

CONTRACT DOCUMENTATION

FOR

THE REFURBISHMENT OF

TWO ELECTRIC PASSENGER LIFTS, HO90&91

AND

REPLACEMENT OF ONE HYDRAULIC PASSENGER LIFT, HO92

AT

GRENFELL TOWER

LANCASTER WEST ESTATE

LONDON W11

FOR

THE ROYAL BOROUGH OF KENSINGTON & CHELSEA

Butler & Young Lift Consultants Limited
Timber Hall
21 Timber Lane
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October 2004

L2508

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April 2004

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PART ONE

SCOPE OF THE WORK

THE LIFTS

DRAWINGS ISSUED

RETAINED EQUIPMENT

CONDITIONS OF CONTRACT MF/1

ANNEXES 1, 2, 3 AND 4

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Part One

1.0 SCOPE OF THE WORK

- 1.01 The scope of the works shall be for the complete refurbishment of one pair of duplex passenger lifts within Grenfell Tower, incorporating enhanced speed and car dimensions, plus the complete replacement of the hydraulic passenger lift which serves the Social Services offices at the lower levels of the Tower.
- 1.02 The lifts are located at Grenfell Tower, Lancaster West Estate, London, W11.
- 1.03 The works shall include all building, civil engineering and electrical works, plus other associated works necessary for the successful completion of the project, including the construction of a complete new pump room located at Ground Floor level for the Social Services lift.
- 1.04 Uninterrupted lift service to the Tower during the course of the works is of the utmost importance and special attention shall be given to the measures outlined in clause 1.3.3 and Part 2 of the specification in this regard.
- 1.05 Prior to the refurbishment of the selected first lift, the remaining lift shall undergo a comprehensive re-test as defined in Part 2A Clause 2A.75.
- 1.06 The lifts shall achieve full compliance with, BS5655, SAFed LG1, HASAW, BS7255 Safe Working on Lifts, EN81-1 and 2, The Lift Regulations, and any other appropriate statutory instruments.
- 1.07 The lifts shall integrate energy saving and efficiently operating equipment.
- 1.08 The specification is generically led, warranting full and free access to all design and operational parameters and rejecting proprietorial tooling for any equipment or systems.
- 1.09 All equipment shall be proven fit for purpose and shall be readily available to the UK lift industry as a whole, thus ensuring freedom of the maintenance market and a 25 year life span for the refurbished installations.
- 1.10 Parts Two, Three and Four plus Schedule 1 of Part Six of the tender documentation detail the requirements of the specification but a summarised schedule is given in Clause 1.1 on page 1/2.

1.1 THE LIFTS

1.1.1 TWO ELECTRIC PASSENGER LIFTS - HO90&91

Type	: Duplex electric passenger lifts
Capacity	: 12 person / 900Kg
Serving	: 21 floors, 21 openings
Levels	: Ground, Walkway and First to Nineteenth Floors inclusive.
Travel	: 62.75m
Control System	: Microprocessor duplex collective with full analogue devices, plus the facility for remote monitoring and firemans control.
Drive Machine	: Geared traction with energy efficient, variable frequency motor.
Speed	: 2.0 mps.
Car	: 1400mm wide x 1450mm deep x 2200high clear approximately. : Patterned stainless steel panels.
Doors	: Single panel side opening in patterned stainless steel 900mm wide x 2000mm high.
Architraves	: Stonehenge design with tapered vertical sections in patterned stainless steel
Sills	: Extruded manganese bronze.
Door Operator	: Power operated, variable frequency drive with variable speed control.
Passenger Protection	: Electronic multi beam detector.
Car Station	: Linished stainless steel faceplates incorporating the full range of Facilities for the Disabled: : Tactile identification of colour coded pushes, with audible response, to be half illuminance at all times, full illuminance when pressed. : Hands free autodialling unit with induction loop facility, in lieu of telephone, connecting direct to a nominated area when the alarm push is used.

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	: Scrolling position indicator, which shall also scroll messages viz 'Lift Returning to Ground Floor' etc.
	: Voice synthesiser announcing floor levels, door movement, messages etc.
	: Communication system to security office
Auxiliary Car Station	: Duplicating the full range of colour coded and audible car pushes.
Landing Push Stations	: Surface mounted stainless steel faceplates engraved with the floor level incorporating tactile pushes with audible response, to be half illuminance at all times and full illuminance when pressed.
Landing Indicators	: Within a surface mounted canted station at 1800mm from finished floor level incorporating a scrolling position indicator which shall also scroll messages viz 'Lift Undergoing Maintenance' etc. when the lift is being serviced.
	: The unit shall also incorporate vertically scrolling arrows to indicate direction of travel, plus a dual tone bleep system to advise the same when the lift arrives at the floor in response to a landing call.
Machine Room	: Above.
Shaft Construction	: Reinforced concrete.
Last Level Served to Soffit of Shaft	: 3950mm
Pit Depth	: 1550mm
Maintenance	: 12 months from handover of the final lift of the extended defects liability period.

Note! The specification shall be generically led, with component parts being generally available to the whole UK lift industry, thus allowing simple access to replacement parts in the future.

This will allow maintenance to be undertaken by any competent lift contractor for a minimum 25 year period.

1.1.2 ONE HYDRAULIC PASSENGER LIFT - HO92

Type	: Hydraulic passenger lift
Capacity	: 8 person / 630Kg
Serving	: 3 floors, 3 openings
Levels	: Ground, Walkway and First Floors Walkway for future service.
Travel	: 9.8m
Control System	: Microprocessor with full analogue devices, plus the facility for remote monitoring.
Drive Unit	: Variable frequency direct acting cantilever hydraulic system with accumulator.
Speed	: 0.63 mps.
Car	: 1100mm wide x 1400mm deep x 2200high approximately. : Patterned stainless steel panels.
Doors	: Single panel side opening in patterned stainless steel. : 800mm wide x 2000mm high.
Architraves	: Stonehenge design with tapered vertical sections in patterned stainless steel
Sills	: Extruded manganese bronze.
Door Operator	: Power operated, variable frequency drive with variable speed control.
Passenger Protection	: Electronic multi beam detector.
Car Station	: Linished stainless steel faceplates incorporating the full range of Facilities for the Disabled: : Tactile identification of colour coded pushes, with audible response to be half illuminance at all times, full illuminance when pressed. : Hands free autodialling unit with induction loop facility, in lieu of telephone, connecting direct to a nominated area when the alarm push is used.

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- : Scrolling position indicator, which shall also scroll messages viz 'Lift Returning to Ground Floor' Etc.
- : Voice synthesiser announcing floor levels, door movement, messages etc.
- Landing Push Stations : Surface mounted stainless steel faceplates engraved with the floor level, incorporating tactile pushes with audible response, to be half illuminance at all times and full illuminance when pressed.
- Landing Indicators : Within a surface mounted canted station at 1800mm from finished floor level incorporating a scrolling position indicator which shall also scroll messages viz 'Lift Undergoing Maintenance' etc. when the lift is being serviced.
: The unit shall also incorporate vertically scrolling arrows to indicate direction of travel plus a dual tone bleep system to advise the same when the lift arrives at the floor in response to a landing call.
- Pump Room : New to the rear of the shaft at Ground Level.
- Shaft Construction : Reinforced concrete.
- Last Level Served to Soffit of Shaft : 3320mm
- Pit Depth : 1300mm
- Maintenance : 12 months from handover of the final lift of the extended defects liability period.

Note! The specification shall be generically led, with component parts being generally available to the whole UK lift industry, thus allowing simple access to replacement parts in the future.

This will allow maintenance to be undertaken by any competent lift contractor for a minimum 25 year period.

1.2 DRAWINGS ISSUED

1.2.1 The following scheme design drawings are enclosed with the tender documentation:

L2508/1 - Proposed and Existing Arrangement
Typical Plan on Lift Shaft

- Map Reference TQ2380NE

W8584/A/01 - Proposed Pump Room For Hydraulic Lift
Rev C

W8584/A/02 - Proposed Pump Room For Hydraulic Lift
Rev C

1.3 RETAINED EQUIPMENT

1.3.1 Two electric passenger lifts - HO90&91

Guides and single riser of car guide brackets

Landing back boxes.

1.3.2 One hydraulic passenger lift - HO92

Complete replacement

- 1.3.3 During the refurbishment of the first of the two electric passenger lifts the following equipment shall be carefully dismantled and stored within the roof plant room area to be utilised in the event of the remaining lift malfunctioning.

Controller complete,
Lift motor,
Tacho generator,
Door motor and coupler,
Car operating panel,

A minimum of 10 sets of landing door equipment including:

Bottom shoes,
Rollers,
Upthrust rollers,
Coupling units,
Closers.

**GENERAL CONDITIONS
OF CONTRACT
MF/1**

Annexe 4

Rights of Third Parties

- 4.1 Save as expressly provided in clause (Annexe 4.2) of this Contract it is not intended that any party who is not a party to this Contract shall have the right to enforce any of the obligations rights or provisions contained in this Contract and any rights under the Contracts (Rights of Third Parties) Act 1999 are hereby expressly excluded.
- 4.2 The parties intend that this Contract may be enforced by the Royal Borough of Kensington and Chelsea Tenant Management Organisation Ltd pursuant to Section 1 (1) (a) of the contracts (Rights of Third Parties) Act 1999.

PART TWO A

LIFT SPECIFICATION

DUPLEX ELECTRIC PASSENGER LIFTS, HO90&91

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LIFT SPECIFICATION

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PART TWO A - DUPLEX ELECTRIC PASSENGER LIFTS, HO90&91

SPECIFICATION AND STANDARDS OF MATERIALS AND WORKMANSHIP

2A.01 Tenders

The Tenderer shall include for the supply of the whole of the products, equipment and materials in accordance with this specification and the whole of the fixing works necessary for the complete lift installations plus builders, structural, electrical and other associated works as detailed in the tender documentation.

The Tenderer shall visit the site to undertake a detailed survey in order to determine the full extent of the work required. No claims arising out of any misunderstanding or want of knowledge of the nature or extent of the work shall be allowed.

This specification shall be read in conjunction with the conditions of contract and any supplementary specification(s), schedule(s), drawings and other documents enumerated in the invitation to tender. In the event of any discrepancy between the clauses in this specification and any related document the Tenderer shall immediately inform the appointed Supervising Officer, (SO), to provide technical information.

In particular the specification shall be read in conjunction with Schedules 1, 2 and 3 which form the basis for the tender submission and which shall identify the equipment offered. Schedules 2 and 3 must be completed in their entirety and returned together with all other documentary information requested.

Should anything be omitted from this specification, which is fitting and usually considered necessary for due and proper completion of the work, the Tenderer shall verbally bring this to the attention of the SO prior to tender submission with confirmation in a letter prior to submitting the Tender return.

The Tenderer shall make due allowance in his tender return for undertaking the role of Principal Contractor as defined in the Construction (Design and Management) Regulations 1994, (as amended) (CDM).

This shall particularly include a detailed Health and Safety Plan with method statements and risk analysis based on the Contractor's own site surveys submitted to the SO 30 days prior to the site start date. Final copies, incorporating received comments, shall be provided to the SO 14 days prior to the start on site. Site copies, including a complete bound copy of the contract specification, shall be located within the machine room together with the site diary.

2A.02 Programme

The Tenderer shall submit a detailed bar chart programme and method statement for the whole works with the tender. The programme and method statement shall make due recognition of all project stages with the intent to minimise disruption and disturbance during the works.

The Contractor's staff and subcontractors shall carry photographic identification cards and shall wear attire having the company logo or name, throughout the contract programme.

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The Contractor shall make adequate provision for achieving all design and manufacturing works prior to commencing work on site. Should the SO be required to perform additional duties or to attend site due to matters that should realistically have been previously identified by the Contractor then any resultant charges by the SO shall be set off against the contract.

Grenfell Tower shall remain fully occupied throughout the project duration and the programme shall make due recognition at all project stages of the intent to minimise disruption and disturbance during the works, with the need for particularly disruptive and noisy operations to be fully co-ordinated with the SO.

Liquidated and ascertained damages shall be attributed to the programme.

Normal hours of working on this contract are 8.00am - 6.30pm Monday to Friday and 8.00am - 1.00pm Saturday.

The Tenderer shall allow for removal of the existing machine room equipment and the sitting of new during weekends, or as otherwise agreed with the SO, for both his lift and sub-contracting operatives.

Drilling, cutting or otherwise of the building fabric shall be programmed and agreed with the SO and shall be undertaken between the hours of 9.30am and 4.30pm Monday to Friday.

The residents of Grenfell Tower are faced with considerable hardship whilst a single lift only operates within a Tower of this height. The Tenderer is invited to propose methods of reducing programme times by alternative safe working practices and shall detail any such proposal in Schedule 2 of the tender return.

Maximum contract durations and proposed dates shall be as detailed below and whilst calendar dates may vary the actual weeks shall not be exceeded. The Tenderer shall advise the preferred programme and achievement thereof within the tender return:

Contract Award	3 rd September 2004	
Re Test Second Lift	6 th December 2004	(2 weeks)
Design, Manufacture, Procurement and Delivery, inc Xmas Shutdown	3 rd January 2005	(17 weeks)
Site Possession, 1 st Lift	3 rd January 2005	
Handover 1 st Lift	17 th June 2005	(24 weeks)
Running In	24 th June 2005	(1 week)
Commence 2 nd Lift	27 th June 2005	
Handover 2 nd Lift	12 th December 2005	(24 weeks)
Running In	19 th December 2005	(1 week)

Note! Each phase includes witness testing, commissioning and snagging.

2A.03 Products, Equipment and Materials

The Tenderer shall clearly identify the products, equipment and materials offered by way of specific part numbers and any other information necessary in Schedule 2. In all cases products offered are to be generic and non-proprietary with spares and support readily available to persons other than the original supplier or installer.

Specialist equipment or data that is required to maintain continuity of service and performance characteristics or to access the equipment shall be provided, with full training, within the Contract and shall **UNEQUIVOCALLY** become the property of The Royal Borough of Kensington & Chelsea Tenant Management Organisation Ltd.

If there is any doubt over the compliance of specific items then further details of approved products for this Contract can be obtained from the SO, on request, and the Tenderer shall be deemed to have obtained any such details before submitting the tender return.

Products and equipment approved for use on previous contracts shall not necessarily be approved for use on this Contract and the SO may require the Tenderer to submit, for approval, samples of products and/or equipment.

The type of products offered shall have been in commercial operation for at least two years prior to the tender and shall have a substantial record of reliability whilst operating on continuous duty and under conditions similar to those which shall apply on this project.

The full technical details of any products or items of equipment must be available to the SO at tender stage and, if so requested, the information must be provided within 3 working days.

2A.04 Cost of Inspecting Products, Equipment and Materials

The SO shall have the power to recover from the Tenderer, by deduction or otherwise, the cost of testing any products, materials or items of equipment which the SO requires to be tested and which, when tested, are found to be unsatisfactory.

2A.05 Regulations

It shall be understood that the equipment specified and that the characteristics of the site, particularly dimensions and clearances, may not fully comply with current British and European Standards and these shall be qualified by the Tenderer in the tender return.

Although it is recognised that the existing structural constraints shall prevent full compliance with harmonised European Standards, the requirement is for the lift installation to include all of those items and features that do comply, as far as is reasonably practicable.

The products, equipment, materials and installation shall comply with all relevant statutory instruments and regulations and in particular those listed in Clauses 2.06 and 2.07.

The successful Tenderer shall be required to obtain all necessary authorisations and derogations from their Notified Body and the DTI and due allowance for any costs shall be made within the tender.

Where the existing structural constraints, particularly in the lift pit, at the top of the lift shaft and within the machine room prevent the necessary clearances being obtained for the protection of maintenance and inspection personnel, alternative means or safe systems of work shall be provided to give equal protection and identification of these shall be detailed with the Tender return.

Where the premises concerned are not subject to such statutory controls they shall, for the purpose of the application of this specification, be deemed to be subject to such statutory controls.

The tender shall be based on the regulations current three months prior to the date for return of the tender. If these regulations are amended or new regulations enacted that shall affect the works after that date, the Tenderer, and subsequently the Sub Contractor, shall immediately inform the SO in writing.

2A.06 Design Standards

The equipment and installation shall conform to this specification and to the relevant British Standards including Codes of Practice and, in particular, BS 5655, BS 7255 and EN81-1. Where this specification differs from those standards and codes, the provision of this specification shall prevail.

Reference to British Standards and Codes of Practice shall mean the edition current three months prior to the date for return of tenders. A certificate of compliance with the relevant British Standards shall be provided to the SO on request. Any changes during the course of the contract in the relevant British Standards and Codes of Practice shall be brought to the attention of the SO by the Contractor.

It shall be understood that the existing characteristics, particularly dimensions and clearances, may not comply with current British Standards and these shall be qualified in the tender return.

The lift is required to function under the following conditions without prejudicing the overall performance:

1. Temperature between +5°C and +40°C
2. Dust or dirt laden atmosphere subject to the effects of moisture.
3. Electrically noisy supply and atmosphere.
4. Mechanical vibration.

Unless stated otherwise in this specification the safety factor shall be 5 or greater for all parts of the equipment. The safety factor shall be calculated on the basis of maximum imposed loads and calculations shall be provided to the SO should they be requested.

2A.07 Related Documentation and References

This tender documentation shall be read in conjunction with, and its requirements are in addition to, the general conditions of contract and any drawings and other documents issued with it and listed in this invitation to tender and as set out below.

Health and Safety at Work etc. Act 1974 (HSWA)
Disability Discrimination Act 1995 (DDA)
Management of Health and Safety at Work Regulations 1999 (MHSWR)
Workplace (Health, Safety & Welfare) Regulations 1992 (WPR)
Provision & Use of Work Equipment Regulations 1998 (PUWER)
Lifting Operations & Lifting Equipment Regulations 1998 (LOLER)
Reporting of Injuries, Diseases & Dangerous Occurrences Regulations 1995 (RIDDOR)
The Lifts Regulations, 1997
Factories Act 1961
Electricity at Work Regulations (H&SE).
Offices Shops and Railway Premises Act 1963
LG1 SAFed Regulations
PM26 - Safe Working at Landings
Control of Pollution Act 1974
The Building Regulations
The London Fire Brigade
The London Electricity Board
The Building Industry National Codes of Practice for Passenger Lifts
Supply of Machinery (Safety) Regulations 1992
Electromagnetic Compatibility Regulations 1992
I.E.E. Regulations for Electrical Installations, current edition
CDM Regulations 1994, Managing Construction for Health & Safety
CIBSE - Guide D, Transportation Systems in Buildings
COSHH - Current edition
BS 2633 - Arc welding of ferritic steel
BS 308 - Drawing practice.
BS 3939 - Graphical Symbols for electrical power, telecommunications and electronic diagrams.
BS 4568 - Steel conduits and fittings.
BS 4568 - Metric steel conduit
BS 4678 - Cable trunking.
BS 476 - Fire tests on building materials and structures.
BS 5420 - Degree of protection of enclosures for LV switch gear.
BS 5514 - Overload requirements
BS 5536 - Preparation of technical drawings for micro filming.
BS 5588 - Fire Precautions in the design, construction and use of building
BS 5655 - Lifts and Service Lifts.
BS 5674 - Thermosetting armoured cables
BS 5750 - Quality management system.

- BS 6207 - MICC Cables
BS 6231 - PVC insulated cables
BS 6977 - Insulation for lifts and for other flexible connection.
BS 7211 - Thermosetting cables for electrical supplies
BS 7255 - Safe Working on Lifts
EN81-1 - 1998 Safety Rules for the Construction and Installation of Lifts.
EN81-70 - 2003 Accessibility to Lifts for Persons Including Persons with Disability
BS 7671 - Requirements for Electrical Installation
BS ISO 9000, 9001, 9002, 9003 - Quality Assurance
BS EN 60947 - Specification for low voltage switchgear and control gear.
PREN 1050 - Safety of machinery risk assessment
LPS 1207 - Loss prevention standard.

2A.08 Drawings to be Provided

All drawings provided shall be CAD generated by means of AutoCAD Release 14, AutoCAD LT2000 or equivalent software.

Drawings shall follow BS 304 drawing convention and shall be appropriately scaled to a conventional size to best fit the paper i.e. 1:5, 10, 20, 25, 50 or 100 on A4, A3, A2, A1 or A0 paper, to clearly provide the intended information to be given.

1. General arrangement indicating weight and position of all equipment, with loads imposed on the building structure.
2. Details of all cutting away, plinths, channels, apertures and concrete bases, complete with all dimensions in respect of the building structure or lift well and all other builders, electrical or associated requirements.
3. Machine and raft details.
4. Details of the landings, incorporating sill, door, entrance and architrave/trim construction.
5. Construction of landing hoardings, protected areas and Walkway storage areas.
6. Landing push station and other fixtures.
7. Details of car, sling and platform construction.
8. Details of lift car design incorporating hinged car stations and finishes schedule.
9. Details of all engraving to the Royal Borough of Kensington & Chelsea Tenant Management Organisation Ltd requirements.
10. The Contractor shall produce a montage incorporating a colour wash isometric drawing of the proposed lift car and samples of the car and landing finishes as agreed by the Royal Borough of Kensington and Chelsea Tenant Management Organisation Ltd, for selection by residents vote.

11. All electrical details relating to existing and new supplies, terminations within the machine room and ratings relative to full and no load, fuses and any other calculations deemed necessary, including operating temperature range and heat output of the equipment.
12. All drawings shall incorporate a finishes and components schedule.

Four copies of drawings 1-4 shall be submitted to the SO for consideration and comment within four weeks of contract award and, allowing one week for comment by the SO, four copies of the as amended drawings shall be issued within a further one week of receipt by the Contractor.

The remaining drawings shall be submitted two weeks after 1-4 with amendments to follow as above.

2A.09 Drawings and Maintenance Manuals on Completion

The Contractor shall provide the following drawings, generated as in 2.08, in accordance with this specification and also a complete maintenance manual as detailed below:-

1. 'As fitted' record drawings.
2. Details of the car and landing door construction and arrangement.
3. Straight line and schematic wiring diagrams for the lift installation, including all electrical apparatus, as wired and fitted. The diagrams shall show the arrangement and marking of all electrical connections and be complete with key reference to symbols and abbreviations used.

One set of the as fitted electrical drawings shall be encapsulated in plastic and wall mounted within the machine room using swivel type brackets.

All electrical drawings shall be to BS 308 using electrical symbols to BS 3939 and be microfilm quality in accordance with BS 5536. Three sets of paper print drawings will be required plus one complete set of microfiche drawings to the system adopted by The Royal Borough of Kensington & Chelsea Tenant Management Organisation Ltd.

4. A description of the scope, purpose and manner of working of each system, product or equipment forming part of the lift;
5. A detailed description of circuit operation, including the supervisory logic and motion control;
6. Data on the setting up and testing of the lift equipment;
7. Instructions for dealing with fault diagnosis and remedial action for each system;
8. Instructions detailing functions and usage of any hand held diagnostic or test equipment relating to the controller and floor setting system or door operator.

9. Planned maintenance programme.
10. Any precautions necessary for ensuring Health and Safety and avoidance of misuse together with details of all emergency procedures.
11. Copies of all certificates and inspection reports relating, but not limited, to
 1. Mill certificates for the finished stainless steel used in fabrication of the cars, doors, architraves and other elements of the project.
 2. All type testing and CE marking,
 3. NICEIC tests,
 4. Tests to BS5655 Pt 10,
 5. Lifting beam tests,
 6. Suspension and governor ropes,
 7. Clause 2.70 of the specification, Painting and Cellulosing,
 8. Manuals by specialist subcontractors.
 9. The names, addresses and telephone numbers of the suppliers of all major components;
 10. Spare parts lists for components that normally need to be replaced due to fair wear and tear, together with those considered essential to maintain the lift in service, e.g. certain printed circuit boards.

The lift shall not be deemed to have been accepted nor achieved practical completion until the drawings, maintenance manuals and Contractors Health & Safety File in accordance with CDM regulations have been received and approved.

After submission and approval of the draft manual by the SO, three copies of hard backed maintenance and operating manuals shall be provided.

2A.10 Proprietary Products

Proprietary products, when agreed with the SO, shall in general be inspected and tested against the manufacturer's specifications and shall be furnished with a certificate of conformity or a type test certificate.

2A.11 Controller: General

The control of the lift shall be duplex full collective and fully automatic arranged for operation by passengers without an attendant and serving each floor. It shall incorporate power operated car and landing doors and indication circuits for:

1. Car position,
2. Call acceptance,
3. Lift out of service,
4. Lift undergoing maintenance,
5. Lift on car preference,
6. Electronic hall lanterns,
7. Lift overloaded,
8. Lift under firemans control.

The micro processor shall have 'field proven' components.

Floor selection shall be via a pattern generator encoder with lift position reference holes in a stainless steel tape to determine floor levels, slowing and stopping zones.

The momentary pressure on any number of car or landing pushes, activating call requirement, shall be stored in the system until answered.

The car shall answer the calls in the order in which the landings are reached and once the car has started travelling in one direction it shall answer the car and landing calls for that direction only. The lift car shall not reverse until it has answered the highest or lowest outstanding call.

With no calls on the control system, one lift shall return and park at the Ground Floor, the other lift shall remain at the last floor served.

When the car stops at the required floor in response to a car or landing call, the doors shall automatically open and automatically close after a time interval. This time interval shall be shortened by the operation of a floor push in the car.

Should a passenger wish to re-open the door, pressure on the 'Door Open' push in the car station shall reverse the motion of the doors, providing the lift has not started.

2A.12 Controller: Microprocessor Requirements

- ## 1. Enclosures

The control equipment shall be mounted in a sheet steel enclosure, with lockable hinged panels for front access only. The controller shall have a clear space of 150mm to the rear for the unforeseen event that rear access may be required in the future.

2. Cable Entry

All cabling associated with lift control etc. shall be routed through entries in the base of the cabinet.

Any alternative method shall have the same effect but must be approved by the SO.

3. Panel Wiring

Panel wiring shall not support combustion, shall be low smoke emission and shall comply with BS 6231. Positive fixing of cable terminations shall be with purpose made clamps or pinch type terminals or by use of crimped cable tags each with an efficient locking device.

Live terminals connected to 240V or higher shall be adequately shielded to allow for safe live working conditions.

All control relays, contactors and safety circuits shall be 240V a.c. and all car and landing push feeds shall be 100V d.c.

No control circuit voltage operating in conjunction with external controller equipment shall be less than 100V.

4. Micro Computer Protection

The micro computer section of the controller shall be separately enclosed in the control cabinet such that the inadvertent connections of high voltages or physical damage from falling objects is prevented.

All incoming signals shall be via 100V d.c. terminals through filters and opto isolating circuits in the protected area.

5. Coils

All relay and contactor coils shall be continuously rated. Neither telephone type relays nor economy resistors with AC contactor coils shall be used.

6. Thermistor motor protection

Thermistor motor protection and associated controller equipment shall be incorporated in the control panel and shall be fully adjustable to suit the size conditions.

7. Heat Dissipation

Any components which may generate significant quantities of heat shall be external to the controller but enclosed and ventilated.

8. Forced Ventilation

If the controller uses forced ventilation then any inlet vents shall be protected by removable filters with a minimum life of 12 months. Failure of the fan shall not cause overheating of the lift equipment.

9. Micro Section Ventilation

The micro computer section of the controller shall have cooling and if this utilises forced ventilation then any inlet vents shall be protected by removable filters with a minimum life of 12 months. Failure of the fan shall not cause overheating of the lift equipment.

10. Environmental Temperatures

The micro computer section shall be capable of operating in environmental temperatures ranging from +5 to +40 degrees centigrade.

11. Input and Output Isolation and Protection

All input and output lines shall be so protected as to prevent the micro computer controller from being damaged. This means that all printed circuit boards, wiring on the micro computer area, terminating pins, bus lines etc. shall be physically protected from inadvertent connection to high voltages.

All input and output lines must be capable of withstanding short circuits and the application of up to 500v. Such application may result in input and output components e.g. fuses, protection resistors, diodes etc., being damaged and hence the equipment shall be designed to allow their rapid identification, removal and replacement.

All outputs shall incorporate interface relays capable of switching 5 amp at 250V d.c.

All circuit board edge connections shall be plated gold and all input/ output floor plug-in boards shall be interchangeable.

12. Identification

All parts of the equipment shall be adequately identified by permanent labels corresponding to designations on the wiring diagrams, in particular:

1. Terminals
2. Wiring by way of sleeves at all terminations
3. Equipment items
4. Card frame positions

13. Wiring Convention

All wiring shall be identified and identification sleeves, in compliance with the wiring diagrams, shall be provided at cable terminations. All specific computer wiring shall be identified in a different colour or style to the conventional wiring. A list of wiring codes, mnemonics and symbols shall be posted in the machine room.

14. Symbols and Abbreviations

A key to any abbreviations and symbols shall be fixed to the inside of each enclosure.

2A.13 Controller: Instrumentation

1. Indicators

Indicators shall be provided on the controller showing:

1. Car position,
2. Hall calls accepted,
3. Lock status,
4. Car direction up or down,
5. Car "In service",
6. Car door status open, closing, closed, opening,
7. Doors obstructed, doors nudging,
8. Car overloaded,
9. Individual board power supply,

All input and output signals shall have LED indicators,

2. Pushes or Switches

Pushes, switches or other suitable means shall be permanently provided on the controller panels in the machine room to allow:

1. Hall call registration.

LED indication shall be provided for calls registered.

3. External Indicators

Provision shall be made for:

1. Hall call acceptance.
2. Call acceptance and half illuminance of landing pushes.

4. Mechanical Counters

A six figure mechanical, non resettable, digital trip counter shall be provided to record the number of journeys for the lift.

5. Event Recorder

The following shall be recorded in the format of time marker, event type, intervals in days since the last identical event, floor number/other relevant data and number of occurrences. It shall be possible to store a minimum of 24 events.

1. Memory fault/self test result,
2. Programme fault,
3. Switch-on reset sequence,
4. Primary safety circuit failure,
5. Door close protection fault,
6. Door open protection fault,
7. Landing door interlock not made up,
8. Car door interlock not made up,
9. Start failure,
10. Door open failure,
11. Lift stopped outside door zone,
12. Hall call failure (no riser power supply),
13. Car call failure (no power supply),
14. Failure to complete journey in "double time",
15. Transfer timer time out,
16. Car overload,

17. Lift alarm operated,
18. Opening of locks when running,
19. LIS signal true,
20. Shutdown after three successive attempts to start,
- 21-24. Provision for four further event types defined by the SO.

Information on additional faults that may be recorded shall be supplied with the tender documents.

The event recorder shall be capable of examination without affecting the normal lift control function or the continued logging of events.

2A.14 Controller: Duplex Lift Control Logic

- ### 1. Controller Function

The control system shall be capable of independently controlling two cars.

- ## 2. Type of Control

The control of the lift shall be duplex fully collective with automatic powered door operation.

- ### 3. Call Acceptance

All call acceptance indicators shall be driven by the computer and the information path is as follows: call registration push pressed-input to computer programme - recognition and acceptance - output by computer to call acceptance indicator.

- #### 4. Hall Call Cancellation

The registered hall call shall be cancelled and the hall call push illumination shall be extinguished before or at the stopping of the lift at floor level.

- ## 5. Door Reversal

Door reversal shall be achieved by constant pressure being applied to the car or landing door open push.

- ## 6. Parking Floor/Sequence

When idle, one lift shall return to the Ground Floor and remain with the doors closed, whilst the other lift shall remain at the last floor served.

- ## 7. Maintenance Control

Car top maintenance control is required on each lift.

8. Firemans Control

Firemans Control is required on each lift.

9. Double Journey Counters

A timer shall be set every time a lift journey is commenced which times out after a duration equal to twice the elapsed time of one full travel journey. The motor shall be switched off and locked out if it continues to run subsequent to the expiry of this elapsed time.

This protection device shall not be operative when the lift is switched to inspection.

10. Adjustment of Timers

Adjustment of all timers shall be possible and their values shall be agreed by the SO.

11. Event Recorder, Supply and Battery Backup

The event recorders shall be provided with a battery back up capable of a minimum of 30 days. This shall be mounted on the printed circuit board.

Alternatively, a limited 8 hour battery back up may be offered on the PCB with an external feed from a battery supply capable of at least 30 days operation.

12. Graceful Degradation

In the event of a malfunction which does not result in the lift becoming "out of service", e.g. landing push supply failure, stuck push, doors jammed at a floor etc the lift shall continue to give a reduced service. The controller shall enter the failure in the event logger and shall continue to serve the building in a degraded fashion, stopping at all floors in an up and down mode.

13. Micro Computer Self Tests

The micro computer shall regularly run diagnostic checks on the memory functions, input and output circuits and run a programme test. Any errors shall be logged in the event recorder.

14. Diagnostic Aids

The controller shall provide diagnostic aids for use in the setting up of the lift to incorporate, but not be limited to:

1. Door times,
2. Call indicator for car and landing,
3. Position and direction indicator.

15. Initialisation

Whenever power is connected to a controller the micro processor shall go through an initialisation routine, clearing all hall call and car call registers and all status registers. Following this zeroing procedure the micro computer shall set all timers to preset default values.

16. Automatic Position Checking

The terminal floors shall be used by the controller to check the correct floor value. Any error found shall automatically cause the lift to travel to the floor level designated for resetting.

17. Stuck Push Protection

The controller shall have the facility to recognise a stuck hall or car push and shall ignore the signal after a pre-determined interval.

18. Programme Examination

The computer programme shall not be accessed, examined or altered within the machine room without the use of special equipment.

19. Overload Indication

Provision shall be made to incorporate a car overload device which shall incorporate a buzzer.

20. Lift "In-Service" Signal

The micro computer will regularly check that the lift is "In Service" and provide an active output signal suitable for connection to a monitoring network. The lift shall be recorded "out of service" should it fail to respond, if the doors fail to close or if the doors are obstructed for a period in excess of 90 seconds even if the lift subsequently continues to be in service.

1. Safety chain broken
2. Alarm operated

21. Interlocks

The door open and door close contactors shall be electrically and mechanically interlocked

22. Auto Re-start

In the event of a power failure, or whenever the lift is switched off, the controller shall automatically restart on the restoration or re-connection of the power supply and cause the lift to move from its static position.

When the lift encounters a floor with auto position reset, the floor value in the controller shall be reset and normal lift operation shall resume.

2A.15 Controller: Variable Frequency Vector Drive Power System

1. The speed controller shall be mounted within the controller enclosure with all PCBs and terminals easily accessible.
2. The power system shall be variable frequency Vector control, closed loop with feedback from the hoist motor supplied by a quadrature bi-phase pulse tacho generator.
3. The regulator shall be a digital drive system that shall control a low slip, single speed a.c. motor by controlling the currents affecting the motor's torque and flux producing components.
4. The regulator components shall accept 3 phase a.c. power, and provide rectified, then inverted, 3 phase a.c. power output controlled by a signal/torque/flux processing section.
5. Braking shall be achieved by absorption of the lift kinetic energy via the d.c. bus with surplus energy being absorbed by the use of dynamic braking resistors switched by use of a dynamic braking module. The lift shall reduce to zero speed at floor level to give an electrical stop.
6. The regulator shall incorporate a monitor parameter unit to allow values of output current, output frequency, slip frequency, d.c. link voltage, motor speed and torque demand to be monitored in real time. The monitor shall have the facility to access the regulator fault codes to allow on site fault finding.
7. The thyristor bridge shall be adequately rated for maximum current with a PIV not less than 1200V.
8. Floor level accuracy shall be consistent at no load or full load to +/- 6mm.
9. Complete circuit diagrams of drive shall be incorporated in both the machine room schematics and manuals.
10. The slow down of the lift at terminal floors shall be achieved by electronic means.
11. The switching of power by contactor to the hoist motor shall be commutated with the thyristor turn on and turn off.
12. Safety guidelines shall be to the British Standard for VF controllers. Where the power electronics are located on printed circuit cards the removal of any card or charts shall apply the brake if the lift is moving or shall prevent the lift from starting a journey. Use of error tracking during a journey to shut down the lift to a fail-safe condition is acceptable.
13. Re-levelling shall be incorporated.

14. Inspection speed to be 0.4m per second and shall be capable of moving the lift throughout travel on a continuous up and down basis for not less than 30 minutes.
15. The motor of any pressure fan shall be started on motor over-temperature.
16. All relay and contactor coils shall be continuously rated. Neither telephone type relays nor economy resistors with AC contactor coils shall be used.
17. The brake switch incorporated in the winding machine shall cause the pickup current of the brake to be reduced to half value, by inserting an appropriate resistor. The natural response time of the brake shall be decreased by placing a resistor in series with the brake coil, which shall be wound for 100 VDC.

2A.16 Controller: Door Operator

The door operator control circuits shall operate the doors in direct response to the selected car and hall calls and shall provide for the following features:

1. Provision to operate the AC variable frequency door motor from the car top maintenance control at any position in the shaft.
2. The inclusion of circuits to connect to a positively operated switch that shall make up only when the door operator is in the fully closed position. The switch shall be incorporated into the car and landing door lock circuits.
3. If the car or landing door contact fails to make up within 10 seconds after the door close cycle initiation, then a door open cycle shall commence, whether the lift is committed to a journey or not.
4. Operation of the door close protection timer shall cause all car and hall calls to be cancelled.
5. Normal lift service shall be restored when a hall call is registered, thus immediately initiating a door close cycle.
6. Operation of the door detector shall initiate a door open cycle.
7. A door open push shall be provided to provide door reversal.
8. Failure of the lift to start its journey due to the doors being held shall cause the hall call to be cancelled after 40 seconds elapsed time.
9. The door operator logic circuits shall be so arranged that operation is not dependent upon a single or secondary circuit element. Failure of such elements shall not cause the doors to remain in the open condition.
10. Care shall be taken to ensure that all wiring and terminal block positioning associated with the lock circuits and safeties to and from the door operator is such that no possibility of short circuits due to fracture of terminals, moisture, etc., can take place.

2A.17 Rubber Insulating Mats in Machine Room

The Contractor shall provide permanently secured rubber insulating mats to the front of the controller and all switchgear.

The mats shall be full width of the relevant equipment and at least 900mm in depth with each mat rated to insulate against 11kV as a minimum each mat clearly displaying a certifying notice.

Where one side of the rubber mat is fluted or profiled, this shall be laid against the floor where the mat shall be retained within a non-conducting periphery trim should the fitting of the mat potentially create a tripping hazard.

2A.18 Lift Machine: Electric Traction

1. Winding Gear Unit

The whole of the winding gear unit including the motor, worm reduction gear, traction sheave, brake and pedestal bearings shall be mounted on continuous bed plate of cast iron or steel construction to form a completely self contained unit.

Should any part of the winding gear unit require dismantling for delivery purposes, reassembly shall be carried out by the manufacturer or his nominated specialist company, not the Contractor.

The design and position of the unit within the machine room shall be such that expendable items within the unit can be replaced without having to move the gear.

The gear shall be rated for 240 starts per hour.

2. Worm Reduction Gear

The winding gear shall be of the worm-reduction type consisting of a steel worm cut from high tensile forged steel, solid meshing with a worm-wheel consisting of a centrifugally cast phosphor bronze rim, shrunk on and securely fitted to the machined cast iron centre hub. Both worm and worm-wheel shall be accurately cut to ensure smooth running and shall have adequate shearing and torque qualities.

The reduction gear shall be contained in a non-porous, cast iron, oil-tight case, with all bearing surfaces automatically lubricated from the oil bath.

A visual oil gauge shall be provided. The oil temperature rise shall under no circumstances exceed 40°C and a label shall be affixed to the gear case to indicate the manufacture, type and quantity of oil used.

All bearings shall be of the renewable sleeve ball or taper roller pattern except when overhung pulleys are employed, in which case roller bearings shall be provided.

The centre distance of the worm gear shall not be less than 37.5% of the effective diameter of the traction sheave.

3. Traction Sheave - general

The traction sheave shall be of the vee-type manufactured from cast iron with 210-250 Brinell hardness and shall be accurately turned and grooved to grip the steel wire suspension ropes. The rim shall be bolted to a flange on the sheave so that the rim may be readily replaced.

The traction sheave diameter shall not be greater than 1.5 times the diameter of the worm-wheel with the minimum effective diameter of the traction sheave not less than 47 times the diameter of the rope it supports.

An outboard bearing shall be provided for the traction sheave which shall be lubricated automatically from an oil bath.

4. Diverter Sheave

The diverter sheave shall have a minimum diameter of 550mm and shall be installed in the machine room to divert the ropes to suit the application.

The sheave shall be manufactured from cast iron with 210-250 Brinell hardness and the minimum effective diameter of the wheels shall not be less than 40 times the diameter of the rope it supports.

Ball or roller bearings shall be used on all sheaves.

5. Brake

The lift machine shall be fitted with a self centring electro-mechanical brake, so arranged to be applied automatically on supply failure and to be capable of bringing the lift to rest under conditions of maximum load and then holding the lift firmly in that position.

The brake shall comprise two cast iron arms, lined with asbestos free brake shoes, that shall act upon the coupling between the motor and worm reduction shaft and which shall be applied by means of a spring in compression. Provision shall be made for adjustments of the brake and ease of removal of the arms for renewal of the brake linings.

The brake shall be released by a direct current operated solenoid and resistors shall be wired in parallel with the coil to smooth the operation.

2A.19 Hoisting Motor: Variable Frequency Vector Drive

1. The hoist motor shall be single speed, 4 or 6 pole, with characteristics of high pull out torque and low slip NEMA B or D type. It shall be dynamically balanced and quiet running and the minimum duty rating shall be 240 starts per hour.

2. If a pressure fan is provided, failure of the fan shall not allow damage to the motor windings due to excessive heat build-up.
3. Thermistors shall be embedded in the stator windings to give protection against overheating.
4. The hoisting motor shall be fully compatible with the specification of the regulator manufacturer, be insulated to Class F, be of drip proof construction and shall bear name and data plate of the maker.
5. The maximum values of start and run current shall be provided with the tender return and, if requested, Tenderers shall provide the design calculations to support their figures.
6. Test certificates for 'complete' tests as set out in BS 5000, Part 99, and BS 4999 (incorporating additional tests for hoisting motor starting torque as a percentage of the full load torque) shall be submitted prior to delivery of the motor to site.

Note: Compliance of the machine and motor with tests of the maker shall not relieve the Contractor from the responsibility of providing a machine capable of performing under all normal working conditions and satisfying the additional tests as set out in this specification.

2A.20 Winding Gear Unit Raft

The winding gear unit raft shall be mounted on rolled steel joists that shall be supported by an independent rolled steel joist assembly, the whole assembly supported by means of the existing concrete plinth and walls. The joists shall be of sufficient length such that bearing in the flank wall of the shaft is achieved.

All steels utilized for the raft assembly shall be a minimum of 203mm x 203mm section weighing 46Kg / m².

2A.21 Isolation

The completed lift installation shall be designed to ensure quiet operation and sound isolation shall be provided to reduce the transmission of any noise or vibration to the building fabric and structure.

Machine isolation shall be positioned between the winding gear unit raft and the support steelwork.

2A.22 Emergency Hand Winding Operation

The machine shall be provided with a hand winding wheel which shall be smooth rimmed, spokeless and of lightweight construction. If it is removable, it must be an accurate fit on the shaft and, when removed, the motor shall be fitted with a shroud.

2A.23 Hand Operation Floor Zone Indicator

Provision shall be made in the machine room for indicating the position of the lift car with respect to each landing when hand-winding is being undertaken by authorised personnel. This shall only be operative when the power supply is switched off and the lock circuit shall not be used to provide the feature.

The Contractor shall provide an automatic and self-contained charger unit to supply both the handwinding position indicator and the buzzer assembly which, in the event of supply failure, shall be maintained by the unit for a minimum of three hours.

The position indicator and buzzer shall operate when the car floor is no more than 25mm from the landing level. The unit shall be clearly visible and audible from the machine and shall be operated by a switch mounted on the front of the controller enclosure.

Durable, clear and precise instructions, encapsulated in plastic, on the use of the above together with the emergency release procedure shall be fixed on the wall adjacent to the machine and to the controller.

2A.24 Auxiliary Stop Switch

The switch shall be of the metal clad, double-pole, bi-stable two way type, totally enclosed and readily accessible adjacent to the machine. When the switch is thrown to the 'STOP' position it shall cause the lift to stop and prevent the lift being started until the switch is returned to the 'RUN' position.

2A.25 Overspeed Governor: Bi-directional

The overspeed governor shall be sealed for the respective tripping speed specified and shall incorporate a test groove to provide means for random checks to prove the governor operating speed.

The governor shall be fitted with electrical contacts which shall open the motor and brake circuits in the event of overspeeding in either direction. A further increase in speed in either direction shall mechanically trip the governor and cause the safety gear to operate.

The breakage or slackening of the governor rope shall cause the motor to stop and the brake to be applied by means of an electric safety device.

If not totally enclosed the governor shall be fitted with a guard that shall have a duplicate dataplate fitted to the uppermost section of the guard.

The governor tension weight shall be secured to the lift pit such that it shall withstand the force imposed when the safety gear operates in the up direction under no load conditions at the mechanical tripping speed of the overspeed governor. The governor tension weight shall be fitted with a rope guard.

2A.26 Guides and Guide Brackets

The Contractor shall ensure that the cross section of the 'T' section guide rails and the rail bracket spacing are calculated for the size and weight of the lift car plus load. A copy of the calculations shall be submitted to the SO for comment within three weeks of contract award.

One set of car guides plus the counterweight guides shall be re-located to suit the new condition.

The Contractor shall plumb and mark out the shaft to suit the fixings required for the guide brackets generally in accordance with the drawing L2508/01 and in so doing shall provide all bracket fixing anchorages.

Where guide bracket fixing anchorages are to the masonry fabric of the building chemical fixings shall be used

The Contractor shall plumb and bone the guides to ensure that they are vertically aligned, and shall advise the preferred method with the tender return. Once all plumbing and boning has been completed, any bracket fixing studs shall be cut off to provide a thread protrusion of not more than 10mm, dressed to eliminate sharp edges.

Tram lining is not acceptable and the Contractor shall leave the boning lines in place for witness inspection by the SO.

The guides shall be secured to channel steels in the lift pit and all guides, sole plates and fixings shall withstand the force imposed when the safety gear operates under full contract load.

2A.27 Roller Guide Shoes Assemblies

The assemblies shall be designed such that in the event of spring, bearing or tyre failure a keeper plate shall ensure that the car or counterweight shall be retained within the guide rails.

The top of the car roller guide shoes shall have a protective cover of such design that it will adequately support the weight of 100kg at any point without causing permanent deformation or damage. The area shall be flat, smooth and without tripping hazards.

Adjustments shall be made by means of slotted apertures in the mounting assembly and by means of adjustable spring pressure to the rollers which shall have a minimum diameter of 150mm to the car and 80mm to the counterweight.

2A.28 Buffers

The car and counterweight shall have energy dissipation buffers.

An electric switch shall be fitted to stop lift service on compression of the buffers and the switch require a manual reset following compression and return of the buffer to the normal position.

2A.29 Pit Ladder

A galvanised, flat tread, mild steel ladder with handholds shall be provided to give ease of access to the lift pit in a position and to a design to be agreed with the SO.

2A.30 Pit Stop Switch and Shaft Access

The two pit switches shall be of the metal clad, double-pole, bi-stable two way type, totally enclosed and positioned away from the lift car. When a switch is thrown to the 'STOP' position it shall cause the lift to stop and prevent the lift being started until returned to the 'RUN' position.

One switch shall be readily accessible from the lowest level served at 1.3m above the landing and a maximum of 1.0m from the landing entrance and the other shall be 1.0m above the pit floor.

2A.31 Limit Switches

The terminal, slowing, stopping and final limit switches shall be complete with all necessary fabricated brackets which shall be pinned after final positioning.

2A.32 Counterweight

The counterweight frame shall be fabricated from rolled steel sections and shall be of bolted construction, having cast iron filler weights of uniform size, but not exceeding 200mm width.

The weights shall be secured to the frame by tie rods with a retaining 'U' bracket bolted between and through the upright channel sections.

At mid point in the shaft the suspended weight of the counterweight shall equal the suspended weight of the car plus 45%-50% of the contract load.

2A.33 Counterweight Screen

A counterweight screen shall be provided in the lift pit. The screen shall be fabricated from heavy gauge, galvanised, 25mm square, mesh wirework in a mild steel rod frame. The screen shall be easily removable and shall extend the full width of the counterweight from 150mm above the pit floor to a height of 2.2m.

2A.34 Car Sling and Platform

The car sling and platform shall be fabricated from rolled steel channel uprights and cross sections and shall be so reinforced and braced as to sustain a fully loaded car without permanent deformation during normal operating conditions, operation of the safety gear or in the event of impact with the buffers.

The roller guide shoes shall be mounted on plates secured to the horizontal sling members and steel buffer plates shall be mounted on the underside of the sling. The platform and car enclosure shall be fully isolated from the sling by means of rubber mountings with restraints.

2A.35 Car Sub-Floor

The sub-floor shall be cut from a single piece of flame retardant Marine Ply to BS 1066 requirements and shall have a minimum depth of 25mm and be secured to the structural platform members. A 16 gauge zintec steel sheet shall be fixed to the underside of the sub-floor.

The floor shall be so constructed as to withstand deformation under normal operating conditions or on operation of the safety gear and in the event of impact with the buffers, fracturing or loosening of the applied car flooring shall not occur.

2A.36 Safety Gear - Bi-directional

A progressive wedge type safety gear shall be provided, fixed to the bottom members of the car sling and designed as to arrest the car should an overspeed condition occur in either direction. The safety gear shall be operated by an independent steel wire governor rope and shall be fitted with an electric switch to cease power to the motor and apply the brake in the event of operation. The switch shall require a manual reset to return the lift to service.

2A.37 Crown Bar Records

The Contractor shall provide and fix an engraved 10 swg brass notice, flush filled with white epoxy resin, to the crown bar of the car sling. Numerical detail shall be metric and the label shall detail the following information:-

1. Makers Name and Lift Number
2. Client Identification and/or Number
3. Total Car and Sling Weight
4. Contract Load and Speed
5. Rope Diameter, Length and Lay

2A.38 Car Top Maintenance Control Station

The control station on top of the car shall meet the requirements of BS 7255, shall have the faceplate facing the front of the car and shall incorporate the following features:-

1. A 240 volt, 9 watt, compact fluorescent low energy lamp, that shall be protected against impact by a screw fixed polycarbonate cover, and controlled by a separate switch. The unit shall incorporate emergency lighting.
2. A switched 13 amp socket outlet to BS 1363 incorporating a residual current tripping device of 30 milliamps.

Items 1. and 2. shall have a common supply.

3. A metal clad bi-stable stop switch and with this switch in the stop position it shall not be possible to move the car from any control position. The stop switch shall be readily accessible from the landing when the car roof is positioned 1 metre above the landing threshold.
4. An "UP" and "DOWN" and a common constant pressure push, clearly marked, this push being sited between and adjacent to the "UP" and the "DOWN" push. The circuitry shall be arranged such that two pushes must be pressed in order for the car to move in either direction.
5. A robust TEST SWITCH, with the "TEST" and "NORMAL" positions clearly engraved.

With the switch in the "NORMAL" position, the lift shall respond to landing and car calls. With the switch in the "TEST" position, the "UP" and "DOWN" and common constant pressure pushes on the car top control station shall become operative, subject to the following conditions:-

1. It shall not then be possible to control the car from any other position.
2. The car shall travel at a speed not exceeding 0.4m p.s.
3. The car shall not move until all safety devices are made and remain in the safe position.
4. The car shall move only while the respective direction and common push are both depressed.
5. A terminal limit switch, associated with this control, shall, when the car is moving upwards, stop the car so that there is a free distance above the maintenance platform area of at least 1.8 m. A white paxoline notice shall be screw fixed to the cover of the limit engraved with the words "MAINTENANCE LIMIT" in red lettering.
6. A door operating switch which shall have its "DOOR OPEN" and "DOOR CLOSE" positions clearly engraved. This switch shall operate the selected doors but only while the car is stationary with the TEST SWITCH in the "TEST" position.
6. The control station shall be so positioned and designed that it does not inhibit safe use and to prevent accidental operation.

2A.39 Car Top and Car Bottom Clearance

Where the pit depth is less than that required to provide the 600mm clearance required by BS 5655, then the bottom run-by of the car when at floor level shall be reduced to 150mm in order to maximise the car bottom clearance.

If the configuration of the machine slab and support steels does not satisfy the requirements for car top clearance required by BS 5655, then a warning notice stating "REDUCED HEADROOM" shall be provided.

2A.40 Suspension Ropes

A minimum of four suspension ropes shall be used, to be not less than 13mm diameter, and a certificate of Test and Examination, as required by Statutory Legislation for ropes used in the United Kingdom, shall be forwarded to the SO.

The roping arrangement shall be 1:1 and all ropes shall be delivered to site on individual reels.

2A.41 Rope Terminations and Anchorages

All ropes shall be anchored to the counterweight and car frame by means of eye bolts and bulldog grips on multi point anchorage plates, secured to the underside of the car and counterweight crosshead assemblies. No less than 4 bulldog grips per termination shall be used and the rope tails shall be 500mm long and tied back to the standing part of the rope.

Wedge sockets may be used as an alternative should space requirements be limited.

Rope retainers fabricated with solid steel bars shall be provided for the traction sheaves.

During the life of the ropes it shall be possible to raise the counterweight by 150mm, by means of adjusting nuts on the counterweight eyebolts or sockets. The eyebolts or sockets shall have spring tensioning on the counterweight and a locking device at both ends to prevent the eyebolts from turning.

2A.42 Rope Stretch and Clearances

The clearance between the counterweight and buffer shall be sufficient to allow for 230mm of rope stretch, or as much as is practicable where space in the well is restricted, before it becomes necessary to adjust the ropes to ensure that the top limit switch shall have its contacts opened before the counterweight touches the buffer. The use of removable stools or packing under the counterweight or buffer is not acceptable.

The Contractor shall allow for one shortening-up of the ropes during the warranty period, the timing of which shall be notified 5 days in advance to the SO.

2A.43 Compensation

Compensation shall comprise a low carbon electrically welded proof coil chain, each link proof tested at twice the working load limit. The chain shall be encapsulated within 60° flame retardant polyvinyl chloride material.

The compensation cable shall be supported beneath the car by means of a safety u-bolt and Kellem grip, together with a safety loop and support bracket.

Damping devices shall be provided at low level approximately 1m above the bottom of the loop.

2A.44 Lift Car: Floor Covering

The floor covering shall be 6mm tactile non slip sheet having a continuous 35mm radius return on a solid core to the car skirting.

2A.45 Lift Car: Sill

The car sill shall be 4mm minimum section extruded manganese bronze, having self cleaning slots and shall be secured by brass countersunk set screws with self-locking nuts. The sill and the rolled steel sill support angle shall cover the full width of the door drive so that each set of door shoes are retained throughout the driven distances. Over the car entrance width, the horizontal distance between the car sill and each landing sill shall be no more than 30mm.

2A.46 Lift Car: Toe Guard

The height of the vertical portion shall be as near as possible to 750mm, subject to the requirement that there shall not be less than 100mm clearance between the bottom of the toe guard and the pit floor when the car rests on fully compressed buffers.

The toe guard shall be fabricated in 1.6mm zintec, supported by a horizontally and vertically braced mild steel frame attached to the car platform steelwork, and fixed at no more than 150mm centres to the car sill by countersunk brass set screws.

The toe guard shall extend to 100mm beyond the clear door width on both sides of the entrance.

2A.47 Lift Car: Enclosure

The Contractor shall provide a 600mm x 1200mm montage having two isometric views of the lift car, complete with all finishes for consideration by the residents.

Stainless Steel

The car walls, ceiling and front return panels plus the car and landing doors and architraves shall be fabricated in 16 gauge, 316 grade patterned stainless steel for which the Contractor shall provide a mill certificate to the SO, prior to any fabrication.

Fixings

All nuts, bolts and washers to be used in the construction of the car carcass, platform and sub-floor shall be cadmium-plated and nuts shall be of the self-locking type.

Fixings, of any type, shall not be visible from the car or landings.

Evode Colour Seal shall be applied to form a separation barrier at the abutment of any dissimilar materials, and 3mm of fire resistant, anti-drumming compound shall be used on the shaft side of all wall and ceiling panels.

Wall Panels

The car wall panels shall be fabricated from patterned stainless steel not more than 250mm in width and shall be sufficiently braced and reinforced to withstand anticipated impact from heavy usage such as furniture removals, prams and trollies.

All mating surfaces shall be treated with mastic.

The bottom edge of the car wall panels shall be positioned 75mm above the car sub-floor and shall be bolted through a 16 gauge stainless steel angle trim 9mm in front of the skirting. The whole shall present a continuous flush face to the passenger with each panel fabricated in one piece vertically.

The joints between each of the car wall panels and each of the roof panels shall be separated by recessed 3mm Darvic strips which shall in all instances be prevented from being forcibly pushed into the shaft by a return flange on all wall and ceiling panels.

The design of the car shall allow simple removal and replacement of the panels in the event of damage.

Return

The return shall be 60mm deep and fabricated from patterned stainless steel, reinforced throughout with 14 gauge zintec sheet steel.

Slam Post

The entrance slam post shall be fabricated from stainless steel, reinforced with 14 gauge zintec sheet steel throughout, with all loads imposed transmitted to the steel car door entrance frame.

Skirting

The channel skirting shall be 316 grade, 3mm minimum satin finished stainless steel with welded gussets and shall have the bottom flange bolted to the car platform using a plastic membrane between to prevent electrolytic corrosion and chafing.

Handrail

Handrails shall be fabricated from 12 gauge, 316 grade satin finish stainless steel and formed to a 47mm x 25mm oval section with the widest part on the horizontal. The handrails shall fit the rear wall and one side wall of the lift car in one piece with end caps and 90° bend and end cap at the lift entrance.

The free space between the handrails and the car walls shall be 35mm.

The handrails shall be fixed with a minimum of six 90° stainless steel angle brackets, three to the side wall and three to the rear wall, and removal shall be from the lift shaft with fixings 900mm +25/-25mm to centre above the car floor.

Ceiling and Roof

The car ceiling shall be constructed from patterned stainless steel panels not more than 250mm in width and shall be reinforced externally with 14 gauge sheet zintec treated with a non-slip compound.

The design of the roof shall be such that it will adequately support the weight of 150Kg at any point on the roof surface without causing permanent deformation or damage. The working area shall be flat, smooth and without tripping hazards.

Ventilation

Concealed ventilation shall be provided to the car at the top and bottom of the side wall panels. The ventilation shall consist of 10mm diameter clear apertures totalling 1.5% of the total car floor area with robust masking plates to the shaft side of the car. The design of the vents shall be such that it shall not be possible for persons travelling in the car to touch any fixed or moving equipment in the lift shaft by means of inserting objects through the vents.

Car Drapes

The car shall be fitted with solid stainless steel capstan studs and supplied with two sets of padded and quilted, coloured canvas covered drapes to each wall and the return of each design of the lift car. The drapes shall have apertures for access to the car stations and a labelled carrying bag shall be provided for the drapes. A sprung rod with rubber end buffers shall be provided to support the drape at the mirror wall.

Plumbing and Alignment

Adjustments to the car shall be made by packing to the base and not by taking up tolerance on the car top isolation rollers which shall be fitted only after the plumbing and levelling of the completed car and inspection by the SO.

2A.48 Lift Car: Station

The faceplate shall be fabricated from 3mm finished stainless steel fitting flush to the wall panel and supported by stand-off furniture hinges on a metal back box mounted in the side wall, adjacent to the slam post.

The minimum lateral distance to the centre of any push from the return shall be 400mm

The hinged faceplate shall have secret fixings and shall incorporate the car station fixtures. The Contractor shall submit a drawing, for approval by the SO, indicating the incorporation, size and arrangement of the following:

1. TMO Lift Number and Identification - engraved characters, black, 20mm characters.
2. Contract Load in Kgs and Persons - engraved characters, black.
3. Auto Dialling Telephone Unit - engraved instruction, yellow.

4. Floor Pushes.
5. Speech Synthesiser.
6. Car Position and Direction Indicator.
7. Door Open Push.
8. Alarm Push, engraved characters, yellow.
9. Key Operated Fan Switch, engraved characters, black.
10. No Smoking Notice - engraved characters, red.
11. Car Preference Key Switch, engraved characters, black.
12. Emergency Lighting Test Switch with LED indication.

Unless specified otherwise, all engraved characters shall be 12mm and flush filled with epoxy resin.

The flat form trailing cables shall run continually from the controller to the car and shall be connected to terminal blocks permanently mounted in the metal back box behind the car station.

The car station fixtures shall be secured by weld studs to the faceplate to enable simple access and replacement of components by authorised personnel.

2A.49 Lift Car: Auxiliary Car Station

A canted, auxiliary stainless steel car station, incorporating the full range of the car pushes, shall be provided within the car wall diagonally opposite the car station to the same design and fixing as the car station.

2A.50 Lift Car: Pushes

All pushes shall meet the requirements of EN81-70 and M2/S2 Building Regulations and shall:

1. Be stainless steel tactile coloured black for the floor and door open pushes, yellow for the alarm push and green for the Ground floor push.
2. Be flush mounted except for the Ground floor push that shall stand proud of the faceplate by 5mm.
3. Incorporate long life LED call acceptance.
4. Be half illuminance at all times with full illuminance to indicate call registered.
5. Remain half illuminance in the event of power failure.

6. Have an audible signal to signify that a call has been registered.
7. Be flame resistant.
8. Have shock loads on the pressel transmitted to the body of the unit and not the contacts.
9. Be of such design as to make the deliberate 'fixing' of the pressels in the depressed position difficult.
10. Have no fixing visible or accessible from the landings or the lift cars.
11. Have the lowest push to the car station positioned at 900mm centre and the highest push at no more than 1200mm centre above the car floor.

2A.51 Lift Car: Load Sensing Device

A load sensing device shall be fitted to the car sling or platform that shall automatically detect a pre-set overload limit of 10% and shall cause a buzzer to sound within the car.

At 80% load, or as determined during commissioning, the device shall activate a landing call by-pass condition causing the lift to respond only to car calls.

The device may be mounted either underneath or on top of the car, but if the latter, the device shall be suitably protected.

2A.52 Lift Car: Alarm Sounder

The alarm sounder system shall be run in conduit or trunking, except for in the travelling cables, and shall consist of 2 x 150mm bells that shall be suitable for a twelve volt d.c. supply.

One bell shall be positioned on top of the lift car and the other shall be housed within a 10 gauge 316 grade stainless steel box fixed to shaft front wall at the Ground floor by means of concealed masonry fixings. The faceplate shall be partially perforated and fixed by means of semi secret fixings to the back box. Pressure on the 'Alarm' push shall ring each of the bells.

2A.53 Lift Car: Voice Synthesiser

The voice synthesiser shall be digital quality and provide for the following messages, each of which shall be easily disabled from the machine room without the requirement to reprogram the unit:-

1. Floor identification,
2. Direction of travel,
3. Doors opening,

4. Doors closing,
5. Lift overloaded,
6. Information for trapped passengers,
7. Lift on Firemans Control.

The unit is to be located in the machine room and shall supply a matched high quality speaker unit in the car station with a switched duplicate speaker which shall be provided in the machine room for testing purposes. Volume adjustment is required to adjust for site conditions.

2A.54 Lift Car: Hands Free Auto Dialling System

Pressure on the 'Alarm' push shall also instantaneously activate the hands free auto dialling system that shall be capable of dialling a minimum of three separate locations, automatically progressing to the next number if engaged or unobtainable.

The unit shall have the facility to receive calls and shall incorporate an inductive loop and have the further facility to cancel on operation of the door open push and after a preset time interval. The autodialling system shall incorporate communications from the lift pit, car top and machine room.

A yellow illuminated pictogram in addition to the audible signal for the emergency alarm transmission shall indicate that the alarm push has been used and a green illuminated pictogram in addition to the audible signal normally required by voice link shall indicate that the emergency call / alarm has been registered.

On activation, the autodialler shall announce a concise message, whether within the lift car, in the lift pit or on the car roof. The message shall confirm that the emergency communication system has been operated, that contact is being made and a request to be patient whilst being connected. The message shall repeat after a short period until the call is acknowledged.

On connection, the recipient of an emergency call from the autodialler shall also receive a concise message, confirming the lift number or reference and that the emergency alarm has been activated.

An emergency call shall be terminated by the call automatically timing out. The duration of an emergency call shall be set at 4 minutes but this may be extended if required by pressing the alarm push again. The last 30 seconds of a call shall be identified so that the call may be extended without loss of the facility.

Two-way communication with the activated alarm station whether in the lift car, pit, or car top shall commence only after the call has been acknowledged.

The system shall allow for the lift car, pit or car top emergency communication station to be called from any external mobile or landline telephone point but such calls shall not be connected if the emergency autodialling system is in operation. The destination for calls made externally shall be determined from the caller's handset, and these calls shall be announced by a concise message, prior to allowing hands free, two-way communication from the lift or shaft.

The cabling shall be terminated in the machine room for final connection by others.

Clear, concise instructions shall be engraved in the car station in 12mm characters, flush filled with epoxy resin.

2A.55 Car Intercom and CCTV Equipment

The existing CCTV camera and intercom equipment in the lift car shall be dismantled, stored, re-installed and commissioned, by Royal Borough of Kensington & Chelsea term contractor, Eversafe, contact Mr A Bailey on 01702 511101.

The equipment shall be housed in replacement stainless steel corner sections similar to that installed at present and faceplates shall be secured by means of semi secret fixings.

2A.56 Lift Car: Lighting

1. The lift car shall have two vandal resistant light fitting enclosures which shall be approximately 700mm long and 250mm wide.
2. The light fitting enclosures shall be manufactured from mild steel, have ventilation slots to the sides and shall be reinforced and braced to withstand a load of 75kg with the whole assembly which shall be supported on the car roof by means of mild steel angle to all four sides.
3. The interior of the enclosures shall be cellulosed white and the whole assembly shall mount flush on the car ceiling.
4. The diffusers shall consist of two layers of shock and impact resistant polycarbonate sheet, the upper layer 3mm opal and the lower layer 10mm clear. The diffuser shall be secured on each side by means of mild steel angle affixed to the enclosure, all to be contained within 1 2.5mm stainless steel frame.
5. In the light fitting enclosures the gap between the bottom of the lamps and the uppermost part of the diffuser shall be nominally 25mm. The complete enclosure assembly shall be made readily removable from the top of the car to ensure ease of access for maintenance of the fittings. To facilitate this, the enclosure shall be secured to the car top by wing nut fixings of 5mm minimum diameter or other similar arrangements.
6. Each enclosure shall contain two 18 Watt x 600mm fluorescent tube fittings each separately controlled to maintain illumination in the event of one fitting ceasing to operate. The lighting shall achieve 200 lux at floor level. One tube in each of the enclosures shall incorporate the emergency lighting system.

7. A key switch shall be incorporated in the car station in order that the emergency car lights may be tested without disconnecting the normal lighting supply. The LED indicator in the car station shall visibly signify that the emergency lighting unit is fully charged.
8. The car light supply shall be separate from the car top lighting and power and a 2 Amp cartridge fuse and terminal block shall be fitted within the enclosure.

2A.57 Lift Car: Emergency Lighting and Alarm Supply

The battery and charging unit for the car emergency lighting shall be fixed on top of the lift car, in a position that does not create a safety hazard and with the wiring run in trunking and/or conduit.

The battery shall power the car emergency lighting and the alarm signal system and shall have the capacity to maintain each for a period of at least 3 hours and, on restoration of the mains supply, the battery shall fully re-charge, automatically, within 24 hours.

The battery shall additionally power the background illumination to all lift car pushes and all position indicators for the same 3 hour period.

The battery shall be fed from the live side of the car light switch in the machine room.

The supply to the luminaires shall be provided via a key operated switch which, on operation, shall disconnect the supply, simulating mains failure for testing purposes.

2A.58 Lift Car: Forced Ventilation

Forced ventilation shall be achieved by means of a protected, silent running exhaust fan unit mounted on the car roof. Ducting shall be provided to encompass a number of the concealed vents in the rear wall of the car. The position of the fan unit shall be agreed by the SO.

The fan shall be activated by a key switch in the car station which, when in the 'OFF' position shall automatically become operable upon activation of the alarm push for an adjustable time period of up to three hours.

2A.59 Automatic Power Door Operator

The automatic door operator shall meet the following:-

1. It shall be driven by a variable frequency AC motor in both opening and closing directions. The motor shall be totally enclosed and rated for its anticipated duty cycle.
2. The door speed during operation, shall have sinusoidal characteristics.
3. When the car top control is set to test with the car not at landing position it shall be possible to test, from the car top control station, the functioning of the door

operator without operation of any other lift equipment and without damage to any equipment.

4. With the exception of 3. above, the car door and associated landing doors shall operate simultaneously and only with the car stationary at a landing.
5. In the event of a power failure and with the car at any landing level, it shall be possible to manually open both the car door and associated landing door, from the landing concerned, with the use of a release key.
6. The operator shall incorporate provision for simple adjustment of door speeds and shall provide the following:
 1. Fast opening speed
 2. Slow closing speed with a check prior to impact.
7. It shall effect mechanical locking of the car door between floor zones.
8. In the event of failure of the lock circuit while the car is in travel, the car door shall not be opened or partially opened by the door operator or by any other means.
9. The lift shall normally park with its doors closed.
10. It shall stop, reverse and fully re-open the car door and its associated landing door if the electronic detector is obstructed while the doors are closing.
11. A 'DOOR OPEN' push shall be provided in the car which shall only operate while the car is stationary at a landing.

2A.60 Passenger Protection

The car doors shall be fitted with a full height multi-beam electronic detector. The detector shall be so arranged that should an obstruction be present whilst the door is closing it shall cause both car and landing doors to stop and initiate a door re-open cycle. The device shall not inhibit the full clear opening.

The detector flex shall be concealed and secured so as to prevent movement against other equipment and in the event of circuit or other failure for whatever reason the lift shall fail safe.

2A.61 Car and Landing Doors

The car and landing doors shall be horizontally sliding having a minimum clear opening as stated in Scope of the Works and the doors shall:

1. Have the car and landing doors fabricated from a different patterned stainless steel to that utilised on the lift car and landing architraves to ensure an alternative textured finish.

2. Be located in the bottom of each door sill by two water and acid resistant, rigid nylon sliding shoes each having a minimum length of 100mm and secured to the well side of the door by a 2.5mm mild steel bracket with three non adjustable fixings such that the shoes may be replaced easily, without lifting the door.
3. Between each sliding shoe a similar flange with five non adjustable fixings shall support a 150mm long 10 gauge mild steel kick plate that shall penetrate the bottom track by not less than 6mm.

Alternatively, the kick plate may form part of the structural component of the door, projecting internally 100mm.

4. Have the vertical clearance between the doors and the sill not exceeding 5mm.
5. Have the horizontal clearance between the doors, door return and architrave not exceeding 5mm.
6. Be suspended from hangers fitted with rollers which run above the top track and have eccentric rollers fitted below the top tracks to stabilise the doors. The rollers shall rotate on roller bearings or similar with 'sealed for life' lubrication.
7. Have hangers and sill shoes that shall be supported by an 8mm thick steel plate fixed at the head and foot of the door. Door hanger fixings shall have a minimum of 15mm thread penetration and a maximum of 5mm shimming.
8. Be fabricated in 16 swg zintec sheet steel, being of hollow construction with internal stiffening sections and faced with patterned stainless steel.
9. Have 16swg patterned stainless steel sight guards to the landing doors, formed in one piece with the landing face of the door and braced over the entire height, returning to the shaft side of the door and pinned with a maximum spacing of 100mm.
10. Have the fixing of associated door equipment to the car and landing doors by means of set screws and bolts with the appropriate shake-proof washers to steel plates specifically fabricated within or on the door construction for the purpose. P.K., Pop rivet or riv-nuts are not acceptable.
11. Be provided with spring closers to ensure automatic closing of each landing door panel when the car is outside the unlocking zone. The closer shall consist of a substantial mild steel arm fixed to the landing sill and shall have a positive spring loaded action.
12. Have a mechanical and electrical interlock to each landing door panel. The locks shall have a clear, toughened, removable plastic cover, sealed to prevent possible ingress of water whilst allowing visible and easy adjustment without the use of special equipment.
13. Have the mechanical and electrical interlock of such design and positioning that interference of the lock or its operation shall not be possible other than by an authorised person.

14. Have the mechanical and electrical interlock pinned after final positioning.
15. Have no fixings visible or accessible from the landings or within the car.
16. Have the landing doors so constructed that when in the locked position, they shall withstand, without permanent deformation, a force of 300N applied at right angle to any point on the landing face, uniformly distributed over an area of 5 sq. centimetres. The doors shall operate satisfactorily after such a test.

2A.62 Emergency Unlocking of Landing Doors

It shall be possible for an authorised person to open each landing door irrespective of the position of the lift car. Opening shall be by means of a drop key unlocking release in the door panel, complete with baffle plate.

2A.63 Landing Door Frames and Architraves

1. The landing entrance steelwork uprights shall be fabricated from rolled steel sections.
2. The header section shall be fabricated from 6mm flat steel plate, pre-drilled to suit the uprights and track assembly.
3. All landing entrances shall be located within a recess in the landing floor slab and the Contractor shall make provision to fix the threshold steelwork to the structural floor by means of bracketry and concrete anchors prior to the final building in and screeding by others.
4. The Contractor shall make provision for fixing the landing architraves to the entrance steelwork and shaft fabric. The fixings shall not be accessible or visible from the landing or the car.
5. The architraves shall be of Stonehenge design fabricated in patterned stainless steel to the full depth of the shaft wall having a 60mm to 100mm tapered face to the vertical section and a flat 100mm to the horizontal section. The architraves shall be recessed 6mm into the front wall of the landing and shall project from the front wall finish by 20mm.
6. The architraves shall be fabricated in three sections and shall be of bolted construction, the lower section projecting 25mm below floor level to be built in.
7. The rear return of each architrave shall be wide enough to eliminate any finger traps.
8. The 25 mm deep recess for the doors to close into shall be fitted with 3mm buffers, fitted 100mm from the top and bottom of the doors.
9. Adjustable rubber buffers shall be fitted to the entrance steelwork to prevent the landing doors from opening more than 3mm beyond the clear opening width. The buffers shall be fitted 100mm from the top and bottom of the doors.

10. The architrave header at the Ground and Nineteenth Floors shall be engraved LIFT HO..... in 40mm high characters, flush filled with epoxy resin.
11. The architrave shall have reinforced webs for additional strength and for binding during the back filling builders work.

2A.64 Landing Sills

The landing sills shall be 4 mm minimum section, extruded manganese bronze having self cleaning slots and shall be secured by brass countersunk set screws with self locking nuts. The sill and any support steelwork shall cover the full width of the door drive so that each set of door shoes are retained throughout the driven distances.

2A.65 Landing Fascias

Landing fascias shall be fabricated from 16 swg zintec steel sheet and shall extend from each entrance header section to the sill at the next level served and shall be the width of the entrance plus 100mm to each side. The fascias shall be stencilled with the appropriate floor designation in 50mm high characters below each sill

The fascias shall be reinforced and braced as necessary to restrict deflection to 5mm and shall be secured by countersunk set screws at 100mm centres.

Fascias shall also be fitted below the lowest and above the last entrance served, returning to the walls and at no point in the shaft shall the fascias exceed 30mm from the car sills.

2A.66 Landing Stations

The existing back box to the landing station shall be retained and modified to suit the Contractors provision of an extended faceplate that shall be of sufficient length to conceal the back box aperture and to accommodate the landing push at a compliant height of 1000mm centre above floor level.

The extended faceplate shall be angle edged, projecting 30mm from the wall shall be fabricated in 16 gauge satin stainless steel.

The faceplate shall be secured by means of extended 6mm stud welds and nuts located on the shaft side.

The landing station shall incorporate the following:

1. Down call push only plus wiring for possible future up push, full collective modification,
2. Floor number engraved 40mm high characters infilled black.

2A.67 Landing Pushes

All pushes shall meet the requirements of EN81-70 and M2/S2 Building Regulations, shall be flush mounted and shall:

1. Be stainless steel tactile with colour contrast.
2. Incorporate long life LED call acceptance.
3. Be half illuminance at all times with full illuminance. to indicate call has been registered
4. Have an audible signal to signify that a call has been registered.
5. Be flame resistant.
6. Have shock loads on the pressel transmitted to the body of the unit and not the contacts.
7. Be of such design as to make the deliberate 'fixing' of the pressels in the depressed position difficult.
8. Have no fixings visible or accessible from the landings or the lift cars.
9. Have all pushes positioned between 900mm and 1100mm from finished landing floor level.

2A.68 Landing Position Indicator

The landing position indicator shall be enclosed at each floor by a 16 gauge satin stainless steel box and faceplate with fixings identical to those described in Clause 2.66, at a height of 1800mm centre from finished floor level. The faceplate shall be canted to provide maximum field of vision.

1. Each landing shall have a position indicator to the same specification as that provided to the car but shall also incorporate hall lantern features.
2. When the lift is due to arrive at the pre-determined floor the LED direction indicator will light to notify the continuing direction of car travel and the audible signal shall announce imminent arrival. The visible indicator shall be maintained until the doors have closed.
3. The audible signal to activate 5 seconds prior to lift arrival, with 1 signal for UP and 2 signals for DOWN. The signal tone shall be agreed with the SO.

2A.69 Out of Service Indicator

In the event of the lift ceasing to provide service through, malfunction or supply failure, each position indicator shall scroll "LIFT OUT OF SERVICE". The Sub Contractor shall provide the necessary emergency supply to enable this feature to function for 12 hours continuous operation.

2A.70 Firemans Control

Each firemans control switch shall have a bevel edge escutcheon for operation of the drop release key.

The faceplate shall be engraved with the words “ON” and “OFF” in characters 10 mm high and engraved arrows indicating direction of operation of the switch. The faceplate shall also be engraved with the words “FIREMANS CONTROL” in characters 15 mm high and all engraving shall be 3 mm deep and filled flush with red epoxy resin.

Activation of the switch shall change the control of the lift to firemans control. The landing indicators shall identify the lift mode by scrolling the message 'LIFT ON FIREMANS CONTROL'. Under firemans control, the lift shall:

1. FIREMANS CONTROL SWITCH - ON

The lift shall remain in service at any position in the lift shaft upon operation of the switch but car and landing calls shall be cancelled and rendered inoperative immediately.

If the lifts are travelling in the UP direction, they shall slow and stop at the nearest floor without opening the doors and return to the Ground floor. If the lifts are already travelling downwards they shall continue to do so and travel to the Ground floor. If the cars are stationary at one of the floors, they shall return to the Ground floor. In all these cases, the doors shall not open and no calls shall be registered or answered.

On reaching the Ground floor, both the car and landing doors shall open and remain open. The car pushes shall assume control, of the firemans lift only but all landing pushes shall remain inoperative whilst the lift is on Firemans Control.

Registration of a car call and closure of the doors shall only be by sustained pressure on a lift car push, after which the lift shall commence travelling to the registered floor. Should a further call be lodged below the first call once the lift is in motion but within stopping distance, the lift shall answer the lowest call and, upon arrival, shall cancel the other call(s).

The lift doors shall only be opened at floor level by sustained pressure on the 'door open' push and if released before the doors fully open, the doors shall close.

Once fully open the sequence may be repeated.

Whilst on Firemans Control, the car call acceptance indication and the car and landing position indicators will remain operative, the latter scrolling "LIFT ON FIREMANS CONTROL" and the floor position alternatively.

2. FIREMANS CONTROL SWITCH - OFF

The lift shall revert to normal operation.

2A.71 Notices, Labels and Instructions

Unless specified otherwise, all notices and labels shall be engraved on white-red-white paxolene and all shall be securely fixed with screws. All characters shall be of similar style and in capitals.

Adhesive fixing is not acceptable.

In addition to the notices and labels otherwise specified within Part 2 and Clause 3.29, the following notices and labels shall be provided:-

1. To identify all miscellaneous electrical switches within the machine room and shaft including the main isolator and consumer unit fuses.
2. To the controller door advising the clients lift number of the live condition of the equipment.
3. To identify all run/stop switches.
4. A 240mm x 170mm paxoline notice to the lift machine room door stating:

DANGER

UNAUTHORISED ACCESS PROHIBITED
DOOR TO BE KEPT LOCKED

The word "DANGER" shall be red and all other wording shall be black.

The following shall also to be provided:-

5. Encapsulated, fully detailed and illustrated, hand winding and emergency release instructions.
6. Encapsulated electric shock notice in accordance with the current IEE Regulations to the machine room.
7. Encapsulated electrical and operational drawings, wall mounted within the machine room, using swivel type brackets.
8. Tool rack to accommodate the landing door drop release key, brake release, safety harness and hand winding wheel if not integral. Each component shall be clearly identified by permanent labels on a shadow board arrangement.
9. Service Log Card and Planned Maintenance Programme.
10. Plastic ring binder with divisions for copies of work sheets, LG1 certification, Statutory Inspection PAS 54, rope and beam test certificates.

2A.72 Guarding

The complete lift installation shall be guarded as necessary to meet the requirements of BS 7255 to ensure the safety of all personnel using, inspecting or maintaining the lift equipment.

All guards containing equipment that requires periodic inspection such as sheaves and overspeed governors shall be fabricated from 12mm rod framing with 25mm welded mesh and be of fixed design with hinged inspection panels. Allen screws shall be used to secure all guarding into permanent fixing points, with the exception of the hand winding wheel guard which shall be fixed using thumb screws. An Allen key shall be placed on the tool board in the machine room.

The Contractor shall provide two fixed harness points to the car sling and a tubular barrier rail with 25mm weld mesh sides to the car top to prevent inadvertent movement into the counterweight and void areas.

A 150mm high zintec skirting shall be fitted to the edges of the car roof.

The design of all guarding shall be agreed by the SO.

2A.73 Machine Room Access

At the bottom of the staircase leading to the lift machine room a gate shall be installed fabricated from angle iron framing and 15mm diameter mild steel infill bars. The gate shall be located in such a manner that safe access from both sides is achieved.

The gate shall be a minimum of 2100mm high and the banister area adjacent shall be clad in 15mm weld mesh contained within an angle iron frame to the same height as the gate. The gate shall be fitted with a Gerda lock free issued by the Royal Borough of Kensington and Chelsea.

At the machine room and roof access staircase a 5mm aluminium chequerplate platform the full width of the staircase shall be erected to the height of the roof door sill, accessed by a set of permanently fixed flat tread steps with handrails.

The platform shall be of sufficient area to facilitate safe personnel access and depositing of tools and equipment prior to entering the roof corridor area, final details to be agreed with the SO

The whole of the steel assembly shall be painted with gloss black rust inhibiting paint, the treads of the stairs and platform to be non slip paint.

2A.74 Painting and Cellulosing

Paint selection shall be approved by the SO and COSHH certificates shall be provided 7 working days in advance of proposed works and in all cases the full requirements of the COSHH certificate are to be implemented to the satisfaction of the SO.

All fabricated and structural iron and steel parts of the lift equipment, but excluding specially finished surfaces, shall be cleaned, wire brushed where necessary, descaled, properly prepared and primed with a zinc-phosphate primer and finished with good quality lead free enamel semi-gloss paint prior to delivery.

All iron and steel rotating parts of the lift equipment, counterweights etc, shall be painted yellow to BS 10E53 in accordance with BS 7255.

Over the whole width of the top edge of the car toe guard the Contractor shall paint alternate 75mm black / yellow stripes at an angle of 45° to the horizontal and to a depth of 150mm.

To the whole 'refuge' areas on the car top and in the lift pit the Contractor shall paint alternate 75mm black / yellow stripes at an angle of 45° to the landing sill.

To all lifting beams and support steels the Contractor shall paint alternate 75mm black / yellow stripes at an angle of 45° to the horizontal.

All fixed guards shall be painted safety orange.

The shaft side of the car and landing doors plus the fascias shall be cellulosed matt black prior to delivery.

Preparation for on site cellulosing maybe undertaken in normal operational hours but all spraying shall be undertaken at nights or weekends.

No on site painting or cellulosing shall be undertaken without 72 hours prior written agreement from the SO.

2A.75 Tests on Completion and Handing Over

After installation of each lift has been completed, the Sub Contractor shall, in the presence of the SO carry out the tests and examinations set out in BS5655 Pt 10, together with any further dynamic or other tests required by the SO to ensure that the installation complies with the specification.

The SO shall not attend site to undertake any witness or commissioning tests until receipt of the Contractors test document and items list, with all items clearly identified as being complete and signed off as witnessed by the Contractors supervisor or project manager.

The SO shall allocate one and a half working days for witness and commissioning tests for the lift. Any additional visits shall be charged as a set off against the contract and the defects liability period shall not be deemed to have commenced until all outstanding works have been completed to the SO's approval, notwithstanding the penultimate paragraph of Clause 2.09.

The Contractor shall provide all test weights, thermometers, test equipment, light meters and special instruments, all with current calibration certificates, and personnel required for this purpose and shall provide the appropriate Certificate of Test and Examination duly completed together with any other necessary Certificates that have requested previously.

In addition to the testing requirements of BS5655 Pt 10 the Contractor shall include for the following supplementary tests:-

1. Load tests by carrying the contract load throughout the travel and at the contract speed for continuous series of consecutive trips aggregating to a period of 30 minutes on mains supply,

During these tests, the motor and controller shall be checked for excessive temperature rise. Checks shall also be made to ensure that the contract speed is maintained and that the levelling limits are not exceeded under no-load conditions and under selected conditions of load.

2. Setting of the main circuit breaker trips in relation to the stalling current and overload.
3. Static balance on car and counterweight to adjust roller guides.
4. Tests to record compliant closing forces on doors.
5. System and motor current readings under full load, balanced load and empty car conditions.

The testing of the lift which shall be designated as the second lift prior to the refurbishment of the first lift shall specifically incorporate the works as detailed below in addition to the testing procedures described above:

6. Setting up and checking of all lock clearances, upthrust rollers and door closer operations.
7. Security of all bottom door shoes and thrust plates.

2A.76 Maintenance and Remedy of Defects

The Contractor shall assume responsibility for maintaining all lifts in accordance with this clause from the date of site possession.

The Contractor shall warrant and maintain the lifts from handover throughout the defects liability period which shall extend from site possession of the first lift, to twelve calendar months from the date of issue of the relevant Acceptance Certificate by the Contractor on Practical Completion of the final lift.

Special Maintenance Requirements During the Refurbishment.

Maintaining continued lift service during the refurbishment is of the utmost importance. The following shall be undertaken to mitigate the effects of one lift only serving the building:

1. The maintenance regime operating throughout the period of refurbishment shall be fully comprehensive with all repairs, both major and minor included within the scope of works.
2. All call backs shall be included with the specific time responses as described in the appropriate clause below.
3. Routine maintenance during the first phase shall be undertaken on a fortnightly basis.
4. Routine maintenance throughout the refurbishment shall be undertaken between the hours of midnight and 5.00 am.
5. Careful dismantling of equipment from the first lift to undergo refurbishment and storing on site as described in clause 1.3.3.

Option Cost 1

The Tenderer shall provide a cost in Schedule 3, Option 1, Page 6/20, to provide the services of a senior grade fitter and mate to standby during the works.

The hours of standby shall be 8.00 am - 8.00 pm seven day per week together with a day work rate for any hours outside that scope. The Option Cost shall be provided on a per week basis. Tenderers unable to source this facility in house shall seek costs from Mr T Vickers - Lift Test Services Ltd 07793 241960. In the absence of a full time standby engineer the refurbishment engineer working on site shall immediately attend to any entrapments and undertake initial endeavours to restore the lift to service following any malfunctions.

Maintenance to the refurbished lifts shall be undertaken twice each month for the first three months and monthly thereafter.

The lift pit, machine room and all parts of the walls and floor adjacent to the lift equipment shall be kept clean and clear of oil, grease and rubbish and the Contractor shall immediately renew any defective lamps, tubes and indicators including car, access, machine room and shaft lighting.

The maintenance shall include all cleaning, oiling, greasing, and adjustments of all appropriate parts of the lift installation to ensure satisfactory operation, with adjustments made as necessary to maintain the levelling accuracy of the car to within plus or minus 6mm. A steel oil storage cabinet shall be provided in the machine room.

A safety barrier is to be used at all times access is required to the lift shaft and this shall be supplied by the Contractor and left on site. The barrier shall not be left unattended when the landing doors are open.

A report on the condition of the lift inspected shall be forwarded to The Royal Borough of Kensington & Chelsea within ten working days of the date of inspection and the report shall:-

1. Relate to only that lift.
2. State clearly the work done and adjustments required/made.
3. indicate any lamps or indicators replaced
4. certify that the lift is or is not in a satisfactory and serviceable condition.
5. give details of any breakdown since the previous inspection.

During the extended defects liability and maintenance period, the Contractor shall, at his own expense, make good any defective, badly worn or weakened parts resulting from incorrect design, poor workmanship or faulty material.

The Contractor shall undertake any LG1 inspections and certification which may become due during the specified maintenance period.

The Tenderer shall operate and include for a 24 hour emergency breakdown service and due to the extremely difficult circumstances during the refurbishment, where a Tower of such a height could be completely without lift service, shall attend to call-outs at all times within 1 hour of reporting of the call. The Contractor shall make such necessary arrangements as required i.e. use of qualified local Contractor, to ensure that the 1 hour response is maintained.

The Tenderer shall advise any special response measures which his service organisation is able to offer, to further mitigate the affects of any malfunctions. Any such measure shall be detailed in the Schedule 2.

In the event of a trap call the Contractor shall ensure that the equipment is rendered safe and that any trapped passengers are released within 30 minutes of the call being received. The Contractor shall make such necessary arrangements as required i.e. use of qualified local Contractor, to ensure that the 30 minutes release for trap release is maintained under all circumstances.

During the defects liability and warranty period the Contractor must be prepared, if and when required, to make nightly and weekend visits in cases of emergency and shall provide the telephone numbers to be used for these call-outs.

Attendance to lift breakdowns resulting from accidental damage, mis-use, vandalism and equipment failures not due to default on the part of the Contractor or his agents shall be paid for against a separate direct order to be issued by the SO.

The Contractor shall allow for one day's training of The Royal Borough of Kensington & Chelsea Tenant Management Organisation staff in usage and emergency release operation.

2A.77 Witness Inspection Points

Witness Inspection Points are to be available to the SO with a minimum of 3 days notice by the Contractor:

1. Witness inspection of the lift controller under test at the Contractor's Works.
2. Witness inspection of lift car with doors and operator fitted at Contractor's Works.
3. Witness inspection of site readiness.
4. Witness inspection of guide rails with alignment equipment still in position.
5. Witness inspection of machine room after fixing positions of controllers, machines etc.
6. Witness inspection of car, sling, counterweight and diverters and alignment.
7. Witness inspection of main roping and compensation arrangements.
8. Witness inspection of safety gear and all pit equipment.
9. Witness inspection of compensation and governor ropes.
10. Witness inspection of entrance frames and sills prior to building in.
11. Witness inspection of hangers, tracks, doors, closers and locks complete.
12. Witness inspection of architraves, prior to building in.
13. Witness inspection of tubed and trunked lift car, complete with doors and operator.
14. Witness inspection of trailing flexes hung and connected.
15. Witness inspection of shaft and landing equipment, installed and wired.
16. Witness inspection of machine room trunking and conduits, etc. before floor screed is laid.
17. Witness inspection of wired electrical equipment in the machine room.
18. Witness inspection of cleaned down shaft, painting, screens, builders work and lift ready for test.
19. Witness inspection of commissioning tests.
20. Witness inspection of items complete and handover.

The Tenderer shall allow and include for all SO attendances and costs for off site witness tests.

PART TWO B

LIFT SPECIFICATION

ONE HYDRAULIC PASSENGER LIFT, HO92

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LIFT SPECIFICATION

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PART TWO B - LIFT INSTALLATION - ONE HYDRAULIC PASSENGER LIFT, HO92

SPECIFICATION AND STANDARDS OF MATERIALS AND WORKMANSHIP

2B.01 Tenders

The Tenderer shall include for the supply of the whole of the products, equipment and materials in accordance with this specification and the whole of the fixing works necessary for the complete lift installation plus builders, structural, electrical and other associated works as detailed in the tender documentation.

The Tenderer shall visit the site to undertake a detailed survey in order to determine the full extent of the work required. No claims arising out of any misunderstanding or want of knowledge of the nature or extent of the work shall be allowed.

This specification shall be read in conjunction with the conditions of contract and any supplementary specification(s), schedule(s), drawings and other documents enumerated in the invitation to tender. In the event of any discrepancy between the clauses in this specification and any related document the Tenderer shall immediately inform the appointed Supervising Officer, (SO), to provide technical information.

In particular the specification shall be read in conjunction with Schedules 1, 2 and 3 which form the basis for the tender submission and which shall identify the equipment offered. Schedules 2 and 3 must be completed in their entirety and returned together with all other documentary information requested.

Should anything be omitted from this specification, which is fitting and usually considered necessary for due and proper completion of the work, the Tenderer shall verbally bring this to the attention of the SO prior to tender submission with confirmation in a letter prior to submitting the Tender return.

The Tenderer shall make due allowance in his tender return for undertaking the role of Principal Contractor as defined in the Construction (Design and Management) Regulations 1994, (as amended) (CDM).

This shall particularly include a detailed Health and Safety Plan with method statements and risk analysis based on the Contractor's own site surveys submitted to the SO 30 days prior to the site start date. Final copies, incorporating received comments, shall be provided to the SO 14 days prior to the start on site. Site copies, including a complete bound copy of the contract specification, shall be located within the machine room together with the site diary.

2B.02 Programme

The Tenderer shall submit a detailed bar chart programme and method statement for the whole works with the tender. The programme and method statement shall make due recognition of all project stages with the intent to minimise disruption and disturbance during the works.

The Contractor's staff and subcontractors shall carry photographic identification cards and shall wear attire having the company logo or name, throughout the contract programme.

The Contractor shall make adequate provision for achieving all design and manufacturing works prior to commencing work on site. Should the SO be required to perform additional duties or to attend site due to matters that should realistically have been previously identified by the Contractor then any resultant charges by the SO shall be set off against the contract.

The Social Services Office shall remain fully occupied throughout the project duration and the programme shall make due recognition at all project stages of the intent to minimise disruption and disturbance during the works, with the need for particularly disruptive and noisy operations to be fully co-ordinated with the SO.

Liquidated and ascertained damages shall be attributed to the programme.

Normal hours of working on this contract are 8.00am - 6.30pm Monday to Friday and 8.00am - 1.00pm Saturday.

Drilling, cutting or otherwise of the building fabric shall be programmed and agreed with the SO and shall be undertaken between the hours of 9.30am and 4.30pm Monday to Friday.

Maximum contract durations and proposed dates shall be as detailed below and whilst the calendar dates may vary the actual weeks shall not be exceeded:

Contract Award by	3 rd September 2004	
Construct New Pump Room	14 th November 2005	(6 weeks)
Design, Manufacture, Procurement and Delivery	19 th January 2006	(70 weeks)
Possession of Shaft	19 th January 2006	
Handover	1 st April 2006	(12 weeks)

Note! Each phase includes witness testing, commissioning and snagging.

2B.03 Products, Equipment and Materials

The Tenderer shall clearly identify the products, equipment and materials offered by way of specific part numbers and any other information necessary in Schedule 2. In all cases products offered are to be generic and non-proprietary with spares and support readily available to persons other than the original supplier or installer.

Specialist equipment or data that is required to maintain continuity of service and performance characteristics or to access the equipment shall be provided, with full training, within the Contract and shall **UNEQUIVOCALLY** become the property of The Royal Borough of Kensington & Chelsea Tenant Management Organisation Ltd.

If there is any doubt over the compliance of specific items then further details of approved products for this Contract can be obtained from the SO, on request, and the Tenderer shall be deemed to have obtained any such details before submitting the tender.

Products and equipment approved for use on previous contracts shall not necessarily be approved for use on this Contract and the SO may require the Tenderer to submit, for approval, samples of products and/or equipment.

The type of products offered shall have been in commercial operation for at least two years prior to the tender and shall have a substantial record of reliability whilst operating on continuous duty and under conditions similar to those which shall apply on this project.

The full technical details of any products or items of equipment must be available to the SO at tender stage and if so requested, the information must be provided within 3 working days.

2B.04 Cost of Inspecting Products, Equipment and Materials

The SO shall have the power to recover from the Tenderer, by deduction or otherwise, the cost of testing any products, materials or items of equipment which the SO requires to be tested and which, when tested, are found to be unsatisfactory.

2B.05 Regulations

It shall be understood that the equipment specified and that the characteristics of the site, particularly dimensions and clearances, may not fully comply with current British and European Standards and these shall be qualified by the Tenderer in the tender return.

Although it is recognised that the existing structural constraints shall prevent full compliance with harmonised European Standards, the requirement is for the lift installation to include all of those items and features that do comply, as far as is reasonably practicable.

The products, equipment, materials and installation shall comply with all relevant statutory instruments and regulations and in particular those listed in Clauses 2.06 and 2.07.

The successful Tenderer shall be required to obtain all necessary authorisations and derogations from their Notified Body and the DTI and due allowance for any costs shall be made within the tender. It is essential that the complete lift is CE Marked and the employer is provided with a Certificate of Conformity.

Where the existing structural constraints, particularly in the lift pit, at the top of the lift and the shaft prevent the necessary clearances being obtained for the protection of maintenance and inspection personnel, alternative means or safe systems of work shall be provided to give equal protection, and identification of these shall be detailed with the Tender return.

Where the premises concerned are not subject to such statutory controls they shall, for the purpose of the application of this specification, be deemed to be subject to such statutory controls.

The tender shall be based on the regulations current three months prior to the date for return of the tender. If these regulations are amended or new regulations enacted that shall affect the works after that date, the Tenderer, and subsequently the Contractor, shall immediately inform the SO in writing.

2B.06 Design Standards

The equipment and installation shall conform to this specification and to the relevant British Standards including Codes of Practice and, in particular, BS 5655, BS 7255 and EN81-1. Where this specification differs from those standards and codes, the provision of this specification shall prevail.

Reference to British Standards and Codes of Practice shall mean the edition current three months prior to the date for return of tenders. A certificate of compliance with the relevant British Standards shall be provided to the SO on request. Any changes during the course of the contract in the relevant British Standards and Codes of Practice shall be brought to the attention of the SO by the Contractor.

It shall be understood that the existing characteristics, particularly dimensions and clearances, may not comply with current British Standards and these shall be qualified in the tender return.

The lift is required to function under the following conditions without prejudicing the overall performance:

1. Temperature between +5°C and +40°C
2. Dust or dirt laden atmosphere subject to the effects of moisture.
3. Electrically noisy supply and atmosphere.
4. Mechanical vibration.

Unless stated otherwise in this specification the safety factor shall be 5 or greater for all parts of the equipment. The safety factor shall be calculated on the basis of maximum imposed loads and calculations shall be provided to the SO should they be requested.

2B.07 Related Documentation and References

This tender documentation shall be read in conjunction with, and its requirements are in addition to, the general conditions of contract and any drawings and other documents issued with it and listed in this invitation to tender and as set out below.

Health and Safety at Work etc. Act 1974 (HSWA)
Disability Discrimination Act 1995 (DDA)
Management of Health and Safety at Work Regulations 1999 (MHSWR)
Workplace (Health, Safety & Welfare) Regulations 1992 (WPR)

Provision & Use of Work Equipment Regulations 1998 (PUWER)
Lifting Operations & Lifting Equipment Regulations 1998 (LOLER)
Reporting of Injuries, Diseases & Dangerous Occurrences Regulations 1995 (RIDDOR)
The Lifts Regulations, 1997
Factories Act 1961
Electricity at Work Regulations (H&SE).
Offices Shops and Railway Premises Act 1963
LG1 SAFed Regulations
PM26 - Safe Working at Landings
Control of Pollution Act 1974
The Building Regulations
The London Fire Brigade
The London Electricity Board
The Building Industry National Codes of Practice for Passenger Lifts
Supply of Machinery (Safety) Regulations 1992
Electromagnetic Compatibility Regulations 1992
I.E.E. Regulations for Electrical Installations, current edition
CDM Regulations 1994, Managing Construction for Health & Safety
CIBSE - Guide D, Transportation Systems in Buildings
COSHH - Current edition
BS 2633 - Arc welding of ferritic steel
BS 308 - Drawing practice.
BS 3939 - Graphical Symbols for electrical power, telecommunications and electronic diagrams.
BS 4568 - Steel conduits and fittings.
BS 4568 - Metric steel conduit
BS 4678 - Cable trunking.
BS 476 - Fire tests on building materials and structures.
BS 5420 - Degree of protection of enclosures for LV switch gear.
BS 5514 - Overload requirements
BS 5536 - Preparation of technical drawings for micro filming.
BS 5588 - Fire Precautions in the design, construction and use of building
BS 5655 - Lifts and Service Lifts.
BS 5674 - Thermosetting armoured cables
BS 5750 - Quality management system.
BS 6207 - MICC Cables
BS 6231 - PVC insulated cables
BS 6977 - Insulation for lifts and for other flexible connection.
BS 7211 - Thermosetting cables for electrical supplies
BS 7255 - Safe Working on Lifts
EN81-1 - 1998 Safety Rules for the Construction and Installation of Lifts.
EN81-70 - 2003 Accessibility to Lifts for Persons Including Persons with Disability
BS 7671 - Requirements for Electrical Installation
BS ISO 9000, 9001, 9002, 9003 - Quality Assurance
BS EN 60947 - Specification for low voltage switchgear and control gear.
PREN 1050 - Safety of machinery risk assessment
LPS 1207 - Loss prevention standard.

2B.08 Drawings to be Provided

All drawings provided shall be CAD generated by means of AutoCAD Release 14, AutoCAD LT2000 or equivalent software.

Drawings shall follow BS 304 drawing convention and shall be appropriately scaled to a conventional size to best fit the paper i.e. 1:5, 10, 20, 25, 50 or 100 on A4, A3, A2, A1 or A0 paper, to clearly provide the intended information to be given.

1. General arrangement indicating weight and position of all equipment, with loads imposed on the building structure.
2. Details of all cutting away, plinths, channels, apertures and concrete bases, complete with all dimensions in respect of the building structure or lift well and all other builders, electrical or associated requirements.
3. Pump, tank unit and accumulator details.
4. Details of the landings, incorporating sill, door, entrance and architrave/trim construction.
5. Construction of hoardings, protected areas and storage area.
6. Landing push station and other fixtures.
7. Details of car, sling and platform construction.
8. Details of lift car design incorporating hinged car stations and finishes schedule.
9. Details of all engraving to the Royal Borough of Kensington & Chelsea Tenant Management Organisation Ltd requirements.
10. All electrical details relating to existing and new supplies, terminations within the machine room and ratings relative to full and no load, fuses and any other calculations deemed necessary, including operating temperature range and heat output of the equipment.
11. The Contractor shall produce a montage incorporating a colour wash isometric drawing of the proposed lift car and samples of the selected car and landing finishes as agreed by the Royal Borough of Kensington and Chelsea Tenant Management Organisation Ltd.
12. All drawings shall incorporate a finishes and components schedule.

Four copies of drawings 1-4 shall be submitted to the SO for consideration and comment within four weeks of contract award and, allowing one week for comment by the SO, four copies of the as amended drawings shall be issued within a further one week of receipt by the Contractor.

The remaining drawings shall be submitted two weeks after 1-4 with amendments to follow as above.

2B.09 Drawings and Maintenance Manuals on Completion

The Contractor shall provide the following drawings, generated as in 2.08, in accordance with this specification and also a complete maintenance manual as detailed below:-

1. 'As fitted' record drawings.
2. Details of the car and landing door construction and arrangement.
3. Straight line and schematic wiring diagrams for the lift installation, including all electrical apparatus, as wired and fitted. The diagrams shall show the arrangement and marking of all electrical connections and be complete with key reference to symbols and abbreviations used.

One set of the as fitted electrical drawings shall be encapsulated in plastic and wall mounted within the machine room using swivel type brackets.

All electrical drawings shall be to BS 308 using electrical symbols to BS 3939 and be microfilm quality in accordance with BS 5536. Three sets of paper print drawings will be required plus one complete set of microfiche drawings to the system adopted by The Royal Borough of Kensington & Chelsea Tenant Management Organisation Ltd.

4. A description of the scope, purpose and manner of working of each system, product or equipment forming part of the lift;
5. A detailed description of circuit operation, including the supervisory logic and motion control;
6. Data on the setting up and testing of the lift equipment;
7. Instructions for dealing with fault diagnosis and remedial action for each system;
9. Instructions detailing functions and usage of any hand held diagnostic or test equipment relating to the controller and floor setting system or door operator.
9. Planned maintenance programme.
10. Any precautions necessary for ensuring Health and Safety and avoidance of misuse together with details of all emergency procedures.
11. Copies of all certificates and inspection reports relating, but not limited, to
 1. Mill certificates for the finished stainless steel used in fabrication of the cars, doors, architraves and other elements of the project.
 2. All type testing and CE marking,
 3. NICEIC tests.

4. Tests to EN81-1 - PAS 32, as amended,
5. Lifting beam tests,
6. Clause 2.70 of the specification, Painting and Cellulosing,
7. Manuals by specialist subcontractors.
8. The names, addresses and telephone numbers of the suppliers of all major components;
9. Spare parts lists for components that normally need to be replaced due to fair wear and tear, together with those considered essential to maintain the lift in service, e.g. certain printed circuit boards.

The lift shall not be deemed to have been accepted nor achieved practical completion until the drawings, maintenance manuals and Contractors Health & Safety File in accordance with CDM regulations have been received and approved.

After submission and approval of the draft manual by the SO, three copies of hard backed maintenance and operating manuals shall be provided.

2B.10 Proprietary Products

Proprietary products, when agreed with the SO, shall in general be inspected and tested against the manufacturer's specifications and shall be furnished with a certificate of conformity or a type test certificate.

2B.11 Controller: General

The control of the lift shall be simplex full collective and fully automatic arranged for operation by passengers without an attendant and serving each floor. It shall incorporate power operated car and landing doors and indication circuits for:

1. Car position,
2. Call acceptance,
3. Lift out of service,
4. Lift undergoing maintenance,
5. Lift on car preference,
6. Electronic hall lanterns,
7. Lift overloaded.

The micro processor shall have 'field proven' components.

Floor selection shall be via a tape head device with lift position reference holes in a stainless steel tape to determine floor levels, slowing and stopping zones.

The momentary pressure on any number of car or landing pushes, activating call requirement, shall be stored in the system until answered.

The car shall answer the calls in the order in which the landings are reached and once the car has started travelling in one direction it shall answer the car and landing calls for that direction only. The lift car shall not reverse until it has answered the highest or lowest outstanding call.

With no calls on the control system, the lift shall return and park at the Ground Floor.

When the car stops at the required floor in response to a car or landing call, the doors shall automatically open and automatically close after a time interval. This time interval shall be shortened by the operation of a floor push in the car.

Should a passenger wish to re-open the door, pressure on the 'Door Open' push in the car station shall reverse the motion of the doors, providing the lift has not started.

2B.12 Controller: Microprocessor Requirements

1. Enclosures

The control equipment shall be mounted in a sheet steel enclosure, with lockable hinged panels for front access only. The controller shall have a clear space of 150mm to the rear for the unforeseen event that rear access may be required in the future.

2. Cable Entry

All cabling associated with lift control etc. shall be routed through entries in the base of the cabinet.

Any alternative method shall have the same effect but must be approved by the SO.

3. Panel Wiring

Panel wiring shall not support combustion, shall be low smoke emission and shall comply with BS 6231. Positive fixing of cable terminations shall be with purpose made clamps or pinch type terminals or by use of crimped cable tags each with an efficient locking device.

Live terminals connected to 240V or higher shall be adequately shielded to allow for safe live working conditions.

All control relays, contactors and safety circuits shall be 240V a.c. and all car and landing push feeds shall be 100V d.c.

No control circuit voltage operating in conjunction with external controller equipment shall be less than 100V.

4. Micro Computer Protection

The micro computer section of the controller shall be separately enclosed in the control cabinet such that the inadvertent connections of high voltages or physical damage from falling objects is prevented.

All incoming signals shall be via 100V d.c. terminals through filters and opto isolating circuits in the protected area.

5. Coils

All relay and contactor coils shall be continuously rated. Neither telephone type relays nor economy resistors with AC contactor coils shall be used.

6. Thermistor motor protection

Thermistor motor protection and associated controller equipment shall be incorporated in the control panel and shall be fully adjustable to suit the size conditions.

7. Heat Dissipation

Any components which may generate significant quantities of heat shall be external to the controller but enclosed and ventilated.

8. Forced Ventilation

If the controller uses forced ventilation then any inlet vents shall be protected by removable filters with a minimum life of 12 months. Failure of the fan shall not cause overheating of the lift equipment.

9. Micro Section Ventilation

The micro computer section of the controller shall have cooling and if this utilises forced ventilation then any inlet vents shall be protected by removable filters with a minimum life of 12 months. Failure of the fan shall not cause overheating of the lift equipment.

10. Environmental Temperatures

The micro computer section shall be capable of operating in environmental temperatures ranging from +5 to +40 degrees centigrade.

11. Input and Output Isolation and Protection

All input and output lines shall be so protected as to prevent the micro computer controller from being damaged. This means that all printed circuit boards, wiring on the micro computer area, terminating pins, bus lines etc. shall be physically protected from inadvertent connection to high voltages.

All input and output lines must be capable of withstanding short circuits and the application of up to 500v. Such application may result in input and output components e.g. fuses, protection resistors, diodes etc., being damaged and hence the equipment shall be designed to allow their rapid identification, removal and replacement.

All outputs shall incorporate interface relays capable of switching 5 amp at 250V d.c.

All circuit board edge connections shall be plated gold and all input/ output floor plug-in boards shall be interchangeable.

12. Identification

All parts of the equipment shall be adequately identified by permanent labels corresponding to designations on the wiring diagrams, in particular:

1. Terminals
2. Wiring by way of sleeves at all terminations
3. Equipment items
4. Card frame positions

13. Wiring Convention

All wiring shall be identified and identification sleeves, in compliance with the wiring diagrams, shall be provided at cable terminations. All specific computer wiring shall be identified in a different colour or style to the conventional wiring. A list of wiring codes, mnemonics and symbols shall be posted in the machine room.

14. Symbols and Abbreviations

A key to any abbreviations and symbols shall be fixed to the inside of each enclosure.

2B.13 Controller: Instrumentation

1. Indicators

Indicators shall be provided on the controller showing:

1. Car position,
2. Hall calls accepted,
3. Lock status,
4. Car direction up or down,

5. Car "In service",
6. Car door status open, closing, closed, opening,
7. Doors obstructed, doors nudging,
8. Car overloaded,
9. Individual board power supply,

All input and output signals shall have LED indicators,

2. Pushes or Switches

Pushes, switches or other suitable means shall be permanently provided on the controller panels in the machine room to allow:

1. Hall call registration.

LED indication shall be provided for calls registered.

3. External Indicators

Provision shall be made for:

1. Hall call acceptance.
2. Call acceptance and half illuminance of landing pushes.

4. Mechanical Counters

A six figure mechanical, non resettable, digital trip counter shall be provided to record the number of journeys for the lift.

5. Event Recorder

The following shall be recorded in the format of time marker, event type, intervals in days since the last identical event, floor number/other relevant data and number of occurrences. It shall be possible to store a minimum of 24 events.

1. Memory fault/self test result,
2. Programme fault,
3. Switch-on reset sequence,
4. Primary safety circuit failure,
5. Door close protection fault,
6. Door open protection fault,

7. Landing door interlock not made up,
9. Car door interlock not made up,
9. Start failure,
10. Door open failure,
11. Lift stopped outside door zone,
12. Hall call failure (no riser power supply),
13. Car call failure (no power supply),
14. Failure to complete journey in "double time",
15. Transfer timer time out,
16. Car overload,
17. Lift alarm operated,
18. Opening of locks when running,
19. LIS signal true,
20. Shutdown after three successive attempts to start,
- 21-24. Provision for four further event types defined by the SO.

Information on additional faults that may be recorded shall be supplied with the tender documents.

The event recorder shall be capable of examination without affecting the normal lift control function or the continued logging of events.

2B.14 Controller: Single Lift Control Logic

- ## 1. Controller Function

The control system shall be capable of independently controlling one car.

- ## 2. Type of Control

The control of the lift shall be simplex fully collective with automatic powered door operation.

3. Call Acceptance

All call acceptance indicators shall be driven by the computer and the information path is as follows: call registration push pressed-input to computer programme - recognition and acceptance - output by computer to call acceptance indicator.

4. Hall Call Cancellation

The registered hall call shall be cancelled and the hall call push illumination shall be extinguished before or at the stopping of the lift at floor level.

5. Door Reversal

Door reversal shall be achieved by constant pressure being applied to the car or landing door open push.

6. Parking Floor/Sequence

When the lift shall return to the Ground Floor and remain with the doors closed.

7. Maintenance Control

Car top maintenance control is required on the lift.

8. Double Journey Counters

A timer shall be set every time a lift journey is commenced which times out after a duration equal to twice the elapsed time of one full travel journey. The motor shall be switched off and locked out if it continues to run subsequent to the expiry of this elapsed time.

This protection device shall not be operative when the lift is switched to inspection.

9. Adjustment of Timers

Adjustment of all timers shall be possible and their values shall be agreed by the SO.

10. Event Recorder, Supply and Battery Backup

The event recorders shall be provided with a battery back up capable of a minimum of 30 days. This shall be mounted on the printed circuit board.

Alternatively, a limited 8 hour battery back up may be offered on the PCB with an external feed from a battery supply capable of at least 30 days operation.

11. Micro Computer Self Tests

The micro computer shall regularly run diagnostic checks on the memory functions, input and output circuits and run a programme test. Any errors shall be logged in the event recorder.

12. Diagnostic Aids

The controller shall provide diagnostic aids for use in the setting up of the lift to incorporate, but not be limited to:

1. Door times,
2. Call indicator for car and landing,
3. Position and direction indicator.

13. Initialisation

Whenever power is connected to a controller the micro processor shall go through an initialisation routine, clearing all hall call and car call registers and all status registers. Following this zeroing procedure the micro computer shall set all timers to preset default values.

14. Automatic Position Checking

The terminal floors shall be used by the controller to check the correct floor value. Any error found shall automatically cause the lift to travel to the floor level designated for resetting.

15. Stuck Push Protection

The controller shall have the facility to recognise a stuck hall or car push and shall ignore the signal after a pre-determined interval.

16. Programme Examination

The computer programme shall not be accessed, examined or altered within the machine room without the use of special equipment.

17. Overload Indication

Provision shall be made to incorporate a car overload device which shall incorporate a buzzer.

18. Lift "In-Service" Signal

The micro computer will regularly check that the lift is "In Service" and provide an active output signal suitable for connection to a monitoring network. The lift shall be recorded "out of service" should it fail to respond, if the doors fail to close or if the doors are obstructed for a period in excess of 90 seconds even if the lift subsequently continues to be in service.

1. Safety chain broken
2. Alarm operated

19. Interlocks

The door open and door close contactors shall be electrically and mechanically interlocked.

20. Auto Re-start

In the event of a power failure, or whenever the lift is switched off, the controller shall automatically restart on the restoration or re-connection of the power supply and cause the lift to move from its static position.

When the lift encounters a floor with auto position reset, the floor value in the controller shall be reset and normal lift operation shall resume.

2B.15 Controller: Variable Frequency Vector Drive Power System

1. The speed controller shall be mounted within the controller enclosure with all PCBs and terminals easily accessible.
2. The power system shall be variable frequency Vector control, closed loop with feedback from the pump motor supplied by a quadrature bi-phase pulse tacho generator.
3. The regulator shall be a digital drive system that shall control a low slip, single speed a.c. motor by controlling the currents affecting the motor's torque and flux producing components.
4. The regulator components shall accept 3 phase a.c. power, and provide rectified, then inverted, 3 phase a.c. power output controlled by a signal/torque/flux processing section.
5. The regulator shall incorporate a monitor parameter unit to allow values of output current, output frequency, slip frequency, d.c. link voltage, motor speed and torque demand to be monitored in real time. The monitor shall have the facility to access the regulator fault codes to allow on site fault finding.
6. The thyristor bridge shall be adequately rated for maximum current with a PIV not less than 1200V.

7. Floor level accuracy shall be consistent at no load or full load to +/- 6mm.
8. Complete circuit diagrams of drive shall be incorporated in both the machine room schematics and manuals.
9. The slow down of the lift at terminal floors shall be achieved by electronic means.
10. The switching of power by contactor to the hoist motor shall be commutated with the thyristor turn on and turn off.
11. Safety guidelines shall be to the British Standard for VF controllers. Where the power electronics are located on printed circuit cards the removal of any card or charts shall apply the brake if the lift is moving or shall prevent the lift from starting a journey. Use of error tracking during a journey to shut down the lift to a fail-safe condition is acceptable.
12. Re-levelling shall be incorporated.
13. Inspection speed to be 0.3m per second and shall be capable of moving the lift throughout travel on a continuous up and down basis for not less than 30 minutes.
14. The motor of any pressure fan shall be started on motor over-temperature.
15. All relay and contactor coils shall be continuously rated. Neither telephone type relays nor economy resistors with AC contactor coils shall be used.
16. The brake switch incorporated in the winding machine shall cause the pickup current of the brake to be reduced to half value, by inserting an appropriate resistor. The natural response time of the brake shall be decreased by placing a resistor in series with the brake coil, which shall be wound for 100 VDC.

2B.16 Controller: Door Operator

The door operator control circuits shall operate the doors in direct response to the selected car and hall calls and shall provide for the following features:

1. Provision to operate the AC variable frequency door motor from the car top maintenance control at any position in the shaft.
2. The inclusion of circuits to connect to a positively operated switch that shall make up only when the door operator is in the fully closed position. The switch shall be incorporated into the car and landing door lock circuits.
3. If the car or landing door contact fails to make up within 10 seconds after the door close cycle initiation, then a door open cycle shall commence, whether the lift is committed to a journey or not.
4. Operation of the door close protection timer shall cause all car and hall calls to be cancelled.
5. Normal lift service shall be restored when a hall call is registered, thus immediately initiating a door close cycle.

6. Operation of the door detector shall initiate a door open cycle.
7. A door open push shall be provided to provide door reversal.
8. Failure of the lift to start its journey due to the doors being held shall cause the hall call to be cancelled after 40 seconds elapsed time.
9. The door operator logic circuits shall be so arranged that operation is not dependent upon a single or secondary circuit element. Failure of such elements shall not cause the doors to remain in the open condition.
10. Care shall be taken to ensure that all wiring and terminal block positioning associated with the lock circuits and safeties to and from the door operator is such that no possibility of short circuits due to fracture of terminals, moisture, etc., can take place.

2B.17 Rubber Insulating Mats in Pump Room

The Contractor shall provide permanently secured rubber insulating mats to the front of the controller and all switchgear.

The mats shall be full width of the relevant equipment and at least 900mm in depth with each mat rated to insulate against 11kV as a minimum each mat clearly displaying a certifying notice.

Where one side of the rubber mat is fluted or profiled, this shall be laid against the floor where the mat shall be retained within a non-conducting periphery trim should the fitting of the mat potentially create a tripping hazard.

B2.18 Hydraulic System: General

The hydraulic unit shall have VF drive and control with energy accumulation and shall provide low start and run currents, low energy consumption and low heat generation.

The hydraulic system shall comply with the general requirements of BS 5655 and EN 81/2 except that, where these differ from the particular requirements of this specification, the provisions of this specification shall prevail.

The system shall not utilise constant quantity bypass control, but shall deliver only the required amount of oil to achieve the contract speed and shall be quiet running in both directions of travel.

Pressurised vessels, such as the accumulator container, are subject to statutory inspections. The Tenderer shall include for such inspections, tests or examinations during the warranty period to meet the requirements of The Pressure Equipment Regulation 1999 and The Pressure Systems Safety Regulation 2000.

The installation shall be rated for 120 journeys per hour, 60 pump motor starts.

2B.19 Hydraulic System Operation

The hydraulic system shall be designed to utilise the minimum amount of oil displacement corresponding to the designed travel of the lift including terminal floor overtravels.

The drive current required to suit the lift equipment and the carrying capacity at the designed speed and maximum duty rating shall be minimised by use of variable frequency controlled equipment with energy accumulation vessels.

An auxiliary motor and pump arrangement shall assist the start up and drive of the lift in the up direction by using stored energy accumulated during a downward journey. The pressure stored within the system shall be constantly monitored and shall be topped up as required to suit the drive characteristics.

Lift travel shall not be possible until the accumulator is charged to the requisite operating pressure. Fluid by-pass or re-circulation is not acceptable.

The drive shall be constantly monitored to provide a smooth lift ride profile from acceleration up to full contract speed and deceleration down to stopping at floor level within +/- 6mm under any loading condition irrespective of the duty cycle.

The mechanical/electrical/electronic drive/control configuration shall be specific to suit the variable frequency, energy accumulation system.

2B.20 Hydraulic Power Unit with Energy Accumulation

The variable frequency hydraulic system shall incorporate a pressurised energy accumulation vessel.

The top up and drive pumps, pump motors, oil storage tank and the accumulator vessel(s) shall be secured and stabilised with isolation mounts to minimise the transmission of vibration and noise through the building structure.

The tank shall have a minimum overcapacity of 25% for the travel, size of ram and pipe work and shall stand on a steel framed raft in an oil-tight bund or catchment tray capable of holding a maximum oil leak plus 10%. The design of the bund or catchment tray shall not inhibit normal maintenance operations and shall be identified to prevent tripping hazards. The bund or catchment tray shall not obstruct means of draining the tank.

The power unit shall be designed specifically for lift duty and shall operate with the minimum of noise and vibration with alignment of the motor, pump and bearings maintained under all normal operating conditions.

A silencer shall be fitted in the hydraulic system to minimise the transmission of pulsations from the pump to the car, and to reduce the emission of airborne noise to below 45dB at a distance of 1m from the pump casing.

Automatic, thermostatic controlled heaters shall be provided to ensure an even oil temperature and an oil filter shall be fitted on the pump inlet, which shall be simply cleaned or changed without loss of oil.

The accumulator vessels shall be painted in red oxide gloss machine paint, except for any valves, joints or connections to pipes or other information or safety devices.

The accumulator vessels shall have a collar or a traffolyte notice advising as a minimum:

1. Manufacturer,
2. Serial number,
3. Date of manufacture,
4. Standard to which the vessel was built,
5. Maximum allowable pressure
6. Minimum allowable pressure where it is other than atmospheric,
7. The liquid and/or gas contained within,
8. A green 'Compressed Gas' internationally recognised warning diamond, and or / alternative dangerous substance warning sign.

2B.21 Pump Motor

The variable frequency pump motor shall be of a standard design with thermistors embedded in the starter windings to give protection against overheating.

The maximum values of start and run current shall be provided with the tender return and, if requested, Tenderers shall provide the design calculations to support their figures.

Test certificates for 'complete' tests as set out in BS 5000, Part 99, and BS 4999, incorporating additional tests for motor starting torque as a percentage of the full load torque, shall be submitted prior to delivery of the motor to site.

Note: Compliance of the machine and motor with tests of the maker shall not relieve the contractor from the responsibility of providing a machine capable of performing under all normal working conditions and satisfying the additional tests as set out in this specification.

2B.22 Valves

The control valves shall ensure safety of operation and provide electronic closed-loop speed and acceleration control. They shall provide constant rates of acceleration, rated speed and deceleration under all normal conditions of loading and changes in temperature of the hydraulic oil.

2B.23 Levelling Accuracy

The maximum difference in level between any landing and the car floor, after travelling in either direction under no load and rated load conditions and with the stopping adjustment to suit general passenger traffic, shall not exceed +/- 6mm.

For half contract load the lift shall stop level at all entrances and the levelling accuracy shall be demonstrated under these specified conditions during the commissioning and acceptance tests.

2B.24 Cylinders and Rams

The rams shall be direct acting for use with a cantilevered car arrangement, manufactured from steel, of ample diameter for the length, truly machine and polished.

The neck of the cylinder shall incorporate a gland, a wiper ring and means to collect and contain wiped oil in a container that shall be clearly labelled including 'DIRTY OIL – DO NOT REUSE'.

The installation shall be designed such that the cylinder may be readily withdrawn for complete external examination and replaced with the minimum of inconvenience and loss of lift service. The Contractor shall provide lifting beams and fixing points whether a temporary or permanent requirement.

Where bolts and screws are used to secure the ram limit stops, they shall be pinned after final positioning, following the witness and commissioning test.

2B.25 Permanent Pressure Test Port

Both the cylinder side of the valve block outlet and each connection to the cylinder shall incorporate a permanent pressure test port with ball valve control to facilitate undertaking the static overpressure test in accordance with LG10.

2B.26 Rupture Valve

The rupture valve shall be easily accessible, though protected from accidental impact in the lift shaft or lift pit. The rupture valve shall be factory set and sealed to suit the design criteria of the lift.

A low pressure device shall be incorporated in the hydraulic line that shall initiate the closing of the lowering valve in the event of an obstruction preventing the car from descending. The rupture valve shall incorporate a lockable and secure test facility to simulate a burst pipe condition, that shall be located at the main hydraulic tank.

2B.27 Pipes and Hoses

Hydraulic piping and hose shall be mounted on, but isolated from, the building structure to minimise the transmission of vibration and noise, with all hose installed in a manner to avoid twisting, sharp bends and chafing. A shut off valve shall be provided between the control valve and the cylinders.

Hose connections shall be of a type recommended by the hose manufacturer and shall comply with the recommendations of BS 5244. The hose size and design shall meet the requirements of the power rating and the flow rate for the type of oil to be used and the system operating pressures.

2B.28 Anti Creep Device

Independent re-levelling switches shall automatically return the car to floor level at a speed not exceeding 0.15mps in the event of a leakage in the hydraulic system causing the car to descend more than 25mm from floor level.

2B.29 Hydraulic Oil

The hydraulic equipment shall operate on a bio-degradable vegetable based medium as approved by The Environment Agency.

This shall offer, as a minimum, the same operating characteristics, flash point, design life and anti-corrosion properties as that offered by multi-grade mineral oils and operation using standard oil seals, glands etc.

2B.30 Emergency Manual Operation

A bright, steel, manual lowering devise for emergency use shall be provided.

A hand pump shall be provided to allow the car to be raised manually. This shall permit a minimum of 0.5m of travel in a period of 60 seconds without excessive manual effort.

Clear and concise instructions for raising and lowering the lift, together with a drawing of the layout and location of the equipment, shall be encapsulated and wall mounted, to be clearly visible from the operating position.

2B.31 Pawl Device

Pawl devices shall be provided to the underside of the car sling. The buffer stroke shall be a minimum of 100mm and the device shall incorporate electrical interlocks such that the lift is unable to move on normal operation until the pawl is energised and is only able to move in the up direction when the buffer is fully compressed.

Pawls shall be fitted to the guide rail at each floor with the pawl at the Ground floor being positioned such that the pawl will engage even in the energised position. A further pawl shall be fitted a reasonable distance above the Ground floor to enable a pit prop equivalent facility.

The pawl device shall therefore fulfil the following functions:

1. Safety device 50mm below each of the upper floors.
2. Energy dissipation buffers.
3. Pit prop equivalent enabled without entering the shaft.

2B.32 Isolation

The completed lift installation shall be designed to ensure quiet operation and sound isolation shall be provided to reduce the transmission of any noise or vibration to the building fabric and structure.

Isolation shall be positioned between both the pump unit raft and the energy accumulator unit and the pump room floor.

2B.33 Hand Operation Floor Zone Indicator

Provision shall be made in the machine room for indicating the position of the lift car with respect to each landing when hand-lowering or raising is being undertaken by authorised personnel. This shall only be operative when the power supply is switched off and the lock circuit shall not be used to provide the feature.

The Contractor shall provide an automatic and self-contained charger unit to supply both the handwinding position indicator and the buzzer assembly which, in the event of supply failure, shall be maintained by the unit for a minimum of three hours.

The position indicator and buzzer shall operate when the car floor is no more than 25mm from the landing level. The unit shall be clearly visible and audible from the machine and shall be operated by a switch mounted on the front of the controller enclosure.

Durable, clear and precise instructions, encapsulated in plastic, on the use of the above together with the emergency release procedure shall be fixed on the wall adjacent to the machine and to the controller.

2B.34 Auxiliary Stop Switch

The switch shall be of the metal clad, double-pole, bi-stable two way type, totally enclosed and readily accessible adjacent to the pump room. When the switch is thrown to the 'STOP' position it shall cause the lift to stop and prevent the lift being started until the switch is returned to the 'RUN' position.

2B.35 Guides and Guide Brackets

The Contractor shall ensure that the cross section of the cantilever 'T' section guide system and steady guide and the rail bracket spacing are calculated for the size and weight of the lift car plus load. A copy of the calculations shall be submitted to the SO for approval within three weeks of contract award.

The Contractor shall plumb and mark out the shaft to suit the fixings required for the guide brackets in accordance with the drawings and in so doing shall then drill for and provide all anchorages by means of chemical fixings.

All guiding surfaces are to be machined and polished and each length of guide shall have male and female connection joints at alternate ends, with the guides connected by steel fish plates. There shall be sufficient length of guide to ensure that no part of the car guide shoe assemblies can run beyond the top section.

The Contractor shall plumb and bone the guides to ensure that they are vertically aligned, and shall advise the preferred method with the tender return.

Tram lining is not acceptable, and the Contractor shall leave the boning lines in place for witness inspection by the SO.

The guides shall be secured to channel steels in the lift pit and all guides, sole plates and fixings shall withstand the force imposed when the rupture valve operates under full contract load in the event of oil loss.

Removable containers shall be provided in the lift pit to collect excess guide oil.

2B.36 Guide Shoes

The guide shoes shall have a minimum length of 175mm and shall have liners easily replaced in the event of wear.

2B.37 Pit Ladder

A galvanised, flat tread, mild steel ladder with handholds shall be provided to give ease of access to the lift pit in a position and to a design, and, to be agreed with the SO.

2B.38 Pit Stop Switch and Shaft Access

The two pit switches shall be of the metal clad, double-pole, bi-stable two way type, totally enclosed and positioned away from the lift car. When a switch is thrown to the 'STOP' position it shall cause the lift to stop and prevent the lift being started until returned to the 'RUN' position.

One switch shall be readily accessible from the lowest level served at 1.3m above the landing and a maximum of 1.0m from the landing entrance and the other shall be 1.0m above the pit floor.

2B.39 Limit Switches

The terminal, slowing, stopping and final limit switches shall be complete with all necessary fabricated brackets which shall be pinned after final positioning.

2B.40 Car Sling and Platform

The car sling and platform shall be fabricated from rolled steel channel uprights and cross sections and shall be so reinforced and braced as to sustain a fully loaded car without permanent deformation during normal operating conditions, operation of the safety gear or in the event of impact with the buffers.

The guide shoes shall be mounted on plates secured to the horizontal sling members. The platform and car enclosure shall be fully isolated from the sling by means of rubber mountings with restraints.

2B.41 Car Sub-Floor

The sub-floor shall be cut from a single piece of flame retardant Marine Ply to BS 1066 requirements and shall have a minimum depth of 25mm and be secured to the structural platform members. A 16 gauge zintec steel sheet shall be fixed to the underside of the sub-floor.

The floor shall be so constructed as to withstand deformation under normal operating conditions or on operation of the safety gear and in the event of impact with the buffers, fracturing or loosening of the applied car flooring shall not occur.

2B.42 Crown Bar Records

The Contractor shall provide and fix an engraved 10 swg brass notice, flush filled with white epoxy resin, to the crown bar of the car sling. Numerical detail shall be metric and the label shall detail the following information:-

1. Makers Name and Lift Number
2. Client Identification and/or Number
3. Total Car and Sling Weight
4. Contract Load and Speed

2B.43 Car Top Maintenance Control Station

The control station on top of the car shall meet the requirements of BS 7255, shall have the faceplate facing the front of the car and shall incorporate the following features:-

1. A 240 volt, 9 watt, compact fluorescent low energy lamp, that shall be protected against impact by a screw fixed polycarbonate cover, and controlled by a separate switch. The unit shall incorporate emergency lighting.
2. A switched 13 amp socket outlet to BS 1363 incorporating a residual current tripping device of 30 milliamps.

Items 1. and 2. shall have a common supply.

3. A metal clad bi-stable stop switch and with this switch in the stop position it shall not be possible to move the car from any control position. The stop switch shall be readily accessible from the landing when the car roof is positioned 1 metre above the landing threshold.
4. An "UP" and "DOWN" and a common constant pressure push, clearly marked, this push being sited between and adjacent to the "UP" and the "DOWN" push. The circuitry shall be arranged such that two pushes must be pressed in order for the car to move in either direction.

5. A robust TEST SWITCH, with the "TEST" and "NORMAL" positions clearly engraved.

With the switch in the "NORMAL" position, the lift shall respond to landing and car calls. With the switch in the "TEST" position, the "UP" and "DOWN" and common constant pressure pushes on the car top control station shall become operative, subject to the following conditions:-

1. It shall not then be possible to control the car from any other position.
 2. The car shall travel at a speed not exceeding 0.3m p.s.
 3. The car shall not move until all safety devices are made and remain in the safe position.
 4. The car shall move only while the respective direction and common push are both depressed.
 5. A terminal limit switch, associated with this control, shall, when the car is moving upwards, stop the car so that there is a free distance above the maintenance platform area of at least 1.8 m. A white paxoline notice shall be screw fixed to the cover of the limit engraved with the words "MAINTENANCE LIMIT" in red lettering.
 6. A door operating switch which shall have its "DOOR OPEN" and "DOOR CLOSE" positions clearly engraved. This switch shall operate the selected doors but only while the car is stationary with the TEST SWITCH in the "TEST" position.
6. The control station shall be so positioned and designed that it does not inhibit safe use and to prevent accidental operation.

2B.44 Car Top and Car Bottom Clearance

Where the pit depth is less than that required to provide the 600mm clearance required by BS 5655, then the bottom run-by of the car when at floor level shall be reduced to 150mm in order to maximise the car bottom clearance.

If the configuration of the machine slab and support steels does not satisfy the requirements for car top clearance required by BS 5655, then a warning notice stating "REDUCED HEADROOM" shall be provided.

2B.45 Lift Car: Floor Covering

The floor covering shall be 6mm tactile rubber sheet having a continuous 35mm radius return on a solid core to the car skirting.

2B.46 Lift Car: Sill

The car sill shall be 4mm minimum section extruded manganese bronze, having self cleaning slots and shall be secured by brass countersunk set screws with self-locking nuts. The sill and the rolled steel sill support angle shall cover the full width of the door drive so that each set of door shoes are retained throughout the driven distances. Over the car entrance width, the horizontal distance between the car sill and each landing sill shall be no more than 30mm.

2B.47 Lift Car: Toe Guard

The height of the vertical portion shall be as near as possible to 750mm, subject to the requirement that there shall not be less than 100mm clearance between the bottom of the toe guard and the pit floor when the car rests on fully compressed buffers.

The toe guard shall be fabricated in 1.6mm zintec, supported by a horizontally and vertically braced mild steel frame attached to the car platform steelwork, and fixed at no more than 150mm centres to the car sill by countersunk brass set screws.

The toe guard shall extend to 100mm beyond the clear door width on both sides of the entrance.

2B.48 Lift Car: Enclosure

The Contractor shall provide a 600mm x 1200mm montage having two isometric views of the lift car, complete with all finishes.

Stainless Steel

The car walls, ceiling and front return panels plus the car and landing doors and architraves shall be fabricated in 16 gauge 316 grade patterned stainless steel for which the Contractor shall provide a mill certificate to the SO, prior to any fabrication.

Fixings

All nuts, bolts and washers to be used in the construction of the car carcass, platform and sub-floor shall be cadmium-plated and nuts shall be of the self-locking type.

Fixings, of any type, shall not be visible from the car or landings.

Evode Colour Seal shall be applied to form a separation barrier at the abutment of any dissimilar materials, and 3mm of fire resistant, anti-drumming compound shall be used on the shaft side of all wall and ceiling panels.

Wall Panels

The car wall panels shall be fabricated from patterned stainless steel not more than 250mm in width and shall be sufficiently braced and reinforced to withstand anticipated impact from heavy usage such as removals, prams and trollies.

All mating surfaces shall be treated with.

The bottom edge of the car wall panels shall be positioned 75mm above the car sub-floor and shall be bolted through a 16 gauge stainless steel angle trim 9mm in front of the skirting. The whole shall present a continuous flush face to the passenger with each panel fabricated in one piece vertically.

The joints between each of the car wall panels and each of the roof panels shall be separated by recessed 3mm Darvic strips which shall in all instances on the car be prevented from being forcibly pushed into the shaft by a return flange on all wall and ceiling panels.

The design of the car shall allow simple removal and replacement of the panels in the event of damage.

Return

The return shall be 60mm deep and fabricated from patterned stainless steel, reinforced throughout with 14 gauge zintec sheet steel.

Slam Post

The entrance slam post shall be fabricated from stainless steel, reinforced with 14 gauge zintec sheet steel throughout with all loads imposed transmitted to the steel car door entrance frame.

Skirting

The channel skirting shall be 316 grade, 3mm minimum satin finished stainless steel with welded gussets and shall have the bottom flange bolted to the car platform using a plastic membrane between to prevent electrolytic corrosion and chafing.

Handrail

Handrails shall be fabricated from 12 gauge, 316 grade satin finish stainless steel and formed to a 47mm x 25mm oval section with the widest part on the horizontal. The handrails shall fit the rear wall and one side wall of the lift car in one piece with end caps and 90° bend and end cap at the lift entrance.

The free space between the handrails and the car walls shall be 35mm.

The handrails shall be fixed with a minimum of six 90° stainless steel angle brackets, three to the side wall and three to the rear wall, and removal shall be from the lift shaft with fixings 900mm +25/-25mm to centre above the car floor.

Ceiling and Roof

The car ceiling shall be constructed from patterned stainless steel panels not more than 250mm in width and shall be reinforced externally with 14 gauge sheet zintec treated with a non-slip compound.

The design of the roof shall be such that it will adequately support the weight of 150Kg at any point on the roof surface without causing permanent deformation or damage. The working area shall be flat, smooth and without tripping hazards.

Ventilation

Concealed ventilation shall be provided to the car at the top and bottom of the side wall panels. The ventilation shall consist of 10mm diameter clear apertures totalling 1.5% of the total car floor area with robust masking plates to the shaft side of the car. The design of the vents shall be such that it shall not be possible for persons travelling in the car to touch any fixed or moving equipment in the lift shaft by means of inserting objects through the vents.

Car Drapes

The car shall be fitted with solid stainless steel capstan studs and supplied with two sets of padded and quilted, coloured canvas covered drapes to each wall and the return of each design of the lift car. The drapes shall have apertures for access to the car stations and a labelled carrying bag shall be provided for the drapes. A sprung rod with rubber end buffers shall be provided to support the drape at the mirror wall.

Plumbing and Alignment

Adjustments to the car shall be made by packing to the base and not by taking up tolerance on the car top isolation rollers which shall be fitted only after the plumbing and levelling of the completed car and inspection by the SO.

2B.49 Lift Car: Station

The faceplate shall be fabricated from 3mm linished stainless steel fitting flush to the wall panel and supported by stand-off furniture hinges on a metal back box mounted in the side wall, adjacent to the slam post.

The minimum lateral distance to the centre of any push from the return shall be 400mm

The hinged faceplate shall have secret fixings and shall incorporate the car station fixtures. The Contractor shall submit a drawing, for approval by the S0, indicating the incorporation, size and arrangement of the following:

1. TMO Lift Number and Identification - engraved characters, black, 20mm characters.
2. Contract Load in Kgs and Persons - engraved characters, black.
3. Auto Dialling Telephone Unit - engraved instruction, yellow.
4. Floor Pushes.
5. Speech Synthesiser.
6. Car Position and Direction Indicator.

7. Door Open Push.
8. Alarm Push, engraved characters, yellow.
9. Key Operated Fan Switch, engraved characters, black.,
10. No Smoking Notice - engraved characters, red.
11. Emergency Lighting Test Switch with LED indication.
12. Blank plate at Walkway push position. Wiring terminated behind faceplate in connection blocks.
13. Car Preference Key Switch, engraved characters, black.

Unless specified otherwise, all engraved characters shall be 12mm, and flush filled with epoxy resin.

The flat form trailing cables shall run continually from the controller to the car and shall be connected to terminal blocks permanently mounted in the metal back box behind the car station.

The car station fixtures shall be secured by weld studs to the faceplate to enable simple access and replacement of components by authorised personnel.

2B.50 Lift Car: Pushes

All pushes shall meet the requirements of EN81-70 and M2/S2 Building Regulations and shall:

1. Be stainless steel tactile coloured black for the floor and door open pushes, yellow for the alarm push and green for the Ground floor push.
2. Be flush mounted except for the Ground floor push that shall stand proud of the faceplate by 5mm.
3. Incorporate long life LED call acceptance.
4. Be half illuminance at all times with full illuminance to indicate call registered.
5. Remain half illuminance in the event of power failure.
6. Have an audible signal to signify that a call has been registered.
7. Be flame resistant.
8. Have shock loads on the pressel transmitted to the body of the unit and not the contacts.
9. Be of such design as to make the deliberate 'fixing' of the pressels in the depressed position difficult.

10. Have no fixing visible or accessible from the landings or the lift cars.
11. Have the lowest push to the car station positioned at 900mm centre and the highest push at no more than 1200mm centre above the car floor.

2B.51 Lift Car: Load Sensing Device

A load sensing device shall be fitted to the car sling or platform that shall automatically detect a pre-set overload limit of 10% and shall cause a buzzer to sound within the car.

At 80% load, or as determined during commissioning, the device shall activate a landing call by-pass condition causing the lift to respond only to car calls.

The device may be mounted either underneath or on top of the car, but if the latter, the device shall be suitably protected.

2B.52 Lift Car: Alarm Sounder

The alarm sounder system shall be run in conduit or trunking, except for in the travelling cables, and shall consist of 2 x 150mm bells that shall be suitable for a twelve volt d.c. supply.

One bell shall be positioned on top of the lift car and the other shall be housed within a 10 gauge 316 grade stainless steel box fixed to shaft front wall at the Ground floor by means of concealed masonry fixings. The faceplate shall be partially perforated and fixed by means of semi secret fixings to the back box. Pressure on the 'Alarm' push shall ring each of the bells.

2B.53 Lift Car: Voice Synthesiser

The voice synthesiser shall be digital quality and provide for the following messages, each of which shall be easily disabled from the machine room without the requirement to reprogram the unit:-

1. Floor identification,
2. Direction of travel,
3. Doors opening,
4. Doors closing,
5. Lift overloaded,
6. Information for trapped passengers,

The unit is to be located in the machine room and shall supply a matched high quality speaker unit in the car station with a switched duplicate speaker which shall be provided in the machine room for testing purposes. Volume adjustment is required to adjust for site conditions.

2B.54 Lift Car: Hands Free Auto Dialling System

Pressure on the 'Alarm' push shall also instantaneously activate the hands free auto dialling system that shall be capable of dialling a minimum of three separate locations, automatically progressing to the next number if engaged or unobtainable.

The unit shall have the facility to receive calls and shall incorporate an inductive loop and have the further facility to cancel on operation of the door open push and after a preset time interval. The autodialling system shall incorporate communications from the lift pit, car top and machine room.

A yellow illuminated pictogram in addition to the audible signal for the emergency alarm transmission shall indicate that the alarm push has been used and a green illuminated pictogram in addition to the audible signal normally required by voice link shall indicate that the emergency call / alarm has been registered.

On activation, the autodialler shall announce a concise message, whether within the lift car, in the lift pit or on the car roof. The message shall confirm that the emergency communication system has been operated, that contact is being made and a request to be patient whilst being connected. The message shall repeat after a short period until the call is acknowledged.

On connection, the recipient of an emergency call from the autodialler shall also receive a concise message, confirming the lift number or reference and that the emergency alarm has been activated.

An emergency call shall be terminated by the call automatically timing out. The duration of an emergency call shall be set at 4 minutes but this may be extended if required by pressing the alarm push again. The last 30 seconds of a call shall be identified so that the call may be extended without loss of the facility.

Two-way communication with the activated alarm station whether in the lift car, pit, or car top shall commence only after the call has been acknowledged.

The system shall allow for the lift car, pit or car top emergency communication station to be called from any external mobile or landline telephone point but such calls shall not be connected if the emergency autodialling system is in operation. The destination for calls made externally shall be determined from the caller's handset, and these calls shall be announced by a concise message, prior to allowing hands free, two-way communication from the lift or shaft.

The cabling shall be terminated in the machine room for final connection by others.

Clear, concise instructions shall be engraved in the car station in 12mm characters, flush filled with epoxy resin.

2B.55 Lift Car: Lighting

1. The lift car shall have two vandal resistant light fitting enclosures which shall be approximately 700mm long and 250mm wide.

2. The light fitting enclosures shall be manufactured from mild steel, have ventilation slots to the sides and shall be reinforced and braced to withstand a load of 75kg with the whole assembly that shall be supported on the car roof by means of mild steel angle to all four sides.
3. The interior of the enclosures shall be cellulosed white and the whole assembly shall mount flush on the car ceiling.
4. The diffusers shall consist of two layers of shock and impact resistant polycarbonate sheet, the upper layer 3mm opal and the lower layer 10mm clear. The diffuser shall be secured on each side by means of mild steel angle affixed to the enclosure, all to be contained within 1 2.5mm stainless steel frame.
5. In the light fitting enclosures the gap between the bottom of the lamps and the uppermost part of the diffuser shall be nominally 25mm. The complete enclosure assembly shall be made readily removable from the top of the car to ensure ease of access for maintenance of the fittings. To facilitate this, the enclosure shall be secured to the car top by wing nut fixings of 5mm minimum diameter or other similar arrangements.
6. Each enclosure shall contain two 18 Watt x 600mm fluorescent tube fittings each separately controlled to maintain illumination in the event of one fitting ceasing to operate. The lighting shall achieve 200 lux at floor level. One tube in each of the enclosure shall incorporate the emergency lighting system.
7. A key switch shall be incorporated in the car station in order that the emergency car lights may be tested without disconnecting the normal lighting supply. The LED indicator in the car station shall visibly signify that the emergency lighting unit is fully charged.
8. The car light supply shall be separate from the car top lighting and power and a 2 Amp cartridge fuse and terminal block shall be fitted within the enclosure.

2B.56 Lift Car: Emergency Lighting and Alarm Supply

The battery and charging unit for the car emergency lighting shall be fixed on top of the lift car, in a position that does not create a safety hazard and with the wiring run in trunking and/or conduit.

The battery shall power the car emergency lighting and the alarm signal system and shall have the capacity to maintain each for a period of at least 3 hours and, on restoration of the mains supply, the battery shall fully re-charge, automatically, within 24 hours.

The battery shall additionally power the background illumination to all lift car pushes and all position indicators for the same 3 hour period.

The battery shall be fed from the live side of the car light switch in the machine room.

The supply to the luminaires shall be provided via a key operated switch which, on operation, shall disconnect the supply, simulating mains failure for testing purposes.

2B.57 Lift Car: Forced Ventilation

Forced ventilation shall be achieved by means of a protected, silent running exhaust fan unit mounted on the car roof. Ducting shall be provided to encompass a number of the concealed vents in the rear wall of the car. The position of the fan unit shall be agreed by the SO.

The fan shall be activated by a key switch in the car station which, when in the 'OFF' position shall automatically become operable upon activation of the alarm push for an adjustable time period of up to three hours.

2B.58 Automatic Power Door Operator

The automatic door operator shall meet the following:-

1. It shall be driven by a variable frequency AC motor in both opening and closing directions. The motor shall be totally enclosed and rated for its anticipated duty cycle.
2. The door speed during operation, shall have sinusoidal characteristics.
3. When the car top control is set to test with the car not at landing position it shall be possible to test, from the car top control station, the functioning of the door operator without operation of any other lift equipment and without damage to any equipment.
4. With the exception of 3. above, the car door and associated landing doors shall operate simultaneously and only with the car stationary at a landing.
5. In the event of a power failure and with the car at any landing level, it shall be possible to manually open both the car door and associated landing door, from the landing concerned, with the use of a release key.
6. The operator shall incorporate provision for simple adjustment of door speeds and shall provide the following:
 1. Fast opening speed
 2. Slow closing speed with a check prior to impact.
7. It shall effect mechanical locking of the car door between floor zones.
8. In the event of failure of the lock circuit while the car is in travel, the car door shall not be opened or partially opened by the door operator or by any other means.
9. The lift shall normally park with its doors closed.
10. It shall stop, reverse and fully re-open the car door and its associated landing door if the electronic detector is obstructed while the doors are closing.

11. A 'DOOR OPEN' push shall be provided in the car which shall only operate while the car is stationary at a landing.

2B.59 Passenger Protection

The car doors shall be fitted with a full height multi-beam electronic detector. The detector shall be so arranged that should an obstruction be present whilst the door is closing it shall cause both car and landing doors to stop and initiate a door re-open cycle. The device shall not inhibit the full clear opening.

The detector flex shall be concealed and secured so as to prevent movement against other equipment and in the event of circuit or other failure for whatever reason the lift shall fail safe.

2B.60 Car and Landing Doors

The car and landing doors shall be horizontally sliding having a minimum clear opening as stated in Scope of the Works and the doors shall:

1. Have the car and landing doors fabricated from a different patterned stainless steel to that utilised on the lift car and landing architraves to ensure an alternative textured finish.
2. Be located in the bottom of each door sill by two water and acid resistant, rigid nylon sliding shoes each having a minimum length of 100mm and secured to the well side of the door by a 2.5mm mild steel bracket with three non adjustable fixings such that the shoes may be replaced easily, without lifting the door.
3. Between each sliding shoe a similar flange with five non adjustable fixings shall support a 150mm long 10 gauge mild steel kick plate that shall penetrate the bottom track by not less than 6mm.

Alternatively the kick plate may form part of the structural component of the door, projecting internally 100mm.

4. Have the vertical clearance between the doors and the sill not exceeding 5mm.
5. Have the horizontal clearance between the doors, door return and architrave not exceeding 5mm.
6. Be suspended from hangers fitted with rollers which run above the top track and have eccentric rollers fitted below the top tracks to stabilise the doors. The rollers shall rotate on roller bearings or similar with 'sealed for life' lubrication.
7. Have hangers and sill shoes that shall be supported by an 8mm thick steel plate fixed at the head and foot of the door. Door hanger fixings shall have a minimum of 15mm thread penetration and a maximum of 5mm shimming.
8. Be fabricated in 16 swg zintec sheet steel, being of hollow construction with internal stiffening sections and faced with patterned stainless steel.

9. Have 16swg patterned stainless steel sight guards to the landing doors, formed in one piece with the landing face of the door and braced over the entire height, returning to the shaft side of the door and pinned with a maximum spacing of 100mm.
10. Have the fixing of associated door equipment to the car and landing doors by means of set screws and bolts with the appropriate shake-proof washers to steel plates specifically fabricated within or on the door construction for the purpose. P.K., Pop rivet or riv-nuts are not acceptable.
11. Be provided with spring closers to ensure automatic closing of each landing door panel when the car is outside the unlocking zone. The closer shall consist of a substantial mild steel arm fixed to the landing sill and shall have a positive spring loaded action.
12. Have a mechanical and electrical interlock to each landing door panel. The locks shall have a clear, toughened, removable plastic cover, sealed to prevent possible ingress of water whilst allowing visible and easy adjustment without the use of special equipment.
13. Have the mechanical and electrical interlock of such design and positioning that interference of the lock or its operation shall not be possible other than by an authorised person.
14. Have the mechanical and electrical interlock pinned after final positioning.
15. Have no fixings visible or accessible from the landings or within the car.
16. Have the landing doors so constructed that when in the locked position, they shall withstand, without permanent deformation, a force of 300N applied at right angle to any point on the landing face, uniformly distributed over an area of 5 sq. centimetres. The doors shall operate satisfactorily after such a test.

2B.61 Emergency Unlocking of Landing Doors

It shall be possible for an authorised person to open each landing door irrespective of the position of the lift car. Opening shall be by means of a drop key unlocking release in the door panel, complete with baffle plate.

2B.62 Landing Door Frames and Architraves

1. The landing entrance steelwork uprights shall be fabricated from rolled steel sections.
2. The header section shall be fabricated from 6mm flat steel plate, pre-drilled to suit the uprights and track assembly.
3. All landing entrances shall be located within a recess in the landing floor slab and the Contractor shall make provision to fix the threshold steelwork to the structural floor by means of bracketry and concrete anchors prior to the final building in and screeding by others.

4. The Contractor shall make provision for fixing the landing architraves to the entrance steelwork and shaft fabric. The fixings shall not be accessible or visible from the landing or the car.
5. The architraves shall be of Stonehenge design fabricated in patterned stainless steel to the full depth of the shaft wall having a 60mm to 100mm tapered face to the vertical section and a flat 100mm to the horizontal section. The architraves shall be recessed 6mm into the front wall of the landing and shall project from the front wall finish by 20mm.
6. The architraves shall be fabricated in three sections and shall be of bolted construction, the lower section projecting 25mm below floor level to be built in.
7. The rear return of each architrave shall be wide enough to eliminate any finger traps.
8. The 25 mm deep recess for the doors to close into shall be fitted with 3mm buffers, fitted 100mm from the top and bottom of the doors.
9. Adjustable rubber buffers shall be fitted to the entrance steelwork to prevent the landing doors from opening more than 3mm beyond the clear opening width. The buffers shall be fitted 100mm from the top and bottom of the doors.
10. The architrave header at the Ground and First Floors shall be engraved LIFT HO..... in 40mm high characters, flush filled with epoxy resin.
11. The architrave shall have reinforced webs for additional strength and for binding during the back filling builders work.

2B.63 Landing Sills

The landing sills shall be 4 mm minimum section, extruded manganese bronze having self cleaning slots and shall be secured by brass countersunk set screws with self locking nuts. The sill and any support steelwork shall cover the full width of the door drive so that each set of door shoes are retained throughout the driven distances.

2B.64 Landing Fascias

Landing fascias shall be fabricated from 16 swg zintec steel sheet and shall extend from each entrance header section to the sill at the next level served and shall be the width of the entrance plus 100mm to each side. The fascias shall be stencilled with the appropriate floor designation in 50mm high characters below each sill

The fascias shall be reinforced and braced as necessary to restrict deflection to 5mm and shall be secured by countersunk set screws at 100mm centres.

Fascias shall also be fitted below the lowest and above the last entrance served, returning to the walls and at no point in the shaft shall the fascias exceed 30mm from the car sills.

2B.65 Landing Stations

The existing back box to the landing station shall be retained and modified to suit the Contractors provision of an extended faceplate that shall be of sufficient length to conceal the back box aperture and to accommodate the landing pushes at a compliant height of 1000mm centres above floor level.

The extended faceplate shall be angle edged, projecting 30mm from the wall shall be fabricated in 16 gauge satin stainless steel.

The faceplate shall be secured by means of extended 6mm stud welds and nuts located on the shaft side.

The landing station shall incorporate the following:

1. Up and down call pushes,
2. Floor number engraved 40mm high characters infilled black.

The walkway station shall comprise a traditional zintec back box plus 3mm stainless steel faceplates secured by means of furniture hinges plus semi secret fixings.

2B.66 Landing Pushes

All pushes shall meet the requirements of EN81-70 and M2/S2 Building Regulations, shall be flush mounted and shall:

1. Be stainless steel tactile with colour contrast.
2. Incorporate long life LED call acceptance indicators.
3. Be half illuminance at all times with full illuminance to indicate that a call has been registered.
4. Have an audible signal to signify that a call has been registered.
5. Be flame resistant.
6. Have shock loads on the pressel transmitted to the body of the unit and not the contacts.
7. Be of such design as to make the deliberate 'fixing' of the pressels in the depressed position difficult.
8. Have no fixings visible or accessible from the landings or the lift cars.
9. Have all pushes positioned between 900mm and 1100mm from finished landing floor level.

2B.67 Landing Position Indicator

The landing position indicator shall be enclosed at each floor by a 16 gauge satin stainless steel box and faceplate with fixings identical to those described in Clause 2.66, at a height of 1800mm centre from finished floor level. The faceplate shall be canted to provide maximum field of vision.

1. Each landing shall have a position indicator to the same specification as that provided to the car but shall also incorporate hall lantern features.
2. When the lift is due to arrive at the pre-determined floor the LED direction indicator will light to notify the continuing direction of car travel and the audible signal shall announce imminent arrival. The visible indicator shall be maintained until the doors have closed.
3. The audible signal to activate 5 seconds prior to lift arrival, with 1 signal for UP and 2 signals for DOWN. The signal tone shall be agreed with the SO.

2B.68 Out of Service Indicator

In the event of the lift ceasing to provide service through, malfunction or supply failure, each position indicator shall scroll "LIFT OUT OF SERVICE". The Sub Contractor shall provide the necessary emergency supply to enable this feature to function for 12 hours continuous operation.

2B.69 Notices, Labels and Instructions

Unless specified otherwise, all notices and labels shall be engraved on white-red-white paxolene and all shall be securely fixed with screws. All characters shall be of similar style and in capitals.

Adhesive fixing is not acceptable.

In addition to the notices and labels otherwise specified within Part 2 and Clause 3.29, the following notices and labels shall be provided:-

1. To identify all miscellaneous electrical switches within the machine room and shaft including the main isolator and consumer unit fuses.
2. To the controller door advising the clients lift number of the live condition of the equipment.
3. To identify all run/stop switches.
4. A 240mm x 170mm paxoline notice to the lift machine room door stating:

DANGER

**UNAUTHORISED ACCESS PROHIBITED
DOOR TO BE KEPT LOCKED**

The word "DANGER" shall be red and all other wording shall be black.

The following shall also to be provided:-

5. Encapsulated, fully detailed and illustrated, hand raising / lowering and emergency release instructions.
6. Encapsulated electric shock notice in accordance with the current IEE Regulations to the machine room.
7. Encapsulated electrical and operational drawings, wall mounted within the machine room, using swivel type brackets.
8. Tool rack to accommodate the landing door drop release key and safety harness. Each component shall be clearly identified by permanent labels on a shadow board arrangement.
9. Service Log Card and Planned Maintenance Programme.
10. Plastic ring binder with divisions for copies of work sheets, LG1 certification, Statutory Inspection PAS 54, rope and beam test certificates.

2B.70 Guarding

The complete lift installation shall be guarded as necessary to meet the requirements of BS 7255 to ensure the safety of all personnel using, inspecting or maintaining the lift equipment.

The Contractor shall provide two fixed harness points to the car sling and a tubular barrier rail with 25mm weld mesh sides to the car top to prevent inadvertent movement into the counterweight and void areas.

A 150mm high zintec skirting shall be fitted to the edges of the car roof.

The design of all guarding shall be agreed by the SO.

2B.71 Painting and Cellulosing

Paint selection shall be approved by the SO and COSHH certificates shall be provided 7 working days in advance of proposed works and in all cases the full requirements of the COSHH certificate are to be implemented to the satisfaction of the SO.

All fabricated and structural iron and steel parts of the lift equipment, but excluding specially finished surfaces, shall be cleaned, wire brushed where necessary, descaled, properly prepared and primed with a zinc-phosphate primer and finished with good quality lead free enamel semi-gloss paint prior to delivery.

All iron and steel rotating parts of the lift equipment, counterweights etc, shall be painted yellow to BS 10E53 in accordance with BS 7255.

Over the whole width of the top edge of the car toe guard the Contractor shall paint alternate 75mm black / yellow stripes at an angle of 45° to the horizontal and to a depth of 150mm.

To the whole 'refuge' areas on the car top and in the lift pit the Contractor shall paint alternate 75mm black / yellow stripes at an angle of 45° to the landing sill.

To all lifting beams and support steels the Contractor shall paint alternate 75mm black / yellow stripes at an angle of 45° to the horizontal.

All fixed guards shall be painted safety orange.

The shaft side of the car and landing doors plus the fascias shall be cellulosed matt black prior to delivery.

Preparation for on site cellulosing maybe undertaken in normal operational hours but all spraying shall be undertaken at nights or weekends.

No on site painting or cellulosing shall be undertaken without 72 hours prior written agreement from the SO.

2B.72 Tests on Completion and Handing Over

After installation of the lift has been completed, the Contractor shall, in the presence of the SO carry out the tests and examinations set out in EN 81-PAS 32, together with any further dynamic or other tests required by the SO to ensure that the installation complies with the specification.

The SO shall not attend site to undertake any witness or commissioning tests until receipt of the Contractors test document and items list, with all items clearly identified as being complete and signed off as witnessed by the Contractors supervisor or project manager.

The SO shall allocate one working day for witness and commissioning tests for the lift. Any additional visits shall be charged as a set off against the contract and the defects liability period shall not be deemed to have commenced until all outstanding works have been completed to the SO's approval, notwithstanding the penultimate paragraph of Clause 2.09.

The Contractor shall provide all test weights, thermometers, test equipment, light meters and special instruments, all with current calibration certificates, and personnel required for this purpose and shall provide the appropriate Certificate of Test and Examination duly completed together with any other necessary Certificates that have requested previously.

In addition to the testing requirements of EN 81-PAS 32 the Contractor shall include for the following supplementary tests:-

1. Load tests by carrying the contract load throughout the travel and at the contract speed for continuous series of consecutive trips aggregating to a period of 30 minutes on mains supply.

During these tests, the motor and controller shall be checked for excessive temperature rise. Checks shall also be made to ensure that the contract speed is maintained and that the levelling limits are not exceeded under no-load conditions and under selected conditions of load.

2. Setting of the main circuit breaker trips in relation to the stalling current and overload.
3. Tests to record compliant closing forces on doors.
4. System and motor current readings under full load, balanced load and empty car conditions.

2B.73 Maintenance and Remedy of Defects

The Contractor shall assume responsibility for maintaining all lifts in accordance with this clause from the date of site possession.

The Contractor shall warrant and maintain the lifts from handover throughout the defects liability period which shall extend from site possession of the first lift, to twelve calendar months from the date of issue of the relevant Acceptance Certificate by the Contractor on Practical Completion of the final lift.

Maintenance to the refurbished lifts shall be undertaken twice each month for the first three months and monthly thereafter.

The lift pit, pump room and all parts of the walls and floor adjacent to the lift equipment shall be kept clean and clear of oil, grease and rubbish and the Contractor shall immediately renew any defective lamps, tubes and indicators including car, access, machine room and shaft lighting.

The maintenance shall include all cleaning, oiling, greasing, and adjustments of all appropriate parts of the lift installation to ensure satisfactory operation, with adjustments made as necessary to maintain the levelling accuracy of the car to within plus or minus 6mm. A steel oil storage cabinet shall be provided for the pump room.

A safety barrier is to be used at all times access is required to the lift shaft and this shall be supplied by the Contractor and left on site. The barrier shall not be left unattended when the landing doors are open.

A report on the condition of the lift inspected shall be forwarded to The Royal Borough of Kensington & Chelsea within ten working days of the date of inspection and the report shall:-

1. Relate to only that lift.
2. State clearly the work done and adjustments required/made.
3. Indicate any lamps or indicators replaced
4. Certify that the lift is or is not in a satisfactory and serviceable condition.

5. Give details of any breakdown since the previous inspection.

During the extended defects liability and maintenance period, the Contractor shall, at his own expense, make good any defective, badly worn or weakened parts resulting from incorrect design, poor workmanship or faulty material.

The Contractor shall undertake any LG1 inspections and certification which may become due during the specified maintenance period.

The Tenderer shall operate and include for a 24 hour emergency breakdown service and shall attend to call-outs during normal working hours within 2 hours of reporting of the call.

In the event of a trap call the Contractor shall ensure that the equipment is rendered safe and that any trapped passengers are released within 30 minutes of the call being received. The Contractor shall make such necessary arrangements as required i.e. use of qualified local Contractor, to ensure that the 30 minutes release for trap release is maintained under all circumstances.

During the defects liability and warranty period the Contractor must be prepared, if and when required, to make nightly and weekend visits in cases of emergency and shall provide the telephone numbers to be used for these call-outs.

Attendance to lift breakdowns resulting from accidental damage, mis-use, vandalism and equipment failures not due to default on the part of the Contractor or his agents shall be paid for against a separate direct order to be issued by the SO.

The Contractor shall allow for one day's training of The Royal Borough of Kensington & Chelsea Tenant Management Organisation Ltd staff in usage and emergency release operation.

2B.74 Witness Inspection Points

Witness Inspection Points are to be available to the SO with a minimum of 3 days notice by the Contractor:

1. Witness inspection of the lift controller under test at the Contractor's Works.
2. Witness inspection of lift car with doors and operator fitted at Contractor's Works.
3. Witness inspection of site readiness.
4. Witness inspection of guide rails with alignment equipment still in position.
5. Witness inspection of machine room after fixing positions of controllers, machines etc.
6. Witness inspection of car, sling, counterweight and diverters and alignment.
7. Witness inspection of main roping and compensation arrangements.

8. Witness inspection of safety gear and all pit equipment.
9. Witness inspection of compensation and governor ropes.
10. Witness inspection of entrance frames and sills prior to building in.
11. Witness inspection of hangers, tracks, doors, closers and locks complete.
12. Witness inspection of architraves, prior to building in.
13. Witness inspection of tubed and trunked lift car, complete with doors and operator.
14. Witness inspection of trailing flexes hung and connected.
15. Witness inspection of shaft and landing equipment, installed and wired.
16. Witness inspection of machine room trunking and conduits, etc. before floor screed is laid.
17. Witness inspection of wired electrical equipment in the machine room.
18. Witness inspection of cleaned down shaft, painting, screens, builders work and lift ready for test.
19. Witness inspection of commissioning tests.
20. Witness inspection of items complete and handover.

The Tenderer shall allow and include for all SO attendances and costs for off site witness tests.