- (c) Type of charger offered _____
- (d) Maximum charging capacity _____ Amp
- (e) Recharging time _____ hr_____

(The recharging should reach approximately 80% of battery capacity within 7 hours.)
Note: Tenderers are reminded that the charger should be of constant potential type designed to limit the Charging current to meet the specification of the battery supplier.

Item No 9

Pressure Switches

- (a) Make _____
- (b) Country of origin _____
- (c) Model Number _____
- (d) Voltage of pressure switch _____

Item No 10

Electrical Work

- (a) Name of the firm that will undertake the electrical work _____

Item No 11

Tank

- (b) Make _____
- (c) Size of plates _____ m x _____ m x _____ m
- (d) External dimensions of tank _____ m x _____ m x _____ m
- (e) Gross capacity _____ l
- (f) Type of depth indicator _____

Item No 12

Pipe work and Fittings

- (a) Size of suction pipe _____ mm
- (b) Size of drainage pipe _____ mm
- (c) Material of non-return valve _____
- (d) Size of sluice valve _____ mm
- (e) Make of pressure gauges _____
- (f) Country of origin of pressure gauges _____
- (g) Diameter of pressure gauges _____ mm
- (h) Diameter of copper pipes to gauges _____ mm

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**SPECIFICATION FOR THE INSTALLATION OF
LIFTS, ACCESS GOODS LIFTS ONLY AND ESCALATORS**

SECTION 1 - GENERAL

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SECTION 1 – GENERAL**1. Intent of Specification**

The lift specification is intended to cover the complete installation of the lift plant. The minimum equipment requirements are outlined, but do not cover all the details of design and construction. Such details are recognised as being the exclusive responsibility of the lift contractor. It is hereby acknowledged that neither the Principle Agent nor the Consulting Engineer invented or developed any part of the lift system, but have only made selections of capacities, speed, control systems, materials and finishes, as well as specified performance and installation criteria as may be applicable.

In all cases where a device or part of the equipment is referred to in the singular, it is intended that such reference shall apply to as many devices as are required to complete the installation.

2. Standards and Codes

All work shall be in accordance with the requirements of the SABS1545-1; SABS1545-2; SABS1545-5; SABS1545-10; SABS1543; "Specifications for Lifts, Escalators and Passenger Conveyors" and shall comply with the Occupational Health and Safety Act 85 of 1993 and current regulations of all other codes applicable to this work.

Equipment and materials shall be new and manufactured in accordance with EN-81 standards and approved by the local authorities having the appropriate jurisdiction.

All equipment shall be provided by the same manufacturer.

3. Compliance with Regulations

The installation shall be erected and tested in accordance with the following Acts and regulations:

- a) The latest issue of SABS 0142: "Code of Practice for the Wiring of Premises",
- b) The Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended,
- c) The Local Government Ordinance 1939 (Ordinance 17 of 1939) as amended and the municipal by-laws and any special requirements of the local supply authority,
- d) The Fire Brigade services Act 1993 Act 99 of 1987 as amended,
- e) The National Building Regulations and Building Standards Act 1977 (Act 103 of 1977) as amended,
- f) The Post Office Act 1958 (Act 44 of 1958) as amended,
- g) The Electricity Act 1984 (Act 41 of 1984) as amended and
- h) The Regulations of the local Gas Board where applicable.

4. Scope of Work**4.1 Work included**

Design and provide all labour, materials, equipment and services and perform all operations required for lift work as indicated on drawings or specified herein.

Supply and installation of all fixing materials for installation of equipment in the lift shaft.

Supply and installation of the necessary wiring in conduit from the controlling circuit breaker to the power section of the lift controller.

Supply and install conduit and wiring for the car lighting and socket outlets and the termination and connection thereof in the distribution board.

The lift shaft shall be provided with permanently installed electric lighting, which shall be switched from both the pit and the motor room. The highest and lowest luminaires shall be mounted not more than 500mm from the top of the shaft and from the bottom of the pit respectively, with intermediate luminaires mounted at intervals not exceeding 7000mm. The minimum illumination at 1000mm above the car roof and the lift pit shall be 50lux.

The installation of all electrical equipment shall comply with the requirements of the SABS0142 and a Certificate of Compliance shall be issued therefor.

4.2 Work Executed by Other Trades

Structural

Lift shafts, pits and motor rooms complete with all access doors and openings as per drawings.

Concrete slabs with up-stands constructed for the lift machine foundations at the top of each lift shaft.

Waterproofing of lift pit after setting of all pit supporting steels and rail inserts. Pit drains or auto draining pumps as required.

Electrical

Provision of a 3-phase, 4-wire, 50Hz 400/230V permanent power supply to a surface mounted distribution board in each machine room in the position shown on drawings. The distribution board will also be equipped with a separate circuit breaker for the shaft and car lighting as well as a separate circuit breaker with earth leakage protection for the socket outlet in the pit and on top of the lift car.

Machine room shall be equipped with sufficient lighting, ventilation and socket outlets as required by the relevant standards and regulations.

If applicable, the standby power supply will be sized to run a predetermined number of lifts simultaneously.

The normal/standby power indicating circuitry shall include, a delayed normally closed potential free contact at 220 Volts/5 Ampere of the emergency power change over switch gear shall be wired to the lift machine room/s and shall be terminated in a suitable junction box. All wire ways or 25mm minimum conduit required to inter-link the lift motor room for the sequencing of lifts in multi-group installations shall be included under this section.

If required, a suitable pit sump pump will be designed, supplied and installed.

5. Co-ordinating

Due to the nature of the installation, a fixed sequence of operation is required to properly install the complete lift system. The work shall be closely scheduled in order not to delay the entire project.

The Lift Contractor shall familiarise himself with the requirements of the other trades and shall examine the plans and specifications covering each of these sections.

The lift space requirements shall be carefully checked with other trades to ensure that the equipment can be installed in the proper sequence in the space allotted.

6. Submittals

Layout and Shop Drawings

Layout drawings are required for all lift work, including car enclosure and landing entrance co-ordinating drawings. Drawings shall show top clearance above cross-heads and counterweight frames, machine room layouts with power requirements and heat release data, location of all equipment on tops of cars, overhead beams and elevations, and reactions which will be transmitted to the building structure during normal operation of lifts.

Shop drawings are required for car enclosure, landing entrances and signal fixture work showing construction, finish and fastening details. Furthermore, shop drawings shall clearly show the motor room construction detail, shaft construction detail including all the required internal supporting beams, pit dividing walls for multi-lift shafts and pit sump pump drains. Composite shop drawings shall be submitted for areas, which require close co-ordination with the work of the different trades.

All special equipment and fixture faceplates shall be submitted for approval. Drawings and samples or brochures shall be submitted for each type of fixture and shall be co-ordinated with the architectural drawings. Final design and material proposed for fixture faceplates and special equipment shall be approved by the Representative/Agent.

Samples

All exposed materials and finishes shall be submitted to Representative/Agent for approval in sample form.

The Lift Contractor shall furnish such samples as may be called for and Representative/Agent may reject all materials or workmanship not corresponding with the samples. All approved samples shall be held in safe-keeping until such time as the work to which they apply has been completed.

7. Tests Certificates and Inspections

The Lift Contractor shall carry out all the tests and checks required in terms of the document SABS1545-10 Annex A and/or B and issue the necessary Certificate of Compliance prior to final completion

Upon completion of the installation of all equipment and once being in full operation the Lift Contractor shall completely test the lift equipment to demonstrate that the equipment is provided in compliance with the specification. The total costs for these test shall be included in the tendered amount.

The Lift Contractor shall make arrangements for such tests and shall give at least 72 hours written notice to the Representative/Agent, before commencing the test.

In the event of the plant, equipment or installation not passing the test, the Representative/Agent shall be at liberty to deduct from the Contract amount all reasonable expenses incurred by the Employer and/or the Representative/Agent attending the test.

Whenever any installation or equipment is operated for testing or adjusting as provided for above, 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 until the system is handed over.

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

After completing the installation or system, all equipment shall be tested, adjusted and readjusted until they operate to the satisfaction and approval of the Representative/ Agent.

The Contractor shall submit certificates of tests carried out to prove the efficiency of all equipment, as well as certificates to be obtained from all relevant authorities, statutory bodies, etc.

8. Application to Department of Labour

The Lift Contractor shall submit all the necessary drawings and information to the Regional Director of the Department of Labour and shall submit the necessary application for the erection and use of the lifts, access goods lifts only and escalators.

9. Operating and Maintenance Manuals

The Contractor shall be responsible for the compilation of a complete set of Operating and Maintenance manuals.

This shall be done in accordance with the Additional Specification – Operating and Maintenance manuals.

All information shall be recorded and reproduced in electronic format as well as supplying the Representative/Agent with three sets of hard copies.

Approval of the final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Practical Completion of the installation.

10. Guarantee

After first delivery of the installation, there will follow a 12-month free maintenance period.

During this period the lift contractor shall maintain the lift installation as per the requirements of the Occupational Health and Safety Act. This maintenance shall include systematic examinations, adjustments and lubrication of all lift equipment. Electrical and mechanical parts shall be repaired or replaced whenever it is required to maintain optimum performance without additional cost to the Department, unless the condition was caused by misuse or vandalism of the lift equipment or due to acts of God.

The work under this section shall be performed by competent, qualified personnel under the supervision and in the direct employment of the Lift Contractor and shall not be transferred to any non-affiliated agent. Contract maintenance and repair work shall be done during normal working hours and shall further provide emergency call-back service twenty-four (24) hours a day, seven (7) days a week.

During the guarantee period the Department will invite tenders for the comprehensive maintenance of the lift installation, which will commence after the final delivery has taken place, i.e. after the twelfth month guarantee period is over and all defects are corrected.

11. Materials and Workmanship

- (a) The work throughout shall be executed to the highest standards and to the entire satisfaction of the Representative/Agent who shall interpret the meaning of the Contract Document and shall have the authority to reject any work and materials, which, in his judgement, are not in full accordance therewith. All condemned material and workmanship shall be replaced or rectified as directed and approved by the Representative/Agent.
- (b) All work shall be executed in a first-class manner by qualified tradesman.

- (c) The Contractor shall be fully responsible for his work and shall replace any of the work which may be damaged, lost or stolen. The Contractor shall protect the building and its contents against damage by him, his employees or sub-contractors and shall make good any damage thereto.
- (d) The Contractor shall indemnify the Employer of all liability for damages arising from injuries or disabilities to persons or damage to property occasioned by any act or omission of the Contractor or any of his sub-contractors, including any and all expenses, legal or otherwise, which may be incurred by the Employer or Representative/Agent in the defence of any claim, action or suit.
- (e) The Contractor shall warrant that the materials and workmanship shall be of the highest grade, that the equipment shall be installed in a practical and first-class manner in accordance with the best practices and ready and complete for full operation. It is specifically intended that all material or labour which is usually provided as part of such equipment as is called for and which is necessary for its proper completion and operation shall be provided without additional cost whether or not shown or described in the Contract Document.
- (f) The Contractor shall thoroughly acquaint himself with the work involved and shall verify on site all measurements necessary for proper installation work. The Contractor shall also be prepared to promptly furnish any information relating to his own work as may be necessary for the proper installation work and shall co-operate with and co-ordinate the work of others as may be applicable.
- (g) The Contractor shall inspect and verify that the existing power feeder system is compatible with the equipment offered and any changes or upgrading of the electrical supply shall be brought to the attention of the Representative/Agent.
- (h) Material and equipment damaged in transit shall be replaced with undamaged material.
- (i) All components and their respective adjustment, which do not form part of the equipment installation work, but influence the optimum and safe operation of the equipment shall be considered to form part of, and shall be included in the Contractor's scope of works.
- (j) All control equipment and serviceable items shall be installed and positioned such that they will be accessible and maintainable.
- (k) The Contractor shall make sure that all safety regulations and measures are applied and enforced during the installation and guarantee periods to ensure the safety of the public and the User Client.
- (l) The Contractor is to include for all scaffolding required to complete the work required.

12. Imported Equipment

This equipment will not be subject to fluctuations in the rate of exchange.

However, should the Contractor choose to be protected against fluctuations in the rate of exchange on imported equipment, the following conditions will apply:

- a) The Materials Offered Ex-Import (Annexure A), which forms part of this tender document, must be completed by the Contractor.
- b) Any fluctuations in the rate of exchange will be for the account of the Government and shall be calculated from a date seven (7) days prior to the date of the Contractor's tender to a date seven (7) days after receipt by the Contractor's bank of the negotiable bill of lading or the exporter's invoice, provided this latter date is not later than 30 days after the date of payment. Thereafter, fluctuations in the rate of exchange shall not be for the account of the Government.

13. Brochures

Detailed brochures of all equipment offered, including the control, drive, door operator, call buttons and signals, remote monitoring station, intercoms and emergency dial-out system shall be presented together with the tender documents.

**SPECIFICATION FOR THE INSTALLATION OF
LIFTS, ACCESS GOODS LIFTS ONLY AND ESCALATORS**

SECTION 2 – EQUIPMENT REQUIREMENT

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SECTION 2 – EQUIPMENT REQUIREMENTS**1. Hoisting Machine****1.1 Traction Drive**

- (a) The brake shall be spring applied and electrically released by direct current. There shall be two shoes actuated by compression springs. The brake shall have sufficient power to hold the car at any landing with the normal amount of counter balancing and with at least 150% of rated load. The brake shall operate in the event of a power failure or any other safety device designed to stop the lift.
- (b) An effective sound reducing material shall be installed between the bed-plate of an overhead or basement driving machine and the beams, the structural concrete slab, shaft structure or the up-stands.
- (c) The driving machine and motor shall have sufficient capacity to operate the lift continuously at 100% of rated speed in both directions without overheating or hunting during levelling.
- (d) The lift machinery shall operate silently and without vibration. The lifts shall constantly operate and shall be maintained at noise levels not exceeding 56 DB (A). The noise level shall be considered acceptable if it does not exceed 56 DB (A) measured on the landing and in the car enclosure.
- (e) Provision shall be made for a safe method of moving the car by hand in the event of a power failure and all the necessary equipment required to carry out this task shall be mounted neatly in the motor room and shall remain on site at all times.
- (f) The Contractor shall supply and install suitable structural steel beams with bearing plates for the mounting of the lift machine on the motor room floor, as well as supporting beams or deflector and secondary pulleys, as required. In the cases where machines are located below, the diverter sheaves shall be secured to the floor slabs and not to the overhead slabs, to prevent the transmission of vibration to the structure.
- (g) Anti-vibration mountings shall be provided to minimise the transmission of vibrations to the structure and to ensure the silent and smooth operation of all the equipment. Tenderers shall describe the methods to be used to achieve the desired results.

1.2 Hydraulic Drive

- (a) An effective sound reducing material / vibration isolation shall be installed between the tank and the motor room walls.
- (b) Provision shall be made for a safe method of moving the lift by hand in the event of a power failure and all the necessary equipment required to carry out this task shall be mounted neatly in the motor room and shall remain on site at all times.
- (c) The lift machinery shall operate silently and without vibration. The lifts shall constantly operate and shall be maintained at noise levels not exceeding 56 DB (A). The noise level shall be considered acceptable if the noise does not exceed 56 DB (A) measured on the landing and in the car enclosure.
- (d) Oil coolers shall be provided if it is required to maintain an acceptable oil operating temperature.
- (e) The driving machine and motor shall have sufficient capacity to operate the lift continuously at 100% of rated speed in both directions without overheating or hunting during levelling.

2. Controller

- (a) Programmable solid state operation and motion controller shall be provided to control the operation, the starting, the stopping and the speed of the lift motor and also to apply the brake automatically if any of the safety devices operate or the power fails.
- (b) All solid state controllers shall be enclosed in ventilated sheet metal cabinets with integral blowers. All power resistors and heat generating transformers shall be mounted in separate enclosures if necessary to maintain the specified control panel internal temperature. The control cabinets shall be totally enclosed, vermin and insect proof, drip proof and dust proof to at least class IP42 of IEC 144.
- (c) Contacts breaking heavy currents shall be provided with magnetic blowouts and arc chutes. Contact surfaces shall be of silver-to-silver except those for heavy currents, where carbon-to-silver or carbon-to-copper contact surfaces may be used.
- (d) All terminals of the machinery and control gear shall be marked with distinctive letters or numbers, and corresponding markings shall appear on the contract drawings.
- (e) All controllers shall be generic manufactured, assembled and supplied.
- (f) As a standard, PLC lift controllers shall not be accepted. However, if these controllers are considered a generic product by the Representative/Agent and are able to meet the requirements of the specification, PLC controllers may be offered as an alternative if the following requirements are met:
 - Documentation stating that the control system has been subjected to extensive testing and is verified as safe, reliable and fully complies with SABS 1545 and all national, local regulations and by-laws.
 - If requested by the Representative/Agent, the Contractor shall provide the Representative/Agent with a full set of back up software / software module and all associated maintenance related documentation including principle diagrams.
 - Documentation from the PLC supplier is provided to verify the age of the model used, the date it is expected to be removed from the production line and the period the PLC supplier will guarantee parts and repairs.
 - The Contractor shall verify that the PLC supplier is willing to maintain under a fully comprehensive agreement, the entire PLC unit(s) for at least 20 years.

3. Control System

- (a) The control system shall be capable of constantly producing the performance criteria specified.
- (b) The associated control equipment for each control system shall provide smooth acceleration and deceleration. In conjunction with the controller and machine, the system shall consistently provide the performance times specified.
- (c) The drive control system shall be capable of decelerating the lift to stand still without a "levelling in" or "creeping in" phase. Only lifts with direct floor approach capabilities shall be accepted.
- (d) The motor drive unit shall provide a smooth lift performance including acceleration, steady velocity and deceleration plus levelling to various floors within the time allowance and levelling tolerances specified. This performance shall be consistent under all conditions of loading and in either direction of travel.

- (e) The motor drive unit shall be equipped with all necessary monitoring circuits to maintain a safe and reliable operation. These shall include but are not limited to the monitoring of the load, direction of rotation, speed, supply voltage, and operating currents.
- (f) The hoist motor shall be provided with a thermostatically controlled blower if necessary, to dissipate the heat in order to maintain the equipment within the specified operating temperature range.
- (g) The control system shall provide a smooth acceleration and deceleration with the levelling accuracy at all landings from no load to full rated load in the lift. This smooth operation shall be obtained for all lifts under stable conditions. A maximum of 0.8 seconds shall be allowed from door close to car start.
- (h) The equipment shall be designed to operate at plus or minus 15% of normal feeder voltage and plus or minus 5% of feeder frequency without damage or interruption of lift service.
- (i) The control system shall be designed to operate the hoist motor continuously at 100% of rated speed and at 100% of rated load in both directions without overheating or hunting.

4. Machine Room Indicators / Rope Markers, Monitors and Testing Tools

- (a) Monitor and keyboard or hand held testing instruments for commissioning, re-commissioning and fault analysis of the lift control system shall be provided and shall remain on site at all times. Each group of lifts shall be supplied with its own monitor and keyboard or testing instrument.
- (b) As each lift travels through the lift shaft, a main hoisting rope marker shall indicate its floor level position by means of a mechanical selector attached to the machine control indicator. This indicator shall operate independently to the lift control and shall not be dependent on the lift supply for its operation.
- (c) The lift control system shall be capable of generating error/fault reports. Error logs for each lift showing at least forty (40) of the most recent faults shall be accessible. The error log shall clearly indicate the type of fault, lift number, date and time the fault occurred.

5. Safety Gear and Governor

- (a) An over-speed governor, driven directly by an independent rope attached to the car, shall be provided in the motor room and shall be designed to operate the safety gear fitted to the car when the speed of the car, due to any cause, exceeds its normal maximum speed by more than a predetermined value. The tripping speed of the governor shall be selected with due regard to the rated speed. The tripping speed shall be approximately inversely proportional to the rated speed and shall for rated speeds ranging from 0,25m/s to 5,0m/s not exceed the rated speed by more than 40% and 20% respectively.
- (b) The safety gear shall be arranged to stop the lift whenever excessive descending speed is attained. Means shall be provided to cut off power from the motor and apply the brake prior to application of the safety gear. The safety gear shall be released by moving the lift in the "UP" direction.
- (c) The governor rope system, including the governor and tension sheave, shall be arranged so that the carrier shall not be released due to system dynamics when the lift is subjected to an emergency stop in the "UP" direction.
- (d) Car and counterweight safety gear shall be provided with a switch to cut off the power from the motor and apply the brake, if the safety gear applies without tripping the governor.

- (e) Rope guards and an electrical contact to monitor the rope stretch shall be provided on the governor tension sheaves.

6. Rope Guards

Rope guards shall be used to cover machine sheaves, secondary or deflector sheaves and governor sheaves to cover moving sheaves and ropes. Guards are also required on rope hole openings in the machine room and secondary level floors to prevent objects from falling into the lift shaft. Guards shall be provided in secondary level floors where ropes and tapes or selector drives pass through to prevent accidental contact.

7. Motor Room Ventilation and Lighting

- (a) The Lift Contractor must ensure that the lighting levels and ventilation of the machine room provided are sufficient.
- (b) If any alterations have to be made the Lift Contractor must inform the Representative/Agent in writing, to ensure that it will be corrected.

8. Machine Data Submittals

The Contractor shall supply all the relevant machine data to ensure the correct power feeder design, including, but not limited to the following:

- Lift numbers
- Capacity / load kg
- Speed m/s
- Supply Voltage Volts
- Supply Frequency Hertz
- Number of wires
- Motor kW rating kW
- Roping
- Full load UP acceleration Amps
- Full load UP nominal speed Amps
- Machine heat release per car BTU/hr/car
- Power Factor %

9. Lift Shaft Requirements

- (a) In terms of SABS 1545 (Parts 1 and 2) provide the necessary rope or selector tape guards in pit areas and landing door unlocking devices on all landings.
- (b) Provide safe Working Platforms in pits with depths in excess of two (2) metres and if necessary at the top of the shaft to create sheave-room platforms. The working platforms shall comply with SABS 1545 (Parts 1 and 2) safety requirements pertaining to the depth/height and free space of these areas.
- (c) In terms of SABS 1545 (Parts 1 and 2), shaft lights are to be provided and installed by the Contractor.

10. Car and Counterweight Guide Rails

- (a) The guide rails for the car and counterweight shall consist of planed steel tees with milled, tongued and grooved joints. Metal splice plates shall be of a suitable length and fixing brackets for guide rails shall be provided at intervals not exceeding 2,4m. Guide rail fixings shall be located in such positions that when the car is at any landing, the guide shoes on the car will be at a fixing bracket. The bottom end of each guide rail shall be provided with a sole-plate fixed to the pit floor.
- (b) All brackets shall be secured by means of approved expandable concrete anchor bolts of adequate size and length.

11. Hoist and Governor Ropes

- (a) The ends of the hoist ropes shall be properly secured to the car and counterweight cross-head or to the dead-end hitch plates on 2:1 roping, with adjustable rope shackles having approved sockets. Screw adjustment shall permit equalisation of the tension in all ropes.
- (b) The lift car hoisting rope attachment / hitch shall be suitably vibration isolated to prevent rope noise from being transferred to the car enclosure.
- (c) Governor ropes shall be in accordance with SABS 1545 (Parts 1 and 2) and the steel rope shall be specially designed for lift service. The two ends shall be securely fastened together at the lift and shall be attached to the safety operating mechanism. The governor rope shall pass over the governor sheave and over an approved tensioner sheave in the pit. An electrical contact shall be fitted to the pit sheave and shall stop the lift if the governor rope becomes slack or breaks.

12. Counterweight

- (a) Each lift shall be suitably counterbalanced for smooth and economical operation. Cast iron or steel sub-weights shall be contained in a guided structural steel frame. The counterweight shall be equal to the weight of complete lift car plus at least **40%** of the rated load. The weights in the counterweight frame shall be balanced with the weight equally distributed across the width of the frame to equalise guide pressures. The sub-weights shall be welded or fastened together as necessary to prevent rattling.
- (b) Counterweight screen guards shall be provided at the bottom of the shaft to a height of 2150mm above the floor of the pit and approximately halfway up the shaft at the position where the car and counterweight pass each other.

13. Car and Counterweight Guide Rollers or Shoes

The car and counterweight guide rollers/shoes shall constantly provide the ride quality as specified in Section 3 clause 11 of this specification.

13.1 Guide Rollers

- (a) Each lift shall be provided with car and counterweight rollers guides. Each roller guide shall consist of at least three wheels with a durable resilient material, each rotating on ball bearings having sealed-in lubrication, assembled on a substantial metal base and so mounted as to provide continuous contact of all wheels with the corresponding rail surface under all conditions of loading and operation. The wheels shall run on three machined rail surfaces. The roller guides shall be properly secured at top and bottom on each side of the car frame and counterweight frame.
- (b) The roller guides shall run on dry guide rails. Sheet metal guards shall be provided to protect wheels located on the top of the car and the counterweight. The roller wheels for the car shall not exceed 500-rpm and the roller wheels for the counterweight shall not exceed 1000-rpm at rated speed.

13.2 Guide Shoes

If the speed and load nominated for a specific lift allows the use of guide shoes:

- (a) The lift shall be provided with car and counterweight spring loaded guide shoes. The spring tension shall be adjusted so as to maintain the lift in the centre of the rails and provide continuous contact with the corresponding rail surface under all conditions of loading and operation. The guide shoes shall be lined with a durable resilient material, which shall ensure a quite and smooth ride. When oil buffers are

attached to the bottom of the counterweight, additional guide shoes shall be installed on each side of the buffer cylinder frame.

- (b) The guide shoes shall run on lubricated rails. The guide rails shall be lubricated by a permanently mounted lubrication reservoir on top of the car and counterweight.

14. Electrical Compensation

A sufficient extra hoisting kilowatt rating in the hoist motor, machine and motor generator capacity and control equipment may be provided so that effective electrical compensation for the weight of the hoist ropes and travelling cables shall be accomplished as the lift travels through the lift shaft.

15. Compensation Cables

If Section 2 clause 14 (Electrical Compensation), cannot be achieved the following shall apply:

- (a) Compensating trailing cables or compensating chains encased in a synthetic sleeve (whisper flex) shall be provided.
- (b) Compensating cable restraining rings shall be provided in each pit and mounted on both the car and the counterweight buffer supports.
- (c) Compensation shall be fixed to the bottom of the counterweight and car in a position which shall allow the counterweight to remain balanced in the guides and exert equal pressure on each face of the guide at the four guide locating positions.
- (d) The fixing of the compensation to the car shall be accomplished by a vibration isolating compensation hitch.
- (e) Where compensating steel ropes are used for compensation they shall be accompanied by a statically balanced compensation pit sheave and shall be mounted centrally between the guides.

16. Buffers

- (a) Suitable oil, heavy spring or polyurethane buffers shall be provided for the car and counterweight and shall be so adjusted that in the case of over-travel, no parts of the car or counterweight will touch the shaft ceiling and that the retardation of the car does not exceed the limits as laid down in the SABS 1545
- (b) Hydraulic buffers shall be so constructed and shall be installed to allow the fluid level to be checked easily. Easy access to the buffer for testing and maintenance purposes shall be possible without having to remove the counterweight pit screen.
- (c) Energy dissipation type buffers shall have an electrical contact fitted to monitor the stroke (extended position).

17. Pit Switches

Each lift pit shall be provided with watertight pit safety switches accessible from the entrance to the pits without the necessity of entering the pit and shall also be accessible from the pit while standing on the pit floor. The pit switch shall interrupt the power supply and apply the brake to hold each car so as to permit safe access to the pit. The pit switch shall be clearly distinguished from other switches that may be mounted in the pit area and the on/off position shall be clearly marked.

18. Stopping Devices

- (a) Normal terminal stopping devices shall be enclosed in dust-proof enclosures for each lift. These devices, once operated, shall bring the lift automatically to a smooth stop at the terminal landing.
- (b) Final terminal stopping devices shall be positioned at the top and at the bottom of each lift shaft. A fixed cam securely attached to the lift shall operate these final limit switches. These limit switches shall be independent of any other stopping devices and shall positively open without the use of springs to cut off all power from the driving machine motor and brake. It shall prevent the operation of the lift in either direction. They shall be so located that they open at the time the lift or the counterweight engages the buffer.

19. Travelling Cables

- (a) Travelling cables between the lift and the fixed lift shaft wiring shall be flexible and suitably suspended to relieve the strains in the individual conductors. All cables shall contain an approximately equal number of conductors, or shall have equal flexibility.
- (b) Travelling cables shall include two shielded pairs for each lift car to accommodate voice communication.
- (c) The travelling cables shall be positioned in such a manner to eliminate the possibility of interference with the shaft information, selector tape or governor rope and all the necessary travelling cable protection shall be fitted to the shaft wall and shaft trimmers to prevent damage to the outer cover during normal travel.
- (d) The travelling cables shall be neatly and adequately strapped to the side of the car enclosure and all the necessary protection shall be provided where the cables cross over metal extrusions.
- (e) Travelling cables for the counterweight shall comply with the requirements of this section.
- (f) Flat and round trailing cables shall be fixed and shall hang in accordance with the trailing cable manufacturer's requirements.

20. Electrical Wiring and Control Communication

- (a) All low voltage and control communication cables shall be run in separate ducts, conduits and trailing cables.
- (b) Car top terminal boxes of ample size and car top inspection control units shall be provided.

21. Automatic Self Levelling

All lifts shall be provided with both a self levelling and a re-levelling feature that shall automatically bring the lift to the floor landings within a tolerance of 3.0 mm under no load to full rated load conditions without hunting. Self levelling shall, within its zone, be entirely automatic and independent of the operating device and shall correct over-travel and rope stretch. The lift shall be maintained level with the landing, irrespective of load and while loading and unloading.

22. Lift Car Construction and Enclosure

- (a) The lift car shall be an assembly consisting of the sling, the platform and the cabin.
- (b) The sling shall be constructed of rolled steel angle or channel sections bolted or welded together to form a rigid framework, which shall be suitably braced and reinforced to withstand the operation of the safety gear without permanent distortion.
- (c) The car platform shall consist of a 3mm thick mild steel plate or 20mm thick hardwood floor laid on closely spaced steel channel sections welded to a steel frame which in turn shall be laid on rubber pads in a structural steel frame. Load weighing devices shall be incorporated where specified.
- (d) The cabin shall be designed as a fully enclosed car with a flat roof and solid full height panels on the sides and the back.
- (e) The cabin shall be securely fixed to its sling and platform in such a manner that the cabin is not subjected to strain in the event of an unequal distribution of load occurring over the floor area.
- (f) The entire car assembly, including the car frame and the car platform shall be constructed to operate free from objectionable squeaks or metallic sounds, comprising of a rigidly tuned resonance car frame and acoustically treated superstructure.
- (g) The following features shall also be embodied in the lift car:
 - A continuous lighting system shall be provided along each side of the car. The lighting system shall consist of concealed, surface mounted, standard 2-lamp open fluorescent luminaires, providing an illumination level of not less than 200 lux at 1000mm above floor level. Fluorescent tubes shall be 1500mm, 58 Watt or 1200mm, 36 Watt, colour "Warm White". Tubes and control gear shall be of the switch start type and shall bear the SABS mark. The width of the lighting troughs shall be the same as the front return panels and shall be covered by easily removable low brightness diffusers, mounted in purpose made hinged frames.
 - One of the lamps in each trough shall be provided with an emergency battery/inverter unit by means of which the lamp will be operated for at least 60 min. in the event of a power failure. This lamp shall operate at full output under normal conditions.
 - Luminous car position indicator and "Up/Down" travel indicators installed above the entrance doors.
 - Fixing clips for the attachment of canvas protective coverings which shall be supplied with the lift for the side and rear walls.
 - Silent running squirrel cage, centrifugal flow exhaust blowers for passenger and goods/passenger lifts shall be mounted to draw air into car enclosure when doors are open and through door side clearances when doors are closed. The blower shall be mounted on the car top, draw air from the car through the perimeter of the suspended ceiling and exhaust the air into the lift shaft. **The fan shall without exception, be capable of delivering not less than 0.3 cubic meters of free air per minute per square meter of floor area.** The fan shall be switched via a toggle switch mounted in the car operating panel.

23. Lift Car Finishes

Lift car finish detail shall be as specified in section 4 of this document.

23.1 Passenger & Goods/Passenger Lift

- (a) The entire car internal finish including the area above the suspended ceiling shall be installed and finished off to the highest standard. All finished work shall be smooth and free from wraps, buckles, squeaks and rattles and all joints shall be light-proof.
- (b) All wall panelling shall be jointed with a pliable material /silicone to prevent squeaks generated by car panel movement / deflection.
- (c) A robust handrail, consisting of an "Intrad" poly-carbonate bumper rail, spaced 50mm off the panelling, must be provided across the rear and side walls of the lift car. The spacer blocks to which the hand and bumper rails are secured shall be fixed to the panels by means of 2 x M10 bolts with locknuts or other approved method.
- (d) A silvered glass mirror shall be provided at the rear of the cabin in the side walls between the hand rail and the ceiling.
- (e) Goods/Passenger lift car panels shall be manufactured from at least 1.5mm mild or stainless steel with at least two horizontal intermediate stiffening ribs and panels with a width greater than 400mm shall have vertical stiffening ribs at intervals not exceeding 200mm or equivalent construction.

24. Fixture Faceplates and Mounting

- (a) Unless otherwise specified, all landing fixture faceplates shall be surface mounted and shall be manufactured of at least 3.0 mm thickness stainless steel, with bevelled edges for all lifts if square rectangle stainless steel face plates are offered. However, Contractors may offer alternative landing fixture face plates if these faceplates are generic products and aesthetically acceptable to the Representative/Agent.
- (b) The fixture faceplates in the lift car and at the landings shall be mounted with concealed security fastenings or fastenings requiring special tools to remove them, as approved by the Representative/Agent. Exposed fastenings shall match the material and finish of the faceplate.
- (c) The following fixture face plates shall be located and sized in accordance with dimensions approved by the Representative/Agent:
 - Car operating panels.
 - Car position indicators.
 - Car direction indicators.
 - Landing push button stations.
 - Landing position indicators and signals.
 - Blanking-off plates
- (d) Without exception the Representative/Agent shall approve the final design of the fixture faceplates before placing the order or manufacturing of this equipment.

25. Car and Landing Door Operator

- (a) Only door operators with the capabilities of coping with medium to heavy traffic shall be accepted and the type of door operator offered shall be clearly shown in the tender submitted. The door system shall be capable of controlling the position of the doors at any given moment and shall constantly produce a smooth, accurate and efficient operation.

- (b) The doors on the lift car and at each landing opening shall be opened and closed quietly and smoothly by an electric operator.
- (c) The motion of the door operator shall be accomplished with arms and appropriate linkages to the approximate centre of gravity of the driven door panel.
- (d) Each landing door shall be equipped with Electro-mechanical interlocks so that the lift can operate only when the interlock circuit is established. Landing door locks shall meet the SABS 1545-1 safety requirements. All work and material related to this Sub-Section shall form part of the Contractor's scope of works.
- (e) An independent auxiliary self-closing device shall close each landing door panel whenever the door is not in the closed position and the equipment relating to the car and landing door system does not restrain it.
- (f) An electric contact for the lift car door shall be provided which shall prevent the lift moving away from a landing unless the door is in the closed position.
- (g) An electrical contact shall be fitted to the non-driving car door if its linkage is dependent on a wire rope or chain.
- (h) Emergency Triangle access key mechanisms shall be provided on each entrance.

26. Lift Door Hangers

Hangers shall be equipped with ball bearing adjustable rollers to take the up-thrust of the doors. The hangers and rollers shall be designed to accommodate the size and weight of the doors operated with a high speed door operator.

27. Car Door Control

27.1 Car Door Motion Controllers

- (a) Car door motion controllers dependent on resistors, rheostats or switches to control the opening and closing motion shall not be accepted. The car door motion controller shall be capable of controlling the position of the doors at any given moment and shall constantly produce a smooth, accurate and efficient operation.
- (b) **(For Group controls only)** Adjustable hardware or software timers shall be provided to hold the doors open for the dwell times specified below. The tabulated dwell times are initial adjustment standards. Further adjustment to suit specific traffic movement capabilities and the arrangement of car and landing stations shall also be possible. The first passenger dwell times are those measured from door fully open to door start-to-close. The second and succeeding dwell times are from restoration of the light beam to door start to close from its fully reopened position.

Passenger Conditions	Stops for Car Call	Stops for Landing Call
First Passenger	2.0 sec.	3.0 sec.
Succeeding Passengers	1.0 sec.	1.0 sec.

Stops at the high or low car call reversal floors shall be considered as landing call stops.

- (c) If doors are held open for an adjustable period of time by a passenger standing in the entrance or by constant pressure of the door open button, a buzzer shall sound and the doors shall start to close at a reduced speed and force level. When the doors touch an obstruction, they shall re-open.

27.2 Door protection devices

- (a) A non-retractable electronic infra-red/ultra-sonic protective leading edge shall be provided and shall extend at least 2100-mm above the platform and its active surface/area shall project beyond the front edges of each leading car door panel. Should this device come in close proximity, or touch a person or object whilst the car doors are closing, the car and shaft doors shall return to their open position. Manual reversal of the doors while the lift is on automatic operation shall be accomplished by pressing a door open button in a car-operating panel. Should this device be activated while the car doors are closing, the car and shaft doors shall return to their open position.
- (b) Without exception the Contractor shall demonstrate on the day of Completion that the door closing pressures comply in full with the SABS 1545 Part 1 and Part 2 under normal and forced closing conditions.
- (c) The door protection device shall have the capabilities of detecting metal/plastic trolleys.

28. Car Platform

The car platform with enclosure of each lift shall be balanced by arranging balancing weights to equalise the guide pressure (front to back and side to side) so that the pressure on any guide shoe roller does not exceed 18kg without load in the car. (Statically balanced).

29. Landing Entrances

- (a) Each lift shaft landing entrance assembly shall consist of unit frame, door panels, fascia, sill, hanger, closer and interlock. The installation shall comply with the applicable code requirements.
- (b) As a standard all lift landing equipment including doors, signal faceplates shall have a two (2) hour fire rating. The Contractor shall provide the relevant SABS test certificates for Class "C" type landing door equipment.

30. Door Panels

- (a) The door panels for all openings shall be constructed of at least 1.5 mm thick mild or stainless steel. Continuous stiffener channels must be provided to the top, bottom and edges at the faceplates. The bottom of each door panel shall be provided with removable laminated phenolic guides, which run in the sill slots.
- (b) Door panels shall be constructed to operate free from squeaks or metallic sounds and shall be adequately treated with a sound deadening material to produce a quiet door operation under all operating conditions.
- (c) The leading edge of the car and landing doors shall have an interlocking profile with rubber stoppers (top and bottom) to prevent the door panels closing metal to metal. Add on rubber profiles shall not be accepted.
- (d) All landing door site guards shall have a stainless steel box type construction for added rigidity.
- (e) Goods/Passenger Lift and Access, Goods Only Lift Car Doors
 - (i) Car and landing sills shall have additional angle iron supports (reinforced sills) to accommodate the applicable point loads.
 - (ii) Landing and car door panels shall have reinforced sliding shoe supporting sections.

- (iii) Only reinforced sliding door panels shall be accepted. Door panels shall be at least 1.5 mm thick Mild Steel or Stainless Steel with at least two horizontal intermediate stiffening ribs.

31. Sills and Support Angles

The landing sills for all openings shall be of narrow extruded aluminium. Grooves in all sills for the door guides shall be machine planed with minimum clearances for the guides. The sills shall be supported on steel angles provided by the lift Contractor and securely fastened to the building floor construction.

32. Toe Guards

Toe guards shall be of at least 1.5 mm thick steel and shall be installed on all landings. They shall extend the full width of the door opening and be gradually bevelled to the wall. The straight vertical portion of the guards shall at least be 400 mm long or as in the case of the lowest landing shall equal the distance travelled by the car sill from the bottom terminal landing to when the car is on the fully compressed buffer.

33. Car Position Indicators

- (a) Electronic LED digital readout position indicators shall be incorporated in each lift car operating panel at a height of not less than 2100 mm above the floor. As each lift travels through the lift shaft, its position shall be indicated continuously by the illumination of the numeral or letter corresponding to the landing that the lift is stopped at or is passing.
- (b) The digital readout shall be at least 50 mm in height.

34. Car Operating Panel (COP) for Passenger and Goods/Passenger Lifts

- (a) The operating device for each lift shall include a series of buttons, numbered to correspond to the active landings served and various additional buttons and key switches, including emergency alarm, intercom, door open and door close buttons, independent control, fire control and rear door control key switches.
- (b) The car call buttons shall be numbered to correspond to the landings served or the numbers shall be engraved with recessed background adjacent to the car buttons.
- (c) Car, landing and emergency buttons shall be of the Micro push operation type and shall be approved in terms of the Occupational Health and Safety Act. Each button shall be clearly marked with its corresponding floor position. The demarcation shall either comprise a raised or recessed numeric or alphabetic character. Car call buttons shall have Braille incorporated into the button unit.
- (d) The car operating station shall be paraplegic friendly and shall be located so that all operating and emergency buttons are located between 1500 mm and 900 mm above the car platform. The emergency buttons and switches shall be mounted at the bottom and the call buttons in numerical order starting above the emergency button and numbering from left to right.
- (e) Swing front return panels used in the passenger car enclosures shall be arranged so that the call buttons and the control and signal devices are substantially flush to the vertical surface and shall be mounted on the return panel. The wiring to the individual components shall permit the panel to swing open for maintenance purposes.
- (f) A second rear door car-operating panel for lifts with two entrances shall operate independently to the front panel and shall comply in full with this section.

- (g) As a standard the lift signage shall include No Smoking, Load, Passengers, Certificate Number and Lift Number / Designation, as required by the applicable standards and regulations. All signage shall be engraved into the Car Operating Panel.
- (h) Without exception the Representative/Agent shall approve the final design of the car-operating panel before placing the order or manufacture of this equipment.
- (i) The number of Car Operating Panels per lift shall be as nominated by the Representative/Agent.
- (j) The button markings/engraving shall be such that it does not fade or wear with continuous operations. The markings, whether engraved or raised shall remain clearly visible and the coloured epoxy shall remain intact throughout the life of the button.
- (k) All key switch cylinders in the fixture faceplates of landing stations, car stations and supervisory control stations shall be master keyed with removable core cylinders (KABA type or equivalent).

35. Call Acknowledging Lights

All car and landing buttons shall be of the call acknowledging type. The registering of a call button shall illuminate the button to acknowledge that a call has been registered. Incandescent indicator lamps shall not be accepted.

36. Landing Call Buttons

36.1 Passenger and Goods/Passenger Lifts

- (a) A riser of landing micro push button stations shall be provided. Terminal floors shall contain a single button station and intermediate floors shall contain both up and down buttons. Pressure on the button in one fixture shall cause the electronic illumination of the corresponding button unit in the other fixture at the same landing. Incandescent button illumination shall not be accepted.
- (b) Landing push buttons shall be of the Micro push operation type and shall be approved in terms of the Occupational Health and Safety Act.
- (c) The location of the centreline of each landing micro push button fixture shall be located at 1050 mm above the floor.
- (d) Each button shall be clearly marked with its corresponding direction of travel. The demarcation shall either comprise a raised or recessed approved symbol.
- (e) The button markings/engraving shall be such that it does not fade or wear with continuous operations. The markings, whether engraved or raised shall remain clearly visible and the coloured epoxy shall remain intact throughout the life of the button. Buttons shall have Braille incorporated into the button unit.

36.2 Access Goods Only Lifts and Dumbwaiters

- (a) Refer to Section 3, clause 1.2 of this document.
- (b) All buttons shall be micro-push buttons.

37. Waiting Passenger Lanterns and Gongs

- (a) Provide an up and down, LED digital readout electric indication waiting passenger lantern at each intermediate landing and an up or down single indication lantern at a terminal landing of all lifts. The lanterns shall be mounted above the head jamb or beside the side jamb of each typical entrance. Incandescent indicator lamps shall not be accepted.

- (b) Supply and fit adjustable electronic arrival gong to each entrance. The fixture face plate shall contain an approved pattern of slots to enable the transmitting of the sound from within the shaft to the lift foyer. In terms of the paraplegic/blind person's requirements the gongs shall have a different tone when announcing cars travelling in the up and down directions - two "gongs" for down and one "gong" for up.
- (c) As soon as a lift has reached a predetermined distance from a landing and is going to stop at that landing, the corresponding waiting passenger lantern shall be illuminated and the gong shall sound whether or not a landing call has been registered. The waiting passenger lantern shall remain illuminated until the lift leaves the landing or if the car becomes filled, whichever occurs first.
- (d) The type and design of the landing signals shall take into account long lift lobbies associated with groups of lifts installed adjacent to each other. After installation the landing direction and/or announcing arrows shall be clearly visible from any position within the lift lobby. It shall be the Contractor's responsibility to inform the Representative/Agent if the selection of landing signal design is not going to achieve the visual requirements detailed under this section.
- (e) As an exception and if specifically requested by the Contractor and accepted in writing by the Representative/Agent, adjustable gongs may be fitted to the car. Gongs fitted to the car shall be positioned in the header section of the car and the sound shall be contained and directed towards the entrance so as not to be transmitted to the floors above and below the lift. The gongs shall further only sound when the lift is within 200 mm from the landing level.
- (f) As an exception and if specifically requested by the Contractor and accepted in writing by the Representative/Agent, announcing arrows may be fitted in the side jambs or incorporated in the push button unit. However, this option shall be restricted to Simplex and Duplex units with a single riser of buttons.

38. Landing Position Indicators

- (a) Electronic LED digital readout position indicators shall be provided over the architrave of each lift in the main lift lobby. As the lift travels through the lift shaft, its position shall be indicated continuously by the illumination of the numeral or letter corresponding to the landing that the lift stopped at or is passing.
- (b) The final number of landing indicators required for each lift and their locations shall be as approved by the Representative/Agent.
- (c) The digital readout shall be at least 50 mm in height.
- (d) Landing position indicators shall not illuminate if the lift can no longer respond to calls as a result of a fault condition or when undergoing routine maintenance.

39. Landing Doors and Architrave Finishes

- (a) All stainless steel landing doors and architraves shall be cleaned prior to final acceptance and receive a coat of an approved stainless steel polish.
- (c) When spray painting the landing doors and frames, the Contractor shall ensure that the landing door panels are satisfactorily prepared before the final coat of Duco is applied.
- (d) Floor designation shall be permanently marked on the inside of the landing doors (shaft side).

40. Lift Intercom System

Only if Specified in Section 4 of this Specification

- (a) Provide an intercommunication system complete with talk-back speakers with all required auxiliary equipment, wiring and a six (6) hour minimum back-up power supply.
- (b) Lift travelling cables shall contain two (2) shielded pairs of conductors for each car for the intercommunication system.
- (c) Terminal strip boxes for all wiring shall be provided.
- (d) All wires in the wiring system shall be shielded without exception.
- (e) Wiring between all master stations in the building shall comply with manufacturer's recommended standards.
- (f) Provide one sub-station in each lift car, one master station for each motor room and one master station for the security control room.
- (g) The voice link shall constantly produce a sound/speech quality comparable to that of the normal Telkom telephone network. All provisions to adequately address interference in the lines shall be included. The intercom master stations shall include an indicator system/panel to indicate the lift car initiating the emergency call and an "All Call" feature to allow for communication to all lifts at the same time.
- (h) The lift intercoms for all the lifts shall be wired back to a common security/control room centrally located.
- (i) The Master Stations shall be capable of accommodating all the lifts covered under this Specification. The individual lift's designation and its call code shall be clearly and neatly displayed on the Master Station.

41. Load Switches

All load switches and sensors which influence the control and the drive shall be adjusted in order to achieve an optimum operation, and their operating loads documented for future reference on the data sheet or certificate of compliance SABS1545 - Annex "A". These load contacts may include but are not limited to the over-load, minimum load and the landing call by-pass functions.

42. Car Top Requirements**42.1 Car Top Working Platform**

Securely fitted working platforms of adequate strength shall be provided on the top of the car roof to create a level and safe working area. The platform shall be free of any electrical cabling and lift equipment. The car roof shall not be regarded as a working platform.

42.2 Car Top Guard Rails

In terms of SABS 1545 the car top shall be provided with a balustrade (guard-rail) where the free distance in the horizontal plane beyond and perpendicular to its outer edge exceeds 300 mm.

43. Special Requirements for Outdoor Escalators

43.1 Outdoor Escalators - Covered

Undercover outdoor escalators are escalators with a roof and optional lateral cladding so that neither snow nor rain can reach the unit under normal circumstances. Any moisture that gets tracked onto the unit by shoes will not impair the serviceability.

The following special design elements does not limit or restrict the Contractor from providing the additional special design elements/requirements in terms of the manufacturers recommendations applicable to outdoor covered escalators. The Contractor shall remain responsible to supply all the recommended special design elements applicable to the escalators covered under this specification.

Outdoor covered escalators without exception, shall incorporate the following related design elements:

- **1.0 mm** stainless steel motor covers
- **1.0 mm** stainless steel drive-chain covers

(a) Water Drain Truss

Outdoor escalators shall have a water drain truss. The water drain is accommodated in the return station and should be installed in tandem with oil separators. A water level contact with an audible alarm shall be provided to protect the escalator against flooding in the return station. The water level contact must be supplemented with a pump installed and supplied by the Employer.

Before the water level in the pit rises to a point where it can cause damage to the escalator equipment, or, to a point where the water can be picked up by the rotating steps, the level switch shall activate an audible buzzer/alarm. After a further rise in the water level the escalator travel shall be blocked.

(b) Special Design Elements

- (i) An increased anodising layer shall be provided for all aluminium profiles.
- (ii) Lateral cladding on both sides of the escalator shall be provided.
- (iii) The escalator motor system shall be IP55 rated.
- (iv) The escalator electrical system shall be IP54 rated.
- (v) Balustrade skirting shall be Stainless Steel – Grain 240.
- (vi) The escalator truss shall be painted with an approved corrosion inhibiting/protection paint (Grey).
- (vii) Step chains shall be provided with sealed rollers.
- (viii) Step axles shall be stainless steel.
- (ix) Automatic lubricating systems and oil drain channels shall be provided.
- (x) Stainless steel drive unit covers shall be provided.
- (xi) Stainless steel drive chain covers shall be provided.
- (xii) Step chain covers shall be provided.
- (xiii) Handrail guide profiles shall be stainless steel.

- (xiv) Increased corrosion protection (Grey) for the escalator track system and (Yellow) for all rotating parts.

43.2 Outdoor Escalators - Uncovered

Uncovered outdoor escalators are escalators exposed to the elements.

The following special design elements does not limit or restrict the Contractor from providing the additional special design elements / requirements in terms of the manufacturers recommendations applicable to **Outdoor Uncovered Escalators**.

The Contractor shall remain responsible to supply all the recommended special design elements applicable to the escalators covered under this specification.

Outdoor uncovered escalators exposed to the elements shall without exception, shall incorporate the following related design elements:

- 1.0 mm stainless steel motor covers.
- 1.0 mm stainless steel drive-chain covers.

(a) Water Drain Truss

Outdoor escalators shall have a water drain truss. The water drain is situated in the return station and should be installed in tandem with oil separators. A water level contact with an audible alarm shall be provided to protect the escalator against flooding in the return station. The water level contact must be supplemented with a pump installed and supplied by the Employer.

Before the water level in the pit rises to a point where it can cause damage to the escalator equipment, or, to a point where the water can be picked up by the rotating steps, the level switch shall activate an audible buzzer/alarm. After a further rise in the water level the escalator travel shall be blocked.

(b) Reinforcement for Wind Exposure

When installing escalators outdoors, wind loads shall be considered. It shall be the responsibility of the Contractor to obtain all the relevant information regarding the maximum wind velocity and wind direction to properly dimension the escalator truss.

(c) Special Design Elements:

The following elements shall be provided:

- (i) An increased anodising layer shall be provided for all aluminium profiles.
- (ii) Lateral cladding on both sides of the escalator shall be provided.
- (iii) The escalator motor system shall be IP55 Rated.
- (iv) The escalator electrical system shall be IP54 Rated.
- (v) Balustrade skirting shall be Stainless Steel – Grain 240.
- (vi) The escalator truss shall be painted with an approved corrosion inhibiting/protection paint (Grey).
- (vii) Step chains shall be provided with sealed rollers.
- (viii) Step axles shall be stainless steel.
- (ix) Automatic lubricating systems and oil drain channels shall be provided.

- (x) Stainless steel drive unit covers shall be provided.
- (xi) Stainless steel drive chain covers shall be provided.
- (xii) Step chain covers shall be provided.
- (xiii) Handrail guide profiles shall be stainless steel.
- (xiv) Increased corrosion protection (Grey) for the escalator track system and (Yellow) for all rotating parts shall be provided.

43.3 Waterproofing of Escalator Pits

It is assumed that water may penetrate down the side of the escalator truss cladding and enter the pit area. It shall be the Contractors responsibility to inform the Representative/Agent of all escalator pit waterproofing requirements and the pit dimensions given and drawings issued must clearly detail the pit waterproofing requirements.

44. Escalator Drive

Escalators shall include the soft-start feature incorporating an adjustable uniform acceleration curve thereby insuring a comfortable ride and limiting mechanical wear on components when the escalator is in automatic mode (stop-and-go operation).

The motor drive unit shall be equipped with all the necessary monitoring circuits to maintain a safe and reliable operation. These shall include but are not limited to, the monitoring of the load, direction of rotation, speed, supply voltage and operating currents.

The equipment shall be designed to operate at plus or minus **15%** of the normal feeder voltage and plus or minus **5%** of the feeder frequency without damage or interruption of escalator service. Protective devices shall be included to prevent damage on over- or under-voltage.

The control system shall be designed to operate the Escalator continuously at **100%** of the rated speed and at **100%** of the rated load in both directions without overheating or stalling.

45. Escalator Control

Escalator control systems shall be Computer Based with self-diagnostic and fault analysis capabilities.

Error Logs showing at least **forty (40)** of the most recent faults shall be accessible. The Error Log shall clearly indicate the type of fault, escalator number, date and time the fault occurred.

46. Operation with Inspection Control

A Remote Inspection Control unit for maintenance purposes shall be provided and shall remain in the escalator Motor Room or pit at all times. The operating buttons shall be of the continuous pressure type and the inspection speed of the escalator shall be **50%** of the nominal speed.

**SPECIFICATION FOR THE INSTALLATION OF
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SECTION 3 – OPERATIONAL REQUIREMENT

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SECTION 3 – OPERATIONAL REQUIREMENTS**1. Simplex Selective-Collective Automatic Operation****1.1 Passenger & Goods/Passenger Lifts**

- (a) The operation of lifts shall be from the landing buttons and from the call buttons in the car-operating panel. Single call buttons shall be mounted at each terminal landing and "up" and "down" buttons at each intermediate landing.
- (b) The operation shall be such that momentary pressure on one or more car or landing buttons, other than those for the landing at which the lift is standing, shall start the lift, provided the interlock circuits are established and cause the lift to stop at the first landing for which a car or landing call is registered corresponding to the direction calls registered and these stops shall be made in the order in which the landings are reached, irrespective of the sequence in which the calls are registered provided the call for a given landing is registered sufficiently in advance of the arrival of the lift at that landing to permit the stop to be made.
- (c) If there are no car calls and the lift starts up in response to several down calls, the lift shall proceed to the highest down call and then reverse to collect the down calls. Up calls shall be collected similarly when the lift starts down in response to such calls. If the lift stops for a landing call the direction of travel shall be anticipated and maintained for a predetermined interval and independent of additional car and landing calls registered in the opposite direction of the anticipated travel.
- (d) If down landing buttons are pressed while the lift is travelling up, the lift shall not stop at these landings, but these calls shall remain registered. After the highest car and landing calls have been answered the lift shall reverse automatically and respond to car and landing calls registered below the lift. When travelling down, the lift shall not respond to up landing calls, but these calls shall remain registered and be answered on the next up trip.
- (e) After the lift has answered the last call and after a pre-set time period, normally **20-seconds**, the lift shall be dispatched to a nominated Boarding Floor. Provision must be made to have this automatic return feature disabled if required.

1.2 Access Goods Lifts Only and Dumbwaiters

- (a) Each landing shall be provided with the number of buttons corresponding to the number of landings served.
- (b) The lift shall have a call and send operation. The lift shall respond to one call at a time and this call shall be the first call registered.
- (c) As the lift arrives at a landing a gong or buzzer shall sound for an adjustable time. The adjustable time shall be pre-set to 30 seconds.
- (d) Should the lift be standing at a landing with open doors and it is called from another floor, a gong or buzzer shall sound on the landing that the lift is standing for an adjustable time before the doors close and the lift moves to answer the call. The adjustable time shall be pre-set to 30 seconds.

2. Group Automatic Operation – Two or More Lifts in a Group**2.1 Automatic Operation**

- (a) The operation of passenger lifts shall be group automatic operation arranged, dispatched and controlled by a group supervisory system. The system shall be supervised by a re-programmable minicomputer or microprocessor system.

- (b) Each lift shall be arranged for automatic operation without attendant through the car and landing buttons in conjunction with a group supervisory system that is re-programmable by the replacement of pre-programmed EPROM's. This re-programming shall be possible without making changes to the lift hardware or shaft or machine room fixed wiring.
- (c) Group, lift, car and drive control commissioning parameters shall be software "switches" and it shall be possible to fine tune these variables using a permanently installed terminal or test tool.
- (d) The starting of a lift shall be contingent upon the establishing of its door interlock circuit. The lifts shall automatically slow down and stop level at the floors in response to car and landing calls. A landing call shall be automatically cancelled as the lift slows down and while stopped to prevent other lifts from responding to the same call.
- (e) Whenever a lift is returned to group automatic operation after being operated on for inspection, independent, or firemen service, the lift shall immediately take its place in the group.
- (f) Car doors shall be prevented from closing or may be reversed while closing by the electronic door control system, the protective leading edge on the car door or by pressing the door open button in the car operating panel.
- (g) The door open dwell times shall be software adjusted so that the open time for a car call is shorter than that for landing calls.
- (h) All car and landing calls shall be cancelled as they are answered.

2.2 Group Supervisory System

Each group of lifts shall be provided with a software programmable automatic supervisory group system arranged to co-ordinate effectively the movement of the individual lifts of the group so as to provide the maximum efficiency in serving the passenger service requirements.

2.3 Group Control Dispatching System

The dispatching system or group control system shall be de-centralised and the lifts shall not be dependent on a central control system for its effective group operation. Each lift control shall be capable of taking over the function of the group control.

2.4 Group Control Up Peak Mode

The Up Peak Mode shall be initiated automatically by recognising or anticipating traffic patterns or when a pre-determined number of cars with a loading above a predetermined weight level leave the main landing in the up direction. Cars shall be permitted to depart from the main landing without predetermined timing. During the Up Peak, down calls shall be served by cars not immediately needed to serve up traffic.

The Up Peak shall be discontinued once a predetermined number of cars with a loading below a predetermined level leave the main landing in the up direction. To suit individual building requirements, it shall be possible to alter the variables, which activate and deactivate the Up Peak without making changes to prints, hardware, the main program or fixed wiring.

2.5 Group Control Down Peak Mode

The Down Peak condition shall be detected by monitoring the number of down landing calls, down boarding rates and down lobby arrival loadings. Under heavy Down Peak traffic, landing calls shall be grouped in sequence of registration and assigned to be served in this sequence in an approximate "first in / first out" pattern. To suit individual

building requirements, it shall be possible to alter the variables, which activate and deactivate the Down Peak without making changes to prints, hardware, the main program or fixed wiring.

2.6 Group Control Distribution of Free Cars

If no car call has been assigned after the lift has answered the last call, the car and landing doors shall close and the lift shall park at this landing awaiting a further assignment of a landing call or assignment to another zone or parking floor. Cars having completed service shall be dispatched after a software adjustable time period to designated floors so that possible future calls shall not keep passengers waiting for long periods of time. The free cars shall not open their car doors when arriving at a parking floor and the doors shall remain closed until required to respond to an assigned call. The distribution of free cars shall take into account additional main landings and priority floors in the following order of priority, unless otherwise specified:

- Main lobby: Priority 1
- Additional main landings: Priority 2
- Executive floors: Priority 3
- Restaurant floors: Priority 4

The main landing / lobby shall have the highest priority when distributing free cars. If two or more free cars are parked on the main landing, only the available free car/master, shall park with its doors open.

2.7 Automatic Landing By-pass

When a car load exceeds a predetermined weight level, it shall automatically bypass all landing calls in the direction of service and shall respond only to car calls. The default setting for this predetermined level shall be 65% of rated load.

2.8 Car Held Up at a Landing

Should a lift be delayed at a typical floor beyond a pre-set software adjustable time period initially set at **thirty (30) seconds**, the lift shall be disconnected from the group automatic operation and the assigned landing calls shall be re-assigned to an alternative operational lift.

2.9 Car Call Cancelling

When the car has responded to the last call in the up or down direction, the car calls shall automatically be cleared from the system to maintain optimum efficiency.

2.10 Load Weighing

Each lift shall be provided with a strain gauge load weighing device to ensure optimum service. This device shall be capable of constantly monitoring the load on the car platform with an accuracy of ± 5.0 kg.

2.11 Anti-nuisance Control

When a lift with a loading level of less than 20 kg arrives at a landing, all car calls shall be reset automatically.

2.12 Motor Generator Set Time-out

When a lift does not receive a group demand dispatch at the dispatching landing for a software adjustable time period up to 10 (ten) minutes, set initially at 5 (five) minutes, the motor generator set, if provided, shall stop and shut down the car lighting and ventilation

automatically after it has opened the car and landing doors. If solid-state motion control is provided, timing devices shall be provided to accomplish this shutdown.

When a dispatch demand is received from the supervisory system by a lift whose generator is stopped, its motor generator shall automatically restart and re-energise the car lighting and ventilation circuits.

3. Operation with Independent Service

- (a) A two position key operated switch, with removable cylinder as approved by the Representative/Agent and master keyed to the building system, shall be mounted in the main car operating station of each lift specified for Independent Service Operation. When this switch is in the on position, the removal of the key from the barrel shall be prevented and the lift shall be operated from the car buttons only and independent of all other automatic or special operation modes.
- (b) The power operated car and lift shaft doors shall remain open when a lift is at a landing until a car call for another landing is registered and the door close button is pressed. If another car call has been registered, it shall be necessary, after each stop, to repress the door close button to affect the closing of the doors.
- (c) It shall further be possible to activate and de-activate this service through the remote monitoring control station.

4. Operation with Inspection

A two position switch shall be provided on top of the car enclosure to operate each lift manually during adjustment, inspection, maintenance and repair. The operating buttons shall be of the continuous pressure type and the speed of the car shall not exceed 0.63 m/s. It shall operate the car only when the car doors and all lift shaft doors are closed and all safety circuits made.

5. Emergency Operation

A two position switch shall be provided in the motor room to operate each lift manually during emergency conditions, adjustment, inspection, maintenance and repair. The operating buttons shall be of the continuous pressure type and the speed of the car shall not exceed 0.63 m/s. Emergency operation shall operate the car only when the car doors and all lift shaft doors are closed and when the inspection control on top of the car is switched to normal operation. However, it shall be permitted to override the final limits, safety contacts and governor contacts.

6. Fireman's Operation

6.1 Fire Recall – Level-1

- (a) All lifts shall be equipped with Fire Control Level-1 and each group or single lift shall be equipped with a common Fire Control switch to recall the lifts (non-stop) to the nominated evacuation landing, where it shall remain parked with open doors. The switch shall be mounted in a box with a break-glass front marked "Lift Fire Control".
- (b) When the switch is activated, cars travelling away from the designated landing, shall reverse at the next served floor without opening its doors, and return non-stop to the designated fireman's floor.
- (c) An illuminated indicator fitted inside the car shall instruct the passengers to evacuate the lift at the designated evacuation floor.
- (d) When on Standby Power the Fire Control operation shall operate as detailed under this section in conjunction with the Emergency Control sequenced evacuation shown under Section-3 Clause 7 (Operation with Standby Power) of this Specification.

6.2 Fire Recall – Level-2

- (a) A Fire Service Key Switch mounted in the car operating panel shall be provided in each lift operating as a Fireman's Lift. Lifts operating as fireman's lifts shall be as nominated by the Representative/Agent.
- (b) A lift operating on Fire Service shall respond only to its own car call while ignoring all landing calls. When the lift arrives at a landing not being the main landing, its car and landing doors shall remain closed. If the door open button is pressed, the doors shall open and continue opening. If the door open button is released, the doors if not yet fully open, shall immediately reverse direction and close. Once the doors have been fully opened via the door open button, they shall remain open until a further car call has been registered and the door close button has been pressed.
- (c) If more than one car call has been registered, all the remaining car calls shall be cancelled once the lift stops at the nearest car call in the direction of travel.
- (d) If the lift remains stationary at a selected floor away from the main landing with the doors closed for an adjustable time initially set at 30 (thirty) seconds, the lift shall return to the fire recall floor automatically. When the lift returns to the main landing, the doors shall open automatically and remain open awaiting a further car call.
- (e) All the car door horizontal and vertical light rays, ultrasonic and infrared detectors, shall be made inoperative during the firemen's service operation.
- (f) It shall further be possible to initiate the fire control operation through the remote monitoring control station or fire detection system. The Fire and Security Sub-Contractor shall provide a potential free contact in each lift motor room to indicate a fire condition.

7. Operation with Standby Power

7.1 Emergency Recall to Main Landing – Level-1

- (a) Provide a standby power operation which recognises the feeder arrangement and the standby power operation which automatically evacuates all lifts on each affected feeder by operating 1 (one) lift at a time to the main dispatching landing without responding to car or landing calls. The system shall subsequently permit automatic and manual selection of any lift to be released for normal operation with standby power. If any lift fails to return to its main landing within 90 (ninety) seconds, it shall automatically be disconnected from the automatic return feature.
- (b) The standby power supply shall be sized to run a predetermined number of lifts simultaneously. The Electrical Sub-Contractor shall provide the number of lifts to run and the maximum kVA available for emergency operation. Alternatively, if this information is available it shall be as nominated by the Representative/Agent.
- (c) In the event of a total failure of normal power, the feeder or feeders in each group shall be transferred to the standby power source. A potential free normally closed contact shall be provided in the lift motor rooms to indicate the transfer to the standby power source. The potential free contact supplied by the Electrical Sub-Contractor shall open (fail to safety) when on standby power and the lifts will commence their sequenced evacuation.
- (d) The lifts shall be capable of operation on standby power at minimum of 100% of rated speed in both directions and at a maximum load of 100% of rated capacity for a period of 10 (ten) minutes without overheating.
- (e) All connections to the lift controls for standby power operation shall be provided in the appropriate machine rooms and all the necessary interlocking interconnection wiring among machine rooms shall be provided under this section.

7.2 Manual Release – Level-2

- (a) Once all the lifts have been evacuated in sequence to the selected main landing, a predetermined lift or lifts shall be released for normal operation automatically or manually via a remote monitoring station. All manual or automatic release shall be prevented until the automatic evacuation covered under Section-3 Clause 7.1 has taken place.
- (b) The cars nominated / selected to run on emergency power shall not be fixed and it shall, furthermore, be possible to change the lift / lifts selected to run on emergency operation without making major changes to the lift wiring or control circuitry.
- (c) In all instances the fireman's lift shall have priority when selecting a lift or lifts to run on emergency power.

8. Door Operation and Control

8.1 Independent Door Operation and Control

For lifts with two car entrances, the car doors front and back shall operate independently from its own car and landing call buttons, and associated door control equipment and this shall include the operation with independent service.

8.2 Car and Landing Doors for Access Goods Lifts Only

- (a) The car and landing doors shall open and close quietly and smoothly. Doors shall be capable of being operated by hand.
- (b) Each landing door shall be equipped with an electro-mechanical interlock so that the lift can only operate when the interlock circuit is established.
- (c) Each car door/gate shall be equipped with a mechanical lock so that the lift can only operate when the car door is locked.
- (d) An electric contact for the car door shall be provided that shall prevent the lift from moving away from a landing unless the door is in the fully closed position

9. Overload Protection

Without exception, overload protection shall be provided (SABS1545-Part-1 1999 & EN81 Code 1997). When the load in the car enclosure exceeds the rated load, a buzzer shall sound, an overload indicator shall illuminate in the car operating panel and the lift doors shall remain open and the lift blocked from travelling. The overload device shall not be active during the travel.

10. Drive Control

- (a) A fully regulated distance dependant closed loop VVVF, DC Ward Leonard, DC Direct Drive or Hydraulic drive control system shall be provided and shall constantly maintain the floor levels and ride quality as specified. Lift acceleration, nominal speed and slowdown phases shall constantly be monitored and controlled against, and with reference to, distance, speed, current and voltage feedback loops. The lift drive shall be capable of bringing the lift to a standstill after a travel without a "creeping in" or "levelling in" phase i.e. a direct approach.
- (b) Driving machine and motor shall be controlled to operate the lift continuously at 100% of rated speed in both directions without overheating or hunting during levelling.

11. Ride Quality and Performance Criteria

11.1 Ride Quality Objective

The main objective is to be able to determine a ride standard and to maintain that standard by routine measurement and adjustment as necessary. The standards nominated are for lifts with rated **speeds of 5 m/s** or higher. Lower speed lifts should be able to perform better in terms of ride quality, and at worst the same parameters should be applied.

(a) Vibration

Vibration, also sometimes referred to as "quaking", is measured in three dimensions:

- Lateral quaking from front to back.
- Lateral quaking from side to side.
- Vertical vibration (up and down).

The vibration levels are measured as acceleration levels of the car floor using an accelerometer. Measurements are expressed in terms of mm/s², milli-g or LAL. - 9.81 mm/s² = 1 milli-g or LAL.

Recording accelerometer tests in the horizontal plane shall be conducted prior to practical completion on each lift travelling at rated speed the full length of the shaft between terminal landings in both up and down directions with a maximum load of 230 kg located in the centre of the platform. Recordings shall be taken on the platform in the plane of the car guide rails and perpendicular to the plane of the car guide rails.

One set of recordings for each lift shall become the property of the Employer as a permanent record. If these tests show that the equipment is in any way defective, at variance with the specified requirements, or objectionable in any operation, the Contractor shall make any change necessary to remedy these defects. All expenses for carrying out this remedial work and the costs of all subsequent tests including labour, material, test equipment, on site observations, etc, shall be for the Contractor's account.

Notice of all tests shall be given to the Representative/Agent in writing at least 96 hours prior to conducting the test.

(b) Noise Levels

Noise levels in the car are measured during operation of the lift. Maximum and mean dB (A) figures are measured.

11.2 Performance Criteria

After practical completion the Contractor shall confirm that the lift equipment performs in accordance with the contract documents and shall provide documentation to substantiate accordingly.

The lifts shall be adjusted as required to, at least meet the following performance requirements within a 10% tolerance:

(a) Ride quality

Acceleration / Deceleration: max 1.0 m/s²
 Jerk Rate: max 2.0 m/s³
 Stack changes: nil
 Shooting Off or Rollback: nil
 Car Noise: max 56 dB (A)
 Car Noise: mean 52 dB (A)

(i) Lateral Quaking ISO X & ISO Y (Velocity m/sec to Time / Drive Curve)

ISO Y = Side to side movement
 ISO X = Front to back movement

Peak to peak: max 15 milli-g
 Peak to peak: mean 5.0 milli-g
 RMS: mean 1.7 milli-g

(ii) Vertical Vibration ISO-Z (Velocity m/sec to Time / Drive Curve)

Peak to peak: max 10 milli-g
 Peak to peak: mean 3.0 milli-g
 RMS: mean 1.2 milli-g

(iii) Vertical Vibration Start and Stop Kicks

Peak to peak: max 18 milli-g

(b) Levelling Tolerance

Re-levelling: max. 3 mm
 Levelling Accuracy: max. 3 mm

(c) Cycle Time

Times specified are for a typical floor-to-floor run of 3400 mm with a balanced load.

Door close to car start: max. 0.8 sec

Rated Speed	Car Start to Car Stop
>1.6 m/s	<5.0 sec.
1.0 m/s	5.6 sec.
0.63 m/s	10.5 sec.

(d) Door Dwell Times

Passenger Conditions	Stops for Car Call	Landing Call
First Passenger	2.0 sec.	3.0 sec.
Succeeding Passengers	1.0 sec.	1.0 sec.

(e) Door Open and Close Times

Door Opening	Type	Door Open	Door Closed
900 mm	C/O	max. 2.2 sec	max. 3.0 sec
1100 mm	C/O	max. 2.2 sec	max. 3.0 sec
1200 mm	C/O	max. 2.4 sec	max. 3.2 sec
1400 mm	C/O	max. 2.7 sec	max. 3.5 sec

(f) Door Pre-Opening

Max. 3/4 open when lift is within 5 mm of floor level.

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SECTION 4 – DETAILED LIFT REQUIREMENTS

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SECTION 4 – DETAILED LIFT REQUIREMENTS

1. General Requirement

Tenderers shall offer lifts designed to comply with the technical requirements and the as described in Sections 2 and 3 of this specification.

The equipment offered shall be suitable for continuous operations under the following conditions:

(a) Electricity Supply

3-phase, 4-wire, 50HZ, AC with nominal voltage of 400/231V varying between 95% and 105% of the nominal voltage.

(b) Ambient Air Conditions

Max. Temperature : 40°C
 Min. Temperature : 8°C
 Max. relative humidity : 80% at max temperatures

(c) Altitude of site

± 80m above sea level

All equipment of the lift installation shall be Y2K compliant in all respects.

All lifts shall comply with the latest edition of SABS1545-1 and SABS-1545-2 specifications.

Copies of ISO9002 accreditation shall accompany the tenders submitted.

The lift installation shall comply in all respects with the requirements of the Occupational Health and Safety Act, Act 85 of 1993 as amended.

2. Description of Lift System

Description	Lift Number	Stops	Floors	Speed	Load	Units
Staff Quarters	L1	4	G, 1,2 & 3	1.0 m/s	1250-kg	1
Staff Quarters	L2	4	G, 1,2 & 3	1.0 m/s	1250-kg	1

3. Technical Requirements for Lifts

3.1 General

<u>Item</u>	<u>Description</u>	<u>Detail Requirements</u>
(a)	Number of Units	2
(b)	Type of Lift	Passenger/Stretcher
(c)	Load	1125 kg (15 passengers)
(d)	Speed	1.0 m/s
(e)	Lift Numbers	L1 & L2
(f)	Total Travel	12
(g)	Number of Stops	4
(h)	No of Openings	4 vertical in line
(i)	Car Entrances	One per Lift
(j)	Floor Designation	0,1,2,3
(k)	Pit Depth	1060
(l)	Shaft Size	1650 x 2450 x 2100mm
(m)	Pit Service Platform	N/A
(n)	Extended Buffers	N/A
(o)	Access below Pit	N/A
(p)	Counterweight Safeties	N/A

3.2 Machine

<u>Item</u>	<u>Description</u>	<u>Detail Requirements</u>
(a)	Drive	ACVF closed loop
(b)	Machine	Gearless, Belt driven (ACVF)
(c)	Roping	2:1
(d)	Automatic Self-Levelling	Yes, As Specified
(e)	Compensation	Yes, As Specified

3.3 Control Operation

<u>Item</u>	<u>Description</u>	<u>Detail Requirements</u>
(a)	Operation	Group Automatic Operation
(b)	Up/Down Peaks	Yes, As Specified
(c)	Fire Control	Level-1, As Specified
(d)	Fireman's Floor	Ground Level
(e)	Emergency Power Control	Level-1 & -2, As Specified
(f)	Evacuation Floor	Ground Level
(g)	Independent Control	Yes, As Specified
(h)	Load Measuring	Over Load, Landing Call By-pass, Anti-Nuisance

3.4 Landing Equipment

Item	Description	Detail Requirements
(a)	Landing Doors Opening	900 x 2100mm Clear Opening,
(b)	Door Operation	Telescopic
(c)	Door Control	VVVF Motion Control
(d)	Position Indicator	Digital Indicators on Main Landing (Ground Level) Only
(e)	Waiting Lanterns	Yes, As Specified
(f)	Gongs	Yes, As Specified
(g)	Call Buttons	Approved, Vandal Proof Mechanical Micro-Push Button
(h)	Direction Arrows	Yes, As Specified – Above all Landing Entrances

3.5 Car Equipment

Item	Description	Detail Requirements
(a)	Number of COP's	One per Lift
(b)	Protection Drapes	No
(c)	Position Indicators	Yes, As Specified on COP
(d)	Direction Arrows	Yes, As Specified on COP
(e)	Intercom	Yes, As Specified – Master Station - Security Control
(f)	Call Buttons	Approved, Vandal Proof Mechanical Micro-Push Button
(g)	Door Detectors	Yes, As Specified – Ultrasonic Proximity Detectors
(h)	Signage	Yes, As Specified
(i)	Emergency Light	Yes, As Specified
(j)	Braille Call Buttons	Yes, As Specified

3.6 Shaft Dimensions and Equipment

Item	Description	Detail Requirements
(a)	Shaft Dimensions	16500 x 2450mm
(b)	Head Room	3800mm
(c)	Pit Sump	Supplied by Others
(d)	Shaft Lighting	Yes, As Specified

3.7 Car Enclosure

Item	Description	Detail Requirements
(a)	Car Dimensions	1200 x 2100
(b)	Car Clear Internal Height	2135
(c)	Clear Door Opening	900 x 2100mm

3.8 Finishes

Item	Description	Detail Requirements
(a)	Fixture Faceplates	<i>Minimum 3mm thick Stainless Steel (SST) with bevelled edges and a brushed finish</i>
(b)	Car COP Faceplates	<i>Full height next to car door SST with brushed Finish</i>
(c)	Car Side Walls	<i>SST – Brushed Finish</i>
(d)	Car Rear Wall	<i>SST – Brushed Finish</i>
(e)	Car Front	<i>SST – Brushed Finish</i>
(f)	Car Floor	<i>Normament – Principal Agent to Specify Colour</i>
(g)	Car Ceiling	<i>High Quality Suspended Ceiling with recessed Fluorescent Luminaires</i>
(h)	Hand Rails	<i>At a height of 900mm above car floor on sides and rear of car</i>
(i)	Car Doors	<i>SST – Brushed Finish</i>
(j)	Landing Doors	<i>SST – Brushed Finish</i>
(k)	Landing Frames	<i>SST – Brushed Finish</i>
(l)	Landing Signals	<i>Fitted above landing entrances</i>

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SECTION 5 – SCHEDULE OF TECHNICAL INFORMATION

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SECTION 5 – SCHEDULE OF TECHNICAL INFORMATION

1. GENERAL

Tenderers are required to complete the following Schedule of Technical Information and shall in addition, under separate cover, give full particulars of the equipment and installations offered as well as detailed descriptions of the various methods of control and operation.

2. TECHNICAL INFORMATION SCHEDULE

Item	Description	Details
1.	Manufacturer's name	
2.	Country of origin	
3.	% South African manufacture	
4.	Performance	
a)	Car speed in m/s	
b)	Average round trip time	
c)	Maximum carrying capacity of each lift car	
d)	Average waiting time after registration of a landing call	
5.	Main Hoist Motor	
a)	Maker's name	
b)	Type	
c)	Rated output (kW)	
d)	Time rating (starts/hr)	
e)	Manufacturing standard and safety codes	
f)	Maximum speed (RPM)	
g)	Rated voltage (Volts)	
h)	Full load current (Amps)	
i)	Starting current (Amps)	
j)	Type of bearings	
k)	Maximum line current with lift starting with full contract load (Amps)	
6.	Type of Brake	
7.	Gearing (If Applicable)	
a)	Material of worm	
b)	Material of worm-wheel	
c)	Type of thrust bearings	
d)	Ratio of gearing	

Item	Description	Details
e)	Type of worm-shaft bearings	
f)	Worm above or below wheel	
8.	Drive	
a)	Diameter of traction sheave (rope centres)	
b)	Type of grooving used on traction sheave	
c)	Type of bearing for sheave shaft	
d)	Diameter of smallest deflector pulley used	
e)	Type of grooves provided on deflector pulleys	
f)	Type of bearings for deflector pulleys	
g)	Means provided for absorption of vibration	
9.	Switch gear and Control System	
a)	Make of main circuit breaker	
b)	Rupturing capacity of main circuit breaker (kA)	
c)	Type of control system	
d)	Control voltage	
e)	Make of contactors	
f)	Make of control relays	
g)	Contact materials used for auxiliary and main contacts of controller switch gear	
h)	Type of selector	
10.	Car and Doors	
a)	Mass of complete car with doors and operating gear (kg)	
b)	Net inside dimensions(width x depth x height) in mm	
c)	Thickness of material of car and landing doors	
d)	Finish of car and landing doors	
e)	Clear width and height of car and landing entrances	
f)	Type of door drive mechanism offered	
g)	Type of suspension used for car and landing doors	
h)	Type of proximity detectors	
(I)	For passengers approaching from landing	
(II)	For passengers leaving lift car	
i)	Type of material used for inside finishes of car (i.e. panels, ceiling trim)	
j)	Thickness and type of floorboards and floor covering	

Item	Description	Details
k)	How is car and platform isolated from supporting structure?	
l)	Are car panels treated externally for sound absorption?	
m)	Door speed:	
(I)	Normal (m/min)	
(II)	On force closing (m/min)	
11.	Ropes	
a)	Maker's name	
b)	Diameter of ropes (mm)	
c)	Number of main ropes	
d)	Breaking load of each rope (kN)	
e)	Maximum working load of each rope	
f)	Factor of safety	
g)	Tensile strength of steel used (MPa)	
h)	Number of strands in rope	
i)	Number of wires per strand	
j)	Construction and lay of rope	
k)	Type of rope fastening used	
l)	System of roping (i.e. 2:1 or 1:1, single or double wrap)	
12.	Counterweight	
a)	Total mass (kg)	
b)	Percentage of live load counter balanced (%)	
13.	Guide Rails	
a)	Type and section	
b)	Mass per metre-length (kg) for:	
(I)	Car	
(II)	Counterweight	
14.	Roller Shoes	
a)	Type	
b)	Material of tyres for roller type guides	
15.	Buffers	
a)	Type	
b)	Length of stroke	

Item	Description	Details
c)	Reactions on pit floor when buffers are hit at 115% of contract speed whilst car is carrying contract load	
(I)	Car buffers	
(II)	Counterweight buffers	
16.	Safety Gear	
a)	Type	
b)	Type of governor	
c)	Stopping distance at overspeed with:	
(I)	Car empty (mm)	
(II)	With contract load (mm)	
d)	Percentage over-contract speed when governor trips safety (%)	
e)	Percentage over-contract speed at which governor trips motor supply	
f)	Is safety still effective if governor rope breaks after application of safety device?	
17.	Steelwork at Top of Shaft	
a)	Number and type of sections used	
b)	Reactions on structure must be submitted with tender by indicating position, magnitude and direction of all reactions on a drawing	
18.	Levelling	
a)	Levelling speed (m/s)	
b)	Levelling tolerance guaranteed (Maximum) (mm)	
c)	Will car and landing doors be fully open when car reaches floor level?	
d)	What is distance of levelling zone above and below floor level?	
19.	Selector Type	
20.	Deviations from Specification as an Alternative Offer: Does the equipment offered comply strictly with the specification (Yes/No)	

3. Deviations from Specification as Alternative Offer

If answer to 20 above is NO, tenderers shall give full details of all deviations between the alternative offered and specified equipment hereunder:

.....
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.....
.....

TENDERER'S NAME AND ADDRESS

.....
.....
.....

.....
Signature of Tenderer's
Authorised Signatory

TEL NO.

DATE :

SPECIFICATION FOR LIFT INSTALLATION

ADDITIONAL SPECIFICATION

OPERATING AND MAINTENANCE MANUALS

CONTENTS

1. SCOPE
2. PROCEDURE FOR SUBMISSION OF MANUALS
3. FORMAT OF OPERATING AND MAINTENANCE MANUALS
4. CONTENTS

1. SCOPE

The Contractor shall be responsible for the compilation of complete sets of Operating and Maintenance Manuals. A separate Operating and Maintenance Manual shall be supplied for each installation.

2. PROCEDURE FOR SUBMISSION OF MANUALS

2.1 Submission Of Draft Manuals

A draft copy of each Operating and Maintenance Manual shall be submitted to the Representative/Agent prior to safety inspection of the installation. Approval of the draft Operating and Maintenance Manuals shall be a prerequisite for commencement of the safety inspection in terms of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)

The manuals will be reviewed and checked by the Representative/Agent and returned to the Contractor with comments, where necessary. The Contractor shall make the necessary changes and amendments to the manuals to incorporate the Representative/Agent's comments.

2.2 Development Of Final Manuals

A final draft copy of each Operating and Maintenance Manual shall be submitted to the Representative/Agent at least one week prior to commencement of Day 1 tests on commissioning. This set of manuals will not be accepted without the Contractor's verification of the information contained in the manuals and the professional language editing thereof. The Representative/Agent shall return the manuals to the Contractor, who shall make the final corrections. The Representative/Agent will, however, not be responsible for the quality control on manuals. Approval of final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Practical Completion for repair of the installation.

After the Representative/Agent has approved the final Operating and Maintenance Manuals, the Contractor shall provide the Representative/Agent with seven (7) sets of the manuals. Approval of the final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Completion.

3. FORMAT OF OPERATING AND MAINTENANCE MANUALS

- (a) Manuals shall be bound in hardcover lever-arch files with plastic coatings. The files shall be clearly labelled on the front cover, as well as on the back band, with the following information:
 - (i) The title "Operating and Maintenance Manuals"
 - (ii) Name of the
 - (iii) Name of the contract and contract number
 - (iv) The Contractor's name, address and contact telephone number and fax (logo optional)
 - (v) Month and year in which the manuals are finally handed over to the Employer
 - (vi) Name of the User Client.
- (b) Pamphlets and bound leaflets/booklets from suppliers or manufacturers shall be placed in plastic pockets.

- (c) Drawings and diagrams larger than A3 shall be folded and placed in plastic pockets to be easily removed or stored.
- (d) The sections of the manuals specified below shall be clearly partitioned.
- (e) Cross-referencing between drawings/diagrams and text shall be in a clear and consequent format.
- (f) The Operating and Maintenance Manuals shall be supplied in English.

4. CONTENTS

4.1 Table Of Contents

The table of contents shall appear on the second page and shall consist of the headings of the various sections in the manual and the relevant page numbers.

The table of contents shall essentially contain at least the following:

1. Introduction
 - 1.1 Scope of the manual
 - 1.2 General arrangement of the manual
 - 1.3 Description of installation
 - 1.4 Specifications
2. List of drawings and diagrams
3. Parts and components
4. Operating procedures
5. Maintenance
 - 5.1 Purpose of maintenance
 - 5.2 Preventative maintenance
 - 5.3 Trouble-shooting
6. Breakdown maintenance and repair
7. List of Appendices.

4.2 Introduction

The introduction shall contain at least the following:

4.2.1 Scope of the manual

A summary shall explain the scope of the contents.

4.2.2 General arrangement of the manual

A brief description shall explain the way in which the manual is arranged.

4.2.3 Description of installation

This section shall give a functional description of the complete installation covered by the manual, including all systems and/or functional units deemed to form part thereof.

4.2.4 Specifications

A summary shall be given of the specifications applicable to the particular part of the Contract.

4.3 Drawings And Diagrams

4.3.1 Mechanical flow diagrams (MFDs) and single line diagrams

Mechanical flow diagrams (for mechanical systems) or single line diagrams (for electrical systems) of the system and/or functional unit shall be included in the Operating and Maintenance Manuals for easy reference by the operators of the installation. Diagrams shall be drawn not only for parts of an installation that have been repaired, but also for the complete installation, including all the components.

4.4 Parts And Components

4.4.1 Equipment data sheets

A data sheet shall be drawn up for each piece of equipment and/or machine forming part of the installation and shall contain the following information:

- (a) Equipment tag number
- (b) Equipment description
- (c) Model/make/manufacturer
- (d) Supplier/Reconditioning details
- (e) Ordering details
- (f) Details of fixed components
- (g) Details of lubrication
- (h) Maintenance references (refer to supplier/reconditioning technical manual).

4.4.2 Technical equipment manuals

For each piece of equipment and/or machine forming part of the installation the following information shall be included in this section of the Operating and Maintenance Manuals:

- (a) The supplier or reconditioning manual and/or standards of operating and maintenance instructions;
- (b) illustrated parts breakdown and/or group assembly drawings as agreed with the Representative/Agent;
- (c) parts lists and data sheets, including all characteristic curves for machines indicating operation point, efficiency, power consumption, etc;
- (d) calibration charts, and
- (e) test certificates for hydraulic pressure tests, flame-proof grading, materials, non-destructive examinations, coating and lining details, etc.

Each detailed description shall be accompanied by a set of engineering drawings. From the drawings the functionality of each part or component used, as well as the special characteristics associated with the part or component shall be very clear.

4.4.3 Parts and components list

A detailed description shall specify all the parts and components used for the duration of the Contract. This description shall include new parts and components, as well as existing parts and components that have either been reconditioned or used as specified in the Contract.

The description shall state at least the part or component number, part or component name, the size of the part or component, an explanatory description, the quantity used, the material of which the part or component is made, the coating (if any), date of purchase, as well as any relevant remarks as to the application thereof.

Details of the manufacturer of the part or component shall also be listed. This shall at least state the name, address, telephone number, fax number and name of a contact person.

The supplier of the part or component shall also be stated and shall include at least the name, address, telephone number, fax number, name of a contact person and an alternative supplier (if available).

4.4.4 Drawings

Drawings shall contain a descriptive heading, an explanatory key and relevant comments. Drawings shall be done on a computer-aided design package approved by the Representative/Agent.

A compound drawing for all subassemblies shall clearly indicate how and where the various parts fit in the subassembly. The compound drawing shall be linked to the equipment data sheets and parts and components list and shall clearly specify the parts or components used, their model numbers, their sizes and the quantities used. The compound drawings shall also be accompanied by a short description explaining the workings of the subassembly, as well as the assembly of the parts or components to complete the subassembly.

4.5 Operating Procedures

The operating instructions shall be a step by step description of the manual start-up and shut-down procedure for every piece of equipment and/or process reconditioned, repaired or supplied with references to the MFDs. For automatic operation the operators shall be referred to the automatic control manual (if applicable).

The functioning of the installation shall be clearly described, using a flow diagram depicting the interrelationships among the various subassemblies. The subassemblies shall be described by descriptive drawings.

Each mechanical or process flow diagram shall contain at least a heading, relevant comments and a key.

Every subassembly shall also have its own flow diagram explaining the operation of the subassembly, as well as the application of each part and component. The application of the subassembly shall also be very clear. The flow diagram shall consist of at least a heading, relevant comments and an explanatory key.

A detailed description shall be given of all operational systems forming part of the installation, explaining the operation and functioning of the system and the number of operations personnel required for performing the operation successfully.

The preparations, which are required before the system can be operational, shall be clearly stated and explained.

The operation tasks shall be clearly explained with reference to dangerous situations that might occur. Hazardous operations shall be explained in great detail and cover all the applicable safety precautions.

4.6 Maintenance

4.6.1 Purpose of maintenance

The maintenance process shall be explained and the main responsibilities described.

4.6.2 Preventative maintenance

A preventative maintenance and lubrication schedule shall be included in this section. This schedule shall be in table format and shall include a summary of all the maintenance actions required for each different system and/or functional unit covered by this manual, in order to give a single summary of all routine preventative maintenance actions required for the complete installation.

The schedule shall indicate daily, weekly, fortnightly, monthly and yearly maintenance actions. A lubrication schedule summary shall also be included under this section.

The frequency of routine preventative maintenance actions shall be indicated very clearly.

The Contractor shall provide the maintenance requirements as prescribed by the manufacturer. The type of maintenance shall be clearly indicated. The description of the maintenance to be performed shall include at least the part name, location of the part in either the assembly or subassembly, the model number, the quantity of the particular part or component to be maintained, the type of maintenance, and notes on the maintenance procedure.

A brief description shall accompany the maintenance schedule, indicating special tools to be used, maintenance and test equipment required for the test procedures. Any special tools necessary for maintenance shall be specified in terms of name, model, size, manufacturer, supplier (name, telephone number, fax number, contact person), coating (if any) and notes on the use of the equipment.

Remarks on the system readiness checks of each subassembly shall be explained in detail. Routine inspection and maintenance processes shall be described. It shall be very clear what needs to be done, how to perform the necessary task and any dangers that are present.

4.6.3 Trouble-shooting

An explanation shall be given to assist the maintenance personnel in analysing and resolving malfunctions that might occur. Various scenarios with possible causes and rectification procedures shall be explained.

The scenarios shall be accompanied by drawings indicating the position of the part that is faulty. Each of these drawings shall have a heading, comments and an explanatory key.

4.7 Breakdown Maintenance And Repair

The Contractor shall describe the complete procedure to be followed in the event of a breakdown. It shall be very clear what the operating personnel should look for, how to eliminate any dangers due to the breakdown (e.g. electricity must be shut off in the event of problems with the wiring) and who should be contacted. The Contractor shall supply the names and telephone numbers of at least two contact persons who may be contacted in the event of a breakdown.

Repair instructions shall provide the maintenance personnel with detailed instructions for the removal and/or replacement of any item requiring replacement due to malfunctioning. Contact numbers shall also be given to assist maintenance personnel, should a breakdown occur.

The Contractor shall specify the actions expected of maintenance personnel in the event of a breakdown.

The Contractor shall also specify the testing procedures to be followed before the system can be put into operation again. Every procedure shall be described clearly and all the potential dangers pointed out, as well as the precautions that have to be taken.

The testing procedures shall be accompanied by drawings illustrating the process to be performed. Every drawing shall have a heading, comments and an explanatory key.

**REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF PUBLIC WORKS**



**SUNDUMBILI MAGISTRATE COURT.
WCS : 044999**

**SUPPLEMENTARY TECHNICAL SPECIFICATION
FOR THE
SUPPLY, DELIVERY AND ERECTION
OF
DOMESTIC WATER PUMPS**

**(DPW OFFICE)
(2006)**

SUPPLEMENTARY TECHNICAL SPECIFICATION

1. GENERAL

This specification consisting of six pages numbered consecutively is for the supply, delivery installation and commissioning of domestic water booster pumps, and is to read as forming part of the Department of Public Works Standard Specification for Clear Water Installations, FN, Issue XI, 1998. The clauses referred to herein are clauses of the Standard Specification, relevant clauses not specifically mentioned shall also apply.

All equipment and installations detailed in this specification shall comply with the requirements of the Occupational Health and Safety Act 85 of 1993.

The Department's Standard Specification for Electrical Installations and Electrical Equipment pertaining to Mechanical Services, Issue IXa, December 1999, shall also apply to this contract.

Where conditions are at variance, this supplementary specification will have preference over both Standard Specifications and drawings.

Copies of the Standard specifications are obtainable from the Director-General: Public Works, Private Bag X 65, Pretoria, 0001. All Standard Specifications are also available on the Department's Website [www.publicworks.gov.za].

(2) DRAWINGS

The drawings that accompany this specification are schematic and do not necessarily indicate the exact position, size or detail the construction of equipment. Tenderers must satisfy themselves that the equipment offered by them will fit into the available space and can be positioned so that access for maintenance, repair or removal is not encumbered.

NOTE: All final dimensions are to be verified on site prior to any equipment or material being ordered or manufactured.

(3) SCOPE OF WORK

This specification covers the design, supply, installation and commissioning of new domestic booster clear water pumps, complete with pumps, motors, base plates ,guards ,power supply ,automated control circuit ,automated control valves , plinths, piping and fittings.

Clear water pumps are required for namely-

(1) To pump the municipal supply to a domestic storage tank with a flow rate of 5 cubes hour and with a head of 24 metres.

(2) To maintain 4 bar pressure in the main domestic water supply line.

Design flow rates shall not be less than 5 cubic metres per hour at the required heads.

(4) PUMP DESIGN AND REQUIREMENTS

(a) The pump shaft shall be manufactured from stainless steel and shall be sealed where it enters the casing with double mechanical face seals.

(b) The impeller shall be suitable for pumping the type of clear water as specified

- (c) The impeller shall be manufactured from stainless steel or, in the case of other materials; it shall be coated with an approved material resistant to abrasion and corrosion prevalent to the conditions under which the impeller shall operate. For pumps rated below 2 kW non-metallic impellers may be utilised.
- (d) The impeller shall be statically, dynamically and hydraulically balanced. No holes may be drilled in the impeller to balance it with regard to mass distribution.
- (e) Only permanently sealed ball or roller bearings shall be installed.
- (f) Bearings shall have a B-10 life rating of 100 000 hours.
- (g) The pump shall be a currently catalogued product.
- (h) Performance curves shall be based on a reproducible and certified test carried out in an approved testing facility, such as the SABS.
- (i) The flow rate at break-off point of the curve for the impeller selected shall be at least 1,5 times that of the maximum flow rate specified.
- (j) The head at zero delivery of the curve of the impeller selected shall be at least 1, 2 times the maximum head in the pump's operational range.
- (k) Each pump shall be clearly labelled. The label shall be a 0,5 mm thick stainless steel plate of dimensions 100 mm x 50 mm. The label shall be fixed to the pump exterior with an approved adhesive or other method after the completion of corrosion protection on the pump. It may be bent to follow the shape of the pump exterior but shall not be bent to accommodate sharp folds. Under no circumstances shall the stainless steel plate of the label influence, damage or otherwise have a detrimental effect on the corrosion protection system. The label shall include the following information:
 - pump rates
 - pump head
 - power required
 - NPSH (r) rotational speed
 - impeller detail.
- (l) All new pumps shall be fitted with double flush mechanical seals, which shall be included in the cost of the pumps. The pump shafts shall be hardened and accurately ground where the seal bears on the shaft. The rotating seal face shall be mounted on a flexible member, sealing on the shaft as well. The flexible member shall be manufactured from rubber, PTFE or equivalent material suitable for the operating environment.
- (m) Centrifugal pumps shall comply with relevant and applicable items under the clause on technical requirements regarding all pump types, as well as the following:
 - (i) Preference shall be given to pumps of the self-regulating type and where the power consumption characteristic is such that the power consumption decreases with an increase in delivery to beyond a certain limit, thus ensuring that the motor is not overloaded in the event of a large reduction in pumping head.
 - (ii) The casing for centrifugal pumps shall be horizontally or vertically split to allow removal of parts.
 - (iii) The efficiency of the pump shall not be less than 95 % of its maximum efficiency at the selected operating point, where the latter shall not be less than 80 %.

(5) **MOTOR DESIGN AND REQUIREMENTS**

- (a) Electric motors shall comply with the requirements of SABS 948
- (b) Imported motors forming an integral part of the pump shall be submitted to the South African Bureau of Standards to be tested in accordance with the requirements of SABS 948.
- (c) All motors shall be standard catalogue models and shall be readily available.
- (d) All motors shall, where possible, be from the same manufacturer and shall have the same interchangeable frames. Variations in type and size shall, where possible, be limited to make stocking a variety of special spares unnecessary.
- (e) All motors shall have dynamically balanced rotors supported by maintenance-free, sealed-for-life ball bearings.
- (f) All motors shall be suitably coated to ensure the satisfactory operation of the motor under the specified class of service.
- (g) All terminal boxes shall be waterproof and suited for submersion up to the depth as specified for the pumps.
- (h) An adequate length of waterproof cable, purpose-made for submerging, shall be supplied with each submersible motor. The coupling of this cable to the normal power-distribution cable, which usually is of the PVC type with steel-wire armour, shall be placed at least 1,0 m above the maximum water level by means of a purpose-made, weatherproof, outdoor junction box. The submerged cable shall be supported to minimise any movement of the cable, which result from turbulence caused by the operation of the equipment or the flow of the water.
- (i) Thermistor protection or Klixon type temperature switches shall be provided for submersible motors.
- (j) Seal monitors shall be provided for submersible motors, together with the required seal monitor relays. The cost for the seal monitor relays shall be deemed to be included in the rates tendered for the equipment.

(6) **WORKING VOLTAGE AND SUPPLY SYSTEMS**

The motors shall be capable of operating within $\pm 10\%$ of the nominal supply voltage without risk of damage. All motors shall be suitable for operating continuously at the specified three-phase voltage system under actual service conditions, including the $\pm 10\%$ voltage tolerance, without exceeding the specified temperature rise determined by the resistance on a basic full load heat run.

All motors shall be capable of operating continuously under actual service conditions at any supply frequency between 48 and 51 Hz together with any voltage between $\pm 5\%$ of the nominal supply voltage.

The slip-in speed of any motor at 80 % of the nominal voltage at 50 Hz shall not exceed a percentage agreed on by the Engineer, and the motors shall be capable of operating at this voltage for a period of five minutes without deleterious heating.

(7) **PROTECTION AND CONTROL DEVICES**

Submersible pumping equipment shall have float switches to switch the pump motor on and off, according to the level of the liquid. Switches shall operate freely and not be hindered by cables or other switches and shall switch off at a level where no damage to the pump or motor will occur.

The level switches shall operate a pump control system:

- (a) For incoming water, level switch in the elevated reservoir shall switch on pumps and switch off at high levels.
- (b) For booster pump ,a maximum system pressure of 4 bar shall be maintained, via a pressure switch in the system
- (c) Over pressure safety devices shall be installed if the pump fails to stop at required pressure.

In the event of a pump failing to start, the other pump must automatically be restarted, and the supply and delivery valves must be activated electrically.

Pumps shall be operated in both manual and automatic modes.

8) **GENERAL**

Suitably sized concrete plinths are required to mount the four pumps.

Piping manifold with automated valves to be installed.

Pumps to be mounted on an angle iron steel frame which shall be galvanised.

UPVC piping class 12 ,50mm diameter and fittings shall be included

Electrical supply and all the relevant switch gear shall be included in this scope of works.

PAINTING

All exposed steel surfaces, excluding galvanized and stainless steel, shall be painted. All mild steel surfaces to be painted shall be prepared according to SABS 064 (Code for the preparation of steel surfaces for painting). Thereafter the surfaces shall be painted with a zinc chromate primer, followed by one coat of universal undercoat and one final coat of high gloss enamel paint, the colour of which will be determined by the Engineer.

GUARANTEE PERIOD

All mechanical equipment and installations are subject to a 12 month guarantee from date of first delivery. contractors shall repair any such defects without delay and at his own cost. This guarantee shall include malfunctions, leaks and adjustments. Should any part of the mechanical installation perform unsatisfactory so as to become detrimental to its functional use, the contractor shall replace any such part, or the complete installation, with equipment as prescribed by the engineer, without delay and at his own cost.



public works
& infrastructure

Department:
Public Works and Infrastructure
REPUBLIC OF SOUTH AFRICA

**DEPARTMENT OF PUBLIC WORKS AND INFRASTRUCTURE
DURBAN REGIONAL OFFICE**

REFERENCE NUMBER – DBN23/11/01

**SERVICE DESCRIPTION: JUSTICE: SUNDUMBILI: ADDITIONAL
ACCOMMODATION**

SUBMITTED BY:

Company Name :

CSD / CIDB registration number:/.....

Physical Address: _____

Contact No. _____

Postal Address: _____

Email _____

CLOSING DATE: 06 DECEMBER 2023

**TENDER BOX LOCATION: PHYSICAL ADDRESS: National Department of Public Works,
157 Monty Naicker, Durban, 4001
TENDER BOX NUMBER: DBN23/11/01**

Enquiries: For technical enquiries contact Mr. Jean Rindel, Mobile number: 0845740712, e-mail Jean.Rindel@dpw.gov.za and for other enquiries contact Ms. Zanele Luthuli Telephone number – 031 314 7072 e-mail zanele.luthuli@dpw.gov.za or Nobuhle Gwala 031 314 7021 e-mail Nobuhle.Gwala@dpw.gov.za

YOU ARE HEREBY INVITED TO BID TO THE GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA

PLEASE TAKE NOTE:

BID NUMBER: DBN23/11/01

ADVERT DATE: 03 NOVEMBER 2023

CLOSING TIME: 11:00

CLOSING DATE: 06 DECEMBER 2023

SITE MEETING DATE: 16 NOVEMBER 2023 @ 11:00 am (SAPS: SUNDUMBILI 1331 NKONYANE ROAD)

CLIENT: JUSTICE: SUNDUMBILI MAGISTRATE OFFICE: ADDITIONAL ACCOMMODATION

BIDS RECEIVED AFTER THE CLOSING TIME AND DATE ARE LATE AND WILL, AS A RULE NOT BE ACCEPTED FOR CONSIDERATION

The Tax Clearance Certificate for Bid Purposes from the Receiver of Revenue and the DPW-07.EC Form of Offer and Acceptance must be completed and signed in the original that is in ink. Forms with photocopied signatures or other such reproduction of signatures may be rejected.

BID DOCUMENTS MAY BE POSTED TO

BID SECTION
DEPARTMENT OF PUBLIC WORKS AND INFRASTRUCTURE
157 MONTY NAICKER
DURBAN
4001

Bid documents that are posted must reach the Department of Public Works before 11:00 on the closing date of the bid/quote.

OR

THE BID DOCUMENTS MAY BE DEPOSITED IN AN ALLOCATED BID BOX BY ENTRANCE, CNR PINE STREET AND ALIWAL (SAMORA MACHEL) STREET, DURBAN

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	S	NATIONAL
	T	DEPARTMENT
	R	OF PUBLIC
	E	WORKS &
	E	INFRASTRUCTURE
PINE	T	STREET

Project Leader: Mr Jean Rindel (084 574 0712)

Administrative Enquiries: Ms Nobuhle Gwala at (031 314 7021)/ Zanele Luthuli (031-314 7072)

The Durban Regional Office of the Department of Public Works is open **Mondays to Fridays: 07:30 – 12:45 / 13:30 – 16:00.**

NB.: Late Bids/Quotes will, as a rule will NOT be accepted for consideration.

Bidders should ensure that bids are delivered timeously to the correct address.

SUBMIT ALL BIDS ON THE OFFICIAL FORMS - DO NOT RETYPE.

Bids by telegram, facsimile or other similar apparatus will not be accepted for consideration.

SUBMIT EACH BID IN A SEPARATE SEALED ENVELOPE WITH BID/QUOTE NUMBER & CLOSING DATE CLEARLY MARKED.

The Government Tender Bulletin is available on the Internet on the following web sites:

1. <http://www.treasury.gov.za>
 2. <http://www.gov.za/bids>
- Map DRO Nov 2005