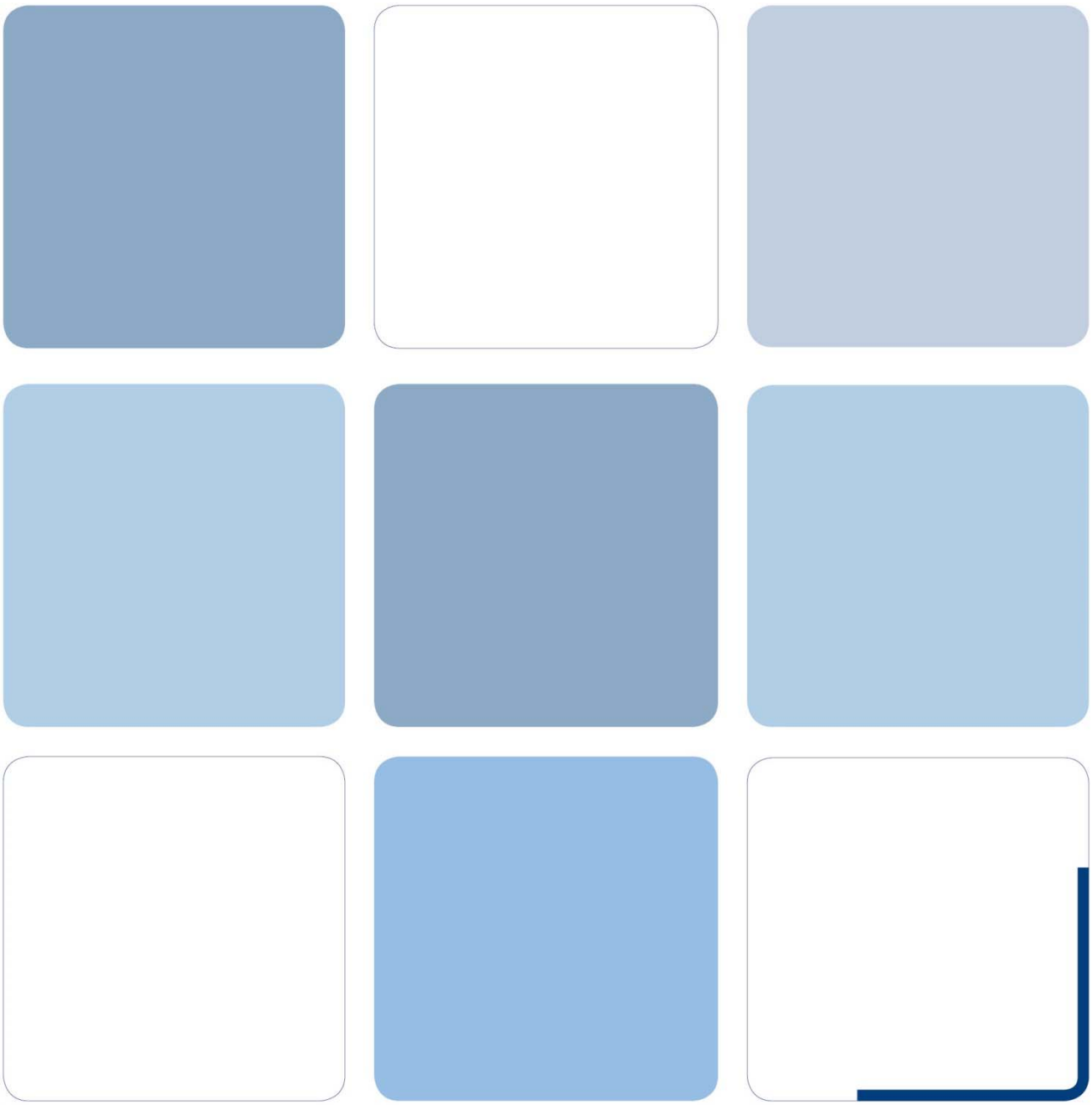
HM LAND REGISTRY – TRAFALGAR HOUSE

1 Bedford Park

Croydon

CR0 2AQ

Tender Specification for 3 off MRL Passenger Lift Installations.



HM LAND REGISTRY – TRAFALGAR HOUSE

1 Bedford Park

Croydon

CR0 2AQ.

Tender Specification for 3 Off MRL Passenger Lift Installations.

Revision: 1

Date: 20th April 2018

RPS
Cathedral Buildings
Dean Street
Newcastle Upon Tyne
NE1 1PJ

Tel: (0)191 232 6306
Fax: (0)191 232 5359
Email: rpsgnw@rpsgroup.com

Document No: N11181

HM Land Registry.

Tender Specification for 3 off MRL Passenger Lift Installations.

AUTHOR			
Signature		**Name:**	Robin King
Designation	Senior Lift Engineer		
Date	20th April 2018		

CHECKED BY			
Signature		**Name:**	Charlie Harris
Designation	Senior Mechanical Handling Engineer (Lifts and Escalators)		
Date	20th April 2018		

A firm accredited to BS EN ISO 9001 : 2008, 14001 : 2004 and 18001 : 2007

REVISION HISTORY DOCUMENT

DATE OF REVISION	NAME OF REVISION	DESCRIPTION/ LOCATION OF REVISION	NAME	SIGNATURE

INDEX

PART A

A1 CONDITIONS OF CONTRACT

The contractor shall provide a compliant tender return fully in accordance with the tendering requirements of the client. The tender returns shall include all necessary costs and responsibilities pertaining to the clients issued contractual terms and conditions for this project in their entirety.

The responsible order placer and the vendor recipient of purchase order to agree final terms and conditions. The below are minimum requirements set out by HM Land Registry.

A2 PAYMENT TERMS

Accepted drawings 10%

Materials delivered to site 50%

Installation works monthly – progress reviewed by engineer – 40%

This is on a per lift basis. Please note only the lift being worked on can be delivered to site at any time.

A3 DELAYS

The lift contractor will complete the project by 31 March 2019. For every week or part of delay in completion the contractor shall deduct % from the final invoice.

Week 1 – 2%

Week 2 – 3%

Week 3 – 4%

Up to a maximum of 10% of the total contract amount.

A4 RETENTION

The Lift Contractor shall provide a retention or contract guarantee Bond, in favour of the Purchaser, to the value of 5% of the contract value during the works, and for the duration of the Defect Liability Period.

The form of Bond shall be in accordance with the LEIA scheme or equal to the approval of the Purchaser.

A5 TYPE OF CONTRACT

HM Land Registry are proposing using the Short Form version of the NEC3 Engineering and Construction Contract.

PART B- GENERAL

B1 INTRODUCTION

The publication of this Specification is to set out the standards and requirements of HM Land Registry in order to provide Passenger Lift Installations which are robust, reliable and meet the needs and expectations of users in the high usage office environments in which they are installed.

All materials and plant supplied shall be sourced with consideration given to their environmental impact during their production, delivery and in their future use and disposal.

B2 WORK INCLUDED

All materials specified in this Specification shall be designed, supplied, delivered, off-loaded, installed and commissioned and maintained. Whilst undertaking the Works it is essential that the 'Duty of Care' is maintained.

Any items of plant and equipment shown on any issued drawings but not described in the Specification, or described in the Specification but not shown on any issued drawings, shall be provided as part of this Section of the Works and be deemed to be included in the Contract Price.

If there is a difference between the requirements of the Specification and any issued drawings, the difference shall be clarified before tendering and ordering.

Where 'shall' is used to give instructions in respect of a part of this Section of the Works, all costs arising from such instructions shall be deemed to be included within the Contract Price.

B3 INFORMATION BEFORE TENDERING

It shall be deemed that the Specification Schedules, any issued drawings and Plans have been examined. If all the required particulars cannot be obtained from this examination, application for further information shall be made.

Any claims because of want of knowledge in respect of the Section of the Works included in this Specification will not be considered.

In the context of this Specification, the Passenger Lift Contractor shall be referred to in this Specification as the Contractor and shall be deemed to mean any nominated persons or company that designs, manufactures, provides and/or installs any of the items of equipment as detailed in Section D of this Specification.

In the context of this Specification, the title HM Land Registry's Lift Consultant shall be referred to in this Specification as the Engineer and shall be deemed to mean any nominated persons who has been given authority by HM Land Registry to compose, issue, amend and generally detail specifications for the services and material required on this project. It shall also mean the persons, who at the instruction of HM Land Registry are acting on their behalf to ensure a delivery, installation and handover of the specified goods and services to their exacting levels of standards and quality.

B4 MATERIALS, DESIGNS AND INSTALLATIONS

Unless otherwise specified and approved, all materials and designs shall comply with the current issue of the relevant British/European Standard Specification and/or part thereof as appropriate.

The installation shall comply with the relevant current British/European Standard Code of Practice and/or part thereof as appropriate.

Materials, designs and installations shall comply with the current Health and Safety at Work Act and any other statutory Rules and Regulations as applicable.

All materials and plant supplied shall be sourced with consideration given to their environmental impact during their production, delivery and also in their future use and disposal.

B5 CERTIFICATION OF CONFORMITY

The Lifts included in this Specification shall comply with the requirements of the new Lift Directive 2014/33/EU.

All Lifts shall comply with the "Harmonised Standards" for Lifts applicable at the time the Lifts are being installed. The Harmonised Standards will include the Edition of BSEN81-20 and BSEN81-50 current at the time of installation.

All safety components shall have a CE marking and shall be provided with an EC Declaration of Conformity.

Each installed Lift shall be provided with an EC Declaration of Conformity and bear the CE mark, after completion, displayed on the car operating panel.

All costs associated shall be deemed included within the tendered sum for the equipment.

The language of all declarations shall be English (UK).

B6 MANUFACTURER'S RECOMMENDATIONS

Products shall be handled, stored and installed in accordance with the manufacturer's recommendations. Any conflict with other specified requirements shall be reported to the Engineer. Copies of the manufacturer's recommendations shall be submitted when requested.

B7 EXAMINATION OF DRAWINGS AND INFORMATION PROVIDED

This Specification shall not be varied in any way.

Where the Specification indicates that examination of the details of any item is required before the Work is undertaken, adequate time must be allowed for this to be carried out.

Examination of drawings or other information will not relieve the Contractor of his responsibilities for discrepancies, errors or omissions in the drawings, provided that such discrepancies, errors or omissions are not due to inaccurate information or particulars furnished to him in accordance with the Conditions of Contract.

B8 BUILDERS AND ELECTRICAL WORK

Builders and Electrical Work drawings covering the whole of the requirements for this Section of the Works shall be provided.

Any Builders or Electrical Work shall be checked as part of this Section of the Works to ensure that they meet the full requirements.

Following the complete removal of the existing lift and all associated components the shaft will be prepared for the installation of the new equipment. This will include:-

1. Dust-inhibiting treatment of lift well with 2 coats of high opacity white emulsion to the lift shaft walls (mist coats shall not be acceptable) down to the pit floor this includes the well cap.

2. The lift pit area is to be degreased and painted with 2 coats oil resistant non-slip grey paint. (coat to be applied when the pit is completely empty and another just before practical completion).

3. Alteration to the existing lifting points/beams or installation of new lifting points/beams as required for the installation and maintenance of the new equipment.

4. Any and all modifications to accommodate the new landing entrances including making good and filling. Finishes shall match existing colour scheme.

5. The suitability of the existing electrical supply shall be assessed at the time of the preliminary survey. If deemed unsuitable costs shall be included for any and all works required such that the supply is suitable for the new equipment proposed by the Contractor.

B9 LIFT REMOVAL

The lift contractor is to remove and dispose of all of the old lifts as part of this project, critical spares from the control panels should be kept until all lifts on site have been decommissioned.

B10 LANDING ENTRANCE PROTECTION

The lift contractor shall provide guarding to the landing entrances / control panels whilst the old lifts are removed and new lifts installed. This shall be in the form of full height vandal resistant lockable steel hoardings. These shall be painted white and display safety notices as required.

B11 DRAWINGS

All installation drawings shall be provided in good time to meet the agreed programme for the Works. The contractor will provide 2 sets of GA Drawings to the Engineer for Approval. One copy will be supplied in an AUTO-CAD and one copy in PDF electronic format.

Apart from those drawings which must be issued for construction purposes before the Contract is let, drawings of builder's work, in accordance with the Clause 'Builders and Electrical Work', wiring diagrams and drawings of Work to be done by other trades required for the purposes of the complete installation, shall be provided as part of this Section of the Works.

This Section of the Works shall include the responsibility for any discrepancies, errors or omissions in the drawings and any other particulars supplied, provided that such discrepancies, errors or omissions be not due to inaccurate information or particulars furnished in writing in accordance with the Conditions of the Contract.

B12 RECORD DRAWINGS

During the progress of the Works, the information necessary for preparing the installation record drawings shall be recorded on drawings in an approved manner. The marked-up drawings shall be made available for inspection and checking upon request.

The relevant record drawings and instructions shall be provided within 6 weeks of Practical Completion, or Taking Over, of a part of or whole of the Works. If the record drawings are not available, the Engineer will not recommend the issue of a Certificate certifying completion.

B13 INSTALLATION LIAISON

The Contractor is responsible for the co-ordination of all his Sub-Contractors and their installation work on site. All Sub-Contractors concerned with the Works will be required to co-operate with the Contractor and others before the Work is commenced and to ensure the correct design intent during the course of construction. This shall include all necessary liaison with the Contractor and all other Sub-Contractors prior to the preparation of the installation drawings to ensure that the final detailed installation drawing layouts prepared under this Section of the Works are compatible with all others aspects of the Works (i.e. structure, and other services, being installed in the same vicinity). Any Work that has to be re-done due to negligence in this respect will not constitute an extra. Particular care shall be taken to prevent obstruction of electrical service positions, cable routes, switch positions, access positions etc.

Particular care shall be taken to obtain uniform and tidy arrangements of wall and ceiling mounted equipment.

All concerned will be required to co-operate in planning these arrangements.

B14 OFF-LOADING AND INSTALLATION

The supply, delivery, off-loading, positioning and installation of all equipment and materials detailed in this Specification shall form part of this Section of the Works.

This shall include the provision of all necessary craneage, hard standing for same, lifting tackle, trolleys, skids, tools, ladders, gangways, fences, scaffolding other than that already erected, etc. and the subsequent removal.

Timely indication shall be given of any difficulties likely to be encountered in accommodating plant or equipment in the spaces available.

The strength of floors across which heavy loads are to be moved shall be checked in good time before the load is applied so that if the strength of any floor is found to be inadequate, arrangements for supporting the load can be made without delaying its movement.

Plant and materials shall not be deposited on roadways or footpaths, in corridors or rooms unless prior permission has been obtained in writing.

This Section of the Works shall include the responsibility for any damage caused by the off-loading and movement or loss or theft of this material. The material is the property of the Contractor until accepted by Engineer. Any replacement costs due to damage, loss or theft caused during offload, storage or installation will be incurred by the Contractor.

B15 DELIVERY AND CONSTRUCTION PROGRAMME

A comprehensive and detailed delivery and construction programme shall be prepared and included within the returned tender as a requirement of this Section of the Works.

The programme shall be of the simple bar chart type, indicating dates for the commencement and completion of all Sections of Work and the content of the programme shall be agreed with the Engineer before preparation commences.

The programme shall make an allowance for preparation of drawings, pre-commissioning checks, setting systems to work, commissioning and performance testing, witnessing of tests by the Engineer and demonstration of plant and equipment. The programme shall clearly indicate what are the required delivery dates of all goods and materials vital to the programme. Evidence shall be provided that such goods and materials can be made available at the required time.

Whilst long delivery items must be ordered early, care must be taken to ensure that items, which may deteriorate under site conditions, are not delivered to site too early (even if there should be slippage in the Construction Programme). Such items, if ready for delivery too early, must be warehoused at the Contractors cost.

The programme shall also show :-

- The period for delivery.
- The period for lift removal
- The period for any builders and/or electrical works and alterations
- The periods for installation.
- The periods allowed for the contractors own testing.
- The periods allowed for witnessed repeat testing by the Engineer.

It should be noted that the Engineer shall only witness test when all elements of building works have been completed and due allowance for this shall be made when the programme is being prepared.

Should the agreed programme for the Works require change, a revised programme covering this Section of the Works shall be prepared and issued.

B16 SUPERVISION OF LABOUR

A qualified representative shall constantly be kept upon the Works with a thorough experience of the class of work covered by the Specification. So far as possible this representative shall not be changed during the course of the Works.

Trade custom in the employment of the appropriate grades of workpeople shall be followed.

Workpeople shall not trespass beyond the limits of their Work.

B17 PROTECTION OF MATERIALS AND WORK

The following shall be provided during storage and installation:-

- Adequate and safe storage for all material, plant and equipment necessary for the installation, including suitable protection against the weather and ingress of dirt or moisture into working parts.
- Precautions and protection against frost, building works or operations by others.
- Precautions and protection against mechanical damage by other trade contractors.
- Painting of parts liable to corrosion immediately after removal of temporary protection.

- Replacement material, plant or equipment where deterioration or damage has occurred prior to handover.

Responsibility for protecting all the lift finishes etc will remain with the contractor until acceptance by the Engineer on completion of the lift installation.

B18 HEALTH AND SAFETY

All Work undertaken and completed as part of this Section of the Works shall be carried out fully in compliance with the 2015 Construction (Design and Management) Regulations (2015 CDM). Full assistance and co-operation shall be given to the Principal Contractor to ensure complete and accurate Health and Safety documentation is provided throughout the course of the contract and ultimately at completion of the Works. Fully detailed method statements and risk assessments for all Works undertaken during the project are required.

It shall be ensured that safe methods of working legislation and site procedures are followed at all times. All necessary precautions shall be taken to safeguard against damage by fire or explosion where the execution of Work may involve the presence of flames or sparks.

Petroleum products and other flammable or vaporising liquids shall not be permitted on site.

It shall be ensured that all safety and welfare measures required under or by virtue of any enactment or regulation on the working rules of the industry are strictly complied with.

B19 PERSONAL PROTECTIVE EQUIPMENT

Site Personal Protective Equipment requirements shall be adhered to at all times.

B20 INTERFERENCE SUPPRESSION

All equipment used for the erection of the Works shall, where necessary, be fitted with suppressors to limit radio interference to the levels prescribed in BS EN 55014-1:1997.

B21 FOUNDATION BOLTS AND ALIGNMENT

Foundation bolts shall be suitable type anchors specifically designed for the purpose for which they are to be used. Foundation bolts shall not be drilled into joints or aggregate.

B22 NOISE AND DISTURBANCE

The use of noisy mechanical tools or equipment will only be permitted by prior arrangement.

Should any request for such use be declined, or specific instructions be issued that such noise cannot be accepted, this decision will be accepted and alternative arrangements made at no additional contractual cost.

Radios / music are not permitted to be used onsite at all. The use of Ipods / MP3 players with head phones will be not be accepted as emergency alarms may not be able to be raised efficiently.

B23 EQUIPMENT SELECTION

Whether or not specified in each section of this Specification, all equipment (i.e., motors etc.) shall be selected to ensure that the specified duty is not on or close to, nor at the top or close to the top of, a particular performance curve of the equipment specified in Section D.

All materials and plant supplied shall be sourced with consideration given to their environmental impact during their production, delivery and in their future use and disposal.

B24 REMOVAL OF RUBBISH

All rubbish and materials not required shall be cleared from the site as they accumulate and the whole of the installation and working areas left in a clean and tidy condition.

All site waste and materials not required shall be suitably sorted and separated for recycling and/or re-use prior to dispersal. All rubbish and materials for disposal shall have minimum landfill requirements. Waste will only be disposed of by licensed contractors and, where possible, waste will be recycled.

B25 WASTE SEGREGATION

All waste will be disposed of by licensed waste disposal contractors and where possible the waste will be recycled.

Waste transfer notices are required to be submitted with the final documentation.

B26 PRIVATE CARS

Private cars will under no circumstances be allowed within the site complex without permission.

B27 SITE VISITORS

All site visitors shall be accompanied or fully inducted by the contractor when on site.

B28 RESPONSIBILITY FOR WORKS

Until each Section of the Works has been formally taken over, the responsibility for such Sections of the Works whether under construction or during test, or in-service use will not change (same as provided in the Conditions of Contract).

B29 INSTRUCTION AND TRAINING

Complete instruction/demonstration, and training in the operation of all systems, plant, equipment and controls shall be given to the person(s) who will be responsible for running them. The name(s) of the person(s) concerned will be supplied on application to HM Land Registry.

B30 SPARES

The Contractor shall ensure that a stock of suitable spare parts is held at a local depot to the site.

Should it be considered that additional spares are desirable for maintenance of the installation, a list of recommended parts and materials shall be provided for approval.

B31 KEYS, TOOLS AND ACCESSORIES

All keys, key fobs, tools and accessories required for the proper running and maintenance of the equipment specified in Section D, together with a complete 12 month supply of lubricants necessary for the correct maintenance of the system(s) installed shall be supplied as part of this Section of the Works prior to handover.

Where machine room-less lifts are supplied the lift contractor shall supply and install a machine room-less controller and cabinet to match the landing finishes. Three sets of controller cabinet keys shall be provided to HM Land Registry when the lifts are accepted.

B32 TYPE TESTING

Where required in this Specification, items of equipment supplied for the Works shall be 'Type Tested' in accordance with the recommendation of BSEN81-20 and BSEN81-50 and BSEN81-72.

Where 'Type Tested' equipment is specified, each Tenderer shall provide suitable documented evidence, certificates etc., with his Tender for each 'Type Tested' piece of equipment included in his Tender Offer.

B33 TESTING ON SITE

The Contractor shall commission and test the complete installation in accordance with the relevant standards and make any adjustments and corrections as necessary for ensuring that the installation fully complies with this Specification. All control and operating devices not included in the Standards shall also be tested for proper functioning.

Before acceptance of the Works and at an agreed date the equipment is to be witness tested. The Contractor shall give the Engineer at least seven days written notification of the proposed date and period during which these witnessed tests may be commenced and carried out. Copies of the Contractors Test Results achieved shall be available for inspection to the Engineer at the time of Witness Testing and all outstanding items identified during testing shall be complete.

Should the completion of the witnessed tests be prevented during the period agreed for the witnesses attendance and have to be postponed to a later date by reason of the Contractor failing to ensure that all equipment has been prepared for functioning in a safe and proper manner, and in accordance with the specified requirements or that the correct documentation is unavailable, then the Contract Sum may be reduced by an amount equal to the costs incurred by the witnesses having to return to site at a later date for resumption of the testing.

B34 DEFECTS LIABILITY PERIOD

Unless otherwise stated, the Defects Liability Period shall be for 12 months from the date of handover of the Works or after 2 months continued operation of the equipment with no call-outs or faults occurring (misuse, abuse and vandalism responses are excluded), whichever is the latest date.

During the Defects Liability Period the Contractor shall provide 12 monthly Maintenance visits. The Contractor shall also provide Fully Comprehensive Maintenance for the equipment including call out facilities, all repairs adjustments and replacements, 24 hours per day, 365 days per year. The response time for call-outs shall be 2 hours maximum with 1 hour for entrapments. Preventative maintenance and repairs and adjustments shall be carried out during normal working hours.

B35 MATERIALS TO BE USED

All materials supplied shall be of a type that will not support bacteria. No acoustic insulation or sound deadening materials shall be manufactured with any form of animal hair.

Deleterious materials shall not be utilised on any part of these Works. Deleterious materials include materials containing fibres of less than 3 microns diameter, asbestos or asbestos products, and urea formaldehyde, but this is not an exhaustive list.

All materials and plant supplied shall be sourced with consideration given to their environmental impact during their production, delivery and in their future use and disposal.

B36 SNAGGING

Once complete, the Engineer will issue a Snagging Items List to the Contractor and Principal Contractor. These items will be completed within 2 weeks of issue of the Certificate of Inspection. Failure to complete all outstanding items will result in the delay of any final payments due to the Contractor.

B37 HANDOVER

When the Installation is complete and compliant with the Specification and all accessories, components, spares and tools have been provided, a recommendation will be made to handover the equipment.

The Contractor shall issue a Certificate of Handover on the successful completion of the Works.

B38 SUPPLY OF HARDWARE AND SOFTWARE

If the Works include for the provision of hardware and software associated with for example the lift control system, the following conditions shall apply.

- A “Statement of Requirements” for the system is given in other parts of this Specification. The Contractor shall warrant that the system fulfils all of the requirements and functions stated in the “Statement of Requirements”.
- During installation, the hardware shall be delivered to site in accordance with the programme or, if no time or date is stated, within a reasonable time to enable the tests or verification routines to be completed prior to installation of the software.
- Following successful passing of the routines tests for the hardware, the Contractor shall provide, deliver, install and commission the software.
- The software listings for the system shall remain the corporate intellect of the Contractor.

B39 ELECTRICAL CONTINUITY

All metal equipment shall be bonded to earth potential. This is to include the car and counterweight guides.

The means of continuity at joints and flanges shall be provided by metal to metal contact and shall be robust, permanent, effective and compatible. Continuity across connections shall be by means of 4 mm^2 earth bonding conductors in accordance with the current Edition of BS 7671

B40 GUARDS

Guards shall be fixed over the drives and moving parts of all machinery supplied. The guards shall be of substantial construction and shall comply with the requirements of the Factories Act, Health and Safety at Work Act, LOLER and PUWER Regulations.

The guards shall be so constructed that the rotation of shafts and the movement of drive belts, chains ropes etc. may be readily observed without removal of the guard.

All guards shall be removable and provision shall be made so that access can be obtained to the ends of the motors and shafts.

B41 ELECTROMAGNETIC COMPATIBILITY

Each installation shall comply with the requirements of EU Directive 2004/108/EC for Electromagnetic Compatibility, EN 12015 and 12016 to ensure emissions from one product/installation are low enough so as not to impinge on the immunity levels of another product/installation.

The Contractor shall be required to supply a Declaration of Conformity complete in English (UK) and incorporate it into the O&M Manual.

B42 LANDING ENTRANCE BARRIER

The Contractor shall supply, as part of the Works for each installation, a 3-panel landing entrance service barrier which shall be free standing and incorporate clamps that shall secure the barrier between the floor and the underside of the entrance header.

The service barrier shall generally be as illustrated in Health and Safety Guidance Note PM 26.

The service barrier shall be provided with suitable danger notices and hazard warning signs.

When not in use the barrier shall be stored in a safe place in the locality of the lift.

B43 INSULATING MATS

The Contractor shall provide two insulating mats for each Lift. One shall be stored in the lift pit and the other on the car top. The mats shall be at least 900 mm x 900 mm. The mat shall be labelled with the level of voltage insulation and the relevant compliant code.

B44 LOG BOOK

The Contractor shall supply for each piece of equipment installed a 'Log Book' which shall be kept in an agreed location for recording all maintenance and breakdown visits, including time of arrival, notice of fault, remedial action taken and time of departure of the maintenance engineers. The nature of each breakdown shall be adequately described, also the action taken to correct the faults found.

B45 PERFORMANCE

The Lift performance shall comply to the following performance criteria (figures are maximum values):-

In Car Noise	55dB(A)
Door Noise	50dB(A) (at a distance of 1.5 m vertical and 1 m horizontal)
Typical Jerk	1.0m/sec^3
Typical Acceleration	1.2m/sec^2 (Adjustable between 0.8m/s^2 and 1.2m/s^2)
Vertical Vibration	8 milli(g)
Lateral Vibration	8 milli(g).

PART C – STANDARD REQUIREMENTS

C1 PARTICULARS OF WORK INCLUDED IN CONTRACT

C1.1 INTRODUCTION

This Specification is for the complete removal of the existing lift with all associated builders/electrical works, design, manufacture, supply, installation, commission and Full Comprehensive Maintenance during the Defects Liability Period of the replacement lift.

The equipment shall comply with the general requirements of Part D2 of this Specification.

C1.2 CODES AND STANDARDS

Each Contractor shall work to the requirements of this Specification which will achieve compliance with the Clients objectives and maintain compliance with the requirements of the Lift Directive 2014/33/EU, EN81-20 and EN81-50, EN81-58, EN81-70, EN81-72, EN81-73 and EN81-28.

C1.3 DEFINITIONS

The following definitions will apply throughout this Specification: -

BS 7255	Code of Practice for Safe Working on Lifts.
"CE marking" or "CE conformity marking"	Means a marking consisting of the initials "CE" in the recognised format of the European Parliament.
Competent Maintenance Person	Persons with the knowledge, technical ability and equipment able to perform the tasks allocated to them without danger.
Emergency	An abnormal situation in which persons require outside assistance.
BS EN 81-20:2014	Safety Rules for the Construction and Installation of Lifts – Lifts for the Transport of Persons and Goods: - Part 20: Passenger and Goods/Passenger Lifts
EN81-28	Safety Rules for the Construction and Installation of Lifts. Remote Alarm on Passenger and Goods Passenger Lifts.
BS EN 81-50:2014	Safety Rules for the Construction and Installation of Lifts – Examinations and Tests: - Part 50: Design Rules, Calculations, Examinations and Tests of Lift Components.

EN81-70	Safety – Part 70: Applications for Passenger Rules for the Construction and Installation of Lifts and Goods Passenger Lifts – Accessibility to Lifts for Persons, including Persons with Disability.
EN81-72 (When detailed within Section D)	Safety Rules for the Construction and Installation of Lifts – Part 72: Applications for Passenger and Passenger Goods Lifts – Part 72 Fire-Fighting Lifts.
EN81-73 (When detailed within Section D)	Safety Rules for the Construction and Installation of Lifts – Part 73: Applications for Passenger and Passenger Goods Lifts – Part 73 Behaviour of Lifts in the Event of Fire.
BS9999:2017	Code of practice for fire safety in the design, management and use of buildings
Fault	A situation of operation in which safe operation of the Lift for its intended use is restricted or impossible.
Handover of Lift	The point in time at which the Contractor makes the Lift available to the Owner for the first time.
Contractor	The natural or legal person who takes responsibility for the design, manufacture, installation and handover of the equipment, including its safety components and who affixes the CE marking and draws up the EC Declaration of Conformity.
Lifts Directive or 'LD'	The European Parliament and Council Directive 2014/33/EU on the approximation of the laws of the Member States relating to Lifts.
Maintenance Company	A company which is given responsibility for carrying out maintenance operations and which has competent persons at its disposal.
Maintenance Operations	All necessary operations (lubrication, inspections, cleaning operations etc.) to ensure the correct and safe functioning of the Lift after the completion of the installation.
Notified Body	An independent body with Quality Assurance, lift experience, professional integrity and technical competence, appointed by an EU Member State.
Owner of the Lift	The natural or legal person who has the power of disposal of the Lift and takes the responsibility for its intended operation and use.

Repair	Replacement or repair of defective and/or worn components.
Safety Components	Components which are defined as safety components in the EU Lifts Directive 2014/33/EU.

C1.4 COMPLIANCE WITH REGULATIONS

It is required that the tenderer shall confirm within their tender that the equipment conforms to the relevant EC codes of conformity listing all those relevant to the equipment.

Where a standard product already possesses a Certificate of Conformity, details of the assessment and CE Number shall be provided with the tender.

Where prior certification does not exist, the tenderer shall advise within his tender of the likely implications to lead times for the 'Conformity Assessment Procedure'.

C1.5 OWNER DOCUMENTATION

The lift contractor shall provide two complete sets of operating and maintenance manuals within 6 weeks of practical completion. A further copy in electronic format shall also be provided.

Owner documentation shall include a Commissioning Schedule for the auto-diallers, key-switches and key fobs if fitted.

The Owner Documentation shall contain a unique list of contents, in the form of a job specific index, and have numbered pages clearly relating to the index.

All information shall be provided in the English (UK) language.

The Owner Documentation shall comprise of at least the following main sections, each with an indexed sub section.

1.0 BASIC DOCUMENTATION

1.1 Basic Characteristics

Based on BSEN81-20 and BSEN81-50, basic characteristics of the Lift shall be indicated such as: -

- Type of Lift (passenger, general purpose goods etc)
- Capacity (rated load, number of persons)
- Speed (rated speed)
- Acceleration Rate
- Jerk Rate
- Number of Stops (number of levels served)

- Number of Landing Entrances
- Number of Car Entrances
- Travel (rise)
- Floor Designation Nomenclature
- Well Construction
- Well Min Plumb Dimensions
- Lift Pit
- Inside Car Dimensions
- Car Construction
- Clear Entrance Dimensions
- Car Doors
- Car Door Operators
- Car Door Times
- Car Door Protection
- Landing Entrances
- Landing Doors
- Landing Entrances Surrounds
- Landing Entrance Sills
- Landing Entrances Finishes
- Landing Entrance Fire Rating
- Power Supplies
- Type of Drive System
- Type of Hauling Machine
- Number of Starts per Hour
- Roping Ratio
- Levelling Accuracy
- Control Panels

- Control System
- Landing Indicators
- Landing Tactile Indication
- Landing Control Stations
- Landing Pushes
- Car Pushes
- Car Indication (Visual)
- Car Indication (Audible)
- Car Control Station
- Suspension Ropes/Belts
- Rope/Belt Terminations
- Rope/Belt Tension Equalisation
- Safety Gear
- Ascending Car Overspeed Device
- Counterweight
- Car Overspeed Governor
- Buffers
- Guide Rails: Car/Counterweight
- Guide Rail Fixings
- Emergency Lighting
- Emergency Communications System
- Layout Drawing Reference Number

1.2 Log Book

A Log Book shall be delivered in which repairs and, where appropriate, periodic checks (statutory inspections) can be noted as well as duplicate dated copies of reports of examinations and inspections executed by Notified Bodies can be filed. The Log Book shall be safely kept and maintained by the Owner for as long as the Lift is in existence.

Requirements:

- Basic information per Lift:-

- Installation Number
- Contract Number
- The Client's Asset Number
- Handover Date
- Site Address

- Following items should be recorded in the Log Book:-

- Date the Lift was first put into service
- Maintenance company identification
- Major repairs/important modifications
- Statutory inspections
- Other information (including rescue operations/accidents)

1.3 Commissioning Schedule (User Guide)

Operation of Autodialler

Operation of any key-switches and/or key fobs

Push button functionality

1.4 Plans of Lift in the Building

General Arrangement Drawings:-

A drawing showing the basic layout of the equipment shall be provided at the handover. This drawing shall include, in particular, information relating to:-

- Dimensions of lift well
- Equipment layout in the well including machine area
- Lift car interior drawing
- Entrance size(s)
- Car size
- Operational safety clearances
- Dimensions on the drawing may be shown in table form.

1.5 Electric Schematic Diagrams

Complete circuit diagrams of the whole system shall be provided. The circuit diagrams shall not be solely limited to the circuits for the overall understanding of the safety considerations (i.e., safety circuits connected with electric safety devices and the power circuits (EN81-20 and EN81-50).

In addition to circuit diagrams, the Contractor shall provide site wiring diagrams to assist the maintainer in identifying safety circuit wiring and colour coding etc. Plastic encapsulated wiring diagrams shall be stored on top of the lift car and/or within the control panel.

These schematic and wiring diagrams should be clearly legible, conform to the relevant equipment and use CENELEC symbols (identical IEC).

The abbreviations used with the symbols shall be explained by means of a nomenclature.

The following information need not be provided and remains the sole intellectual property of the Original Equipment Manufacturer (OEM):-

1. Software listings and software documentation

2. Printed circuit board layouts and logic design diagrams

1.6 Basic Characteristics of Ropes, Belts and Chains

The basic characteristics of ropes, belts and/or chains (e.g. suspension, governor etc) shall be provided either by a list of the characteristics or a copy of the certificates originating from the manufacturer.

A suitable maintenance plan shall be developed by the maintenance company as part of its maintenance contract, taking into account the type of Lift, its intended use and the environment in which the Lift is installed as well as the relevant instructions of the Contractor given in the instruction manual.

1.7 General Maintenance Instructions for the Lift

Maintenance work shall be carried out by a maintenance company with competent persons and according to the instructions provided by the Installer in the instruction manual.

The instructions shall inform about:-

1. Necessary maintenance of the Lift and its accessories in order to keep it in a safe working condition.

2. Instruction for safe maintenance.

3. A description of methods of checking and adjusting equipment to correct settings and clearances, including diagrams and a list of sizes of, or special tools to be used (i.e., door running clearances, brake clearances etc).

4. A description and diagrams of all lubrication facilities provided, frequency of lubrication required and recommended lubricant suppliers.

5. Full planned maintenance schedules detailing weekly, monthly, quarterly, half yearly and annual duties to comply with Statutory Regulations.

Annex A to BS EN 13015 normal Maintenance Instructions for Lifts and Escalators provides a non-exhaustive list of components and their maintenance operations which may be carried out.

Only the following Work may be carried out by persons other than the maintenance company:-

1. Cleaning of the external parts of the well of the Lift.

2. Cleaning of the internal parts of the car of the Lift.

3. Putting the Lift in or out of service, when permitted.

4. Checking proper working order of Lift.

5. Rescue operations.

The persons must be instructed by the Maintenance Company based on the instructions given by the Installer and must be authorised to perform the tasks by the Owner.

1.8 Maintenance Instructions for Safety Components

Maintenance work on safety components (LD, Annex IV) shall be carried out by a Maintenance Company with competent persons and according to the maintenance instructions of the manufacturer given by the Installer in the instruction manual.

The instructions must provide the information necessary for carrying out effectively and without danger all activities required in maintaining safety components.

1.9 Construction Stage Health and Safety Plan

The Contractor will be required to produce a 'Construction Stage Health and Safety Plan' prior to Works commencing in accordance with 2015 CDM Regulations.

1.9.1 Health and Safety Plan

The 'Health and Safety Plan' information relevant to the Installation(s), as required by the '2015 Construction (Design and Management) Regulations', shall record all information for the Owner/End user which informs those who will be responsible for the equipment in the future of the risks that have to be managed during the installation, maintenance, repair, renovation or refurbishment and/or demolition. A further copy of the information shall be issued to the Principal Contractor for incorporation in to the Main Health and Safety Plan.

1.10 Instructions for Normal Use of the Lift

The normal use instructions shall inform about the following topics by drawing attention to possible risks:-

Issues to be considered:-

1. Purpose and scope of the instructions

2. Intended use of the Lift

3. Symbols and definitions

4. Duties of the owner

5. Description of the Lift
6. Necessary information about the normal use of the Lift, especially about:-

    Keeping the documentation

    Events requiring the intervention of a competent person

    Safe loading and unloading

    Free access on landings

    Precaution to be taken on a Lift with partially enclosed well

    Use of the landing door emergency unlocking key

7. Maintenance activities:-

    Safety precautions

    Cleaning

    Correction of faults

    Repairs

    Taking the Lift out of service

8. Information about examinations and tests after an important modification or after an accident
9. Rescue responsibilities and procedures
10. Environmental aspects/disposal of material (waste oil etc.)
11. National statutory requirements

1.11 Instructions for Rescue Operations

Rescue Operational Instructions should:-

1. Be legible and printed on durable material,
2. Use illustrations of the machine and tools etc. to facilitate rescue operations
3. Use symbols where possible to highlight risks, dangers etc., (see ISO 3864)
4. Provide the address of the current maintenance company
5. Be placed near the equipment in a visible position
6. Define responsibilities (between maintenance, rescue and authorised persons)
7. State that rescue operations shall only be performed by authorised and trained persons
8. Give warnings where there is a special risk

9. Inform of any actions that should NOT be performed

10. Inform about the use of the landing door emergency unlocking key

C1.6 MAINTENANCE

The Contractor shall maintain the total completed Works from the time of handover in compliance with Section B of this Specification, until the expiry of the 12 Months Defect Liability Period.

The maintenance shall include regular examination adjustment, lubrication, cleaning of all parts and the replacement of all worn or faulty components including promptly attending to all call-outs and breakdowns within a maximum of 4 hours of receiving the call. All entrapments shall be attended to within ONE hour of receiving the call.

The Lifts shall receive scheduled Maintenance visits at an agreed frequency but not contravening the manufacturer's recommendations, during the Defects Liability Period. Of the scheduled visits a large proportion shall be 'technical', a smaller proportion being 'adjustment' and the remainder 'inspection and lubrication'.

The contract maintenance shall include for Annual Supplementary Inspections, certification of all locks and testing/re-calibration of the car overload device.

The cost for this Work shall be included in the Tender Total.

Immediately after any call-out, the Contractor shall send the Client's Contract Manager a report fully detailing the time the site was attended, the nature of the fault, details of any remedial action taken and the time the Lift was returned to service.

Only call-outs resulting from indisputable misuse or other third-party damage shall be charged at an agreed rate included in the Tender Schedule.

C1.7 TESTING AND COMMISSIONING

On completion of the Lift, fully in accordance with the specified requirements and the requirements of the relevant British Standards, the Contractor shall commission and test the complete installation in accordance with the requirements of Table 18 of EN81-20 and the Contractors QA procedures and make any adjustments/corrections as necessary for ensuring that the installation fully complies with the requirements of the Standards and this Specification. All control and operational devices not included in the Standards shall also be tested for proper functioning.

Before acceptance of the Works and at a date agreed by the Engineer, this examination and testing shall be repeated in the presence of the Engineer. The Principal Contractor shall give the Engineer at least seven days written notification of the proposed date and period during which these witnessed tests may be commenced and carried out. Copies of the Contractors Test Certificates shall be made available for inspection by the Engineer at the time of the Witness Testing.

Should completion of the witnessed tests be prevented during the period agreed for the witnesses attendance and then have to be postponed to a later date by reason of the Contractor failing to ensure that all equipment has been prepared for functioning in a safe and proper manner and in accordance with the specified requirements, then the Contract Sum may be reduced by an amount equal to the expenses incurred by the witnesses having to return to site at a later date for resumption of the testing.

C1.8 TEST CERTIFICATES

The Contractor shall provide the Engineer with one copy of all test certificates, including certificates for suspension ropes, anchorage's, safety gear or governor ropes at the time of witness testing to verify that the information recorded is an accurate representation of the installed equipment. These shall be included in the O&M manuals.

C1.9 SITE CONDITIONS

A site visit shall be made prior to material delivery and starting on site to determine the nature and location of the site, means of access confirmation of power and other required services as no claim will be considered on the grounds of ignorance of conditions under which the Works will be constructed.

The tenderer shall be deemed to have satisfied themselves that, with regard to access to the site, the various working heights, the extent and nature any third-party scaffolding, protective sheeting or boarding that might impact the delivery or installation and generally the conditions under which the Work will be required to be carried out.

Before making the visit, prior approval must be obtained from the engineer and HM Land Registry.

C2 LIFT WELL EQUIPMENT

C2.1 GUIDE RAILS

Lift cars and counterweights shall be guided by at least two plumb, undercut, machined, tee-section steel guide rails to the requirements EN81-50 Part 5.10.1 and EN81-20 Part 5.7.

The guide rails shall comply with the requirements of EN81-20, relating to jointing, surface finish straightness, twist and tensile strength.

Drip trays, having easily removable oil pans, shall be provided by the Contractor at the bottom of each oil lubricated guide rail.

The non-running surfaces of each rail shall be painted with blue oil based gloss paint before delivery to site and all damaged painting shall be made good on site.

All scaffolding or platforms required for the Lift Installation shall be provided by the Contractor.

C2.2 GUIDE RAIL STRESSES

Guides shall be selected in accordance with EN81-50 Part 5 and EN81-50 Annex C.

C2.3 GUIDE RAIL BRACKETS

Each guide rail shall be supported from the shaft walls by purposely designed and manufactured steel brackets, combination brackets are to be of fully welded design witch adjustable brackets for each individual guide. All brackets are to be drilled and pinned.

The guide rail and guide rail fixings shall be so designed and spaced to ensure that the maximum guide rail deflection during normal operation, loading and unloading operations and operation of safety gears, does not exceed the values stated in EN81-20 Part 5.7.

Where practicable, to assist the foregoing during loading and unloading operations, a guide rail fixing shall be located opposite the top and bottom car guide shoes when the car is level with a landing.

Where shims or packings are required to accommodate wall irregularities above plumbing tolerances, they shall be of the captive type, which remain on the fixing bolts when nuts become slackened. The thickness of the shims or packings shall not exceed 40 mm per bolt.

All brackets shall be delivered to site pre-painted and paintwork made good after erection.

C2.4 BUFFERS

Where specified in the Schedules, energy dissipation type buffers shall be fitted in the lift pit under each lift car and, where relevant, counterweight. They shall, wherever possible, be positioned in-line with and symmetrically between car and counterweight guide rails.

Energy dissipation buffers shall be CE Marked.

Energy dissipation buffers shall be positively secured to the pit floor to prevent toppling over on impact.

C2.5 COUNTERWEIGHTS

All counterweights shall be frame type counterweights.

Each Traction Lift counterweight shall be balanced to a mass equal to that of the combined mass of the lift car, plus approximately 45 - 50% of the rated contract load as determined for economic running and traction of the Lift.

The counterweight filler weights shall be securely clamped in frame so that no filler weight can be displaced by impact on the buffers.

On Lifts having a 2:1 roping ratio, the counterweight frame shall have a reeving pulley attached to the counterweight cross head. The reeving pulley shall incorporate rope stops to prevent the ropes leaving the pulley in the event of a slack rope situation and guards around the pulleys.

Each completed counterweight assembly shall be powder coated gloss bright yellow to denote ‘HAZARD' (minimum requirement being the frame painted).

Mid-point counterweight screens shall not be fitted.

C2.6 PIT LADDERS

The Contractor shall supply and fit in each lift pit a permanent vertical access ladder constructed to BS EN ISO 14122 and in compliance with EN81-20 Annex F. It shall extend from the floor of the pit with rungs terminating at the floor level of the bottom landing entrance and hand rails extending to 1100 mm above the floor level of the lowest entrance served.

The ladder shall be located within access of the lowest landing entrance and due allowance must be made by the Contractor when setting out the lift equipment to accommodate the ladder, the position of which must be shown and detailed on the lift general arrangement drawings.

Removable pit access ladders may be used and must have sill locators to prevent slip and access chains for safe retrieval and access. They must extend by 1100 mm above pit access level and be prevented from toppling over.

C2.7 COUNTERWEIGHT SCREEN

The front and two sides of each counterweight shall be guarded in the pit area by a rigid metal screen secured to the counterweight guide rails.

The screen shall be constructed of either sheet metal or wire mesh of pitch not exceeding 13 mm in the horizontal or vertical planes.

The bottom of the screen shall cover the lowest projection of the counterweight under buffer compression and shall extend to a height of not less than 2.5 m above the base of the pit or the lowest landing served where the counterweight is accessible from the landing.

The screen must allow for inspection of counterweight bottom runby. Any removable panels must be able to be removed without special tools (for clarity in this instance spanners and screwdrivers of any head are classified as special tools).

The screen shall be powder coated orange.

C2.8 SHAFT LIGHTING

The Contractor shall provide permanent three-way shaft lighting consisting of multi LED lighting conforming to EN81-20:2014 within the lift shaft. One three-way switch for shall be located within the lift controller for machine room-less lifts or within the machine room, another shall be mounted within the lift shaft within reach of the lowest landing door and at a convenient height for easy operation and the third switch shall be mounted on each car top. All shaft light switches shall be engraved “SHAFT LIGHTS”.

The lighting shall incorporate 54 LED’s per metre and provide a lighting level of 125 lux at a 2 metre distance. The lighting shall incorporate at least 6 emergency lighting LED’s per metre. Lighting fittings shall have IP65 protection. Light strip is to run across the slab of the shaft, down the middle of the rear wall and half way around the pit area.

The Contractor’s Electrical Contractor shall undertake the Electrical Works associated with the lift well lighting and moving power supplies where necessary.

The Contractor shall install an RCD protected 13A socket outlet in the lift pit.

The light fittings shall incorporate emergency back-up capacity exceeding the requirements of BS 7255, Annex B2.3.2.

Suitable lighting shall be installed at the head of the lift shaft to give 200 lux at the base of the lifting machine and the controller. This shall incorporate additional emergency lighting in the event of the main light fitting failing.

Lighting fittings shall have robust diffusers and IP65 protection.

C3 LIFT CARS

C3.1 LIFT CAR

Each lift car shall be built independent of the car sling and platform. It shall be complete with floor, walls, ceiling, doors and fittings as specified in the relevant Schedule of Requirements and Schedule of Designs and Finishes in Part D of this Specification.

C3.2 CAR SLING

The car sling shall be constructed of fabricated powder coated steel members adequately braced and sufficiently rigid to withstand, without permanent deformation, the application of the safety gear or buffering of the car under 125% Contract Load and 115% Contract Speed conditions.

The bracing arrangement shall ensure that any normal operating strain undertaken by the frame is not transmitted to the car enclosure.

The car sling shall incorporate substantial support for the car platform and all auxiliary equipment required on the car.

C3.3 CAR PLATFORM

The car platform shall consist of a frame constructed of painted steel channels or hollow sections supporting steel bearers for supporting the flooring.

The steel car frames and flooring support steels shall be painted.

The flooring shall comprise of sheet metal and ply wood of adequate thickness and supported to prevent distortion.

C3.4 GUIDE SHOES

Guide shoes shall be fitted to at least the top and bottom of each side of the car sling and counterweight. The car guide shoes shall be mounted so that the vertical distance between them prevents excessive turning moments being imposed upon the car guides during loading and unloading operations.

Adjustable spring-loaded guide shoes with renewable liners or roller guides shall be supplied.

C3.5 DATA PLATE

A data plate shall be fitted in a conspicuous position on the crosshead channels of each lift car sling, giving the following information where applicable:-

1. The installation completion date.

2. The Contractors Name and Serial Number.

3. The Contract Load in kgs.

4. The Contract Speed in m/sec.

5. The complete weight of lift car, sling, platform etc., in kgs.

6. The maximum tensile strength of the suspension ropes in kgs.

7. The size, construction and length of the suspension ropes.

8. Details of the balanced load in kgs.

This information will be obtained during the Contractors testing and be available for the time of the witnessed test.

C3.6 CONSTRUCTION OF CAR ENCLOSURES

The lift Contractor shall supply and install new lift cars in accordance with the requirements of BS EN 81-20.

Ventilation shall be provided comprising clear openings at the top and bottom of alternate wall panels. Baffles shall be fitted to all ventilation apertures.

The slam posts shall extend from the sill to the underside of the door header and shall be firmly braced to prevent deflection. The slam posts shall be finished in brushed grade 304 stainless steel. The design of the slam posts shall be such that when the car door is closed it shall not be possible to pass objects between the slam post and the car door.

The car return panels and door headers shall be manufactured from brushed grade 304 stainless steel.

The lift cars shall be finished in “Amtico Welsh slate” flooring in a colour to be agreed with the Engineer.

Lift cars shall be fitted with a 16 swg grade 304 stainless steel skirting between the floor pan and the car walls.

Construction of the lift car roofs shall be marine ply timber with white gloss interior and 16 swg galvanised steel exterior. The roof shall be constructed in such a way that it will adequately support the weight of two persons standing at any point on the roof without permanent damage.

Where practical all nuts, bolts washers and screws used for the car construction shall be:-

- Nuts shall be of the self-locking type.
- No fixings shall be visible from inside the car.

The Lift contractor shall supply and install car entrances from those listed in section 11.

The inside of the cars shall be as specified in the Schedule of Designs and Finishes in Section D3.

The roof of each lift car capable of carrying maintenance engineers shall be designed to withstand a vertical force of 2000N at any position without deformation. All equipment, including conduits and trunking, shall be kept to the edges of the car roof to provide as large a space as possible where engineers can safely stand.

C3.7 ANTI-VIBRATION MOUNTINGS

The complete car enclosure and platform of all Passenger Lifts shall be effectively isolated from the car sling. Isolation shall be achieved by rubber pads or other equal and approved anti-vibration material securely keyed into position to prevent displacement of the car enclosure when the fully loaded car is stopped by application of the safety gear or buffers.

C3.8 LOAD PLATE

A load plate, stating in bold characters the maximum permissible load in 'PERSONS' and in 'kgs' to be carried, shall be engraved in a conspicuous position on each Lift Car Operating Panel.

C3.9 CAR LIGHTING

The interior of each lift car shall be illuminated by LED type of luminary specified in this Specification.

LED Car Lighting shall operate on a run timer that shall commence from when a call is first placed upon a Lift and continue for an adjustable period, preliminary set at 20 minutes. The Car Lighting shall also operate in the event of the alarm push being operated or a fault situation, which prevents the lift car moving.

The Car Lighting shall give a light intensity of at least 200 lux at floor level and on the car control station.

All light fixtures within the lift car shall be flush fitted without visible fixings and in a manner such as to prevent unauthorised access.

The electrical supply for all Car Lighting shall be taken from the lift lighting distribution board.

C3.10 EMERGENCY CAR LIGHTING

Each Lift shall have a separate Emergency Lighting System.

On all Lifts the system shall provide 80 lux light intensity at floor level. The maintained sealed unit providing shall provide 3 hours of power for the Emergency Lighting.

The emergency lighting lamp(s) shall be fitted inside the car lighting luminary in the ceiling above the car operating panel.

The power unit shall be contained within a ventilated sheet metal casing fitted on the car top. It shall be of a pattern that is automatically rechargeable from a discharged condition to full capacity within 10 hours, repeating this cycle continuously without deterioration.

The Emergency Lighting Power Unit shall be connected to the same single-phase electrical supply provided for the car lighting circuit.

C3.11 CAR VENTILATION

A ceiling mounted super silent fan and concealed lower vent slots shall ventilate each lift car.

Each row of slots shall have a minimum free area of 1% of the car floor area and be protected on the rear with fine wire mesh panels and metal scoop plates.

The fan shall operate on a run timer that shall commence from when a call is first placed upon a Lift and continue for an adjustable period, preliminary set at 20 minutes. The fan shall also operate in the event of the alarm push being operated or a fault situation which prevents the lift car moving.

C3.12 CAR TOP BALUSTRADE

Where the gap between the edge of the car top and the well walls exceeds the dimensions stated in EN81-20, the perimeter of the car roof shall be provided with a balustrade complying with EN81-20. The balustrade shall be supported from the sling and on no account should be positioned to produce a shearing point with static well equipment or counterweights.

The balustrade shall be powder coated bright orange (RAL 2003) and shall have suitable Yellow Triangular Warning Notices attached at points where equipment passes in close proximity (e.g., the counterweight).

C4 CAR AND LANDING ENTRANCES

C4.1 GENERAL

Each car and landing entrance shall be protected by an entrance arrangement of the type stated in the Schedules and as indicated on the drawings and shall comply with the specified requirements of this Section of the Specification.

C4.2 LANDING ENTRANCE ASSEMBLIES

The Contractor shall provide complete single unit entrance assemblies comprising of door frame (including tracks etc.), door sill and entrance surround, all rigidly connected in one unit onto which the door panels can be suspended. The arrangement of the entrances will be stated in the Schedule of Technical Particulars elsewhere in this Specification.

The Landing Entrance Surrounds shall be an integral part of the landing entrance assembly unit and shall be installed with all fire rated elements to provide the specified Certified Fire Integrity.

The complete entrance assembly shall have a 2-hour fire certificate assessment by an approved UK fire-testing establishment.

The complete entrance assembly shall be mounted on sill angles and secured to the inside of the well at each floor level by the Contractor.

The Contractor shall include for the supply and installation of all fixings and brackets to secure the landing sill and base of the doorframe including the sill angles.

C4.3 LANDING AND CAR DOOR SILLS

At each entrance, protected by a horizontally sliding panelled door, a sill shall be provided. The sill plate material shall be as specified in the Schedule of Designs and Finishes.

The material used for the sills shall be non-combustible.

The sill shall be of heavy duty design and adequate strength to support the passage of loads into a lift car.

The sill grooves shall be self-cleaning of dirt.

Where the proposed landing floor finish permits, the landing sill shall be set 10 mm above the finished floor level and the landing floor finish ramped up within the depth of the entrance wall in an effort to prevent water penetrating the well.

C4.4 SLIDING PANELLED DOORS

The car and landing door panels shall be constructed of double skinned or suitably reinforced panels having flush exposed facings.

The exposed faces of the door panels shall be finished as outlined in Schedule of Designs and Finishes.

Leading edges of landing door panels shall be shaped to allow a lapped or mated section.

The doors shall be lined or coated on the non-exposed face to reduce sound transference to a minimum and shall operate quietly and smoothly.

Sight guards shall be provided to the leading edges of the landing doors, extending to the edge of the sill line in order to reduce the gaps between the opened car and landing doors to the minimum practicable and to prevent unauthorised interference with any part of the door mechanisms or other equipment contained within the shaft.

Each landing door panel shall be suspended from a top track of machined steel bar or folded section having a smooth, profiled running surface which shall be adequately dimensioned to support the weight of the door panels and other vertical/horizontal loading without deformation.

The top of the door panel shall be bolted to a hanger assembly incorporating ball bearing mounted rollers, which shall run on the top track. The hanger assembly shall also incorporate up-thrust or kicking rollers that shall run on the underside of the entrance top track. The up-thrust rollers shall be accurately adjustable and incorporate a method of locking in the correct position.

The hanger shall be adjustable to allow the panel to be accurately aligned with the top track and to reduce clearance between door panels, panels and entrance surrounds to a maximum of 3 mm up to 6 mm subject to wear. This statement shall be subject to the requirements of the entrance fire assessment.

Each door panel shall be equipped with bottom shoes accurately located in the groove of the sill plate to ensure smooth running of the door. The shoes shall comprise of robust steel plate gibs of adequate dimensions to ensure that the metal gib penetrates at least 6 mm of the grove in the landing sill. The shoes shall be plastic or nylon covered to reduce friction.

The bottom of each door panel shall also be equipped with robust metal flanges or stops not normally in contact with the sill groove. These shall extend downwards into the groove sufficiently such that, in the event of the shoes being damaged or excessively worn, the door panel cannot be forced out of the sill groove by impacts applied to the door facings.

C4.5 LANDING DOOR CLOSERS

All automatically operated landing doors shall be fitted with a self-closing device which shall automatically close opened landing doors when the car is not at the corresponding landing level.

The closer shall be one of the following forms:-

1. A gravity weight operated mechanism in which the weights are guided by solid bottomed tubes to prevent the weights falling down the shaft if the suspension wire ropes or cords break.

2. A spring lever arrangement between the landing sill and car door in which the spring is compressed each time a door is opened.

C4.6 LANDING ENTRANCE SURROUNDS

The Landing Entrance Surrounds shall be an integral part of the landing entrance assembly unit and shall be installed with all fire rated elements to provide the specified Certified Fire Integrity.

The entrance surrounds shall be assembled with a full width one piece header panel and two one piece jambs, forming a single folded joint at the line of the entrance clear height and shall comply with the following:-

1. All surface levels of surrounds shall be formed level and gaps between sections will not be accepted.

2. Jambs of architrave and soffits of surrounds headers shall have a clearance to the landing doors of no more than 6 mm.

Bolts, screws or other fixings used for securing or assembling the architraves shall not be visible on the exposed surfaces of the architraves.

C4.7 SAFETY CONTACTS AND LOCKS FOR LANDING DOORS

Each Landing Door Panel shall be equipped with electro-mechanical locks which shall prevent the car from being moved under power until all doors (or any of the door panels in the case of non-mechanically coupled multi-panel doors) are in their closed position.

Door locks shall be type tested in accordance with EN81-50 Part 5.2.

On multi-panel side and centre opening doors the leading panel or panels need only be electro-mechanically locked if the trailing door panels are each directly mechanically coupled to the leading panel.

It shall not be possible, in normal operation, to open the landing door unless the car has stopped or is about to stop in the unlocking zone.

The unlocking zone may extend to a maximum of 200 mm above and below the landing level where mechanically operated car and landing doors operate simultaneously. This shall also allow for advance opening of landing doors.

The locking of the landing door must be proved by electrical safety devices in accordance with EN recommendation and the car shall not move under power until the locking elements of the landing door locks are engaged by at least 7 mm however this does not prevent the controller from initiating pre-start sequences in anticipation of the landing door locking being proved by the electrical safety device. This will assist the overall lift operating times.

The locking elements shall be maintained by gravity or compression springs and shall be suitably robust to resist the forces stated in EN81-20 Part 5.2.

All landing locking elements shall be protected from dust accumulation by clear non-flammable covers to allow easy inspection of the lock contacts without removal of the covers.

A pivoted roller assembly on the rear of each landing door panel or header shall engage between the skates on the car door panel causing the roller assembly to pivot and release the lock beak by a rigid mechanical linkage.

The opening of the car door panels shall be transmitted to the landing door panels by means of the landing lock roller engaging between the tapered skates on the driven car door panels.

C4.8 LOCK RELEASE FOR DOORS AND GATES

All landing doors shall be capable of being unlocked from all landings with the aid of a key designed to suit the requirements EN81-20 Part 5.3.9.3.1.

The unlocking triangle should preferably be located in the underside of the landing entrance header panel however, where a Contractors Standard Arrangement is in the face of one door panel, the unlocking triangle shall be surrounded by a bezel to match the door finish as selected by the Architect.

C4.9 FASCIA PANELS AND TOE GUARDS

All landing sills overhanging the general face of the shaft wall shall be guarded by flush faced sheet metal plates or fascia panels.

Each fascia panel shall extend from the header of the door to the sill nosing of the landing entrance above and shall have a width not less than the full clear width of the car plus 100 mm.

Guards fitted to overhanging sills at the bottom terminal landings shall each have a straight vertical face extending below the sills for a depth not less than the depth of the landing zone plus the distance through which the car will travel after the brake is applied or 750 mm, whichever is the greater. Each of these guards shall extend still further below the sill to provide a bevelled face at an angle of 75° to the horizontal and extending to the face of the wall.

Each car entrance sill shall have a sheet metal toe guard of dimensions complying with EN81-20 with an additional 25 mm horizontal section at the base, to prevent any object being trapped between the under-side of the car and the landing while the landing door is open. The requirement shall safeguard against any person's toes being trapped during occasions when the car is being hand wound to the floor.

All toe guards and fascia panels shall be of rigid construction, securely fixed in position and shall be provided galvanised.

C4.10 POWER OPERATIONS FOR HORIZONTALLY SLIDING DOORS

The car and landing doors are to be power operated and shall be opened and closed automatically and simultaneously by an electronically controlled heavy duty, linear door operator.

The electrical operator shall work quietly and shall be mounted on the car frame by an arrangement which shall minimise the transmission of vibration to the car enclosure.

The operator shall be linked to the doors by a system which shall ensure smooth acceleration of the doors in either direction of movement, the doors being brought to a controlled stop and both limits of travel.

The door operators on all Passenger Lifts operating as part of a group shall be capable of high-speed operation to attain the door opening and closing times stated in the Schedules at the rear of this Specification.

The door operator shall be a heavy duty inverter controlled A.C. type to achieve rapid torque and speed control of the doors for the full width of the entrance and achieve the specified door functions of the relevant part of this Specification.

All motors shall be of the totally enclosed type and shall not exceed 1000 rpm.

It shall not be possible to open the car door whilst it is travelling under power except for when advance door opening is specified in the Schedules.

The operator shall be arranged so that the car and landing doors may be opened manually within the car in the event of failure of the electrical power supply when the car is within the landing zone.

Risk of injury to persons obstructing the doors while closing shall be minimised by the operation of approved door detector devices fitted in accordance with the requirements as specified in the Schedules at the rear of this Specification. This device shall be rendered inoperative during the nudging operation.

Each door operator shall be equipped with devices for safeguarding the motor in the event of the doors meeting an obstruction that fails to operate the ‘car door’ safety devices.

Lifts with power operated doors shall park at landings with the doors closed unless reacting to the fire alarm in accordance with EN81-73 when incorporated within Section D of this Specification.

C5 STANDARD REQUIREMENTS FOR SAFETY GEARS

C5.1 INTRODUCTION

Each Traction Lift shall be provided with a safety gear fitted to the car sling and, where specified, a counterweight safety gear shall be provided on the counterweight frame.

Each Lift shall be provided with a device, or devices, which shall prevent free fall or uncontrolled upward movement of the car. This device shall operate independently of the means of suspension.

In the case of free fall of a car with less than balanced load, in the upward direction, the device shall operate causing a rate of retardation, which shall lay between 0.2 gn and 1.0 gn.

If the design of the safety-gear jaws have limited operational life before replacement become necessary, this number must be permanently recorded along with the number of operations performed. This record must be kept with the Lift.

C5.2 GENERAL

Where specified in the Schedule of Requirements, each lift car shall be fitted with a safety gear conforming to the respective following clause(s):-

The safety gear actions at one side of the car shall be transmitted to the other side of the car or counterweight by positive mechanical linkages.

The safety gear shall be securely attached to the car sling and be designed for disengagement from the guide rails by raising / lowering the car without the use of special tools.

Release of the safety gear will require the intervention of a Competent Person. After its release the safety gear will be in a position to operate normally.

Each car safety gear shall be equipped with an electrical switch to disconnect the power supply from the hauling motor and apply the brake immediately in advance of the safety gear engaging with the guide rails. The switch shall have sufficient follow-through stroke and compression after closing, to prevent opening of the electrical circuit from impacts or vibrations sustained during all conditions of normal loading or running of the Lift.

When the safety gear operates with a uniformly distributed load the car platform shall not incline more than 5% from its horizontal position.

C5.3 OVERSPEED GOVERNORS

Each governor shall be designed and Type Tested in accordance with EN81-50 Part 5.4.

Each overspeed governor shall be designed to be a “matching pair” and be fully compatible with the safety gear detailed in this clause.

The location of each governor shall preferably be within the lift well. Each governor shall be driven by a steel flexible rope, of not less than 6 mm diameter, kept taut by a tensioning pulley mounted in the lift pit. The two ends of the driving rope shall be attached to the safety gear operating mechanism mounted on the car sling.

The governor rope pulley and tensioning pulley shall have a diameter equal to at least 30 times the diameter of the rope used.

Each governor-tensioning pulley shall be fitted with an electrical contact which, if the governor rope should become slack or break, shall open the lift safety circuit and stop the Lift.

The tensile force produced in the overspeed governor rope by the governor shall be at least 200% of that necessary to engage the safety gear.

Each governor shall be accurately adjusted and sealed at the manufacturer's works before delivery to site. A data plate shall be fitted on the governor in a conspicuous position indicating:-

- The name of the manufacturer.
- The type examination mark and its reference number.
- CE Mark.
- The tripping speeds for which the governor has been set electrically and mechanically.
- The size, type and construction of the operating rope used.

The governor shall be designed to operate an electrical trip or trips to stop the Lift by disconnection of the power supply to the hauling motor and application of the brake before the governor final tripping speed is attained.

Test certificates for the governor and rope shall be forwarded to the Engineer before delivery to site and each governor shall, whenever possible, be tested on site to check the information given on the governor data plate.

Each overspeed governor shall be fitted with a sheet metal guard, which shall completely cover all moving parts of the governor and operating ropes.

Overspeed governors fitted within the top of the well shall be fitted with a remote test trip facility.

C6 STANDARD REQUIREMENTS FOR SUSPENSION SYSTEMS

C6.1 SUSPENSION ROPES

The method of suspension for this lift shall fully comply with EN12385-5.

The size and number of suspension ropes shall be calculated to give the required traction, groove pressure and safety factor in accordance with EN81-50.

Copies of the rope safety factor calculations and traction calculations shall be forwarded to the Engineer upon request.

All suspension ropes or belts used on any single Lift Installation shall be separate lengths and all lengths used on the Installation shall be obtained from one continuous length as manufactured to ensure uniformity, construction and performance in use.

On each Lift Installation, regardless of roping ratio, the suspension ropes shall incorporate an automatic device to equalise the tension in the suspension ropes.

Steel helical springs shall be used for tension equalisation in preference to rubber bobbins.

An independent method of tensioning shall be provided for each rope.

Copies of Test Certificates for all suspension ropes shall be included in the Owners Technical Documentation.

Rubber coated steel belts can be used as an alternative method of suspension complying to all necessary codes and standards.

PVC coated ropes will not be accepted.

C6.2 ROPE TERMINATIONS

The strength of rope terminations must be at least 80% of that of the rope.

The ends of the ropes shall be fixed to the car or counterweight anchorage by means of self-tightening, wedge type sockets where the dead end is secured with rope grips.

Rope grips around thimbles, babbitted sockets, hand spliced or crimped eyes shall not be accepted.

Suspension belt terminations must be of comparable requirements and standards.

C6.3 PULLEYS, SHAFTS, BEARINGS AND LUBRICATION

All rope diverting and, where fitted, multiplying pulleys whether rotating, on fixed shafts or fixed to rotating shafts, shall run on roller, ball or sleeve bearings as necessary and for obtaining silent operation, maintaining proper alignment of the drive and the maximum of trouble free service.

Diverting and multiplying pulleys for suspension ropes shall have diameters complying with EN81-20 Part 5.5, (i.e., at least 40 times rope diameter and shall rotate on fixed shafts supported by dead eyes).

They shall also be shrouded or equipped with retaining devices to prevent slackened ropes from leaving the grooves. Particular care shall be given to this requirement on all Installations.

All rotating pulleys/sheaves shall be painted yellow.

Non-rotating shafts shall be positively prevented from turning in their supports by means conforming to the requirements specified in BS 5655 : Part 6.

All bearings and bushes shall be positively secured in their housings and all bearing surfaces shall be arranged so that they can be lubricated efficiently. In all cases, where grease is used as a lubricant, lubricators of the screw-down pattern or grease nipples equipped for grease gun attachment shall be provided. Oiling holes shall, wherever practicable, be equipped with covers or attachments for excluding dust.

C6.4 GUARDING OF EQUIPMENT

All dangerous parts throughout the Installation shall be guarded in accordance with the requirements of EN81-20, the EEC Machinery Directive, the Factories Act 1961, the Offices Shops and Railway Premises Act 1963, and the Health and Safety at Work Act 1974, and wherever practicable, lubricating points shall be accessible without removal of the guards.

This shall include overspeed governors, flywheels, sheaves, pulleys and rope lays.

All guards shall be wire mesh to allow inspection of the equipment and shall be powder coated bright orange (RAL 2003) by the Contractor.

C7 STANDARD REQUIREMENTS FOR MACHINE ROOMLESS TRACTION LIFTS

C7.1 INTRODUCTION

Only Machine Roomless Traction Lifts which have a suitable/applicable Model Assessment Certification shall be tendered on this project.

The Machine Roomless Traction Lift will have the hauling machine mounted within the lift well.

The control equipment shall be mounted in an enclosed lockable panel on the top landing.

The mounting position of the control panel with the access door in the open position must not impede escape routes from the building or particular floor level, or firefighting equipment.

C7.2 CONTROL EQUIPMENT.

All control systems will be fully open protocol, no diagnostic / interrogation tools shall be necessary in order to carry out the initial set up of the controller or to interrogate the control system during maintenance.

Control equipment providing full collective, triplex operation shall be contained within a lockable control panel accessible to only authorised persons.

The enclosure of the control equipment shall be of such construction that it does not reduce the integrity of the fire compartmentation.

The control equipment shall achieve the operation as summarised within the Schedules of Part D of this Specification.

The control equipment shall be installed complete with 2 sets of volt free contacts for the building management system(s).

C7.3 HAULING MACHINE

The hauling machine may be mounted either at the top of the lift well or to the side of the car.

The hauling machine shall comprise of:-

- A sheave complete with rope guards
- Gearless machine
- AC synchronous permanent magnet motor
- Mechanical dual braking system

Either of the above shall be capable of stopping a fully laden lift and an absolute rotary encoder.

The machine shall give reliable service based upon the number of starts per hour stated in the Schedules and have a design life of at least 5 million journeys.

It shall be possible to replace the sheave independently of the motor.

The hauling machine shall include suitable permanently attached lifting points.

All fixings to the lift shaft shall be provided by the Contractor. Lifting beam/s and/or eye/s required for the safe removal of the existing lift and/or installation of the new equipment shall be supplied, installed tested and certified by the Contractor.

C7.4 MAINTENANCE ACCESS

It shall be possible to maintain the equipment within the lift well from the top of the lift car.

The top of the lift car shall offer an unobstructed maintenance platform without tripping hazards.

The car top shall incorporate mechanical devices to prevent the car top platform travelling beyond 1.0 m above the top floor finished floor level, even in the event of a control malfunction. This will ensure that a minimum of 1.0 m remains between the top of the lift car and the underside of the entrance header to allow adequate space for escape even in the event of a fault condition.

The top of the lift car shall be provided with balustrades or the well is to be fitted with full height screening to prevent falling from the car top where gaps greater than 0.3 m exist.

Car top safety rails shall extend to 0.7 m above the car top where the distance between the edge of the car top is 0.3 m but less than 0.8 m or 1.1 m where the distance is greater than 0.8 m or if the fall distance is 12 m or greater.

The Contractor shall provide emergency lighting in the top of the lift well to illuminate the hauling machine. This shall be provided in addition to well lighting, which may be provided by others, as stated in the contract specific data. This provision will facilitate the engineer's escape from the car top in case of loss of power.

A stop push shall be located at the top of the lift well adjacent to the hauling machine.

C7.5 RESCUE OF TRAPPED PASSENGERS

It shall be possible to release the hauling machine brake(s) from the control panel location and simultaneously observe the drive mechanism via an inspection aperture in the well wall or a battery backed up CCTV system.

When power is removed from the machine a short circuit shall be placed on the synchronous motor to prevent the machine moving at a speed higher than 0.3 m/s.

The control panel location shall incorporate a visual indicator displaying which floor and additional audible signal(s) to indicate when the car is within the unlocking zone of the landing entrance.

Provision shall be made to move a lift car in a 'balanced' situation. The device may be either a battery driven input to the hauling machine motor/drive or an auxiliary drive.

C7.6 RELEASE OF CAR SAFETY GEAR

Where the motor torque is not adequate to release a fully loaded car with safety gear engaged or there is insufficient traction to achieve the same, an approved method of safety gear release shall be provided. The Contractor shall supply details of the methods of safety gear release with their tender together with risk assessments.

C8 VARIABLE VOLTAGE - VARIABLE FREQUENCY A.C. DRIVES

C8.1 GENERAL

The lift car speed shall be controlled by a Variable Voltage - Variable Frequency A.C. drive unit capable of 180 starts per hour and providing stopping accuracy of ± 5 mm under all load conditions.

C8.2 METHOD

The 400v, 50 Hz, 3 phase supply network voltage shall be rectified and fed to a constant voltage intermediate D.C. circuit. When the motor is to be driven, the intermediate D.C. voltage shall be fed to an inverter module comprising of high speed switching power transistors in a 3 phase bridge configuration.

The power transistors shall supply the intermediate voltage to the motor stator in pulse form of a high frequency.

C8.3 OPERATION

The motor speed and torque shall be controlled by varying the motor stator frequency and, to compensate for a corresponding reduction in torque caused by an increase in stator frequency, the stator voltage shall be varied with the change in frequency so that the ratio of stator voltage to stator frequency remains constant. The air gap flux shall therefore remain constant to provide constant torque capability.

At low frequencies the stator voltage shall be increased beyond the proportional value with respect to stator frequency to overcome the effects of the stator resistance at the low frequencies and maintain the constant torque, (i.e. the inverter principal shall be a constant flux, voltage fed drive).

The voltage frequency ratio shall be controlled by closed loop controls providing motor speed feedback from a suitable transducer and load feedback from car or brake mounted transducers.

When a change in load occurs an increase in rotor frequency will occur proportional to the slip, the stator frequency will be increased proportional to the difference between the tacho voltage and the rotor frequency which shall compensate for the drop in speed.

The drive system shall allow motor control in all four quadrants (i.e., the motor may be braked or driven in both directions).

In the ‘overhauling' mode, the motor will operate as an AC generator producing excess or regenerative power. In gearless lift applications, the regenerative power is more significant and shall be returned to the mains via a controlling network to produce a near sinusoidal output of mains frequency.

Where regenerative power is returned to the mains, a dissipating resistor circuit shall also be provided for use in the event of failure of the regeneration circuitry or if the line voltage is sensed as rising due to the regenerated power (i.e., the supply cannot utilise the regenerated power).

Change of motor direction shall be achieved by semi-conductor switching without the reliance of electro-mechanical switches in the drive circuit. There may be directional electro-mechanical switches in the drive circuit to achieve two series points of isolation in accordance with EN81-50.

C8.4 CONSTRUCTION

1) Scheme

The drive system shall generally comprise of the following primary components which shall all be contained within the drive control cabinet:-

- A tuned L-C network filter between the supply and the drive system.
- A rectification network to convert the AC line voltage to any intermediate DC voltage.
- A DC stabilising circuit.
- A drive module to convert the intermediate DC voltage into a voltage and frequency controlled source.
- An acoustic noise filter to attenuate the pulse width modulation sound in the motor. For high frequency switching operations this may not be necessary.
- Regenerative braking resistor or regenerative control circuitry providing a 'return to mains' system.

2) Enclosures

Each drive unit shall be enclosed in a drip proof steel cabinet, having hinged doors fitted with a method of locking.

The drive cabinets shall allow all wiring to enter the base of the drive controller.

3) Ventilation

Drive cabinets shall be force ventilated by the use of one or more thermostatically operated axial flow fans arranged for flow or extract in areas of the panel containing heat dissipating components (e.g., heat sinks, braking resistors etc).

The supply or exhaust from the drive panel, dependent upon fan arrangement, shall be through pressed louvers at the base of the panel which shall be fitted with dust filters.

4) Transistor Modules

Static switching in the inverter and regenerative networks shall be achieved by high speed, high power transistor modules of a type particularly suited to inverter applications.

5) Heat Sink

The heat sink shall have at least one thermally operated device embedded in the main extrusion which shall operate axial fans when the heat sink temperature rises to a predetermined value and

shall also operate a circuit to isolate the supply from the drive in the event of excessive temperatures of the heat sink which could indicate a possible fault condition.

6) Protection

The drive unit shall employ the following supervision or protection:-

- Over-current in the drive circuit.
- Over-voltage of the intermediate circuit.
- Under-voltage of the intermediate circuit.
- Heat sink over temperature.
- Network voltage asymmetry.
- Supervision of regenerative circuit.
- Shunt braking resistor.
- Saturation of the speed regulator.
- Motor thermistor protection.

There shall be at least two independently operated electro-mechanical contactors between the motor and the supply, the contacts of which shall be connected in series.

One of the contactors shall be connected between the supply and the drive system.

7) General Construction

The construction of the drive shall be generally as specified for the control panel in respect of the following:-

- Wiring
- Terminals
- Labelling
- Fuses
- Earthing

8) Tacho-Generators/Speed Transducer

The closed loop control system shall derive the motor speed reference from a digital encoder. Where a digital encoder is used it shall not be directly connected to the motor shaft where a handwinding wheel is to be installed. When the lift car is in motion, failure of the digital encoder which may result in the Lift overspeeding, shall cause the supply to the lift machine to be removed and the brake applied.

9) Controlled Starting

On all variable frequency drive systems the control system shall control the current consumed during starting to not more than 2.5 times the full load current of the motor.

C8.5 SUPPLY NETWORK AND RADIO INTERFERENCE SUPPRESSION

Each complete Installation shall be satisfactorily suppressed to prevent any interference to other electrical and electronic equipment within the building and adjacent buildings.

Small electrical motors shall be suppressed to comply with Statutory Instrument No.291 - The Wireless - Telegraphy (Control of Interference from Electrical Motors) Regulations 1955.

The radio interference classification for all control equipment used shall be at least Class 'N' and defined in VDE 0875. This is a frequency related limit in the 150 KHz to 30 MHz range.

In addition to the above requirement all equipment shall be suppressed to the recommendations of BS EN 55014-1:1997.

C8.6 VOLTAGE AND CURRENT HARMONIC DISTORTION

Cyclic three-phase semi-conductor switching and inversion in the lift drive generate harmonic voltages and currents, therefore the Contractor shall provide filtering between the supply isolator and the drive.

The filtering should be a tuned L-C filter network comprising of suitably dimensioned inductor coils and capacitors in each phase of the supply to attenuate the low order harmonics to an acceptable load.

The principal concern is to prevent damage to other plant such as p.f. correction capacitors.

Harmonic distortion levels shall not exceed 40% of the stage 2 limits of G5/3 requirements.

Where it is considered necessary the Engineer will request the Contractor to provide a harmonic analysis test on the Lifts. Where the test proves the lift harmonics comply with the requirements of this Specification the Contractor shall be reimbursed by the Contractor. Where the harmonic analysis test fails the Contractor shall bear the cost of the test and the subsequent tests after additional filtering has been installed.

The harmonic analysis tests shall take place in the presence of the Engineer.

The harmonic analysis tests shall be recorded for harmonic orders 2 to 18 for each load condition of the Lift and a hard copy of the results produced.

The Contractor shall provide details in his tender of all equipment included to attenuate the harmonic voltages and currents.

C8.7 PERFORMANCE

The Lift performance shall comply with the following performance criteria (figures are maximum values):-

In Car Noise	55dB (A)
Door Noise	50dB (A) (at a distance of 1.5 m vertical and 1 m horizontal)
Typical Jerk	1.0m/sec^3
Typical Acceleration	1.0m/sec^2 (Adjustable between 0.8m/s2 and 1.2m/s2)

Vertical Vibration	8 milli (g)
Lateral Vibration	8 milli (g).

C9 STANDARD REQUIREMENTS FOR PRE-LOOMED LIFT SHAFT WIRING FOR MACHINE ROOMLESS LIFTS

C9.1 GENERAL

Wiring within the lift shaft shall comply with the following clauses of this Specification and shall be contained in galvanised metal trunking.

C9.2 WELL WIRING

To assist installation times and improve reliability, pre-loomed shaft wiring may be utilised.

The complete shaft wiring loom shall, where possible, be factory tested and functionally simulated before delivery to site.

The well wiring loom may comprise of single core, stranded, insulated copper conductors of a quality equal to BS 7629 and shall be bound using cable wraps or similar fixings at regular intervals to maintain the desired structure of the loom. All conductors will be stranded and of a minimum of 1.0 mm² CSA.

Each main loom shall incorporate an earth wire to EACH switch, landing lock, control station and indicator.

All conductors within the well wiring loom shall be insulated for the highest voltage present and each conductor shall be readily identifiable by means of either insulation colour coding or marked at each plug/socket termination.

Spurs from the well trunking may be wired as a continuous part of the main well loom or be connected to the main well loom via an approved plug/socket connection within the well trunking or a plug connection to a socket connection in the side of the well trunking.

Spurs from the main well trunking to switches, locks, indicators, pushes etc., may be wired in double insulated multi-core cable to a length not exceeding 1200 mm (only if the use conduit is not possible). The multi-core cable shall be secured to the well wall with an approved cable fixing for concrete at intervals of 250 mm.

Where spurs from the main well loom are in excess of 1200 mm the spurs shall be contained within small section trunking / conduit.

Plug/socket connections between the main well loom and electrical equipment within the well or on the landings shall be a rigid plastic positive plug and socket arrangement that can only be mated in the correct position.

Each plug/socket shall be boldly identified by a legible, indelible legend which identifies each plug to the corresponding socket and which also corresponds to the legend on the appropriate wiring diagram. Legends on self-adhesive labels shall not be accepted.

Each plug/socket arrangement shall contain an earth wire of cross sectional area in accordance with the latest Edition of BS 7671.

The vertical well trunking shall be fitted with pin racks, or an alternative means of cable support at regular intervals throughout the trunking to relieve tension in the loom conductors.

Where the spurs from the well wiring are connected to the rear of landing equipment, the spur wiring shall be adequately protected, by the Contractor, to allow grouting up of the rear of push boxes by the Builder.

C9.3 CONDUCTORS AND CABLES

All cables contained in conduits and trunking shall be PVC insulated stranded copper conductors of a quality equal to BS 6004 and be adequately rated.

For all 3 phase and neutral supply circuits the colours of the insulation of the conductors installed between the supply isolator and the lift control panel shall be brown, grey, blue or black accordingly.

In all single-phase power circuits the colour brown shall identify the live conductor and blue shall identify the neutral conductor.

In addition to phase identification, all terminations of cables connecting control gear, indicator, alarm and signalling equipment shall be adequately marked to be positively identifiable with corresponding markings on the terminals to which they are connected and with the symbols used on the wiring diagrams.

C9.4 FLEXIBLE CONDUITS

Flexible conduits shall only be used on items of equipment which are flexible, subject to vibration or adjustment (e.g., hauling machine governor etc., and shall be in accordance with BS 731: Part 1).

Flexible conduits shall not be used in place of pulled or manufactured bends within the solid conduit system and all lengths used shall be kept as short as is reasonably practicable. No length shall exceed 300 mm.

Electrical continuity of all flexible conduits shall be maintained by running, outside the flexible conduit, a separate green PVC sheathed earth wire of minimum size 4.0 sq. mm suitably terminated at each end in a ‘Simplex' earthing coupler (Cat. No. 6582-6584) or other equal and approved fitting.

An earth continuity conductor of section conforming to the latest edition of BS 7671 shall run inside the conduit between the fixed distribution point and the plant supplied.

C9.5 INSTALLATION OF CONDUITS & TRUNKING

All trunking / conduit shall be galvanised metal.

Conduits / trunking shall not be installed in contact with plumbing and mechanical services, a minimum distance of 150 mm being maintained wherever possible.

Conduits / trunking shall not be laid in positions where they can cause a tripping point for Engineers working on or around the hauling machine or control panel.

Prior to erection, all burrs and sharp edges shall be removed from the conduit together with dirt, oil or paint which may be present.

Corners shall be turned by means of handmade bends or, where this is impracticable, by means of conduit boxes. Factory made bends, tees and elbows and inspection tees and elbows shall not be used without approval.

C9.6 CABLES IN CONDUIT AND TRUNKING

The number of cables drawn into any conduit or trunking shall not exceed those specified in the latest edition of BS 7671.

During installation, cables shall be combed to facilitate drawing-in and possible replacements.

Cable joints shall not be used unless specified or on the written approval of Engineer.

Cables of AC circuits installed in steel conduit or trunking shall always be so bunched that the cables of all phases and the neutral conductor, if any, are contained in the same conduit or trunking.

Cables of different control circuits may occupy the same trunking or conduit providing they exclude emergency alarms and are separately identified and insulated to the higher voltage present.

C9.7 EARTH CONTINUITY

Earth continuity conductors shall be in accordance with the latest edition of BS 7671. All such conductors, other than tapes, shall be insulated with green/yellow PVC sheathing. Earth clips shall comply with BS 951.

Earth couplings shall be connected by means of an insulated copper wire coloured green which shall be secured to the equipment with M4 brass screws. In surface conduit installations in which a high degree of neatness is required, plain couplings with compression washers may be authorised.

In lighting switches, socket outlets and all equipment outlets, the copper earth wire from the couplings shall pass through a hole in the box and terminate at a M4 brass screw tapped or bolted into the box.

The supply and fixing of all earthing and bonding materials which may be required for the proper and effective earthing and bonding of any equipment, shall be considered to be included in the material and labour covered by the supply and installation of the equipment.

C9.8 TRAVELLING CABLES TERMINATION AND PROTECTION

All travelling cables shall comply with BS EN 50214 : 1998 Flexible Cables for Lifts.

A separate travelling cable shall be installed and contain cores suitable for the transmission of television images (for CCTV) and other data link.

These data link cables shall be rated as CAT6E/Class E, compatible with all current connecting hardware to EN 50173 and ISO/IEC 11801, optimized for RJ45 plug systems supporting AWG 26 stranded wires. They shall be flexible data cable S/FTP: Al/PETP foil tape screen per pair, tinned copper-braid screen overall. PVC outer sheath standard type. Cross sectional area of 4 x 4 x 2 x AWG26. Rated 100/100V, loop resistance 270 Ohm/kM, 43pf/m capacitance with impedance of 100 ohms and compliant to IEC 61156-6 Cat.6

Colour coding to be in accordance with IEC189+708-pair and constructed to EN50214 with electrical values reference to EN50288-2-2.

The number of conductors in each cable shall be between 4 to 24. Each cable shall have 10% spare conductors for future repairs.

The travelling cables should preferably be run from control panels to a junction box on top of the lift car. The junction boxes shall be sheet metal and contain the appropriate terminal blocks or plug/socket connectors, all as identified as per wiring diagram notation.

Where telecommunication units are included, separate cables shall be used.

Telecommunication units shall be chosen from copper pairs, copper coaxial or optical fibres and units shall have a diameter equal or very close to the diameter of insulated cores. Preferably the number of telecom units in a cable shall not exceed three.

The CCTV travelling cable to be terminated in a suitable junction box in the lift well at the ground floor with a minimum of 2000mm flex left for any localised repositioning of the junction box. It shall be terminated on the car roof with a minimum of 2000mm flex.

A strain bearing member (SBM) or members, either of textile material or metal, shall be included in all cables for freely suspended lengths exceeding 3 m. They shall be separated from the core groups.

The value of the freely suspended length for each particular contract shall be declared in the Tender Schedules. The SBM shall preferably be located on the edges of the cable in a symmetrical position and shall be easily separable from the cable, without damage to the cores, when separate terminations of the SBM are necessary.

All travelling cables not using SBM shall be suspended on clamp blocks or by looping over rollers preventing connections to the junction boxes being strained.

C9.9 EARTH INSULATION RESISTANCES

The insulation resistance between voltage circuits and earth after drying out of the building shall not be less than 1.0 megohm when measured at a pressure of 500 volts DC.

The resistance of the insulation between conductors and conductors and earth shall be greater than 1000 ohms/volt with a minimum of:-

- 500,000 ohms for power circuits and electric safety device circuits.
- 250,000 ohms for other circuits (controls, lighting, signalling etc.).

C9.10 WIRING ON CAR TOPS

Wiring on car tops shall be run in trunking with short connections to the equipment in solid conduit to fixed items and flexible conduit adjustable or vibrating items.

The trunking shall be kept to the edges of the car and conduit runs shall be so placed as to provide as much clear standing space as is reasonably practicable.

Flexible conduit, cables or trunking shall not be positioned where it is possible to be stood on by Service Engineers.

C10 STANDARD REQUIREMENTS FOR ELECTRONIC CONTROLLERS, SWITCHGEAR, MAINTENANCE CONTROLS AND ELECTRICAL INSTALLATION AS APPLICABLE TO MACHINE ROOMLESS DESIGN EQUIPMENT

C10.1 CONTROL PANELS

(1) Introduction

The controller and switchgear of each Lift shall give reliable service under all operating conditions. The controls shall be entirely automatic, quiet in operation and provide the systems of operation specified in the relevant sections of this Specification.

Only controllers from the suppliers outlined in the schedule of technical particulars, section D2 will be accepted.

(2) Enclosures

Any emergency/inspection control panels located on the landing shall be fitted with suitable locks for use by authorised personnel. Euro style locks are acceptable. Three sets of keys for each lock shall be provided to HM Land Registry when the lifts are accepted.

Control panels shall be ventilated at high level by means of pressed louvers in the sides of the control panel in must be in accordance with EN81-20

Where delicate electronic equipment is used in the control circuitry, which could become damaged by deposits of dust, then filters shall be provided on the rear of each louver.

(3) Wiring

All control panel wiring shall be PVC insulated and no materials of an inflammable nature shall be used in control gear assembly.

All wiring within the control panel shall be installed inside PVC trunking for as much of its length as is practical.

All external wiring entering the control panel shall be identified by the use of an approved cable marker and shall terminate in a modular terminal rail assembly as specified below.

(4) Terminals/Sockets

All single core wiring entering the control panel shall be terminated in easily accessible modular, assembly rail mounted, screw clamp terminals at the base of or at one side of the control panel.

Continuous terminal strip shall not be accepted.

Each terminal module or socket shall have at least one possibility for terminal identification which shall correspond to the terminal reference on the wiring and schematic diagrams.

All multi-core wiring shall terminate in a positive locking-plug-socket arrangement in which the plugs are clamped or otherwise secured.

All modular terminals used for voltages in excess of 110 volts AC shall be of the shrouded pattern. They shall be fitted with a printed warning label of a suitable insulating material for the terminal voltage they are guarding, bearing the terminal voltage.

The incoming supply and motor supply terminals shall be shrouded and identified in their respective group of terminals.

(5) Switching Components

All control panel components mounted within the control cubicle shall be mounted upon either a DIN type mounting rail or upon slotted mounting plates and shall be suitably arranged for easy withdrawal to facilitate replacement and servicing.

Circuits opened to stop the lift machine by operation of contactors with metal to metal contacts shall incorporate at least two independent contactors, the contacts of which shall be in series in the supply circuit, either of which shall break the supply circuit at all poles.

(6) Labelling

Plastic labels shall clearly and permanently identify each control panel component and abbreviations used shall be identical with the corresponding abbreviations used on the wiring diagrams:-

Labels SHALL NOT be mounted on component casings.

(7) Protection

Overload circuit breakers shall be installed by the Contractor in the incoming supply to the Lifts within the lift control panel or inspection panel. These circuit breakers shall be of the enclosed type with a paddle handle, manually operated, latch switch mechanism with trip-free release, double break contact system, bi-metal and instantaneous magnetic trips and a high breaking capacity relative to their current rating.

Each control panel supplying a poly-phase motor shall include a phase failure and phase reversal protective relay which shall automatically break the supply circuit to the motor in the event of its operation. The relay shall include an LED status display which shall remain illuminated during 'healthy' operating conditions.

All thermistors protecting each individual armature winding shall be connected in a series circuit with only the end connections of the thermistor series circuit being wired back to the thermistor control unit within the control panel.

When an operating resistance change takes place (i.e., a large increase in resistance of the thermistor probes), then the relay shall operate an auxiliary circuit tripping the supply to the motor and an LED on the relay will illuminate to indicate a motor over-temperature trip.

The control system shall automatically cut off the power supply and bring the car to rest on failure or operation of any of the safety devices or accidental earthing of any of the components and all control circuits shall be arranged to fail to safety.

Brake coils of hauling machines shall be de-energised by being disconnected at both poles or by the opening of at least two independent contacts.

(8) Fuses

All fuses shall be din rail mounted and be easily accessible. They shall be individually labelled indicating the circuit protected and the rating of the fuse in amps. Main fuses (where provided) and control fuses shall mcbs.

(9) Earthing

A main earth terminal or earthing ‘bus' shall be provided at the base of each panel.

The surfaces of all equipment, where earth connections are to be made, shall be made free from paint or other non-conducting material to ensure a good connection and the connection protected thereafter against corrosion.

A flexible tinned copper braid shall bond each hinged door and each removable panel to the cubicle.

In control panels containing electronic or other equipment that could be damaged by the use of a megger on the earth, an isolatable link shall be provided, wherever practicable, in the earth/ground conductor of each circuit susceptible to such damage.

Each isolatable link shall be clearly identified with the circuit label or reference as per the wiring diagrams and, in addition, be clearly labelled stating that:-

THIS LINK MUST BE ISOLATED BEFORE MEGGER TESTING

or similar wording.

All isolatable earth links mentioned above shall be grouped together in the panel.

(10) Diagrams

Wiring diagrams should comprise a working / installation set and a plastic encapsulated A3 set, these are to be stored on top of the lift or within the lift control panel.

(10) Indications

Individual control panels shall incorporate a local status display. The status display shall be at least LED or LCD produced and shall indicate the status of the following items:-

(a) Car Position

(b) Doors Open

(c) Doors Closed

(d) Up Direction Call

(e) Down Direction Call

(f) Lift Out of Group

(g) Safety Circuit Open

(h) Landing Door Lock not Made

(I) Drive Protection Operated

(j) Overtravel

(k) Overload

(l) Oscillator/Proximity Failure

(m) Inspection Control

Where LED's are used, a suitable legend shall be printed adjacent to each LED, in a prominent position on either the PCB or engraved fascia.

The remote monitoring facility shall incorporate a local connection port on the control panel to allow the temporary connection of a local analyser or display in the machine room.

(11) Maintenance Switches

A manually operated switch shall be provided inside the control panel or inspection panel of each Lift for operating the car during testing and maintenance periods.

In the ‘test' position the switch shall make UP/DOWN test buttons on the panel effective and render all push buttons, with the exception of the car top control station button when on test, inoperative and shall also render the door opening and closing functions inoperative.

Operation of the switch shall not cut out the door locks or safety contact. All push buttons shall be of the shrouded, constant pressure pattern.

The car top control station shall override the maintenance controls within the panel.

(12) Manual or Electronic Winding Levelling Signal

The Contractor shall fit an audible and visual indication of the true position of the lift car within the well for use during hand winding or lowering operations. The visual indicator shall show the position of the lift car and the bell or buzzer shall sound when the Lift is within the unlocking zone.

The hand winding or electronic levelling indication shall be connected to the supply available for the alarm bell with a toggle switch in circuit for isolating the device during normal running of the Lift. A second pair of contacts on the toggle switch shall prevent the lift motor from running under power during hand winding periods.

The bell or buzzer shall have a permanent label affixed to it bearing the characters ‘HAND WINDING/ELECTRONIC FLOOR LEVELLING INDICATOR' and instructions on the use of the equipment must be fitted close to the bell or buzzer.

(13) Solid State Circuits

Where ‘Electronic Control Panels' are specified in the Schedules the term 'Electronic Control Panel' shall be defined as a control panel where the control logic and despatch is produced by solid state components or micro-processor circuits.

All electronic components and circuits shall be designed to maintain stable operation between the temperature range +5°C to +40°C.

Each PCB shall have an easily visible reference number on its visible edge which corresponds to an individual reference or type number included in the schematic and wiring diagrams.

All electronic control circuits shall be isolated from potentially damaging higher voltage levels on other parts of the circuit by the use of opto-couplers or pulse transformers.

(14) Micro-Processor Controlled Circuits

Where micro-processor controlled lift control systems are specified in the Schedules, the processor power supply shall be derived from its own individual stabilised power supply unit independent from the supply for the control electronics.

The controlling micro-processor shall be of the EPROM type mounted on a DIP low profile socket and be supplied pre-programmed to allow the operating characteristics to be carried out as required by other sections of this Specification.

All memories used shall be of a non-volatile nature or shall be supplied with a back-up battery supply which may be either integral lithium batteries or a PCB mounted nickel-cadmium battery capable of being charged/discharged continuously, without deterioration. They shall provide sufficient power to retain stored data for a minimum 28 day period.

(15) Standby Supplies

A self-contained, sealed for life, rechargeable battery/charger unit shall be provided inside of the control panel to supply the specified emergency lighting and the lift alarm. The battery shall be capable of being charged and drained continuously without deterioration and shall have adequate power to supply the alarm for a period of not less than 3 hours.

(16) Maintenance/Inspection Panel Temperature Sensor

The Contractor shall provide a thermostat within the Maintenance/Inspection Panel, which shall operate in the event of the Maintenance/Inspection Panel temperature exceeding a pre-determined maximum temperature of the lift equipment, not greater than 40 ºC. When the temperature is exceeded the Lift shall stop at the next floor in the direction of travel and park up. The door open push within the car shall remain operative.

(17) Motor Run Timer

A motor run timer shall be provided in accordance with EN81-50.

C10.2 SUPPLY NETWORK AND RADIO INTERFERENCE SUPPRESSION

Each complete Installation shall be satisfactorily suppressed to prevent any interference to other electrical and electronic equipment within the building and adjacent buildings.

The whole of the Lift Installation shall be designed, installed and tested in accordance with the EMC Directive 2004/108/EC, 12015 and 12016.

Small electrical motors shall be suppressed to comply with Statutory Instrument No.291 - The Wireless - Telegraphy (Control of Interference from Electrical Motors) Regulations 1955.

In addition to the above requirement, all equipment shall be suppressed to the recommendations of BS EN 55014-1:1997.

Where there is a possibility of interference from the controls via trailing cables, interference suppressors shall be fitted as close as possible to the sources.

C10.3 LIMIT SWITCHES

Each Lift shall be equipped with devices operated by the car and arranged to bring the car to a stop automatically at the terminal landing independently of the normal floor stopping switches. On other than single speed lifts, these devices shall automatically safeguard against the normal slowing switches for the terminal landing failing to operate.

Final limits switches operated by the movement of the car and independently of the terminal stopping switches shall be provided to disconnect the motor from the supply and prevent further operation of the Lift under power should the car travel beyond the zones of the terminal stopping devices.

The final limit switches shall be arranged to break the electrical circuit before the buffers are engaged and ensure that the contacts remain open when the buffers are fully compressed.

All contacts shall have positive separation and be arranged to mechanically break even if the contacts have welded together.

All limit switches shall be marked with a conspicuous label to identify their function/circuit reference.

C10.4 MAINTENANCE CONTROLS

To facilitate inspection, a car top control station shall be provided on the car top within 1 m of the landing entrance. The car top control station shall comply with EN81-20 and BS 7255 with the pushes mounted in the vertical plane.

On cars having front and rear access to the car top, a bi-stable stop switch shall be fitted within 1 m of the rear landing entrances on the car top.

The fittings provided on the top of the car, for maintenance purposes, shall be protected against accidental contact and shall include the following:-

1. ‘Emergency Stop' switch in the form of a bi-stable red stop push button in which the ON and OFF positions are clearly visible where it is not possible to reset by an involuntary action.

2. ‘Inspection Operation’ switch clearly labelled NORMAL AND INSPECTION.

3. ‘UP', ‘DOWN' and ‘RUN' (or common) shrouded test buttons that shall be clearly and unambiguously marked with the direction of operation and common function.

4. A protected switch for controlling the operation of the power operated doors.

5. An Engineers alarm in the form of hands free auto dialler with the speaker and microphone mounted on the car top.

6. A fixed and guarded lamp and switch. The lamp shall be located to give adequate all-round illumination to the top of the car and be connected to operate independently of the car interior lighting. (N B: A portable lamp is not acceptable.)

7. A 240 volt switched socket outlet rated at 5A, the socket shall be RCCD protected.

8. An emergency light connected to the car top control light supply.

Maintenance controls shall operate the car at reduced speed and in no case shall the speed under maintenance control exceed 0.63 metres/second.

Under maintenance operation, the control system shall automatically prevent the car travelling higher than a level affording 1.8 m clear headroom from the platform area of the car top for maintenance staff working on the top of the car. A maintenance limit switch that shall be enabled upon operation of the Inspection Operation Switch shall provide this.

C10.5 STOPPING DEVICES

A bi-stable push type stop push with a large red button for stopping the Lift and maintaining it 'Out of Service', including the power operated doors, shall be provided:-

1. At a point within the well directly accessible from the lowest landing entrance.

2. At a point within the well accessible from the lift pit.

3. On the car top control unit and within 1 m of the rear entrances on the car top.

4. Adjacent to the hauling machine.

5. On the Emergency Electrical Control Unit.

Each stop push shall be clearly marked with the 'STOP' position and shall be designed to prevent resetting by involuntary operation.

C11 REQUIREMENTS FOR LIFT CONTROL SYSTEM OPERATING EQUIPMENT AND INDICATORS

C11.1 GENERAL

Each Passenger Lift shall be controlled and operated by an automatic system of the fully collective type, unless otherwise specified in the Schedules and in accordance with the respective specified clauses of this section of the Specification.

C11.2 OVERLOAD AND LOAD WEIGHING DEVICE

Each Lift shall be fitted with an approved automatic load-weighing system which shall be used as an overload device in accordance with Clause 5.12.1.2 of EN81-20 and as a load weighing for by-pass functions and also the drive controller to assist in determining desired starting torques for the Lift to ensure jerk free acceleration.

In the event of an overload being detected by the control system when the car is at the floor level, the doors will be prevented from closing. An overload buzzer will sound, the car position indicator will illuminate to show 'OL' and the speech synthesis shall announce 'CAR OVERLOADED'.

If the lift doors have closed in response to a car or landing call, the overload function will not be effective again until the car has stopped and the doors opened (i.e: it will not operate during travel).

An overload will be 10% of the contract load with a minimum of 75kg.

The by-pass function shall allow a car loaded to 70% of contract load to by-pass a landing call and the controller shall store the call in the system and answer it collectively, or where the interval is prolonged, as a priority.

C11.3 CAR DOOR SAFETY EDGE

Each power operated lift car door shall be fitted with an electronic detector. This shall be located on the shaft side of the car door (i.e: between the car and landing doors). The location of the safety edge shall be in line with the requirements of EN81-71 part 5.3.4 if category 2 anti-vandal has been specified in D2 schedule of technical particulars.

The detector shall project an infra-red beam curtain along the side of and in front of the landing doors

When a passenger or object is detected within the door edge beam whilst the doors are closing, the doors shall open then, after a short adjustable time delay, attempt to re-close.

If, after an adjustable time delay, the obstruction has not been removed, the doors shall commence a nudging operation until the doors are fully closed.

The sensitivity of the door edge detector shall be adjusted to prevent any contact of the close doors with an intending or alighting passenger. This shall NOT be achieved by reducing the speed of the doors beyond an acceptable minimum speed.

The sensitivity of the safety edge may be reduced in the final stages of closing.

The safety edges shall not be affected by temperature variation or dust.

The safety edge shall project a multi-beam infra-red reflective curtain with 3D detection into the landing zone between the car and landing doors with coloured indicators, green on opening and red on closing.

C11.4 DOOR OPEN CONTROL

The car control station of each Lift equipped with power operated doors shall contain a 'DOOR OPEN' push button, effective in operation only while the car is stationary at a landing and the doors have 'not' been interlocked in response to any call registered.

Momentary action of the 'Door Open' button shall open the doors and then allow the doors to re-close automatically without delay. Constant pressure of the 'Door Open' push shall hold the doors until pressure on the push is released.

C11.5 INDEPENDENT OPERATION

Where specified under the Car Control Station Clause, operation of the car preference key switch shall disconnect the Lift from the normal operational sequence of the control system. On being disconnected from the auto service the Lift shall respond only to calls made from the car control station and all calls made from the landings shall be allocated to other lifts within the group.

Whilst a Lift is on independent operation, the doors shall not close until a call is registered on the car control station to despatch the car to another floor.

If there is a temporary break in the power supply when the Lift is under "Independent Operation" with no calls registered in the system, the lift car shall not automatically move to a terminal floor after restoration of the power supply to reset electronic floor selectors. The resetting movement, if necessary, must only take place after a call has been registered on the car control station. The lift car shall then travel to the floor selector resetting floor, then to the registered call floor.

C11.6 HALL POSITION INDICATORS

The indicators at all floors shall be mounted to the side landing entrances and fulfil the requirements EN81-70.

The indicators shall comprise:-

1. A digital LCD display to provide 50 mm high alpha-numeric characters.

2. The display shall include direction of travel arrows which shall show the direction that the Lift is travelling in at that instant.

3. Lift arrival gongs to provide two-tone sound with one chime for 'up' and two chimes for 'down'.

The foregoing will be set in a satin finish stainless steel flush fitting faceplate mounted in back boxes recessed into the wall.

C11.7 CAR OPERATING PANEL

The car-operating panels shall be mounted in the side wall to which the car door closes. The car control station shall be in accordance with the requirements of EN81-70, EN81-28 and BS8300:2009+A1:2010 Part 8.3.3.3.

The position of user controls shall comply with the requirements of Part M of the Building Regulations, with all controls mounted between 900 mm and 1200 mm above floor level.

The control car stations shall comprise the following equipment:-

- An engraved Lift Serial Number with resin filled lettering.
- A CE Mark and the reference number of the Notified Body shall be engraved on the COP.
- The car load plate engraving with resin in-filled lettering giving load in persons and in kg.

A display system which shall comprise:-

- A 50 mm high bi-colour arrow and a digital segmental position indicator to provide 50 mm numerals.
- A perforated grid of a symmetrical oval pattern with a fine mesh backing for the hands-free auto dialler.
- An engraving providing the instructions for operation of the hands free auto dialler. (On public lifts the engraved instructions shall be replaced with tactile instructions for the benefit of blind persons).
- Car preference is to be available by the provision of a Key switch to provide a separate independent Door Hold/Goods. Operation of the key switch will inhibit landing calls, and cancel all car calls. The car shall stand at a floor with doors open, and answer car calls only, non-collectively. A minimum of 10 keys shall be supplied in total, all key switches to be keyed alike for all 3 lifts.
- One floor despatch button for each floor served with adjacent tactile identification. The halo of the push shall be LED illuminated when pressed and remain illuminated until the car reaches that particular floor level. The push buttons shall have an audible feedback adjustable between 35 dB and 65 dB given on every operation of the push button.
- One ‘door open’ push. Constant pressure on the push shall hold the door in the open position. The halo of the push shall be LED illuminated when pressed and remain illuminated until released.
- An alarm push button with a yellow coloured pressel having a bell logo on the pressel which shall illuminate under emergency lighting conditions.
- Pictograms for auto-dialler in accordance with EN81-28.

The panels shall be locked in place at the top, middle and bottom by a concealed locking arrangement which shall be arranged to be tamperproof. The face plate of the car operating panel shall be a vertical brushed satin stainless steel finish.

C11.8 LANDING CONTROL STATIONS

All push buttons shall be mounted with the upper most push button at a height of between 900 mm and 1100 mm above finished floor level.

Push buttons shall be either Dewhurst US91 or Lester PB5 Each push shall dual illumination, Back light white, call acceptance blue.

C11.9 SPEECH SYNTHESIS UNITS

Each lift car shall be provided with a speech synthesis unit to provide audible messages in relation to the operation of the lift.

The speaker for the speech synthesis unit may be included in the car operating panels or be ceiling mounted where practicable.

The voice of the speech synthesis unit shall be a female voice to the approval of the Client's representative.

The speech synthesis unit shall provide a list of floor announcements or functions.

The speech synthesis unit announcements shall include the following messages:-

- Going Up
- Going Down
- Doors Closing
- Fire Alarm, Returning to Ground
- Please Evacuate on Arrival
- Level X
- Stand Clear of the Doors (before nudging)

C12 STANDARD REQUIREMENTS FOR OPERATION OF PASSENGER LIFTS

C12.1 GENERAL

The Lift shall be controlled by an automatic push button system, arranged for enabling the Lift to be operated under “Passenger” or “Independent Service” control, as selected by a key switch.

Momentary pressure on any of the floor despatch buttons in the car or on the directional call buttons on the landings, shall automatically register and store a call for the appropriate floor in the control system.

The stored calls shall automatically select the direction in which the car will start to travel.

The following equipment, installed to comply with the respective clauses of this Specification, shall be included in the lift car:-

- Electronic Car Door Safety Edge
- Independent Operation
- Car Overload Device

C12.2 PASSENGER CONTROLLED OPERATION

Momentary pressure on a floor despatch button on the car control panel shall automatically and immediately close the car and landing doors and, when the door interlocking circuit is made, the car shall automatically start and travel towards the floor initially selected from the car control station.

On arrival of the car at a floor, the car and landing doors at the floor shall be opened automatically by the electric door operator fitted on the car.

Adjustable timers incorporated in the control system shall delay operation of the car after it stops at a landing and afford the passengers sufficient time for entering or leaving the car.

After the car has arrived at a floor and a pre-determined short interval has elapsed, the car and landing doors shall close automatically subject to the controlling influence of the protective devices fitted to the doors.

The pressing of a landing push button, while a car is stationary at the landing with the doors closing, shall cause the doors to re-open automatically and immediately providing the call is for the direction of travelling for which the car has been pre-selected and the door interlocking circuit has not been completed.

C13 EMERGENCY CONTROLS (WHERE SPECIFIED IN SECTION D)

C13.1 ALARM SYSTEM

Each Lift shall be equipped with an emergency alarm system operated from the yellow push button incorporated in the car control station.

Under emergency lighting conditions the alarm push shall be illuminated to obviate the alarm push.

The Contractor shall provide and fix the following equipment and system suitable for operation from a maintained safe low voltage emergency power battery/charger unit which shall provide sufficient power when fully charged to operate and maintain the alarm system for a continuous period of 3 hours:-

- An approved loud sounder within the ground floor landing entrance labelled 'LIFT ALARM', of a pattern that has a different tone to the Fire Alarm. The sounder shall be to the approval of the Engineer.

C13.2 COMMUNICATIONS SYSTEM (PASSENGER)

The Contractor shall provide a hands free auto dialler within the car control station as detailed in the relevant section of this Specification. This autodialler shall be capable of four point 2-way communication and shall be from the Windcrest or Safeline range of products and shall fully comply with EN81-28.

The autodiallers shall include for an Inductive Loop. The inductive loop shall be of a suitable design to operate at any point within the lift car.

These autodiallers shall identify lift location and address using the voice recorded message facility.

Operation of the alarm button for a period of 3 seconds shall activate a site programmed auto-dial sequence to call the lift service provider call out centre. Once established, the trapped passenger shall maintain 2-way communication without further intervention.

In the event of the first programmed number not responding within a pre-defined period, the auto dialler shall automatically dial the next programmed number in the sequence.

C13.3 COMMUNICATIONS SYSTEM (ENGINEERS)

The auto dial facility shall also be connected to the engineer's car top and pit alarms to allow two-way voice communication in accordance with EN81-20.

The car top and pit alarms shall include an individual speaker and microphone and shall be activated from a yellow alarm push with a bell logo.

The pit alarm shall be mounted at a height of 500 mm above the base of the pit. The alarm push shall not be activated from the underside of the car.

C13.4 TELEPHONE SOCKETS/GSM UNITS

The existing provisions for the current autodailler are to be re-used. If dedicated phone lines, terminated with BT phone boxes are installed then the contractor shall ensure that the new autodailler is reconnected to the same phone line as the existing autodailler is currently connected.

GSMs are currently in use as BT lines were disconnected, HM Land Registry are arranging for the BT lines to be reinstated.

C13.5 FIREFIGHTING AND EVACUATION CONTROL

When firefighting or evacuation requirements are detailed in D2 Schedule of Technical Particulars, reference should be made to the fire strategy for the building. Where firefighters and or evacuation lifts are required then the lift contractor shall include in his tender for compliance with the requirements of BS EN81-72:2016 Firefighters lifts and BS 9999:2017 Code of practice for fire safety in the design, management and use of buildings.

C13.6 FIRE ALARM RECOVERY

The Lift shall conform to EN81-73 when incorporated within Section D of this Specification.

The lift control system shall provide for the following functions where necessary, within the control system. The fire alarm system outputs may not be available at the time of commissioning the Lifts therefore the system shall be demonstrated from the lift control panel.

In the event of a fire being detected, the fire alarm panels will provide a signal or signals to the lift machine room:-

- Signal 1 - will be for a fire at a point other than the ground floor lobby area in the vicinity of the Lift.

- Signal 2 - will be for a fire at the ground floor in the area of the Lift.

When the lift control system receives ‘Fire Alarm Signal 1’, the Lift shall immediately stop at the next floor in their direction of travel without opening the doors and return to the ground floor level where it will open its doors and then park, doors closed but with the door open push button on the car operating panel remaining functional.

When the car is responding to ‘Fire Alarm Recovery’ the speech synthesis unit on the lift car will make an announcement ‘FIRE ALARM SOUNDING’, ‘RETURNING TO GROUND’. ‘EVACUATE UPON ARRIVAL’.

When the lift control system receives ‘Fire Alarm Signal 2’ the Lift shall immediately stop at the next floor in the direction of travel (providing this is not the ground floor) and without opening its doors travel to the nearest floor level where it will open its doors and then park, doors closed but with the door open push button on the car operating panel remaining functional.

When the car is responding to ‘Fire Alarm Recovery’, the speech synthesis unit on the lift car will make an announcement ‘FIRE ALARM SOUNDING’, ‘EVACUATE ON ARRIVAL AT FLOOR‘.

PART D– SCHEDULES

D1 SCHEDULE OF DRAWINGS

1. The Contractor shall prepare and submit the following drawings in electronic formats (PDF and DWG) to the Engineer for comment within 2 weeks of receipt of order.

    a) Builder's Work Drawings showing all dimensions, loadings, entrance threshold rebates, etc.

    b) Drawings showing general arrangement of the equipment including any external controls, sensors etc. and also showing the required positions of all co-ordinated services and power supplies for the installation(s) including all Builder's Work.

With 8 weeks of receipt of order the Contractor shall submit the following drawings:-

1. Drawing control systems arrangements including Builder's Work.

2. Detailed Drawings showing the construction of the equipment including architectural finishes.

3. Wiring and Schematic diagrams.

The Contractor shall also supply the Contract Record Drawings or "as built drawings" following completion of the project to reflect any changes that have been incorporated during works.

D2 SCHEDULE OF TECHNICAL PARTICULARS FOR MACHINE ROOMLESS PASSENGER TRACTION LIFT DESIGN (MRL)

The Contractor shall strictly comply with the requirements of the following Schedule, which is a summary of the specific requirements for this project. The Lifts shall fully comply with this Specification, Part M of the Building Regulations, BS 7255, BS 7671, EN81-20, EN81-50, EN81-58, EN81-70, EN81-72 (Lift 2 only), EN81-73 , EN81-28, BS8300, EN ISO 12100-1 and EN ISO 12100-2. This Schedule should be read in accordance with Schedule 'C' of this Specification:-

RPS Reference	:	PMRL
Number of Lifts to be Installed	:	3 – Triplex Installation with Full Collective Control
Type of Lifts	:	Traction MRL 3 off Passenger/Goods
Lift Designations	:	• Lift 1 Left Hand Lift, • Lift 2 Right Hand Fire Fighters EN81-72 • Lift 3 Goods
Contract Loads	:	• Lift 1 800 Kg 10 Persons • Lift 2 800 Kg 10 Persons • Lift 3 1000 Kg 13 Persons
Contract Speed	:	1.6 m/s (All lifts)
Number of Floors	:	9
Number of Car Entrances	1	1
Main Entrance Floor	:	G
Number of Landing Entrances	:	9
Total Travel of Lift	:	29500 mm approx. (To be verified by the installer prior to manufacture.)

Floor Designation Nomenclature	:	G, 1, 2, 3, 4, 5, 6, 7 and 8 (To be verified by the installer prior manufacture.)
Well Minimum Plumb Dimensions	:	Lift 1 and 2 - 2000 mm wide x 1800 mm deep Lift 3 (Goods) – 2140 mm wide x 1900 deep Minimum dimensions to be confirmed as suitable in Tender Documentation.
Well Construction	:	Concrete shaft
Pit Depth	:	1500 mm - Minimum dimensions to be confirmed in Tender Documentation.
Headroom	:	4000 mm available overall. Suitability of the existing lifting points is to be determined by the tenderer. If unsuitable then all associated costs for the installation of a new beam/s or lifting points for the purposes of the lift removal and/or installation should be included for within the contract sum.
Inside Car Dimensions	:	Maximum available floor area 2200 ceiling height. Sizes to be confirmed within Tender Documentation.
Landing Entrance Trims	:	Small frame trims consisting of 2 vertical members and a header section finished as per the Schedules of Designs and Finishes.
Landing Doors	:	Centre opening stainless steel doors shall give a minimum clear entrance opening of 900 mm wide x 2000 mm high. Finished as per the Schedules of Designs and Finishes. Where a larger entrance exists then the larger dimensions will be retained for the new entrances.
Landing Door Closers	:	Guided bias weights or spring type.
Landing Entrance Fire Rating	:	2 hour - E120

Car Doors	:	Side or centre opening stainless steel doors shall give a minimum clear entrance opening of 900 mm wide x 2000 mm high. Finished as per the Schedules of Designs and Finishes. Where a larger entrance exists then the larger dimensions will be retained for the new entrances.
Car Door Operators	:	Door operators are to be either GAL MOVFR, Selcom Pegasus II, or Fermator Robusta. Suppliers are detailed below: a. International Lift Equipment Ltd Units 1 and 2 Highams Park Industrial Estate Larkshall Road London E4 9JD TEL: 0208 527 9669 b. Wittur Group 11 Broncoed Business Park Wrexham Road Mold, Flintshire CH71HP TEL: 01352 707 470 c. Global Lift Equipment Ltd Unit H42/43 Ashmount Enterprise Park, Flint, Flintshire CH6 5YL TEL: 01352 735 400 Controlled to provide torque control over the full width of the entrance complete with mechanical zone locking.
Car Door Protection	:	Full height 3D multi infra-red light beam safety edges shall reverse the doors without striking passengers. The safety edge shall project a multi-beam infra-red reflective curtain with 3D detection into the landing zone between the car and landing doors with coloured indicators, green on opening and red on closing.

Electric Supply Available	:	AC 3 phase, 50 Hz, 400V between phases with neutral and earth. 230 volts single phase.
Drive System Required	:	Gearless AC hauling machine mounted in the lift well comprising of permanent magnet synchronous motor mounted on a common shaft with sheave. Machine to be over rated by 20%. Geared machines will not be considered.
Drive Control	:	Variable Frequency Vector Control.
Regeneration	:	To be included.
Number of Starts Required	:	180 electrical starts per hour.
Required Stopping Accuracy	:	± 5 mm under all load conditions.
Required Re-Levelling Accuracy	:	± 5 mm under all load conditions.
Control Panels	:	The main drive control panel shall be located on the top floor. Only controllers supplied by the following will be accepted: a. Lester Control Systems Ltd Unit D 18 Imperial Way Croydon Surrey CR0 4RR TEL: 0208 288 0668 b. Digital Advanced Control Limited Unit 2 Faraday Close Drayton Fields Industrial Estate Daventry Northamptonshire NN11 8RD. TEL: 01327 879 334

c. Thames Valley Controls
Unit 15
Manor Farm Industrial Estate
Flint
Flintshire CH6 5UY

TEL: 01352 793 222

The maintenance and rescue panel shall be located outside the lift shaft on the top floor landing and shall be incorporated to the main control cabinet. Where possible sit flush with the wall finish. The integrity and fire rating of the shaft should not be compromised and all associated builders/electrical works to achieve this shall be included in the tender. The final position shall be agreed with the Engineer and Design Team.

Three sets of keys for each lock of each cabinet shall be provided to HM Land Registry when the lifts are accepted.

Solid state electronic logic panel incorporating:-

- Fused Switch/CB on incoming supply.
- Phase failure/reversal protection.
- Motor overload protection.
- Manual movement visible and audible signal/switch.

Control System : Microprocessor Full Collective Triplex Control Incorporating:-

- Fire Alarm Recall to Fire Service Access Level (FSAL) – This is level G
- Evacuation function and intercom/call system to be provided to the right-hand lift of the installation satisfying the requirements of the clients existing evacuation strategy and as far as reasonably practicable all requirements of BS 9999:2017 & EN81-72. This system should offer an equal or improved level of integration into the buildings current evacuation strategy as the existing equipment currently installed.

Car Operating Panel :

The Car Operating Panel shall be mounted on the car side wall to satisfy EN81-70. It shall contain the following equipment:-

- Raised Main Floor Access Button (Green Surround) – Level G.
- Load Plate
- Lift Serial Number and Date of Installation.
- CE mark and Notified Body Number.
- TFT Full Position Indicator to show location, direction of travel arrows, lift status, time & date.
- Engraved information for operation of hands free auto dialler.
- Perforated grid for hands free auto dialler.
- One push button for each floor served with tactile notation, Dewhurst US91, Dual illuminated, or Lester PB5 with built in buzzer.
- Door OPEN/HOLD push button Dewhurst US91 or Lester PB5.
- Alarm push, coloured yellow, complete with bell logo and back-lit with an emergency back-up supply Dewhurst US91, or Lester PB5
- Car preference key switch, key to be removable in both positions.
- Car light key switch – Test, Off, On.

All pushes shall be mounted at a height of between 900 mm and 1200 mm.

Pushes incorporating dual LED illuminated call acceptance halos to match push surrounds and include EN tone acknowledgement facility.

Indicators in Lift Car (Visual) :

50 mm high, LED or Vacuum Fluorescent, digital full position indicator which shall give dual digit notation.

Indicators in Lift Car (Audible)	:	The Speech Synthesis Unit shall give floor position announcement and direction of door operation information.
Landing Pushes		Pushes shall be provided at each landing complete with dual LED illumination Call Accept Halos and Tactile Legend Plates. All pushes to be Dewhurst US91, Back light white, call acceptance Blue or Lester PB5. Pushes shall be between 900 mm and 1100 mm above FFL.
Landing Indicators (All Floors)	:	50 mm high, LED or Vacuum Fluorescent, digital full position indicator shall give alphanumeric notation, direction of travel arrows and pre-arrival annunciation electronic chimes and shall be positioned to satisfy the requirements of EN81-70 Indicators shall incorporate lift arrival gongs.
Guide Rails	:	Undercut tee sections selected in accordance with EN81-20 Part 5.7.
Guide Shoes	:	Sliding type with removable liners or roller guides. Sliding shoes shall have a means of self-lubrication.
Car Safety Gear	:	Type tested assemblies shall suit contract load and speed in accordance with EN81-50 Part 5.3.
Counterweight Safety Gear	:	Not Required (only required if the counterweight buffers are not fitted direct to solid ground).
Car Safety Gear Operation	:	Overspeed Governors shall be mounted within the top of the well with a remote test and reset facility. Governor(s) mounted beneath the car will be considered on application.
Upward Overspeed device	:	100% redundancy of gearless machine brake.
Buffers	:	Hydraulic to suit.

Emergency Lighting	:	Shall be supplied from self-contained, sealed for life, battery charger unit(s) having adequate capacity to provide 50 lux at the car control station for 3 hours. Supply the alarm push LED, hand lowering audible signal and alarm signal.
Emergency Communications System	:	Hands free Auto Dial Telephone operated from alarm push with visual yellow and green indication in the car. This Auto Dialler shall be capable of four point 2-way communication and shall be from the Safeline range of products and shall fully comply with EN81-28. These Auto Diallers shall identify lift location and address using the voice recorded message facility. Inductive loop to be included in a design to be accessible at any point within the lift car. Yellow alarm indicator on car control station complete with bell logo and green voice activation symbol when the call is registered. Additionally, an intercom/call system is to be provided to the right-hand lift of the installation satisfying the requirements of the clients existing fire strategy and as far as reasonably practicable all requirements of BS 9999:2017. This system should offer an equal or improved level of integration into the buildings current fire strategy as the existing equipment currently installed.
Alarm System	:	The alarm system shall comprise:- • Approved sounder mounted above the main landing entrance (and audible from within the car) of a different tone to the fire alarm system. This shall be supplied from a separate power pack. The sounder shall provide an output of not less than 95 dBA.
Car Ventilation	:	Concealed high and low-level grilles fitted with external baffle plates and in grilles and ceiling mounted extract fan that shall operate on a run timer. Fans shall not be key switch operated and shall not run continuously. They will however run on indication of a lift fault or after an activation of an entrapment situation.

Maintenance Controls	:	A Car Top Maintenance Control Unit shall be fitted on the car top in accordance with BS 7255 (with the pushes mounted in the vertical plane) and shall be complete with car top light and emergency light. A second Maintenance Control panel shall be installed within the pit in accordance with EN81-20 Part 5.12.1.5.
Engineers Emergency Communications System	:	An alarm push button shall be provided in the lift pit (not on the underside of the car) and on the car top to operate the hands free auto dialler, comprising of a speaker and microphone at both locations (not relying on car internal microphone) and provide 2-way communication between the pit or the car top. If a top of car inspection alarm button is fitted this must work in conjunction with the audible alarm sounder and the autodial system.
Controller to Car Emergency Communication	:	Two way communication must be installed between landing controller and car interior to be switched to operate under emergency conditions.
BREEAM		The lift controller and drive shall have regeneration. After a period of 20 minutes of non-activity, the car lights will automatically be turned off. Additional energy saving features shall include but not be limited to the following: The ability to switch off floor level and directional arrows at landings after an adjustable time period and return them to service when a call is registered. The ability to switch off floor level and directional arrows within the lift cars after an adjustable time period. Switching off dual illumination for car calls. Switching off dual illumination for landing calls.

Other Items to be included by Lift Contractor :

a) All wall fixings shall be supplied, drilled and fixed by the Contractor (out of hours drilling to building structure) These times are:-

Monday – Friday 20.00 – 06.30

Saturday 16.30 – 06.30

Sunday 14.30 – 06.30

b) All fixings for all brackets and steelwork for machine support.

c) Supply hand-winding floor level audible and visible (true position) signal and instructions. Supply a 2-way communication system between the landing control station and the lift car.

d) Testing of the lift in accordance with Table 18 of EN81-20.

e) Repeat testing of the lift in the presence of the Engineer.

f) Provide 12 months warranty and maintenance during the Defects Liability Period which shall include all call outs, 24 hours per day, 7 days per week.

All call-outs and breakdowns shall have a maximum 4 hour response and all entrapments a maximum one hour response.

g) Before the end of the Defects Liability Period, the Lift Maintainer shall undertake all annual inspections as listed under the Supplementary 12 Month Inspection Documentation. All certificates shall be issued to the Engineer.

The Defects Liability Period shall incorporate a proving period as detailed in Section B of this Specification.

q) Include for two hours training for x4 HM Land Registry nominated staff.

r) Include for one-day service standby per lift.

s) Include for the provision of 110 volt a.c. task lighting.

t) Electric shock treatment notices shall be

provided within the lift shaft and in the landing control panel.

u) The lift contractor must include for a site survey of the lift shaft. This survey could be required at a time independent of the installation date and where possible in co-ordination with the survey by the Engineer. The survey shall include the shaft width, depth, headroom and pit depth. It shall also include for checking the plumbness and squareness of the lift shaft.

v) A metal storage container is to be supplied (purchased) by the contractor for use as storage for the duration of the job. On completion of the job the container will be left onsite for HM Land Registry's facilities depart. (this will need to be flat pack type as Limited access available for HGVs). Size to be confirmed by engineer. 2m x 5m. units are available from companies such as Cleveland containers.

w) The contractor will provide a sample finish board with options of different finishes available.

D3 SCHEDULE OF DESIGNS AND FINISHES FOR PASSENGER LIFTS

The interior of the Lift Car shall be robust and shall generally comply with the following requirements, if specified materials are not available, the proposed alternative must be approved by the Engineer prior to manufacture:-

It should also be noted the right hand lift needs to comply with EN81-72.

Flooring	The sub floor shall be constructed to facilitate easy removal of the flooring without dismantling the lift car. The lift cars shall be finished in “Amtico Welsh slate” flooring. Flooring shall fulfil the requirements outlined in EN81-70 & BS8300.
Walls	The walls of the lift cars shall be constructed from steel panels externally flanged, braced and reinforced, fully meeting the requirements of EN81-20. All walls shall be finished in white back painted glass.
Mirror	The rear wall shall include a half height mirror meeting the requirements of EN81-70.
Front Return Walls and Header Panels	The car front return and header panels shall be constructed of three panels, assembled with the minimum number of joints and shall have concealed fixings. The front return panels shall be finished in 304 brushed stainless steel.
Ceiling	To be finished in matt white. Drop down by means of euro key from inside of car. The clear height of the lift car shall be no less than 2100 mm high and the design shall fulfil the requirements of EN81-20 part 5.4.1.2
Lighting	LED low energy down lighter fittings shall be located in the ceiling giving 200 lux at floor level and meeting the requirements of EN81-20.

Drapes	A full set of protective drapes for each lift is required. There shall be permanently mounted studs within the lift car to hang the drapes from.
Car Operating Panels	They shall be installed in the side wall of the lift car and comply with EN81-28 and EN81-70 requirements. The car operating panels shall be flush fitting full height panel extending from the skirting line to the frieze line and be finished in 304 brushed stainless steel. Surface mounted maybe accepted to gain car floor area. To be confirmed with engineer prior to build. The car operating panel pushes shall be mounted at a height to suit disabled access (i.e., with all pushes between 900 mm and 1200 mm) fully satisfying the requirements of EN81-70. Pushes shall be complete with audible feedback from the manufacturers standard range.
Handrail	A 45 mm diameter tubular handrail shall be provided on all side walls of the car and meet the requirements of EN81-70.
Ventilation	Ventilation shall be provided by means of a car top extract fan and upper and lower ventilation apertures and in accordance with EN81-20 part 5.4.3
Landing Doors	Landing doors shall be finished in 304 brushed stainless steel. All landing doors shall fulfil the requirements of EN81-20
Landing Door Entrance Trims	Small type finished in 304 brushed stainless steel. All landing Entrance Frames shall fulfil the requirements of EN81-20
Car Doors	Car doors shall be finished in 304 brushed stainless steel to match the front returns. The car doors shall fully meet the requirements of EN81-20

Landing Fixtures	Faceplates of all landing fixtures shall be flush mounted, chamfered edges & radiused corners, brushed finish in 304 satin stainless steel to contrast with the pushes. All landing fixtures will satisfy the requirements of EN81-20.

PART E – RISK ASSESSMENT

E1 HM LAND REGISTRY PASSENGER MACHINE ROOMLESS LIFT INSTALLATION AND/OR REPLACEMENT RISK ASSESSMENT

Risk Assessment No: N11184

Date: 20th April 2018 Engineer's Name: Robin King Signature:

Site and Location: HM Land Registry, 1 Bedford Park, Croydon, CR0 2AQ

NOTES:

This Document is a Generic Risk Assessment and its intended use is for Tender/Reference Purposes only.

Site Specific Risk Assessments shall be completed by the Contractor prior to commencement of the project.

KEYS:	Risk Rating Key (S x P):	1 - 4 Low = Acceptable; 5 - 9 Medium = Investigate and where practical reduce the risk; 10 - 14 High = Action must be taken to reduce the risk; 15 – 24; Very High = Risk is too high to START work or continue. work must stop
	Persons at Risk:	E = Employee; C = Contractor; P = Public
	Severity (S):	1 = Negligible; 2 = Minor Injury; 3 = Serious Injury; 4 = Major Injury

Probability (P): 1 = Impossible; 2 = Improbable; 3 = Remote; Occasional = 4; Probable = 5; Frequent = 6

No	Activity/Location Materials/Tools etc (Cause/Rigger)	Hazards Identified - (Effect)	Persons at Risk	Severity	Probability	Risk Rating	Control Measures/Corrective Actions Identifying persons responsible where necessary	Severity	Probability	Risk Rating	Residual Risk
1	Unloading new lift equipment and removal of redundant materials	Trips and falls. Vehicle access - collision and crushing. Contact with other trades and the public. Damage to the building fabric.	E C P	3	4	12	Use banksman to direct vehicles. Ensure adequate labour is available. Maintain clear access to job site. Wear PPE and follow manual handling procedures. Conduct local risk assessment. Use only certified mechanical lifting devices. Where appropriate cordon off works area. COSHH issues with redundant materials need to be addressed.	2	2	4	Debris, site conditions, other trades. Heavy/ bulky items. COSHH
2	Moving new equipment into the storage area and redundant materials off site.	Manual handling, strains and sprains. Site conditions-trips and falls. Mechanical handling equipment to lift or move materials. Damage to building fabric. Identify any COSHH risks (i.e. Oil)	E C P	3	4	12	Use entrance barriers hoardings, scaffolding as required to protect the work areas. Wear PPE and follow mechanical handling procedures. Carry out local risk assessments. Use only certified mechanical handling equipment and lifting beams within their working capability, inspect all slings for damage prior to use. Dispose of waste materials through the correct channels and provide certification.	2	2	4	Debris, site conditions, other trades. Heavy and bulky items. COSHH

No	Activity/Location Materials/Tools etc (Cause/Rigger)	Hazards Identified - (Effect)	Persons at Risk	Severity	Probability	Risk Rating	Control Measures/Corrective Actions Identifying persons responsible where necessary	Severity	Probability	Risk Rating	Residual Risk
3	Installation of shaft equipment	Falling objects, fall hazards, open shafts drilling, access/ egress, moving machinery and electrical hazards. COSHH hazards as identified in the safety plan.	E C	4	4	16	Use only tested and certified lifting equipment. Wear appropriate PPE and use fall protection equipment as and when required. Consult site specific method statement, risk assessment and installation folders. Ensure adequate lighting. Keep machine room and hoardings locked to prevent uncontrolled access. Use only inspection speed and maintain a safe position when working on top of the Lift.	2	4	8	Falling objects dropped down shaft, fall hazards due to working at heights, mechanical/ electrical energy.
4	Installation of Machine room area equipment, Electrical and mechanical.	Manual handling, electrical shock unauthorised entry, COSHH hazards, other trades working in vicinity.	E C	3	4	12	Lock and tag out supply when not in use. Rubber mat to be in position when working on the control panel. Fix suitable code compliant notices, keep machine room area secure and operate a permit to work system. Wear appropriate PPE and use only certified lifting equipment within its capabilities. Fit all machine guards before the Lift is moved. Ensure safe access to the machine room area.	2	3	6	Live working when fault finding and testing. Moving machinery. Trips and falls.

No	Activity/Location Materials/Tools etc (Cause/Rigger)	Hazards Identified - (Effect)	Persons at Risk	Severity	Probability	Risk Rating	Control Measures/Corrective Actions Identifying persons responsible where necessary	Severity	Probability	Risk Rating	Residual Risk
5	Commissioning Lift	COSHH, electrical energy, moving machinery, mechanical handling, moving test weights.	E C	4	4	16	Use mechanical lifting aids to transport weights. Use only inspection speed when on car top. Lock and tag out when power not required. Follow set procedures for carrying out EN81-20 tests.	2	3	6	Live working when fault finding and testing moving machinery when setting up limits etc.
6	Associated Builders Works	Builders works making good to entrances – fall hazards and COSHH issues, Drilling masonry eye injuries Erecting hoardings manual handling injuries sharp edges.	E C P	3	3	9	Wear appropriate PPE including eye protection and dust masks. Have sufficient labour to carry materials. Cordon off work areas until hoardings are in place or use safety barriers when entrance frames are not to be replaced. Isolate and lock out Lift when power not required. Consult COSHH data sheets.	2	2	4	Trips and falls. Unauthorised access into works areas.

No	Activity/Location Materials/Tools etc (Cause/Rigger)	Hazards Identified - (Effect)	Persons at Risk	Severity	Probability	Risk Rating	Control Measures/Corrective Actions Identifying persons responsible where necessary	Severity	Probability	Risk Rating	Residual Risk
7	Painting	Trips and falls. Working from heights. COSHH issues.	E C P	3	3	9	Isolate Lift when working near lift machinery. Work platforms are the preferred method of working at height. The use of steps and ladders shall be kept to a minimum. Consult COSHH data sheets.	2	2	4	Trips and falls due to site conditions. Occasional use of ladders and steps. Product COSHH issues.
8	Electrical Works	Trips and falls. Eye injury through drilling operations. Electric shock.	E C	3	3	9	Wear appropriate PPE and fall protection equipment. Isolate Lift and other power supplies when not required. Supply temporary lighting as required. Use inspection speed and adopt a safe position when working from the car top. Secure hoardings and machine room and implement a permit to work system in these areas.	2	3	6	Trips and falls. Unauthorised access into works areas.
9	Asbestos	None present – new build.									

PART F – TENDER QUESTIONNAIRE

F1 QUESTIONS AND DEVIATIONS

Should you have any queries or comments on the attached Specification for this Project please return this form duly completed. Should no queries be received then your offer shall be deemed to be fully compliant with this Specification.

1.

2.

3.

Please note it would be our intention to share the answers to your queries with the other Lift/Escalator Contractors tendering for the project.