
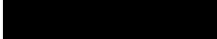


**THE REFURBISHMENT OF**  
**TWO ELECTRIC PASSENGER LIFTS, HO90&91**  
**AND**  
**REPLACEMENT OF ONE HYDRAULIC PASSENGER LIFT, HO92**  
**AT**  
**GRENFELL TOWER**  
**LANCASTER WEST ESTATE**  
**LONDON W11**  
**FOR**  
**THE ROYAL BOROUGH OF KENSINGTON & CHELSEA**

Butler & Young Lift Consultants Limited  
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April 2004

L2508

The Royal Borough of Kensington & Chelsea  
Tenant Management Organisation Ltd  
The Town Hall  
Hornton Street  
London W8 7NX

Prepared by: .....


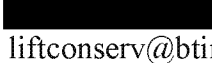
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**PART ONE**

**SCOPE OF THE WORK**

**THE LIFTS**

**DRAWINGS ISSUED**

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**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 proprietary 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**

**INDEX - PART TWO****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.



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

#### **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.

Evoid 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.

**2A/78 Drawings**

The drawings overleaf detail the suggested means of achieving the requirements of the specification and tender documentation.

The drawings are subject to the Tenderers own detailed assessment and final design, responsibility rests with the Contractor.



**PART TWO B**

**LIFT SPECIFICATION**

**ONE HYDRAULIC PASSENGER LIFT, HO92**

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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 <sup>rd</sup> September 2004	
Construct New Pump Room	14 <sup>th</sup> November 2005	(6 weeks)
Design, Manufacture, Procurement and Delivery	19 <sup>th</sup> January 2006	(70 weeks)
Possession of Shaft	19 <sup>th</sup> January 2006	
Handover	1 <sup>st</sup> 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 device 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 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. 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 LGI 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.

**PART THREE A**

**ELECTRICAL SPECIFICATION**

**TWO ELECTRIC PASSENGER LIFTS, HO90&91**



**INDEX - PART THREE**

**ELECTRICAL SPECIFICATION**

**SPECIFICATION OF THE WORKS**

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**PART THREE A**

**ELECTRICAL WORK - TWO ELECTRIC PASSENGER LIFTS, HO90&91**

**3A.01 General**

The physical location of all equipment shall be agreed with the SO prior to any site installation work and all existing supplies, switchgear, conduits or trunking shall be removed where not compliant with the requirements of the specification.

All wiring shall be classified as low smoke and zero halogen.

All work necessary to provide a fully operational installation, compliant with all current standards and legislation including equipotential bonding of all exposed metalwork, shall be included.

The electrical works shall be undertaken by an NICEIC qualified electrician and a copy of all electrical test sheets shall be included in the Operation and Maintenance Manual.

The complete electrical installation shall meet the requirements of the specification.

**3A.02 Temporary Electrical Installation**

The Contractor shall provide all temporary lighting, low voltage power supplies and temporary supplies to drive the lift machine from existing supply points during the works in accordance with Health and Safety requirements.

The use of temporary supplies to drive the lift machine during the works shall be limited to as short duration as possible and shall comply with IEE electrical regulations and requirements.

Temporary site lighting shall be 110volt supplied with a centre tapped transformer with 100watt tungsten bulb light fittings positioned at 3m intervals. Each light fitting shall be protected to prevent accidental damage and arcing against conductive parts if broken.

Durable and environmentally protected 110volt power sockets and plugs shall be provided at 3m intervals.

Temporary lighting and power cables including extension leads shall be considerably used/located and cable tied to temporary works ie: hoardings, scaffolding or the building fabric, to prevent tripping and guillotine hazards or snagging points occurring.

Wherever possible all electrical provisions shall be sourced from any new supplies, provided and fused switches and sockets as further specified.

**3A.03 Existing Electrical Supplies**

The three phase supply to the lift may be retained if suited to the new conditions. The Tenderer shall confirm suitability in his tender return.

## 3A.04 Main Isolators

A lockable 80A TPN fuse switch and a lockable 63A SPN fuse switch shall be provided for the lift controller and the consumer unit respectively.

All electrical works detailed below shall be undertaken by the Contractor.

## 3A.05 Lift Machine Room Auxiliary Supplies

A 12 way consumer unit shall be provided in the machine room adjacent to the 63A SPN fuse switch. The consumer unit shall incorporate miniature circuit breakers, to BS 3871, Type 2, to provide 240V a.c. single phase supplies as follows:

- |          |  |                  |
|----------|--|------------------|
| 1.       | Machine room lighting                                    | - 6 Amps rating  |
| 2.       | Machine room heating                                     | - 20 Amps rating |
| 3.       | Power sockets  | - 20 Amps rating |
| 4 & 5.   | Shaft lighting per lift                                  | - 6 Amps rating  |
| 6 & 7.   | Car light supply per lift                                | - 6 Amps rating  |
| 8 & 9.   | Car top maintenance control, lighting and power per lift | - 20 Amps rating |
| 10 & 11. | Autodialler per lift                                     | - 6 Amps rating  |
| 12.      | 1 spare ways   | - Blanked off    |

## 3A.06 Machine Room Lighting

Four twin 1850mm - 70W fluorescent fittings with polycarbonate diffusers shall be positioned over the controller, machine and access areas to provide 200 lux illumination at floor level. An additional fitting to the same specification shall be provided within the roof access corridor.

The light switch shall be located adjacent to the machine room access door and the supply to the luminaires shall be provided via a key operated switch with LED indication which, on operation, shall disconnect the supply, simulating mains failure for testing purposes.

Emergency luminaires shall be provided within each fluorescent fitting, each of an 8 watt fluorescent type, non-maintained.

## 3A.07 Shaft Lighting

Shaft lighting shall consist of 600mm twin fluorescent fittings with 3mm polycarbonate diffusers having screw fixings. One fitting shall be provided 500mm from the top and bottom of the shaft and one at each level served.

Control of the shaft lighting shall be independent and 3 way switched from the machine room, pit, and car top with each switch engraved 'Shaft Lighting'.

### **3A.08 Socket Outlets**

Twin 13 amp socket outlets shall be provided adjacent to each controller, machine and in each lift pit. Each outlet shall be protected by residual current devices rated at 25amp 30ma.

### **3A.09 Car Lighting and Car Top Maintenance Control**

Both the car top maintenance control light and socket outlet and the car lighting shall each have a separate feed from the consumer unit, with notices stating:

‘CAR LIGHTING’ and ‘CAR TOP CONTROL’

### **3A.10 Machine Room Heating**

A minimum of four 1200mm tubular heaters shall be fixed to the wall adjacent to each machine, fed from the consumer unit.

The heaters shall be controlled by a metal clad, wall mounted adjustable thermostat to provide ambient temperature control between +5°C and +20°C.

### **3A.11 CCTV - In Car Security Cameras**

A low loss, co-axial travelling cable shall be installed terminating in conduit boxes at the car top and machine room suitable for the re-commissioning of the security cameras within the lift cars. The Contractor shall provide a 24v a.c. supply on the car roof for this purpose.

### **3A.12 Cooling**

The Contractor shall provide cooling either by air conditioning, chiller unit or low velocity extract fan to achieve sufficient cooling to maintain the machine room equipment at the Contractor's designed operating temperature limits but in no event to exceed 40°C.

The Tenderer shall confirm in the Tender Return if the equipment to be provided shall require cooling.

**PART THREE B**

**ELECTRICAL SPECIFICATION**

**ONE HYDRAULIC PASSENGER LIFT, HO92**

**INDEX - PART THREE**

**ELECTRICAL SPECIFICATION**

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**PART THREE B**

**ELECTRICAL WORK - ONE HYDRAULIC PASSENGER LIFT, HO92**

**3B.01 General**

The physical location of all equipment shall be agreed with the SO prior to any site installation work and all existing supplies, switchgear, conduits or trunking shall be removed where not compliant with the requirements of the specification.

All wiring shall be classified as low smoke and zero halogen.

All work necessary to provide a fully operational installation, compliant with all current standards and legislation including equipotential bonding of all exposed metalwork, shall be included.

The electrical works shall be undertaken by an NICEIC qualified electrician and a copy of all electrical test sheets shall be included in the Operation and Maintenance Manual.

The complete electrical installation shall meet the requirements of the specification.

**3B.02 Temporary Electrical Installation**

The Contractor shall provide all temporary lighting, low voltage power supplies and temporary supplies to drive the lift machine from existing supply points during the works in accordance with Health and Safety requirements.

The use of temporary supplies to drive the lift during the works shall be limited to as short duration as possible and shall comply with IEE electrical regulations and requirements.

Temporary site lighting shall be 110volt supplied with a centre tapped transformer with 100watt tungsten bulb light fittings positioned at 3m intervals. Each light fitting shall be protected to prevent accidental damage and arcing against conductive parts if broken.

Durable and environmentally protected 110volt power sockets and plugs shall be provided at 3m intervals.

Temporary lighting and power cables including extension leads shall be considerably used/located and cable tied to temporary works i.e: hoardings, scaffolding or the building fabric, to prevent tripping and guillotine hazards or snagging points occurring.

Wherever possible all electrical provisions shall be sourced from any new supplies fused switches and sockets as further specified.



## 3B.03 Electrical Supplies

New supplies comprising multi use armoured cable shall be provided from the plant room electrical intake area to the new pump room at Ground Level. The cables shall be routed via the existing cylinder chamber through the pit floor.

The supplies shall be terminated in a 63A TPN lockable fuse switch for the lift controller and a 63A SPN lockable fuse switch for the consumer unit.

## 3B.04 Lift Pump Room Auxiliary Supplies

A 9 way consumer unit shall be installed in the pump room adjacent to the 63A SPN fuse switch. The consumer unit shall incorporate miniature circuit breakers, to BS 3871, Type 2, to provide 240V a.c. single phase supplies as follows:

- |  |                  |
|--|------------------|
| 1. Pump room lighting                              | - 6 Amps rating  |
| 2. Pump room heating                               | - 20 Amps rating |
| 3. Power sockets                                   | - 20 Amps rating |
| 4. Shaft lighting                                  | - 6 Amps rating  |
| 5. Car light supply                                | - 6 Amps rating  |
| 6. Car top maintenance control, lighting and power | - 20 Amps rating |
| 7. Autodialler                                     | - 6 Amps rating  |
| 8&9. 2 spare ways                                  | - Blanked off    |

## 3B.05 Pump Room Lighting

Two twin 1500mm 58W fluorescent fittings with polycarbonate diffusers shall be positioned over the controller and pump unit to provide 200 lux illumination at floor level.

The light switch shall be located adjacent to the machine room access door and the supply to the luminaires shall be provided via a key operated switch with LED indication which, on operation, shall disconnect the supply, simulating mains failure for testing purposes.

Emergency luminaires shall be provided within each fluorescent fitting, each of an 8 watt fluorescent type, non-maintained.

## 3B.06 Shaft Lighting

Shaft lighting shall consist of 600mm twin fluorescent fittings with 3mm polycarbonate diffusers having screw fixings. One fitting shall be provided 500mm from the top and bottom of the shaft and one every 3m in between.

Control of the shaft lighting shall be independent and 3 way switched from the machine room, pit, and car top with each switch engraved 'Shaft Lighting'.

**3B.07 Socket Outlets**

Twin 13 amp socket outlets shall be provided adjacent to the controller, pump unit and in the lift pit. Each outlet shall be protected by residual current devices rated at 25amp 30ma.

**3B.08 Car Lighting and Car Top Maintenance Control**

Both the car top maintenance control light and socket outlet and the car lighting shall each have a separate feed from the consumer unit, with notices stating:

'CAR LIGHTING' and 'CAR TOP CONTROL'

**3B.09 Machine Room Heating**

A minimum of four 1200mm tubular heaters shall be fixed to the wall adjacent to the pump unit, fed from the consumer unit.

The heaters shall be controlled by a metal clad, wall mounted adjustable thermostat to provide ambient temperature control between +5°C and +20°C.

**3B.10 CCTV - In Car Security Cameras**

The Tenderer shall include for the future provision of CCTV.

A low loss, co-axial travelling cable shall be installed terminating in conduit boxes at the car top and machine room suitable for the installation of security cameras within the lift car. The Contractor shall provide a 24v a.c. supply on the car roof for this purpose.

**3B.11 Cooling**

The Contractor shall provide cooling either by air conditioning, chiller unit or low velocity extract fan to achieve sufficient cooling to maintain the machine room equipment at the Sub Contractor's designed operating temperature limits but in no event to exceed 40°C.

The Tenderer shall confirm in the Tender Return if the equipment to be provided shall require cooling.

**PART THREE C**

**ELECTRICAL SPECIFICATION**

**STANDARDS OF MATERIALS & WORKMANSHIP**

**INDEX - PART THREE (Continued)**

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**ELECTRICAL - STANDARD OF MATERIALS AND WORKMANSHIP**

**3C.01 Regulations**

The whole of the works shall be executed in accordance with the Regulations stated in this specification and all wiring shall be LSOH.

**3C.02 General**

All trunking, conduit and wiring shall be replaced unless otherwise specified.

All material shall be free from rust or damage and shall be stored 'off ground' and protected prior to use, with the ends or apertures in conduit, trunking and other equipment sealed.

Plugs and screws of adequate lengths and size shall be used for securing materials and equipment to structural concrete and brickwork. Fixings shall not be made in stud partitioning, plasterboard or structural steelwork nor shall 'fired' pins or screws be used.

Fixings to structural steel or metalwork shall be made by use of adequately sized and rigidly secured clamps manufactured from similar material to the steel or metal.

**3C.03 Electricity Supply**

The Contractor shall be responsible for all electrical installation work from the supply point.

**3C.04 Distribution Boards**

Distribution boards shall be metalclad and of the 415/500v pattern and comply with BS 5486: 1989, Part 11 or 12 as appropriate and be fitted as later specified with either:

- a) HRC fuselinks and carriers to BS 88 – 2.2 : 1988 with a fusing factor Q1 not exceeding 1.5 or,
- b) Miniature Circuit Breakers of the “current limiting” type, with “bolt-on” connections on the BS EN 60898 : 1991 or,
- c) Moulded Case-Circuit Breakers, to BS EN 60898 : 1991.

Every distribution board and the circuit phases and poles shall be clearly labelled.

Each distribution board shall be indelibly marked to indicate the number of the British Standard, i.e. BS 5486, the rated voltage and current, the suitability for use with AC only or DC only, the diversity factor and the manufacturer's name or distinguishing mark.

Neutral bus-bars shall be of the same current carrying capacity as the phase bus-bars and all SP & N, T.P & N distribution boards shall have one outgoing neutral terminal for each circuit.

A brass earth terminal block having the same number of terminals as the neutral bus-bars shall be provided and securely bolted to the inside of the distribution board case.

All distribution fuseboards shall be fitted with an earthing terminal with brass washers and nuts.

Distribution boards shall not be made up from “consumer unit” type enclosures unless specifically requested.

The distribution boards shall incorporate an integral isolator and contain the maximum number of fuseholders or miniature circuit breakers, irrespective of the number being used. All spare fuseways and miniature circuit breakers shall be of assorted sizes to correspond to the used ways of distribution board/consumer's control unit. The labelling of each circuit shall clearly identify the circuit fed and the mcb or fuseway.

### 3C.05 Low Voltage Switches

Isolators, switchfuses, fuseswitches, whether mounted in cubicle type switchboards or separately, shall conform to the requirements of BSEN 60947 : 1992 and Section 537 of the IEE Regulations and shall be rated at 500 volts, those items of fusegear which may be 250 volt rating provided that they:

- a) Are fed only by a single-phase supply.
- b) Do not form part of any switchboard in which phases other than the one feeding them are present.
- c) Are AC22 category of duty.

All contacts shall be fully shrouded and have breaking capacity on manual operation as required by the relevant British Standard. The fuse links shall be of high breaking capacity cartridge type conforming to BS 88 – 2.2:1988 which is a Class Q1 fusing factor and category of duty 550/440 VAC 80.

### 3C.06 Fusing

The current rating of every fuse for all fuse switches, switch fuse, distribution board, consumer's control unit, etc., shall be as indicated. Fuses shall comply with BS 88 – 2.2:1988. Miniature circuit breakers shall comply with BS EN 60898 : 1991, Type B.

Miniature circuit breakers shall be rated to withstand maximum short circuit current present at their point installation and shall comply with Section 533 of the IEE Regulations.

### **3C.07 Fused Connection Units**

Fused connection units shall be double pole switched and comply with BS 5733.

The earthing terminal of each fused connection unit shall be connected by a separate 2.5mm<sup>2</sup> insulated green/yellow copper circuit protective conductor to an earthing terminal incorporated in the associated box or other enclosure where the circuit protective conductor is formed by conduit, trunking or ducting or the metal sheath and/or armour of cables. Fixing of cover screws shall not be relied upon for earth continuity.

The mounting height of fused connection units shall suit the equipment height served.

All fused connection units shall be complete with boxes for use in conjunction with the conduit or other wiring system in which they are used and each box shall be complete with a brass earthing terminal.

### **3C.08 Lighting Installations**

All circuits and switching shall be as indicated on the contract drawings and/or schedules unless prior approval to their variation is obtained from the SO.

Unless specified otherwise, supply and erect all lighting fittings complete with lampholders, lamps, diffusers and include for any modifications to the manufacturer's standard suspension or mounting in order to comply with the requirements relative to mounting heights.

In the event of extra long stems or chains being required for lighting fittings the stems or chains shall be effected only for the purpose of shortening the manufacturer's standard suspension stems or chains, but the fundamental method of suspension shall not differ from that adopted by the manufacturer. Where chain suspensions are specified, the flexible cord shall be untwisted and each wire threaded through alternate links of the chain in a neat manner.

The internal wiring of the tube suspension and ceiling mounting lighting fittings shall be LSOH insulated flexible cable or other equal and approved heat resisting cable from a connector block fitted to the conduit box.

Unless stated otherwise, a separate earth conductor shall be installed with the flexible cord for chain suspended fittings and to fittings employing a non-earthed type of tube suspension.

Where lighting fittings are to be used in conjunction with surface conduit and/or conduit boxes, include for the supply of pattresses to be mounted over the conduit and/or boxes.

All fittings shall be lift in a clean condition.

All lamps shall be to the latest appropriate BS Specification of the approved manufacturer.



## 3C.09 Fixings

All fixings in brick, stone or concrete shall be made with standard "Rawplugs" for internal work and metal "Rawlplugs" with brass screws for all external work or for fixings in damp situations.

Fixings into brickwork joints and the use of wood plugs shall not be permitted.

In certain instances and subject to the approval of the SO fixings applied by a cartridge operated tool may be used.

All pattresses and boxes shall be securely fixed to the structure by at least two screws or other approved means so that they are held rigid and in correct alignment. Except where screw holes in the pattress or box are countersunk, round head screws shall be used.

## 3C.10 Cables

The names of the proposed cable manufacturers shall be submitted for approval to the SO and only the approved make shall be used throughout the installation unless specified otherwise.

All cables shall be copper conductor unless specified otherwise and shall comply with the appropriate British Standard. Types and sizes shall be as specified on the drawings and schedules and all cables shall be metric sizes.

Multicore armoured cables shall be LSOH insulated, LSOH sheathed and shall comply with BS 6724 : 1997 or MICC to BS 6207 : 1995.

Single core cables shall be LSOH insulated (and LSOH sheathed where indicated) and shall comply with BS 7211 : 1998.

No reduction of strands forming the conductor shall be allowed at switch or other terminals and all strands shall be effectively secured by screws, nuts and washers, brass thimbles or other approved means.

Cable connections to busbars shall be made using single core LSOH insulated cables of the same cross sectional area as the outgoing cables from the equipment being connected. Cables shall be terminated by means of compression fittings or mechanical clamps.

Unless particularly detailed in this Specification or drawings, cables shall not be run through lighting fittings.

Cable cores shall be coloured in accordance with Regulation 514-06-04.

All cables shall be subjected at the maker's works to the appropriate voltage tests, thickness of insulation test, insulation resistance, fire resistance and flexibility as set out in the appropriate British Standard and the coil shall bear the maker's name sealed to the coil and the results of the tests carried out.

In addition, the SO may take or cause to have taken from each coil delivered to site, a sample length or lengths of not less than 1.30m to be submitted to the tests set out in the appropriate British Standard. Should any sample fail to pass the tests, the coil from which it was taken will be rejected.

All cables shall be identified at both ends of connections using Critchley LSOH ferrules.

All cables for position indicators shall be screened.

No new coil or trailing cable manufactured more than twelve months prior to delivery to site will be accepted and the Contractor may be required to furnish satisfactory evidence of the date of manufacture of any coil.

All cables shall be drawn into conduits by means of draw wires or steel tapes and not 'fed in' from one end only. Cables shall be drawn in upon completion of erection and conduits shall not be dismantled for this purpose. Cables shall only be installed when the ambient and cable temperature has been above 0°C for at least 24 hours.

### **3C.11 Flexible Cords**

Flexible cords shall be 300/500V grade single phase to BS 6500 : 1994 selected in accordance with IEE Regulations for Electrical Installation, BS 7671 : 1992.

Conductors shall be plain annealed copper strand LSOH cords and shall be tinned annealed copper stranded for elastomeric cords.

The conductors shall be insulated with LSOH. The cores shall be coloured brown and blue with earth wire coloured green/ yellow.

### **3C.12 Trailing Cables**

The cables shall meet the requirements of the preceding sub-clauses where appropriate and shall be designed specifically for lift use.

The cables shall meet the requirements of BS EN 50214 : 1998 as amended and shall be of flat form design to be approved by the SO. The cables shall be hung in the lift shaft for a minimum of 24 hours with ends suitably weighted and free to rotate. When finally hung, it shall not be possible for any trailing cable to foul any fittings or equipment in the lift shaft.

The cables shall be PVC insulated and sheathed with a fire resisting compound finish having a maximum of twenty separately identified cores per flex and shall allow for 10% spare cores total.

The method of identifying cable cores shall be either colour or core markers.

The cables shall be run direct from the controller to the lift car and shall be contained within trunking from the controller to a position adjacent to the shaft anchorage point where the open end shall have a shroud.

Trailing cables serving the car light, car top light/power, door operator motor and associated circuit protective conductors shall be entirely separate from other circuit cables.

A separate cable shall be provided for the autodialler.

Clamps and/or wedges to a design approved by the SO shall be used for anchoring the cables both at the shaft anchorage point and under the car.

### **3C.13 Final Sub-Circuits**

Every final sub-circuit shall be connected to a separate way of a fuseboard, a separate switchfuse or a circuit breaker and the conductor size shall be adequate for the duty as required by the IEE Regulations for Electrical Installation. All single pole switches shall be connected in the phase side of the system. The wiring of each final sub-circuit shall be electrically separate from every other final sub-circuit.

Neutral conductors shall be connected at the fuseboard in the same order as the live conductors are connected.

At termination points such as switch or socket outlets, etc., adequate length must be left on cable ends to ensure that there is no tension on the connections and sufficient for future re-making.

The conductor insulation must be removed for a minimum length to facilitate connections, and no excess length of exposed conductor shall be left.

The separate conductors of the same circuit or circuits shall in all cases be drawn into one conduit.

When preparing cable ends, the contractor shall ensure that none of the conductor strands are damaged, and the strands shall be twisted together by mechanical means to ensure a neat and firm connection. If the terminal is of sufficient size the twisted ends shall be doubled back to provide a larger area of contact. Where more than one stranded conductor enters a terminal, all strands shall be twisted together and not doubled back.

The Contractor shall bind the ends of all stranded cables above 6mm<sup>2</sup>. No more than three conductors shall be connected to any one terminal at an accessory.

### **3C.14 Conduits and Boxes**

The use of plastic conduit shall not be accepted.

All conduit and trunking together with associated fittings shall be made by a manufacturer having a licence to use the British Standard Institution mark and shall be heavy gauge screwed galvanised conduit to comply with BS 4568 : 1970 Part 2, with amendments. The inside surface shall be smooth, dry, free from burrs and other defects and, if deemed necessary by the SO, the Contractor shall have a rag drawn through to clear any material waste or moisture.

All conduit work on the walls and ceilings of machine rooms and shaft shall be installed on the surface, but where conduits cross finished machine room and/or pit floors they shall be securely fixed in recesses prior to building in. The Contractor shall be permitted to use approved galvanised trunking and fittings in lieu of conduit at positions where it is necessary to enclose a large number of cables.

The whole of the conduit system shall form a mechanically and electrically continuous installation.

Steel conduit shall be screwed between lengths and into all boxes and fittings and where bends or sets are required they shall be made from the conduit. Bends shall be a maximum of 90° and the inner radius not less than 2.5 times the outside diameter of the conduit. Where this is impracticable or where conduits runs exceed 10m in length or 7.5m when the run contains a bend or bends, draw-in boxes of ample size shall be provided. Drawn-in boxes shall be provided at all important changes in direction.

All vice marks, exposed threads or wherever the original finish has been damaged, shall be immediately painted with an approved zinc-based paint of matching colour.

Conduits fixed on the surface walls, ceilings, steelwork, etc., shall be secured by means of heavy iron distance saddles spaced at not more than 900mm apart with additional saddles as necessary at joints, bends and within 225mm of such fittings.

All free ends of conduit shall be fitted with female brass bushes.

At a switch, control unit, distribution board or other metal clad fittings, hexagonal male brass bushes and couplers suitably locked shall be used to terminate conduit in boxes, where a suitable screwed spout outlet is not provided.

Solid or inspection elbows, bends, tees, reducers or couplers shall not be used.

Conduits shall be run neatly and parallel to the general building lines and vertical runs shall be plumbed and horizontal runs shall be verified with a level.

All box lids shall be fitted by means of brass round headed screws. All conduit boxes, saddles and boxes shall be fixed to the building fabric by No. 8 wood screws with Rawplugs or similar fibre plugs.

All spare ways in junction boxes etc. provided for future extensions shall be fitted with brass stopping plugs.

During installation and subsequently, open boxes and other openings shall be suitably protected to prevent the ingress of concrete slurry, plaster or any other foreign material.

### **3C.15 Flexible Steel Conduit**

All conduit connections to motors or other such items of removable equipment, unless otherwise stated, shall be made with LSOH sheathed metallic flexible conduit.

The flexible conduit shall terminate in the equipment fittings or conduit box etc. by means of a proper manufactured coupling. Terminations shall be complete with male bush and coupler.

A separate LSOH insulation green/yellow earth cable wire of suitable size, shall be run through all such flexible conduit, and shall be connected to the motor or other such item's earth terminal at one end, and with an M4 metric brass screw and washer tapped into the back or side of BS 4568 : 1970 conduit box at the other end.

### **3C.16 Steel Trunking/Cable Trays**

The use of plastic trunking shall not be accepted.

Cables shall not be laid to the trunking until erection of the installation is complete.

All conduit and trunking together with associated fittings shall be made by a manufacturer having a licence to use the British Standard Institution mark and shall be manufactured to BS 4678 : 1971.

The whole of the system shall form an electrically and mechanically continuous system throughout.

All trunking and cable trays shall be from 16 gauge galvanised sheet steel and shall be electrically continuous by means of copper links across each joint with electric tinned bolts (heads inside) and nuts (6mm diameter minimum) flat and spring washers.

Flush floor trunking shall have a 6mm mild steel galvanised chequer plate cover carried in a tray with suitable gasket and secured by flush fitting set screws. The overall depth of the trunking shall not exceed 50mm.

All cut ends shall be rendered free from burrs and immediately painted with an approved zinc-based paint of a matching colour. LSOH bushing shall be fitted to any exposed edges of trunking.

All cable trunking shall have 33% square capacity for the drawing-in of any future cables, due precautions being taken to ensure that the correct space factor of the fully loaded trunking is provided in accordance with relevant clause in the current IEE Regulations.

Single phase or 3 phase power circuits shall be run in separate trunking.

Trunking accessories must be of the same manufacturer as the trunking system, and must be the correct item (e.g. bends, tees, connecting sleeves, end caps, etc.) as listed by the manufacturer.

All trunking fittings (i.e. bends, tees, etc.) shall leave the main trunking completely clear of obstruction and continuously open except through floors, wall partitions and ceilings, at which points suitable internal fire resisting barriers shall be provided as may be necessary to prevent the spread of fire. At these points the building element shall be made good to the same standard as the original construction.



Where tees, bends or similar fittings are used, particular attention shall be given to avoid damage to cables at corners. Any such damage shall be rectified by the Contractor at his own expense. All tees and bends shall be 'easy' type and factory made.

Where trunking is used to connect switchgear or fuseboard, such connections shall be made by a trunking fittings manufactured for this purpose and not be multiple conduit couplings.

The trunking lid shall be made from the same material as the trunking and shall be removable except where the trunking passes through ceilings, walls or floors, where the cover shall be firmly fixed before erection so that the cover plate extends 150mm either side of ceilings and floors and 50mm either side of the aperture. The cover shall be secured at centres not greater than 600mm by cadmium plated mushroom headed screws.

Cable retaining and supporting clips shall be provided at 600mm intervals in all trunking.

Trunking and cable trays shall be attached to the building fabric by No. 12 round headed zinc plated wood screws at a maximum 900mm spacing.

Screws and bolts securing trunking joins and trunking covers shall be arranged so that no damage to cables can occur.

Trunking and cable trays shall be installed neatly and parallel to the building lines and shall be plumbed where run vertically and installed to a spirit level where run horizontally.

### **3C.17 Connections to Equipment**

Conduits to machines, pump units and equipment of a fixed nature shall, unless stated otherwise, be terminated in a BS 4568 : 1970 box, erected rigidly to the unit or erected adjacent on the building fabric, and the final connections in the latter case, e.g. motor or heater, etc., shall be by means of flexible conduit as previously specified.

All screw connections shall be securely locked to the satisfaction of the SO and shall be in accordance with the latest British Standard. All screws for electrical contacts shall be screwed into metal work or bolted through the insulating material.

The Contractor shall allow where necessary for connections of any control gear, starters, etc., that may be supplied by the equipment manufacturer.

When connecting motorised equipment, the final connection shall be of the same current rating as the final sub-circuit.

## 3C.18 Earthing and Bonding

### General

The whole of the electrical installation and all other equipment connected thereto, shall be earthed to conform with the current IEE Regulations, BS 7671 : 1992 and to the requirements of the Supply Authority.

Earthing terminals shall be provided at the controller and on the lift car.

Circuit protective conductors shall be provided for the following:

- between main fused switch, isolator and controller.
- between controller and hoisting motor
- between each local switch and the equipment they control.

### Bonding Clamps

Bonding clamps shall comply with BS 951 : 1999 and each clamp shall be complete with a permanent label indelibly marked with the words "Safety Electrical Earth - DO NOT REMOVE".

### Earthing of Lighting Fittings and Appliances

The metalwork of all lighting fittings, appliances and similar equipment shall be effectively earthed by means of green/yellow LSOH insulated copper flexible cord of equal or greater diameter than the current carrying conductor.

### Earthing of Socket Outlets

The earthing terminal of every socket outlet is to be connected to the earthing terminal in the accessory box by means of 2.5mm<sup>2</sup> green/yellow LSOH insulated cable.

### Bonding

Equipotential protective bonding to the main earth terminal shall be provided throughout the lift installation to all metallic equipment and the means of achieving this requirement for the car and landing doors and the entrance steelwork and architraves shall be shown on the drawings for agreement by the SO.

A label stating "SAFETY ELECTRICAL EARTH - DO NOT REMOVE" shall be attached at every point of connection of every conductor which bonds extraneous conductive parts.



## 3C.19 Labels

Adhesive fixing of labels is not acceptable.

The Contractor shall allow for the supply and fixing of white Ivorine or Traffolyte labels to all switchgear and control gear, bus-bar chambers and distribution boards and black text on yellow background for warning signs, all to comply with BS 5378, Part 1 : 1980. The labels shall be engraved in 5mm characters filled with black epoxy resin and shall be fixed to the cover plates by means of brass headed screws.

Labels on switchgear shall denote the identification number/letter of switchgear current rating, polarity, circuit being fed, outgoing cable size and description of circuit. Where necessary diagrams, charts or signs shall be provided for this purpose.

Sub-switches which are out of sight of the lamps or equipment they control, or where there are more than two separate switches installed adjacent to each other, shall have their cover plates engraved, indicating the equipment they control.

The new main supply run shall be identified at 6m spacing detailing service.

A rigid LSOH safety sign/symbol indicating risk of electric shock, in conjunction with non-inflammable supplementary notice of approved design, indicating the maximum voltage present, shall be fixed to every enclosure of equipment. Equipment connected to more than one phase shall be clearly labelled "DANGER 415 VOLTS".

## 3C.20 Circuit Lists

Each distribution MCB and fuseboard and consumer's unit must be provided with a engraved circuit list having the following information:

1. Number of MCB/fuseway
2. Circuit description and location supplied by each MCB/fuseway.
3. Size of HRC MCB/fuses fitted, the size reference number of the fuse, or where miniature circuit breakers are fitted, and current rating of the circuit breaker.

The circuit list shall be white traffolite with black lettering 5mm high. The circuit list shall be installed adjacent to, or below the distribution fuseboard or consumer unit to which it refers by means of 4 No. brass screws.

## 3C.21 Testing

The whole of the installation shall be tested on completion in the presence of the SO, in the manner described in the current IEE Regulations, BS 7671 : 1992. The Contractor shall provide the necessary labour, materials and instruments for carrying out these tests.

Testing and inspection shall generally be carried out in the following sequence.

1. Continuity of final circuit conductors

2. Continuity of all protective conductors.
3. Insulation resistance.
4. Verification of polarity
5. Earth fault loop impedance at relevant points.
6. Continuity test of metalwork of other services
7. Operation of protective devices.
8. Protection by electrical separation and/or barriers.

If any test indicates a fault condition, the fault shall be rectified and that particular test (and the previous tests) repeated to ensure the installation complies with the requirements of the aforementioned regulations.

Any instruments used shall be of the approved type for the purpose of the test and of such sensitivity to accurately record the values. All instruments shall have been tested and recalibrated if necessary within 6 months of the test and the instrument numbers shall be recorded on the appropriate test certificate which shall be available to the SO.

The SO may inspect the installation at any time during the contract and may require the Contractor to undertake inspections or tests, for any purpose, to confirm compliance.

The Contractor shall provide the SO with a minimum of 7 days prior notice of the proposed dates of all tests.

The Contractor shall be responsible for isolating and disconnecting any item of lift equipment which may be damaged or otherwise affected by the execution of the tests.

The Contractor shall submit the results of the tests to the SO on an Inspection Certificate of the type described in the above regulations within 7 days of testing.

The Contractor shall also check the labelling of circuits in the various distribution boards and switchboards, check that there are no cross circuits and that all fuse sizes are correct.

Visual checks are to be made of overload settings of all starts which should be set in relation to the full load rating of the motor they control.

Should the Regional Electricity company require a Certificate of Tests as a condition of accepting an installation or part thereof, for final connection to the supply, the Sub Contractor shall furnish such Test Certificate direct to the R.E.C. and a copy to the SO.

**PART FOUR A**

**BUILDING AND CIVIL ENGINEERING**

**SPECIFICATION**

**TWO ELECTRIC PASSENGER LIFTS, HO90&91**

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**BUILDING AND CIVIL ENGINEERING**

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**PART FOUR A - TWO ELECTRIC PASSENGER LIFTS, HO90&91**

**BUILDER'S WORK REQUIREMENTS**

**4A.01 Description of the Works**

The builders and associated works incorporate the provision of all storage areas and containers complete with all temporary protection, hoardings, compounds and storage areas plus attendance for the specific works to the shaft, machine room, landings and other areas in association with the lift refurbishment, all in conjunction with the specification and the drawings as listed, and as particularly described in the Contract and Preliminaries with this Tender document.

The Contractor shall take a photographic schedule of the condition of each landing entrance prior to erection of the hoardings and issue one set of prints to the SO.

The Contractor shall at all times ensure that his method of work does not impede access.

A 30sq m. area of the Walkway level shall be made available for the erection of a heavy duty, metal compound enclosure that shall be speedily constructed for the project. The floor area within the enclosure and supply route areas outside the enclosure shall be fully protected by means of 6mm plywood sheets. If not erected from floor level to ceiling the hoarding shall have a metal fabricated roof.

**4A.02 Phasing**

The Tenderer shall provide a bar chart with the tender return detailing the Programme of Works which shall be written into the Contract.

**Tenderers may propose a method of work to reduce the installation programme whilst still meeting the requirement of the specification. In consideration of this, the Tenderer shall include a detailed method statement and risk assessment, together with evidence of the Tenderer having successfully employed any such methodology during previous projects.**

Liquidated and ascertained damages shall be attributed to the programme.

**4A.03 Mess and Toilet Facilities**

The Contractor shall provide storage, office and mess room facilities for his operatives and his sub-contractors, complete with all temporary services.

**4A.04 Protective Hoardings**

The Contractor is reminded that the hoardings open directly on to the landings and the staircases, to which the residents have access, and that the appearance and containment of noise shall be taken into account in the design of the hoardings.

A drawing of the hoardings shall be submitted for approval by the SO.

Prior to the removal of any existing lift equipment, the Contractor shall provide a rigid protective hoarding to each entrance to the lift. The hoarding shall extend to a minimum height of 2.4m or to ceiling level and shall enclose such working space as is available to a minimum depth of 900mm. The enclosure shall extend the full width of the shaft plus the landing fixtures and shall abut the adjacent architrave, but in so doing shall not obstruct access or means of escape.

**The hoarding shall incorporate a temporary riser of pushes to the side wall adjacent to the lift remaining in service with pushes located 900mm to 1100mm from FFL. The riser shall incorporate a zintec back box and the faceplate shall be secured by semi secret fixings. The stations and wiring tails shall be prepared in advance and a lift engineer shall be present during the erection of the hoarding to connect each set of pushes in order to minimise loss of facilities.**

The closed area immediately beyond the lift entrances at the Ground Floor shall be enclosed by a hoarding to the full protective requirements of this clause. Should the right hand lift be undertaken in the first phase then this hoarding may extend forward to fully enclose both entrance and the closed area during these works.

Due to the very restricted single point of access at the Ground Floor this closed area shall be used for containment of the lift car panels and small hand held items of equipment only, not for storage of entrances, builders rubble and other associated equipment and materials which are to be stored in the compound at Walkway level.

Each hoarding shall have a hinged and lockable access door meeting half hour fire resistance to a clear height and width to suit the Contractor's requirements. The hoardings shall be assembled from 20mm plywood and shall have 75mm x 50mm softwood framing to all edges.

The doors shall be not less than 20mm plywood with recessed hinges and shall be framed and braced with 75mm x 50mm softwood. The access doors shall open outwards, with restraints, from the lift shaft through an arc of not more than 90°, or as may be directed by the Building Control Officer.

The access doors shall be fitted with a mortice lock which shall be operable with the same key to all hoardings and six keys shall be provided for the use of the SO. Two 800mm shoot bolts shall be fitted on the inside of each door which shall have an external notice, stencilled 'DANGER - KEEP OUT', with an additional notice advising the floor number.

The floor surface within the hoarding shall be protected over the entire area with hardboard over polythene sheeting and the top section to the enclosure shall be boarded over.

The hoarding shall return as protection to the face of the painted landing walls and these areas to be lined with polythene and 15mm Tentest to protect the finishes.

Gaps between any adjoining surface shall not exceed 3mm and the method of fixing the hoardings shall be agreed with the SO and shall be such that the fixings cannot be removed from outside of the hoardings. The Contractor shall maintain the hoardings and doors in a safe condition through the duration of the work and shall not remove them until the day on which the lift is to be put into service, except by prior agreement with the SO.

All hoardings shall be constructed of new materials that shall adequately reflect the area within which they are sited.

The Contractor shall paint the hoardings two coats emulsion to generally match the surrounding area once erected and shall make provision for repainting on each subsequent phase of the Contract.

The Contractor must be prepared to meet any additional requirements of the Building Control Officer as to the construction, fire resistance, overall dimensions, access doors and frames.

Under no circumstances are materials, products or equipment whether old or new, contractors or his sub-contractors be left unattended outside of hoardings or site storage areas.

### **4A.05 Scaffolding**

Scaffolding shall be provided in the shaft for the use of the lift erectors and for builders work use and due allowance shall be made for cutting scaffold poles and boards to fit the shafts.

Working platforms shall be provided at 2.2m centres in the shaft and the Contractor shall include for inspecting and recording the scaffold condition weekly, making any necessary adjustments to ensure safe working conditions are maintained.

The scaffold shall have a removable section at the lowest floor to allow access for pit and lift car works.

### **4A.06 Plant and Cranage**

The Contractor shall provide all necessary plant, hoists and/or cranes to remove, position and install lift equipment and building materials and shall include all negotiations with the Police and Public Authorities for the appropriate authorisation.

Scaffold boards shall be used to support all materials and equipment temporarily landed or stored on exposed areas and securely fastened, heavy duty, weatherproof sheeting shall be used to protect the materials.

Tenderers may propose an alternative for the delivery of materials to the Walkway level compound storage area and shall describe their preferred method in Schedule 2. Mobile cranes may be used on a limited number of occasions during the course of the project to deliver consolidated shipments of materials on a per lift basis.



Alternatively, a scaffold construction at the rear of the Ground and Walkway levels may be considered, together with a builders hoist. Should this method be preferred then the Tenderer shall provide full details in respect of protection of this facility and the general public within the precinct.

#### **4A.07 Preparation of the Shaft and Landing Entrances**

It is imperative that dust and debris is contained within the shaft and machine room during the preparatory works and the Contractor shall undertake the following programme plus any other works that he sees fit.

After careful removal of the existing lift installation, all redundant bolts, steelwork and brackets within the lift shaft be cut out or off and made flush to the shaft surface and on completion of all cutting away the Contractor shall render all surfaces flush and smooth.

After removal of the existing landing entrance equipment the Contractor shall trim each vertical section of the concrete aperture to achieve a clear width of 1000mm to enable the installation and backfilling of the tapered section architrave.

The Contractor shall also prepare the recess for fitting of the sill and this operation together with enlarging the entrance width shall be undertaken using conventional percussive methods.

On completion of all these preparatory works and prior to any other works the Contractor shall thoroughly clean down the shaft by vacuum method.

The Tenderer shall provide a cost under **Option 2, Page 6/20 in Schedule 3**, to undertake enlarging the landing entrances by trimming the structural openings by alternative appropriate quiet methods such as diamond, drilling or sawing, with the provision that the timescale allowed for such works shall be extended to 8.30 am - 5.00 pm Monday to Friday. The Tenderer shall, in addition, identify the programme implications of such methods within the tender return.

#### **4A.08 Preparation of the Machine Room**

Existing concrete machine slabs or supports shall be broken out by the hydraulic bursting method.

#### **4A.9 Non Hammered Cutting**

All demolition works and recesses, holes, pockets and additional fixings for guide brackets shall be cut by non-hammered tools. These works shall be undertaken between the hours of 9.30 a.m. and 4.30 p.m., by prior arrangement with the SO.

#### **4A.10 Building in of Lift Entrances**

When properly positioned and fixed, the landing entrance equipment shall be back filled and built in.

#### **4A.11 Machine Room Builders Work**

The Contractor shall employ the services of a structural engineer to determine the suitability of the existing walls and building fabric to meet the new conditions and shall include for any additional works proven necessary by the calculations, copies of which shall be forwarded to the SO.

The Contractor shall form new holes for ropes and trunking and shall make good all redundant rope, conduit and trunking holes in the slab and shall make good the floors with a smooth, level, trowelled finish. Any conduits on the floors shall have a minimum of 30mm screed cover.

The Contractor shall employ the services of The Royal Borough of Kensington & Chelsea specialist contractor to remove the asbestos liner to the machine room access hatch and replace same with Durasteel sheet, in the first week of the project.

The Specialist Contractor is:                      Slough Thermal Insulations Services  
19 Willoughby Road  
Langley Slough SL3 8JH  
Tel: [REDACTED]  
Contact: L R Gibbons Esq.

The Contractor shall clear all debris and rubbish from the machine room and roof access corridor in the first week of the project and in readiness for painting.

#### **4A.12 Lifting Beams**

The existing lifting beams may be re-used and the Contractor shall confirm their suitability for retention.

All lifting beams shall be load tested and certified to 1000kg, with the load and date of test stencilled in the web of the beam.

#### **4A.13 Air Vents**

The Contractor shall remove and clean the air vents and fit mesh fly screens to shaft and machine room.

#### **4A.14 Painting**

Immediately upon completion of the works outlined in 4A.08 and 4A.11, the Contractor shall paint the machine room and the roof access corridor with one coat stabiliser and two coats white emulsion.

Tenderers shall provide a cost under **Option 3, Page 6/20 Schedule 3**, to paint the lift shaft walls in accordance with the above.

Immediately after removal of the lift installation the heavily oil contaminated pit shall be degreased with solvent. The floors to the machine room, the roof access corridor, the pit and the pit walls to 300mm high shall be painted with red non-slip paint.

**4A.15 Finishes**

The Contractor shall finish the linings and floor finishes up to the trims, architraves and sills where these items are affected by the works and thus making good shall match or harmonise with the adjacent finishes.

Where the front walls are painted they shall be repainted to harmonise with the existing décor to ceiling level and to the nearest door jamb or corner.

**PART FOUR B**

**BUILDING AND CIVIL ENGINEERING**

**SPECIFICATION**

**ONE HYDRAULIC PASSENGER LIFT, HO92**

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**BUILDING AND CIVIL ENGINEERING**

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**PART FOUR B - ONE HYDRAULIC PASSENGER LIFT, HO92**

**BUILDER'S WORK REQUIREMENTS**

**4B.01 Description of the Works**

The builders and associated works incorporate the provision of a newly constructed pump room at Ground Level, plus all compounds and storage areas and containers complete with all temporary protection, hoardings, compounds and attendance for the specific works to the shaft, pump room, landings and other areas in association with the lift refurbishment, all in conjunction with the specification and the drawings as listed, and as particularly described in the Contract and Preliminaries with this Tender document.

The Contractor shall take a photographic schedule of the condition of each landing entrance and the site of the new pump room prior to erection of the hoardings and issue one set of prints to the SO.

The pump room may be constructed in advance of the lift replacement programme and once secure may be used as a temporary storage area.

The Contractor shall at all times ensure that his method of work does not impede access.

**4B.02 Phasing**

The Tenderer shall provide a bar chart with the tender return detailing the Programme of Works which shall be written into the Contract.

Liquidated and ascertained damages shall be attributed to the programme.

**4B.03 Mess and Toilet Facilities**

The Contractor shall provide storage, office and mess room facilities for his operatives and his sub-contractors, complete with all temporary services.

**4B.04 Protective Hoardings**

The Contractor is reminded that the hoardings open directly on to the landings and the staircases, to which the residents and Royal Borough of Kensington & Chelsea Tenant Management Organisation Ltd employees have access, and that the appearance and containment of noise shall be taken into account in the design of the hoardings.

A drawing of the hoardings shall be submitted for approval by the SO.

Prior to the removal of any existing lift equipment, the Contractor shall provide a rigid protective hoarding to each entrance to the lift. The hoarding shall extend to a minimum height of 2.4m or to ceiling level and shall enclose such working space as is available to a minimum of 750mm from the face of the enclosure and the full width of the shaft, but shall not obstruct access or means of escape.

At Ground Level the lift lobby may be fully enclosed as a protected hoarding.

Each hoarding shall have a hinged and lockable access door meeting half hour fire resistance to a clear height and width to suit the Contractor's requirements. The hoardings shall be assembled from 20mm plywood and shall have 75mm x 50mm softwood framing to all edges.

The doors shall be not less than 20mm plywood with recessed hinges and shall be framed and braced with 75mm x 50mm softwood. The access doors shall open outwards, with restraints, from the lift shaft through an arc of not more than 90°, or as may be directed by the Building Control Officer.

The access doors shall be fitted with a mortice lock which shall be operable with the same key to all hoardings and six keys shall be provided for the use of the SO. Two 800mm shoot bolts shall be fitted on the inside of each door which shall have an external notice, stencilled 'DANGER - KEEP OUT', with an additional notice advising the floor number.

The floor surface within the hoarding shall be protected over the entire area with hardboard over polythene sheeting and the top section to the enclosure shall be boarded over.

The hoarding shall return as protection to the face of the painted landing walls and these areas to be lined with polythene and 15mm Tentest to protect the finishes.

Gaps between any adjoining surface shall not exceed 3mm and the method of fixing the hoardings shall be agreed with the SO and shall be such that the fixings cannot be removed from outside of the hoardings. The Contractor shall maintain the hoardings and doors in a safe condition through the duration of the work and shall not remove them until the day on which the lift is to be put into service, except by prior agreement with the SO.

All hoardings shall be constructed of new materials that shall adequately reflect the area within which they are sited.

The Contractor shall paint the hoardings two coats emulsion to generally match the surrounding area once erected. At the Ground Floor the Contractor may occupy the entire lobby area, with the permanent fixed door being removed and carefully stored.

The Contractor must be prepared to meet any additional requirements of the Building Control Officer as to the construction, fire resistance, overall dimensions, access doors and frames.

Under no circumstances are materials, products or equipment whether old or new, contractors or his sub-contractors be left unattended outside of hoardings or site storage areas.

### **4B.05 Scaffolding**

Scaffolding shall be provided in the shaft for the use of the lift erectors and for builders work use and due allowance shall be made for cutting scaffold poles and boards to fit the shafts.



Working platforms shall be provided at 2.2m centres in the shaft and the Contractor shall include for inspecting and recording the scaffold condition weekly, making any necessary adjustments to ensure safe working conditions are maintained.

The scaffold shall have a removable section at the lowest floor to allow access for pit and lift car works.

### **4B.06 Plant and Cranage**

The Contractor shall provide all necessary plant, hoists and/or cranes to remove, position and install lift equipment and building materials, and shall include all negotiations with the Police and Public Authorities for the appropriate authorisation.

Scaffold boards shall be used to support all materials and equipment temporarily landed or stored on exposed areas and securely fastened, heavy duty, weatherproof sheeting shall be used to protect the materials.

Storage of materials and equipment shall be in the Ground lift lobby level hoarding, in the newly constructed pump room or at the Walkway level.

### **4B.07 Preparation of the Shaft and Landing Entrances**

It is imperative that dust and debris is contained within the shaft and machine room during the preparatory works and the Contractor shall undertake the following programme plus any other works that he sees fit.

After careful removal of the existing lift installation, all redundant bolts, steelwork and brackets within the lift shaft be cut out or off and made flush to the shaft surface and on completion of all cutting away the Contractor shall render all surfaces flush and smooth.

On completion of all these preparatory works and prior to any other works the Contractor shall thoroughly clean down the shaft by vacuum method.

### **4B.08 Existing Pump Room**

The existing lift equipment shall be removed from the existing pump room within the plant area and the room shall be thoroughly cleaned and painted with two coats of white emulsion.

### **4B.09 Non Hammered Cutting**

All demolition works and recesses, holes, pockets and additional fixings for guide brackets shall be cut by non-hammered tools. These works shall be undertaken between the hours of 9.30 am and 4.30 pm, and by prior arrangement with the SO.

### **4B.10 Building in of Lift Entrances and Back Boxes**

When properly positioned and fixed, the landing entrance equipment and back boxes shall be built in. The complete new entrance at the offices walkway level shall be enclosed by a semi permanent studwork and marine ply screen, decorated to harmonise with the surroundings.

**4B.11 Air Vents**

The Contractor shall remove and clean the air vents and fit mesh fly screens to the shaft.

**4B.12 Painting**

Immediately upon completion of the works outlined in 4B.07, 8 and 10, the Contractor shall paint the shaft fabric with one coat stabiliser and two coats white emulsion.

Immediately after removal of the lift installation the heavily oil contaminated pit shall be degreased with solvent. The floors to the pump room, the pit, and the pit walls to 300mm high, shall be painted with red non-slip paint.

**4B.13 Finishes**

The Contractor shall finish the linings and floor finishes up to the trims, architraves and sills where these items are affected by the works and thus making good shall match or harmonise with the adjacent finishes.

Where the front walls are painted they shall be repainted to harmonise with the existing décor to ceiling level and to the nearest door jamb or corner.

**4B.14 Particular Specification for the Construction of a New Pump Room at Ground Floor Level**

**4B.14.01 Preliminary Works**

- 4B.14.01.1 Pressure hose clean the entire area and the bicycle store, relocate the bicycle store and hoard off the working area in accordance with 4B.04 for the duration of the works.

**4B.14.02 Demolition Works**

- 4B.14.02.1 Remove the metal and timber screen and make good.
- 4B.14.02.2 Strip out the bitumen macadam pavings and expose reinforced suspended concrete ground slab and undertake any remedial measures as recommended by the structural engineer, including casing new 100mm thick mass concrete floor slab with a floated finish.

**4B.14.03 Masonry**

- 4B.14.03.1 Construct cavity wall brickwork with outer skin of multi-stock brickwork to closely match the existing and inner skin of fair faced blockwork, with painted finish in accordance with 4B.12.
- 4B.14.03.2 Form opening in existing wall approximately 300 x 300mm for services.

**4B.14.04 Roof Works**

- 4B.14.04.1 Construct reinforced concrete flat roof slab with parapet upstand and asphalt coverings with white / silver solar reflective paint.

**4B.14.05 Concrete Works**

- 4B.14.05.1 Construct mesh reinforced concrete floor screed to make up levels.

**4B.14.06 Joinery**

- 4B.14.06.1 Form single door opening size 2100 x 900mm in varnished hardwood to match the existing entrance screen.

**4B.14.07 Roof Drainage**

- 4B.14.07.1 Install rainwater outlet to flat roof and run rainwater pipe and connect to existing drainage system.

**4B.14.08 Materials**

- 4B.14.08.1 Multi-stock clay facing bricks to closely match the existing.
- 4B.14.08.2 Varnished hardwood single door and frame to match the existing entrance frame.

4B.14.08.3 Concrete flat roof slab with white / silver solar reflective paint finish.

4B.14.08.4 Cycle storage as existing.

**PART FOUR C**

**BUILDING AND CIVIL ENGINEERING**

**SPECIFICATION**

**STANDARDS OF MATERIALS & WORKMANSHIP**

**INDEX - PART FOUR (Continued)****STANDARDS OF MATERIALS AND WORKMANSHIP**

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## **MATERIALS AND STANDARDS OF WORKMANSHIP**

### **4C.01 Generally**

1. The whole of the works shall comply with the requirements of the London Building (Constructional) By-Laws 1972 or The Building Regulations 1972, as appropriate. Drainage work shall comply with the requirements of the Drainage By-Laws made by the Greater London Council and/or the local By-Laws, and shall be executed to the satisfaction of the Engineer and the Local Authority.
2. Except where otherwise stated the sub contractor shall be at liberty to provide any material or process which complies with the description contained in the relevant specification clause. The sub contractor may also put forward the name of any similar material or process for approval but such material or process shall not be used until approval has been given by the Engineer or SO.
3. Cement, lime and plaster shall be stored off the ground in a dry, ventilated place. Aggregate, fine aggregate and sand shall be stored on clean hardstandings, and kept separate. Bricks and clay blocks shall be stored on level hardstandings and be protected from inclement weather. Concrete blocks shall be open stacked to permit ventilation and be protected from inclement weather. All other manufactured items shall be stored under cover. Painting materials shall be kept in a dry clean store, protected from frost.
4. No concrete shall be laid in frozen ground. No frozen materials shall be used. No concreting, bricklaying or plastering shall be carried out when the air temperature falls below 3°C (37°F) unless adequate precautions are taken to ensure the work is protected from damage. No painting work should be carried out when the air temperature falls below 4°C (40°F) unless the permission of the Engineer or SO has been previously obtained.

### **4C.02 Demolitions and Alterations: Generally**

1. Before starting work examine all available drawings and undertake a thorough examination of the structure of the building.
2. Adequately protect the existing building during the work. Execute demolition works with care to provide the minimum disturbance to the occupiers of the building. Cut away and strip out the minimum necessary to reduce the amount of making good required.

### **4C.03 Support of Existing Structure**

When demolishing structures, leave adequate temporary support and protection at each stage and arrange for inspection by the Engineer or SO. Leave permanent support to the existing property as instructed by the Engineer or SO. Proceed with subsequent stages of demolition as agreed with Engineer or SO.

Support the existing structure as necessary during cutting of openings or replacement of structure parts. Do not remove supports until new work is strong enough to support the existing structure.

**4C.04 Services**

Before starting demolition, arrange for the electrical sub-contractor to disconnect all services which cross the site of the work.

Maintain electrical services to the occupied parts of the building. Ensure that where services have to be disconnected for diversion or during works, that the supplies are off for the minimum period possible and that advance notice of any such disconnection is notified to the Engineer or SO at least a day in advance of the work being undertaken.

**4C.05 Demolition Materials**

Products and materials arising from the work are to become the property of the sub contractor unless otherwise stated. Remove from site as work proceeds.

**4C.06 Excavations: Generally**

The whole of the excavation shall be carried out to the required lines and levels, widths and depths as shown on the drawing or agreed on site.

Where made deeper than directed the ground shall be made up with concrete (1:10) at the Contractor's own expense.

Where taken out to greater lengths and widths they shall be filled with material well rammed at the sub contractor's own expense.

The bottom of all excavations are to be approved by the Engineer or SO before concrete is placed on them.

**4C.07 Obstructions Found During Excavation**

Redundant drain pipes, roots, old foundations, etc., shall be broken up and removed from site. The Engineer or SO shall be notified if any live drain or other service is found.

**4C.08 Support of the Sides**

The sub contractor shall provide all necessary temporary timbering, sheeting, strutting etc., to ensure the stability and safety of the excavations.

**4C.09 Water in the Excavations**

Excavations shall be kept free from water at all times. The responsibility for removing water shall rest with the sub contractor and no claim for expenses incurred shall be entertained. Where pumping is necessary, the sides and bottom of the excavations shall not be disturbed. All sumps shall be excavated clear of excavations.

**4C.10 Underpinning**

1. The Contractor shall be responsible for ensuring that his operations do not in any way impair the safety or condition of the existing structure or the adjacent properties. He shall provide any temporary supports required for the purpose, and shall carefully inspect the condition of the structure both before and during the execution of the work, and immediately inform the Engineer or SO if he considers that any more stringent procedure than that specified is necessary.
2. Underpinning is to be carried out to the satisfaction of the Engineer and Building Inspector in short sections not exceeding 1000mm in length.
3. The underside of the footings are to be cleaned and hacked free of any dirt, soil or loose materials before underpinning.
4. The body of the underpinning is to be constructed in concrete mix Type A, using sulphate resistant cement and 20mm aggregate, and is to be cast to the widths and depths shown on the drawings. As far as practicable excavation and concreting of any section of underpinning shall be carried out on the same day. Unconcreted sections shall be kept covered to prevent the ingress of water.
5. The mass concrete is to be stopped off approximately 75mm below the underside of the existing footing, and the final pinning up over the whole extent of the latter is to be carried out with a semi dry fine concrete well rammed in as soon as possible after the foundation has set hard.

The pinning up concrete is to consist of 1 part by volume of sulphate resistant cement to 3 parts of aggregate (well graded from 10mm maximum size down to fine sand) with a water/cement ration by weight of 0.35.

6. Excavation to any section of underpinning shall not be commenced until at least 48 hours after completion of any adjacent section of the work.
7. The joint between adjacent sections of mass concrete underpinning shall be made by forming a rough surface against which the first sections is to be cast, and thoroughly cleaning the exposed concrete face before the adjacent section is cast.
8. Mild steel rods 16mm in diameter and 600mm long shall be cast equally into each section to cross the joint, at 300mm centres vertically and horizontally.
9. The Contractor shall prepare a sequence of work and submit it to the Engineer or SO for his comments 1 week prior to the commencement of the work.

#### **4C.11 Backfilling**

Backfilling of trenches etc. with excavated material shall be carried out using the best of the excavated sub-soil, free from vegetable soil or rubbish, and not frozen, and shall be consolidated in layers not exceeding 150mm thick and well rammed. Where backfilling is required below the level of the existing foundations concrete of the same mix as that used for foundations shall be used instead of soil.

#### **4C.12 Hardcore**

Hardcore shall be hard stone, broken brick or concrete rubble not exceeding half brick size free from plaster, rubbish or organic materials.

#### **4C.13 Concrete Work**

Cements shall comply with the British Standards as follows:

Portland Cement	BS 12: Part 2
Rapid Hardening Cement	BS 12: Part 2
Sulphate Resisting Cement	BS 4027: Part 2 and as listed

Aggregates shall comply with British Standards as follows:

Fine (sand)	BS 822: Part 2
Coarse	BS 822: Part 2 graded
'All in' ballast	BS 882: Part 2 graded

Reinforcement shall comply with British Standards as follows:

Mild Steel	BS 4449
Cold worked deformed bars	BS 4461
Steel fabric	BS 4483

Admixtures for promoting workability, for improving strength, for entraining air or for any other purpose shall only be used with the prior approval of the Engineer or SO. The amount added and the method of use must be approved and strictly controlled.

Waterproof building paper shall comply with BS 1521: Grade B1F.

Water shall be from the mains and kept free of any impurities.

#### **4C.14 Reinforcement**

Steel bar reinforcement to the underpinning pit floor and elsewhere is to comply with BS 4449 and BS4461 and is to be cut and bent in accordance with BS 4466. Fabric reinforcement is to comply with BS 4483. The Contractor is referred to the bar bedding schedules supplied by the Structural Engineer for details of what is required.

The prices for reinforcement are to include all tying wire, distance blocks and spacers.

#### 4C.15 Formwork

The sub-contractor is to be responsible for the adequacy of the formwork. It shall be of sufficient strength to carry all loads imposed on it during construction. Formwork is to be constructed from plywood or steel sheet with steel or timber supports at close centres to avoid any deflection, all joints are to be sealed to prevent seepage of grout. All surfaces in contact with concrete are to be thoroughly cleaned and treated with mould oil or other suitable and approved composition.

#### 4C.16 Minimum Cement Content for Durability

This also relates to maximum/cement ratio where applicable.

The figures given below are to durability only but not necessarily sufficient for strength. The Contractor must provide as much cement as necessary to achieve the strength requirements specified elsewhere in this specification.

Mix Ref	Grade	Normal Maximum Size of Aggregate	Concrete not exposed to sulphates	Concrete exposed to sulphates		Maximum free water cement ratio	Location
			Minimum cement content (kg/m <sup>3</sup> )	Minimum cement content (kg/m <sup>3</sup> )	Cement		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A	C35	20		300	SCR	0.55	
B	C35	20	300				
C	C35	10	315				
D	C20	20	220				

OPC = Ordinary Portland Cement.

SCR = Sulphate Resisting Cement.

Note. The maximum cement content of 550kg/m<sup>3</sup> must not be exceeded.

#### **4C.17 Strength Requirements of Concrete**

Grade	Trial Cubes  Average Strength per mix to be not less than	Concrete Used in the Works		
		Only two out of forty consecutive cubes of one mix may be less than	Minimum strength of individual cubes	Average strength of any four consecutive cubes of one mix, to be not less than
	(N/mm <sup>2</sup> )	(N/mm <sup>2</sup> )	(N/mm <sup>2</sup> )	(N/mm <sup>2</sup> )
C20	24	20	18	23
C25	29	25	22	28
C30	34	30	27	33
C35	39	35	32	38

1. All strengths refer to cubes crushed at 28 days.
2. The prediction of the 28 days' strength from cubes crushed earlier is at the discretion of the Engineer or SO.
3. The calculation of the 28 days' strength from cubes crushed at a later date is at the discretion of the Engineer or SO.
4. The term "cube" and "cubes" mentioned in this section mean cube and cubes respectively made and cured in accordance with BS 1881 Part 3.
5. The validity of tests other than cube tests, the interpretation of results of such tests and the conversion of such results into equivalent cube strengths are at the discretion of the Engineer or SO.

#### **4C.18 Ready-Mixed Concrete**

Ready-mixed concrete shall comply with BS 1926 and shall be obtained from an approved supplier.

#### **4C.19 Site Mixed Concrete**

Site mixed concrete will only be permitted for unreinforced work.

Materials shall be measured using gauge boxes or by weight. The mix shall be consistent throughout; all ingredients shall be moist, but the concrete shall not be so wet that the concrete flows into place or shows excess water on the surface.



#### **4C.20 Placing Concrete**

After mixing, the concrete shall be conveyed quickly to its final position in the work and thoroughly worked into place with suitable tools to surround any reinforcement and form a solid mass without voids or honeycombing.

All concrete shall be placed within half an hour of mixing, and shall be carefully tipped into place and compacted thoroughly to eliminate voids without causing materials to separate. Ready-mixed concrete shall be placed and compacted within two hours of the addition of the cement to the aggregate.

All concrete shall be mechanically mixed by machinery. The quantity of water shall be the minimum required to ensure a uniform distribution of materials, and workability. On the cessation of work including short stoppages for meals or on any change of cement used in the mix, the mixer and all handling plant shall be washed out with clean water.

The sub contractor shall obtain approval before using ready mixed concrete.

Reinforcement shall be free from all loose rust, oil, grease or similar defects, immediately before placing the concrete.

Formwork shall be true to line, level, face and profile, sufficiently rigid to maintain its shape during and after pouring concrete and be grout tight. Formwork shall not be struck until the concrete has sufficiently hardened.

Concrete shall be placed in its final position as rapidly as practicable by methods which preclude segregation or loss of ingredients; compaction shall be completed before initial set commences. Partially set concrete shall not be re-worked or used. Concrete shall be thoroughly compacted by punning with suitable tools, or by vibrators.

All concrete shall be prevented from drying out until properly cured.

#### **4C.21 Brickwork and Blockwork: Generally**

All masonry shall comply with BS 5627, Code of Practice for the structural use of Masonry

#### **4C.22 Blockwork**

Generally all blocks are to be the best of their respective kinds, hard, square and sound, in accordance with the following:-

1. Fired-clay block to BS3921
2. Concrete blocks to BS6073
3. Brick and Blocks to be special category to BS5628 : Part 1

#### **4C.23 Brickwork**

Generally all bricks are to be of their respective kinds, hard, square, sound and well burnt in accordance with the following:-

1. Fired-clay bricks to BS3921
2. Calcium silicate bricks to BS187
3. Concrete bricks to BS6073

All bricks used in cavity walls shall be whole bricks and no snapped headers are to be used.

#### **4C.24 Bricks and Blocks – Comprehensive Strength**

All brickwork and/or blockwork shall have the required minimum compressive strengths as specified on the Engineer's or SO's drawing.

The Contractor shall satisfy the Engineer or SO before bulk orders are placed, and at intervals as required throughout the period of delivery, that batches of brickworks and/or blockwork used have the required minimum crushing strength as shown on the Engineer's or SO's drawing.

The Contractor shall furnish the Engineer or SO with reports or certificates of such tests carried out by the brick or block suppliers and produce evidence to show that a regular, efficient method of quality control as referred to in BS3921 is in use.

#### **4C.25 Work Below Ground**

1. All blocks to be dense concrete with minimum crushing strength of  $7\text{N/mm}^2$ .
2. All bricks to have a minimum crushing strength of  $20\text{Nmm}^2$  Class 4 or better.
3. All mortar below ground to be 1:½:4½ designation ii, or better made with sulphate resisting cement.

#### **4C.26 Work Above Ground**

Mortar shall use OPC and to be 1:1:6 mix

NOTE 1: for non load bearing blockwork refer to Engineer's or SO's specification.

NOTE 2: if higher strength masonry units are required then this shall be stated specifically on the drawings.

#### **4C.27 Delivery and Storage**

All bricks and blocks shall be carefully unloaded and stacked, so that they will normally be used in order of delivery.

They should be unloaded by hand or machine on to a reasonably dry and level site, and not tipped from vehicles.

They must be protected from rain, snow and rising moisture.

If bricks or blocks are stacked on suspended slabs attention is drawn to the maximum imposed loading on the slabs, at 28 day strengths, which must not be exceeded without adequate propping as shown in the appropriate MMP specification.

## **4C.28 Cement**

Cement shall be ordinary Portland cement complying with BS 12, and shall be sulphate resisting below damp proof course level.

## **4C.29 Lime**

The lime is to be approved hydrated lime and used in accordance with the manufacturer's instructions.

## **4C.30 Sand**

The sand is to comply with BS 1200: Table 1. Colour is to match existing as closely as possible.

## **4C.31 Water**

The water used for mortar is to be fresh drinkable water.

## **4C.32 Plasticisers**

No plasticisers or other admixtures shall be used without the Engineer's or SO's written approval.

## **4C.33 Damp Proof Courses**

The damp proof courses shall be Ruberthene polythene membrane, manufactured by Ruberiod Building Products Ltd., Tewing Road, Welwyn Garden City, Herts, AL7 1BP (telephone) 0707 373750).

## **4C.34 Stainless Steel Straps, Ties and Anchors**

All stainless steel straps and ties shall be BAT Stainlessfix, manufactured by Expamet Building Products Ltd., P.O. Box 14, Longhill Industrial Estate (North), Hartlepool, Cleveland, TS25 1PR (telephone 0429 266633).

The Halfen stainless steel slots and anchors are manufactured by Halfen Fixing Systems Ltd., Griffin Lane, Aylesbury, Bucks, HP19 3BP (telephone 0296 20141).

#### **4C.35 Air Bricks**

Air bricks shall be standard 225mm Square terracotta, colour to match brickwork as closely as possible.

#### **4C.36 Construction Joints in Brickwork**

Joints are to be provided as stipulated on the Engineer's or SO's drawings. The Miothene30 filler is manufactured by LJA Miers (Special Products) Ltd., Church Street, Gamlingay, Sandy, Beds, SG19 3JH (telephone 0208 965 8877)

#### **4C.37 Floor Paint**

Where water exists within the pit area, or the pit walls emit heavy dampness, the Contractor shall remove all water and when completely dry shall treat the walls and pit floor with 'Watco Universal Sealer'.

Once dry the walls are to be treated with 2 coats of 'Watco Safety Sealer'.

In the event that it is not possible to remove all traces of the water then three coats of 'Watco Octo Seal' are to be applied to the pit walls and floor.

#### **4C.38 Mortars Generally**

Gauge boxes are to be used for measuring materials for mortars.

#### **4C.39 Brickwork Workmanship**

Lay bricks on a full bed of mortar and fill all cross joints. Keep courses level, true to line and evenly spaced. Accurately plumb all wall faces, Gauge brick courses four to 300mm including joints. No part of the work shall rise more than 10000mm above the adjoining work. All blockwork shall be accurately set out and built plumb, properly bonded and well pinned up to soffits.

#### **4C.40 Brickwork in Cold Water**

1. Do not freeze materials and do not lay on frozen materials and do not lay on frozen surfaces.
2. Do not lay bricks/blocks when air temperature is at or below 3° unless mortar has a minimum temperature of 4° when laid and walling is protected.
3. Maintain temperature of the work above freezing until mortar has fully hardened.
4. Adequately protect newly erected walling against rain and snow by covering when precipitation occurs and at the completion of each days works.
5. Rake out and replace mortar damaged by frost and where instructed, rebuild damaged work.

#### **4C.41 Bond**

Half brick walls shall be in stretcher bond and one brick and thicker walls in bond to match the surrounding brickwork. No cut bricks shall be used except where required for bond. Toothing and corbelling shall be executed where necessary. Facing brickwork shall be pointed to match existing.

#### **4C.42 On Completion**

Putlog holes shall be pointed to match the adjacent work and facing brickwork cleaned down and left free from marks and mortar.

#### **4C.43 Asphalt Work: Mastic Asphalt tanking**

The asphalt for tanking is to be natural rock asphalt to BS 6577 and laid in accordance with the recommendations of the Mastic Asphalt Consortium Technical Advisory Service (telephone 0892 833972).

#### **4C.44 Underlay**

The isolating sheathing felt underlay for asphalt roofing shall be to BS 747, type 4A – bitumen felt, laid directly on the construction.

#### **4C.45 Mastic Asphalt Roofing**

The asphalt for roofing is to be natural rock asphalt to BS 6577 and laid in accordance with the recommendations of the Mastic Asphalt Consortium Technical Advisory Service (telephone 0892 833972).

#### **4C.46 Carpentry and Joinery**

1. Timber shall be sound, well conditioned, properly seasoned to suit the particular use and free from defects or combination of defects rendering it unsuitable for the purpose intended. It shall be hardwood and softwood as defined in BS 881 and 589 respectively. All timber used structurally shall comply with the relevant By-Laws and Regulations. Timber for joinery shall comply with BS 1186, Part 1.
2. Plywood shall comply with BS 1455:
  - Grade 1 for clear finish
  - Grade 2 for painting
  - Grade 3 for concealed surfaces or of corresponding grades of veneers and type of bonding if from sources not included in BS 1455.
3. Screws shall comply with BS 12101.  
  
Nails shall comply with BS 1202.  
  
Black Bolts shall comply with BS 916.

Ragbolts, coach screws and other accessories shall comply with BS 1494, Parts 1 and 2

Timber connectors shall comply with BS 1579.

Nails for fixing joinery having an external exposed face shall be aluminium or sheradised in accordance with BS 1202, Part 3 or Part 1 respectively. Galvanised joist hangers shall be 2.5mm minimum thickness steel.

4. Workmanship for joinery shall comply with BS 1186, Part 2.
5. Timber generally shall be protected from dampness. Joinery shall be protected from the weather during transit and shall be stored under cover, clear of the ground in clean, dry, ventilated structures before and after priming.

## **4C.47 Plasterwork**

1. Lime putty shall be prepared from hydrated lime complying with BS 890, Part 2.
2. Gypsum building plasters shall comply with BS 1191, Part 1 and Part 2 premixed lightweight plasters, of the classes described and used in accordance with the manufacturer's recommendation.
3. Sand for gypsum plaster mixes shall comply with BS 1198, Table 1 Type 1. Sand for cement and lime mixes shall comply with BS 1199, Table 1.
4. Ready mixed lime and sand shall comply with BS 4721. When gauging with cement care shall be taken to adjust the amounts to obtain the required proportions.
5. Plasticisers shall be of the resin type used in accordance with the manufacturer's instructions.
6. Aluminium and steel angle and casing beads shall be used.
7. Surfaces to receive plaster shall be dry brushed to remove all loose particles, dust, etc. and shall be wetted to equalise suction before the first coat is applied.
8. Plaster lath shall comply with BS 1230, Part 2 and be fixed in accordance with the manufacturer's recommendations with joints completely filled with neat Class 'B' board finish plaster.
9. All materials shall be thoroughly mixed in the proportions described. No re-tempering will be permitted except as is reasonable for class 'C' gypsum plaster, and fresh plaster shall not be contaminated with set plaster. Bankers and gauge boxes shall be cleaned after each mix.

10. Unless otherwise described all finishing coats in cement based mixes shall be finished with a wood float, and finishing coats in gypsum and lightweight plasters with a steel trowel. A neat cut shall be made with the edge of the trowel through all coats of wall plaster at the junction with the ceiling plaster. Unless otherwise described all arises shall be pencil rounded.

11. The proportions stated in the following table shall be by volume.

Ref.	Plaster		Thickness	Surface Plastered
A	Setting coat Class 'B' board finish	neat	5mm	Plaster Lathe
D	Undercoat (cement/lime putty sand) (OR plasticised cement sand) Finishing coat Class C finishing/lime putty	1:1:6 1:6 3:1	16mm	Brickwork and Blockwork
E	Undercoat Bonding plaster finishing Coat Class 'B' finishing	neat  neat	13mm	Concrete and Smooth Dense Surfaces
G	Undercoat lightweight browning finishing Coat lightweight finishing	neat  neat	13mm	Brickwork and Blockwork
H	Undercoat bonding plaster finishing Coat lightweight finishing	neat  neat	13mm	Concrete and Smooth Dense Surfaces
O	Undercoat Cement/lime putty sand OR Plasterised cement/sand Finishing coat as for undercoat	1:1:6 1:6		
P2	Cement/sand in two coats	1:4		

#### **4C.48 Screeds and Backings**

1. Cement and sand and mixing of materials shall be as described in 'Plasterwork'.
2. Cement and sand screeds or backings shall be in proportion of 1:4 by volume.
3. Walls shall be prepared as for 'Plasterwork' Clause 4.3.7. Concrete floors and roofs, shall be hacked to remove concrete, mortar or plaster droppings and well brushed to remove all loose particles and dirt. Surfaces shall be wetted as necessary before screeding.



4. Screeds and backings shall be laid in suitable sized bays and shall be kept wet and protected until set hard and shall be left with a surface for the appropriate finish.

#### **4C.49 Tile and Sheet Finishings**

1. Materials for mortar and mixing shall be as described in 'Plasterwork'.
2. All surfaces to receive finishings shall be thoroughly cleaned and screeds to receive mortar beds shall be well wetted.
3. Glazed and eggshell ceramic wall tiles shall comply with BS 1281, of the colours described. Tiles shall be fixed in suitable tile adhesive in accordance with the manufacturer's recommendations and joints shall be pointed in white/tinted cement.
4. Clay tiles shall comply with BS 1286, Type A (Class 1 for external use and Class 2 for internal use). The tiles shall be thoroughly soaked in water and drained off before bedding in cement and sharp sand (1:2) pointed in cement and sand (1:2), coloured where directed.
5. Linoleum and thermoplastic tile flooring will generally be the subject of a P.C. sum.
6. Plasterboard lining to receive direct decoration shall be gypsum wallboard complying with BS 1230, Part 2 fixed with ivory face outwards in accordance with the manufacturer's recommendations.

#### **4C.50 Painting and Decorating**

The relevant British Standard Code of Practice to this Section is C.P. 231 'Painting of Buildings'.

1. Painting and decorative schemes shall be carried out in colours selected by the SO.
2. All paints, varnishes, distempers and other surface coatings shall be delivered in sound and sealed containers, labelled clearly by the manufacturer, the label or decorated container stating:-
  1. The type of product;
  2. The brand name, if any;
  3. The use for which it is intended;
  4. The manufacturer's batch number.

The label shall be a printed label, typewritten labels will not be accepted. The batch deliveries shall be dated and used strictly in order of delivery.

3. While materials for the works may be obtained from several makers, undercoats and finishing coats for a particular surface must be obtained from the same maker. The materials are to be used in accordance with the manufacturer's instructions and the addition of thinners or other material will only be permitted when required by the maker.

Samples for analysis may be taken both from the kettle and paint cans by the Engineer or SO. Any unsatisfactory materials shall be removed from the site and any work executed by such defective materials shall be made good by the Contractor at his own expense to the satisfaction of the Engineer or SO.

4. Concrete, rendering or brickwork shall be of a similar materials to the background and shall be finished with a similar texture;
5. White spirit shall comply with BS 245.
6. Turpentine shall comply with BS 244 and 290, either type 1 or type 2.
7. Size shall comply with BS 3357.
8. Emulsion paint - the first coat shall be thinned in accordance with the manufacturer's instructions.
9. Plastic compound shall have a washable finish.
10. Black bituminous paint shall comply with BS 3416, Type 1 for general use, Type 11 for drinking water tanks.
11. Multi-colour paint and the appropriate priming coat shall be obtained from the same maker.
12. Hard gloss, eggshell and emulsion paints and their respective undercoats shall be obtained from the same maker.
13. Alkyd varnish shall be interior or exterior quality.
14. Polyurethane lacquer shall be single pack polyurethane lacquer, interior quality.
15. The preparation of all surfaces including any cleared off prior to redecorations must be seen and approved before any surface coatings are applied. All plaster and mortar splashes etc., shall be removed from surfaces to be decorated. All surfaces shall be brushed down to remove dust and loose material. Surfaces shall be subsequently prepared as follows prior to decorations:-
16. Plaster, rendering, concrete and brickwork - stop all holes and cracks. Where efflorescence has occurred or is suspected painting on this area shall be deferred for as long as possible.
17. Woodwork to be clear finished - stop holes, rub down with abrasive paper, dust off.

18. The contents of all cans and containers must be properly and thoroughly stirred before use and shall be suitably strained as and when necessary.
19. Unless otherwise described all coatings shall be applied by brush. Written permission must be obtained for the application of coatings by spray or roller where not so described.
20. Structural steelwork not encased with concrete shall be primed at works wherever possible. Surfaces subsequently inaccessible to the brush shall be painted two coats bituminous paint before fixing.
21. All coatings shall be allowed to dry thoroughly before succeeding coats are applied.
22. All undercoats for oil paints and clear finishes shall be rubbed down to a smooth surface with abrasive paper and all dust removed before the succeeding coat is applied.
23. Each succeeding coat of priming and undercoating paint shall be sufficiently different in colour as to be readily distinguishable.
24. Adequate care must be taken to protect surface while still wet, by the use of screens and 'wet paint' signs where necessary.
25. Care must be taken when storing materials, preparing surfaces or painting, etc., not to damage or stain other work. The Contractor shall remove all such stains, make good and touch up.
26. All brushes, tools and equipment shall be kept in a clean condition and surfaces shall be clean and free from dust during painting. Painting shall not be carried out in the vicinity of other operations which might cause dust. The Contractor shall provide a suitable movable receptacle, into which are to be placed all the liquids, slop washing, etc., which are on no account to be thrown down any of the gullies, manholes, sinks, lavatories, WCs or any other sanitary fittings. All solid refuse or inflammable residues must be removed from the site or burned.

**PART FIVE**

**PRE-TENDER**

**HEALTH & SAFETY PLAN**

**INDEX - PART FIVE**

**HEALTH & SAFETY PLAN**

<b>Clause No.</b>	<b>Title</b>	<b>Page No.</b>
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3.	Existing Drawings/Information	5/2
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**PART FIVE**

**HEALTH & SAFETY PLAN**

**1. NATURE OF PROJECT**

**Client:** The Royal Borough of Kensington & Chelsea  
Tenant Management Organisation Limited  
The Town Hall, Hornton Street, London, W8 7NX

**Location:** Grenfell Tower, Lancaster West Estate, London, W10

**Nature of Construction work to be carried out:**

Refurbishment of two electric passenger lifts and installation of one hydraulic passenger lift inclusive of all builders, electrical, structural and other attendant works.

**Timescale for completion of Site Work:** 70 weeks

**2. EXISTING ENVIRONMENT**

- **Surrounded land use and related restrictions.**

The building shall be fully occupied for the contract duration, see the Particular Specifications L2508.

Restrictions, if any, shall be discussed with Butler & Young Lift Consultants Ltd, the SO, and the Policy Authority.

- **Existing services (e.g. underground and overhead lines).**

Information shall be supplied by The Royal Borough of Kensington & Chelsea and co-ordinated by the SO.

- **Existing traffic systems and restrictions, e.g. access, delivery times, parking etc.**

Access shall be by prior arrangement only for street parking for immediate off loading.

The Principal Contractor shall be aware that the vehicle route around Grenfell Tower is a fire path and must be maintained free of any obstruction.

**There shall be no space allocated for permanent provision of a skip.**

The Principal Contractor shall appoint a nominated key holder for his storage and access areas.

- **Existing Structures/Plant, e.g. special health problems from existing materials which may be disturbed or require disposal, fragile materials, instability problems, etc.**

**3. EXISTING DRAWINGS/INFORMATION**

- **Available drawings of structure(s) to be demolished for incorporated, of new equipment.**

Installation drawings for the existing duplex lifts are available but all works shall be subject to the Principal Contractors detailed site surveys.

- **Available information on construction of materials to be removed.**

Not generally applicable but all works shall be subject to the Principal Contractors detailed site surveys.

**4. THE DESIGN**

The following check-list provides information on potential hazards associated with construction, operation, maintenance, decommissioning and demolition with specific examples. The list covers those items where hazards may be present and is based on such information as is available.

The list must be updated as necessary once the Principal Contractor has surveyed the site and produced the necessary risk assessment and method statements for the works. A detailed risk assessment may be required for aspects identified by this process and the hierarchy of risk control shall be followed.

**Potential hazards**

**4.1 Falls from a height.**

**Examples:**

Ladders, including machine room access arrangements,

Scaffold primarily within the lift shaft,

Shaft structural steelwork,

Falls from landing entrances or access doors, into the lift shaft,

Temporary working platforms,

Car top and platform,

Floors and surfaces generally,

Other areas highlighted during the Principal Contractor's site survey and determined by his Risk Assessment.



## **Means of addressing the hazard in order to eliminate it or minimise the risk:**

The works to the lifts shall be as defined in the Particular Specifications L2508.

Hoardings, barriers, harnesses and warning notices of hazards shall be in accordance with the Particular Specification, L2508.

Hard hats shall be worn at all times when working below a hazard.

Floors and surfaces shall generally be inspected for any possibility of slipping or sliding.

The Contractor shall assess the risk of relevant situations and ensure that a suitable method to solve these is implemented.

The Contractors safety policy document shall make reference to the Particular Specifications, L2508.

## **4.2 Struck by moving vehicle.**

### **Examples:**

Delivery van or delivery lorry with tail lift or crane facilities,

Other areas highlighted during the Principal Contractors site survey and risk assessment.

## **Means of addressing the hazard in order to eliminate it or minimise the risk:**

The Principal Contractor shall provide a method statement for site access of delivery vehicles or his own or others construction vehicles identified during the course of the site works.

## **4.3 Struck by falling or flying objects.**

### **Examples:**

Routeing of equipment to and from the lift machine and pump room,

Preparation and trimming of landing entrances,

Working at other levels within the lift shaft,

Other areas highlighted during the Principal Contractors site survey and risk assessment.

## **Means of addressing the hazard in order to eliminate it or minimise the risk:**

Hard hats and other PPE shall be worn for hazardous areas and operations,

Blanking of holes within the machine room floor, as practical,

Close boarding the scaffolded lift shaft,

Safety precautions as the Particular Specifications, L2508.

**4.4 Contact with electricity or an electrical discharge.**

**Examples:**

Control panels/switchgear/electrical panels etc.,

Hand tools or hand lamps,

Lighting fittings,

Other areas highlighted during the Principal Contractors site survey and risk assessment.

**Means of addressing the hazard in order to eliminate it or minimise the risk:**

All switching requirements shall be referred to the SO,

Restrictions on live working shall be applied,

Hand tools and temporary lighting shall be 110volt.

Refer to Particular Specifications, L2508, relevant to Health and Safety Policy.

**4.5 Access for physical installation, construction and maintenance.**

**Examples:**

Removal of redundant equipment through shaft, hatches and the site generally,

Delivery of new equipment through shaft, hatches and the site generally,

Personnel access to the lift shaft and machine room during construction and subsequent maintenance,

Other areas highlighted during the Principal Contractors site survey.

**Means of addressing the hazard in order to eliminate or minimise the risk:**

Hard hats shall be worn as applicable,

Hoardings at shaft landing entrances with applicable signs,

Safe method of machine room access with security locking.

Refer to relevant clauses of Particular Specifications, L2508.

**4.6 Contact with moving machinery or material being machined**

**Examples:**

Lift machine,

Sheaves and diverters

Grinders and cutters,

Other areas highlighted during the Principal Contractor's site survey and risk assessment.

**Means of addressing the hazard in order to eliminate it or minimise the risk:**

Lift machine shall be adequately guarded,

Protective clothing and glasses shall be worn to minimise risk. Personnel using hand tools should be adequately trained,

Refer to Health & Safety requirements in Particular Specifications, L2508.

**4.7 Trapped by plant collapsing or overturning.**

**Examples:**

Scaffolding collapse,

Vehicles falling from supports/overturning,

Plant, including lifting machinery,

Other areas highlighted during the Principal Contractors site survey and risk assessment.

**Means of addressing the hazard in order to eliminate it or minimise the risk:**

Vehicles shall be suitably stabilised during equipment movement,

Lifting or hoisting plant shall have current test certificates and instruction on use.

Hoardings, scaffolding and boarding shall be as Specification requirements,

**4.8 Exposure to hot or harmful substance.**

**Examples:**

Asbestos,

Dust, (grinding, cutting, drilling),

Lead paint removal,

Hot works generally,

Chemicals stored on site, (paints, specialist cleaning).

**Means of addressing the hazard in order to eliminate it or minimise the risk:**

Protective clothing and glasses shall be worn at all times,

All operatives shall be adequately trained specific to the operations,

Adequate secure storage shall be provided as required,

Adequate ventilation shall be provided for specific processes,

Hot works permit shall be issued by the Royal Borough of Kensington and Chelsea.

**4.9 Manual handling.**

**Examples:**

Off loading plant,

General lifting and movement of plant and equipment,

Manual demolition tasks,

Other tasks specific to the method of site working.

**Means of addressing the hazard in order to eliminate it or minimise the risk:**

All operatives shall be trained in relevant tasks,

One engineer shall be in overall control of all lifting and movement tasks,

Reference shall be made to the Particular Specifications, L2508 and Safety rules.

**4.10 Hygiene aspects generally.**

**Examples:**

Contamination of the existing lift installations,

Accumulation of dust and oil,

Asbestos removal.

**Means of addressing the hazard in order to eliminate it or minimise the risk:**

The installation shall be cleaned down, all waste materials removed and disposed of, and the areas disinfected prior at the start of site works and prior to installation of any materials or equipment.

**4.11 Exposure to noise.**

**Examples:**

Grinding/cutting/drilling,

Pneumatic drilling/breaking.

**Means of addressing the hazard in order to eliminate it or minimise the risk:**

Ear defenders and specific protective equipment shall be available and used.

Times and details of noise restrictions shall be agreed with client.

Detailed Method Statement required from Principal Contractor.

**4.12 Structural Implications of the Design.**

Shall be discussed between the Principal Contractor and the Planning Supervisor.

**4.13 Fire Alarm Systems.**

The Principal Contractor shall protect any smoke detector systems and be aware of operation.

**5. CONSTRUCTION MATERIALS**

- **Health hazards arising from construction materials where particular precautions are required. Applicable only where such hazards cannot be avoided or designed out.**

**5.1 Hazardous Materials**

Any materials that are specified for use during construction and are considered to present a level of risk that is manageable and controllable during their application and use and, where applicable, during their subsequent presence as part of the completed installation are to be listed. Prior to use the Principal Contractor shall provide a separate COSHH assessment for each of these. Unless otherwise stated, the materials selected are in general use within the construction industry and been chosen to minimise, so far as is reasonably practicable, risks to health and safety:

**Paint, cellulose, french polish, oil, grease and others subject to the Principal Contractor's site surveys.**

Materials that are considered to be essential for effective maintenance of the facility and contain substances that may be considered as hazardous to health are to be listed.

The Principal Contractor shall provide a separate COSHH assessment for each of these. Unless otherwise stated, the materials selected are in general use within the construction industry and been chosen to minimise so far as is reasonably practicable, risks to health and safety:

**6. SITE-WIDE ELEMENTS**

- **Access and egress points (e.g. for deliveries and emergencies).**

The Ground level and street approach to the building and external staircase access plus the rear access point to the Walkway level, all to be agreed with the SO.

- **Location of temporary site accommodation.**

To be agreed with the SO.

- **Location of unloading, layout and storage areas.**

On the Walkway level together with the hoardings and the machine or pump room, or as agreed with the SO.

- **Traffic/pedestrian routes and method of segregation.**

To be agreed with the SO.

## 7. THE RESIDENTS

- Risk to vulnerable residents due to loss of lift service plus potential of losing all lift service in the event of the occasional failure of the remaining lift.
- Means are included within Specification L2508 to mitigate the risks of lift failure viz:
  - Re-testing and overhauling the lift which is designated to be refurbished in the second phase.
  - Maintaining an enhanced supply of spare parts on site, utilising materials removed during the first phase of the refurbishment.
  - Specifying special arrangements for rapid response to breakdowns.
  - Examining possibility of permanent standby engineers.
- The Royal Borough of Kensington & Chelsea Tenants Management Organisation Ltd shall examine soft issue solutions such as portage, assistance with shopping or buggies etc.
- Design and instigate a lift failure plan.

## 8. OVERLAP WITH THE ROYAL BOROUGH OF KENSINGTON & CHELSEA TENANT MANAGEMENT ORGANISATION UNDERTAKING

- **Consider health and safety issues for working in occupied or partly occupied premises (e.g. fire/evacuation procedures).**

Comply with all The Royal Borough of Kensington & Chelsea Tenant Management Organisation Ltd Health & Safety Policy, other documentation and the Particular Specifications, L2508.

## 9. SITE RULES

- **Specific site rules required as a result of points 2 to 8 above, e.g. permit to work, emergency procedures), any others required by Health and Safety Legislation, e.g. RIDDOR (Reporting of Injuries and Dangerous Occurrences).**

Comply with The Royal Borough of Kensington & Chelsea Tenant Management Organisation Ltd Health & Safety Policy and the Particular Specifications, L2508.

## 10. CONTINUING LIAISON

- **Procedures for considering health and safety implications of design elements of the principal contractor's and other contractor's packages.**

Refer to Particular Specifications, L2508.



- **Procedures for dealing with unforeseen eventualities during project execution resulting in substantial design change and which might affect resources.**

The principal contractor shall liaise with all parties to ensure his development of the Health Safety Plan.

All relevant information for the Health and Safety Plan shall be incorporated in the Health, Safety File, including “as built” drawings and maintenance manuals and returned to the Planning Supervisor at the end of the contract.

**11. DECLARATION BY THE PLANNING SUPERVISOR**

The above plan has been prepared in relation to the stated design element of the project. Inclusion of potential hazards addressed within the plan has taken account of the proposed contractual arrangements and the nature and stature of the Principal Contractor and his sub-contractors. The hierarchy of risk control has been followed and where possible the hazard has been designed out or risks minimised by the methods stated.

Signed ..... Date .....

For and on behalf of .....  
and acting in the capacity of Planning Supervisor

**PART SIX**

**THE SCHEDULES**

**THE REFURBISHMENT OF**

**TWO ELECTRIC PASSENGER LIFTS, HO90&91**

**AND**

**REPLACEMENT OF ONE HYDRAULIC PASSENGER LIFT, HO92**

**AT**

**GRENFELL TOWER**


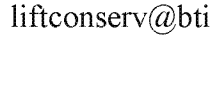
**LANCASTER WEST ESTATE**

**LONDON W11**

**FOR**

**THE ROYAL BOROUGH OF KENSINGTON & CHELSEA**

Butler & Young Lift Consultants Limited  
Timber Hall  
21 Timber Lane  
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Surrey CR3 6LZ

Tel.   
Fax.   
Email: liftconserv@btinternet.com

April 2004

L2508

The Royal Borough of Kensington & Chelsea  
Tenant Management Organisation Limited  
The Town Hall  
Hornton Street  
London W8 7NX

Prepared by: .....

Date: .....

Checked by: .....

Date: .....

**PART SIX**

**THE SCHEDULES**

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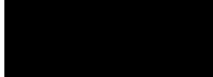

**LANCASTER WEST ESTATE**

**LONDON W11**

**FOR**

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The Royal Borough of Kensington & Chelsea  
Tenant Management Organisation Limited  
The Town Hall  
Hornton Street  
London W8 7NX

April 2004

L2508

**THE REFURBISHMENT OF TWO ELECTRIC PASSENGER LIFTS,  
HO90&91 AND  
REPLACEMENT OF ONE HYDRAULIC PASSENGER LIFT, HO92  
AT  
GRENFELL TOWER, LANCASTER WEST ESTATE**

**SCHEDULE 1**

**APPROVED MANUFACTURERS AND COMPONENTS**

This schedule provides the Tenderer with a preferred list of approved makers of generic and non-proprietary products that are available to all Tenderers. It is not exclusive but has been prepared to reflect the standard considered necessary by the SO.

The schedule is for guidance purposes only and it must be understood that appearance on this list does not automatically guarantee compliance with the Specification and detailed enquiries must be made by the Tenderer to the manufacturers to confirm such matters.

Where descriptions appear, these should be read in conjunction with the relevant clauses in the specification and where a trade name, firm or supplier is given in the Tender Documentation, this shall be taken as a standard of quality, service, and/or material only.

Subject to the SO's approval, products or services of other companies may be offered in their stead provided that the quality, design and/or material of the substituted company is at least equal to that specified and/or complies with the design criteria and that any alternative offered has been approved by the SO, and agreed in writing, **PRIOR** to the tender return.

The Contractor shall supply at his own cost all information including any necessary testing to allow the SO to decide upon the acceptability of alternative products and no allowance or extension of time shall be made attendant on such consideration.

**SUBMISSION OF THE TENDERERS OWN SPECIFICATION OF PRODUCTS OR EQUIPMENT SHALL RENDER THE TENDER INVALID.**

<b>Item</b>	<b>Manufacturer</b>	<b>Type</b>
<b>ELECTRIC LIFTS</b>		
Controllers	Thames Valley Controls Ltd International Lift Equipment	6809 with closed loop VF, Skycom
Encoder	Thames Valley Controls Ltd	SE 500
Machine	Sassi, Hollister Whitney	37.5% centre distance
Motor	Loher, Ziehl Abegg	Specific to lift VF
Machine Isolation	Metalastic LCL	HD1/2 Cushyfoot X36928-R
Governor L2508	Dupar/Hollister Whitney 6/1	To specification

## Butler & Young Lift Consultants Ltd

Item	Manufacture	Type
Safety Gear	Haushahn/Hollister	Bi-directional
Roller Guide Shoes	Whitney/ILE VG ELSCO	Car: 'B' Type Counterweight: 'D' Type
Ropes	British Ropes	Blue Strand
CCTV	RBKC Term Contractor	To specification
Asbestos Removal	RBKC Term Contractor	To specification

### HYDRAULIC LIFT

Controller	Thames Valley Controls Ltd International Lift Equipment	Onix To specification
Tapehead	Thames Valley Controls Ltd	Magnet tapehead detector
Pump Unit	Bucher	Orion á
Accumulator	Bucher	To suit application
Pipe Rupture Valve	Bucher	To specification
Hydraulic Ram and Cylinder	Bucher	Two stage direct acting cantilever
Guide Shoes	ILE / ELSCO	175mm
Guide Rails	Corus Steel	Section to calculation

### ALL LIFTS

Car Top Maintenance Control Station	A.A. Electrical TVCL	CT105 CTC-1
Lift Cars	Mulhouse, Propbrook	Patterned stainless steel
Doors and Architraves	Mulhouse, Propbrook	Patterned stainless steel
Stainless Steel	FSC, Rigidised	Patterned stainless steel Different for car and doors
Sills	McKechnie	Extruded bronze
Automatic Power Door Operators	GAL	MOVFR - HA
Door Hangers, Rollers, Locks	GAL	CP

## Butler & Young Lift Consultants Ltd

Item	Manufacture	Type
Switches, track assemblies	GAL	CP/HA
Door Closers	GAL	Spring arm
Landing Door Release	LCL	X78358
Passenger Protection	Memco	Panaforte
Car and Landing Pushes	Dupar	Stainless steel, tactile US91-EN, partial illuminance.
Door Open and Alarm Push	Dupar	Stainless steel, tactile US91-EN, partial illuminance
Scrolling Car and Landing Position Indicator	Stentorgate,	MFCU50/3/H
Hands Free Communication Unit	Windcrest	Autodialler EN4
Voice Synthesiser	Stentorgate	MFS24g
Car Light Fittings	Thorn, Fitzgerald, Phillips	As specification
Emergency Converter	Chloride Bardic, AA	As specification
Wiring	AEI, BICC	Stranded, PVC Covered, LSOH
Trailing Cables	Boston, BICC, Datwyler	Stranded, Flat-form, LSOH
Trunking and Conduit	Davis, Walsall, Simplex	Galvanised
Guarding	K G Fabrications	To specification
CCTV	RBKC Term Contractor	To specification
Asbestos Removal	RBKC Term Contractor	To specification

**THE REFURBISHMENT OF TWO ELECTRIC PASSENGER LIFTS,  
HO90&91 AND  
REPLACEMENT OF ONE HYDRAULIC PASSENGER LIFT, HO92  
AT  
GRENFELL TOWER, LANCASTER WEST ESTATE**

**SCHEDULE 2****INFORMATION TO BE SUPPLIED BY THE TENDERER**

Unless deviations from the requirements of this specification have been agreed with the SO **PRIOR** to tender date and are fully detailed in a letter accompanying the tender all things offered on this Schedule shall be deemed to comply with the Specification and/or drawings.

	ITEM	DETAILS
	<b>ELECTRIC LIFTS</b>	
<b>1.</b>	<b>Control System</b>  Maker ..... Type ..... Wall or floor mounted ..... Variable Frequency drive Yes/No ..... Regulator maker ..... Regulator type ..... Collective control logic Yes/No ..... Forced ventilation Yes/No ..... Power circuit control voltage ..... Logic circuit voltage ..... Remote diagnostic test tool required Yes/No ..... Retained on site as property of the Employer ..... Relay maker Yes/No/Not Applicable ..... Relay type .....	
<b>2.</b>	<b>Shaft Encoder</b>  Maker ..... Type ..... Location Car top/Machine room	
<b>3.</b>	<b>Floor Levelling Accuracy</b>  Offered +/-.....mm	



	ITEM	DETAILS
4.	<b>Lift Machine</b>  Maker Type Bearing/Support provided outboard of Traction sheave Wormgear maker Worm material and grade Worm and wheel diameters Teeth and thread(s) Lead angle Dismantling machine, clause 2.19	..... ..... Yes / No ..... .....(df) .....mm .....(df).....mm .....(T).....(≠) .....(λ) .....° Yes/No
5.	<b>Sheaves</b>  Traction sheave effective diameter Groove form Diverter sheave effective diameter Lift Groove form Included angle Angle of wrap on traction sheave –	..... mm Straight U/Undercut V ..... mm Straight U/Undercut V .....radians
6.	<b>Brake</b>  Brake maker Type and size Brake coil	..... ..... .....volts .....amps
7.	<b>Lift Motor</b>  Maker Rated output power at full load speed Starts per hour Motor control system	..... ..... kW ..... rpm ..... Open loop / Closed loop
8.	<b>Hand Winding Indicator</b>  Make Type Form of display	..... ..... .....

	ITEM	DETAILS
9.	<b>Electrical Protection of Motor</b>  Maker of electrical protection device Type Low speed trip time High speed trip time Total current demand from the declared supply, when raising the contract load.	  ..... Solenoid/oil dashpot/thermal ..... ..... Starting ..... amps Running ..... amps
10.	<b>Isolation</b>  Machine isolation maker Type Other isolation Type	  ..... ..... ..... .....
11.	<b>Overspeed Governor</b>  Maker Type Electrical trip Mechanical trip Number of type test certificate Force expected by governor when tripped Rope diameter and construction Test groove	  ..... ..... .....mps .....mps ..... ..... ..... Yes/No
12	<b>Roller Guide shoes</b>  Maker Type Reference no. Roller Material Roller diameter Means of adjustment	Car                      Counterweight  .....                      ..... .....                      ..... .....                      ..... .....                      ..... .....mm                      .....mm .....                      .....
13.	<b>Buffers</b>  Maker Type and reference no. Number of type test certificate attached Stroke	Car                      Counterweight  .....                      ..... .....                      ..... .....                      ..... .....                      .....

	ITEM	DETAILS
14.	<b>Suspension Ropes</b>  Number and diameter Construction Lay Tensile strength Minimum breaking load Weight per metre Estimated mass of car sling and attachments Terminations Type of equalising device	..... No. .... mm ..... ..... ..... kgf/mm <sup>2</sup> ..... kN ..... kg/m ..... kg
15.	<b>Counterweight</b>  Rolled steel frame Percentage of rated load balanced Filler weights cast iron Tie rods	Yes/No ..... % Yes/No Yes/No
16.	<b>Safety Gear</b>  Maker Type and reference no. Number of type test certificate Force required to operate	..... ..... ..... .....
17.	<b>Lift Car</b>  Internal clear dimensions to front return and between handrails  Sound deadening material Type Depth  Clear opening	..... Width ..... Depth ..... Height  ..... ..... .....mm

	ITEM	DETAILS
18.	<b>Cooling</b>  Required Maker Type and Reference No. Cooling Capacity  Air Changes	Yes/No ..... ..... sensible ..... Kw latent ..... Kw total ..... Kw .....per min
	<b>HYDRAULIC LIFT</b>	
19.	<b>Control System</b>  Maker Type Wall or floor mounted Variable Frequency drive Regulator maker Regulator type Collective control logic Forced ventilation Power circuit control voltage Logic circuit voltage Remote diagnostic test tool required Retained on site as property of the Employer Relay maker Relay type	..... ..... ..... Yes/No ..... ..... Yes/No Yes/No ..... ..... Yes/No Yes/No/Not Applicable .....
20.	<b>Floor Selector</b>  Make Type	..... .....
21.	<b>Floor Levelling Accuracy Offered - Hydraulic Lift</b>	+/- ..... mm

	ITEM	DETAILS
22.	<b>Hydraulic Pump/Tank/Motor assembly</b>  Pump/Tank/Motor assembly make ..... Type ..... Tank size .....  Tank capacity ..... litres Tank weight when full ..... kg Type of tank isolation provided ..... Type of catchment/bund provided ..... Capacity of catchment/bund ..... litres Energy accumulator type ..... Accumulator capacity ..... litres Accumulator flow rate/pressure rating ..... Motor type ..... kW ..... rpm Rated output power at full load speed ..... Number and type of motor protection ..... Total current demand from the declared supply, when raising the contract load. Starting ..... Amps Running ..... Amps Valve type ..... Type of control ..... Min. temperature oil heater provided Yes/No Oil capacity sight glass provided Yes/No Oil pressure gauge provided Yes/No Hand-pump provided Yes/No Maximum motor starts per hour without cooling. ....	
23.	<b>Hydraulic Piping</b>  Type ..... Length ..... Solid/Flexible .....m	
24.	<b>Oil Cooler</b>  Provided Yes/No Make ..... Type ..... Size ..... Heat dissipated to Inside/Outside machine room	

	ITEM	DETAILS
25.	<b>Hydraulic Oil</b>  Type Biodegradable Minimum flash point Recommended life span under normal operating conditions	..... Yes/No °C  ..... years
26.	<b>Hydraulic Ram Arrangement</b>  Ram diameters Location of rupture valve Ram header arrangement Type Header sprocket/pulley diameter	.....mm ..... Existing/New Chain Sprocket/Roped .....mm
27.	<b>Guides</b>  Maker Reference number Type of section Guide size Pitch of fixings Fixing type	..... ..... ..... ..... .....mm .....
28.	<b>Guide Shoes</b>  Make Type Shoe length	..... ..... .....mm
29.	<b>Lift Car</b>  Internal clear dimensions to front return  Sound deadening material Type Depth  Clear Opening	Width ..... mm Depth to car front return ..... mm Height ..... mm  Depth..... mm  .....mm

	ITEM	DETAILS
	<b>ALL LIFTS</b>	
<b>30.</b>	<b>Door Operator</b>  Maker Type Operator motor Speed regulation Starts per hour Coupler type	..... ..... ..... ..... ..... .....
<b>31.</b>	<b>Door locks</b>  Maker Type Type test certificates attached	..... ..... .....
<b>32.</b>	<b>Landing Door Equipment</b>  Make Top tracks and type Suspension rollers type and diameter Kicking rollers type and diameter Door closers type Lock cover – transparent Bottom door shoes maker and type Kicking plate provided at base of each door panel	..... ..... ..... ..... ..... ..... ..... Yes/No
<b>33.</b>	<b>Emergency Release</b>  Maker Type	..... .....
<b>34.</b>	<b>Passenger Protection</b>  Maker Type Range	..... ..... .....



	ITEM	DETAILS
35.	<b>Pushes</b>  Maker Type	  ..... .....
36.	<b>Position and Arrival Indicators</b>  Maker Type	  ..... .....
37.	<b>Hands Free Communication Unit</b>  Maker Type	  ..... .....
38.	<b>Speech Synthesiser</b>  Maker Type	  ..... .....
39.	<b>Emergency Lighting Unit</b>  Maker Type	  ..... .....
40.	<b>Electrical</b>  Wiring make and type LSOH  Trailing cables manufacturer and type LSOH  Suspension anchorage type  Trunking and conduit maker and type Galvanised  Rubber insulation mat maker and type Certified for 11kV insulation	  ..... Yes/No  ..... Yes/No  .....  ..... Yes/No  ..... Yes/No

	ITEM	DETAILS	
41.	<b>Clearances – Top of Lift Shaft and Machine Room</b>	<b>Electric Lifts</b>	<b>Hydraulic Lift</b>
	Will there be sufficient personnel refuge space on top of the car when at the extreme position without requiring mechanical/electrical intervention	Yes/No	Yes/No
	Will there be EN81/1 clearances above the lift equipment when the car is at the extreme position?	Yes/No	Yes/No
	Will there be EN81/1 clearances above and around the machine equipment.	Yes/No	
	Notified Body dispensation required?	Yes/No/NA	Yes/No/NA
	DTI derogation required?	Yes/No/NA	Yes/No/NA
	Has provisional dispensation or dispensation been achieved?	Yes/No/NA	Yes/No/NA
	If yes, weeks required to obtain dispensation or derogation from the Tenderer's Notified Body or DTI.	..... weeks	..... weeks
	Cost included	Yes/No/NA	Yes / No / NA
42.	<b>EN 81/1 Compatibility and CE Certification</b>		
	Will CE Marking of the installation be achieved?	Yes/No/NA	Yes/No/NA

	ITEM	DETAILS	
43.	<p><b>Programme</b></p> <p>To be inclusive of Christmas shutdown.</p> <p>Weeks required for design, procurement and preparation of materials from Contract award or letter of intent.</p> <p>Weeks per lift required for installation and completion including consultants witness test, snagging and commissioning and one week proving between phases.</p>	<p><b>Electric Lifts</b></p> <p>.....</p> <p>.....</p>	<p><b>Hydraulic Lift</b></p> <p>.....</p> <p>.....</p>
44.	<p><b>Proposal to reduce programme by alternative safe method of work.</b></p> <p>Details</p> <p>Use further pages if necessary</p>	<p><b>Electric Lifts</b></p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	
45.	<p><b>Proposed measures to mitigate the effect of lift malfunction during the refurbishment.</b></p> <p>Details</p> <p>Use further pages if necessary</p>	<p><b>Electric Lifts</b></p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	
46.	<p><b>Preferred method for delivery of equipment.</b></p> <p>Details</p> <p>Use further pages if necessary</p>	<p><b>Electric Lifts</b></p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	

## 47. Performance Characteristics - Electric Lifts

At the time of the SO undertaking both the witness and commissioning test and the final handover of the lift to the employer on completion of the defects liability period, the Contractor shall undertake all necessary tests to prove the performance characteristics.

The Tenderer shall submit the following information with the tender return. The terms minimum or maximum are not acceptable:

Door opening time	.....	secs
Door closing time	.....	secs
Door operator closing forces at each floor	.....	joules
Acceleration from stationary to contract speed on balanced load	.....	m/secs <sup>2</sup>
Deceleration from contract speed to stationary on balanced load	.....	m/secs <sup>2</sup>
Acceleration jerk rate to contract speed	.....	m/secs <sup>3</sup>
Deceleration jerk rate to contract speed	.....	m/secs <sup>3</sup>
3m one floor flight time, brake lift to brake set	.....	secs
6m two floor flight time, brake lift to brake set	.....	secs
Vertical vibration in car on contract load and speed	.....	Mg
Horizontal vibration in car on contract load and speed	.....	Mg
Auditory effect in car with fan on at contract load and speed	.....	dB
Auditory effect in car with fan off at contract load and speed	.....	dB
Auditory effect of landing lock engagement at 1m	.....	dB

The performance characteristics shall be used as part of the maintenance audit trail at varying times during the defects liability period and during the subsequent fully comprehensive maintenance contract.

## 48. Performance Characteristics - Hydraulic Lift

At the time of the SO undertaking both the witness and commissioning test and the final handover of the lift to the employer on completion of the defects liability period, the Contractor shall undertake all necessary tests to prove the performance characteristics.

The Tenderer shall submit the following information with the tender return. The terms minimum or maximum are not acceptable:

Door opening time	.....	secs
Door closing time	.....	secs
Door operator closing forces at each floor	.....	joules
Acceleration from stationary to contract speed on balanced load	.....	m/secs <sup>2</sup>
Deceleration from contract speed to stationary on balanced load	.....	m/secs <sup>2</sup>
Acceleration jerk rate to contract speed	.....	m/secs <sup>3</sup>
Deceleration jerk rate to contract speed	.....	m/secs <sup>3</sup>
3m one floor flight time, brake lift to brake set	.....	secs
6m two floor flight time, brake lift to brake set	.....	secs
Vertical vibration in car on contract load and speed	.....	Mg
Horizontal vibration in car on contract load and speed	.....	Mg
Auditory effect in car with fan on at contract load and speed	.....	dB
Auditory effect in car with fan off at contract load and speed	.....	dB
Auditory effect of landing lock engagement at 1m	.....	dB

The performance characteristics shall be used as part of the maintenance audit trail at varying times during the defects liability period and during the subsequent fully comprehensive maintenance contract.

## 49. Information to be Provided

The Contractor shall submit the following information and documentation with his tender:

Lift Method Statement	Enclosed	Yes/No
Lift Project Programme	Enclosed	Yes/No
Company Health and Safety Policy	Enclosed	Yes/No
Five Years Safety Record	Enclosed	Yes/No
Service Record Card	Enclosed	Yes/No
Controller and Monitoring System Technical Details	Enclosed	Yes/No
Provision of standby service engineer. on a full time basis as required by Option 1.	In house / Sub-Contractor	
If sub-contractor, who?	.....	
Service Department Location	.....	
Maintenance Interval Between Visits	.....	Weeks
Building Sub-Contractor & CIS 5	.....	Yes/No
Lift Removal Sub-Contractor	.....	
Lift Installation Sub-Contractor	.....	
Electrical Sub-Contractor	.....	
Car Enclosure Sub-Contractor	.....	
Doors and Architraves Sub-Contractor	.....	
Screening / Guarding Sub-Contractor	.....	
Machine Supplier	.....	
Machine Re Assembly Sub Contractor	.....	
Other Sub-Contractors	.....	
	.....	
Compliance with Tender Documentation		Yes/No
Schedule of all Agreed Deviations	Enclosed	Yes/No

Additional Works Over Specification                      Enclosed                      Yes/No

**Information to be Provided Items 1-49 inclusive on pages 6/1 to 6/18 inclusive**

Directors Signature .....  
Directors Name & Title .....  
Company or Trading Name .....  
Address .....  
.....  
Date .....

**THE REFURBISHMENT OF TWO ELECTRIC PASSENGER LIFTS,  
HO90&91 AND  
REPLACEMENT OF ONE HYDRAULIC PASSENGER LIFT, HO92  
AT  
GRENFELL TOWER, LANCASTER WEST ESTATE**

**SCHEDULE 3****SUMMARY OF TENDER AND PRICES**

The summary of tender and prices is for the whole of the works as defined and associated with the preliminaries, preambles, specifications and all other matters encompassed within the tender document for the provision of the lift, inclusive of comprehensive maintenance from Main Contractor's possession of site to the end of the Defects Liability Period.

The Tenderer shall be deemed to have met and included for the full requirements of the specification and completed and complied with the full requirements of The Schedules. Any deviation whatsoever shall be agreed in writing with the SO prior to Tender submission and be shown on a separate schedule to be returned by the Tenderer. **SUBMISSION OF THE TENDERER'S OWN SPECIFICATION OR DEVIATIONS NOT AGREED WITH THE SO SHALL RENDER THE TENDER INVALID.**

The Tender shall be open for acceptance for 12 weeks from the due in date.

PART ONE	- The Contract and the Preliminaries	£	_____
PART TWO A	- Electric Lift Specification	£	_____
PART TWO B	- Hydraulic Lift Specification	£	_____
PART THREE A	- Electrical Specification - Electric Lifts	£	_____
PART THREE B	- Electrical Specification - Hydraulic Lift	£	_____
PART FOUR A	- Building and Civil Engineering Specification - Electric Lifts	£	_____
PART FOUR B	- Building and Civic Engineering Specification - Hydraulic Lift	£	_____
PART FIVE	- CDM Regulations	£	_____
PROVISIONAL SUM	- Structural Engineers Fee	£	2,000.00
<b>Sub Total</b>		<b>£</b>	_____
CONTINGENCIES AT 5% -		£	_____
<b>TOTAL NETT FIXED PRICE FOR CONTRACT DURATION</b>		<b>£</b>	_____



**Option 1: Permanent Stand By Of Senior Fitter and Mate**  
**Electric Lifts as Clause 2A.72** £ .....per week

**Labour rate for any hours outside those specified for this function as below.**

**Option 2: Quiet trimming of entrances**  
**Electric Lifts as Clause 4A.07** £ .....

**Programme Implication** plus / minus .....days

**Option 3: Paint Lift Shaft**  
**Electric Lifts as Clause 4A.14** £ .....

**Programme Implication** plus .....days

## Daywork Rates

The following prime cost rates, inclusive of all overheads and associated costs, shall be applicable to any works deemed necessary over, above or in addition to the contents of this whole tender document, the rates to apply for the Contract duration. The rates shall apply between 08.00 hours and 18.00 hours.

## Labour

	Monday - Friday	Saturday	Sunday
Lift	£ .....	£.....	£..... per pair hour
Electrical	£ .....	£.....	£..... per single man hour
Builder	£ .....	£.....	£..... per single man hour
After Hours	+.....%	+.....%	+.....%
Sub Contractor	+.....%		
Materials	+.....%		
Plant	+.....%		

Directors Signature .....

Name & Title .....

Company or Trading Name .....

Address .....

LEIA Index and Date .....

**MAYOR AND BURGESSES OF  
THE ROYAL BOROUGH OF KENSINGTON AND CHELSEA**

**FORM OF TENDER**

**SITE: GRENFELL TOWER, LANCASTER WEST ESTATE**

**REF: L2508**

**WORKS: REFURBISHMENT OF TWO ELECTRIC PASSENGER LIFTS,  
HO90&91 AND REPLACEMENT OF ONE HYDRAULIC PASSENGER  
LIFT, HO92**

We ..... hereby  
offer to undertake on the acceptance of this tender to perform, provide, execute and do all the  
works, material matters and things described or mentioned on the accompanying Specification  
(which has carefully been examined by us) in strict accordance with and under an subject to  
the terms and conditions set forth or mentioned in the accompanying Conditions of Contract  
and the said Specification by excluding VAT for the sum of:

IN WRITING    £ .....

.....

IN FIGURES    £ .....

inclusive of Provisional and Contingency and sums, but excluding VAT.

We ..... undertake to complete  
the whole of the works to the satisfaction of the Supervising Officer within ..... weeks from  
the date of possession provided the order to commence is received within ..... weeks.

We ..... further  
undertake to enter into a contract under seal with the Council incorporating the terms and  
conditions subject hereto.

Date ..... Signed .....

for and on behalf of .....

.....  
The Council does not bind itself to accept the lowest, or any Tender, neither will they pay any  
expense in connection with such tenders.

Tenders are to be delivered (BUT NOT BY DATAPOST) sealed in the envelope provided  
and bearing not name nor franking machine identification or marks indicating the sender, to  
the Royal Borough of Kensington and Chelsea, Town Hall, Hornton Street, Kensington, W8  
7NX not later than midday on:

**16<sup>TH</sup> JULY 2004**

**PRO FORMA**

**CERTIFICATE FOR USE WHEN TENDERING**

**SITE: GRENFELL TOWER, LANCASTER WEST ESTATE**

**REF: L2508**

**WORKS: REFURBISHMENT OF TWO ELECTRIC PASSENGER LIFTS,  
HO90&91 AND REPLACEMENT OF ONE HYDRAULIC PASSENGER  
LIFT, HO92**

**RETURNABLE BY 12 NOON ON FRIDAY 16<sup>TH</sup> JULY 2004.**

The essence of selective tendering is that the client shall receive bona fide competitive tenders from all those tendering. In recognition of this principle, we certify that this is a bona fide tender, intended to be competitive, and that we have not fixed or adjusted the amount of the tender by or under or in accordance with any agreement or arrangement with any other person. We also certify that we have not done and we undertake that we will not do at any time before the hour and date specified for the return of this tender any of the following acts:

- (A) Communicating to a person other than the person calling for those tenders the amount or approximate amount of the proposed tender, except where the disclosure, in confidence, of the approximate amount of the tender was necessary to obtain insurance-premium-quotations required for the preparation of the tender;
- (B) Entering into any agreement or arrangement with any other person that shall refrain from tendering or as to the amount of any tender to be submitted;
- (C) Offering or paying or giving or agreeing to pay or give any sum of money or valuable consideration directly or indirectly to any to any person for doing or having done or causing or having caused to be done in relation to any other tender or proposed tender for the said work any act or thing of the sort described above.

In this certificate, the word "person" includes any person any body association, corporate or unincorporated; and "any agreement or arrangement" includes any such transaction, formal or informal, and whether legally binding or not.

Signed .....

for and on behalf of .....

Date .....