

**DETAILED TECHNICAL  
SPECIFICATIONS FOR LIFTS  
CARLTON CENTRE  
JOHANNESBURG**

## **TABLE OF CONTENTS**

1. TECHNICAL SPECIFICATIONS FOR LIFTS
  - a. PART 1: CONDITIONS OF CONTACT
  - b. PART 2: OPERATIONS
  - c. PART 3: EQUIPMENT
  - d. PART 4: SPECIFIC REQUIREMENTS FOR LIFTS
2. TECHNICAL SPECIFICATIONS FOR ESCALATORS
  - a. PART 1: CONDITIONS
  - b. PART 2: PRODUCTS
  - c. PART 3: EXECUTION
  - d. PART 4: SPECIFIC REQUIREMENTS FOR ESCALATORS
3. SCOPE OF WORK SPECIFIC TO THE CONTRACT
4. GENERAL
5. TECHNICAL DATA
6. BILLS OF QUANTITIES

# TECHNICAL SPECIFICATION FOR LIFTS

## **TABLE OF CONTENTS PART 1: CONDITIONS OF CONTRACT**

0.0	DEFINITIONS
1.0	INTENT
1.1	WORKS INFORMATION
1.2	STANDARDS AND CODES OF PRACTICE
1.3	QUALIFICATIONS
1.4	APPROVALS AND SUBSTITUTIONS
1.5	VERIFICATION, STANDARDS AND DEVIATIONS
1.6	ALTERNATIVES
1.7	GENERAL RESPONSIBILITIES
1.8	LIFT-CONTRACTOR'S SUBMISSION OF WORKS BY OTHER TRADES
1.9	CO-ORDINATION
1.10	WORKS INCLUDED IN THE LIFT EQUIPMENT SCOPE OF WORKS
1.11	CUTTING AND PATCHING
1.12	INSTALLATION PROGRAMME
1.13	SUBMITTALS
1.14	OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS
1.15	VISITS TO SITE
1.16	CERTIFICATE OF COMPLIANCE AND TEST CERTIFICATES
1.17	TESTS AND COMMISSIONING CERTIFICATES
1.18	N/A
1.19	ATTENDANCE AT SITE MEETINGS
1.20	GUARANTEE
1.21	ELECTIVE MAINTENANCE AGREEMENT
1.22	VARIATION ORDERS
1.23	PAYMENT
1.24	RUBBLE
1.25	ORGANISATION AND STAFF
1.26	FLUCTUATION IN LABOUR AND EQUIPMENT COSTS
1.27	RETENTION MONIES
1.28	PENALTY FOR DELAY
1.29	ON-SITE STORAGE AND ACCOMMODATION
1.30	PROFIT AND ATTENDANCE
1.31	OMITTING EQUIPMENT FROM THE TENDER
1.32	BROCHURES – TECHNICAL INFORMATION
1.33	SUPERVISION OF ON-SITE WORK – CONSTRUCTION SUPERVISOR
1.34	TENDER SUBMITTALS
1.35	MAINTENANCE DURING INSTALLATION
1.36	EXISTING BUILDING IN OCCUPATION
1.37	SAFETY & SECURITY

- 1.38 STATEMENT OF INSTALLATION
- 1.39 SANS 1545 SAFETY REQUIREMENTS
- 1.40 BUILDER'S WORK
- 1.41 RADIO FREQUENCY INTERFERENCE
- 1.42 TESTING, CONFIDENCE TRIALS AND WORKS COMPLETION

## **PART 2: OPERATION**

- 2.1 GROUP AUTOMATIC OPERATION
- 2.2 AUTOMATIC LANDING CALL BY-PASS
- 2.3 CAR HELD UP AT LANDING
- 2.4 CAR CALL CANCELLING
- 2.5 LOAD WEIGHING
- 2.6 ANTI-NUISANCE CONTROL
- 2.7 OPERATION WITH INDEPENDENT SERVICE
- 2.8 OPERATION WITH INSPECTION
- 2.9 EMERGENCY OPERATION
- 2.10 FIREMAN'S OPERATION
- 2.11 OPERATION WITH STAND-BY POWER
- 2.12 OVER-LOAD PROTECTION
- 2.13 DRIVE CONTROL
- 2.14 TRAFFIC HANDLING
- 2.15 DUTY RATE – TRIP COUNTER

## **PART 3: EQUIPMENT**

- 3.1 EQUIPMENT AND LOCATION
- 3.2 SHEAVES SITUATED IN THE SHAFT
- 3.3 HOISTING MACHINE
- 3.4 CONTROLLERS
- 3.5 CONTROL SYSTEM
- 3.6 MACHINE ROOM INDICATORS / ROPE MARKERS MONITORS AND TEST TOOLS
- 3.7. AUTOMATIC SELF-LEVELLING
- 3.8 STOPPING DEVICES
- 3.9 ROPE GUARDS
- 3.10 CAR AND LANDING DOOR OPERATOR
- 3.11 PASSENGER LIFT DOOR HANGERS
- 3.12 CAR DOOR CONTROL
- 3.13 LIFT SHAFT & PIT REQUIREMENTS
- 3.14 CAR AND COUNTERWEIGHT GUIDE RAILS
- 3.15 HOIST AND GOVERNOR ROPES
- 3.16 COUNTERWEIGHT
- 3.17 CAR AND COUNTERWEIGHT GUIDE ROLLERS OR SHOES
- 3.18 COMPENSATION CABLES
- 3.19 BUFFERS
- 3.20 SAFETY GEAR AND GOVERNOR
- 3.21 PIT SAFETY STOP SWITCHES
- 3.22 CAR PLATFORM AND SLING
- 3.23 TRAVELLING CABLES
- 3.24 ELECTRICAL WIRING AND CONTROL COMMUNICATION NETWORKS
- 3.25 PASSENGER LIFT CAR ENCLOSURES
- 3.26 LANDING ENTRANCES
- 3.27 DOOR PANELS
- 3.28 SILLS AND SUPPORT ANGLES
- 3.29 STRUTS AND DOOR CLOSER SUPPORT ANGLES
- 3.30 DOOR HANGER SUPPORTS
- 3.31 TOE GUARDS
- 3.32 FASCIA PLATES
- 3.33 FIXTURE FACEPLATES AND MOUNTING
- 3.34 BLANKING OFF FACEPLATES
- 3.35 CAR POSITION INDICATOR
- 3.36 CAR OPERATING PANEL (COP)
- 3.37 CALL ACKNOWLEDGING LIGHTS
- 3.38 LANDING CONTROL STATION
- 3.39 WAITING PASSENGER LANTERNS AND GONGS
- 3.40 LANDING POSITION INDICATOR
- 3.41 LANDING DOORS AND ARCHITRAVE FINISH
- 3.42 LIFT CAR FINISHES
- 3.43 PROTECTION PADDING / DRAPES
- 3.44 LIFT INTERCOM SYSTEM

- 3.45 MACHINE AND CONTROL DATA SUBMITTALS
- 3.46 MOTOR-ROOM-LESS (MRL) LIFTS INSTALLATIONS

## PART 1 CONDITIONS OF CONTRACT

### 0.0 DEFINITIONS

- **“Best Practice”** shall mean the exercise of that degree of skill, diligence, prudence and foresight which would reasonably and ordinarily be expected from time to time from a skilled and experienced, Manufacturer, Supplier and/or Lift-Contractor seeking in good faith to comply with its contractual obligations as envisaged by the Works Information in accordance with world best class practices.
- **“Budgetary Allowance”** shall mean the monetary value anticipated for finishes which shall not form part of the Contract Appointment. The partial or full allocation of funds from the Budgetary Allowance shall be at the sole discretion of the Employer and/or Lift-Consulting Engineer.
- **“Builder’s Lift”** shall mean a lift used by an authorised Builder / Main Contractor to transport material and/or staff during the installation period prior to Works Completion.
- **“Builder’s Work”** shall mean all the work relating to the construction and/or modification and/or repair and/or finish of the building structure, electrical supply and distribution board, machine space ventilation and all other building related work necessary for the proper and complete installation of the lift equipment in terms of the Works Information.
- **“Confidence Trials”** shall mean the initial period of operation where the equipment is checked and monitored for operational compliance with the Works Information.
- **“Domestic Sub Contractor”** shall mean the Sub Contractor(s) directly appointed by and under the full direction, control and responsibility of the Lift-Contractor. The Domestic Sub Contractor(s) shall not be assigned or assume any of the contractual responsibilities of the Lift-Contractor.
- **“Lift-Contractor”** shall mean the tendering company or company contracted to supply, deliver, installed and maintain the equipment as specified.

- **“Main Offer”** shall mean the offer tendered or presented which complies in full with the intent and requirements of the Works Information without alternatives, options or deviations.
- **“Maintenance Agreement”** shall mean the Employer’s performance based Maintenance Agreement detailing the minimum requirements for the maintenance, repair and replacement of the equipment during the **12-month** guarantee period.
- **“Manufacturer”** shall mean the international parent company designing, manufacturing, supplying and supporting the control and drive equipment and who has the official jurisdiction to authorise and approve product usage or selection as well as setting the minimum standards of installation, safety and operation.
- **“Practical Completion”** shall mean that the equipment is in a state of completion where it can be made fully operation to provide an efficient and reliable service with safety in terms of the Works Information.
- **“Works Completion Inspection”** shall mean the final inspection(s) and test(s) conducted or witnessed by the Consulting Lift Engineer prior to placing the equipment into full operation.
- **“Works Completion”** shall mean the time of full compliance with the Works Information after the Works Completion Inspection(s) and Confidence Trial(s) have been satisfactory concluded and on issue of the Works Completion Certificate(s).
- **“Works Information”** shall mean the specification, approved programme, drawings and all other documentation that collectively makes up the Contract Appointment.

## 1.0 **INTENT**

1.0.1 The specification is intended to cover the complete upgrade/replacement of the lift equipment. The specifications outline the minimum equipment required, 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 Principal Agent nor the Consulting Lift Engineer invented or developed any part of the lift system, but have only made selections of capacities, speeds, control systems, materials and finishes, as well as specified performance and installation criteria as may be applicable.

## 1.1 **WORKS INFORMATION**

1.1.1 “Works Information” shall be interpreted as the tender documentation, specification, approved programme, drawings and all other documentation that collectively make up the Contract Appointment.

1.1.2 By submission of a tender, the Lift-Contractor shall be deemed to have inspected and be fully acquainted with the Works Information, local requirements, by-laws, regulations and all aspects of the works envisaged whether or not shown or detailed in the Works Information.

1.1.3 Check the Works Information and should any pages be missing, incorrectly numbered, duplicated, the reproduction is indistinct or contains any errors, notify the Consulting Lift Engineer and Principal Agent timeously for rectification. No liability whatsoever shall be admitted in respect of errors due to the abovementioned causes.

## **1.2 STANDARDS AND CODES OF PRACTICE**

1.2.1 Provide all work in accordance with the requirements of the South African National Standards **SANS 1545-1**, all other relevant published lift **SANS Standards**, the Occupational Health and Safety Act 85 of 1993 as revised and current regulations of all other codes applicable to the work. Other relevant Standards (SANS) to be applied shall include but shall not be limited to:

- SANS 50081-1 (EN 81-1) Electric Lifts
- SANS 50081-70 (EN 81-70) Accessibility to lifts for persons including persons with disability.
- SANS 1545-9 Lift landing doors – Fire resistance testing.
- SANS 0360- lift maintenance requirements.

1.2.2 Equipment shall be new and approved by the local authorities having the appropriate jurisdiction.

1.2.3 Provide all equipment from the same Manufacturer.

## **1.3 QUALIFICATIONS**

1.3.1 Furnish a document which gives a complete description of all equipment wherein the lifts proposed do not comply with the Works Information, or are in conflict with the work of other trades as specified or shown in the Works Information. Failure to furnish such a document shall be interpreted to mean that the Lift-Contractor agrees to meet all requirements of the Works Information. Any conflict with the work of other trades brought about by the use of the Lift-Contractor's equipment shall not result in any added cost to the Employer.

## **1.4 APPROVALS AND SUBSTITUTIONS**

1.4.1 Where the words "for approval" or "approved" are used and it is desired to substitute a different make or type of apparatus from that specified, all information pertinent to the adequacy and adaptability of the proposed equipment shall be submitted to the Principal Agent and Consulting Lift Engineer for approval prior to the equipment being ordered or released for manufacture.

1.4.2 Approvals for equipment specified or proposed substitutions shall not be given merely upon the submission of Manufacturer's part names.

1.4.3 Approvals for all equipment submitted as a substitution for that specified or shown on the drawings may be granted if such equipment meets the intended and anticipated requirements pertaining to performance, reliability, operation, space conditions, weight, and quality of equipment.

## 1.5 VERIFICATION, STANDARDS AND DEVIATIONS

1.5.1 Deviations from the Works Information shall not be accepted. The Lift-Contractor shall verify in the tender covering letter, that they have read and understand the content, meaning and intentions of the Works Information and have tendered accordingly.

1.5.2 When the Works Information cannot be met in terms of specific design requirements; substitution or alternative equipment may be considered provided that the substituted equipment does not reduce the intended performance, operation, duty-rate, redundancy and reliability requirements of the Works Information. Deviations or substituted equipment not clearly shown and detailed in the Tenderer's covering letter under the headings, "DEVIATIONS", shall not be considered or accepted.

1.5.3 Tender supplementary documentation showing the technical details, load, speed size, performance and operation of the equipment offered and conditions of Contract, shall only serve as an informative document in terms of the equipment offered, program, organisation and staff, and alternatives offered and shall not be considered an acceptable qualification in terms of the Works Information. Equipment offered as substitution that does not comply with **Part-1.5.2** of this Specification, whether or not shown in the supplementary document shall not be accepted.

1.5.4 It is accepted that the Manufacturers of lift equipment are continuously introducing new designs of equipment or individual components of the equipment. However, although the Principal Agent or Consulting Lift Engineer has not specified specific makes of equipment and has only specified the design, operation, reliability and performance requirements, there are a number of individual components of the equipment offered by lift Manufacturers that shall not be accepted. The following equipment components offered in terms of this specification shall be clearly detailed in the tender supplementary documentation and shall be regarded by the Manufacturer as the most modern, technically advanced and most reliable equipment available:

- Car and landing signals,
- Car and landing call button units,
- Door drive equipment,
- Door protection devices,
- Control equipment,
- Drive equipment, • Intercom equipment.

1.5.5 Not to restrict or limit the Lift-Contractor's technical input, advice or experience, substitute equipment better suited to the installation as a whole may be offered. Provide all technical details and descriptions of the substituted equipment for approval by the Principal Agent and Consulting Lift Engineer.

1.5.6 Should any person request equipment that in any way technically deviates from the Works Information, inform the Consulting Lift Engineer in writing, before entering into detailed discussions with the person requesting the revised equipment or placing the order for the manufacture and supply of the revised equipment. Should approval for the revised equipment not be obtained from the Consulting Lift Engineer, the Lift-Contractor shall be liable for all costs associated with providing equipment in terms of the Works Information.

## **1.6 ALTERNATIVES**

- 1.6.1 Not limiting the Lift-Contractor's obligations in terms of **Part-1.5 (Deviations)**, the Principal Agent and Consulting Lift Engineer may consider alternatives based on grounds of cost if the alternatives do not negatively affect the specified performance levels, operation, reliability, duty-rate, and product expectation. Lift-Contractor's offering alternatives will not be penalised however, Lift-Contractor's shall not deviate with regards to the Main Offer.
- 1.6.3 Provide duplicates of and complete Bills of Quantities- if provided for each Alternative offered.
- 1.6.4 Alternatives presented and accepted by the Principal Agent and Consulting Lift Engineer shall comply in full with the Conditions of Contract as contained in the Works Information and shall not be limited to performance, operation, reliability, duty rate and quality of equipment.

## **1.7 GENERAL RESPONSIBILITIES**

- 1.7.1 The work throughout shall be executed to the highest standards and to the entire satisfaction of the Principal Agent and Consulting Lift Engineer who shall interpret the meaning of the Works Information and shall have the authority to reject any work or equipment which in their judgement is not in full accordance therewith.
- 1.7.2 The Lift-Contractor shall be fully responsible for his work and shall replace any of the same, which may be damaged, lost or stolen, without additional cost to the Employer. The Lift-Contractor shall protect the building and its contents against damage by him, his Employees or Domestic Sub Contractors and shall make good any damage thereto. The Lift-Contractor shall indemnify the Employer and Principal Agent from and against all liability for damages arising from injuries or disabilities to persons or damage to property occasioned by any act or omission of the Lift-Contractor or any of their Domestic Sub Contractors, including any and all expenses, legal or otherwise, which may be incurred by the Employer, Principal Agent, Consulting Lift Engineer or in the defence of any claim, action or suit.
- 1.7.3 The Lift-Contractor shall put his work in place as fast as reasonably possible, shall at all times keep a competent Foreman in charge of the work and shall facilitate it's inspection by the Principal Agent and/or Consulting Lift Engineer. Arrange any rubbish caused by on-site work in orderly piles and remove from site promptly.
- 1.7.4 Except for such changes as may be specifically approved by the Principal Agent and Consulting Lift Engineer, all work shall be in full accordance with the intent of the Works Information, complete in every detail and ready for satisfactory and efficient operation when delivered at Works Completion.
- 1.7.5 The Lift-Contractor warrants that the equipment and workmanship shall be of the highest grade, installed in a practical and first-class manner in accordance with Best Practice and ready and complete for full operation at Works Completion. It is specifically intended that all equipment and 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 detail in the Works Information.

- 1.7.6 The Lift-Contractor shall thoroughly acquaint himself with the work involved and shall verify on-site measurements necessary for the proper installation of his work. He shall also promptly furnish information well in advance of field requirements and shall cooperate with and co-ordinate the work of others as may be applicable.
- 1.7.7 Equipment damaged in transit shall not be set and shall be replaced without additional cost to the Employer.
- 1.7.8 The Lift-Contractor shall be fully responsible to check and verify that the retained equipment including the electrical feeder system / design is mechanically and electrically sound and compatible with the new equipment provided in so far as meeting the requirements of the Specification and providing a long term **(20-years)** solution.
- 1.7.9 **Retained Equipment:** Where **Part-4** allows the option for the Lift-Contractor to retain existing equipment; it shall remain the Lift-Contractor's sole responsibility to ensure that retained equipment complies in full with the specification with regards to safety, operation, performance, reliability, duty rate and where applicable, the finish. Modifications made to retain components of the equipment which may become necessary to achieve the requirements of the specification shall be undertaken in accordance with the Manufacturer's approved design and installation requirements.
- 1.7.10 **Insurance:** The Lift-Contractor shall be required to take out adequate insurance in order to cover its obligations in terms of the Works Information and to keep them current for the duration of the Contract and in compliance with the NEC type contract.

## **1.8 LIFT-CONTRACTOR'S SUBMISSION OF WORKS BY OTHER TRADES**

Notwithstanding the Lift-Contractor's obligations in terms of this specification with regards to Builder's Work:

- 1.8.1 Inform the Principal Agent and Consulting Lift Engineer in writing, clearly detailing all electrical, mechanical and structural work necessary for the proper installation of the equipment. Comments referring to the excluded work on the Lift-Contractor's plans, lay-outs or shop drawings shall not be regarded as sufficient detail and shall not replace the document called for under this section.
- 1.8.2 It is intended that at the outset of the installation, all parties shall clearly understand their responsibilities with regards to the proper and complete installation of the equipment. Failure to furnish the information covered under this section shall result in the Lift-Contractor being held liable for all work, which may become necessary for the proper and complete installation of the equipment.

## **1.9 CO-ORDINATION**

Notwithstanding the Lift-Contractor's obligations in terms of this specification with regards to included Builder's Work:

1.9.1 Due to the nature of the installation, a fixed sequence of operations is required to properly install or upgrade the lift equipment therefore, closely schedule the work in order that the installation may be carried out in the proper sequence without delaying the completion of the entire Project.

1.9.2 The Lift-Contractor shall familiarise himself with the requirements of the other trades and shall carefully check the space requirements with other trades to ensure that the equipment can be installed in the proper sequence in the spaces allotted.

## **1.10 WORKS INCLUDED IN THE LIFT EQUIPMENT SCOPE OF WORKS**

1.10.1 Design and provide all labour, equipment and services and perform all operations required for lift work as indicated on the drawings, or specified herein and in accordance with all applicable requirements of the Works Information.

1.10.2 The supply and fixing of all holding down bolts, car rail fixing bolts and associated motor room and shaft steel work.

### **1.10.3 Protection of Works during Installation:**

- Adequately protect against damage, all equipment during installation.

## **1.11 CUTTING AND PATCHING**

1.11.1 Furnish at tender stage all information so that the necessary openings for work can be built into the floors and walls in a timely manner.

1.11.2 The Lift-Contractor shall obtain approval from a Structural Engineer appointed by the Principal Agent for all cutting / core drilling of existing motor room slabs or shaft structural beams. Should the Lift-Contractor proceed with the cutting or core drilling of lift shaft structural beams or motor room slabs without written approval from a structural engineer, the Lift-Contractor shall be held liable for any consequence associated with the weakening of the slabs and beams covered under this section.

## **1.12 INSTALLATION PROGRAMME**

1.12.1 Immediately after appointment, produce a detailed programme of intent (Gantt chart or any acceptable format) setting out the sequence of the construction time periods for the installation and completion of each section of the work

1.12.2 Computer generated and printed programme shall include in detail, the following:

- Production of workshop drawings
- Order of overseas material
- Ex-factory shipment date
- Material arrival on site
- Removal of existing equipment

- Installation of new equipment
- Commissioning & legal certification
- Handover

### **1.13 SUBMITTALS**

**1.13.1 Errors and Mistakes:** The Lift-Contractor shall be responsible for executing the work in accordance with the Works Information and shall remain responsible for any discrepancies, errors or omissions in the drawings and information supplied, whether it has been approved or not approved.

#### **1.13.2 Workshop Drawings:**

- Provide drawings and co-ordination drawings for all lift work, including shafts and motor rooms, car enclosures and landing entrances. Drawings shall show top clearances above cross-heads and counterweight frames, machine room layouts with power and heat release data, locations of all equipment on tops of cars, overhead beams and elevations, and reactions transmitted to the building structure.
- The lift contractor shall ensure that the design of all equipment meets the relevant legal and safety requirements.

#### **1.13.3 Samples/Brochures:**

- All exposed equipment and finishes shall be submitted to the Principal Agent or Consulting Lift Engineer for approval in sample form.

#### **1.13.4 Machine specification and data:**

- Layouts shall contain certification that the machines and controls selected meet the performance levels and duty rate specified.

**1.13.5 Occupational Health and Safety Act Mandatory:** In terms of the Occupational Health and Safety Act, the Lift-Contractor as the “Mandatory” shall issue the necessary documentation pertaining to on-site duties.

### **1.14 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS**

1.14.1 Operating instruction and maintenance manuals will be regarded as a critical item required for Works Completion. The information included and presentation shall be functional, user-friendly and accurate.

Provide 3 sets of manuals for each individual/group of lifts

**1.14.2 Presentation:** The presentation of the operating instruction and maintenance manuals shall be as follows:

Part-1	Index
Part-2	Description of the lift system and equipment detail
Part-3	User operating instruction and safety procedures
Part-4	Complete set of layout / engineering drawings
Part-5	Complete set of principal / wiring diagrams
Part-6	Certificates of Compliance, permission to install & concessions.
Part-7	Test and commissioning certificates and data sheets
Part-8	Maintenance procedure manual
Part-9	Complete set of installation parameters including programming Instructions and passwords

**1.14.3 Operating Instructions:** Instruction for the Employer’s designated operating personnel in the proper normal and emergency operation and safety procedures of the lift systems.

**1.15 VISITS TO SITE**

So that provision can be made in the tender, undertake site visits to understand the nature of the ground access to the site, areas suitable or available for storage of equipment and any other circumstances which could affect work and rates. No claim in this respect shall be considered later.

**1.16 CERTIFICATE OF COMPLIANCE AND TEST CERTIFICATES**

Carry out all the tests and checks required in terms of **SANS-1545** and issue the necessary Certificate of Compliance prior to Works Completion. Items or incomplete or incorrect test or check noted on the Certificate of Compliance (Commissioning Document) shall render the Certificate of Compliance (Commissioning Document) “**Not Valid**” and the entire document will have to be re-issued on satisfactory completion of all items noted.

**1.17 TESTS AND COMMISSIONING CERTIFICATES**

1.17.1 Upon completion of the installation and once being in full operation, completely test the equipment to demonstrate the equipment provided is in compliance with the Works Information. Provide all labour and equipment for on-site observation, testing, correction and re-setting.

**1.18 N/A**

**1.19 ATTENDANCE AT SITE MEETINGS**

Attend all site meetings arranged at regular intervals during the contract period.

## **1.20 GUARANTEE**

### **1.20.1 Maintenance Guarantee Period (Free Maintenance Period):**

- Provide fully comprehensive maintenance for the lift equipment for a period of: As specified in the main tender document and Bill of Quantities, or longer if applicable in terms of after Works Completion. As a minimum the maintenance work shall be performed in terms of the Employer's Maintenance Agreement.

**1.20.2 Equipment Guarantee:** Equipment supplied shall be guaranteed against defect or failure of design, material and workmanship for a period of **Twelve (12) months** from date of Works Completion or, earlier if approved in writing by the Consulting Lift Engineer and provided the equipment is fully operational, maintained under a fully comprehensive Maintenance Agreement and delays in the Works Completion cannot be attributed to the Lift-Contractor's acts or omissions.

**1.20.3 Latent and Patent Defects Liability Period:** Equipment supplied shall be guaranteed against latent defect in design of material for a period of **10-years** after date of Works Completion.

## **1.21 ELECTIVE MAINTENANCE AGREEMENT**

**1.21.1 Maintenance Agreement:** Notwithstanding the requirements of the Works Information:

- The Lift-Contractor shall be prepared to enter into the Employer's fully comprehensive performance based Maintenance Agreement for a term as specified in the main tender document at the end of the free maintenance period. It is accepted that the Lift-Contractor is acquainted with the Employer's Maintenance Agreement and consequently a specimen copy of the Maintenance Agreement will only be presented on award of tender.
- **Maintenance Costs:** Submit at tender stage, the proposed current day monthly maintenance costs for each unit. These maintenance costs will be escalated using the **Consumer Price Index (CPI)**
- The Employer reserves the right to appoint the Lift-Contractor or any alternative maintenance contractor of its choice at the end of the free maintenance period.

## **1.22 VARIATION ORDERS**

No claims for any extras, additions or for any variations shall be entertained unless such extra, addition or variation has been approved in writing by the Project Manager.

## **1.23 PAYMENT**

1.23.1 As per tender document and requirements of NEC 3 Contract

**1.23.7 Ownership of Equipment / Works:** Equipment or Works shall become the property of the Employer:

- on delivery to the site and provided payment in respect of the equipment delivered to site has been passed or,
- if approved and authorised by the Employer, on delivery to an off-site storage facility and provided payment in respect of the equipment delivered to the offsite storage facility has been passed or,
- on **thirty (30)-days** after delivery to the site if payment has not yet been passed and the delay in processing and passing payment was as a result of the LiftContractor's acts or omissions.

Such equipment or work whether or not ownership has been passed to the Employer, shall remain in the care of the Lift-Contractor, and shall remain subject to all the conditions of Contract as contained in the Works Information until Works Completion.

Notwithstanding the requirements of this section, the Project Manager reserves the right to reject equipment or work which is not in accordance with the Works Information and upon such rejection the ownership of the equipment or work rejected shall immediately revert back to the Lift-Contractor.

**1.24 RUBBLE**

The Contractor shall clear and cart away all rubbish and superfluous material that may accumulate on a daily basis.

**1.25 ORGANISATION AND STAFF**

Provide at tender stage an organogram of people who will be operationally responsible or as per requirements of the main tender document.

**1.26 FLUCTUATION IN LABOUR AND EQUIPMENT COSTS**

1.26.1 Clearly show under **Part-6** of this specification, the Rand value of the labour, local equipment and imported equipment to be adjusted in accordance with this section.

**1.26.2 Imported Components / Rate of Exchange:**

Without restricting the Employer's right to buy forward cover:

1.26.2.1 The Contract price shall be subject to adjustment as per the NEC 3 contract

1.26.2.2 For imported equipment, provide the following information:

- Description of items imported,
- Country of origin,
- Currency,
- Banker's name,
- Tendered exchange rate,

- Free on-board cost expressed in Rands of each item of imported equipment included under this section together with a breakdown thereof,

**1.26.3 Escalation:** As per requirements of NEC 3 Contract

**1.27 RETENTION MONIES**

As per requirements described in main tender document

**1.28 PENALTY FOR DELAY**

As per requirements described in main tender document

**1.29 ON-SITE STORAGE AND ACCOMMODATION**

1.29.1 On-site stores shall be organised to allow for the efficient and effective control of lift equipment and the store and immediate vicinity shall be kept clean and organised at all times.

1.29.2 The Principal Agent or Consulting Lift Engineer reserves the right to inspect the storage areas at any time during the installation period.

**1.30 PROFIT AND ATTENDANCE**

As per requirements described in main tender document

**1.31 OMITTING EQUIPMENT FROM THE TENDER**

It is accepted that the prices tendered have been based on quantity units. However, the Principal Agent reserves the right to remove one or more entire lifts or any part of a lift from the Works Information without being penalised in any way, if it can be shown, that this decision was taken in light of a design change, design requirement or was budget motivated.

**1.32 BROCHURES – TECHNICAL INFORMATION**

1.32.1 Notwithstanding the requirements of the Works Information, all documentation presented under this section shall be regarded as informative information only. Presentation of technical information and brochures shall not be regarded as notice of a deviation, substitution or alternative. Present the following detailed brochures and technical information at tender stage:

- control system,
- drive system,
- door operator,
- door safety device / detector,
- call buttons and signals,
- remote monitoring station if specified,
- intercoms,
- emergency rescue device if specified.

1.32.2 Failing to submit the required information covered under this section shall entitle the Principal Agent, or Consulting Lift Engineer to disqualify the Tenderer.

1.32.3 Appointment for the lift Contract shall not be considered as acceptance of the equipment offered and it shall remain the Lift-Contractor's responsibility to select, supply and install the correct equipment in terms of the Works Information.

### **1.33 SUPERVISION OF ON-SITE WORK – CONSTRUCTION SUPERVISOR**

1.33.1 Appoint a full-time competent employee in writing as the Construction Supervisor who shall not supervise any construction or other work on or in any other construction site.

### **1.34 TENDER SUBMITTALS**

Provide the following information at tender stage:

- Brochures and technical information as specified,
- Detailed company profile and list of lift installations with contact numbers recently completed,
- Covering letter confirming verification, standards, substitutions deviations and alternatives as specified.
- Operational organogram

### **1.35 MAINTENANCE DURING INSTALLATION**

1.35.1 **Maintenance during Installation Included:** Provide fully comprehensive free maintenance for all lifts during the installation period as specified below:

- The installation free maintenance period for each group of lifts shall commence on the day the first lift in each group is taken out of service for upgrade and shall continue until works completion of the entire group or the start of the **12-months** free maintenance period as specified.
- If it can be proven that extensions to the installation period was not as a result of the Lift-Contractor's actions or omissions, an amount for maintenance shall be paid pro-rata to the Lift-Contractor and the costs of the maintenance, shall be that calculated in accordance with maintenance contract.

### **1.36 EXISTING BUILDING IN OCCUPATION**

1.36.1 The building shall be in occupation during the upgrade period therefore, allowances shall be made for the work to be carried out in such a manner as shall least interfere with the general routine of the occupants. Issue a programme with tender clearly showing the sequence in which the lifts are to be upgraded, the over-all upgrade period and the individual period of the lifts.

1.36.2 Work shall not be permitted on the landings without the use of barricades/hoarding and safety notices.

**1.36.3 Protection of Site:** It shall be the sole responsibility of the Lift-Contractor to protect against damage, the walls and floor finishes in the areas frequented the installation personnel. Provide canvas floor covering to protect the floor finishes of the lobbies used to gain access into the shaft, motor rooms and pit. Repair / replace all damage resulting from the Lift-Contractor's acts, negligence or omissions in this regard.

1.36.4 **Disturbances:** The Lift-Contractor shall carry out the work with as little mess and noise as possible and with the minimum disturbance to the operational environment of the building activities. This matter will be strictly enforced and should the Lift Contractor fail in any way to comply with these requirements; the Principal Agent or Consulting Lift Engineer will instruct the Lift-Contractor on measures to rectify the situation at the Lift-Contractor's expense

### **1.37 SAFETY & SECURITY**

1.37.1 The safety of the building occupants is of the utmost importance and to this end without exception; the Lift-Contractor shall be liable for any unsafe condition occasioned directly or indirectly by any act or omission of the Lift-Contractor or any of his Domestic Sub Contractors.

1.37.2 Immediately after appointment, issue a document for distribution to the on-site staff, the Consulting Engineer and the Principal Agent, detailing all safety procedures to be followed during the installation period. This document shall cover safety procedures pertaining to:

- Work carried out on landings,
- Work carried out in lift shafts with adjacent lifts still in service,
- Work carried out in lift motor rooms with lifts still in service,
- Movement of material through the occupied building,
- Releasing of passengers trapped in lifts.

**1.37.3 Occupational Health and Safety Act Mandatory:** In terms of the Occupational Health and Safety Act, the Lift-Contractor as the "Mandatory", issue the necessary documentation pertaining to its on-site duties and appoint a Safety Officer who shall regularly inspect the site, and ensure safe working conditions and procedures at all times.

**1.37.4 Mandatory:** Enter into the Employer's Occupational Health and Safety Mandatory Agreement prior to starting on-site work. The completed OHS Mandatory Agreement shall be tabled for signature after appointment for the upgrade works.

**1.37.5 Security:** Abide-by and adhere to the strict building security measures. Security measures implemented and accepted shall pertain to all staff involved on this project.

#### **1.37.6 Barricading / off Landings / Foyers:**

- Provide barricades and safety notices for the area / foyer where upgrade work is in progress. Signage to warn persons of unsafe conditions related to work in progress on lift foyers shall not be regarded as sufficient without physically barricading off the working area.

- Barricading / Hoarding shall be rigidly secured and supported **WHITE 16-mm** plywood. The colour shall be verified and approved by the Employer before placing the order for the material to construct the barricading.
- The height of the hoarding shall be as follows:
  - **2100-mm** where no structural and/or wet works is required and
  - **3000-mm** where structural and/or wet works is required on the landings.
- The quantities shall be as determined and as deemed necessary by the Lift Contractor to meet the safety requirements of the Works Information.

### **1.38 STATEMENT OF INSTALLATION**

Submit at tender stage, informative technical information and drawings relevant to the type, design, method of installation, Builder's Work (electrical, structural and mechanical) and the method of installing the position of the landing buttons and signals.

### **1.39 SANS-1545 SAFETY REQUIREMENTS**

At Works Completion, all lift equipment shall comply with all the relevant and published South African National Standards including but not limited to the **SANS1545Part-1 or Part-2** as the case may be.

### **1.40 BUILDER'S WORK**

1.40.1 Provide all Builder's' Work, structural, mechanical and electrical work which is necessary for the proper and complete installation of the equipment. Builder's Work to be considered shall include but shall not be limited to:

1.40.2 Visit the site to clearly determine the anticipated scope of the Builder's Work and provide such detail in the tender submittal under the heading "Builder's Work

#### **1.40.3 Contingency Sum – Builder's Work**

1.40.3.1 In terms of the Works Information and at the discretion of the Consulting Lift Engineer and Principal Agent, a contingency sum shall be provided to cover unforeseen.

- 1.40.3.2 Claims against the contingency sum shall be clearly motivated and a detailed quotation(s) presented for approval by the Consulting Lift Engineer and Principal Agent prior to commencing with the associated work.
- 1.40.4 Make good any damage to the walls and floor that has resulted from the on-site work.
- 1.40.5 **Removal of Equipment:** Make provision to remove the existing lift equipment as required.
- 1.40.6 **Motor-Room-Less Lift's Control Panel:** Consider the position of the MRL lift control panel on the landing and determine the extent of the structural and electrical work associated with the installation of this item.
- 1.41 RADIO FREQUENCY INTERFERENCE**  
Provide only equipment sufficiently suppressed so as not to interfere with building communication and/or building management systems. Equipment provided shall not be susceptible to EMI.
- 1.42 TESTING, CONFIDENCE TRIALS AND WORKS COMPLETION**
- 1.42.1 Works Completion Inspection:** The Lift-Contractor having satisfied itself that the works are complete in every respect and ready for testing, shall notify the Consulting Lift Engineer with reasonable notice in writing of the date after which the Works Completion Inspection and tests can take place. Unless otherwise agreed the Works Completion Inspection shall take place within **10-days** of such notice.
- 1.42.2 Availability:** The availability of the unit(s) for testing and hand-over shall be as measured against the Works Information with regards to the stage(s) or phase(s) of completion.
- 1.42.4 Works Completion:** Works Completion shall be regarded as having been attained on full compliance with the Works Information, on the satisfactory conclusion of the Confidence Trial(s) and on issue of the Works Completion Certificate by the Consulting Lift Engineer or Principal Agent.
- 1.42.5 **Repeat Works Completion Inspections and Tests:** At the Works Completion Inspection, if any portion of the work is not ready for inspection or testing or fails to pass the tests, the Works Completion inspection shall be repeated within a reasonable time under the same terms and conditions save that all reasonable expenses incurred by the Employer which has resulted from repeat inspection and tests shall be deducted from the Contract Sum.
- 1.42.6 Failure to pass Repeat Works Completion Inspections or Confidence Trials:** If the work or any section thereof shall fail to pass the tests on a repetition thereof, the Consulting Lift Engineer shall be entitled to:

- Order further repeat inspections and tests under the conditions of **Part-**

**1.42.5&Part 1.42.6 or**

- Reject the works as a Defect if the results of the inspection or tests shows that the work or any section thereof fails to meet the performance, operation and reliability as specified or
- Issue a Works Completion Certificate if the Employer so wishes, subject to such reduction of the Contract Sum as may be provided in the Works Information or failing such provision, as may be agreed by the Employer and Sub-Contractor or failing agreement, as may be determined by mediation/ arbitration.

<b>Tenderer's Official's name (Print):</b>	
<b>Signature of Official</b>	
<b>Date:</b>	

## **PART 2: OPERATION**

### **2.1 GROUP AUTOMATIC OPERATION – TWO OR MORE LIFTS IN GROUP**

2.1.1 The operation for groups of lifts shall be group automatic operation arranged, dispatched and controlled by a de-centralised group supervisory system. The lift system control shall be supervised by a flexible and intelligent re-programmable microprocessor system and re-programming shall be possible without making changes to the lift hardware or fixed wiring.

### **2.2 AUTOMATIC LANDING CALL BY-PASS**

2.2.1 When the car loading exceeds a predetermined level, it shall automatically bypass all landing calls in the direction of service and shall respond only to car calls.

- Default setting: **65% of rated load**

### **2.3 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.

### **2.4 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.

### **2.5 LOAD WEIGHING**

2.5.1 Each lift shall be provided with a strain gauge or load-cell type load-weighing device to ensure optimum service.

## **2.6 ANTI-NUISANCE CONTROL**

When a lift with a loading level of less than **10-kg** arrives at a landing, all car calls shall be reset automatically.

## **2.7 OPERATION WITH INDEPENDENT SERVICE**

2.7.1 A two-position Independent service key operated switch, with cylinder as approved by the Consulting Lift Engineer and Principal Agent and master-keyed to the building system, shall be readily accessible and mounted in the car operating station of each lift. 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.

## **2.8 OPERATION WITH INSPECTION**

Provide a two-position switch on top of the car enclosure (car top working platform) 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 lift when on inspection control shall **not exceed 0.63-m/s and** shall operate the car only when the car doors and all lift shaft doors are closed, and all safety circuits are operational.

## **2.9 EMERGENCY OPERATION**

Provide a two-position switch 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 when on emergency operation, the speed of the lift shall **not exceed 0.63-m/s** and shall operate when the lift doors are closed, and when the inspection control on top of the car is switched to normal operation. It shall be permitted to over-ride the final limits, safety gear contacts, and governor contacts.

### **2.9.1 AUTOMATIC LOWERING OPERATION DURING POWER FAILURE**

Provide a battery powered automatic lowering system which functions automatically in the event of a power failure. The automatic lowering system is to ensure that the lift is lowered to the nearest floor and opens the doors when floor level is reached. If the lift is not connected to backup generated power, the doors are to remain open and the lift is to remain stationary until such time that the normal power supply is returned to the lift.

## **2.10 FIREMAN’S OPERATION**

### **2.10.1 Fire recall – Level 1:**

- 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 (nonstop) 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".
- When the fire control switch is activated, lifts travelling away from the designated landing, shall stop and reverse direction at the next closest floor without opening its doors, and return non-stop to the designated fireman's floor.
- An illuminated indicator fitted inside the car shall indicate that the lift is on fire control and shall further instruct the passengers to evacuate the lift at the designated evacuation floor.
- When on standby power the fire control operation shall operate as detailed under this section in conjunction with the emergency standby power control sequenced evacuation.

## **2.11 OPERATION WITH STANDBY POWER**

### **2.11.1 Emergency recall to main landing – Level 1:**

- 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 **One (1)** 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.
- The lifts shall be capable of operation on standby power at **100%** of rated speed in both directions and **100%** of rated capacity without overheating.
- Provide all connections to the lift controls for standby power operation in the appropriate machine rooms and all the necessary interlocking interconnection wiring among machine rooms of different lifts.

**2.11.2 Emergency Control Cables/Wiring:** Provide all the cabling and the installation thereof to link motor rooms and control room. The site and relevant drawings shall be checked to determine the route and lengths of cable required. It is anticipated that the existing cabling shall be re-used or extended as required.

## **2.12 OVERLOAD PROTECTION**

Provide overload protection for all lifts. If the load in the car enclosure exceeds the rated load, a buzzer shall sound, an overload Indicator will illuminate in the caroperating panel to indicate this condition, the lift doors shall remain open and the lift blocked from travelling. The overload device shall not be active during the travel phase of the lift.

## **2.13 DRIVE CONTROL**

2.13.1 Provide fully regulated distance dependant **closed loop AC VVVF** drive control system capable of constantly maintaining 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 travel without a creeping-in or levelling-in phase (direct approach).

2.13.2 Driving machine and motor shall be controlled to operate the lift continuously at **100%** of contract speed in both directions without overheating or hunting during levelling.

2.13.3 **Levelling Tolerance:** Provide equipment to maintain levelling as shown below:

- Levelling Accuracy: **3-mm** maximum
- Re-levelling Accuracy: **3-mm** maximum

## 2.14 TRAFFIC HANDLING

The lift, drive and group controls shall constantly deliver the traffic handling performance times and percentages as specified herein.

## 2.15 DUTY RATE –TRIP COUNTER

In order to evaluate the duty rate (usage factor) in terms of the specification and subsequent maintenance agreements, provide external trip counters on each lift controller. Trip counters incorporated in to the lift control software if not easily accessible to building management personnel shall not be regarded as sufficient in terms of this section. As a minimum, the trip counters to incorporate a re-settable **7digit** dual function display:

- Function-1: Record the total trips / starts - not re-settable
- Function-2: Re-settable tip counter

2.15.1 **Back-up Software:** Keep safe at a local office, full back-up software for the lift controls and remote monitoring system. Software replacement shall be deemed to be included under future maintenance agreements unless the replacement of the software resulted from abuse or misuse of the equipment. It shall be accepted that by purchasing the lift equipment, the Employer has already paid for all development costs associated with replacement software.

# PART 3: EQUIPMENT

## 3.1 EQUIPMENT AND LOCATION

3.1.1 Lifts with machines located directly over the lift shaft and machines below shall be mounted on steel beams on steel or concrete up-stands. Motor room less lift machines shall be mounted on steel beams at the top of the shaft and outside the projection of

the car. The steel beams shall be provided by the lift supplier and shall be suitably rated for normal duty as well as for any maximum load which may be placed on the machinery during full load safety applications etc.

3.1.2 Provide all required templates, inserts and signal boxes in walls or floors.

3.1.3 Arranged that rotating elements, sheaves, etc., so that they can be removed for repairs or replacement, either by trolley hoist and dolly, or other conventional means, without dismantling or removing other equipment components in the same machine room.

3.1.4 Trolley beams shall not be utilised as the normal support of diverter sheaves.

3.1.5 Provide any additional structural members required for the installations of the equipment, such as shelf angles and steel beam supports for sheaves, governors, motor generator sets, controllers and dead-end hitch beams

3.1.6 Clearance around equipment located in each machine room shall comply with the applicable provisions of the relevant SANS codes.

**3.2 Sheaves Situated in the Shaft:** The Lift-Contractor shall provide all equipment necessary to meet the requirements of **SANS-1545** with regards to diverter sheaves situated in the shaft and positioned directly above the lift enclosure including but not limited to:

- Installation of working platforms to create separate sheave rooms if the existing head-room permits including sheave guards, lights and emergency stop switches.
- Supply and installation of remote activate / release governors if not accessible from outside the shaft.

### **3.3 HOISTING MACHINE**

#### **3.3.1 Traction Drives:**

- **Main Brake:** The main brake shall be spring applied and electrically released by direct current. The main brake shall have sufficient power to hold the car at any landing with the normal amount of counterbalancing and with at least **150%** of contract load. Each brake shall be fitted with monitoring switches which shall be monitored by the main control CPU and the lift shall be immediately shutdown in the event of a malfunction of these switches.
- **Vibration Isolation:** Provide an effective sound reducing material / vibration isolation shall be installed between the bed-plate or supporting steelwork of an overhead, basement or motor room less driving machine and the beams, the structural concrete slab, shaft structure or the up-stands.
- **Duty Rate:** Driving machines, motors and drive controls shall have sufficient capacity to operate the lift continuously at **100%** of contract speed in both directions without overheating or hunting during normal operation and levelling.
- Equipment shall meet heavy usage requirements not less than the duty rates shown below:
  - **>= 240 starts per hour**

- **Noise and Vibration Levels for Conventional Machines:** Overhead and basement driving machinery situated in a machine room shall operate silently, without vibration and shall constantly maintain noise levels not **exceeding 56DB (A)**. The machine noise level shall at all times remain at an acceptable level, shall be inaudible from the landings or the car enclosure and shall maintain the performance levels as specified herein.
- **Noise and Vibration Levels for Motor-Room-Less Lifts:** Motor room less driving machinery shall operate silently, without vibration and the noise generated by the control and machine on the landing shall not exceed **42-DB (A) maximum** and **38-DB (A) average**. The noise and vibration levels measured in the lift car shall not exceed the performance levels as specified herein.
- Provision shall be made for a safe method of moving the machine by hand in the event of a power failure. All the necessary equipment and signage required to carry out this task in terms of **SANS-1545**, shall be mounted neatly in the motor room and shall remain on site at all times.
- For protection against entanglement, a positive action emergency stop switch shall be supplied and installed in close proximity to the main driving sheave it controls.

### 3.4 CONTROLLERS

- 3.4.1 Provide re-programmable solid state operation and motion controller to control the operation, the starting, the stopping, the speed of the lift motor and to apply the brake automatically if any of the safety devices operate or the power fails. Three phase protection shall be provided to the motor-generator set, driving motor or the solid state motion controller by the use of simultaneous tripping devices.
- 3.4.2 Provide solid state controllers enclosed in ventilated sheet metal cabinets with integral blowers. In order to maintain an acceptable control panel internal temperature, all power resistors and heat generating transformers shall be mounted in separate enclosures.
- 3.4.3 Each controller or the section of the controller supporting the main control contactors shall be vibration isolated from the motor room floor slab and building structure.
- 3.4.4 Provide only control systems which have been designed and manufactured for passenger carrying lifts. **PLC type controllers will not be accepted.**
- 3.4.5 Provide and install a Main Switch for each lift in a position where it is easily and rapidly accessible from the entrance to the machine room.
- 3.4.6 The Main Switch shall have a dual application namely:
- Motors connected directly to the mains shall be protected against short circuit. (Not required if motor protection is provided in the control panel),
  - The main switch shall be capable of breaking the supply to the lift by interrupting all the live conductors,
  - The main Circuit Breaker or Isolator provided in the motor room Distribution Board shall not be regarded as the Main Switch covered under this section,

- The Main Switch shall not cut off the supply to the circuits feeding the car light, car ventilation and car, shaft, pit and motor room **220-volt** supply.

3.4.7 Control panels and machines of multi-lifts situated in a common area shall be clearly marked with numerical or alphabetical number at least **100-mm high**.

### **3.5 CONTROL SYSTEM**

3.5.1 The control system shall be capable of constantly producing the performance criteria specified herein.

3.5.2 Provide drive control system 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.

3.5.3 Provide Variable Voltage Variable Frequency motor drive control units capable of providing a smooth acceleration, steady velocity and deceleration plus levelling to various floors within the time allowance and levelling tolerances as specified herein. This performance shall be consistent under all conditions of loading and in either direction of travel.

3.5.4 The motor drive unit control 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.

3.5.5 The hoist motor shall be provided with a thermostatically controlled blower if necessary, to dissipate accumulated heat so as to maintain the equipment below the maximum operating temperature rise specified by the Manufacturer.

3.5.6 The control system shall provide a consistent operation with the levelling accuracy at all landings from no load to full rated load in the lift. The specified operation shall be maintained for all lifts under stable conditions at maximum car start to car stop and floor approach times as specified.

3.5.7 A maximum of **0.5-second** shall be allowed from door close to car start.

3.5.8 Equipment shall be designed to operate at plus or minus **10%** of normal feeder voltage and plus or minus **5%** of feeder frequency without interruption and protective devices to prevent damage to equipment on over or under-voltage shall be provided.

3.5.9 The control system shall be designed to operate the lift continuously at **100%** of contract speed and at **100%** of contract load in both directions without overheating or hunting.

3.5.10 Lifts shall be adjusted as required to meet the performance requirements as specified within **10%** tolerance.

### **3.6 MACHINE ROOM INDICATORS / ROPE MARKERS MONITORS AND TEST TOOLS**

3.6.1 **Monitors / Test Tools:** Monitor and key board or hand held testing instruments for commissioning, re-commissioning and fault analysis of the lift control systems shall be provided and shall remain on site at all times. If monitors are provided, each group of lifts shall be supplied with its own monitor.

3.6.2 **Emergency Floor Level Indicator:** As each lift travels through the lift shaft, its floor level position shall be indicated by an LED indicator mounted in a position clearly visible from the machine. This indicator shall operate independently to the lift control and shall not be dependent on the lift supply for its operation.

3.6.3 **Error logs:** The lift control system shall incorporate the equipment to generate error logs and fault reports. Error logs for each lift shall generate a history of at least **fifty (50)** of the most recent faults indicating the type of fault, lift number, date and time the fault occurred.

### **3.7. AUTOMATIC SELF-LEVELLING**

Provide lifts with both a self-levelling and a re-levelling controls to 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 for over-travel and rope stretch. The lift shall be maintained level with the landing, irrespective of load and while loading and unloading.

### **3.8 STOPPING DEVICES**

3.8.1 Provide normal terminal stopping devices enclosed in dust-proof enclosures for each lift. These devices through operation shall bring the lift automatically to a smooth stop at the terminal landing.

3.8.2 **End of Shaft Final Limits:** Provide final terminal stopping device 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 and shall prevent the lift operation in either direction. Limit switches shall be so located that they operate before lift or the counterweight engages the buffer.

### **3.9 ROPE GUARDS**

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

3.9.2 Rope guards shall be fitted to the top of main diverter and governor sheaves mounted in the shaft, pit or under-slung sheaves protruding past the projection of the car.

### 3.10 CAR AND LANDING DOOR OPERATOR

**NOTE:** For the purpose of this specification the door operator shall be interpreted as the entire door operator including all associated components on the car and landing excluding the door panels and sills.

3.10.1 The door operator is regarded as a CRITICAL ITEM and it shall be the Lift-Contractor's responsibility to select and supply equipment considered by the Manufacturer as **top of the range, low maintenance equipment** which is capable of meeting the highest operation, duty rates and performance levels. Only door operator considered by the Manufacturer as **heavy-duty**, with continuous operation capabilities will be accepted.

#### 3.10.2 Duty Cycle:

- **Passenger Lifts:** Only door operators with heavy-duty guide rails / tracks shall be accepted for Passenger Lifts.

3.10.3 Incorrectly supplied or suspect door equipment with regards to clearly meeting the requirements shall be replaced with suitable equipment at no additional cost to the Employer.

3.10.4 Appointment for the Contract shall not be considered as acceptance of the equipment offered and it shall remain the Manufacturer's responsibility to select, supply and install the correct equipment in terms of this specification.

3.10.5 Doors on the lift car and at each landing opening shall be opened and closed quietly and smoothly by a fully regulated electric motor and driving mechanism.

3.10.6 Car doors shall be mechanically locked when fully closed under power. It shall not be possible to force the car doors open from within the car and interrupt the safety contact when the doors are fully closed under power.

3.10.7 Provide mechanical car door locks where the free distance from the car sill to the shaft front wall exceeds **120-mm**.

3.10.8 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.

3.10.9 Each landing door shall be equipped with electro-mechanical interlocks so that the lift can operate only when the interlock circuit is established.

3.10.10 Each landing door panel shall be closed by an independent auxiliary self-closing device (door closer weight) whenever the door is not in the closed position and it is not restrained by the equipment relating to the car and landing door system.

3.10.11 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.

3.10.12 An electrical contact shall be fitted to the non-driving car and landing doors if its linkage is dependent on a steel rope, belt or chain.

3.10.13 Emergency Triangle access key mechanisms shall be provided on each entrance.

3.10.14 The opening time and closing time for lift doors shall be within **10%** of the values specified herein.

### **3.11 PASSENGER LIFT DOOR HANGERS**

3.11.1 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.

3.11.2 Either the running surfaces of the tracks or the sheaves shall be non-metallic.

### **3.12 CAR DOOR CONTROL**

#### **3.12.1 Door Motion Control:**

Only door operators with a fully regulated **VVVF** motion controller shall be accepted.

#### **3.12.2 Door Open and Close Times:**

Door open and close times shall be regulated by software and shall be adjusted to meet the traffic requirements of the application.

3.12.3 **Door Anti-Nuisance Control / Forced Closing:** 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.

#### **3.12.4 Door Protection Devices**

- **Leading Door Edge Protection:** Provide an electronic infra-red car leading edge protection device. The car door protection device 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.
- The door protection device shall have the capabilities of detecting metal objects / trolleys.

### 3.13 LIFT SHAFT & PIT REQUIREMENTS

3.13.1 Provide access ladders into pit and for pit buffers as required to service the equipment. The pit ladder shall extend from the pit floor to **1100-mm** beyond the level of the lower entrance.

3.13.2 Provide the necessary rope, or selector tape guards in pit areas.

3.13.3 **Deep Pits:** 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 **the SANS 1545 (EN 81)** safety requirements pertaining to the depth/ height and free space of these areas. Access to the area below the pit working platform including lighting shall be provided to accommodate the checking of the lower section of car and counterweight guide, cleaning and checking of hoisting ropes if applicable for basement machines.

3.13.4 In terms of **SANS-1545 (EN 81)**, provide and install shaft lights in each lift shaft, the lower and highest light fitting shall be mounted no more than **500-mm** from the pit floor and shaft top respectively. These lights shall be switched from the lift motor room, top of shaft and pits and shall maintain a minimum lighting level of **50Lux** measured at **1000-mm** above the car roof.

**3.13.5 Shaft Requirements:** shall apply if the existing equipment covered under this section is upgraded or if replaced:

- The positioning and fixing of all shaft steelwork shall be uniform and consistent throughout the shaft.

**3.13.6 Lower Shaft Dividing Screen:** Where the lift shaft contains several lifts and in terms of the **SANS-1545 (EN 81)**, provide ridged metal screens to separate the moving parts of the individual lifts. The metal screen shall be from the level of the first landing to a height of **2500-mm** and shall be the full width / depth of the shaft.

**3.13.7 Upper Shaft Dividing Screen:** Where the lift shaft contains several lifts and the running clearances of car and counterweight and car and counterweight of adjacent lifts in a common shaft do not meet the minimum requirements in terms of the **SANS-1545 (EN 81)**, provide ridged metal screens to separate the moving parts of the individual lifts.

**3.13.8 Pit Dividing Screen:** In terms of the **SANS-1545 (EN 81)**, provide ridged metal screens to separate the moving parts of the individual lifts situated in a common pits. The screens shall be the full depth of the shaft to the level of the first landing.

### 3.14 CAR AND COUNTERWEIGHT GUIDE RAILS

Notwithstanding the requirements pertaining to performance, ride comfort, retained car and counterweight guide rails (shaft steelwork), guides for prestige office buildings, **SANS 1545 (EN 81)**, Best Engineering Practice and the Manufacturer's requirements, **Part-3.14.1 to Part-3.14.8** shall apply if the existing equipment covered under these sections is modernised or if replaced.

- 3.14.1 Provide guide rails with brackets and sliding rail clips for each lift car and counterweight, suitably attached to the building structural members. Car guide rails and car frame shall be so located as to balance the car assembly in the guides.
- 3.14.2 **Guide fixings:** Provide any additional car and counterweight guide rail backing, intermediate steel and brackets fixed to the shaft wall with **two (2)** (minimum) bolts / Anchors per bracket as required between floors to maintain proper bracket spacing not exceeding **manufacturers specification**
- 3.14.3 **Guide Bracing:** Intermediate guide supports which use the guides of an adjacent lift and not the shaft wall or shaft trimmer as the supporting member, shall not be regarded as a guide fixing.
- 3.14.4 **Fish Plates:** Joints of car and counterweight rails shall be accurately machined with tongues and grooves in the ends of the rails at the centre of the railhead and base forming matched joints. Each rail joint gap, as installed, shall **not exceed 1.0-mm**. Each rail joint shall be fitted with machined fish-plates fastened to the back of each rail's machined surface with not less than a total of eight **(8) through-bolts**. Additional brackets with sliding rail clips between floor beams shall be provided as necessary to obtain proper rail rigidity and maintain the alignment for both the car and counterweight rails.
- 3.14.5 Shim packs shall be **20-mm** maximum and shall secure rail clip alignment and shall be so designed that they shall remain in position even though the fastening bolts may become loosened.
- 3.14.6 Building Settlement:** Car and counterweight rails shall be cut off at the top and bottom with an allowance for building compression of **3.5-mm** per typical floor and a maximum of **300-mm** at Works Completion.
- 3.14.7 The final location of divider beams, with respect to each floor level, shall be coordinated under this section. Any additional steel members required for the installation of the lift equipment and not shown on the structural drawings, including their fabrication and installation shall be provided under this section. The reinforcement of structural steel to absorb rail forces and safety application applied at pinning floors, rather than in the pit, shall be provided under this section. Car and counterweight rail backing shall be provided as required by the code.
- 3.14.8 Shaft Trimmer:** Shaft trimmers shall be (I) beams of adequate strength. Formed metal sections for example; (U) channels, (T) sections or Box Channels shall only be accepted on the submittal of the Manufacturer's design and fixing details.
- 3.14.9 The blade of car guides shall be machined.
- 3.14.10 The car and counterweight guide rails shall be provided and aligned so that the faces of the rails are plumb within plus or minus **5.0-mm** from top to bottom of the lift shaft. The maximum change in the distance between guides (DBG) shall not exceed **2.0-mm**.
- 3.14.11 Retained Car and Counterweight Guide Rails:**

- The car and counterweight guide rails shall be aligned if necessary to provide smooth and vibration and jerk free ride throughout the length of travel.

### **3.15 HOIST AND GOVERNOR ROPES**

3.15.1 Hoist ropes of sizes and numbers sufficient to comply with the requirements of the relevant code and traction requirements. The shop drawings shall indicate the number and sizes of ropes proposed, together with the name of the manufacturer, type, ultimate strength, the proper working load and that the core is of manila fibre. All hoist ropes shall be cut in sequence from the rope reel and tagged for sequential adjacent installation.

3.15.2 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.

3.15.3 **Governor Ropes:** Governor ropes shall be in accordance with **SANS-1545 (EN 81)**. 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.

### **3.16 COUNTERWEIGHT**

3.16.1 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 contract 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.

3.16.2 If the main ropes are to be replaced or renewed as part of this project or in terms of the Maintenance Agreement, blocking between the counterweight and the buffer striker plate shall be provided equal to **300-mm per 30-meters** of hoist rope between car and counterweight.

### **3.17 CAR AND COUNTERWEIGHT GUIDE ROLLERS OR SHOES**

**3.17.1 Guide Shoes:** **Part-3.17.1** shall apply if the existing equipment covered under this section does not comply with the requirements of this section or if modernised or if replaced:

- If the speed and load specified allows and guide rollers are not required, provide car and counterweight spring loaded shoe guides. 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 shoe guides shall be lined with a durable resilient material, which shall ensure a quiet and smooth ride.

- If the speed and load allows, spring tensioned guide shoes on the counterweight may be replaced with an alternative approved system.
- The car and counterweight guide rollers / shoes shall constantly provide the ride quality as specified.
- **Guide / Sliding Shoe Noise:** The guide and sliding shoe arrangement in conjunction with the guide rails selected for both the car and counterweight shall be designed and manufactured to limit all guide noise to a level not audible in the car enclosure or on the landings during travel.

### **3.18 COMPENSATION CABLES**

Provide compensation cables when required by manufacturer's specification and in order to maintain traction on driving sheave throughout the length of travel.

### **3.19 BUFFERS**

New buffers shall be provided

- 3.19.1 Lifts operating at speeds of up to and including **1,0m/s** shall be provided with buffers of the energy accumulation type, at speeds of up to and including **1,6m/s** shall be provided with buffers of the energy accumulation with buffered return type, and at speeds exceeding **1,6m/s** shall be provided buffered of the energy dissipation type, placed at the bottom of the hatchway for both the car and the counterweight.

### **3.20 SAFETY GEAR AND GOVERNOR**

New safety gear and/or governor shall be provided.

- 3.20.1 Over speed governors and safety gear shall be arranged to stop the lift whenever excessive descending speed is attained. The safety gear shall be released by moving the lift in the up direction.
- 3.20.2 The governor rope system, including the governor and tension sheave, shall be arranged so that the carrier shall not release due to system dynamics when the lift is subjected to an emergency stop.
- 3.20.3 Car and counterweight safety gear shall be provided with a switch to cut off power from the motor and apply the brake if the safety gear applies without tripping of the governor.

3.20.4 The governor shall be provided with an electrical contact, which shall cut off power from the motor and apply the brake if a speed of **110% nominal speed** is reached in either direction before tripping the governor.

3.20.5 Rope guards and an electrical contact to monitor the rope stretch shall be provided on governor rope tension sheaves.

3.20.6 If an accessible space exists below the car or counterweight, the counterweight shall be equipped with safety gear in terms of this section.

3.20.7 Safety gear supplied and installed shall comply with **SANS-1545 (EN 81)**.

3.20.8 **Ascending Over-Speed Brake / Safety Gear:** shall be provided for all installation where there is a required upgrade or replacement of the main driving machine.

As required in terms of **SANS-1545 (EN 81)** the lift speed in the upward direction shall be controlled by one of the following:

- Ascending safety gear fitted to the car,
- Governor and safety gear fitted to the counterweight,
- Main hoisting rope brake / clamp fitted to the machine bed-plate, • Brake fitted to the main drive sheave.

### **3.21 PIT SAFETY STOP SWITCHES**

3.21.1 Each lift pit shall be provided with positive action pit safety switches easily accessible from the entrance to the pits without the necessity of entering. Pit switches shall comply with **SANS-1545 (EN 81)**.

### **3.22 CAR PLATFORM AND SLING**

Should a new lift car be required, provide new platform and sling complying to **SANS 1545 (EN 81)**

#### **3.22.1 Static Balancing:**

- 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 18-kg** without load in the car. **(Statically balanced)**.
- It shall be accepted that the level of ride comfort is directly related to the static balancing of the car / sling. Therefore, as requested by the Lift Consulting Engineer, the Lift-Contractor shall demonstrate that the free hanging car / sling has as a minimum, been statically balanced in accordance with the requirements of this specification.
- As required the work related to meet the requirements of this section shall include but shall not be limited to:
  - Re-positioning and/or installation of balancing weights,
  - Repositioning of steady brackets,

- Repositioning and/or adjustment of guide shoes / rollers and
- Repositioning of the rope hitch.

### **3.23 TRAVELLING CABLES**

3.23.1 Provide travelling cables between the lift and the fixed lift shaft or motor room wiring. Travelling cables shall be flexible and suitably suspended to relieve the strains in the individual conductors and all cables shall contain an approximately equal number of conductors, or shall have equal flexibility.

3.23.2 As a minimum travelling cables shall contain two shielded pairs for each lift car to accommodate voice communication.

### **3.24 ELECTRICAL WIRING AND CONTROL COMMUNICATION NETWORKS**

3.24.1 Low voltage and control communication cables shall be run in separate ducts, conduits and trailing cables.

### **3.25 PASSENGER LIFT CAR ENCLOSURES**

Should new car enclosures be required, the entire enclosure is to be manufactured from stainless steel.

3.25.1 **Emergency Light Unit:** Provide emergency battery operated lighting and alarm units. The alarm switch shall be connected to the emergency battery source to ring the alarm bell in the lift shaft when the normal and the standby power source is not available. A button for the testing of the emergency-light battery power pack shall be mounted on top of the car. The emergency light unit shall form an integral part of the normal car lighting including fluorescent lighting and down lighter. Separate emergency light units mounted within the car enclosure shall not be accepted.

3.25.2 **Lift Enclosure Fan:** Provide silent running squirrel cage, centrifugal flow exhaust blowers mounted in the car roof to draw air into car enclosure from the landing when the doors are open and through car vents and door clearance gaps when doors are closed. The car ceiling or suspended ceiling shall be designed so as not to restrict the flow of air to the fan.

3.25.3 Provide car top terminal boxes of ample size incorporating clearly marked car wiring terminals and a car top inspection control unit.

### **3.26 LANDING ENTRANCES**

**NOTE:Part-3.26.1 to Part-3.26.4** shall apply if the equipment covered under these sections is upgraded or if replaced.

- 3.26.1 Provide shop drawings showing the wall and unit frame connection for the masonry or concrete wall system.
- 3.26.2 The type and construction of the unit landing frame shall be as specified under **Part-3** of this specification.
- 3.26.3 **Fire Rating of the Lift Entrances: (When Specified)** Provide **two-hour fire rated** landing entrance equipment, including door panels and signal faceplates. Should the landing faceplate fixtures not meet the two hour fire rating, provide additional fire rating fixed on the inside of the shaft. Provide the relevant **SANS** (South African National Standards) or equivalent International test certificates for a Class “C” type landing door equipment.
- 3.26.4 For maintenance purposes, floor designation shall be clearly and permanently and neatly marked with at least **100-mm** letters or numbers on the inside of the landing doors (shaft side).
- 3.26.5 Lift shaft landing entrance assembly shall consist of a unit frame, door panels, fascia, sill, hanger, closer and interlock in compliance with the applicable code requirements.
- 3.26.6 In compliance with **SANS-1545 (EN 81)**, provide landing door dis-locking devices on all landings.

### **3.27 DOOR PANELS**

- 3.27.1 Provide door panels for all openings manufactured from **1.5-mm** minimum stainless steel. Provide continuous stiffener channels at top, bottom and edges. The bottom of each door panel shall be provided with removable laminated phenolic guides running in the sill slots and door guides shall be designed to be replaced without removing door panels. All door panels shall be reinforced and provided with keyways as required for door hangers and operating mechanisms. All mitres, junctions or other joints shall be securely welded, ground smooth and filled.
- 3.27.2 Door panels shall be constructed to operate free from objectionable squeaks or metallic sounds and shall be acoustically designed. Metal door panels shall be treated with a sound deadening material to produce a quiet door operation under all operating conditions.
- 3.27.3 **Door Panel Leading Edge:** Provide door panels with leading edge interlocking profiles and with rubber stoppers top and bottom to prevent the metal door panels touching when fully closed. Door leading edge rubber profiles shall meet the specified fire rating.
- 3.27.4 Car and landing door assembly shall be designed to maintain a minimum gap between door panels when fully open. It is intended that landing door add-on or infill site guards shall not be required.

**3.27.5 Stainless Steel Door Panels:** Where stainless steel door panels are specified, the entire door panel shall be constructed from stainless steel and shall not be a mild steel construction clad in stainless steel.

3.27.6 The selection of the door operator shall take into account the door height, clear opening and weight of the panels.

### **3.28 SILLS AND SUPPORT ANGLES**

The landing sills for all openings shall be of narrow extruded aluminium or stainless steel. Grooves in sills for the door guides shall be machined with minimum clearances for the guides. The sills shall be supported on steel angles securely fastened to the building floor construction.

### **3.29 STRUTS AND DOOR CLOSER SUPPORT ANGLES**

Steel strut angles of adequate size shall be provided to rigidly support the hanger housing and the door closers. The angles shall be continuous between the sill and building beams above and securely bolted to the header. Strut angles fastened to the guide rails or the lift shaft wall construction shall not be accepted.

### **3.30 DOOR HANGER SUPPORTS**

Hanger supports shall be **5.0-mm** minimum thick steel-formed sections securely bolted to strut angles and closer support angles.

### **3.31 TOE GUARDS**

Provide toe guards constructed from mild steel on all landings. Toe guards shall extend the full width of the door opening and shall be gradually bevelled and fixed to the wall. The straight vertical portion of the guards shall equal a distance of **400mm** or as in the case of the lowest landing shall equal the distance travelled by the car sill from when the car is on the fully compressed buffer. Toe guards for observation lifts shall be the full width of the door sill and shall be manufactured from the material as specified for observation lifts.

### **3.32 FASCIA PLATES**

3.32.1 Where the car sill to shaft front clear distance exceeds the maximum allowed in terms of **SANS-1545 (EN 81)**, provide fascia plates constructed from mild steel and reinforced where necessary to ensure a ridged surface. Fascia plates shall extend the full distance between header and sill and shall extend the full width of travel of the doors.

3.32.2 Alternatively, if car door mechanical locks are provided, fascia plates are not required. Car door locking mechanism using an electrical solenoid shall not be accepted.

### **3.33 FIXTURE FACE-PLATES AND MOUNTING**

3.33.1 For all lifts with square rectangle stainless steel face-plates and unless otherwise specified, landing fixture faceplates shall be surface mounted and shall be of stainless steel. However, alternative landing fixture faceplates may be offered if these faceplate are generic products and aesthetically acceptable to the Principal Agent and Consulting Lift Engineer.

3.33.2 The fixture faceplates in the lift car shall be mounted with concealed security fastenings or fastenings requiring special tools to remove them. Exposed fastenings shall match the material and finish of the faceplate.

3.33.5 Without exception the Principal Agent and Consulting Lift Engineer shall sign off and approve the final design of the fixture faceplates before placing the order or manufacture of this equipment.

**3.34 Blanking-off Faceplates:** Where applicable, allowances for full blanking-off plates to cover the existing landing indicator and/or arrow and/or button unit cut-outs shall be included and shall be of stainless steel.

### **3.35 CAR POSITION INDICATOR**

3.35.1 Provide LED or LCD readout position indicators incorporated in each lift car operating panel.

3.35.2 Information to be displayed shall include but shall not be limited to, floor position, fire control information / status, independent service (goods mode) and over-load conditions maintenance operation etc..

3.35.3 The digital readout shall be at least **50-mm** in height.

### **3.36 CAR OPERATING PANEL (COP)**

3.36.1 Provide car operating panel(s) incorporating but not limited to:

- A series of call buttons, numbered to correspond to the active landings. Not applicable if destination control has been specified.
- Emergency alarm button.
- Fan switch if not automatically controlled.
- Intercom equipment.
- Voice Annunciation components as specified.
- Door open and door close buttons.
- Position indicator as specified.
- Signage as specified.
- Independent / reservation control equipment specified.

3.36.2 Car operating panels shall be flush mounted into the car fronts or car side panels.

3.36.3 Provide car call and emergency buttons with an approved, micro-push operation. Each button shall be clearly marked with its corresponding floor position or function as the case may be. The demarcation shall either comprise a raised or recessed numeric or alphabetic character. Call buttons offered shall be those as regarded as top of the range equipment by the Lift-Contractor and shall be approved in terms of Health and Safety.

#### 3.36.4 Disabled Requirement.

Except for dedicated goods lifts and in accordance with **SANS 50081-70:2004 (EN 81-70:2003)** the following shall apply:

- **Braille Buttons:** Provide Braille car call buttons. Braille buttons shall be provided with the Braille incorporated (engraved) into the button unit.
- The car operating panels shall be **Disabled friendly** and shall be located so that all operating and emergency buttons are located within **1200-mm and 900-mm** above the car platform. The emergency buttons and switches including the alarms, door-open button, intercom button and control key switches shall be mounted at the bottom and the call buttons shall be mounted in numerical order starting above the emergency button and numbering from left to right.
- The minimum area of the active part of the button shall be **49-mm** square or an inscribed circle of **20-mm** square diameter.
- The position of the symbol shall be on the active part or **10-mm** to **15-mm** left of it.
- The minimum distance between active parts of the buttons shall be **10-mm**.

#### 3.36.5 Voice Annunciation:

Provide blind friendly full range volume controlled voice annunciation / voice synthesiser. The voice annunciation shall be software generated. Voice annunciation shall be in English and shall have a clearly understandable English accent.

Voice annunciation shall include:

- Next selected landing at which the lift will stop,
- The direction the lift is committed to travel,
- Special door safety instructions,
- Special instructions if the lift is held up at a landing for an extended period of time.
- Announcement when the lift is overloaded.

3.36.6 Car operating panels shall be arranged so that the call buttons and the control and signal devices are substantially flush to the vertical surface. The wiring to the individual components shall permit the panel to swing open for maintenance purposes without disconnecting any of the fixed wiring.

**3.36.7 Signage:** Provide all mandatory notices including, load plate, official lift number and emergency instructions. Signage shall be engraved into the car operating panel or alternatively, signage on removable plates laser cut and flush mounted into the car operating panel may be accepted.

**3.36.8 Key Switches:** All key switches 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). Key switches shall be clearly designated and the on/off position shall be clearly marked.

**3.36.9 Goods and Trolley Passenger Lift COP:** To allow for maximum and optimum loading, bed, goods and trolley passenger lift's COPs shall be mounted in the car fronts or if no car fronts exist, as close as possible to the lift entrance.

### **3.37 CALL BUTTON ACKNOWLEDGING LIGHTS**

Car and landing call buttons shall be of the electronic illumination acknowledging type. The registering of a call button shall illuminate the button to acknowledge that a call has been registered. Incandescent lamp illumination shall not be accepted.

### **3.38 LANDING CONTROL STATIONS**

#### **3.38.1 Landing Call Buttons (Conventional Lift Controls):**

- Provide landing button stations on all floors. Terminal floors shall contain a single button station and intermediate floors shall contain both up and down buttons. In the case of multiple risers, activation of a button on one riser shall ensure the activation of same button on all risers on the same floor.
- Provide landing buttons with an approved, micro-push button operation. All landing fixtures shall be high quality vandal resistant type.

### **3.39 WAITING PASSENGER LANTERNS AND GONGS**

#### **3.39.1 Waiting Passenger Lanterns and Gongs (Conventional Lift Controls)**

- Provide an up and down, LED or LCD 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 or shall be incorporated into the landing frame on each typical entrance. Incandescent illumination indicator lamps shall not be accepted.
- Supply and fit electronic arrival gongs to each entrance. The fixture faceplate shall contain an approved pattern of perforations / slots to enable the transmitting of the sound from within the shaft to the lift foyer. Gongs shall be fitted in enclosures to retain and direct the annunciation to the applicable landing foyer. It is intended that arrival gongs on one landing will not be heard on another landing.

- 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.
- **Disabled Friendly Gongs:** In order to meet the disabled friendly requirements, the tone of the gong for up and down shall differ i.e. one “gong” for up and two “gongs” down.

### **3.40 LANDING POSITION INDICATOR**

3.40.1 Provide LED or LCD digital readout position indicators over the architrave of each lift. 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 at which the lift is stopped or passing.

3.40.2 Landing position indicators **shall not illuminate** with the floor position if the lift is not able to respond to landing calls as a result of a fault condition, on inspection control or when undergoing routine maintenance.

### **3.41 LANDING DOORS AND ARCHITRAVE FINISH**

**3.41.1 Stainless Steel Landing Finish:** The direction of the grain of stainless steel door panels, frames and headers shall be in the same direction. Unless otherwise specified by the Principal Agent or Consulting Lift Engineer, the direction of the grain for a stainless steel finish shall be vertical / top to bottom.

### **3.42 LIFT CAR FINISHES**

3.42.1 Decorative finishes in the car or floor covering shall not have a fire index of more than **two (2)** when tested in accordance with **SANS-0177: Part3 or 4**, as the case may be.

#### **3.42.2 Enclosure Finish Safety Gear Test:**

- The design and final fixing of the car interior wall and ceiling covering shall be tested by activating the safety gear while the lift is running in a down direction at nominal / contract speed.
- On completion of the safeties test, the lift enclosure wall and ceiling panels shall be inspected for distortion or damage and if necessary, the test covered under this section shall be repeated until satisfactory conclusion.
- In order to verify the design and inspect the hidden fixings of the car enclosure wall and ceiling panels, the Principal Agent or Consulting Lift Engineer reserves the right to request the removal of the wall and ceiling covering after the safety gear test covered under this section.

**3.42.3 Stainless Steel Car Entrance Finish:** The direction of the grain of stainless steel door panels, slam-posts and headers shall be in the same direction.

**3.42.5 Blanking off Plates:** Where applicable, provide full blanking-off faceplates to cover the existing car operating panels and indicator cut-outs. Blanking off plates to cover cut-outs of removed indicators above the entrance shall extend the full width of the car entrance header section.

### **3.43 PROTECTION PADDING / DRAPES**

Provide vinyl impregnated nylon faced drapes for all goods / passenger lift car enclosures. The vinyl-impregnated nylon shall be at least **1.5-mm** thick backed by **7.0-mm** padding. Pads shall be double stitched on a grid **150-mm** on centres. Padding shall be treated with a fire retardant compound so as to be selfextinguishing. The protection padding shall be provided to protect the two sides and the rear of the car enclosure. Suitable supporting studs shall be provided in the car enclosure in accordance with the Principal Agent and Consulting Lift Engineer's requirements. Quantities shall be specified under **Section-6**.

### **3.44 LIFT INTERCOM SYSTEM**

3.44.1 Provide an intercom system complete with talk-back speakers with all required auxiliary equipment, wiring, a **Six (6) hour** minimum back up power supply/

3.44.2 Lift travelling cables on each lift shall contain **Two (2)-shielded** twisted pairs of conductors for intercom usage.

3.44.3 Provide one hands-free sub-station in each lift car, one master-station for each motor room and one master-station for the security / control room as specified. Two-way voice communication between the lift car and lift motor room, lift car and control room, and lift motor room and control room shall be possible.

**Intercom Security / Control Room:** The lift intercoms for all the lifts and motor rooms shall be wired back to a centrally located common security / control room.

**GSM Auto-Dialler:** in addition to the specified intercom system, all lifts are to be equipped with a GSM Auto-Dialler system. The GSM unit is to be located on top of the car or in the lift motor-room. The installation shall ensure that the signal strength to the GSM unit is at all times sufficient to ensure radio communication no matter what the position of the lift car in the shaft. The required audio quality shall be the same as that specified for the intercom unit.

The GSM unit shall be programmable and shall have the facility to dial alternate numbers should the first programmed number be unavailable. The unit shall be activated after the alarm button is pushed for a period longer than 3 seconds

#### 3.44.4 CCTV Camera Requirements:

Provide CAT6 Shielded twisted cable for each lift car for the connection of digital CCTV cameras, which will be provided by the Client.

#### 3.44.5 Breakdown Rate:

- Provide guarantees that after completion of the lift installation, the lift breakdowns / equipment interruptions shall not exceed the stop rate shown below. The fault analysis shall be compiled on a monthly basis and assessed on a “rolling year”. A defect as stated above is defined as an event, which prevents equipment from providing its required service and which was not as a consequence of an external factor or at the specific direction of the Employer.
- The total annual average stops per lift shall not exceed **Four (4)**. The total annual stops per lift which are attributed to the lift drive and control systems, shall not exceed **Two (2)**.
- If the lifts do not deliver the specified service after Works Completion and the twelve (12) months guarantee period, it shall be considered as a Latent Defect to be rectified by re-commissioning, adjusting, or replacing equipment at no additional cost to the Employer.

### 3.45 MACHINE AND CONTROL DATA SUBMITTALS

**3.45.1 Machine Data:** Provide the relevant machine data as shown below to ensure the correct Power Feeder Design well in advance of field requirements:

- 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: %

### 3.46 MOTOR-ROOM-LESS (MRL) LIFTS INSTALLATIONS

Shall apply if motor-room-less lift equipment is provided.

**3.46.1 Codes of Practice:** The standards and requirements for the installation of motorroom-less lifts will therefore, have to satisfy **SANS-1545** (latest edition) as well as all other codes, practices, standards and local by-laws applicable to this type of lift installation.

**3.46.2 Noise and Vibration Levels:** The noise generated by the control and drive on the landing shall not exceed **42-DB (A)maximum** and **38-DB (A) average**. The noise and vibration levels measured in the lift car shall not exceed the performance levels as specified herein.

**3.46.3** Motor-room-less lifts shall be supplied as a complete package and the following items shall be provided and considered as an integral part of the equipment:

- Distribution board including circuit breakers and earth leakage for control equipment,
- Motor room lights (**minimum 200-lux**),
- Car lights and plugs,
- Pit lights (**minimum 50-lux**),
- Shaft lights (**minimum 50-lux**), • Motor room plug socket (15-Ammps),
- Pit plug socket (15-Amps).

3.46.4 All electrical work shall comply with the requirements of **SANS-0142**.

**3.46.5 Painting of the Motor Room:** Paint the motor room walls and roof within the shaft white. The motor room shall be considered as the complete shaft area containing the drive and control equipment from the level of the highest landing to the top of the shaft / motor room roof.

**3.46.6 Electrical Feeder / Supply Cable & Distribution Board:**

- Provide all material and work required to extend or transfer the lift supply cable(s) from the existing DB Board to the new distribution board mounted in the shaft (motor-room less lifts).
- Provide all material, work and signage necessary to make the existing distribution board safe after relocating of the lift's electrical supply and distribution board into the lift shaft.

**3.46.7 Car-Top Guard Rails:** In terms of **SANS-1545 (EN 81)**, the car roof 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**. The balustrade shall fulfil the following requirements:

- It shall consist of a toe guard of **100-mm** height and an intermediate bar at half the height of the balustrade,
- Considering the free distance in a horizontal plane beyond the outer edge of the hand-rail of the balustrade, its height shall be at least:
  - **700-mm** where the free distance is up to **850-mm** and
  - **1100-mm** where the free distance exceeds **850-mm**.

3.46.8 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 Consulting Lift Engineer and Principal Agent at tender

stage. Any work to the power feeder system necessary to produce a reliable lift operation and which was not brought to the Consulting Lift Engineer and Principal Agent's attention, shall be undertaken by the Manufacturer at no additional cost to the Employer.

3.46.9 All components and their respective adjustment which do not form part of the equipment change yet influence the optimum operation of the upgraded equipment, shall be included in the Manufacturer's scope of works.

## **PART 4**

### **SPECIFIC REQUIREMENTS FOR LIFTS**

The following items are special requirements for the upgrade project at Carlton Centre; it is a requirement of the tender that these requirements be met. Should it not be possible for the tenderer to meet these requirements, they are to indicate any deviation or qualifications in writing and this information is to be submitted in the form of a covering letter together with the tender document.

#### **LIFTS**

##### ***4.1 Guide-Rails***

With the intention of minimizing disruption to daily operations of the building and in keeping the project lead-time to a minimum, the Tenderer is allowed the option to retain and re-use the existing guide rails. Should the guide rails be retained, it is the responsibility of contractor to ensure that the rails are re-aligned to ensure that the ride quality as detailed in this specification is achieved.

##### ***4.2 Contract Speed***

For all units, existing lift contract speeds should be maintained; tenderers who propose any contract speed lower than the existing will not be considered for this project.

##### ***4.3 Hydraulic Lifts***

All hydraulic lifts are to be replaced in their entirety with machine-room-less type lifts. The successful tenderer will be responsible for the removal and safe disposal of any hydraulic oil/ fluid as well as the rehabilitation of pits or motor-rooms where there may be contamination due to earlier oil spills etc.

**The bidder is to provide at tender stage the following information relating to all hydraulic lifts which are to be replaced with traction type motor-room less lifts: Load Capacity, Speed, Car internal dimensions, Door opening type, width and height**

##### ***4.4 Goods Passenger Lift Cars***

All goods/passenger lift cars provided shall be of the same design as the existing with extended car roofs, etc., tenderers are to ensure that they familiarise themselves with the existing design and they offer the same or better. Standard/reduced car sizes will not be accepted as replacements for the existing goods/passenger lift cars.

#### **4.5 Destination Dispatching System**

Office tower Low, medium and high-rise groups of lifts are to be equipped with Destination Dispatching Group Control Systems. In addition to the destination control system, elevator cars are to be equipped with an additional car operating panel which is to be housed in a lockable panel which will allow the lift to be removed from the group and used on independent service or as a goods lift.

Tenderers are to provide detailed information on the proposed destination dispatching system. The information of the offered Destination Dispatching System shall include high resolution photos of lobby, car control and signal panels, a comprehensive system operation manual as well as a traffic analysis comparing traffic handling with traditional group control system as well as Destination Dispatching system. This information is to be submitted together with the tender document.

#### **4.6 Retained Equipment**

With the intention of minimizing disruption to daily operations of the building and in keeping the project lead-time to a minimum, the Tenderer is allowed the option to retain and re-use the following equipment:

4.6.1 Guide Rails: As detailed in point 4.1 above

4.6.2 Counterweights: the existing counterweights can be retained and re-used, however it is a requirement that all guide-rollers and their stands be replaced with suitable high performance equipment. Should a 2:1 roped lift counterweight be retained, the successful contractor is to ensure that the counterweight diverter sheaves are removed, all bearings are to be replaced, the sheave is to be inspected by X-Ray and a certificate is to be issued to the Client (prior to the unit being returned to service) indicating that the diverter sheave is free from any structural or mechanical defects and that the diverter sheave is safe for re-use.

4.6.3 Pit equipment: any pit equipment including but not limited to; diverter sheaves, rope tension sheaves, car and counterweight buffers are to be fully reconditioned and certified as per the requirements for counterweight sheaves and bearings.

4.6.4 Landing Door Frames: Existing landing door frames are to be retained for all office tower lifts, the frames are Granite and form an integral part of the buildings foyer designs. Any tenderer who requires that these frames be removed or adjusted to suit the new installation will not be considered for this project. Tenderers are to confirm in writing that the offered product will be suitable to re-use the existing landing doorframes.

#### **4.7 Counterweight Safety Gear**

4.7.1 Counterweight safety gear is to be provided as specified, all units which are to be replaced and where the existing unit is fitted with counterweight safety gear, the replacement unit shall be the same as the existing.

**PART 4**

**SCOPE OF WORK SPECIFIC TO THE  
PROJECT**

## **MEDIUM RISE OFFICE TOWER LIFTS**

1. Full replacement, only the following items may be retained:
  - a. Guide Rails
  - b. Counterweight
  - c. Landing door sills
  - d. Car and Counterweight buffers
2. Provide a Destination Despatching type group control system
3. Provide AC Power Regenerative Drives
4. Retain all existing landing door frames
5. Removal of existing equipment
6. Include builders work cost and scope of work
7. One lift in each group of lifts to be configured with the necessary software and hardware as a Fireman's lift.

# GENERAL

## THIS APPLIES TO BOTH LIFTS

- ***Builders Work:***

Tenderers are to submit a list of builders work which is required as part of the installation of lifts and escalators together with the tender document.
- ***Scaffolding:***

All scaffolding, hoarding, boarding and barricading required during removal of existing equipment or installation of new equipment is to be included in the tender amount and erection and dismantling thereof shall be the responsibility of the successful bidder.
- ***Hoarding & Barricading of Works:***

It should be noted that Carlton Centre is a fully occupied and operational building, all works taking place in areas exposed to building occupants and the general public are to be enclosed by suitable, aesthetically acceptable temporary structures which will ensure that building occupants and the general public are not exposed to any danger. Prior to the commencement of any construction or installation of hoarding and barricading, a drawing indicating the structure and type of materials intended for use is to be submitted to the consultant for approval.
- ***Structural Changes:***

Tenderers are to submit a list of any changes, which will be required to the lift/escalator supporting structure to facilitate the removal or installation of the new equipment. The list of required changes is to be submitted together with the tender document. Should any structural changes be required for the removal or installation of lifts and escalators forming part of this tender, details of the changes are to be submitted to the Client or the Client's appointed representative in writing prior to the commencement of any related work.
- ***Lift and Escalator Management System:***

As part of the Tender, the cost for an integrated lift and escalator management system is to be included in the tender amount. The management system shall be a 'real time' system, which displays lift group activity, car positions, and lift and escalator status. The management system shall also allow remote control of lifts and escalators (shutdown, fire operation etc.) A full description of the offered management system is to be submitted together with the tender document.
- ***Setup and Test Equipment:***

After completion and final handover of the project, the contractor is to provide as part of the handover package, to the Client or the Client's appointed representative the following: A list of setup and adjustment parameters, passwords, test tools required for setup and adjustment, software required for setup and adjustment together with any required user licenses. This requirement is for all units, which are upgraded.
- ***Proposed Project Program:***

Tenderers are to submit together with the tender document, a proposed project program in Microsoft Project format. The proposed program is to indicate lead-times for manufacture, shipping, installation and commissioning for each group of lifts/escalators. The proposed program should be realistic and achievable. Preference will be given to tenderers who can provide the shortest but achievable lead-time.

- ***Compliance:***  
All complete units as well as any equipment supplied shall fully comply with the requirements of the Occupational Health & Safety ACT as well as any relevant SANS standard.
- ***Finishes:***

- Landing Doors: All landing doors and frames where required are to be hairline stainless steel with vertical grain.
- Car interior: all supplied lift car panels including doors are to be hairline stainless steel with vertical grain.
- Car operating panels: All passenger lifts, excluding those which are to be equipped with Destination despatching systems are to have 2 car operating panels; each panel shall have an LED display located at the top of the car operating panel. Goods passenger lifts shall have only one car-operating panel with controls for independent service etc. housed in a lockable sub-panel below the car-operating panel.
- Passenger lift car flooring: all passenger lift cars are to be supplied with a minimum 30mm recess to facilitate the installation of ceramic floor tiles.
- Goods lift car flooring: all goods lifts are to be supplied with durable Norament flooring.

Details of all standard finishes are to be provided at tender stage.

• **Scrap:**

All scrap, obsolete and salvaged material remains the property of the Client, all existing lift/escalator material which is to be removed to facilitate the installation of new equipment is to be handed over to the Client or the Clients appointed representative for disposal or removal from site.

# **TECHNICAL DATA: LIFTS**

## TECHNICAL DATA: LIFTS

Unit no's: 680480/1/2/3/4/5 (6 units)(JE5413 TO JE5418)

<b>General:</b>	
Unit No.	680480/1/2/3/4/5
Known As	No. 08, 09, 010,011,012,013
Location	Medium-Rise office tower
<b>Item</b>	<b>Specific Requirements</b>
Load	1816kg
Speed	4m/s
Shaft Width	2895mm
Shaft Depth	2600mm
No. of Stops	16
No. of Openings	16
Travel	129235mm
Pit Depth	5410mm
No. of Car Doors	1 per lift
Door Width	1219mm
Door Height	2133mm
Door Type	Two Panel Centre opening
Operation	Group
Machine Type	Gearless
Machine Room Location	Above Shaft
No. of Units	6
Number of landing Doors	16 Per Lift
Counterweight Safeties	Provide
Intercommunication Device	Provide
Shaft Lighting	Provide
Position indicators	In car and at all landings
Arrival Signals	Provide on all landings

<b>Item</b>	<b>Specific Requirements</b>
Machine:	Permanent Magnet Gearless
Drive system	AC – VVVF
Rated Speed	4m/s
Load	1840kg
Ascending over-speed protection	Provide
Emergency Lowering Device	Provide
AC Power Regeneration	Provide
Group Control	Provide Destination Dispatching System

