

SCHEDULE 1



SCOPE OF WORKS
&
TECHNICAL SPECIFICATION
FOR

ERSKINE COURT, SPRING GARDENS TERRACE, SPLOTT, CARDIFF. CF24
NEW LIFT REPLACEMENT PROJECT

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SECTION 1

PRELIMINARIES QUALITY & TOLERANCES



Preliminaries

Description of the Works and Purpose of the Plant

The dismantling and removal of the existing hydraulic passenger lift and full installation of a new traction (MRL) passenger lift at Erskine Court, Spring Gardens Terrace, Splott, Cardiff. CF24 1QX including all associated building and electrical works.

The Plant shall have a minimum service life of not less than 20 + years commencing from Taking Over by the Purchaser.

Definition of Terms

Purchaser	CARDIFF COMMUNITY HOUSING ASSOCIATION LIMITED
Main Contractor	The Successful Lift Contractor
Quantity Surveyor	TÜV SÜD
Contract Administrator	TÜV SÜD
Engineer	TÜV SÜD
Lift Consultant	TÜV SÜD
Structural Engineer	To be appointed by the successful Lift Contractor (If required)
M & E Engineer	TBC (if required)
Contractor	The Successful Lift Contractor
Principal Designer	TÜV SÜD
Principal Contractor	The Successful Lift Contractor

Programme

The Lift Contractor is required to confirm in writing the Production Schedule and Schedule of Site works, in **Section 10** of the Specification and the dates for possession and completion as set out in the Conditions of Contract.

The Lift Contractor shall be responsible for the complete programming of all sub-contractors and service boards (water, gas, electricity, etc) before and during the work on site. The Lift Contractor shall also be responsible for organising meetings, as and when necessary, with the various sub-contractors and service boards.

The Lift Contractor shall provide, within 4 weeks of appointment, a detailed bar chart programme for both off-site and on-site works showing the items detailed in the Production Schedule and Schedule of Site Works contained in Section 10 of this Specification. This shall be updated throughout the Works, as a progress report, at the frequency required by the Engineer.

Site Conditions

The site is situated at Erskine Court, Spring Gardens Terrace, Splott, Cardiff. CF24 1QX.

Access to the site will be via the main entrance to the side of the building day to day, delivery and material entrance will be agreed in the pre-start meeting.

Site Storage

The site has limited space, allocated for a storage container and skip will be agreed during the pre-start meeting. There is a height restriction on entering the car parking area, which will limit the height of a storage container.

Car Parking

Parking is limited onsite. This is to be discussed further at the prestart meeting. Street parking is available outside the property but very limited space.

Site Management Costs

The Lift Contractor shall provide for all on-site and off-site management costs including the cost for the Person in Charge.

The CDM 2015 Regulation requires that a Principal Contractor take responsibility for managing the Site Works.

For the avoidance of doubt, the Lift Contractor shall undertake the role and duties of Principal Contractor and is expected to fulfil those duties applying the requirements of CDM 2015 which, based on the scope and complexity of the work, may require a full-time managerial presence on site. In this respect the Lift Contractor must ensure that one of their senior employees acts as an on-site Supervisor/Manager, particularly when wholly Sub-contract labour is employed.

The Lift Contractor shall include for site management costs in relation to the requirements of the CDM 2015 Regulation together with the provisions of this Specification.

Lift Contractor Project Manager/Supervisor

The Lift Contractor shall appoint a Project Manager/Supervisor who is sufficiently experienced in terms of the work involved as to ensure the effective and safe and efficient management of the Works and the satisfactory progress of these. The Lift Contractor's appointed Project Manager/Supervisor shall be fully conversant with accepted lift industry work practices and safety requirements, the requirements of the CDM Regulations 2015, labour management, and in relation to the management and control of Works of a similar extent and nature.

Labour on-cost

The Lift Contractor shall provide for all on-costs in respect of all employees in relation to disbursements arising from the employment of labour.

Hours of Work

The hours of work will be as shown on the Schedule of Site Works incorporated into the Contract. No additional working hours will be allowed except by agreement of the Engineer.

Daywork

The Lift Contractor shall obtain the Engineer's approval prior to the commencement of any work which is to be executed on a daywork basis, or which the Lift Contractor considers should be paid for on a daywork basis. The Lift Contractor shall submit proper daywork sheets signed by the Person in Charge specifying the time daily spent upon the daywork and the workmen's names and the materials employed. The daywork sheets shall be delivered to the Engineer or their Authorised Representative not later than the end of the week following that in which the daywork has been executed.

Acceptance of daywork sheets will imply agreement only of the record of the hours worked and materials used and shall not thereby be considered to authorise payment for the work on a daywork basis. Payments for daywork shall be made in accordance with the relevant provision of the Contract.

The Engineer shall be entitled to amend the amount of time and/or materials shown in such daywork sheets if, in their opinion, such amount exceeds that which should reasonably have been expended in producing the result, the Engineer having regard to the circumstances and to the Lift Contractor's obligations under the Conditions of Contract to proceed with the work in a regular and diligent manner.

Sub Contractors

The Lift Contractor is required to enter into Contracts with all Sub-contractors paid through them such as to bind the Sub-contractors to the same obligations and benefits in respect of the Sub-contract as those for which the Contractor is liable in respect of this Contract.

Working Rule Agreement: Declaration of Intent

The Lift Contractor or any Sub-contractor, whether nominated by the Purchaser or not, shall not employ in or upon the Works or any part thereof, any labour-only sub-contractor, other than in accordance with the National Working Rule settled by the National Joint Council for the Building Industry.

For the purpose of this Clause, a 'labour-only sub-contractor' shall mean any Sub-contractor undertaking to execute any part of the Works on terms that the materials and/or equipment and plant needed or used by such Sub-contractor shall be supplied or paid for directly by the Purchaser or Lift Contractor.

The Lift Contractor shall, if so required, produce evidence to the satisfaction of the Purchaser that any particular Sub-contractor for the time being or formerly employed on the Works is or was not a labour-only Sub-contractor employed, other than in accordance with the said National Working Rules at the time of such employment and, if in any specific case the Purchaser shall not be so satisfied, then the Purchaser shall be entitled to determine the Lift Contractor's employment, notwithstanding that the Lift Contractor may have ceased to employ such Sub-contractor on the Works.

If the Purchaser should determine the Lift Contractor's employment under this Contract as aforesaid, then the Purchaser shall be entitled forthwith to enter upon the site of the Works and take possession thereof of all plant, tackle and materials thereon and complete the Works or have them completed by some other contractor and, all loss and extra expense which the Purchaser may suffer, incur or be put to, shall be borne by the Lift Contractor and may be deducted from any moneys due to them or may be recovered by legal process.

Incentive & Bonus Payments

The Lift Contractor is to note particularly, that should any change in the rates of wages and other emoluments and expenses payable to work people by a decision of the National Joint Council for the Building Industry or other body have in any way the effect of increasing the incentive and/or bonus payments, then such increase will not be allowed as an addition to this Contract.

Sample & Other Testing

The Lift Contractor shall provide samples, as the Engineer may require, of any or all materials and workmanship to be used on the Works.

The Lift Contractor shall bear the cost of providing samples and any testing of such samples of material which the Engineer may direct the Lift Contractor to arrange to be undertaken.

Any material or equipment which fails to meet the tests applied shall be replaced, "free of charge", by the Lift Contractor, using a suitable alternative material or equipment which has first been approved by the Engineer.

Tolerances in Construction

The Lift Contractor is responsible for the co-ordination of tolerances (whether manufacturing or workmanship, including nominated sub-contractors and nominated suppliers) between different materials or components of the building.

Claims attributed to varying tolerances between materials and components will not be considered.

Drawings & Dimensions

Wherever dimensions are marked on drawings or described such dimensions are to be considered as correct. In the case of discrepancy between drawings and any existing site measurement this shall be referred to the Engineer whose decision will be final.

Trade Names

Where in the Specification a particular firm or product is specified, the Lift Contractor must use such firm or product. Where in the Specification a choice of more than one firm or product is permitted for any particular item, then the Lift Contractor shall use the particular firm or product upon which they have based their Tender.

If the Specification permits an equivalent to a named product or firm then the Lift Contractor, should they elect to supply or use the equivalent, will be required to confirm that a full stock of relevant spares will be readily and promptly available at their local branch or depot. These spares must be made available to the Purchaser's maintaining contractor throughout the anticipated life of the installation, as declared in the summary of Technical and Constructional Details.

If the Lift Contractor wishes to substitute an alternative firm or product they must submit a written request to the Engineer enclosing samples and indicating the financial effect of their proposed change.

The Lift Contractor will not be allowed to proceed with any substitution until samples are approved, financial adjustment agreed, and the written approval of the Engineer has been given.

Abbreviations

The following abbreviations have been used:

BS	British Standards Specification
BSI	British Standards Institute
dBA	Decibels
FFL	Finished floor level



kg	kilograms
kW	kilowatts
m	metres
mA	milliamps
mg	millig
mm	millimetres
No.	Number
SWG	Standard Wire Gauge (Imperial)

Advertisements & Signboard

The Lift Contractor shall not, without first obtaining the permission of the Engineer, utilise or use any information and/or material from this Contract for advertising in such a manner that the building or project may be readily identified. Within the site and its environment no display of signboards will be permitted without prior written agreement of the Engineer.

Work Covered Up

The Lift Contractor must give due notice to the Engineer when any work or material is intended to be covered up. In default thereof the work and/or material shall be uncovered at the Lift Contractor's expense.

Warranty

The Lift Contractor shall Warrant that they have exercised, and will exercise, all proper skill and care in the design of the Works and in the selection of materials and goods, so far as the Works have been, or will be, designed by them, and so far as such materials or goods have been, or will be, selected by them.

In addition, the Lift Contractor shall comply with and satisfy any Performance Specification or requirement included in, or referred to in, their Tender as part of the Description of the Works.

Defects Liability Period

Will be for a period of 12 months commencing upon issue of the Taking Over Certificate. Refer to Section 9 of this Specification in relation to details of maintenance requirements.

Site Waste Management

The Lift Contractor shall, if and when required, produce a Site Waste Management Plan (SWMP) PRIOR to commencement of the Works.

The Lift Contractor shall adopt the Purchaser's SWMP and ensure compliance with the Environmental Protection Act 1990 (EPA) and the CDM Regulations 2015.

Quality and Tolerances

Guide Rails

Guide rails of the highest available standard and quality shall be installed such as to achieve the performance criteria laid down in Section 10.

The guide rails shall be plumb to +/- 3mm in verticality and – 0 / + 1mm in distance between guide rails.

The Lift Contractor is required to demonstrate accuracy of alignment as part of the Witness Test as detailed in Section 8 of this Specification.

Structural Tolerances

The existing lift shaft is constructed to front, side and rear walls in concrete blockwork. There are currently steel lintels that the existing landing entrances are utilising for fixings.

The Lift Contractor shall include for all necessary fixings, brackets and associated components, to install their equipment within these conditions.

The detail and dimensions of the lift shafts and pits are detailed in Section 6.

The Lift Contractor shall confirm their full acceptance of these, including any restrictions and tolerances, with their Tender. In the event of a failure to provide this requirement for confirmation it will be assumed that the Lift Contractor confirms compliance and therefore no future additional costs will be entertained in relation to any non-compliance.

Regulations and Quality of Work

The Lift Contractor should refer to the Tender Documentation and the relevant clauses within this Specification.

The completed installation shall comply, in all respects, with the provisions of the latest editions of the following British Standards, including Draft Standards as follows:

- | | | |
|----|---------------|--|
| a) | BS 476 | Fire tests on building materials |
| b) | BS 5499 | Fire safety signs |
| c) | BS 5655 | Lifts & Service Lifts Parts 1 – 14 inclusive, where relevant |
| d) | BS 7255 | Safe Working on Lifts |
| e) | BS 7671 | The IET Wiring Regulations |
| f) | BS 7980 | Vehicle Lifts – Installation, maintenance, thorough examination and safe use – Code of practice |
| g) | BS 8300-1 & 2 | Design of Buildings to meet the needs of the Disabled |
| h) | BS 8486 -9 | Examination and test of new lifts before putting into service. Specification for means of determining compliance with BS EN 81. Lift features for emergency recall conforming to BS EN 81-73 |

i)	BS 8486-1 & 2	Examination & Test of New Lifts before putting into service. Specification for means of determining compliance with BS EN81-1/2
j)	BS 8486-3	Examination and test of new lifts before putting into service - Specification for means of determining compliance with BS EN 81 - Part 3: Passenger and goods passenger lifts conforming to BS EN 81-20
k)	BS 8486-4	Examination and test of new lifts before putting into service - Specification for means of determining compliance with BS EN 81 - Part 4: Passenger and goods passenger lifts conforming to BS EN 81-21
l)	BS 8486-5	Examination and test of new lifts before putting into service - Specification for means of determining compliance with BS EN 81 - Part 5: Lift alarm systems conforming to BS EN 81-28
m)	BS 8486-6	Examination and test of new lifts before putting into service - Specification for means of determining compliance with BS EN 81 - Part 6: Lift features for accessibility conforming to BS EN 81-70
n)	BS 8486-7	Examination and test of new lifts before putting into service - Specification for means of determining compliance with BS EN 81 - Part 7: Lift features for vandal-resistance conforming to BS EN 81-71
o)	BS 8486-8	Examination and test of new lifts before putting into service. Specification for means of determining compliance with BS EN 81. Lift features for fire-fighting conforming to BS EN 81-72
p)	BS 8899	Code of Practice – Improvement of Firefighting & Evacuation Provisions in Existing Lifts
q)	BS 9999	Fire Safety in the Design and Use of Buildings
r)	BS EN 12015	Electromagnetic Compatibility - Product Family Standard for Lifts, Escalators & Moving Walks – Emission
s)	BS EN 12016	Electromagnetic Compatibility - Product Family Standard for Lifts, Escalators & Moving Walks – Immunity
t)	BS EN 12385-4&-5	Steel Wire Ropes
u)	BS EN 13015	Maintenance for Lifts & Escalators – Rules for Maintenance Instructions
v)	BS EN 1493	Vehicle Lifts
w)	BS EN 50525-1	Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V. General requirements

x)	BS EN 50525-2	Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V. Cables for general applications. (All Parts)
y)	BS EN 50525-3	Electric cables. Low voltage energy cables of rated voltages up to and including 450/750 V. Cables with special fire performance. Cables with halogen-free, and low emission of smoke. (All Parts)
z)	BS EN 60332-1&-2	Tests on Electric Cables under Fire Conditions
aa)	BS EN 61111	Live working — Electrical insulating matting
bb)	BS EN 81-1	Electric Lifts
cc)	BS EN 81-2	Hydraulic Lifts
dd)	BS EN 81-20	Lifts for the Transport of Persons & Goods – Part 20: Passenger and Goods Passenger Lifts
ee)	BS EN 81-21	New Passenger & Goods Passenger Lifts in Existing Buildings
ff)	BS EN 81-22	Electric Lifts with Incline Path
gg)	BS EN 81-28	Remote Alarm on Passenger & Goods Passenger Lifts
hh)	BS EN 81-3	Electric & Hydraulic Service Lifts
ii)	BS EN 81-31	Accessible Goods Only Lifts
jj)	BS EN 81-40	Stairlifts & Inclined Lifting Platforms Intended for Use by Persons with Impaired Mobility
kk)	BS EN 81-41	Vertical Lifting Platforms Intended for Use by Persons with Impaired Mobility
ll)	BS EN 81-50	Examinations & Tests – Part 50: Design Rules, Calculations, Examinations & Tests of Lift Components
mm)	BS EN 81-58	Examinations & Tests – Part 58: Landing Door Fire Resistance Test
nn)	BS EN 81-70	Accessibility to lifts for persons including persons with disability
oo)	BS EN 81-71	Vandal Resistant Lifts
pp)	BS EN 81-72	Firefighter's lifts
qq)	BS EN 81-73	Behaviour of Lifts in the Event of Fire
rr)	BS EN 81-77	Lifts Subject to Seismic Conditions
ss)	BS EN 81-80	Rules for the improvement of safety of existing passenger and goods lifts
tt)	BS EN 81-82	Improvement of Accessibility of Existing Lifts for Persons Including Persons with Disability
uu)	BS EN ISO 13857	Safety of Machinery – Safety Distances to Prevent Danger Zones Being Reached by the Upper & Lower Limbs

vv)	BS EN ISO 14120	General Requirements for the Design & Construction of Fixed & Moveable Guards
ww)	BS EN ISO 14798	Risk Assessment & Reduction Methodology
xx)	BS EN ISO 16032	Acoustics – Measurement of Sound Pressure Levels from Service Equipment in Buildings
yy)	BS EN ISO 25745	Energy Performance of Lifts, Escalators & Moving Walks (All Parts)
zz)	BS ISO 22201	Programmable Electronic Systems in Safety Related Applications (All Parts)
aaa)	BS ISO 4190	Lift (Elevator) Installation (All Parts)
bbb)	BS ISO 8100-1	Lifts for the Transport of Persons & Goods – Part 1: Passenger and Goods Passenger Lifts
ccc)	BS ISO 8100-2	Lifts for the Transport of Persons & Goods – Part 2: Design Rules, Calculations, Examinations & Tests of Lift Components
ddd)	BS ISO 8100-30	Lifts for the Transport of Persons & Goods- Part 30: Class I, II, III, and VI lifts installations
eee)	BS ISO 8100-34	Measurement of Lift Ride Quality
fff)	BS ISO 8102-1	Electrical requirements for lifts, escalators and moving walks -- Part 1: Electromagnetic compatibility with regard to emission
ggg)	BS ISO 8102-2	Electrical requirements for lifts, escalators and moving walks - Part 2: Electromagnetic compatibility with regard to immunity
hhh)	BS ISO 8102-6	Electrical requirements for lifts, escalators and moving walks - Part 6: Programmable electronic systems in safety-related applications for escalators and moving walks(PESSRAE)
iii)	BS ISO 8102-20	Electrical requirements for lifts, escalators and moving walks - Part 20: Cybersecurity
jjj)	DD 222	Specification for Rack & Pinion Lifts
kkk)	DD CEN/TS 81-76	Evacuation of Disabled Persons Using Lifts
lll)	DD CEN/TS 81-83	Existing Lifts. Rules for the Improvement of Resistance Against Vandalism
mmm)	EN 12600	Glass in Building – Pendulum Test – Impact Test Method & Classification for Flat Glass
nnn)	EN 131-2	Ladders – Requirements, Testing, Marking
ooo)	EN 14122-1-4	Permanent Means of Access to Machinery: Parts 1 to 4
ppp)	EN 1570-1	Lifting Tables Serving Up to Two Levels
qqq)	EN 1993-1-1	Eurocode 3 – Design of Steel Structures – Part 1-1: General Rules and Rules for Buildings
rrr)	EN 60068-2-14	Environmental Testing – Part 14: Tests – Test N. Change of Temperature



sss)	EN 60112	Method for the determination of the proof & the Comparative Tracking Indices of Solid Insulating Materials
ttt)	EN 60529	Degrees of Protection Provided by Enclosures (IP Code)
uuu)	EN 61800-5-2	Adjustable Speed Electrical Power Drive Systems – Part 2: Safety Requirements. Functional
vvv)	EN 61810-1	Electromechanical Elementary Relays – Part 1: General Requirements
www)	EN 14122-1-4	Permanent Means of Access to Machinery: Parts 1 to 4
xxx)	HD 60364-6	Low-voltage Electrical Installations – Part 6: Verification
yyy)	ISO 1219-1	Fluid Power Systems and Components – Graphic Symbols and Circuit Diagrams – Part 1: Graphic Symbols for Conventional Use & Data-processing Applications
zzz)	PD ISO/TS 18870	Requirements for Lifts Used to Assist in Building Evacuation

The Works shall comply with the following Acts, Regulations and Working Rules:

- Building Safety Act 2022
- The Construction (Lifting Operations) Regulations
- The Construction (General Conditions) Regulations
- The Construction (Health & Safety) Regulations
- The Construction (Work in Places) Regulations
- The Construction Products Regulations
- The Factories Act and all amendments thereto
- Health & Safety at Work Act
- The Electricity at Work Act
- The Fire Safety (England) Regulations 2022
- The Management of Health & Safety at Work Regulations 1999
- The Provision and Use of Work Equipment Regulations 1998
- The Workplace (Health, Safety & Welfare) Regulations 1992
- The Construction (Design & Management) Regulations 2015
- The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
- The Supply of Machinery (Safety) Regulations 2008 as amended.
- The Lifts Regulations 1997 as amended.
- The Lifts Regulations 2016 as amended.
- The Lifting Operations and Lifting Equipment Regulations 1998 as amended.
- The Building Regulations Part M2 and subsequent updates
- The Health & Safety (First Aid) Regulations 1981



- The Work at Height Regulations 2005
- The Control of Noise at Work Regulations 2005
- The Control of Asbestos Regulations 2012
- The Waste Electrical and Electronic Equipment Regulations 2013 as amended 2018.
- The Environmental Protection Act 1990
- The Environmental Protection (Duty of Care) Regulations 1991
- The Environment Act 1995
- The Equality Act 2010
- The Welsh Language (Wales) Measure 2011 & associated Standards

Site Inspection (MANDATORY)

The Lift Contractor shall be deemed to have satisfied themselves as to the local conditions with regards to accessibility of the site; as to the full extent and nature of the Works; as to the supply of and conditions affecting labour; as to provisions for messing, toilets, carriage, cartage, unloading, tools, accommodations, scaffolding, hoisting, craneage, ladders, and anything other which may influence their Tender or them carrying out the Works.

Failure for a tenderer to attend site and carry out a detailed survey at the bidding stage will deem the tender invalid and thus discarded from the procurement process.

Component Life

All major components, including but not limited to, contactors, relays, push units, indicators, call-accepted indicators, door operators, door interlocks, shaft switches and associated equipment, components and materials shall have been type tested to a minimum of 1 million operations.

The Lift Contractor shall state the expected life of solid-state components.



SECTION 2
SCHEDULE OF BUILDERS WORK

Builders and Associated Electrical Work Requirements

Schedule of Builders Work

The work described in this section is to be provided by the Lift Contractor or their Sub-contractor and is to be included within the Tender price.

Attendances

Attendances as set out in the Preliminaries including: -

- Storage and accommodation;
- Temporary lighting and power;

Scaffold as required for the Lift Contractor's preferred method of discharging the Works. All scaffolding used is to be designed and installed in compliance with the requirements of BS EN12811: 2003, CITB TG20:13, the CDM Regulations 2015 and the Health & Safety at Work Act, together with any other Guidance, Regulation or Statutory requirement which may apply to the site and/or Works.

The scaffolding installation may be altered, modified, moved and or revised only by authorised and approved scaffolding operatives, and shall be inspected, tested and tagged periodically through the duration Works.

Dismantling

The Lift Contractor is to allow for dismantling of all redundant lift and associated equipment and the expeditious removal of the same from site.

On completion of the dismantling element of the works, the Lift Contractor shall include for the preparation of, and any alteration to, the building fabric, which is required to accommodate the new lift equipment.

The redundant materials shall be disposed of by the Lift Contractor in a responsible manner, taking due regard of all relevant Regulations, and the Lift Contractor shall include for the payment of all relevant Taxes or charges associated with this within their Tender.

Steelwork

The Lift Contractor shall dismantle any redundant steelwork and supply and install all necessary new steelwork which is, or may be, required to accommodate the new lift equipment within the lift machine room and lift shaft.

Plinth

The Lift Contractor shall remove the plinth within the lift pit area and make good to the lift pit floor.

Fire Stopping

The Lift Contractor shall install suitable fire stopping, rated such as to provide a level of fire resistance equal to, or in excess of, the surrounding material.

Where required by the building's fire strategy or local authority requirements, the Lift Contractor shall utilise temporary firestopping where compartmentation is breached during the course of their works

The Lift Contractor shall install the fire stopping throughout the entire lift installation, including the lift machine room, pulley rooms, and lift shafts, such as may be required in order to meet LPC and Building Regulations Approved Document B requirements.

All fire stopping shall be certified to confirm compliance with the Building Regulations and each location shall be tagged with details of the installation contractor, fire rating, material used, and the date of installation.

Lifting Beam

Prior to commencement of the Works, the Lift Contractor shall supply and install within the lift machine room, lifting beams over the lift machines and the machinery access trapdoor. These shall be purpose designed such as to accommodate the weight of the lift car, counterweight or complete lift machine assembly.

The beams shall be designed in accordance with the requirements of the equipment to be lifted and those of BS EN1993-6. The installed beams shall be tested in accordance with the requirements of BS2853: 2011.

Prior to use the installed beams shall be tested and a label affixed indicating the safe working load in compliance with the requirements of PUWER, LOLER and the Health & Safety at Work Act 1974.

Lifting Beams (Testing)

The existing lifting beams shall be tested by the Lift Contractor and a label affixed displaying the safe working load in compliance with the requirements of PUWER, LOLER and the Health & Safety at Work Act 1974.

Lifting Beams (Temporary)

Temporary lifting beams for facilitating the handling of the new equipment onto site and removal of the old are to be provided by the Lift Contractor. The design and construction of these shall conform to all statutory requirements.

The Safe working load shall be displayed upon each beam and necessary test certification shall be available on site for inspection.

The beams shall be designed and constructed in accordance with the requirements of the equipment to be lifted and the relevant sections of BS EN1993.

Pit Ladder (fixed)

In cases in which the depth of the lift well pit does not exceed 2.5 m and/or in cases in which a separate pit access door is not provided, the Lift Contractor shall supply and install a fixed access ladder in the lift pit(s).

The access ladder shall be easily accessible from the landing entrance door and shall be permanently and securely fixed to the building fabric.

The design and construction of the access ladder shall be such as to withstand the weight of one person based upon a minimum force of 1500 N.

The access ladder shall be designed in accordance with the requirements of BS EN81-20 and BS EN131-2 and shall be constructed in steel with a suitable anti-corrosion finish.

The ladder shall be constructed from steel uprights, which provide for safe and easy hand grasping, and which extend vertically from the base of the pit floor to a minimum of 1.1 m above the landing sill of the pit access landing entrance. The uprights shall be of width not exceeding 35 mm and depth not exceeding 100 mm.

The ladder shall incorporate flat steel treads which shall be of minimum clear width 280 mm, with a flat tread of minimum 25 mm and maximum 35 mm in depth, and which shall be spaced equally at vertical intervals of not less than 250 mm and not exceeding 300 mm. The upward surface of each tread shall be non-slip by way of permanent surface finish.

The access ladder shall be designed and installed such that a minimum clear distance of 200 mm is attained between the rear of each tread and the wall of the pit or any other element of the building fabric or equipment.

Pit Ladder (Alternative Design)

Should it be impossible to safely accommodate a fixed ladder within the lift pit, the Lift Contractor shall provide a suitable alternative access ladder the design and construction of which shall be in accordance with the requirements of the designs designated Type 1, Type 2a, Type 2b, Type 3a, Type 3b or Type 4, set out at Annexe F of BS EN81-20, and to the approval of the Engineer.

The Lift Contractor shall state at Section 10 of this Specification in the Technical Details of the Tender Return which of the ladder Type Designs they have included for in their Tender.

The ladder shall be permanently housed and stored in the lift well pit such that this cannot be removed from the lift well and/or used for other purposes.

The distance between the edge of the landing entrance and the ladder in its stored position shall not exceed 800 mm.

The distance between the edge of the landing entrance and the centre of the ladder treads when the ladder is in the deployed position shall not exceed 600 mm.

When in the deployed position the first tread of the ladder shall be as close as possible to the level of the landing sill.

If, when in the deployed position, the ladder is within the travel path of the lift car, or whenever there is a risk that the ladder may come into contact with moving machinery, then the ladder, and/or its storage bracket/mounting, shall be equipped with an electrical safety device which prevents operation of the lift whilst the ladder is in the deployed position and when the ladder is not in the stored position.

In each design case the ladder, when in use, shall be such that this is secured to the landing sill and/or, the base of the pit and/or, the wall of the lift well, such as to ensure safe access and to prevent tipping-over of the ladder.

In the case of retractable and/or folding ladder designs these shall be such as to prevent the shearing or crushing of hands or feet during use and during deployment and during storage following use.

In the case of moveable and/or foldable access ladders these shall be designed and constructed such that the weight of this does not exceed 15 kg and such that handling and storage may be safely undertaken at the landing sill and lift well pit.

In the case that the ladder is stored upon the pit floor the ladder shall not, when in its stored position, encroach upon the pit refuge spaces.

Machine Room Decoration (Partial)

Following completion of the installation work all surfaces which have been exposed by the removal of old equipment, or which have become damaged during the Works, shall be made good and re-decorated by the Lift Contractor with décor to match the existing. Upon completion the whole of the lift machine room is to be left in a clean and well-decorated condition. This will include the necessary block work required to close up the existing lift shaft opening within the existing machine room.

Protective Screens on Landings (Full Hoardings)

The Lift Contractor shall provide sketch drawings of their proposed landing protective screens. The drawing shall detail the design, the materials to be used, the method of construction and the manner in which the protective screen is to be secured to the building fabric.

Prior to the commencement of works on site the Lift Contractor shall provide rigid protective screens at each lift landing entrance. The screens shall be securely capped at a minimum height of 2.5 m. Each screen shall enclose such working space as is available but shall not obstruct access and/or means of escape to routes, stairways and landings. Each screen shall incorporate a hinged and lockable access door to a clear height and width to suit the Lift Contractor's requirements.

The screens shall be constructed from smooth faced plywood or MDF board, with sufficient softwood bracing as to provide rigidity and security. Polythene sheeting which is covered with sheet(s) of hardboard over the entire area shall protect the floor area within the protective screen.

The Lift Contractor **must** include for meeting the additional requirements of the Building Control Officer, wherever applicable, as to the construction, and in particular the fire resistance, overall dimensions and exact positioning of protective screens, access doors and frames. Note: any protective screen on a fire escape route **must** be a minimum ½ hour fire rated including the doors and surround.

The access door/s shall be fitted with suited locks such that each door can be positively locked from the outside by way of a key and can be opened from the inside without the use of a key, even when locked from the outside. In addition, two shoot-bolts shall be fitted on the inside of each such door. All doors shall be fitted with self-closers in order to prevent these being inadvertently opened.

All fixings shall be such that these cannot be removed from the outside of the screen and shall not cause any damage to the decorative finishes. The Lift Contractor shall maintain the screens and doors in a safe condition throughout the duration of the Works and shall not remove these until directed to do so by the Engineer.

Within each hoarding a handrail, mid-rail and toe board shall be provided in order to protect any open void. These may be removed temporarily for working only when the lift car is safely positioned at that landing and on the basis that these are re-instated before the lift car is moved.

The screens shall be decorated to complement the surrounding décor, with a minimum of two coats of emulsion paint, in a colour to be agreed.

The Lift Contractor shall maintain the finish of the screens throughout the works and to the satisfaction of the Engineer and shall ensure that any dirty marks are removed from the landing side of the screen as and when these arise.

Danger notices warning of the nature of works and any exposed voids, complete with 'apology for inconvenience' signage, shall be prominently displayed on the screens.

Making Good

The Lift Contractor shall make good all damage to the fabric or finishes in the building and its surroundings, whether scheduled or inadvertent, which has been occasioned by the Works. These shall be reinstated in materials and or finishes which match the existing. In the event that matching material proves difficult to obtain, alternatives shall be offered for consideration prior to the making good being put in hand. Particular care is to be taken in relation to the decorative finishes to floors and walls around the lift landing entrances.

The extent of making good shall be defined for estimating purposes as the full front wall of the lift shaft from floor to ceiling up to 2 m from each architrave horizontally. This may be varied prior to commencement by mutual agreement between the Lift Contractor and Engineer.

Shaft Openings

The lift shaft wall into which entrances are installed shall be modified to suit the requirements of any new equipment and made good both internally and externally on completion.

In cases where an opening is created or altered in dimension or location the lift contractor shall provide a report from a Chartered Structural Engineer confirming the design and works relating to any alteration of the structure are such that the structural integrity of the opening and any shaft wall above complies with building regulations.

Lift Pit

If required, the existing lift pit shall be increased in depth to ensure that the minimum refuge spaces and clearances detailed in BS EN81-20 are achieved and that the new equipment can be accommodated. Any Voids within the shaft shall be suitably filled. The Lift Contractor shall include employing a Structural Engineer to provide a detailed design for these works and to check the design and construction on completion.

On completion the pit floor shall be sealed with two coats of a non-slip, oil proof paint.

The Lift Contractor shall also be responsible for obtaining all necessary Statutory Approvals from Local Authorities including Structural Engineering designs, Building Controls, and associated fees.

Should the Lift Contractor have any doubts in relation to the achievability of the pit works, then these **must** be raised with the Engineer at the time of Tender.

Shaft Painting

The Lift Contractor shall clean down the shaft and pit, remove all debris, grease and oil, and then treat the shaft walls and soffit with two coats of white emulsion paint.

The pit floor shall be cleaned, decreased and then sealed using two coats of an anti-slip, oil proof, and proprietary floor paint.

At the completion of the Works, any damage to these finishes shall be repaired to the satisfaction of the Engineer.

Landing Fixture Apertures

The Lift Contractor shall include for cutting new apertures to accommodate the new landing pushes/indicators in the front wall.

The pushes shall be fixed at a height in compliance with Part M2 of the Building Regulations and the provisions of BS EN81-70 and BS8300.

The lift landing indicators shall be as detailed elsewhere in this Specification.

The Lift Contractor shall include for making good the existing apertures in an equivalent matching finish to the existing, and to the satisfaction of the Engineer.

Decommissioning and Removal of Lifts

The Lift Contractor shall include for all decommissioning and removal of the existing lift equipment. Except as otherwise stated in this Specification materials of any kind obtained from dismantling shall become the property of the Lift Contractor. The Lift Contractor shall dispose of such materials in a responsible manner, taking due regard of all relevant Legislation, but in all cases, shall remove the materials from the premises promptly, and as soon as dismantled, and at all times expeditiously and cleanly. The Lift Contractor shall include for all taxes and/or other statutory fees associated with the disposal of the materials.

Prior to commencement of the Works the Lift Consultant shall identify any items of equipment which the Lift Contractor shall carefully remove and deliver to an agreed location within the premises for re-use by the Purchaser on other installations.

As part of the Works the Lift Contractor shall ensure that personnel have the appropriate skills and have received the correct safety induction and have available all of the necessary tools and plant, complete with required test certification, and all personal protective equipment necessary to undertake the work.

Wherever and whenever angle grinders and/or Oxy-propane cutting equipment, or other hot-works are used the Lift Contractor shall operate a suitable Hot Work Permit System and shall also, where applicable, comply with the requirements of the Purchaser's Permit System.

Where Oxy-propane equipment is to be used then the personnel involved shall have a minimum of two years' experience and training certificates shall be provided. A Fire Watchperson must also be present and shall continue to be present for a minimum period of one hour following completion of the process.

In terms of manual handling, all dismantled materials shall be broken down into adequately manageable sections, ready for disposal, and using mechanical methods wherever possible.

All equipment and redundant materials will be removed from the lift machine room and lift shaft areas via an agreed route approved by the Engineer.

The Lift Contractor shall apply safety measures in accordance with the requirements of BS 7255, BS 6187, HSE Guidance FOD 1-2013 and LEIA Guidance Demolition and Dismantling of Lifts PA54.

**Fire Stopping**

The Lift Contractor shall install suitable fire stopping, rated such as to provide a level of fire resistance equal to, or in excess of, the surrounding material.

Where required by the building's fire strategy or local authority requirements, the Lift Contractor shall utilise temporary firestopping where compartmentation is breached during the course of their works

The Lift Contractor shall install the fire stopping throughout the entire lift installation, including the lift machine room, and lift shaft, such as may be required in order to meet LPC and Building Regulations Approved Document B requirements.

All fire stopping shall be certified to confirm compliance with the Building Regulations and each location shall be tagged with details of the installing contractor, fire rating, material used, and the date of installation.

Site specific

- Ensure all holes in the shaft are filled to meet compliance with applicable building codes.
- Install fire-rated boarding to fully seal the top of the lift shaft in accordance with applicable fire safety standards.



SCHEDULE OF ELECTRICAL WORK

3 **Schedule of Electrical Work**

The works described below are to be provided by the Lift Contractor or their sub-contractor and are to be included in the Tender Price.

Except where specifically excluded all works are to be carried out and completed in full compliance with the current edition of BS7671 the IET Regulations and the Electricity at Work Act

Mains Switch and Wiring (Intake retained & new switch fuse)

All electrical wiring, conduit, trunking, cable tray and ladder systems are to be replaced throughout the installation. Should the Lift Contractor wish to retain any item they must seek prior agreement from the Engineer in writing.

The existing main distribution board and or isolator(s) shall be retained, and the circuit protection device(s) replaced, where required, with device(s) rated to the current for which the circuit is designed. It shall be verified that the existing supply cable is also suitably rated to the current for which the circuit is designed. In compliance with the earthing requirements of this Specification, an earthing conductor having a cross-sectional area complying with the current edition of the BS7671 IET Wiring Regulations shall be provided between the distribution board and or the isolator(s) and the lift control panels.

Where the existing main distribution board and or isolator(s) have no form of isolation and or circuit protection device(s) to current Standards and Regulations, then a suitable means of providing isolation and circuit protection shall be designed and installed by the Lift Contractor in compliance with BS7671 IET Wiring Regulations and BS EN 81-20.

Where the main isolation switch is not directly accessible from the control cabinet(s), the drive control system or the lift machine, device(s) according to EN 60204-1:2018, 5.5 shall be provided at these locations.

Existing Ellison oil circuit breakers shall be removed and replaced with new isolation and circuit protection designed and installed by the Lift Contractor in compliance with BS7671 IET Wiring Regulations and BS EN 81-20

Mains Supply Cable

The Lift Contractor shall test to satisfy themselves that the existing electrical main supply cable is adequately rated, including earth loop impedance and the required number of conductors and earth conductors, and in a satisfactory condition to be re-used to supply the new lift installation and shall provide a certificate from a suitably qualified Electrician registered with one of the following bodies: NICEIC, ECA.

If the Lift Contractor should find that existing cable is not adequate, they shall allow for providing a new cable and show the cost for this in the appropriate part of the Fixed Price Summary.

Any new cable and its installation shall meet the requirements of the current edition of BS7671 the IET Wiring Regulations.

Machinery Lighting

The Lift Contractor shall install new low energy LED light fittings within the lift machinery area such as to provide a minimum level of illumination of 200 lux at any point within the machinery area. This lighting may form part of the lift shaft lighting and shall be controlled by a switch (or switches) located adjacent

to the landing entrance access door(s) and/or machinery area access and shall be fitted at a convenient height.

The machinery area lighting shall provide the minimum levels of illumination in all areas of the machinery area such as meet the requirements of BS EN81-20 and the PUWER Regulations.

The light fittings closest to the lift controller and/or equipment located within the machinery area shall be utilised as an emergency light and shall derive its alternative power source from an auto-recharge unit fitted with nickel-cadmium cells. The unit shall have a minimum duration of 3 hours and a maximum recharge time of 12 hours and shall be in full compliance with the requirements of BS5266-1.

The light fittings shall be suitably guarded in accordance with the PUWER Regulations.

Lift Shaft Lighting (MRL Lifts)

The Lift Contractor shall provide permanent lift shaft lighting throughout the travel of the lift. All associated wiring shall be installed and routed in metal conduits which are separate from the lift electrical wiring. The light fittings shall be industrial type low energy LED bulkhead with polycarbonate diffusers to the approval of the Engineer.

Three-way switching shall be provided such that the shaft lighting can be controlled from the lift machine room/machinery spaces, lift car top and from the lift shaft pit. The shaft light switch in the lift pit shall be readily accessible from the landing and shall be located within 0.75 m of the inner edge of the landing entrance door frame and at a height not less than 1.0 m above the landing sill level.

Light fittings shall be mounted 500 mm from the pit floor and 500 mm from top of the lift shaft, and at an adequate pitch in-between, such as to ensure that the level of illumination specified in BS EN81-20 are achieved at all point within the lift shaft.

The light fittings at the top of the shaft and in the pit area shall each incorporate an emergency light facility, with an alternative power source derived from an auto-recharge unit fitted with nickel-cadmium cells. These units shall have a minimum duration of 3 hours and a maximum recharge time of 12 hours and shall be in full compliance with the requirements of BS COP BS5266-1.

Socket Outlets

The Lift Contract shall provide, within the lift machine room, machinery area/s, pulley room and lift pit, switched 13-amp three pin double socket outlets, each with integral RCD which shall be designed to operate at 30mA. The electrical supplies to these socket outlets shall be derived from the consumer unit located within the lift machine room/machinery area.

SCHEDULE OF ELECTRICAL WORK (SITE SPECIFIC)

In addition to the above-mentioned items, this document draws attention to the specific requirements known.

Fire Relay

The existing fire relay is to be utilised for fire connection into the new controller. The Lift contractor will extend the existing fire cable to its new location, carry out the connection and programming of the lift element.



SECTION 4
SCHEDULE OF EQUIPMENT

4 Schedule of Existing Equipment Erskine Court

Number & Type of Lift	Passenger Lift
Capacity	630Kg / 8 Persons
Speed	0.5m/s
Levels Served	G, 1, 2
No. of Stops	3
Car Entrances	1
Machine Position	Machine room left hand side, next to lift shaft, on Ground floor.
Drive Systems	Hydraulic
Duty Cycle	Low
Leveling Accuracy	+/- 10mm
Power Supply	415V. 4 wire supply
Control Systems	Simplex
Control Features	Down Collective
Signal & Operating Fixtures	N/A
Car Dimensions	1050mm wide x 1375mm depth x 2200mm
Car & Landing Entrances	800 x 2000 (2 PCO)
Architraves	Painted steel
Shaft Dimensions	1900mm depth x 1800mm width (approximated)
Minimum Clear Opening Width	800mm
Minimum Clear Opening Height	2000mm
Headroom	3995mm below beam (approximated)
Pit Depth	1420mm

Schedule for New Equipment Erskine Court

Item	Description
Type of lift	Traction MRL Passenger Lift
Capacity	8 persons, 630kg
Speed	1.0m/s
Levels served	0, 1, 2
Number of car doors	1
Number of stops	3
Machine position	MRL, within shaft, in headroom
Drive system	Gearless VVVF with permanent magnet motor
Suspension arrangement	2:1 underslung
Duty cycle	240 starts/hour
Levelling accuracy	+/- 3mm guaranteed under all conditions
Power supply	400 V, 3 phase, 50 Hz, +/- 10%
Control systems	Full collective
Control features	Car preference, Fire recall, BREEAM energy saving features, CCTV provision, Open protocol autodialler
Signal and operating fixtures	CPI, LPI, (all floors) Voice announcer, Braille
Car dimensions	Minimum 1400mm (W) x 1100mm (D) x 2100mm (H)
Car and landing entrances	Stainless steel, 900mm
Door arrangement	2PSO or 2SCO
Architraves	Full Architraves, Stainless Steel
Door tracks	Aluminium
Shaft Dimensions	1900mm depth x 1800mm width (approximated)
Headroom	3995mm below beam, (approximated)
Pit Depth	1420mm

Schedule of Finishes and Designated Materials

The successful Lift Contractor shall provide car design samples of all agreed finishes prior to manufacture or approval of the car design. The samples shall be provided on a presentation board produced from A4 size white card.

Each selected finish shall be fully described on the presentation board inclusive of British Standard or manufacturer's numbers and codes where applicable.

Materials applied for the car interior décor shall be designed and manufactured in accordance with the requirements of BS EN13501-1 as follows:

- Car Flooring – Cfl-s2
- Car walls – C-s2, d1
- Ceiling – C-s2, d0

Mirrors or glass materials shall be designed, constructed and installed such as to comply with the requirements of Mode B or C of BS EN12600, and Annex C should the material become broken.

Schedule of Finishes and Designated Materials

Floor Covering	Type	Heavy duty vinyl, non-slip flooring
	Supplier	Altro or equal quality (20-year commercial guarantee)
Stainless Steel	Grade	304
	Finish	Stainless steel
Mirror	Grade	BS EN 12600 Category B or C
	Type	Wall Mounted Mirror
		Type – Half Height, Full Width
		Colour - Clear
Secret Fixings	Type	Hidden Allen headed screws or equal to approval
Push Buttons	Type	BS EN 81-70 compliant, Type - US91 or OEM by approval of engineer (Tactile) /Braille
	Finish	Stainless steel
	Colour	White LED halo except exit floor

Key Switches	Type	Type - US91 or OEM by approval of engineer
Car Operating Panel	Number Type	Two BS EN 81-70 compliant, Full height, Flush mounted, Type - US91 or OEM by approval of engineer (Tactile) Braille
	Finish	Brushed Stainless Steel
Car Door	Material	Stainless steel
	Finish	Brushed
Landing Door	Material	Stainless steel
	Finish	Brushed
Car Enclosure	Material	Stainless steel
	Finish	Stainless steel
Car lighting	Type	Low Energy LED Downlighters
Skirting	Material Finish	Stainless Steel Brushed
Suspended Ceiling	Material	Painted Steel
	Finish	White
Car Handrail	Type Material Finish	BS EN 81-70 compliant, turned ends Stainless Steel (No visible fixings)

Car Interior

The Lift Contractor shall state the maximum weight of finishes allowed for in Section 10.

Car Capacity Details	The details of capacity expressed in metric terms in compliance with BS EN81-20 and BS 5655 requirements shall be engraved in the car station panel and filled with an epoxy resin, colour to approval.
Operating Panel	Finish – Stainless Steel
Front Wall Stainless steel	Stainless steel

Side Walls Stainless steel	Stainless steel
Rear Walls Stainless steel	Stainless steel
Handrail	Finish – Stainless Steel
Ventilation	<p>Ventilation apertures shall be provided at the upper and lower levels. These shall be designed such as to prevent the passing of a rigid rod of 10 mm in diameter from the car interior and shall be protected on the exterior of the car by the provision of deflectors to prevent foreign objects being passed through. The effective area of ventilation apertures shall be not less than 1% of the available car area at each of the upper and lower apertures. Clearance around the lift car doors may be utilized to provide up to 50% of the required effective area.</p> <p>Forced ventilation is to be provided from an exhaust fan mounted on the car roof and it shall be fitted with covers to afford protection against accidental damage by personnel, both internally and externally. The type and design shall be submitted for approval. It shall be designed to provide a minimum of five air changes per hour and is to be controlled by a key switch in the car station suitably engraved to depict its use. With the key switch in the off position, the fan will be connected into the emergency alarm circuit and operation of the alarm will cause the fan to come into operation. A variable timer is to be provided with an operating range of zero to 45 minutes and after operation of the alarm, the fan will continue to operate for the duration of the timer setting.</p>
Ceiling	
Suspended Ceiling	
Lighting	The design of the lighting shall be such as to provide a minimum lighting intensity of 100 lux on the control devices and at any point 1 m above the floor and not less than 100 mm from any wall.
Emergency Lighting	The light fitting nearest the car operating panel shall act as an emergency light in the event of failure of the normal lighting supply and shall include an alternative supply from an auto recharge unit fitted with maintenance free nickel cadmium batteries. The light shall provide a minimum lighting intensity of 5 lux for 1-hour measured at a point 1 m above the floor in the center of the lift car. The minimum duration for the light shall be 3 hours with a maximum re-charge time of 12 hours.
Skirting	
Floor covering	The flooring material shall be of matt finish incorporating a non-slip surface and fire characteristics in accordance with BS EN81-20

Final car details must be submitted for approval

Car Interior (Equality Act 2010 Additions)

The lift car interior shall comply fully with the requirements of BS 8300 and BS EN 81-70 including but not limited to:

- All wall finishes should be non-reflective and contrast with the floor covering.
- If the space within the lift car is inadequate to allow a wheelchair to be turned around, (i.e. less than 1500 mm x 1500 mm), a safety mirror shall be fitted on the rear wall of the lift car in order to aid wheelchair maneuvering.
- Mirrors shall incorporate measures to avoid creating confusion for lift users with impaired vision, including a minimum vertical distance of 300 mm between the floor of the lift car and mirror.
- Each lift car shall have a handrail on at least the side wall where the car operating panel is located. The rail shall have a cross-sectional dimension of between 30 mm and 45 mm, with a minimum radius of 10 mm for gripping and a minimum projection of 35 mm clear. The top edge of the gripping part of the handrail shall be positioned 900 mm above the lift car floor \pm 25mm, projecting ends shall be closed and where there is the risk of collision with the projecting ends, they shall be turned inwards in order to reduce risk of injury.
- The design of the lighting shall be such as to provide a minimum lighting intensity of 100 lux on the control devices and at any point 1 m above the floor and not less than 100 mm from any wall. Spotlights should be avoided.
- The light fitting nearest the car operating panel shall act as an emergency light in the event of failure of the normal lighting supply and shall include an alternative supply from an auto recharge unit fitted with maintenance free nickel cadmium batteries. The light shall provide a minimum lighting intensity of 5 lux for 1-hour measured at a point 1 m above the floor in the center of the lift car. The minimum duration for the light shall be 3 hours with a maximum re-charge time of 12 hours.
- Lift car interior operating panel shall be located to ensure the minimum lateral distance between the centreline of any button to the corner of any adjacent walls is 400 mm. The alarm and door open push buttons, which shall be the lowest of the push buttons in the lift car, shall be positioned at a height not less than 850 mm above the car floor. The operating pushes shall be positioned at a height of between 850 mm and 1200 mm above the lift car floor.
- Single operating panels to be located on the right-hand side wall, for centre opening doors and on slam side for side opening doors. Where the car width exceeds 1600mm two car operating panels shall be provided.
- The pushes shall be tonal contrast to the panel and the panel to the surrounding wall. An **LED** call registered illuminated signal shall be incorporated within the halo symbol of each push and each push button shall incorporate an audible signal to confirm operation. The Exit floor push shall protrude 5mm beyond the other floors and be coloured green, with green illumination. The Alarm button system shall be provided with an additional yellow illuminated pictogram to indicate the alarm has been given, and a green illuminated pictogram to indicate that the alarm has been registered. The key operated independent service switch shall, when switched to 'Independent Service', isolate the lift car from all landing calls. The lift car shall respond to only to car interior calls, and on a single call basis only, and shall park with the doors open. The key operated car interior light switch shall be suitably shrouded and incorporate a test position for the lift car emergency lighting.
- Operating panels shall be a tonal contrast from surrounding wall.



- An alphanumeric digital lift car position indicator, or alternatively a scrolling message type position indicator, shall be provided within each lift car operating panel at a height between 1600 mm and 1800 mm above the lift car floor. The visible part of the floor numbers shall be between 30 mm and 60 mm.
- Materials causing allergies shall not be used in the lift car or landing fittings. In general, these are detailed in BS EN 81-70 but are not exhaustive.
- Car ventilation shall be designed so that it is able to be easily cleaned on a regular basis.



SECTION 5

TECHNICAL SPECIFICATIONS

6 INFORMATION FOR APPROVAL, NOTICES AND TECHNICAL SPECIFICATION

Information for Approval and Notices

The Lift Contractor must take all necessary dimensions on site during the progress of the works.

Before commencing work, **three** copies of the following working drawings shall be submitted for approval of the Engineer.

Item	Description
a)	General arrangement and builders work detail, shaft and machine room.
b)	Car enclosure, car doors, landing entrance complete with frame fixing details (where applicable).
c)	Landing architrave and threshold details including the 25 mm ramp for Firefighters' lift(s).
d)	Landing door frame firestopping details.
e)	Car design, Perspective and Manufacturing Drawings.
f)	Sketch drawing of proposals for landing protective hoardings.
g)	Car operating panel engraving details.
h)	Landing push and indicator details.

After approval **three** copies of each shall be submitted for use during the duration of the Contract. Electronic copies shall also be provided in Auto Cad 2000 format or equal as advised.

The Lift Contractor shall submit, no later than the date of submission of the initial General Arrangement Drawings, a schedule of the electric power and lighting requirements for the lift installations.

The information shall be complete in all respects and will include confirmation of the kW ratings, full load and starting currents, fuse ratings, permitted volt drop and a line diagram of the switch gear arrangement in the machine room, for the 3-phase and single-phase supplies.

Any additional requirements for ancillary equipment, such as communications or diagnostics, shall be fully detailed with all information on cabling and terminations.

On completion of the work, the Lift Contractor shall provide and fix in the machine room a suitably mounted "straight line" and "as wired" set of wiring diagrams of all electrical apparatus of the lift as actually wired and fitted and showing the arrangement and markings of all connections. These diagrams shall be plastic encapsulated or equivalent finish to approval.

Similarly, nomenclature detailing all symbols and forms of identification used on the equipment drawings or circuit diagrams applicable to the equipment, encapsulated in plastic or equivalent to approval, shall be mounted alongside the circuit diagrams.

Full information in respect of the heat output and operating temperature range of the equipment is to be provided.

Notices

All danger, warning or advisory notices as may be required by LOLER or PUWER, and by BS EN 81-20, BS EN81-50, BS EN81-72, BS5655 and BS7255, which are applicable to this Contract, shall be

provided and installed by the Lift Contractor. These shall comply in all respects with the requirements of British Standards and shall be relief engraved on plastic laminate or equivalent material with 12 mm minimum height lettering.

All notices shall be screw fixed. Self-adhesive notices will not be accepted.

Hand Winding Notice (Machine Room less)

The Lift Contractor shall provide and install diagrammatic and written hand-winding instructions which shall be mounted in an appropriate and prominent position where these may easily be read when carrying out emergency hand-winding operations.

The instructions shall be specific to the site and to the lift equipment and machinery installed.

The notice shall be a minimum of 500 mm wide x 500 mm high and shall be in English and clear and legible.

The design of the notices shall comply in all respects with the requirements of BS EN81-20, BS EN81-50, BS5655, BS7255 and LOLER and PUWER.

Car Top and Pit Access and Egress

The Lift Contractor shall provide onsite full site-specific details of the process and method of access and egress for the car top and pit.

Details shall be fixed inside the control panel or Emergency and Test Panel.

In addition, details of the site-specific pit egress and pit inspection reset procedure shall be securely fixed adjacent to the pit inspection station.

Notices (Restricted Travel)

The Lift Contractor shall provide, in the lift well pit, and adjacent to the pit stop switch and/or facing the lowest floor pit access entrance, notices warning maintenance personnel of the restricted pit depth.

The final wording shall be to the approval of the Engineer.

The Lift Contractor shall provide, on the lift car top, in the lift machine room and/or machinery area, and on the wall of the lift shaft directly facing the top floor entrance, a notice to warn maintenance personnel of the restricted headroom.

The final wording shall be to the approval of the Engineer.

Notices (Electrical)

The Lift Contractor shall supply and install, adjacent to the lift main switch fuse, an Electric Shock Notice, which is in accordance with the Electricity at Work Act,

The Lift Contractor shall supply and install a notice upon the electrical consumer unit which identifies the all of the circuits and their particular fuse ratings.

The Lift Contractor shall supply and install, to all electrical switches within the lift machine room and/or machinery areas, a permanently fixed label identifying their function.

Machine Area (Machine Room less)

Lift Machine

The gearless machine shall comprise a traction sheave directly coupled to an electric motor and incorporating an electro-mechanical brake. Transmission of vibration to the fabric of the building shall be prevented by the use of proprietary anti-vibration mountings. The Lift Contractor is to ensure that their offer includes for all necessary steelwork to accommodate the lift machine. The lift machine shall be configured such as provide safe access for maintenance and adjustment processes. The whole assembly is to be designed and tested to sustain contract load plus 25% over-load and shall be designed constructed and installed in accordance with the requirements of BS EN 81-20.

The hoisting motor shall be either a permanent magnet synchronous motor or an induction motor which is designed specifically for use with inverters and rated for the duty set out in this Specification. The synchronous speed of the motor shall not exceed 1500 rpm. The design and construction of the motor shall be in accordance with the requirements of the BS EN 60034 Standards.

Suitably designed motor protection shall be provided and shall be by way of thermistors which are embedded in the motor windings. Minimum of three separate thermistors shall be used.

The design shall be such as to incorporate an electronic sensor in the control system which shall be configured to monitor the motor speed control encoder/device such that the electronic sensor shall detect any error and/or fault condition which may arise and operate to isolate the motor electrical supply in the event of a fault condition arising.

The motor shall bear a nameplate which clearly sets out the manufacturer's details together with the motor design information and serial number.

All moving parts of the lift machine shall be suitably guarded in accordance with the requirements of this Specification and those of BS EN ISO 14120 and BS EN 81-20. All prime movers shall be painted in safety yellow.

The lift machine shall incorporate a means of manual operation the design and application of which shall be such that the manual effort required to move the lift car under any load condition between 0% and 110% shall not exceed 150 N.

The lift machine brake shall be of spring applied, electrically released design and shall be of heavy-duty construction complete with the necessary brake shoe/pad to brake drum/disk contact surface area to suit the load and speed of the lift. The design of the brake shall be such that this shall incorporate no less than two separate brake shoes/pads which are configured such as to be self-aligning. Each brake shoe/pad shall incorporate its own specific actuation device and guided compression spring and housing. The lift machine brake shall, in all respects, be designed, constructed, and tested in accordance with the requirements of BS EN 81-20 and BS EN 81-50

The machine brake, unassisted by any other equipment of the lift, shall be such that it shall safely stop the lift machine when the lift car loaded with 125% of rated load, is travelling downwards at rated speed, such that the average retardation of the lift car shall not exceed that arising during safety gear and/or buffer operation.

The design of the lift machine brake shall incorporate redundancy such that all of the mechanical components of the brake, including any solenoid plunger, which are involved in the application of the braking action on the brake drum shall be provided in two separate sets. Each of the two sets of braking

components shall be designed and constructed such as to apply a braking effort which is sufficient to decelerate, stop and hold the lift car, loaded at rated load and travelling downwards at rated speed; and when travelling upwards with the lift car empty.

The brake drum/disk shall be coupled by direct and positive mechanical means to the lift machine traction sheave, winding-drum or sprocket.

In cases in which the lift machine is installed within the lift well it shall be possible to test each of the braking sets from outside of the lift well.

Traction and Diverter Sheave

All lift machine traction sheaves and rope diverter pulleys shall be painted yellow, and suitably designed rope restraints shall be installed such as to prevent the suspension ropes from leaving the sheave/pulley grooves.

The lift machine traction sheave shall have sufficient diameter to ensure that the ratio between traction sheave and suspension rope diameter is not be less than 40:1.

The roping system shall be 2:1 underslung

Roping Arrangement

Each lift shall be designed such that the lift car is configured in an underslung arrangement and applying a 2:1 suspension roping arrangement. Lifts cars configured in an overslung arrangement may also be considered, to suit the manufacturer's standard arrangement, but subject to the approval of the Engineer.

Overhead rope diverter sheaves shall be located outside of the footprint area of the lift car in order to ensure safe operation, safe access for maintenance and to minimise headroom requirements.

The rope diverter sheaves which are located below the lift car platform shall be configured in a manner such as to minimise the effects of offset forces from the ropes and to allow the lift car to be satisfactorily statically balanced at all points in the lift travel. All diverter sheaves shall have a minimum sheave to rope diameter ratio of 40:1.

The Lift Contractor shall supply and fix all necessary steelwork to support the diverter sheaves and suspension rope hitches for each lift.

The location for the governor shall be in the lift shaft. The Lift Contractor shall provide a means to remotely trip and reset the governor from outside of the lift shaft.

Machinery Guarding – General Requirements

The design and construction of machinery guards shall meet with all of the requirements of The Supply of Machinery (Safety) Regulations as amended, and with the requirements of PUWER, BS EN81-20 and BS EN81-50, the Lifts Regulations 2016 as amended, and shall be fully compliant with the requirements of BS EN ISO14120: 2015 Safety of Machinery - Guards - General Requirements for the Design and Construction of Fixed and Moveable Guards.

All guarding shall be designed and constructed to offer adequate, clear and satisfactory viewing of the components guarded in order to meet maintenance, lubrication and inspection requirements. Wherever possible this shall be achieved without requiring the complete removal of the guard.

Machinery guards shall be designed to be of suitable size and weight to permit ease of handling and shall be designed such that these may only be removed with the aid of a tool. The guards shall be

designed in order that they do not cause hazardous crushing or trapping points with reference to parts of the machinery being guarded or other guards. Wherever practicable, guards shall be designed such that these are unable to remain in place without their fixings.

The guards shall be so constructed as not to have exposed sharp edges, corners or other hazardous projections. Welded, bonded or mechanically fastened joints shall be of sufficient strength, number and spacing to ensure the stability and rigidity of the guard so that it remains secure under all foreseeable loading conditions. In particular guards shall be designed to withstand reasonably foreseeable impact from parts of the machinery and any ejected solid or fluid materials. All fastenings shall be fitted with lock nuts, spring washers or other features to ensure these are resistant to machinery vibration and remain attached to the guard/machine.

Guards shall be formed from materials that allow the protective properties of the guard to be maintained throughout the foreseeable life of the machinery. Supports, frames and all infill materials shall be selected from a range to provide a rigid and stable structure and to resist deformation. The materials selected for the construction of the guard are to be resistant to foreseeable oxidation and corrosion and other environmental factors. This may be achieved through the application of suitable protective coatings.

Guarding - Sheaves

The traction and divertor sheaves (and over-head and lift shaft pulleys) shall be guarded by suitably designed perforate, removable guards which shall be designed and constructed in full compliance with all of the requirements of The Supply of Machinery (Safety) Regulations 2008 as amended, and with the requirements of PUWER, BS EN81-20 and BS EN81-50, the Lifts Regulations 2016 as amended, and shall be fully compliant with the requirements of BS EN ISO14120: 2015 Safety of Machinery - Guards - General Requirements for the Design and Construction of Fixed and Moveable Guards.

All guarding shall be designed and constructed such as to offer adequate, clear and satisfactory viewing of the components guarded in order to meet maintenance, lubrication and inspection requirements. Wherever possible this shall be achieved without requiring the complete removal of the guard.

All guards must be securely held in place by fixing/securing systems which may be opened/released only by the application of suitable tools. These fixing/securing systems shall remain attached to the guard when the guard is removed. Suitable tools shall be supplied and installed on the tool-board to ensure easy access for maintenance.

Brake

The lift machine brake shall be of spring applied, electrically released design and shall be of heavy-duty construction complete with the necessary brake shoe/pad to brake drum/disk contact surface area to suit the load and speed of the lift. The design of the brake shall be such that this shall incorporate no less than two separate brake shoes/pads which are configured such as to be self-aligning. Each brake shoe/pad shall incorporate its own specific actuation device and guided compression spring and housing. The lift machine brake shall, in all respects, be designed and constructed in accordance with the requirements of BS EN81-20 and BS EN81-50.

The machine brake, unassisted by any other equipment of the lift, shall be designed such that this shall safely stop the lift machine when the lift car loaded with 125% of rated load, is travelling downwards at rated speed, such that the average retardation of the lift car shall not exceed that arising during safety gear and/or buffer operation.

The design of the lift machine brake shall incorporate redundancy such that all of the mechanical components of the brake, including any solenoid plunger, which are involved in the application of the

braking action on the brake drum shall be provided in two separate sets. Each of the two sets of braking components shall be designed and constructed such as to apply a braking effort which is sufficient to decelerate, stop and hold the lift car, loaded at rated load and travelling downwards at rated speed; and when travelling upwards with the lift car empty.

The brake drum/disk shall be coupled by direct and positive mechanical means to the lift machine traction sheave, winding-drum or sprocket.

The lift machine brake solenoid shall be designed for a DC electrical supply sourced from suitably rated rectifiers in the lift control system. The supply shall be controlled by at least two electromechanical devices which shall be designed and applied in accordance with the requirements of BS EN81-20. These electromechanical devices shall be designed and configured such that if, whilst the lift is stationary, one of these has failed to open the electrical circuit to the machine brake solenoid, then further movement of the lift car shall be prevented. The effect of any stuck-at-failure monitoring of this system shall be such as to prevent further movement of the lift car.

Alternatively, the lift machine brake shall incorporate an electrical monitoring circuit which is designed and configured in accordance with the requirements of BS EN81-20. In case in which this method is applied the Lift Contractor shall provide a Certificate of Type Examination which is in accordance with the requirements of BS EN81-50.

The design shall be such that electrical current shall not be applied to the lift machine brake solenoid unless the lift drive motor has been powered. The brake shall be designed to apply instantly and automatically in the event of interruption of the power supply to the solenoid.

The lift machine brake shall be designed such as to incorporate a means whereby the brake may be released manually, by way of continuous manually applied pressure, in order to enable hand winding of the lift machine. The design and construction of the means of manual release shall be such that this cannot cause a failure of the braking function.

In cases in which the lift machine is installed within the lift well it shall be possible to test each of the braking sets from outside of the lift well.

Stop Switches (Machine Room)

The Lift Contractor shall supply and install a stopping device which is in accordance with the requirements of BS EN81-20.

The design and construction of the stopping device shall be in accordance with the requirements of BS EN60947-1-1.

The Lift Contractor shall supply and install, on or near to the stopping device, a suitable sign marked 'STOP'.

The stopping device shall be installed adjacent to the lift machine in a position and at a height where this is readily accessible to personnel in an emergency situation.

Emergency Electrical Operation

In cases in which the design of the lift machinery is such that the manual effort required to move the fully loaded lift car upwards is in excess of 400 N, and/or if no mechanical means of emergency operation in accordance with BS EN81-20 is provided, the Lift Contractor shall supply and install a means of emergency electrical operation which is designed, constructed and installed in accordance with the requirements of BS EN81-20.

The emergency electrical operation shall be supplied from the main electrical supply and, where building requirements are such, from any stand-by or secondary electrical supply.

The means of emergency operation shall incorporate an emergency electrical operation switch, designed and constructed in accordance with the requirements of BS EN81-20, which when operated shall enable the control of lift car movement through constant pressure buttons which are design such that these are protected against accidental operation. The emergency electrical operation control shall be designed and constructed to incorporate a minimum level of protection of IPXXD in accordance with BS EN60529.

The lift car speed shall not exceed 0.3 m/sec. The lift machine shall be observed directly from the point at which the emergency operation controls are positioned or shall be observable by way of a display device which is designed and constructed in accordance with the requirements of BS EN81-20.

The operation of the emergency electrical operation switch shall be such as to prevent all movement of the lift car except for that controlled by the switch.

The functionality of the emergency operation system shall be dependent upon all inspection control devices being set to 'Normal' operation. Activation of the emergency electrical control switch whilst any inspection control device is set to 'Inspection' control shall NOT override the inspection control which will remain fully operative until such time as this is reset to 'Normal' control.

The functionality of the emergency operation shall be immediately overridden by the switching of any inspection control device to 'Inspection' control, and the inspection control device shall remain fully operative.

Whilst switched to emergency electrical operation the following devices shall be rendered inoperative:

- Slack rope or slack chain device;
- Lift car mounted safety gear operated switch;
- Governor overspeed detection switch;
- Ascending car protection switch;
- Buffer return switch;
- Final limit switch.

Manual Rescue

The Lift Contractor shall provide a suitable means by which the lift car may be safely moved in a controlled manner, from a suitable and safe position which is external to the lift shaft.

The means provided shall be designed and constructed in accordance with the requirements of BS EN81-20.

If the means is in any way reliant upon the lift car and counterweight being out of balance in order to achieve movement of the lift car then the lift contractor shall install a suitable means of ensuring that the lift car may be safely moved under an out of balance condition.

The design and application of the means shall be such that the manual effort required to move the lift car shall not exceed 150 N.

The direction of the lift car movement shall be indicated during manual rescue operations.

In all cases the means of manual operation and/or rescue shall function such as to provide for manual movement of the lift car through the full operational load range of the lift car from 0% to 110% lift carload.

Automatic Rescue Device ARD (Electrical Emergency Operation) Optional cost

The Lift Contractor shall provide an optional cost for the installation of a suitable battery-operated automatic rescue system, which is designed and constructed in accordance with the requirements of BS EN81-20.

In the event of mains power failure, and after a short delay, the system shall recover the lift at slow speed to the nearest suitable floor and open the doors. The lift will remain out of service until mains power is restored, at which point the lift will recover and return to normal service.

The system shall incorporate a separate battery power supply and automatic charging system, and shall be design and constructed such as to be capable of moving the fully loaded lift car, in either direction of travel, at a speed not exceeding 0.3 m/sec, to a landing such that passenger release may be safely effected.

The system shall incorporate a self-checking 'fail safe' facility in order to ensure full functionality and battery condition at all times. In the event of malfunction or failure a signal shall be initiated in the lift controller fault logging system (or BMS system if fitted) and the lift car shall home automatically to the nearest floor and park with its doors open.

In all cases the means of operation and/or rescue shall function such as to provide for movement of the lift car through the full operational load range of the lift car from 0% to 110% lift carload.

Floor Level Indication During Hand-Winding

In order to assist emergency hand-winding/lowering operations, the Lift Contractor shall supply and install a unit which incorporates an activation switch, a digital lift car position indicator and an audible electronic sounder. The unit shall be installed adjacent to the lift machinery hand lowering device. When the activation switch is placed in the "ON" position and the lift car is position which is within the unlocking zone of any landing, the digital indicator will read the floor of the particular landing, and the audible sounder shall activate. The unit shall have a separate electrical supply which is configured to supply a self-contained low voltage, auto re-charge battery pack with rechargeable nickel cadmium batteries.

The hand-winding activation switch is to be of the changeover type, with the normally open contacts configured to operate the audible sounder and the normally closed contacts configured to open the lift safety circuit preventing operation of the lift whilst the activation switch is in the 'ON' position.

Hand Winding Position Indicator

In order to assist emergency hand-winding/lowering operations, an emergency hand-winning position indicator shall be provided. This shall indicate the position of the lift car during the hand winding process and shall incorporate a separate indicator and buzzer to indicate when the lift car is positioned level with a lift landing and/or within the landing unlocking zone. The device shall have a separate electrical supply which is configured to feed a self-contained low voltage, auto re-charge battery pack with rechargeable nickel cadmium batteries.

Over-speed Governor

A robustly designed and constructed overspeed governor complete with governor rope and tension pulley frame shall be provided. The design and construction shall be such that the overspeed governor rope and its terminations shall remain intact during engagement of the safety gear.

The design of the overspeed governor shall be such that the tensile force produced in the governor rope when the governor is tripped shall be at least twice the force necessary to operate the safety gear and in no case less than 300 N.

The design and construction of the overspeed governor shall be such that the maximum distance between tripping shall not exceed 250 mm relative to the movement of the governor rope.

The design, construction and installation of the overspeed governor, together with its associated components, shall be in accordance with the requirements of BS EN81-20.

The overspeed governor shall be subject to Type Examination in accordance with the requirements of BS EN81-50, the Lifts Regulations 2016 as amended, and a Type Examination Certificate which is in accordance with the requirements of BS EN81-50 shall be provided and a copy retained in the lift O&M Manual.

The overspeed governor shall be designed such as to meet the requirements of the particular lift speed and safety gear design, and in accordance with the respective electrical and mechanical tripping speeds specified in BS EN81-20. The governor rope shall be easily detachable from the safety gear such as to ease testing and maintenance.

The pitch diameter of the overspeed governor and of its tension and diverter pulleys shall be no less than 30:1 in relation to the diameter of the governor rope.

The governor rope shall be tensioned by way of a pulley and tension weight which shall be securely guided. Breakage or excessive stretch of the governor rope shall be detected by an electrical device which is designed and constructed in accordance with the requirements of BS EN81-20.

The governor rope shall be designed and constructed in accordance with the requirements of BS EN12385-5 and with a minimum safety factor equivalent to eight times the tensile force generated in the governor rope and based upon a friction factor of 0.2 for traction governors.

The overspeed governor shall be located such that this is readily accessible and reachable for maintenance and testing purposes from outside of the lift well. This requirement may, with the agreement of the Engineer, be dis-applied providing that all of the following provisions are met:

- The design shall be such that the governor may be remotely tripped from outside the well, and;
- That the governor is readily accessible from the lift car roof or pit, and;
- The mechanical reset of the governor is automatic upon raising of the lift car, and the governor electrical devices may be reset by remote means.

A means shall be provided for testing purposes to allow the governor to trip when the car is travelling at normal speed.

The direction of rotation corresponding to the operation of the safety gear shall be permanently and indelible marked upon the governor.

Governors which incorporate adjustable speeds shall be sealed such that adjustment causes the seal to be broken.

Governor and pulley guards shall be provided and shall be designed in accordance with the requirements of BS EN81-20, BS EN ISO14120 and the requirements of this Specification, and such as to allow the governor trip mechanism and switches to be reset without the need for removal of the guard. The data plate details shall be **repeated** on the top of the guard.

Control Panels (Machine Room less)

The control equipment shall be totally enclosed in a steel cabinet with louvered ventilation and hinged doors exposing all components for accessibility, and design and constructed in accordance with the requirements of BS EN 81-20. Forced ventilation fans complete with suitable filters shall be applied wherever necessary in order to ensure the correct operating environment for the control components.

The control and drive system, together with its various elements of equipment and enclosures, shall be designed and constructed in accordance with the requirements of BS EN81-20, BS EN50274, BS EN60204-1, BS EN60529, BS EN60664-1, BS EN60947-4-1, BS EN60947-5-1, BS 60800-5-2, BS EN61810-1, HD60364-4-41, HD60364-4-42 and HD60364-6.

All main components including circuit boards, transformers, power supplies, relays, contactors, fuses, overloads and associated equipment shall be suitably identified, by way of permanent indelible labeling, and a nomenclature compatible with the circuit diagrams shall be provided.

The hoist/pump motor windings shall be protected by way of suitable thermistors which shall be electrically connected to detection units which are designed to provide a level of protection commensurate with the motor manufacturer's recommendations.

All solid state/thermistor/micro-processor-based control circuits shall be fed from electrical power supplies providing the correct voltage, and with all necessary over and under voltage and current protection devices, such as to ensure their correct and safe operation. Circuits shall be designed in accordance with current British Standard requirements such that in case of failure this is to a safe condition.

A device shall be incorporated within each controller which will detect a loss of one phase of main electrical supply or a reversal of the phases. Where the device detects either of these conditions a switch, relay or contactor shall be rendered open circuit removing the supply to all relevant contactors and control panel circuitry and preventing movement of the lift.

Lift speed regulation over the range between no load and full load shall be within 5% of the contract speed.

The entire lift installation shall run normally when the supply voltage varies to a limit of +10% and -6% of the declared supply voltage.

The electrical supply to the drive motor shall be controlled by at least two independent contractors. If, when the lift is stationary, the main contacts of one of the contactors should fail to open any further movement of the lift shall be prevented. Alternatively, a stuck-at-failure monitoring system shall achieve the same result. Alternative systems of protection, which shall be designed and constructed in accordance with the requirements of BS EN81-20 may be proposed of the approval of the Engineer.

The controller shall prevent the lift machine starting unless the car door is in the closed position and all landing doors are in the closed and locked position.

A means of lift position indication based upon a digital display shall be provided within the control panel.

Permanent provision shall be made for inserting lift car and landing calls within the cabinet and this shall remain accessible and functional at all times, and for isolating landing calls, remote commands and to disable automatic door operation.

An inspection control station which is designed and constructed in accordance with the requirements of BS EN81-20 shall be incorporated in each of the control panels. The lift shall remain in inspection mode until all inspection control stations are set to the normal operation condition.

A landing and car door bypass device shall be provided in the lift controller. The device shall be designed and constructed in accordance with the requirements of BS EN81-20. The device shall be protected against unintended use and protected mechanically by means of a permanently installed robust and secure guard or by way of a plug socket combination. The device shall be marked 'Bypass' and that activation status of the device shall be clearly marked. When operated the Bypass Device shall: normal operation including that of automatic doors shall be prevented; the bypassing of the lift landing door contacts and locks and the lift car door contacts and locks shall be possible, although the simultaneous bypassing of both car and landing door contacts and locks shall be prevented; a separate monitoring signal shall be provided such as to provide a check that the car door is in the closed position during lift movements with the car door bypassed; movement of the lift car shall be possible only under inspection control operation or emergency electrical control operation; and audible signal at the lift car (minimum 55 dB(A) measured 1 m below the lift car) and a clearly visible flashing light under the lift car shall be activated during movement of the lift car. In the case of manually operated doors or gates the simultaneous bypass of the landing door contacts and landing door locks shall be prevented.

The controller shall incorporate a device which is configured such as to verify the correct operation of the lift door contact circuits whenever the lift car is within the unlocking zone, the car door is open, and the landing door lock is released. The device shall monitor the condition of the electrical device which proves the closed condition of the lift car door, the electrical device proving the locked condition of the landing door locking device and the monitoring signal associated with the 'Bypass' device, in order to detect malfunction and to prevent the normal operation of the lift.

Where required, and/or where required by this Specification, an Emergency Electrical Control Operation device shall be provided, and shall be designed and constructed in accordance with the requirements of BS EN81-20.

All wiring within the control panel cabinet shall be properly and securely terminated. Any spare wires which are run to the panel shall be properly segregated and insulated from any live circuits and components and shall be suitably identified.

A rubber isolation mat, which is design and constructed in accordance with the requirements of BS EN61111, shall be provided in front of the control panel cabinet and at the rear of the panel in case where access may be required.

Portable and/or hand-held devices which permit the interrogation of the lift control system shall be provided to the Purchaser complete with detailed instructions for safe use of the device. The device shall be provided free of any additional charge, hire, rental, lease or license and the device and its associated software shall remain functional the service life of the lift installation.

The controller shall incorporate a means to detect the temperature of the lift machine room and configured such as to isolate the lift in accordance with the requirements of BS EN 81-20 should the temperature limit of the equipment be exceeded.

The control system shall be designed to meet the requirements of BS EN12015 and BS EN12016 in relation to Electro-Magnetic Compatibility (EMC). A valid Declaration of Conformity shall be provided as evidence of compliance.

Drive System (VVF)

The lift drive control system shall be of the variable voltage variable frequency AC type utilising full flux vector or direct torque control of an AC motor, to provide smooth, stepless acceleration/deceleration and stopping cycles and to achieve a floor level stopping accuracy of ± 5 mm.

The drive system shall be closed loop system utilising a tacho generator and/or digital encoder directly coupled to the hoist motor or geared machine high-speed shaft, to provide a speed feedback/motor shaft position reference.

Speed regulation between no load and full load shall be within 5% of the contract speed.

The entire lift installation shall run normally when the supply voltage varies to a limit of +10% and -6% of the declared supply voltage.

The electrical supply to the drive motor shall be controlled by at least two independent contactors. If, when the lift is stationary, the main contacts of one of the contactors should fail to open any further movement of the lift shall be prevented. Alternatively, a stuck-at-failure monitoring system shall achieve the same result. Alternative systems of protection, which shall be designed and constructed in accordance with the requirements of BS EN81-20 may be proposed of the approval of the Engineer.

The drive system shall prevent the machine starting, unless the car door is in the closed position and all landing doors are in the closed and locked position.

The control and drive system, together with its various elements of equipment and enclosures, shall be designed and constructed in accordance with the requirements of BS EN81-20, BS EN50274, BS EN60204-1, BS EN60529, BS EN60664-1, BS EN60947-4-1, BS EN60947-5-1, BS EN61800-5-1, BS EN61800-5-2, BS EN61810-1, HD60364-4-41, HD60364-4-42 and HD60364-6.

The drive system shall be designed to meet the requirements of BS EN12015 and BS EN12016 in relation to Electro-Magnetic Compatibility (EMC). A valid Declaration of Conformity shall be provided as evidence of compliance.

Drive System (VVF Regenerative) – (Optional)

The lift drive control system shall be of the variable voltage variable frequency AC type utilising full flux vector or direct torque control of an AC motor, to provide smooth, stepless acceleration/deceleration and stopping cycles and to achieve a floor level stopping accuracy of ± 5 mm.

The drive system shall be closed loop system utilising a tacho generator and/or digital encoder directly coupled to the hoist motor or geared machine high-speed shaft, to provide a speed feedback/motor shaft position reference.

Speed regulation between no load and full load shall be within 5% of the contract speed.

The entire lift installation shall run normally when the supply voltage varies to a limit of +10% and -6% of the declared supply voltage.

The lift drive control system shall incorporate a regenerative function such that energy which is generated when the lift drive motor is in braking mode is transferred back into the building electrical supply as clean energy, without the introduction of undue distortion or harmonics.

The lift drive control system shall incorporate means to ensure regenerated energy remains in full synchronization with the supply at all times.

Prior to commencement of material procurement, the lift contractor shall be responsible for ascertaining the suitability of the building electricity supply network to supply lifts which have regenerative type variable voltage variable frequency motor drive systems.

In cases where the lift can be supplied by a back-up generator the lift drive system shall be arranged such that when supplied by a back-up generator it is automatically reconfigured so that the regenerative unit becomes temporarily disabled and the system shall operate in a dynamic resistive braking mode. The lift contractor shall provide all details of interfacing requirements for this feature at the time of tender.

The electrical supply to the drive motor shall be controlled by at least two independent contactors. If, when the lift is stationary, the main contacts of one of the contactors should fail to open any further movement of the lift shall be prevented. Alternatively a stuck-at-failure monitoring system shall achieve the same result. Alternative systems of protection, which shall be designed and constructed in accordance with the requirements of BS EN81-20 may be proposed of the approval of the Engineer.

The drive system shall prevent the machine starting, unless the car door is in the closed position and all landing doors are in the closed and locked position.

The control and drive system, together with its various elements of equipment and enclosures, shall be designed and constructed in accordance with the requirements of BS EN81-20, BS EN50274, BS EN60204-1, BS EN60529, BS EN60664-1, BS EN60947-4-1, BS EN60947-5-1, BS EN61800-5-1, BS EN61800-5-2, BS EN61810-1, HD60364-4-41, HD60364-4-42 and HD60364-6.

The drive system shall be designed to meet the requirements of BS EN12015 and BS EN12016 in relation to Electro-Magnetic Compatibility (EMC). A valid Declaration of Conformity shall be provided as evidence of compliance.

Control System (Simplex Full Collective)

A simplex fully collective control system shall be provided with the following features:

- a) The system shall be micro-processor based and incorporate the facility for future installation of "fault logging" and remote monitoring equipment complying with BS EN627.
- b) Lift car and landing calls shall be registered and retained in the system after operation of the respective lift car or landing push button. The lift car shall answer all calls in sequence in the direction of travel prior to reversing direction in order to answer any landing calls registered in the opposite direction.
- c) The lift car and landing calls shall be cancelled marginally prior to or during the door opening cycle at the appropriate landing.
- d) Lift car calls shall be answered in the order in which destinations are reached, irrespective of the sequence in which these are registered.
- e) Whilst no calls are in the system any landing call registered shall receive an immediate response.
- f) At a pre-determined time after the last call in the system has been answered the lift car shall return to the main floor and park, with the doors closed. This parking feature shall be readily disabled if required and without recourse to tools or devices.
- g) An adjustable timing device shall be incorporated in the system, and which will allow a pre-determined time for passengers to enter or leave the lift car prior to the commencement of door closing in response to a further landing call. The registration of a lift car call shall override this timer, and the doors shall immediately start to close. Operation of the landing push for the direction in which the lift car is set to travel, during

the closing cycle of the doors at the floor at which the lift car is positioned, which will cause the doors to stop immediately and re-open.

CCTV

The Lift Contractor shall provide each lift car with the necessary electrical and mechanical facilities necessary for the incorporation of a CCTV system, which shall be supplied and fitted by a specialist contractor. The Lift Contractor shall include for providing access and support in relation to the installation and termination of the CCTV system and equipment.

The Lift Contractor shall include within their works package for the supply and installation of a separate, purpose-manufactured LSF lift trailing cable connecting each lift controller to each lift car. The trailing cable shall be designed and manufactured such as to meet the requirements of BS EN 81-20 in relation to the speed and travel of the lift and the height of the lift shaft and shall be in conformity with EN 50214, IEC 60227-6 or IEC 60245-5.

The trailing cable shall be designed to incorporate the requirements of the CCTV system as set out herein or associated with this Tender or, in the event that the design/specification for the CCTV system has not been finalised, the Lift Contractor shall as a minimum base their costs on the supply and installation of a screened lift trailing cable incorporating, as a minimum, the following conductors:

- 4x power supply
- 2x co-axial
- 4x twisted pairs
- 2 x Cat 5E
- 8x control

The final materials and construction shall be subject to the agreement of the Engineer.

The Lift Contractor shall supply, install and interconnect to suitably designed junction boxes at the lift car top, lift car interior, in the lift shaft and at the lift machinery space/machine room. The junction boxes shall be suitably marked and labeled in accordance with the requirements of this Specification.

Diagnostics

The lift control system shall incorporate facilities for fault and event diagnostics in the form of a microprocessor which shall be capable of being interrogated at the controller. The information shall be presented as a digital display and, if coded, the appropriate key shall be listed on a label fixed to the interior of the controller and in the O&M Manuals.

The following list of faults and events shall be the minimum requirement, as detailed in BS EN627:

Code	Fault
00	No faults recorded.
01	Safety circuits interrupted.
02	Lock circuit interrupted whilst running.
03	Failure of normal door closing sequence.
04	Car stopped outside door unlocking zone.



05	Stuck call button.
06	Lift failed to start.
07	Low voltage on the lift logic supply.
08	Not allocated.
09	Failure of the self-test procedure.
10	Run-time limiter operated.
11	Position lost.
12	Excessive temperature of drive system.
13	Failure of normal door opening sequence.

Code	Event
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40	No events recorded.
41	Main lift supply switched off.
42	Inspection control mode.
43	Fire service mode.
44	Data logging OFF (Engineer on site).
45	Car preference mode.
46	Emergency power operation.

Code	Alarm Code for Lifts
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90	Alarm button pressed.
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The record shall be held in the memory of the microcomputer in real time and shall be retained in rolling sequence of up to 5 timed occurrences of each of the listed fault or event. The system shall incorporate a facility for recognising and reporting that there have been more than 5 recurrences of any one fault or event and the first and last shall be retained in the memory. Upon clearance of a fault, the date and time shall be recorded, and the next occurrence of the fault shall be reported as the first.

The equipment shall be configured such that it is possible to interrogate the system and through a serial link to a remote location or modem into a communication network, whereby each lift may be interrogated.

The memory shall be maintained by a back-up battery supply against a mains power failure for a minimum of 100 hours.

If the information at the controller is accessed by a portable reader, then one such reader shall be supplied to become the Purchaser's property, together with one copy of the operating manual containing a key to the codes and all operational and servicing information relevant to the diagnostics system.

Fire Recall (Doors Required to Park Closed)

There may be circumstances in which the local Fire Officer and/or the Building Fire Strategy require that the lift car should park with its doors closed. In this instance, or where National Regulations do not permit the lift doors to remain open, a means shall be provided to open the doors (even with the electrical power is switched on) such as to enable the Fire Service to check whether the lift car is present at the landing and ensure that persons are not trapped in the lift car.

On receipt of a fire signal from one of two pairs of volt-free contacts in each lift machinery area (to be provided by others), the lift(s) shall immediately return to the designated floor without stopping or answering any calls. If travelling away from the designated floor, the lift shall stop at the next available floor and, without opening its doors, return to the main floor. On arrival to the main floor, the lift doors shall open, and remain open for a pre-determined period, and then close and remain closed until the fire signal is cancelled. The additional pair of contacts shall be utilized in order to indicate that there is a fire at the designated floor and shall cause the lift control system to send the lift car to an agreed alternative level. In all cases the lift car interior door open button shall remain operational at all times.

Fire Alarm Automatic Recall (BS EN 81-73)**Behavior of Lifts in the Event of Fire.**

The lifts shall operate in accordance with the requirements of BS EN 81-73.

The lift controller shall be configured such as to include a fire recall mode which may be initiated on receipt of electrical signals provided by an automatic fire detection and alarm system, or where applicable, by way of the manually operated system.

The fire recall system shall be capable being activated by the operation of voltage free contacts or by way of a manually activated recall switch.

If, at the time of activation, the doors are closed, the lift car shall travel non-stop to the designated floor where the lift shall remain inoperable.

If, at the time of activation, the lift car is at a landing, other than the designated landing, with open doors an audible signal shall sound within the lift car and shall continue until the doors are closed. If after 20-seconds the doors are not closed the door protection devices shall be rendered inactive and the doors shall close with reduced kinetic energy, not exceeding 4 J, and with an acoustic warning signal in operation during the door closing cycle. The lift shall then travel non-stop to the designated landing.

If, at the time of activation, the lift car is descending, the lift car shall continue to the designated landing without stopping and on arrival the lift doors shall open.

If, at the time of activation, the lift car is ascending, the lift car shall decelerate and stop normally at the next available floor and shall then return to the designated landing where the doors shall open.

On arrival of the lift car at the designated landing an audible speech message and a visual signal, each indicating "Fire alarm – lift out of service – exit now", shall be initiated within the lift car. The doors shall remain open for 20 seconds after which the doors shall close and the lift shall be removed from service, with only the lift car interior door open and emergency alarm buttons remaining operational.

If the design of the building provides for more than one designated landing then separate pairs of volt free contacts, or suitable signaling system, shall operate in order to recall the lift car and park this at the appropriate designated landing following the same control sequence as is set out here above.

A prohibition sign, which is designed in accordance with the requirements of BS EN 81-73, shall be provided on each lift landing in a position in which this is easily visible. An addition sign stating “Do not use lift in the event of fire” shall be installed in conjunction with the prohibition sign.

When the recall device is operated all of the lift safety devices shall remain operational, and all of the lift landing and lift car controls (excepting for the door open and emergency alarm push buttons) shall be rendered inoperative. All existing calls in the system shall be cancelled.

A visual signal located in the lift car operating panel shall be illuminated and shall remain illuminated until the lift is returned to normal operation.

If at the time the recall device is activated the lift is on inspection control, under emergency electrical operation and/or under any other maintenance control, audible and visual indicators installed in the lift motor room, at each lift machinery space, on the lift car top, and in the lift pit shall automatically activate and shall remain activated until the lift is returned to normal control whereupon the lift shall immediately revert to fire recall operation, and the audible and visual signal shall cease.

All audible signals shall be designed and constructed to provide a sound level which is adjustable between 35 d(B) A and 65 d(B) A and shall be set at 55 d(B) A. The sound produced shall be such that this differs from other signals used on the installation in order to enable maintenance staff to easily identify the condition.

Lift Car Frame and Enclosure

Car Frame

The car enclosure shall be carried within a steel frame which is of substantial construction, formed with angle and channel sections which are suitably braced and stiffened. The lift car frame shall be designed and constructed such as to sustain a fully loaded car plus 25% overload, together with the dynamic loads and forces arising during use, during loading, and during safety gear and buffer operation, without permanent deformation. In the case of Goods Passenger Lifts, or Mobility Scooter use the calculation of the rated load shall be increased such that the design and construction of the lift car frame and platform shall be such as accommodate the additional loads and forces imposed by the handling devices and/or Mobility Scooters.

During the operation of safety devices, the lift car floor shall not incline in excess of 5% from its normal position under the full load range of the lift car.

The lift car enclosure shall be suitably isolated from the lift car frame by way oil resistant isolation rubbers which are of suitable resistance and density.

On the underside of the lift car provision shall be include for statically balancing the lift car. The design and construction of the static balancing system shall ensure that the complete lift car and its attachments can be statically balanced without exceeding the design parameters relating to the overall weight of the complete lift car and sling assembly and the lift safety equipment.

A toe guard, designed and constructed in accordance with the requirements of BS EN81-20, and manufactured in not less than 16 SWG steel, shall be installed beneath the lift car sill complete with adequate bracing to the lift car platform steelwork. The toe guard and bracing shall be painted as detailed within this Specification.

All exposed metal work shall be painted with machine paint, in a colour to the approval of the Engineer, and as detailed in this Specification.

The design of the lift car frame, platform and entrances, including sills and mountings, shall be such as to accommodate the loads imposed during loading and unloading of the lift car and shall be designed based upon a minimum loading of:

- **In the case of Passenger Lifts which carry Class C wheelchairs and/or mobility scooters 60% of lift car rated load.**

A data plate shall be fitted to the crosshead of the lift car frame which shall provide details of the suspension rope type, construction, diameter and length along with weight of the lift car and the contract speed all expressed in SI Units.

Car Top Balustrade

In all cases in which the distance between the outer edge of the lift car roof and the wall of the lift well, measured horizontally and perpendicular to the lift car roof, exceeds 0.3 m the Lift Contractor shall supply and install a balustrade in accordance with the requirements of BS EN 81-20.

The design and construction of the balustrade shall include; a handrail; an intermediate bar positioned at half the height of the balustrade, and; a toe board, of minimum height of 0.1 m, fitted around the external perimeter of the lift car roof.

The height of the balustrade, in its fully extended position, shall be not less than 1.1 m and the balustrade shall be located at a maximum distance of 0.15 m from the edges of the car roof. The distance between the outer edge of the handrail and any component of the lift or part of the lift well shall in no case be less than 0.1 m.

The design of the balustrade shall be such that this shall resist, without elastic deformation in excess of 50 mm, the application of a force of 1000 N applied horizontally and at right angles at any point at the top of the balustrade.

In cases in which the available headroom clearance is insufficient to accommodate a barrier of 1.1 m in height a suitably designed extendable barrier, which is designed and constructed in accordance with the requirements of BS EN81-20, and which has been approved by the Lift Contractor's Approved Body, may be applied. Such designs shall incorporate electrical interlock safety switches, which are designed and constructed in accordance with BS EN81-20, and configured such that the lift cannot be operated on 'Normal' operation whilst the barrier is extended, and such that the extension of the barrier is necessary in order to enable the lift car top inspection control operation.

A suitable warning notice shall be provided on each rail in order to warn of the danger of leaning over the rail.

The rail shall be manufactured in galvanised steel and suitably painted in a colour to the approval of the Engineer.

Lift Car Apron

An apron, designed and constructed in accordance with the requirements of BS EN81-20, and manufactured in not less than 16 SWG steel, shall be installed beneath each lift car entrance sill complete with adequate bracing to the lift car platform steelwork. The apron and bracing shall be painted as detailed within this Specification.

The apron shall extend for at least the full width of the clear landing entrance and shall extend vertically downwards by at least 750 mm. The lowest edge of the apron shall be formed to provide a chamfer of angle of at least 60° and which shall extend in the horizontal plane for not less than 20 mm.

Only countersunk screws will be accepted such that the surface, at all points on each panel, is smooth and flush. Any projections on the face of the apron shall not exceed 5 mm and any projections in excess of 2 mm shall be chamfered at least 75° to the horizontal.

The design, construction and installation of the apron shall be in accordance with the requirements of BS EN81-20 and such that this is capable of withstanding a force of 300 N, which is applied at right-angles to the fascia from the landing side, and at any point on the lower edge, and evenly distributed over an area of 5 cm² in round or square section. The apron shall resist without permanent deformation in excess of 1 mm and without elastic deformation in excess of 35 mm.

Safety Gear

A robustly designed and constructed safety gear shall be fitted to the underside of the lift car. The safety gear shall be of the progressive type and operated by a suitably designed overspeed governor which is designed and constructed to match the characteristics of the safety gear. The safety gear shall be designed, constructed and installed such that this is capable of safely stopping and sustaining the descending lift car complete with rated load, by locking this to the guide rails. The safety gear shall operate at the tripping speed of the overspeed governor and in the case of a breakage of the suspension means.

The design of the safety gear shall be such that this will release automatically by movement of the lift car in the upwards direction of travel and shall reset such that the safety gear is immediately enabled for further operation. The design shall be such that the release may be affected under all load conditions up to and including rated load.

The design, construction and installation of the safety gear, together with its associated components, shall be in accordance with the requirements of BS EN81-20.

The safety gear shall be subject to Type Examination in accordance with the requirements of BS EN81-50, the Lifts Regulations 2016 as amended, and a Type Examination Certificate which is in accordance with the requirements of BS EN81-50 shall be provided and a copy retained in the lift O&M Manual.

In all cases the average retardation of the lift car in the case of free fall shall be between 0.2 gn and 1.0 gn.

In cases in which a bi-directional safety gear is installed such as to prevent uncontrolled ascent or unintended movement of the lift car, this shall comply in all respects with the above requirements excepting that when actuated, the overspeed governor and safety gear shall be designed such that engagement of the 'upwards' direction elements of the governor and safety gear shall be released by movement of the lift car in the 'downwards' direction.

Protection Against Unintended Movement of the Lift Car

The Lift Contractor shall supply and install a safety device which shall detect and prevent unintended movement of the lift car at a landing whilst the landing door is not in the locked position and the car door not in the closed position.

The device shall detect unintended movement of the lift car and shall by way of a suitably designed actuation system, cause the lift car to stop, and remain stopped, in accordance with the distance constraints set out in BS EN81-20.

The design, construction and installation of the safety device, together with its associated components, shall be in accordance with the requirements of BS EN81-20. Electrical devices associated with the safety device shall be designed and constructed in accordance with the requirements of BS EN81-20.

In the case that the lift machine brake is used as a means of preventing/stopping unintended movement this shall be designed and constructed in accordance with the requirements of BS EN81-20. The brake shall incorporate self-monitoring of correct lifting and dropping of the braking mechanism and verification of the braking force. The self-monitoring function shall be subject to Type Examination in accordance with the requirements of BS EN81-50, and the Lifts Regulations 2016 as amended.

The unintended movement device shall incorporate, in the form of specific system design, a means of detection, a means of actuation and a stopping means. Suitable stopping means may include additional safety gears on the lift car or counterweight; lift machine sheave brakes; rope brakes or an equivalent to the approval of the Engineer.

The combined system of detection, actuation and stopping means shall form an integrated system which shall be subject to Type Examination in accordance with the requirements of BS EN81-50, and the Lifts Regulations 2016 as amended.

The Lift Contractor shall state the type of device and the means detection, means of actuation and stopping means in Section 10 of this document.

Ascending Car Over-Speed Protection

The Lift Contractor shall supply and install a safety device which shall detect, prevent and stop uncontrolled ascent of the lift car.

The device shall be operational during normal lift operation and during manual rescue operations.

The design, construction and installation of the safety device, together with its associated components, shall be in accordance with the requirements of BS EN81-20. Electrical devices associated with the safety device shall be designed and constructed in accordance with the requirements of BS EN81-20.

The device shall detect uncontrolled ascent of the lift car and shall by way of a suitable means, cause the lift car to stop, and remain stopped, in accordance with the requirements set out in BS EN81-20.

In the case that the lift machine brake is used as a means of preventing/stopping uncontrolled ascent of the lift car this shall be designed and constructed in accordance with the requirements of BS EN81-20. The brake shall incorporate self-monitoring of correct lifting and dropping of the braking mechanism and verification of the braking force. The self-monitoring function shall be subject to Type Examination in accordance with the requirements of BS EN81-50, and the Lifts Regulations 2016 as amended.

The uncontrolled ascent protection device shall incorporate, in the form of specific system design, a means of detection, a means of actuation and a stopping means. Suitable stopping means may include additional safety gears on the lift car or counterweight; lift machine sheave brakes; rope brakes or an equivalent to the approval of the Engineer. During operation of the device the retardation of the empty lift car shall not exceed 1 gn

The combined system of detection, actuation and stopping means shall form an integrated system which shall be subject to Type Examination in accordance with the requirements of BS EN81-50, and the Lifts Regulations 2016 as amended.

The Lift Contractor shall state the type of device and the means detection, means of actuation and stopping means in Section 10 of this document.

Suspension Rope (Machine Room Less)

The requirements regarding suspension are as follows:

- a) In the case of traction lifts at least four suspension ropes shall be used, and in the case of hydraulic lifts at least four suspension ropes for each hydraulic jack. Their nominal diameter shall not be less than 8 mm with a minimum safety factor of 12:1 and which shall be calculated in accordance with the requirements of BS EN81-50 based upon the worst-case scenario.
- b) The characteristics and tensile strength of the wire ropes shall be in accordance with the requirements of BS EN12385-5.
- c) Each of the ropes shall be independently attached at its termination. Terminations shall be designed and constructed in accordance with the requirements of BS EN 81-20 and shall be fitted with a means of equalization and an isolated car hitch by means of springs or other method to the approval of the Engineer. The roping arrangement shall be as specified in section 6 of this document
- d) Acceptable means of termination include self-tightening wedge type sockets in accordance with the requirements of BS EN13411-6 or BS EN13411-7; ferrule secured eyes in accordance with the requirements of BS EN13411-3; or swage terminal in accordance with the requirements of BS EN13411-8. In all cases the design and construction of the rope termination shall be such as to achieve not less than 80% of the minimum breaking load of the rope.
- e) During the servicing of the lift, it shall be possible, by means of adjustment of nuts on the rope terminations, to shorten the ropes by 150 mm or more. The design shall be such that the termination shall not work loose following installation or adjustment
- f) Following installation an anti-twist rope (6 mm) shall be fitted through the rope terminations in order prevent rotation.
- g) A data plate shall be fixed to the lift car crosshead giving the details of the suspension ropes type, construction, diameter, length and lift car weight, all expressed in SI Units.
- h) Ropes and their terminations shall be installed in full compliance with the manufacturer's data and instructions, a copy of which shall be made available at the request of the Engineer, and which shall be included in the Operation & Maintenance Manuals.

Alternative means of suspension will be considered only on the basis that the design has been formally approved by a UK Approved Body, and in accordance with the Lifts Regulations 2016 as amended and the requirements of BS EN81-20 and BS EN81-50, and strictly on the basis that the Lift Contractor has provided full details of the proposed design at the time of Tender.

Load Weighing Devices (Simplex)

The car sling or platform shall incorporate an automatic load-weighing feature. The device shall be operated when the lift car is overloaded such that lift operation is prevented whenever the load in the lift car reaches or exceeds 110% of the rated load.

When operated the device shall prevent normal starting of the lift car, including re-levelling (re-levelling shall remain operative in the case of hydraulically driven lifts) and prevent the closing of the lift doors. In the case of manually operated doors or gates these shall remain unlocked. The device, when operated, shall cancel any preliminary lift starting functions.

When operated the device shall cause an audible and visible warning signal, which shall be located within the lift car interior, and fitted in the car station, to be activated to indicate the 'overload' condition.

The design shall be such as to include a means of self-checking, and the device shall 'fail to safe' such that it is not possible for an overloaded lift to operate.

The load-weighing feature shall also detect when the car is loaded to 80% load and will cause the lift to by-pass other landing calls in the current direction of travel. The final load figures shall be agreed with the Engineer during the Commissioning Tests.

The “overload” and “load weighing” switches may be fixed to the underside or top of the car sling but if mounted on the top, these shall be provided with suitable protection against damage.

Guide Shoes (Adjustable)

The lift car and counterweight shall be fitted with self-adjusting robust guide shoes which incorporate renewable liners. Each of the shoes on the top of the lift car and counterweight shall be provided with an oil reservoir which incorporates wick lubricators complete with a means of adjusting the flow of lubricant to the guide rails.

In cases where sliding guide shoes with oil lubrication are employed a readily serviceable metal drip tray shall be provided at the base of each guide rail.

Car Top Inspection Control Station

An Inspection Control Station, which is in compliance with the requirements of BS EN 81-20, and the requirements of BS 7255, shall be installed on the lift car top.

The Inspection Control Station shall incorporate an ‘Inspection Control Switch’ which is designed in accordance with the requirements of BS EN 81-20. The Inspection Control Switch shall be of bi-stable design and shall be suitably protected against involuntary or accident operation.

Switches which are of rotary design shall incorporate a mechanical means (non-friction) of preventing the rotation of the stationary element.

In addition, the Inspection Control Station shall incorporate direction push buttons, designated ‘UP’ and ‘DOWN’ and a push button designated ‘RUN’. These push buttons shall be suitably protected against involuntary or accidental operation.

The design and construction of these push buttons shall be such that these operate in a constant pressure mode. Movement of the lift car shall be possible only by way of simultaneous constant depression of the ‘RUN’ button and one of the ‘UP’ or ‘DOWN’ directional buttons. The design of the push buttons shall be in accordance with the requirements of BS EN 81-20, and these shall be configured such that operation of the ‘RUN’ and ‘UP’ or ‘DOWN’ buttons may be performed simultaneously by a person using only one hand.

The Car Top Inspection Control Station shall incorporate a stopping device which is designed and constructed in accordance with the requirements of BS EN 81-20.

The Car Top Inspection Control Station shall be designed with a minimum level of protection of IPXXD in accordance with BS EN 60529.

The Inspection Control Switch, when switched to the ‘INSPECTION’ mode of operation, shall:

- Neutralise the normal controls of the lift;
- Neutralise the lift emergency electrical operation function;
- Disable the levelling and re-levelling functions;
- Prevent automatic operation of the lift door equipment; and

- Permit power operated closing of the lift doors by way of the operation of one of the direction push buttons of the Inspection Control Station; or additional switches, incorporated into the Car Top Inspection Control Station, and suitably protected against involuntary or accident operation, which control the operation of the doors.
- Prevent the lift car from overrunning the normal stopping positions.
- Maintain all lift safety devices in a functional and operational condition.

When in use the Inspection Control Station shall limit the speed of the lift car to a maximum of 0.63 m/sec **and**, to 0.3 m/sec whenever the vertical distance above any standing area on the lift car top is 2.0 m or less.

In cases in which more than one Inspection Control Station is provided (lift pit or machinery space, etc) and when more than one of these is switched to 'INSPECTION' mode, movement of the lift car shall be possible only by the simultaneous operation of the same control function switches of each Inspection Control Station.

The Inspection Control Station shall be located such that this is readily operable from within of horizontal distance of 0.3 m of a refuge space.

A stopping device, which is designed and constructed in accordance with the requirements of BS EN81-20, shall be located in a readily accessible position and not more than 1.0 m from the entry point to the lift car top. This device may be that incorporated in the Car Top Inspection Control Station if this is located with 1.0 m of the car top entry point or may be a separate device.

Incorporated into the Inspection Control Station shall be a switched 13-amp three pin socket outlet with integral RCD operated at 30mA. A minimum 100-watt inspection lamp fitted with a protective guard shall be mounted on the Station and controlled by a switch fitted adjacent to it.

The inspection lamp, or an additional emergency light unit complete with protective guard, shall be provided with emergency backup by means of a battery and charger, giving a minimum 3 hours duration and maximum 12 hours recharge. The light shall provide a minimum light intensity of 5 lux for a minimum period of 1-hour, measured at the engineer alarm initiation device and at a point 1 m above the floor of the car roof at the centre of the car roof.

A lift car top communication system, designed and constructed in accordance with the requirements of BS EN 81-20 and BS EN 81-28, shall be incorporated into, or mounted adjacent to the Car Top Inspection Station, together with clear instructions as to its use.

Pit Inspection Control Station

An Inspection Control Station, which is in compliance with the requirements of BS EN 81-20, and the requirements of BS 7255, shall be installed in the lift well pit.

The Inspection Control Station shall incorporate an 'Inspection Control Switch' which is designed in accordance with the requirements of BS EN 81-20. The Inspection Control Switch shall be of bi-stable design and shall be suitably protected against involuntary or accident operation.

Switches which are of rotary design shall incorporate a mechanical means (non-friction) of preventing the rotation of the stationary element.

In addition, the Inspection Control Station shall incorporate direction push buttons, designated 'UP' and 'DOWN' and a push button designated 'RUN'. These push buttons shall be suitably protected against involuntary or accidental operation.

The design and construction of these push buttons shall be such that these operate in a constant pressure mode. Movement of the lift car shall be possible only by way of simultaneous constant depression of the 'RUN' button and one of the 'UP' or 'DOWN' directional buttons. The design of the push buttons shall be in accordance with the requirements of BS EN 81-20, and these shall be configured such that operation of the 'RUN' and 'UP' or 'DOWN' buttons may be performed simultaneously by a person using only one hand.

The Inspection Control Station shall incorporate a stopping device which is designed and constructed in accordance with the requirements of BS EN 81-20.

The Mechanic's Control Station shall be design with a minimum level of protection of IPXXD in accordance with BS EN 60529.

The Inspection Control Switch, when switched to the 'INSPECTION' mode of operation, shall:

- Neutralise the normal controls of the lift;
- Neutralise the lift emergency electrical operation function;
- Disable the levelling and re-levelling functions;
- Prevent automatic operation of the lift door equipment
- Prevent the lift car from overrunning the normal stopping positions.
- Maintain all lift safety devices in a functional and operational condition.

When in use the Inspection Control Station shall limit the speed of the lift car to a maximum of 0.63 m/sec **and** to 0.3 m/sec whenever the vertical distance above any standing area in the lift well pit is 2.0 m or less.

In cases in which more than one Inspection Control Station is provided (lift car top or machinery space, etc.) and when more than one of these is switched to 'INSPECTION' mode, movement of the lift car shall be possible only by the simultaneous operation of the same control function switches of each of the Inspection Control Stations.

The Inspection Control Station shall be such that this is readily operable from within of horizontal distance of 0.3 m of a refuge space.

An electrical reset switch shall be provided and shall be configured such that this is operated from outside of the lift well, either by operation in conjunction with the emergency unlocking means provided to the door which gives access to the pit; or which is located outside of the well, at the pit access landing, and which is accessible to authorised persons only.

The return of the lift to Normal operation shall only occur when:

- The landing doors providing access to the pit are closed and locked;
- All of the stopping devices in the pit are set to their 'Run or 'Normal' mode;
- When an electrical reset switch located outside of the lift well, is operated.

A lift well pit communication system, designed and constructed in accordance with the requirements of BS EN 81-20 and BS EN 81-28, shall be incorporated into, or mounted adjacent to the Station, together with clear instructions as to its use.

Car Signal and Operating Devices

Operating Panel (Side Wall)

The lift car interior operating devices shall be incorporated within the side wall of the lift car and integral with it, in a position which is in compliance with the requirements of Part M2 of the Building Regulations and those of BS EN 81-70. Faceplate designs will not be accepted.

A key operated independent service switch, a key operated fan switch and a key operated car interior light switch, door open push and alarm push buttons shall be provided in addition to the required lift floor call push buttons.

A visual indicator and audible buzzer shall be provided in order to signify “car overloaded”. The alarm and door open push buttons shall be permanently illuminated, including under emergency lighting operation. The alarm and door open push buttons, which shall be the lowest of the push buttons in the lift car, shall be positioned at a height not less than 900 mm above the car floor. The operating pushes shall be positioned at a height of between 900 mm and 1200 mm above the lift car floor in order to aid accessibility.

The design of the push buttons shall be such as to meet the requirements of BS EN 81-70 and shall be in a single or double column arrangement and of the “micro” movement type. The key switches, door open button and alarm button and the overload indicator shall all be of the same design and manufacture as the push buttons. Each push button shall be arranged to illuminate to indicate call acceptance, and the method of illumination shall be by light emitting diodes (LED).

The pushes shall be tonal contrast to the panel and the panel to the surrounding wall.

An LED call registered illuminated signal shall be incorporated within the halo symbol of each push and each push button shall incorporate an audible signal to confirm operation.

The Exit floor push shall protrude 5mm beyond the other floors and be coloured green, with green illumination.

The Alarm button system shall be provided with an additional yellow illuminated pictogram to indicate the alarm has been given, and a green illuminated pictogram to indicate that the alarm has been registered.

The key operated independent service switch shall, when switched to ‘Independent Service’, isolate the lift car from all landing calls. The lift car shall respond to only to car interior calls, and on a single call basis only, and shall park with the doors open.

The key operated car interior light switch shall be suitably shrouded and incorporate a test position for the lift car emergency lighting.

An alphanumeric digital lift car position indicator, or alternatively a scrolling message type position indicator, shall be provided within each lift car operating panel at a height between 1600 mm and 1800 mm above the lift car floor. The visible part of the floor numbers shall be between 30 mm and 60 mm.

All of the equipment shall be designed, constructed and installed in accordance with the requirements of B EN81-20 and BS EN81-70.

The car-operating panel shall incorporate the lift manufacturer’s name, the lift serial number, the UKCA Mark and the reference number of the UK Approved Body.

Car Lighting Supply Monitoring

The lift car lighting supply and controls shall be arranged such that in the event of failure of the normal car lighting supply the lift shall not accept any further car or landing calls whilst in Normal operating mode.

The lift shall complete its current journey and then go out of service upon arrival at the **next stop** and display “lift out of service” on the car control station and landing indicators.

Firefighters’ and Recall operation to BS EN 81-72 and BS EN 81-73 shall override this function.

Emergency Signal (Audible Alarm)

An audible alarm signal shall be fixed in an approved position within 5 metres of the lift shaft or within the lift shaft. A secondary alarm signal shall be provided on the roof of the lift car. They shall give a minimum audible level of 90 dBA at 1 metre outside the shaft area.

The supply shall be obtained from an auto-recharge unit of approved make fitted with nickel cadmium batteries. Minimum duration is 3 hours, maximum recharge time 12 hours.

The Lift Contractor shall supply and fix the auto-recharge unit either in the lift machine room/machinery area or on the lift car roof.

The signal will be actuated by the “alarm” push in the lift car station. A pair of volt-free contact terminals are to be incorporated for the emergency telephone function.

Emergency Auto Dialling

An auto-dialling emergency communications system which is designed, constructed and installed in accordance with the requirements of BS EN81-20, BS EN81-28 and the Lifts Regulations 2016 as amended, shall be provided in each lift car and electrically connected to the machine room/machinery space. The system shall be compatible with operation on a digital line following digital switch over and shall include as a minimum:

- a) A speaker unit shall be suitably mounted and concealed behind the lift car front panel. The unit shall be fitted with an integral steel baffle plate for protection against vandalism and a volume control which shall not be accessible from within the lift car.
- b) A call/speaker unit mounted on the car top and in the pit.
- c) A main power pack and control unit mounted on the lift car roof and connected to the speaker by communications grade cabling.
- d) The auto-dialler shall be activated by the operation of the “alarm” push and will then automatically dial the first of a sequence of pre-programmed telephone numbers. When the operator answers, the system will allow two-way “hands-free” conversation, and a pre-programmed voice message shall identify the lift number and its precise location. e.g. “Lift alarm activated on passenger lift 3 at Dunbar & Boardman House, 95 Spencer Street, Birmingham B18 6DA, please press star to acknowledge this call.” This voice prompt shall continue at pre-set intervals until acknowledgement has been given. Two-way communication shall be possible throughout this period. If the call has not been acknowledged within an adjustable period of 30 seconds, the call will terminate and move onto the next number in the sequence. Similarly, failure to connect with the first number will initiate dialling to the second pre-programmed number. This cycle of automatic dialling shall continue to all programmed numbers until acknowledgement of the call has been registered. When the call has been acknowledged then an adjustable call duration

of 2 minutes will be allowed. This period may be extended or the call terminated by following the advice of voice prompt messages.

- e) The following features will be incorporated:
 - f) 220-240-volt mains supply
 - 8 hours battery back-up
 - 3 programmable numbers to 10 digits
 - programming by portable programmer
 - 3 second response delay
 - 2 minutes time out per conversation
 - System generated self-test of auto-dialler, at least once every 3 days
 - Voice enunciation of instruction, to minimise engraving.
 - g) Provide an acoustic coupler or, when a remote proximity device is installed, an inductive loop system with sufficient field strength to be suitable for its purpose, along with suitable indication of its availability for hearing aid users.
 - h) Yellow and green illuminated pictograms as required by BS EN81-28.
 - i) Adjustable volume to ensure a sound level of between 35 and 65 dBA.

The Lift Contractor shall include for all costs of reprogramming the auto-dialler system and/or changing the telephone numbers in order to suit the Purchaser's requirements, in the case that the Lift Contractor is not awarded the Maintenance Contract upon completion of the Defects Liability Period, or at any subsequent time.

GSM Provision

In cases where digital cellular technology (GSM or similar) is provided for the emergency communications system the Lift Contractor shall ensure that any transmitter or extension antenna is located such that sufficient signal strength is available to guarantee reliable connection to a rescue service irrespective of position of the lift car within the shaft.

The Lift Contractor shall include for the supply and installation of all necessary cabling & power supply requirements where necessary to locate the antenna remotely from the emergency communication equipment.

To ensure the optimum network signal is utilized the Lift Contractor shall install and configure the equipment for automatic selection of network operator. Systems which operate on 2G/3G only or with a single network operator will not be accepted.

The Lift Contractor shall include within the operation and maintenance manual all details relating to each SIM card, such as phone number, SIM card identification number, primary network operator, etc.

The Lift Contractor shall include within the maintenance price all costs related to maintaining and operating the SIM card.

Audio Induction Loop System

The Contractor shall provide an audio induction loop system in the car to assist the hard of hearing.

This shall be designed, constructed and installed in accordance with the requirements of BS7594 and BS EN60118-4: 2015 and shall be capable of providing a minimum magnetic field strength, over a covered area, of 100mA RMS per metre.

Induction loop system signage shall be provided on the car control station below the carload plate on the car operating panel. This shall be an engraved sign with blue infill. Stickers shall not be accepted.

The outputs of the speech synthesis unit and the emergency auto-dialler shall be linked into the loop system amplifier, via transformer isolated inputs, which shall provide a corresponding electric current in the loop, proportional to the source input signal. The electric current in the induction loop will produce a magnetic field which can be detected by hearing aid users with their hearing aids set on the 'T' or 'MT' settings.

The induction loop circuit shall also generate sufficient magnetic field strength at a height of not more than 1200 mm above floor level of the lift car, to ensure wheelchair users have equal benefit from the loop system, with minimal electrical interference.

The frequency response shall cover the range 80Hz to 5kHz \pm 1.5dB relative to 1kHz at low level, measured as loop current with no metal loss correction.

The induction loop cable shall be run around the perimeter of the lift car ceiling in a concealed location, with non-metallic containment, providing 300mm separation from electrical switching equipment on the car e.g. door operator, which may provide interference to the magnetic field.

In circumstances where the loop can only be installed above the car roof, the system shall include a "Metal loss correction" adjustment to compensate for the reduction in field penetration.

The induction loop field strength shall be tested as part of the commissioning procedures of the lift and demonstrated to the engineer using a calibrated Magnetic Field Strength Meter and Loop Listening Device.

Voice Synthesiser

The voice synthesiser shall be of the digital type capable of on-site programming and shall include, as a minimum, for the transmission of the following messages.

- Arrival at the floor and its designation.
- Preparing to depart.
- Doors are about to close.
- Remove obstruction from the doors.
- Lift failed to start, please press door open push.
- Lift overloaded.

The synthesiser shall have an additional facility for incorporating and processing a further 10 separate phrases.

Final detail in respect of the voice type and the wording of the individual messages to be transmitted shall be subject to the Engineer's approval.

The voice synthesiser shall have an inductive loop system with sufficient field strength to be suitable for its purpose, along with suitable indication of its availability for hearing aid users.

The sound level shall, as a minimum, be adjustable between 35 dB(A) and 65 dB(A), and with a facility to increase the sound level such as to meet site conditions. The final sound level shall be to the approval of the Engineer.

Car & Landing Entrances

Automatic Power Operation of Car and Landing Doors

The automatic door operator shall provide quiet controlled motion of the car and landing doors throughout the full extent of the opening and closing cycles. A solid guard shall be fitted to the operator driving mechanism. The whole of the operator and its associated devices shall be mounted on steel members forming part of the car sling. Where an alternative mounting arrangement is proposed it shall only be accepted by prior approval of the Engineer. The following requirements shall also be maintained:

- a) It shall be driven by an electric motor in both opening and closing directions and tested for compliance with BS EN81-20 in relation to closing force and for kinetic energy by using an approved device. Any reduction gearbox shall utilise steel/bronze gearwheels. Nylon/plastic gears will not be acceptable.
- b) Provision shall be made for the site adjustment of the opening and closing cycles of the car and landing doors and these adjustments shall be independent from each other.
- c) In the case of glass panel construction lift car and/or landing doors a device which limits the door opening force to 150 N and which stops the door in the opening cycle in the event of an obstruction shall be provided.
- d) Car doors shall only operate on normal service while the car is in the levelling zone of a particular floor.
- e) A "door open" button shall be provided in the car, and it shall be operative only while the car is stationary with the car door coupled to a landing door.
- f) The design of the door operator shall be such that the prevention of the door closing movement shall initiate an automatic re-opening of the door.
- g) In the event of the doors being obstructed or held open, then after a pre-determined period, the doors shall close at reduced speed, and an audible warning will sound until the doors are closed. The lift shall normally "park" with the doors closed.
- h) Couplers shall be of the metal type of robust construction, being of the same manufacture as the door operator and landing locks.
- i) The design and construction of the door operator and associated equipment shall be such that when the lift car is stopped within the unlocking zone it shall be possible, applying a force not exceeding 300 N, to open the lift car and landing door by hand from the interior of the lift car, and from the landing once the landing door has been unlocked, either by the car door or by way of the landing locking device release key.
- j) The design and construction of the door operator and associated equipment shall be such that when the lift car is stopped within 1.2 M of a landing it shall be possible to open the lift car doors from the corresponding landing without the need for tools, other than for the landing locking device release key and/or a specific tool which is permanently retained with the lift installation.
- k) Car doors shall be fitted with a device to ensure that they remain closed and interlocked when the lift is outside the levelling zone. The device shall be designed and constructed in accordance with the requirements of BS EN81-20 and shall be subject to Type Examination in accordance with the requirements of BS EN81-50 and the Lift Contractor shall provide a Type Examination Certificate which is in accordance with BS EN81-50.

Locking Devices and Switches for Car and Landing Entrances

The car door contacts, car and landing door locking devices and “pick-up” mechanism shall be of the same manufacture as the door operator and properly aligned for correct operation.

The landing and car doors shall be provided with electro-mechanical interlock devices, which shall prevent operation of the lift under any circumstances, unless all lift car and landing doors are in the closed position and are locked both electrically and mechanically.

Provision shall be made for fully opening each landing door by an authorised person by the aid of a release key which shall be designed such as to fit an unlocking device which is incorporated into in one door panel. The release aperture on the visible face shall be fitted with a 3 mm raised circular stainless-steel bezel secured in position, or by way of a fixed escutcheon plate with a profile aperture suitable for the specific type of release key. No fixing screws shall be visible from the landing.

The design of the release key shall be in accordance with BS EN 81-20 and shall be of steel section or cast materials and the access to each lock shall be restricted to this key. The force necessary to operate and release the door shall be such that unauthorised use of the release mechanism (by the use of screwdriver, pliers etc) will not be possible.

In order to enable safe egress from the lift pit the Lift Contractor shall provide an additional, permanently installed device, which allows a person standing on the base of the pit to safely unlock the pit access landing entrance door. The device shall be designed and constructed in accordance with BS EN81-20.

All locking devices shall be designed and constructed in accordance with the requirements of BS EN81-20 and shall be subject to Type Examination in accordance with the requirements of BS EN81-50.

Landing entrance interlocks shall be UKCA Marked and Certified in accordance with the requirements of BS EN81-20, BS EN81-50 and the Lifts Regulations 2016 as amended. The Lift Contractor shall provide a valid UKCA Certificate which is to be in accordance with the requirements of BS EN81-50 and the Lifts Regulations 2016 as amended.

The lock circuit voltage shall be given in the Tender Particulars in Section 10 of this Specification. If this is designed to be in excess of 50v then suitable warning notices, in accordance with the relevant standards, shall be provided on each lock cover to warn of the hazard within. Additionally, a suitable residual current device (RCD) or similar earth leakage circuit breaker shall be incorporated in the lock control circuitry to minimise the risk of electrocution.

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The landing and car doors shall be provided with electro-mechanical interlock devices, which shall prevent operation of the lift under any circumstances, unless all lift car and landing doors are in the closed position and are locked both electrically and mechanically.

Provision shall be made for fully opening each landing door by an authorized person by the aid of a release key which shall be designed such as to fit an unlocking device which is incorporated into in one door panel. The release aperture on the visible face shall be fitted with a 3mm raised circular stainless-steel bezel secured in position, or by way of a fixed escutcheon plate with a profile aperture suitable for the specific type of release key. No fixing screws shall be visible from the landing.

The design of the release key shall be in accordance with Section 5.3.9.3 of BS EN 81-20: 2014 and shall be of steel section or cast materials and the access to each lock shall be restricted to this key.

The force necessary to operate and release the door shall be such that unauthorized use of the release mechanism (by the use of screwdriver, pliers etc.) will not be possible.

In order to enable safe egress from the lift pit the Lift Contractor shall provide an additional, permanently installed device, which allows a person standing on the base of the pit to safely unlock the pit access landing entrance door. The device shall be designed and constructed in accordance with Clause c.5.3.9.3.5 of BS EN81-20: 2014.

All locking devices shall be designed and constructed in accordance with the requirements of Section 5.3.9 of BS EN81-20 and in particular Clauses c.5.3.9.2, c.5.3.13 and c.5.3.14 (lift car door devices); and Clauses c.5.3.9.1, c.5.4.9.4 and c.5.3.11 (lift landing door devices), and shall be subject to Type Examination in accordance with the requirements of Section 5.2 of BS EN81-50: 2014.

Lift Contractor shall provide a Type Examination Certificate which is in accordance with Annexe A of BS EN81-50: 2014.

The lock circuit voltage shall be given in the Tender Particulars in Section 10 of this Specification. If this is designed to be in excess of 50v then suitable warning notices, in accordance with the relevant standards, shall be provided on each lock cover to warn of the hazard within. Additionally, a suitable residual current device (RCD) or similar earth leakage circuit breaker shall be incorporated in the lock control circuitry to minimize the risk of electrocution.

Door Detector (Panachrome+)

The car door panels shall be fitted with an electronic device, which will provide a protective zone for the full width and height of the doors. Provide ALL car doors with Memco/Avire Panachrome+ type, 234 minimum beam light curtain 3D safety edge sensing with "traffic light" red/green indication to be fitted to all doors

The principle of operation shall be an infra-red curtain of light. The device shall remain operational throughout the complete closing cycle of the doors to within 20 mm of the door closed position. The device shall have the facility to detect persons and/or objects as these approach the entrance. The device shall be capable of detecting objects and/or obstacles of 50 mm in diameter. When the device is obstructed, it shall cause the doors to immediately stop and then fully re-open after which the doors will re-commence the normal closing cycle.

The device shall incorporate red and green indicators to advise users of current operation.

Whenever the device is deactivated and/or in failure mode the kinetic energy of the combined lift car and landing doors shall be reduced to 4J or less and a distinct acoustic warning signal shall operate whilst the doors are closing.

The device location shall be given in the Tender Particulars in Section 10.

Car and Landing Doors (Fire Rated – Double Skin)

The lift landing entrances and doors and frames shall be 2-hour Fire Rated and subject to Fire Resistance Test in accordance with the requirements of BS EN81-58. The Lift Contractor shall issue a Test Report and a Declaration of Performance in accordance with the requirements of BS EN81-58.

The construction shall be single skin, and the sheet steel shall be a minimum of 16 SWG. The face of the door panels shall maintain a fixed running clearance in relation to the architrave or door entrance surround and provision for adjusting this dimension shall be provided. All fixings and attachments of

each individual door panel shall be adequately reinforced to ensure that distortion of the door panel cannot occur.

Door panels shall be of double skin construction, and the sheet steel shall be a minimum of 16swg such as to assure the continuing integrity of these for the life of the lift installation and the prevailing site conditions. The face of the door panels shall maintain a fixed running clearance in relation to the architrave or door entrance surround and provision for adjusting this dimension shall be provided. All fixings and attachments of each individual door panel shall be adequately reinforced to ensure that distortion of the door panel cannot occur.

The design and mechanical strength of the lift car and landing entrance door panels and frames shall be such that these meet the requirements of Section 5.3.5.3 of BS EN81-20: 2014.

The lift car and landing entrance doors shall be equipped with devices which ensure that the door panels are retained in position in the event of failure of a guiding element. The door panels and retaining devices shall be tested in accordance with the requirements of c.5.3.5.3.4 of BS EN81-20: 2014 and of Section 5.14 of BS EN81-50: 2014. The Lift Contractor shall provide a Test Report in accordance with c.5.14.5 of BS EN 81-50: 2014.

When the doors are in the closed position the clearances between door panels, between door panels and uprights and lintels and sills shall not exceed 6 mm, which shall be measured from the back of any recess.

The clear entrance of landing doors shall match that of the car doors and in no case shall the clear entrance width of the landing doors exceed that of the car doors by more than 50 mm at any side.

Each panel shall be located in its bottom track by means of two sliding shoes, each having an offset vertical flange secured to the well side of the door, so that the shoe can be easily replaced without lifting the panel. In addition, a robust mechanical retaining shoe/bracket, formed in metal, shall be incorporated into the design of each door panel such that the panel shall be securely retained in the sill in the event that the door shoes should fail or of physical impact to the door panel.

Each door panel shall be suspended from the top track assembly by hangers fitted with at least two polyurethane rollers with anti-friction bearings and a steel restraint boss to prevent the suspension becoming dislodged from the track.

The landing doors shall be provided with mechanical spring closers for automatic closing of the doors when manually opened. At no time shall the springs operate in tension.

Each landing door panel to be fitted with a reinforced sight guard and the return edge shall be not less than 50 mm wide to mask the shaft side of the landing panel. The guard shall be finished to match the doors. No fixings to be visible on the exposed faces.

The non-driven door panels of each lift car and landing entrance shall be fitted with an electrical interlock, or alternatively, may be mechanically coupled in accordance with Sections 5.3.11 and 5.3.14 of BS EN81-20: 2014. Any air cord inter-connections shall be of steel construction.

The design of the lift car and landing entrances systems, including sills and mountings, shall be such as to accommodate the loads imposed during loading and unloading of the lift car and shall be designed based upon a minimum loading of:

- **In the case of Passenger Lifts which carry Class C wheelchairs and/or mobility scooters 60% of lift car rated load**

Car & Landing Sills (Aluminium)

The lift car and landing door sills shall be designed and manufactured in the form of a heavy section aluminium extrusion. The sills shall be securely bolted on to RSA angles which shall be fixed to the front wall of the lift shaft with proprietary fixings. The number of fixings used shall be calculated to accommodate the maximum point loading which may be applied. Any packing between the aluminium and RSA sill or treadplate shall be continuous and such that no voids shall exist on completion such that deflection of the sill cannot occur.

The design of the sills and mountings shall be such as to accommodate the loads imposed during loading and unloading of the lift car and shall be designed based upon a minimum loading of:

- In the case of Passenger Lifts 40% of lift car rated load;
- In the case of Passenger Lifts which carry Class C wheelchairs and/or mobility scooters 60% of lift car rated load;
- In the case of Goods Passenger Lifts 60% of lift car rated load.

Car & Landing Sills Vandal Resistant

In addition to the general requirements of this Specification the design, construction and installation of the lift car and landing entrances and sills shall meet with the requirements of, and tests specified in, BS EN81-71.

Landing Fascia

Fascia panels manufactured from a minimum of 16 SWG zinc-coated mild sheet steel shall be fitted between the header of each entrance and the sill of the floor above.

The panels shall be rigidly braced and any fixings or brackets used for mounting or to achieve rigidity shall be of steel. The design, construction and installation of the fascia shall such that this is in accordance with the requirements of BS EN81-20 and such that this is capable of withstanding a force of 300 N applied at right-angles to the fascia, and evenly distributed over an area of 5 cm² in round or square section, and applied at any point on the fascia, without permanent deformation, and without elastic deformation in excess of 15 mm. The surface of the fascia panels and their joints shall be continuous and hard and smooth throughout the height and width of the shaft. Each fascia panel shall exceed the full width of the widest entrance by 200 mm on either side. Only countersunk screws will be accepted such that the surface, at all points on each panel, is smooth and flush. Following installation, the fascia shall be site painted with hand brushing cellulose colour to match all other site steelwork.

Architraves (Standard Surround)

Box section or small trim architraves, to the Lift Contractor's standard design, shall be provided at each lift landing entrance at each floor level.

Full details, including dimensions and illustrations, shall be provided at the time of Tender.

The architraves shall be finished in stainless steel material as is detailed in the Finishes Schedule of this Specification.

The architraves and lift landing entrances shall be provided with minimum a 2-hour fire rating and certification in accordance with the requirements of BS EN81-58.

The Main Contractor shall provide the necessary making good around the entrance including sill and header and to meet the requirements of the Fire Certification.

Landing Signal and Operating Devices (Simplex/Standard)

The landing signal and operating units shall comprise of robustly constructed steel or PVC back boxes, which are of rectangular form and let into appropriate cut-out preparations in the landing structural walls. The unit shall contain the push units and have cover plates manufactured from 12 SWG stainless steel.

The cover plates shall be secured by semi-secret fixings such as recessed captive grub or socket headed screws. Visible screw heads will not be accepted. Cover plates shall provide an adequate overlap of the wall box and the method of securing shall allow for adequate adjustment in order to overcome any error in the positioning of the back boxes.

Landing controls shall be arranged as a single riser with a push station located on the landing wall adjacent to the landing entrance at each floor.

Each landing push station shall be fitted with one or two push units to suit the requirements of the control system. The design and construction of the units shall be in accordance with the requirements of BS EN81-70. The units shall be positioned and arranged in accordance with the requirements of BS EN81-70. The visible section of each push shall incorporate a pressel, with a translucent halo and symbol, which are suitably finished to contrast in colour and tone with that of the cover plate. Each push pressel shall be arranged to illuminate to indicate call acceptance. The method of illumination shall be by light emitting diodes (LED).

Each push shall have an audible signal to confirm operation. The push stations shall be installed at a height which ensures a minimum dimension of 900 mm above Finished Floor Level to the centreline of any push and a maximum height of 1100 mm above Finished Floor Level the centreline of the highest push.

The push plate shall be in tonal contrast to the surrounding wall.

Signal and Operating Devices (Tactile and Braille Marked Pushes)

The lift call pushes in both the lift car operating panel and at each of the lift landing stations shall be designed and constructed in accordance with the requirements of BS EN81-70 and shall incorporate braille and tactile markings, either on the pressel or immediately adjacent to the pushes.

The pushes shall be illuminated by means of LED's and full details shall be provided as part of the Tender submission.

The floor designation shall be of tonal contrast to the push pressel. The pressel shall be of tonal contrast to the plate.

Each push shall have an audible confirmation of operation.

Each landing push plate shall have a tactile indication of the floor level.

Landing Position Indicators (Individual Cover Plate)

Landing signal devices shall be provided at each landing entrance and shall comprise of an alpha numeric display combined with an audible enunciator.

The display shall consist of a matrix of LED lamps, or other alternative device to the approval of the Engineer, installed behind a tinted polycarbonate mask providing a display of alpha/numeric characters

of minimum 40 mm in height. The enunciator shall be of a soft tone gong or electronic sounder design and shall be contained within the unit. The enunciator shall provide different sounds for 'UP' and 'DOWN' directions of lift travel e.g. one sound up, two sounds down.

As the lift car moves in the lift well its position shall be indicated by the changing the alpha numeric display. As the lift car approaches a landing at which it is to stop in order to discharge or receive passengers, the tone shall sound in order to announce the imminent arrival of the lift car and the display shall switch to an arrow indicating the next direction of lift travel from the landing. This directional signal shall be maintained until the lift doors close, and the lift car moves away from the landing.

The lift position indicators shall be supplied as individual units and shall be located between 1800 mm and 2500 mm from Finished Floor Level, and adjacent to their respective lift landing entrances and shall be provided complete with cover plates to match those of the landing push stations.

The indicator shall provide an angle of view of at least 140° from any position in the lift landing lobby.

The devices shall be designed and constructed in accordance with the requirements of BS EN81-70.

Landing Position Indicators and Direction Arrows.

In addition to the stated general requirements of this Specification the design, construction and installation of the landing position indicators on all floors.

Maintenance Barrier

A maintenance barrier shall be provided by the successful tenderer to the purchaser

A sample design of the barrier shall be submitted for approval to the Purchaser's Representative. When not in use, the barrier shall be retained in the lift machine room or machinery space and mounted on purpose made brackets, or at an agreed location on the site.

At the expiry of the maintenance contract, the barrier shall remain as the property of the Purchaser. The barrier shall be collapsible in design, painted safety yellow and be fitted with a suitable "DANGER" notice and designed and constructed in accordance with the requirements of BS7255.

Lift Shaft, Counterweight & Pit

Guides and Fixings

The Lift Contractor shall supply and install "T" section machined steel guide rails complete with purpose designed brackets, bolts and fixings, all designed, constructed and installed in accordance with the requirements of BS EN81-20 and BS EN81-50.

Both the lift car and counterweight sets of guide rails shall be plumbed and aligned with each other. And, "tram lining" will **not** be allowed.

The guide rail system, inclusive of brackets and fixings, shall be designed to suit the configuration of the lift shaft and the loads imposed by the lift, lift equipment and the means of loading of the lift car, including motorised wheelchairs.

The design and installation of the guide rail brackets shall be such as to accommodate settling of the building structure and/or shrinkage of concrete. The design and installation of the fixings shall be such as to prevent rotation which could release or compromise the integrity of the system

The vertical pitch of fixings and size of guide rails shall be selected and designed such as to accommodate the maximum loading that may be imposed upon this at any time and without excessive deflection of the guide rails.

The guide rails, fixings and the pitch of fixings shall be designed such that the maximum deflection criteria detailed in BS EN81-20 is not exceeded. The necessary proof calculations, based upon the BS EN81-50 method, shall be made available at the Engineers request. The Lift Contractor shall include for the possible failure of any non-metallic elements of the guide rail fixings in the calculation of permissible deflection.

The design of the guide rails, brackets and fixings shall be such as to accommodate the loads imposed during loading and unloading of the lift car and shall be designed based upon a minimum loading of:

- In the case of Passenger Lifts which carry Class C wheelchairs and/or mobility scooters 60% of lift car rated load;

Counterweight and Screen

The Lift Contractor shall supply and install robustly constructed channel frame type of counterweight which shall be designed to securely house a number of multiple section filler weights commensurate with the design of the lift installation.

The filler weights shall be of either cast iron or flame cut mild steel construction.

The complete counterweight shall be balanced by the suspended weight of the lift car and its attachment together with 45% to 50% of the contract load of the lift car.

The Lift Contractor shall include provision for securely clamping the filler weights into position such that under no circumstances, including operation of the lift car or counterweight buffers, can the filler weights become dislodged from the counterweight frame. The whole counterweight assembly shall be site painted with safety yellow proprietary machine paint.

In cases in which extension sections are attached to the bottom of the counterweight in order to provide an allowance for adjustment of the run-by after normal stretching of the suspension ropes, these extension sections shall be fabricated from rolled steel sections, and shall be securely bolted to the underside of the counterweight and accurately aligned with the striking surface of the buffer(s).

The Lift Contractor shall supply and install, at the base of the counterweight guides, a counterweight screen rigidly constructed in expanded mesh in accordance with the requirements of BS EN ISO 13857.

The counterweight screen shall extend upwards from the lowest point of counterweight travel (including the stroke of the counterweight buffer), or a point not greater than 300 mm, whichever is the lower, to a minimum height of 2.0 m above the pit floor.

The counterweight screen shall extend for a minimum of the full width of the counterweight.

In the case that the horizontal distance between the counterweight guide rails and the wall of the lift well should exceed 300 mm the areas at the sides of the counterweight and counterweight guide rail shall be guarded using materials of the same design and specification as that of the counterweight screen.

In cases in which chain or rope compensation is applied that counterweight screen may be designed to accommodate slots which shall be of the minimum width necessary in order to safely accommodate the compensation.

The design and construction of the counterweight screen shall be such as to accommodate a force of 300 N evenly distributed over an area of 5 cm² in round or square section, applied at any point on the screen, without deflection such that the screen should come into contact with the counterweight.

The design of the counterweight screen shall be such that a minimum clearance of 50 mm is maintained at all times between the lift car and the counterweight and their associated components and the screen.

The bottom of the screen shall be designed to assure easy access to the buffers, and to permit checking of run-by clearances, but such as to prevent inadvertent contact between personnel and the counterweight.

Buffers (Energy Accumulation)

The Lift Contractor shall supply and install energy accumulation (spring or polyurethane) buffers below the lift car and below the counterweight.

The design, construction and installation of the buffers shall, in all respects, be in accordance with the requirements of BS EN81-20.

The Lift Contractor shall supply and install all necessary associated steelwork for the mounting and fixing of the buffers.

Concrete supporting piers will NOT be acceptable.

The buffer mounting steelwork shall be of robust construction securely fixed between the respective lift car and counterweight guide rails and be of sufficient height to maintain the overtravel of the lift car and counterweight and the clearances required under BS EN81-20.

The design of the buffers shall be such as to ensure that the rate of retardation applied in order to safely arrest the fully loaded lift car and counterweight, is applied without undue discomfort to passengers or damage to the equipment.

In the case of buffers designs in which the buffers are mounted directly upon the lift car or counterweight a permanently installed, robust, steel pedestal, of not less than 300 mm in height, shall be securely fixed to the floor of the lift well pit in a position corresponding to each buffer impact point.

In the case of hydraulic lifts, the stroke of the buffers shall be such that when the buffers are fully compressed that the ram of the hydraulic jack shall not contact the base of the hydraulic cylinder.

In the case of buffers with linear characteristics the stroke of the buffers shall be not less than twice the gravity stopping distance corresponding to 115% of the rated speed of the lift, but in no case shall the stroke be less than 65 mm. The design of the buffers shall be such that the buffer stroke shall be calculated to fall within that arising under the application of a static load of 2.5 and 4 times the mass of the lift car and its rated load, or of the counterweight,

In the case of buffers with non-linear characteristics the average retardation, calculated based upon the fully loaded lift car in free fall striking the buffer at 115% of contract speed, shall not exceed 1 gn; and retardation in excess of 2.5 gn shall be for no longer than 0.04 seconds; and with the return speed of the lift car not exceeding 1.0 m/sec; and without permanent deformation. In any case the maximum peak retardation shall not exceed 6 gn.

In the case of buffers with non-linear characteristics each buffer shall incorporate a permanently fixed data plate which sets out the name of the manufacturer of the buffer; the number of the associated Type Examination Certificate; and the type of the buffer.

A Certificate of Type Test, in accordance with the requirements of BS EN81-50, shall be provided in relation to buffers with nonlinear characteristics.

Restricted Headroom (EN81-21) (If required)

In all cases of a new lift installation in which the Refuge Spaces above the lift car are not in compliance with the requirements of, and the provisions set out in BS EN 81-20, the Lifts Regulations 2016 as amended, the Lift Contractor, in liaison with their Approved Body, shall as necessary seek and obtain a Derogation against the particular requirements and provisions from the relevant department of the UK Government. The Lift Contractor shall provide a copy of the Derogation to the Engineer.

In the case of a new lift the aforementioned provisions, together with any additional provisions which may be required, shall be formally approved, in writing, by the Lift Contractor's Approved Body and any other additional items required from the Lift Contractor's Risk Assessments.

Where the headroom restrictions of an existing lift well/installation prevent the attainment of the clearances and refuge spaces as set out in BS EN 81-20, the following safety features designed in accordance with the requirements of BS EN 81-21 shall be provided:

- The Lift Contractor shall supply and install devices providing refuge spaces in the headroom together with a safety system controlling the operation of the lift.
- The devices shall be movable stops, or a pre-triggered stopping system.
- The detailed design of the Lift Contractor's proposed device/s shall be provided to the Engineer for approval.

Moveable Stops

In the case of movable stops these shall be operated automatically such as to prevent damage due to collision when the stops are moved between the retracted and extended positions.

In the case of traction drive lifts the movable stops shall be installed under the counterweight and arranged to mechanically stop the lift car.

In the case of drum or chain driven lifts the movable stops shall be installed above the lift car and arranged to mechanically stop the lift car.

In each case the moveable stops shall be fitted with suitable buffers which are designed and installed in compliance with the requirements of BS EN 81-20.

In the case of hydraulic lifts, the movable stops shall consist of one or more devices which are external to the hydraulic jack, and which are located outside of the projection of the lift car, but with the resultant force exerted upon the centre line of the hydraulic jack. The design and construction of the movable stops shall be such that the average retardation of the lift car does not exceed 1 gn and, in the case of indirect acting lifts, such that the retardation does not result in a slack rope or chain situation.

Pre-Triggered Stopping System

Pre-triggered stopping systems shall include a triggering device which shall be designed, constructed and installed complete with a linkage type actuating mechanism which shall operate a mechanical stopping gear when the lift car reaches a fixed tripping point in the upwards direction of travel.

The triggering device shall be easily accessible such that examinations and maintenance may be undertaken in complete safety from the lift well pit, or from the roof of the lift car, or from outside of the lift well.

The pre-triggered stopping system shall be designed and constructed such that;

- the stopping gear is fixed on the lift car and acts upon the lift car guide rails;
- the system is tripped by a mechanical triggering device, formed of a mechanical linkage, for the tripping operation;
- the stopping gear shall be kept tripped by the triggering device and the linkage when the lift car is at any position above the tripping point;
- in the case of a release of the stopping gear due to dynamic effects or rescue operations this shall be reengaged when the car moves again in up direction above the tripping point keeping the required refuge space;
- the stopping gear shall be operated positively. Where springs are used these shall act by compression and where a rope is used the minimum breaking load of the rope shall be related by a minimum safety factor of 8 in terms of the tensile force created during operation of the stopping gear;
- the force required to activate the stopping gear shall be at least twice the engagement force of the stopping gear taking into consideration the tolerances due to friction, and in no case less than 300 N;
- the stopping gear shall operate an electric safety device which is designed and constructed in accordance with the requirements of BS EN 81-20 whenever this is engaged;
- when the stopping gear has been tripped its return to normal operation shall require the intervention of a competent maintenance person;
- following its release the stopping gear shall be in a condition to operate;
- the system shall be designed and constructed such that the triggering device shall be protected against the accidental insertion of objects, dirt and corrosion;
- the pre-triggered stopping system shall be able to stop the car and keep it stopped from any speed between zero and the tripping speed of the ascending car overspeed protections means;
- the maximum retardation by the stopping gear shall not exceed 1 gn in the worst condition as validated according to BS EN 81-21;
- when the stopping gear operates the floor of the lift car, regardless as to whether any load is uniformly distributed, shall not incline by more than 5 % from its normal position;
- the pre-triggered stopping system shall be designed and verified according to the requirements of BS EN 81-21.

Clearance

When the buffering parts of movable stops are fully compressed, or when the lift car is stopped by the pre-triggered stopping system, the refuge spaces on the lift car roof and the clearances in the headroom shall comply with the requirements of BS EN 81-20.

Operation

The movable stops or the triggering device shall be operated:

- automatically at the latest when the safety system has been activated, or;

manually.

Power Failure

In the case of power failure:

- in the case of automatic movable stops or an automatic triggering device these shall be activated and maintained in the active position up until the restoration of power supply or until a secondary/emergency power supply has been activated.
- in the case of manually operated movable stops or manually operated triggering devices a mechanical safety device shall maintain the lift car stationary. The device shall be activated and maintained in the active position at least up to the power restoration.

In the case of traction drive lifts which are equipped with manual operation of moveable stops or manual operation of triggering devices the mechanical safety device shall be operated by the safety system such as to prevent any movement of the lift car in the up direction if the movable stops or the triggering device is not in the active position.

Electrical monitoring

The movable stops or the triggering device shall be provided with electrical safety devices which are designed and constructed in accordance with the requirements of BS EN 81-20. These shall monitor:

- the fully extended (active) position, and.
- the fully retracted (inactive) position.

Safety system

An electrical safety device which is designed and constructed in accordance with the requirements of BS EN 81-20 shall be provided such as to:

- activate a safety system that neutralises lift normal operation.
- be operated when any door/trap door giving access to the lift car roof is opened by means of a key.
- be bi-stable.
- be reset together with the resetting of the safety system.

In the case of lifts with hinged landing doors a second electric safety device in accordance with BS EN 81-20 shall prevent any movement of the lift car if any door giving access to the lift car roof is open. This device shall not be accessible without using a tool.

The resetting of the safety system and the return of the lift to normal operation shall be by operation of an electrical resetting device.

The resetting shall be effective only when:

- the lift is not in inspection operation.
- the stopping devices in the lift well pit and on the lift car roof are not in the STOP position.
- any door/trap door giving access to the lift car roof is closed and locked.
- the devices providing the refuge spaces are in the inactive position.
- any extendable balustrades on the lift car top are retracted.

A power failure shall not reset the safety system.

The electrical resetting device shall be:

- lockable with the use of a padlock or equivalent such as to ensure no inadvertent operation; and
- placed outside of the lift well and accessible to authorized persons only (maintenance, inspection and rescue); and
- monitored by an electrical safety device which is designed and constructed in accordance with the requirements of BS EN81-20 which prevents normal operation of the lift whenever the resetting device remains activated.

An additional electrical safety device which is designed and constructed in accordance with the requirements of BS EN81-20 shall interrupt movements of the lift car under inspection operation in up direction prior to any contact with the buffering parts of the movable stops and before the triggering device is tripped.

The lift car shall be stopped before the stopping gear is tripped.

This electrical safety switch shall allow the movement of the lift car only in the down direction.

In the position in which the car is stopped examinations, tests and maintenance operations in relation to all components which are located in the headroom shall be possible, in complete safety, from the lift car roof or from outside of the lift well.

Normal operation of the lift shall only be possible if the movable stops or the triggering device are in the inactive position and the safety system is not activated.

When the safety system has been activated, inspection operation shall only be possible if the movable stops or the triggering device are in the active position.

When the safety system has been activated, and the movable stops or the triggering device are not in the active position, emergency electrical operation shall only be possible in the downwards direction.

Visible and/or audible information

On opening, by means of a key of any door/trap door giving access to the lift car roof, a signal visible and/or audible from the landing shall clearly indicate the status (active and not active) of:

- the movable stops; or
- the triggering device.

In cases in which both ends of the lift travel are protected by movable stops and/or by pre-triggered stopping systems, the signal shall clearly indicate the status of the equipment at the top and bottom of the lift well.

The audible signal may be switched off after 60 s provided that the movable stops or the triggering devices are in the active position.

Car roof balustrade

Where the design of a lift is such that a balustrade is necessary on the lift car roof in accordance with the requirements of BS EN81-20, an easily and safely extendable balustrade shall be permanently installed.

The extendable balustrade shall meet the following requirements:

- the design and construction of the balustrade shall be in accordance with the requirements of BS EN 81-20 and shall be such that its fixings ensure that the balustrade remains in its extended position under the foreseeable vertical forces.
- the balustrade shall be designed in such a way that it can be totally unfolded/folded or extended/retracted while standing on a safe area.
- if the standing area is on the lift car roof this shall be:
 1. in accordance with the requirements of BS EN 81-20.
 2. clearly indicated and visible from the landing.
 3. placed at a distance from the edge of the lift car roof not less than 0.5 M from where the risk of falling exists.
- electric safety devices which are designed and constructed in accordance with the requirements of BS EN81-20 shall prevent the movement of the lift car if:
 1. in normal operation the balustrade is not fully retracted.
 2. in lift car top inspection operation if the balustrade is not fully extended.
- In the case of emergency electrical operation and in inspection operation a direction dependent electric safety device designed and constructed in accordance with the requirements of BS EN81-20 shall prevent upward movements in the zone where the balustrade, if not folded or retracted, can collide with the ceiling of the lift well.

Limits and Switches

The Lift Contractor shall incorporate an “UP” limit in the lift control circuit such that when the mechanic’s lift car top control switch is set to the “INSPECTION” position and the “UP” button depressed, the upwards travel of the lift car shall be limited such that inspection and maintenance of any equipment at the top of the lift shaft may be safely undertaken, **AND** such as to ensure that safe egress is possible through the top floor landing entrance.

The lift control circuits shall incorporate terminal slow down switches and/or shaft limit switches which, in the event of a circuitry or selector malfunction, shall operate such as to safely slow and stop the lift, in a safe and controlled manner, at each of the terminal floors.

The electrical switches and/or devices used shall be designed and constructed in accordance with the requirements of BS EN81-20. The Lift Contractor shall identify the switches/devices and outlined the proposed operation of these, in the appropriate section of the Schedule of Technical and Constructional details of this Specification.

Stop Switches (Pit)

The Lift Contractor shall supply and install two stop switches in the lift well pit. One stop switch shall be installed in a position that is readily visible and easily accessible from the landing entrance and at a height of 1 m above the landing sill level and at a horizontal distance not greater than 0.75 m from the inner edge of the landing entrance door frame.

The second switch shall be installed such that this is visible and readily accessible and may be safely operated from a pit refuge space, and in no case shall the stop switch be position in excess of 1.2 m above the pit floor.

The stop switches shall be designed and constructed in accordance with the requirements of BS EN81-20 and shall be of mushroom headed, "push to stop, pull to release" type.

Restricted Headroom (If required)

Where the headroom restrictions of an existing installation prevent the attainment of the correct clearances and refuge spaces set out in BS EN 81-20, the following minimum safety features shall be provided:

- Reduced headroom notices as detailed in this Specification.
- Suitable warnings in the Operating and Maintenance Manuals/Health and Safety File.
- Test limit as detailed in this Specification to stop the lift when on Inspection control.
- A device which is designed, constructed and installed in accordance with the requirements of BS EN 81-21. The design of the Lift Contractor's proposed device shall be provided to the Engineer for approval.
- A means to detect the presence of a person on the car roof and prevent the lift from moving unless it is under maintenance control.

In the case of a new lift the aforementioned provisions, together with any additional provisions which may be required, shall be formally approved, in writing, by the Lift Contractor's Approved Body and any other additional items required from the Lift Contractor's risk assessments.

In all cases of a new lift installation in which the Refuge Spaces are not in compliance with the requirements of, and the provisions set out in BS EN 81-20, the Lifts Regulations 2016 as amended, the Lift Contractor, in liaison with their Approved Body, shall seek and obtain a Derogation against the particular requirements and provisions from the relevant department of the UK Government. The Lift Contractor shall provide a copy of the Derogation to the Engineer.

Pit Communications

A communications unit shall be provided in the lift well pit which will enable two-way communication with a permanently manned rescue service in the event of a person being trapped in the lift pit.

The unit shall meet with the requirements of BS EN81-20.

The communication device may form part of the lift car trapped passenger and lift car top communication system.

The communication unit shall meet with the requirements of BS EN81-28.

The communication unit shall be located such that this is readily accessible from the floor of the pit and that this is readily operable from the refuge spaces.

Clear instructions as to the use of the unit shall be provided on, or in close proximity to, the unit.

Electrical Installation Method

Electrical Installation Method (Conduit and Trunking)

The Lift Contractor shall install all necessary wiring, trunking, conduit, cable tray, ladder systems and accessories for the lift/s from the 3 phase and or single-phase lift power supply isolator/s or Distribution Boards within the lift machine room/s.

All cables, except travelling cables in the lift shaft, shall be enclosed throughout their length in heavy gauge steel conduit, steel trunking or secured in a suitable manner to cable tray and ladder systems. The use of existing conduit, trunking, cable tray, ladder systems and fittings is not acceptable unless prior agreement is sought from the Engineer. All trunking and cable tray runs shall be at high level and shall not run across the machine room floor. All conduit, trunking, cable tray and ladder systems and associated fittings shall have a galvanized finish and shall comply with the appropriate parts of BS EN 61386 series, BS EN50085 series and BS EN 61537 series.

All travelling cables shall run direct from the controller to the lift car termination box. Each cable shall be suspended from a clamp provided by the cable manufacturer with adequate protection to the cable coverings. Excessively tight bends will **not** be acceptable.

Flexible metal conduit shall be used only in cases where it is necessary to provide for adjustment, to reduce the transmission of noise and vibration or final connection to switch housings. The conduit shall terminate in suitable couplings which shall positively grip the flexible conduit and an additional earth continuity conductor shall be run **inside** the conduit. Excessive lengths of flexible conduit may be rejected by the Engineer and shall be reconfigured at no additional cost.

Provision shall be made within the travelling cables for any cables necessary for the car communication system/s.

All wiring, including trailing flexes, shall be insulated with low emission of smoke and halogen free cross-linked insulation.

Where SY type cable is used to connect the main switch to the control panel the lift contractor shall provide evidence the cable has been manufactured in compliance with designated British standards.

Where provided, the Lift Contractor, shall include for connection of all extraneous metalwork to earth bonding and lighting protection systems terminated in the lift pits.

Electrical Installation Method (Pre-loomed LSZH)

The Lift Contractor shall install all necessary wiring, trunking and conduit for the lifts from the main riser termination point.

All wiring must comply with the current Edition of BS 7671 of the IET Regulations where applicable.

All wiring, including trailing flexes, shall be insulated with halogen-free low smoke emission insulation, in compliance with BS 7211, BS EN50525-1 and BS50525-3

Any wiring which is exposed and vulnerable during normal maintenance (i.e. control panel to shaft, car top, pit and machine room), shall be mechanically protected to prevent damage.

All travelling cables in the shaft and on the car shall be supported by purpose made clamps or suspension devices. Excessively tight bends will **not** be acceptable.



All cables shall be obtained from an approved manufacturer. Only one make of travelling cable shall be used in this installation.

Any coil of cable or travelling cable manufactured more than twelve months prior to delivery on site will not be accepted. The Lift Contractor may be required to furnish satisfactory evidence of the date of batch manufacture of any coil.

Where round flexes are fitted, prior to termination on the car they shall be hung, suitably weighted and free to rotate in order to relieve these cables from any tendency to twist during service.

Factory manufactured wiring looms for site wiring will be allowed providing detailed and accurate site dimensions are obtained from site for use during manufacture. Any looms installed which have excessive length or are not generally neatly finished and installed, will be rejected and will have to be returned to the Lift Contractor's manufacturing facility for re-manufacture at the **"Lift Contractor's own expense"**.

All plugs and sockets shall be permanently and indelibly factory labelled to show the plug and corresponding socket.

Where trailing cables are suspended from a point above halfway, restraints shall be fitted between the suspension anchorage and the halfway point to eliminate the possibility of the trailing cable moving into the path of the car or counterweight. Any such restraints shall allow vertical movement of the trailing cable to accommodate stretch.

Provision shall be made within the travelling cables for any specialist conductors necessary for the car communication system.

All travelling cables shall be delivered on a cable reel and stored in site in a cable rack protected from moisture.

Travelling cables delivered in loose coils and subject to kinking shall be rejected.

The Lift Contractor shall include for connection of all extraneous metalwork to earth bonding and lightning protection systems terminated in the lift pits.

Earthing

A separate electrical earth conductor shall be run in all conduits and trunking to every item of electrical equipment from the earth termination in the control panel. This termination shall in turn be connected by means of a suitable conductor to the electrical mains supply earth point.

A separate earth conductor in at least one trailing cable shall be connected to the lift car equipment and to the control panel earth termination.

Each section of trunking shall be electrically and mechanically bonded to the earth conductor by means of brass screw, clamp washers, locking washer and nut.

All of the earth points shall be identified using coloured tags.

Radio and TV Suppression

All electrical equipment shall be provided, as necessary, with suppressers, to prevent interference to radio, television and computer equipment within the premises in accordance with current British Standards and Telecommunications Guidelines.

The lift and lift equipment shall be design and constructed in accordance with the requirements of BS EN12015 in terms of EMC Emission, and with the requirements of BS EN12016 in terms of EMC Immunity.

Painting

All equipment shall be suitably prepared, primed, undercoated and then painted with an approved colour before shipment to site. All shaft steelwork within the shaft shall be painted in two coats of machine paint following erection. Any existing steelwork retained within the lift shaft, pit or lift machine room shall be wire-brushed, cleaned, primed, undercoated and then painted with an approved shade of machine paint. Any damage to the painted surfaces which arises prior to completion shall be made good by the Lift Contractor.

Any new steelwork that will not be readily accessible after erection shall be painted with red oxide paint (or paint of similar protective quality) prior to installation.

1.1.1 MRL LIFTS – MISCELLANEOUS

Machine room-less lifts shall comply in all respects with the requirements of BS EN81-20: 2014 and BS EN81-50: 2014.

The Lift Contractor's attention is drawn in particular to the requirements of the above Standards in the case that lift equipment supplied is not contained wholly within the lift-well or that the equipment is to be maintained from outside of the lift-well, and/or by way of inspection doors, access hatches or similar.

Machinery Spaces Inside the Lift-well

Shall be designed and constructed such as to:

- Permit easy and safe working on the equipment.
- Provide a clear height of at least 2.1 M at all working areas.
- Provide a clear height of at least 1.8 M for moving between one work area and another.
- Provide a clear horizontal area of at least 0.5 M x 0.6 M at parts which require maintenance and inspection.
- Provide a clear horizontal space at the front of control panels and cabinets which is not less than 0.7 M, measured from the front face of the enclosure, and the full width of the cabinet or panel, and in no case less than 0.5 M.
- Include permanent low energy LED lighting providing a minimum level of illumination 200 lux and incorporate emergency lighting in accordance with the requirements of this Specification and which shall be in full compliance with the requirements of BS COP BS5266-1.

Working Areas in the Lift Car or on the Lift Car Roof

Shall be designed and constructed such as to:

- Include a permanently installed mechanical device which is designed and constructed in accordance with the requirements of c.5.2.6.4.3.1 of BS EN81-20 shall be provided.
- Include clear instructions in relation to the safe deployment of the device which shall be provided at the Working Area and in the O&M Manual.

- Include permanent low energy LED lighting providing a minimum level of illumination 200 lux and incorporate emergency lighting in accordance with the requirements of this Specification and which shall be in full compliance with the requirements of BS COP BS5266-1.

Working Areas in the Lift Pit

Shall be designed and constructed such as to:

- Include a permanently installed mechanical device which is designed and constructed in accordance with the requirements of c.5.2.6.4.4.1 of BS EN81-20 shall be provided.
- Include clear instructions in relation to the safe deployment of the device which shall be provided at the Working Area and in the O&M Manual.
- Include permanent low energy LED lighting providing a minimum level of illumination 200 lux and incorporate emergency lighting in accordance with the requirements of this Specification and which shall be in full compliance with the requirements of BS COP BS5266-1.

1.2 Silent Operation

The Lift Contractor shall include for taking every practical precaution to ensure quiet operation of the new equipment. Every practical precaution shall also be taken to prevent vibration being transmitted to the building structure from all items of the lift equipment. The Lift Contractor shall indicate, at Section 10 of this Specification, the proposed methods which he proposes to adopt in order to assure quiet operation and provide details of the noise and vibration levels which are guaranteed to be achieved by the completed installation.

BRE Environmental Assessment Method (BREEAM) for Buildings

The lift system shall meet the criteria for best practice in sustainable design and hence contribute to the environmental performance of the building. All the following features shall be incorporated into the lift installation to maximise the award of BREEAM credits:

- Provision of PIR or standby control of car lights and ventilation fan to ensure automatic shutdown when not in use.
- Provision of low energy LED lift car lighting or similar low energy light fittings with an average luminous efficacy across all fittings in the car of > 70 luminaire lumens per circuit Watt
- Standby mode on controllers and drives to reduce power consumption to a minimum during periods of inactivity.
- Variable Voltage Variable Frequency Regenerative drives.



SECTION 6
COMMISSIONING, ACCEPTANCE PROCEDURE
AND
SERVICE MANUALS

6 COMMISSIONING, ACCEPTANCE PROCEDURE AND SERVICE MANUALS

Commissioning and Acceptance Procedure

The Lift Contractor shall agree a full commissioning and testing programme with the Engineer. Prior to offering the installation to the Engineer for acceptance tests, the Lift Contractor shall carry out full tests in compliance with the requirements of BS 8486, BS EN81-20, BS EN81-50, the Lifts Regulations 2016 as amended and the specific requirements of the Specification. Any defects identified during or arising from the Lift Contractor's inspection and testing shall be remedied prior to the installation being offered for acceptance tests. The Lift Contractor shall further ensure that the whole installation fully satisfies the design criteria and functionality in accordance with the requirements of the Specification.

The Lift Contractor shall make complete records of the tests utilising test sheets, which shall be in full compliance with BS 8486. In the case of a modernisation of existing installations the Lift Contractor shall provide **additional** updated test sheets in the form applicable to the original installation of the lift.

The Lift Contractor shall be responsible for providing all of the instruments necessary to undertake the commissioning and the tests as required by the Engineer, including, but not limited to, test weights, thermometers, noise and vibration measurement devices, induction loop test unit, electrical test meters, force measurement gauges, deflection gauges and jigs, all of which shall be accurately calibrated and accompanied by current (within 12-months) Calibration Certificates, and to the satisfaction of the Engineer.

The Lift Contractor shall provide the Engineer with not less than five full working days prior notice of their intention to offer the installation for acceptance tests. The Lift Contractor shall confirm this in writing.

The Lift Contractor shall be responsible for all the tests to ensure the proper function and operation of the lift under this Contract. Prior to acceptance and placing into service the lift shall, under the supervision of the Engineer, pass all of the tests detailed within this Specification or as may be required by the Engineer during commissioning.

- a) 25% overload test.
- b) 60 minutes full load test.
- c) Motor current and speed tests.
- d) Door Inspection and tests.
- e) Electrical insulation resistance to earth test, earth loop impedance and RCD test.
- f) Earth continuity resistance test.
- g) Full load, full speed safety gear test (if applicable)
- h) Ascending car overspeed test. (if applicable)
- i) Full load and empty car test of the unintended movement protection device.
- j) Brake test full load and redundant shoe/disc test.
- k) Buffer test carried out with contract load and at contract speed.
- l) Overload test (electrical).
- m) RCD electrical protective device tests.
- n) Electrical protective device tests.

- o) Levelling device tests.
- p) Car balance tests. (if applicable)
- q) Noise and vibration tests as specified.
- r) Fire Recall systems.

In cases where the veracity and/or strength of the mechanical design of elements of the lift structure and/or lift equipment or components under the requirements of BS EN81-20 and BS EN81-50 are determined by the assessment of material deflection the Lift Contractor shall, at the request of the Engineer, demonstrate compliance as part of the commissioning tests, providing all tools and test equipment required to demonstrate compliance.

The Lift Contractor shall also carry out any other tests required by the Engineer in order to prove that the equipment complies with the requirements of the Contract and with all codes and Regulations relating to the equipment supplied and its installation under the Contract.

The Lift Contractor shall generally demonstrate the lift in operation under various loading conditions from no load to 25% overload in order to check the operation and floor levelling accuracy.

The lift shall also be subject to a 60-minute test such as to prove the adequacy of all components in terms of achieving the rated duty and minimum starts per hour. The test shall be conducted with the lift car fully loaded, during which it shall stop at each floor in the up and down direction, opening and closing its doors at each stop. The test shall be continuous, the stops being of 10 seconds maximum duration and with the doors operational. During the test, the equipment should not overheat, spark excessively, become noisy or operate in a faulty or deficient manner.

All the tests shall be carried out in the presence of the Engineer and the results shall be recorded in a tabulated form for easy checking and reference with the form signed by the Lift Contractor's representative undertaking the tests.

Health & Safety File and Service Manuals

The Lift Contractor shall provide a separate Health & Safety File as is required under the CDM 2015 Regulations, including residual risks, risk assessments, COSHH data, accident records and all other relevant data and information.

The Lift Contractor shall ensure that the Manuals and Certificates are available at the time of hand over of the Lift in accordance with the requirements of the Lifts Regulations 2016 as amended, BS EN13015 and all applicable UK Regulation.

Duplicate copies of the Manuals, which shall be in full compliance with the requirements of BS EN13015 and the requirements of this Specification, shall be provided and these shall include the following:

Documents

- Full written general description of the equipment as installed identifying its main operational features.
- Sequence of operations applicable to the functioning of all control apparatus.
- Nomenclature detailing all symbols and forms of identification used on or in relation to the equipment and to drawings or circuit diagrams applicable to the installation.

- Fully descriptive list of components which it is anticipated may require regular or routine replacement due to wear and tear. The minimum information provided shall ensure that ordering of replacement components can be achieved.
- Maintenance schedules detailing all areas of planned preventative maintenance, routine servicing and including all settings and adjustments together with control and component software parameters.
- Wherever any hand held or portable device is used to service, interrogate, alter, modify, adjust, reset and/or recalibrate the lift system and/or components the Lift Contractor shall supply one of these devices for each lift together with clear instructions for the use of the device and all necessary data sheets for the interpretation of information shall be included. The device shall be supplied free of license for the duration of the life of the lift installation, and free of any hire, lease, rental or servicing charges.
- Full details of recommended methods of cleaning all finishes, including any special materials required.

Test Certificates

The Lift Contractor shall supply a minimum of two copies of the BS 8464 test sheets together with the site test certificates in respect of the tests carried out at the time of commissioning of the equipment. These shall be fully completed and signed by a competent person authorised by the Lift Contractor.

- a) Hoisting ropes (Each certificate identified with its lift number)
- b) Governor ropes
- c) Overspeed governor
- d) Hoisting motor
- e) Lift machine brake and brake monitoring
- f) Door gear motor
- g) Car and counterweight buffers
- h) Safety gears lift car (ascent and descent) and counterweight.
- i) Unintended movement protection
- j) Reports of pendulum tests relating to lift car and landing entrances and doors, lift car enclosure panels, shaft enclosure panels and any glass panels.
- k) Fire Certificate for lift landing and car doors.
- l) Lifting beam or eyes (where applicable)
- m) Electrical completion certificate to BS 7671
- n) UK Certificate of Conformity for the lift installation
- o) UK Certificates of Conformity complete with annexes for all of the lift safety components.

Drawings and Circuit Wiring Diagrams

The Lift Contractor shall provide a full set of electrical circuit diagrams which shall incorporate any and all amendments which have been carried out prior to the equipment being accepted by the Engineer.

The Lift Contractor shall supply a complete set of wiring and “as built” drawings in respect of the completed lift installation.



The Lift Contractor shall supply a complete set of builders work and general arrangement drawings, including landing entrances and lift car interior perspective.

The “as-built” drawings shall record details of any significant residual hazards and risks affecting the installation, the works and the design, which could not be eliminated and/or adequately mitigated in the design, on the final “as built” record drawings and in the H&S File.

Inspection Certificates

This section shall be provided for the future retention of Inspection Certificates in accordance with SAFed Recommendations.

Maintenance Contract and Inspection Reports

This section shall be provided for the future retention of maintenance reports and the maintenance contract documents.

Warranties & Guarantees

Each Manual shall include copies of the manufacturers or supplier’s guarantees or warranties in relation to products as described in the Preliminaries Section of this Specification.

Handover Procedure

Prior to offering the equipment for acceptance, the Lift Contractor shall ensure that all works identified during the witness tests as remedial items have been satisfactorily completed and that the Operating and Maintenance Manuals with complete with all Certification and the complete CDM 2015 H&S File are available.

Should the handover be delayed because remedial items are outstanding, the commencement of the Defects Liability Period shall be deferred until such time as all outstanding works and items are complete to the satisfaction of the Engineer.

Prior to, or during handover, the Lift Contractor shall provide on-site training to the Purchaser’s representatives, comprising of practical instruction and demonstration of safe passenger release procedures and emergency handwinding/lowering. This shall also include instruction in relation to procedures for calling the Lift Contractor in the case that safe release should be unsuccessful or deemed unsafe for the Purchaser’s representative to undertake.

At handover, the Lift Contractor shall provide for the Purchaser’s use the following:

- a) Three sets of keys for each key switch on each lift installation.
- b) Three landing door release keys.
- c) A typed document, which is encapsulated in plastic, providing full details of the Lift Contractor’s local and national emergency breakdown and call out procedure inclusive of phone numbers.
- d) Certificates of personnel trained in emergency release and handwinding/lowering procedures.

Levels of acceleration, deceleration and jerk rate shall also be measured and recorded.



SECTION 7
MAINTENANCE

7 MAINTENANCE

Comprehensive Form of Contract

Excluded from the Lift Contractor's responsibility on maintenance are:

- a) Decorative finishes of the car enclosure, car and landing entrances except where damage is a result of the Lift Contractor's own negligence and/or misuse or abuse.
- b) Cleaning of the lift shaft fabric and enclosure walls.
- c) Buried piping and cylinders which are located below the level of the pit floor on hydraulic lifts.
- d) The incoming electrical mains power supply cable to both power and lighting circuits in connection with the lift installations.
- e) Failure of the lift equipment due to misuse with such repairs, where established as due to misuse, will be chargeable as an extra to the Contract.

Included in the Lift Contractor's responsibility is the provision of all labour and materials required for the correct adjustment, repair and/or replacement, as conditions warrant, of all other component parts of the lift installation which are not specifically excluded here above.

Cleaning of all equipment in the lift machine room, machinery spaces, lift shaft and lift pit, such as to ensure that the areas and equipment are kept clean at all times and free of rubbish and potentially inflammable material.

Provision of all cleaning materials and the correct lubricants, which are in accordance with the equipment manufacturer's specifications, such as to ensure the correct maintenance of the lift equipment. No stocks of lubricating oil or lubricants of an inflammable nature are to be retained on site at any time.

Whenever the lift is not available for service due to this being in the control of the Lift Contractor during works or inspections, the Lift Contractor shall provide a suitable barrier at each lift entrance under inspection to indicate that the installation is not available for service. A sample design of the barrier shall be submitted for approval to the Purchaser's Representative. When not in use, the barrier shall be retained in the lift machine room or machinery space and mounted on purpose made brackets, or at an agreed location on the site. At the expiry of the maintenance contract, the barrier shall remain as the property of the Purchaser. The barrier shall be collapsible in design, painted safety yellow and be fitted with a suitable "DANGER" notice and designed and constructed in accordance with the requirements of BS7255.

"Out of service" indication notices shall be placed on each landing whenever a lift is removed from service for either maintenance or repair.

The lift contractor shall include for the replacement of all rechargeable batteries included within the lift system, including (but not limited to) controllers, intercoms, emergency lighting, emergency brake release or recovery systems within the time periods and/or dates recommended by the manufacturer/supplier. The lift contractor shall provide a schedule of recommended replacement periods with the contract.

The lift contractor shall include for all SAFed supplementary tests as defined in Section 5 Annex A of the Guidelines on the supplementary tests of in-service lifts 2020, issued by the Safety Assessment Federation and endorsed by the Health & Safety Executive.

Test No.	Supplementary Test
A1	Earth Continuity
A2	Electric Safety Devices
A3	Terminal Speed Reduction Systems
A4	Landing Door Interlocks
A5	Lift Machine – Investigatory Test (Type A)
A6	Lift Machine – Comprehensive Test (Type B)
A7	Overspeed Governors
A8	Governor Operated Safety Gear – Instantaneous Type
A9	Governor Operated Safety Gear – Progressive Type
A10	Safety Gear Operated by Other Means
A11	Devices to Prevent Overspeed of Ascending Car
A12	Unintended Car Movement
A13	Energy Dissipation Buffers
A14	Suspension System
A15	Car Overload Detection Warning Devices
A16	Hydraulic System
A17	Hydraulic Cylinder in Boreholes or Similar Location
A18	Hydraulic Rupture/Restrictor Valves
A19	Electrical Anti-creep Device
A20	Mechanical Anti-creep Device (Pawl or Clamp)
A21	Low Pressure Detection Devices
A22	Traction, Brake & Levelling
A23	Car/Counterweight Balance
A24	Automatic Power Operated Doors
A25	Other Supplementary Tests

On completion of an Examination, two original signed certificates shall be provided; one copy for the Client's file, the other to be displayed within the maintenance records, by the Lift Contractor.

A reasonable stock of replacement lamps, LED luminaires and fluorescent tubes for use within the motor room, machinery spaces, lift shaft, lift car and all indicators and push units shall be retained in the lift machine room and/or machinery space.

Within one month following each maintenance visit a Report shall be forwarded to the Purchaser's Representative. All reports shall:

- a) Relate to one visit to each of the lifts.
- f) State clearly the work done, and adjustments made and indicate which car and/or landing indicator lamps, if any, were renewed at the time of the visit.
- g) Certify that the lift is in a satisfactory safe and serviceable condition, or in the alternative suitably advise the Purchaser's Representative.



- h) Give details of attendance to any breakdowns during the period since the date of the preceding Report.

The Lift Contractor shall include for providing full instruction as to the running and operation of the lifts to the Purchaser's appointed staff, including safe passenger release and emergency hand-winding/lowering procedures. Each person trained shall be issued with a Certificate by the Lift Contractor. This training shall be carried out annually under the Maintenance Contract.

The Lift Contractor shall include for annual re-programming of the auto dialer.

The Comprehensive Contract shall include for operational guarantees by the Lift Contractor to the Employer for:

- a) Response times to breakdowns not exceeding:
 - 1 hour - at any time when a person is trapped within the car.
 - 2 hours – during normal office hours) where no trapping has
 - 4 hours – outside normal office hours) occurred.
- b) Guarantees against failure. This will be a maximum number of:
 - Five failures per lift, per annum maximum.
- c) The Lift Contractor shall refund to the Purchaser as financial compensation a sum equivalent to 1% of the contract sum for the lift for each failure above the agreed rate. This provision shall be operational immediately following the 12 months Defects Liability Period.
- d) Repair and replacement component availability to be stated, including an agreed schedule of "down" time.
- e) Maintenance during agreed periods as determined by the Purchaser's requirements.
- f) Rebate in full, or rescheduling, at the Purchaser's discretion, of any missed maintenance visits.
- g) Maintenance visits planned and advised in advance by means of annual planner provided at handover.
- h) Six sets of encapsulated details to be provided at handover giving full details of contact procedure for trappings, breakdowns and routine maintenance.