

**General Specification for Lift, Escalator And
Passenger Conveyor Installation
2007 Edition (Incorporating Corrigendum No. GSLF01)**

The 2007 edition (Incorporating Corrigendum No. GSLF01) of the General Specification for Lift, Escalator And Passenger Conveyor Installation comprises considerable updating and revisions to the 2007 edition.

The updating of specification is a continuous process. With the benefit of information technology, electronic version of this new 2007 edition (Incorporating Corrigendum No. GSLF01) can be kept up-to-date and may be viewed on the ArchSD Homepage.

In view of the revisions and new additions, there will be an introductory period of 3 months whereby the General Specification for Lift, Escalator And Passenger Conveyor Installation 2007 Edition will still be the Contractual Document, whilst the new General Specification for Lift, Escalator And Passenger Conveyor Installation 2007 Edition (Incorporating Corrigendum No. GSLF01) may be viewed in parallel in preparation for full implementation by 1 April 2011.

- **Hence, for tenders to be invited on or after 1 April 2011, General Specification for Lift, Escalator And Passenger Conveyor Installation 2007 Edition (Incorporating Corrigendum No. GSLF01) shall be used.**
- **Existing contracts (including contracts using previous editions tendered before 1 April 2011) would not be affected.**

**MAJOR CHANGES IN THE CORRIGENDUM OF THE GENERAL SPECIFICATION FOR
LIFT, ESCALATOR AND PASSENGER CONVEYOR INSTALLATION IN GOVERNMENT BUILDINGS
OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION – 2007 EDITION**

Old Ref. No.	New Ref. No.	Major Changes
TABLE OF CONTENTS		
	B2.10	New clause added.
	B4.9	New clause added.
	C4.5	New clause added.
	C11.3	New clause added.
	C14.10	New clause added.
	C16.8	New clause added.
	C16.9	New clause added.
	C22.7	New clause added.
	C22.8	New clause added.
	C25.6	New clause added.
	C25.7	New clause added.
	D4.3	New clause added.
	D18.3	New clause added.
	H1.4	New clause added.

Old Ref. No.	New Ref. No.	Major Changes
PART A - SCOPE AND GENERAL REQUIREMENTS		
Section A1 - SCOPE OF SPECIFICATION		
A1.2	A1.2	Clause revised.
Section A2 - STATUTORY OBLIGATIONS AND OTHER REGULATIONS		
A2.1	A2.1	Clause revised.
A2.1.1	A2.1.1	Clause revised.
A2.1.2	A2.1.2	Clause revised.
A2.1.3	A2.1.3	Clause revised.
A2.1.4	A2.1.4	Clause revised.
Section A3 – EXECUTION OF WORKS		
A3.7	A3.7	Clause revised.
Section A4 - DRAWINGS AND MANUALS		
A4.2.4	A4.2.4	Clause revised.
PART B - GENERAL TECHNICAL REQUIREMENTS		
Section B2 - ELECTRICITY SUPPLY AND ELECTRICAL INSTALLATION		
B2.2	B2.2	Clause revised.
B2.3	B2.3	Clause revised.

Old Ref. No.	New Ref. No.	Major Changes
B2.8	B2.8	Clause revised.
B2.9	B2.9	Clause revised.
	B2.10	New clause added.
Section B3 - MISCELLANEOUS		
B3.3	B3.3	Clause revised.
B3.5	B3.5	Clause revised.
Section B4 - REQUIREMENTS RELATING TO ENVIRONMENTAL SUSTAINABILITY		
B4.1	B4.1	Clause revised.
B4.2	B4.2	Clause revised.
B4.4	B4.4	Clause revised.
B4.6	B4.6	Clause revised.
B4.8	B4.8	Clause revised.
	B4.9	New clause added.
Section B5 - REQUIREMENTS FOR LIFT RIDE QUALITY		
B5.1	B5.1	Clause revised.
B5.2	B5.2	Clause revised.

Old Ref. No.	New Ref. No.	Major Changes
PART C - ELECTRIC & HYDRAULIC LIFT		
Section C1 - GUIDES AND FIXING		
C1.2	C1.2	Clause revised.
Section C4 - SUSPENSION		
C4.1	C4.1	Clause revised.
C4.4	C4.4	Clause revised.
	C4.5	New clause added.
Section C8 - CAR ENCLOSURES		
C8.4	C8.4	Clause revised.
C8.5	C8.5	Clause revised.
C8.7	C8.7	Clause revised.
C8.8	C8.8	Clause revised.
C8.9	C8.9	Clause revised.
C8.10	C8.10	Clause revised.
C8.11	C8.11	Clause revised.

Old Ref. No.	New Ref. No.	Major Changes
Section C9 - CONTROL AND INDICATION IN CAR		
C9.1	C9.1	Clause revised.
C9.2	C9.2	Clause revised.
C9.4	C9.4	Clause revised.
C9.5	C9.5	Clause revised.
C9.7	C9.7	Clause revised.
Section C10 - CAR AND LANDING DOORS		
C10.1	C10.1	Clause revised.
C10.9	C10.9	Clause revised.
C10.12	C10.12	Clause revised.
C10.15	C10.15	Clause revised.
C10.16	C10.16	Clause revised.
Section C11 - LANDING FIXTURES		
C11.1	C11.1	Clause revised.
C11.2	C11.2	Clause revised.
C11.3	C11.3	Clause revised.
C11.4	C11.4	Clause revised.

Old Ref. No.	New Ref. No.	Major Changes
C11.5	C11.5	Clause revised.
Section C13 - LOAD PLATES, NOTICE BOARDS AND INSTRUCTIONS		
C13.3	C13.3	Clause revised.
Section C14 - SAFETY GEAR AND OVERSPEED GOVERNOR		
	C14.10	New clause added.
Section C16 - LIFT MACHINERY		
C16	C16	Title revised.
C16.4	C16.4	Clause revised.
C16.5	C16.5	Clause revised.
	C16.8	New clause added.
	C16.9	New clause added.
Section C18 - AUTOMATIC CONTROL SYSTEM		
C18.7	C18.7	Clause revised.
Section C19 - POWER SYSTEM APPLICATION		
C19.4	C19.4	Clause revised.

Old Ref. No.	New Ref. No.	Major Changes
Section C20 - ALARM BUZZER/BELL SYSTEM, SUPERVISORY CONTROL PANEL, INTERCOM SYSTEM, TELEPHONE AND CLOSED CIRCUIT TELEVISION		
C20.1	C20.1	Clause revised.
C20.2	C20.2	Clause revised.
C20.3	C20.3	Clause revised.
C20.5	C20.5	Clause revised.
Section C21 - FIRE SERVICES REQUIREMENTS		
C21.3	C21.3	Clause revised.
C21.4	C21.4	Clause revised.
C21.5	C21.5	Clause revised.
Section C22 - REQUIREMENTS FOR BARRIER FREE ACCESS		
C22.1 to C22.6	C22.1 to C22.6	Whole section revised.
	C22.7	New clause added.
	C22.8	New clause added.
Section C24 - REQUIREMENTS FOR SERVICE LIFT		
C24.11	C24.11	Clause revised.
Section C25 - REQUIREMENTS FOR MACHINE-ROOM-LESS LIFT		
C25.2 to C25.5	C25.2 to C25.5	Whole section revised except clause C25.1.

Old Ref. No.	New Ref. No.	Major Changes
	C25.6	New clause added.
	C25.7	New clause added.
PART D - ESCALATOR AND PASSENGER CONVEYOR INSTALLATION		
Section D4 - LANDING PLATE		
D4.3	D4.3	New clause added.
Section D7 – HANDRAILS		
D7.6	D7.6	Clause revised.
Section D17 - MAINTENANCE FACILITIES AND NOTICES		
D17.7	D17.7	Clause revised.
Section D18 - ALARM BUZZER/BELL		
	D18.3	New clause added.
PART E - POWERED VERTICAL LIFTING PLATFORM INSTALLATION		
Section E1: - REQUIREMENTS FOR POWERED VERTICAL LIFTING PLATFORM INSTALLATION		
E1.2	E1.2	Clause revised.
E1.3	E1.3	Clause revised.

Old Ref. No.	New Ref. No.	Major Changes
Section E2: - LIFTWELL		
E2.1	E2.1	Clause revised.
E2.4	E2.4	Clause revised.
E2.5	E2.5	Clause revised.
Section E3 - LIFTING PLATFORM CARRIAGE		
E3.2	E3.2	Clause revised.
Section E4: - LANDING DOORS/GATES		
E4.1	E4.1	Clause revised.
E4.2	E4.2	Clause revised.
E4.3	E4.3	Clause revised.
Section E6 - OPERATION CONTROL SYSTEM		
E6.4	E6.4	Clause revised.
E6.5	E6.5	Clause revised.
Section E7 - SAFETY DEVICES		
E7.1	E7.1	Clause revised.
Section E9 - BATTERY POWERED OPERATION AND FIRE EMERGENCY SERVICE		
E9.1	E9.1	Clause revised.

Old Ref. No.	New Ref. No.	Major Changes
PART F - STAIRLIFT INSTALLATION		
Section F1 - REQUIREMENTS FOR STAIRLIFT		
F1.1	F1.1	Clause revised.
F1.4	F1.4	Clause revised.
F1.5	F1.5	Clause revised.
Section F2 - OPERATION CALL STATIONS		
F2.1	F2.1	Clause revised.
F2.3	F2.3	Clause revised.
PART G - INSPECTION, TESTING AND COMMISSIONING DURING CONSTRUCTION PERIOD		
Section G1 - GENERAL REQUIRMENTS		
G1.1	G1.1	Clause revised.
Section G2 – INSPECTION AND TESTING		
G2.1	G2.1	Clause revised.
Section G4 – MANDATORY INSPECTION/TEST		
G4.1	G4.1	Clause revised.

Old Ref. No.	New Ref. No.	Major Changes
PART H - TRAINING, INSPECTION, ATTENDANCE AND OPERATION AND MAINTENANCE DURING MAINTENANCE PERIOD		
Section H1 - GENERAL REQUIRMENTS		
H1.1	H1.1	Clause revised.
	H1.4	New clause added.
Section H3 - EMERGENCY SERVICES AND ATTEDANCE TO FAULT CALLS		
H3.3	H3.3	Clause revised.
Section H4 - INSPECTION, OPERATION AND MAINTENANCE REQUIREMENTS		
H4.2	H4.2	Clause revised.
H4.5	H4.5	Clause revised.
H4.6	H4.6	Clause revised.
ANNEX IA - MAINTENANCE SCHEDULE FOR ELECTRIC PASSENGER, GOODS AND SERVICES LIFTS		
Schedule no. 2	Schedule no. 2	Annex revised.
Schedule no. 4	Schedule no. 4	Annex revised.
Notes to Annex IA	Notes to Annex IA	Notes revised.
ANNEX IB - MAINTENANCE SCHEDULE FOR HYDRAULIC LIFTS		
Schedule no. 2	Schedule no. 2	Annex revised.
Schedule no. 4	Schedule no. 4	Annex revised.

Old Ref. No.	New Ref. No.	Major Changes
Notes to Annex IB	Notes to Annex IB	Notes revised.
ANNEX ID - MAINTENANCE SCHEDULE FOR POWERED VERTICAL LIFTING PLATFORMS		
Schedule no. 2	Schedule no. 2	Annex revised.
ANNEX IE - MAINTENANCE SCHEDULE FOR STAIRLIFTS		
Schedule no. 2	Schedule no. 2	Annex revised.
ANNEX IIB - NOTES ON ENTRY OF LOG BOOK		
Annex IIB	Annex IIB	Annex revised.
ANNEX V - LIST OF TECHNICAL STANDARDS QUOTED IN THIS GENERAL SPECIFICATION		
Annex V	Annex V	Annex revised.

ARCHITECTURAL SERVICES DEPARTMENT
BUILDING SERVICES BRANCH

**GENERAL SPECIFICATION FOR LIFT, ESCALATOR AND
PASSENGER CONVEYOR INSTALLATION IN GOVERNMENT BUILDINGS OF
THE HONG KONG SPECIAL ADMINISTRATIVE REGION**
2007 EDITION

Corrigendum No. GSLF01
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The following content and clauses are amended in the above General Specification.

Content

TABLE OF CONTENTS

PART B GENERAL TECHNICAL REQUIREMENTS

SECTION B2 ELECTRICITY SUPPLY AND ELECTRICAL INSTALLATION

- B2.1 Electricity Supply
- B2.2 Works Provided by Electrical Contractor
- B2.3 Wiring
- B2.4 Equipotential Bonding
- B2.5 Travelling Cable
- B2.6 Temporary Electricity Supply
- B2.7 Emergency Lights for the Control Panels in the Lift Machine Room
- B2.8 Batteries And Chargers
- B2.9 Suppression of Radio and Television Interference
- B2.10 Voltage Dip Operation

SECTION B4 REQUIREMENTS RELATING TO ENVIRONMENTAL SUSTAINABILITY

- B4.1 Harmonic Distortion
- B4.2 Provision for Future Energy Audit
- B4.3 Total Power Factor of Motor Drive Systems
- B4.4 Maximum Allowable Electrical Power
- B4.5 Maximum Allowable Decoration Load
- B4.6 Energy Management of Lift
- B4.7 Motor Efficiency
- B4.8 Service-on-demand Escalator/Passenger Conveyor Control
- B4.9 Compliance with Energy Code

PART C ELECTRIC & HYDRAULIC LIFT

SECTION C4 SUSPENSION

- C4.1 Suspension Ropes
- C4.2 Number of Ropes and Safety Factor
- C4.3 Minimum Nominal Diameter
- C4.4 Compensating Rope
- C4.5 Protection for Traction Sheaves, Pulleys and Sprockets

SECTION C14 SAFETY GEAR AND OVERSPEED GOVERNOR

- C14.1 Provision of Safety Gear
- C14.2 Requirements of Safety Gear
- C14.3 Types of Safety Gear
- C14.4 Overspeed Governor
- C14.5 Operation of the Overspeed Governor
- C14.6 Construction of Governor Ropes
- C14.7 Breakage or Slackening of Governor Rope
- C14.8 Ascending Car Overspeed Protection Means
- C14.9 Protection against Unintended Car Movement
- C14.10 Protection against Earthquake

SECTION C16 LIFT MACHINERY

- C16.1 Lift Motor
- C16.2 Bearing and Gear Case
- C16.3 Emergency Operation by Manual Device
- C16.4 Emergency Operation by Electrical Switch
- C16.5 Electro-Mechanical Brake
- C16.6 'RUN/STOP' Switch to be Provided where Lift Equipment is housed in Separate Compartment
- C16.7 'RUN/STOP' Switch to be Provided in Pit
- C16.8 Stopping at the Nearest Landing
- C16.9 Move to the Nearest Landing after Emergency Stop

SECTION C21 FIRE SERVICE REQUIREMENTS

- C21.1 Fireman's Lift
- C21.2 Fireman's Switch
- C21.3 Home Landing Operation
- C21.4 All Lifts To Return To Landing of Designated Point of Entry Upon Actuation of Fire Alarm System
- C21.5 Relevant Lifts To Return To Landing of Designated Point of Entry Upon Actuation of Fire Alarm System
- C21.6 Refuge Floor
- C21.7 Notice

SECTION C22 REQUIREMENTS FOR BARRIER FREE ACCESS

- C22.1 General
- C22.2 Lift Control Buttons
- C22.3 Handrail
- C22.4 Landing and Car Doors
- C22.5 Emergency Alarm Push Button and Intercom
- C22.6 Door Jamb
- C22.7 Identification
- C22.8 Mirror in Accessible Lift

SECTION C25 REQUIREMENTS FOR MACHINE-ROOM-LESS LIFT

- C25.1 Definition
- C25.2 Statutory Requirements
- C25.3 Specific Requirements
- C25.4 Control Panel
- C25.5 Provisions for Rescue of Passengers
- C25.6 Fire Resisting Construction
- C25.7 Energy Efficient Lift

PART D ESCALATOR AND PASSENGER CONVEYOR **INSTALLATION**

SECTION D4 LANDING PLATE

- D4.1 Landing Plate
- D4.2 Landing Gap
- D4.3 Tactile Warning Strips

SECTION D18 ALARM BUZZER/BELL

- D18.1 Alarm Buzzer/Bell Provided by the Contractor
- D18.2 Type of Alarm Buzzer/Bell
- D18.3 Audio Indicator for Disabled

**PART H TRAINING, INSPECTION, ATTENDANCE AND
OPERATION AND MAINTENANCE DURING MAINTENANCE
PERIOD**

SECTION H1 GENERAL REQUIRMENTS

- H1.1 Administrative Requirements
- H1.2 Outstanding and Defective Works
- H1.3 Keeping of Records
- H1.4 Allowance for Inspection

PART A- COPE AND GENERAL REQUIREMENTS

SECTION A1

SCOPE OF SPECIFICATION

A1.2 SCOPE OF THE WORKS

This General Specification, Particular Specification, Tender Equipment Schedule and Drawings detail the performance requirements of the Works. The Works to be carried out in accordance with this General Specification shall include the whole of the design, supply and installation of all materials necessary to form a complete installation including any necessary tests, adjustments, commissioning and maintenance as prescribed and all other incidental sundry components together with the necessary labour for installing such components, for the proper operation of the installation.

SECTION A2

STATUTORY OBLIGATIONS AND OTHER REGULATIONS

A2.1 STATUTORY OBLIGATIONS AND OTHER REQUIREMENTS

The lift (passenger, bed/passenger, service and goods), escalator/passenger conveyor, powered vertical lifting platform and stairlift installations shall comply with the following:

A2.1.1 Statutory Obligations

- (a) Lifts and Escalators (Safety) Ordinance, Chapter 327, and other subsidiary legislation made under the Ordinance;
- (b) Security and Guarding Services Ordinance, Chapter 460, and other subsidiary legislation made under the Ordinance;
- (c) Electrical Ordinance, Chapter 406, and other subsidiary legislation made under the Ordinance;
- (d) Fire Service (Installations and Equipment) Regulations, Fire Services Ordinance, Chapter 95, and other subsidiary legislation made under the Ordinance;
- (e) Building (Planning) Regulations and Building (Construction) Regulations, Buildings Ordinance, Chapter 123, and other subsidiary legislation made under the Ordinance;
- (f) Noise Control Ordinance, Chapter 400, and other subsidiary legislation made under the Ordinance;
- (g) Water Pollution Control Ordinance, Chapter 358, and other subsidiary legislation made under the Ordinance;
- (h) Air Pollution Ordinance, Chapter 311, and other subsidiary legislation made under the Ordinance;
- (i) Ozone Layer Protection Ordinance, Chapter 403, and other subsidiary legislation made under the Ordinance;
- (j) Waste Disposal Ordinance, Chapter 354, and other subsidiary legislation made under the Ordinance;
- (k) Environmental Impact Assessment Ordinance, Chapter 499, and other subsidiary legislation made under the Ordinance;
- (l) Waterworks Ordinance, Chapter 102, and other subsidiary legislation made under the Ordinance;

- (m) Dangerous Goods Ordinance, Chapter 295, and other subsidiary legislation made under the Ordinance; and
- (n) Places of Public Entertainment Ordinance, Chapter 172, and other subsidiary legislation made under the Ordinance.

A.2.1.2 Other Requirements

- (a) Code of Practice on the Design and Construction of Lifts and Escalators issued by the Electrical and Mechanical Services Department, the Government of the HKSAR;
- (b) Code of Practice on the Design and Construction of Buildings and Building Works for the Installation and Safe Use of Lifts and Escalators, and the subsequent addendum, issued by the Building Authority, the Government of the HKSAR;
- (c) Code of Practice for Safety at Work (Lift and Escalator) issued by the Labour Department, the Government of the HKSAR;
- (d) Code of Practice for Lift Works and Escalator Works issued by the Electrical and Mechanical Services Department, the Government of the HKSAR;
- (e) Code of Practice for Fire Resisting Construction issued by the Building Authority, the Government of the HKSAR;
- (f) Code of Practice for Means of Access for Firefighting and Rescue issued by the Building Authority, the Government of the HKSAR;
- (g) Code of Practice for the Electricity (Wiring) Regulations published by the Electrical and Mechanical Services Department, the Government of the HKSAR;
- (h) Codes of Practice for Minimum Fire Service Installations and Equipment and Inspection, Testing and Maintenance of Installations and Equipment published by the Fire Services Department, the Government of the HKSAR;
- (i) Requirements and Circular Letters of the Fire Services Department, the Government of the HKSAR;
- (j) Circulars on Lifts and Escalators issued by the Electrical and Mechanical Services Department, the Government of the HKSAR;
- (k) Code of Practice for Energy Efficiency of Lift and Escalator Installations issued by the Electrical and Mechanical Services Department, the Government of the HKSAR;

- (l) Code of Practice for Energy Efficiency of Electrical Installations issued by the Electrical and Mechanical Services Department, the Government of the HKSAR;
- (m) Code of Practice for Energy Efficiency of Air Conditioning Installations issued by the Electrical and Mechanical Services Department, the Government of the HKSAR;
- (n) Code of Practice for Energy Efficiency of Lighting Installations issued by the Electrical and Mechanical Services Department, the Government of the HKSAR;
- (o) Performance-based Building Energy Code issued by the Electrical and Mechanical Services Department, the Government of the HKSAR;
- (p) General Requirements for Electronic Contracts, (Specification No. ESG01) – Electronic Division, Electrical and Mechanical Services Department, the Government of the HKSAR;
- (q) General Specification for Monochrome and Colour Closed Circuit Television System, (Specification No. ESG14) - Electronic Division, Electrical and Mechanical Services Department, the Government of the HKSAR;
- (r) General Specification for Electrical Installation in Government Buildings, Hong Kong, issued by the Architectural Services Department, the Government of the HKSAR;
- (s) General Specification for Air Conditioning, Refrigeration, Ventilation and Central Monitoring and Control System Installation in Government Building, Hong Kong, issued by the Architectural Services Department, the Government of the HKSAR;
- (t) Design Manual: Barrier Free Access 2008 published by the Buildings Department, the Government of the HKSAR;
- (u) The relevant electricity supply company's regulations and requirements;
- (v) Code of Practice on Wind Effects in Hong Kong 2004, issued by the Buildings Department, the Government of the HKSAR;
- (w) Code of Practice for the Structural Use of Steel 1987 (Reprinted 1996), issued by the Building Authority, the Government of the HKSAR;
- (x) ISO 9386-1:2000, 'Power-operated lifting platforms for persons with impaired mobility – Rules for safety, dimensions and functional operation – Part 1 : Vertical lifting platforms';

- (y) BS6440:1999, 'Powered Lifting Platforms for Use by Disabled Persons';
- (z) ASME A18.1:2008, 'Safety Standard for Platform Lifts and Stairway Chairlifts';
- (aa) GB50011-2008, 'Code for Seismic Design of Buildings' where seismic design consideration is required; and
- (ab) Relevant International Standards and International Codes of Practice.

A2.1.3 Safety Requirements

- (a) Lift and Escalators (Safety) Ordinance, Chapter 327, and other subsidiary legislation made under the Ordinance;
- (b) Occupational Safety and Health Ordinance, Chapter 509, and other subsidiary legislation made under the Ordinance;
- (c) Factories and Industrial Undertakings Ordinance, Chapter 59, and other subsidiary legislation made under the Ordinance;
- (d) Public Health and Municipal Service Ordinance, Chapter 132, and other subsidiary legislation made under the Ordinance;
- (e) Construction Site (Safety) Regulations;
- (f) Code of Practice on the Design and Construction of Buildings and Building Works for the Installation and Safe Use of Lifts and Escalators issued by the Building Authority, the Government of the HKSAR;
- (g) Code of Practice for Safety at Work (Lift and Escalator) issued by the Labour Department, the Government of the HKSAR; and
- (h) Construction Site Safety Manual issued by the Environmental, Transport and Works Bureau, the Government of the HKSAR.

A2.1.4 Technical Standards

BS, BS EN, EN, ISO, IEC Standards and Codes of Practice, etc. shall be deemed to include all amendments, revisions and standards superseding the standards listed herein, which are current at the closing date of the tender of the Contract unless otherwise specified or unless the latest amendments are not allowed or approved by the relevant authorities under the statutory regulations. Equivalent International Standards may be used if approved by the Architect.

A summary of technical standards quoted in this General Specification to which the Works shall comply is listed in Annex V.

Materials, equipment and products that comply with equivalent technical standards and demonstrated to be equivalent in overall technical substitute on the type of construction, functions, performance, general appearance and standard of quality of manufacture to the standards and requirements listed herein may be submitted to the Architect for consideration and approval.

SECTION A3

EXECUTION OF WORKS

A3.7 SAMPLE BOARD

Within 6 weeks of the acceptance of his Tender and prior to the commencement of Works, the Contractor shall submit to the Architect for approval in good time a sample board of essential components proposed to be used in the Contract. However, the Contractor may request the Architect in writing for an extension of time, if 6 weeks are practically insufficient.

Items displayed shall be deemed to be adequate for the Works unless otherwise clearly indicated. Each sample, with clear numbering and labelling, shall be firmly fixed onto a rigid wooden or metal board. A list shall also be affixed on the sample board to show the item description, make and brand, country of origin and locations of installation (if not generally used). Samples rejected by the Architect shall be replaced as soon as possible. Upon approval of all items, the Architect will endorse the list on the sample board and the Contractor shall deliver the board to the site office for reference.

The board shall contain samples of all 'compact' sized materials and accessories to be used in the Works. Written approval of all samples and technical details shall be obtained from the Architect before commencement of any installation work.

In the context of this General Specification the term 'compact' means any item that will fit into a 300 mm cube.

The following items shall be included in the sample board as a minimum. Additional items may be required by the Architect and/or specified in the Particular Specification.

- (a) Electrical and mechanical accessories;
- (b) Finishing materials; and
- (c) Colour chart.

SECTION A4

DRAWINGS AND MANUALS

A4.2 INSTALLATION DRAWINGS

A4.2.4 Builder's Work Drawings

Unless otherwise approved by the Architect, the Contractor shall submit to the Architect in accordance with the approved "Submission Schedule", 6 copies of drawings showing details of all builder's work required e.g. the weight and the load on each support of equipment. Such drawings shall clearly indicate the details and positions of all openings, trenches, ducts and cutting required and construction details for plinths and equipment bases and all other requirements in relation to:

- (a) Lift Installation
 - (i) Lift machine room/lift equipment room and associated equipment, including sub-floor where appropriate;
 - (ii) The arrangement of scaffolding required in the lift well for the installation of the equipment;
 - (iii) All structural openings, such as landing entrances (including structural dimensions), openings, etc.;
 - (iv) All bases, plinths, channels, holes, grouting-in of fixings, etc.;
 - (v) Lifting beams or other facilities for supporting lifting tackle in the machine room and lift well;
 - (vi) Permanent means of access to the lift pit;
 - (vii) Suitable locations of luminaires for machine room and lift well lighting;
 - (viii) Guard rails in the machine room;
 - (ix) Hoisting facilities and access required for delivery of equipment to the machine room etc., showing the loading and size of the largest single piece of equipment;
 - (x) Details of structural steelwork for lift machinery in the lift machine room;

- (xi) Details of shaft dividing steelwork for supporting guard brackets etc., and inter-well screens for multiple wells; and
 - (xii) Method of fixing guide rails.
- (b) Escalator/Passenger Conveyor Installation
 - (i) Escalator/Passenger Conveyor pits and associated equipment;
 - (ii) End supports including escalator layout;
 - (iii) Hoisting facilities and access, which should contain similar information as that required in Clause A4.2.4 (a)(ix);
 - (iv) Openings with adequate size in the floor on both landings of escalator/passenger conveyor; and
 - (v) Concrete supporting beams at both landings and the intermediate support if required by escalators with a large vertical rise.
- (c) Powered Vertical Lifting Platform Installation
 - (i) Lift enclosure with pit;
 - (ii) Opening to open air for ventilation of the lift shaft;
 - (iii) Powered Vertical Lifting Platform pit/ramp and associated equipment; and
 - (iv) Hoisting facilities and access, which should contain similar information as that required in Clause A4.2.4 (a)(ix).
- (d) Stairlift Installation
 - (i) Path of flight, stairway dimensions and landing levels;
 - (ii) Details of structural steelwork on stairway;
 - (iii) Method of fixing guide rails; and
 - (iv) Clear height above stairlift platform.

PART B - GENERAL TECHNICAL REQUIREMENTS

SECTION B2

ELECTRICITY SUPPLY AND ELECTRICAL INSTALLATION

B2.2 WORKS PROVIDED BY ELECTRICAL CONTRACTOR

The Electrical Contractor will be responsible for providing the power supply for the electrical equipment. The supply point will be terminated at an isolating switch or switch-fuse at the following location according to the type of installation:

- (a) Lift installation - lift machine room or near lift controller;
- (b) Service lift installation - lift machine compartment;
- (c) Escalator/passenger conveyor installation - escalator/passenger conveyor machinery space;
- (d) Powered Vertical lifting platform installation - lift machine compartment; and
- (e) Stairlift - adjacent to stairlift drive cabinet.

From the isolating switch or switch-fuse, all electrical works for the lift, escalator, passenger conveyor, powered vertical lifting platform and stairlift installation shall be the responsibility of the Contractor.

The Electrical Contractor will provide permanent lighting in the lift well and the machine and pulley rooms, and socket outlets in the machine and pulley rooms and the lift pit. The lighting in the lift well will comprise one lamp positioned at most 0.5 m from the highest and lowest points of the guided travel of the lift car with intermediate lamps at 7 m maximum spacing and controlled by two-way switches located in the machine room and in the lift pit. The socket outlet in the lift pit will be of weatherproof type.

The Electrical Contractor will be responsible for the provision of conduit/trunking facilities for the following:

- (a) from the lift well at the landing of designated point of entry to the position of the supervisory control panel;
- (b) for the alarm buzzers/bells, call bell system and the supervisory control panel at the landing of designated point of entry between the lift well and the position of the panel;
- (c) for the intercom system linking the lift well to machine room and the caretaker's office;
- (d) for CCTV system inside the lift well and the machine room; and

- (e) for the telecommunication system such as the emergency telephone system in Clause C20.4

The Contractor shall furnish sufficient information to the Architect in good time before the conduit/trunking installation work is commenced on site. The Contractor shall be liable for all expenses incurred due to his failure to comply with the above requirement.

B2.3 WIRING

All cables, trunkings, conduits and conduit fittings necessary for the circuits (including power, lighting and control circuits) shall be installed in accordance with the Electrical General Specification, the Code of Practice for the Electricity (Wiring) Regulations.

All wiring installed in the lift machine room and lift well, other than travelling cables, shall be enclosed in galvanized steel conduits or trunkings.

The Contractor shall supply, install and commission all electrical wiring installation as required for completion of the work which shall include all necessary suitably sized cables and wiring from the electrical power isolator.

Labels and identifications for electrical installation shall comply with Electrical General Specification.

B2.8 BATTERIES AND CHARGERS

The batteries for each lift, escalator, passenger conveyor, powered vertical lifting platform and stairlift shall be capable of maintaining a supply to the connected emergency load for a minimum period of two hours. The batteries shall be of sealed, high rate maintenance free nickel-metal hydride type, or a type of better functions and performance and approved by the Architect and shall have a guaranteed life expectancy of at least 4 years. They shall not have any memory effect as to affect their usable life or performance. The nickel-metal hydride battery shall comply with EN61951-2:2003 where appropriate. The battery charger shall be compatible with the batteries used. The charger shall comply with EN 60335-2-29:2004 and be capable of fully re-charge the batteries in not more than 12 hours.

B2.9 SUPPRESSION OF RADIO AND TELEVISION INTERFERENCE

The lift, escalator, passenger conveyor, powered vertical lifting platform and stairlift installations shall be adequately suppressed against radio and television interference to limits as laid down in EN 55014:2006, IEC 60939-1:2005 and IEC 60939-2:2005. Interference suppression components shall not be used in any part of the circuit where their failure might cause an unsafe condition.

B2.10 VOLTAGE DIP OPERATION

The Contractor shall provide post-voltage-dip-operation means for all lifts to comply with the statutory codes and requirements as stipulated in Circular No. 16/2009 issued by the Electrical and Mechanical Services Department, the Government of the HKSAR in case any lift stops when voltage dip occurs. Also see Clause C16.9.

SECTION B3

MISCELLANEOUS

B3.3 FINISH

All metal work supplied by the Contractor in out of the way locations such as the lift well, lift pit, machine room and on the outside of the lift car shall be properly wire-brushed, cleaned of rust, scale, dirt and grease prior to the application of one coat of rust inhibiting primer, with particular attention paid to the priming of outer surfaces of car doors, inner surfaces of landing doors, metal work associated with door assemblies, the underside and the framework of lift cars. Any part of the equipment, including guide rails, which requires greasing or oiling and any components that are supplied unpainted by the manufacturers due to functional reasons shall not be painted.

All normally visible metal surfaces, other than stainless steel and non-ferrous surfaces, shall be finished with one coat of rust inhibiting primer, one under coat/finishing coat and one finishing coat of enamel paint to a colour to be selected by the Architect.

All locally applied paints and primers shall comply with Air Pollution Control (Volatile Organic Compounds) Regulations, Cap 311.

B3.5 STAINLESS STEEL

Unless otherwise specified, stainless steel shall be of EN 10029:1991, EN 10048:1997, EN 10088-1:2005, EN 10095:1999, and ISO 9445:2002 Grade 1.4401 (or Grade 316S31 or Grade AISI 316) or equivalent.

SECTION B4

REQUIREMENTS RELATING TO ENVIRONMENTAL SUSTAINABILITY

B4.1 HARMONIC DISTORTION

The lift/escalator/passenger conveyor installation shall not, by injection of undesirable waveforms into the electricity supply distribution system, adversely affect the power company's system and/or the electricity supply to other users or consumers. The Total Harmonic Distortion (THD) produced by the lift/escalator/passenger conveyor motor drive system measured at the isolator connecting the lift/escalator/passenger conveyor equipment to the feeder circuit of the building is limited to the maximum allowable values specified in Table B4.1–(1) and (2). For lift installation, the THD shall be measured at the moment the lift car is moving up with rated load at its rated speed. For escalator/passenger conveyor installation, the THD shall be measured when the escalator/passenger conveyor is operating with no-load at its rated speed.

The Contractor shall be responsible for providing all necessary harmonic filter(s) to bring down the THD to within the maximum allowable values should the THD of the installation exceed the maximum allowable values specified in Table B4.1–(1) and (2).

Table B4.1–(1) - Maximum Allowable THD for Lift Motor Drive Systems

Circuit Fundamental Current of Motor Drive	Maximum THD (%)
$I < 40A$	40
$40A \leq I < 80A$	35.0
$80A \leq I < 400A$	22.5
$400A \leq I < 800A$	15.0

Table B4.1–(2) - Maximum Allowable THD for Escalator/Conveyor Motor Drive Systems

Circuit Fundamental Current of Motor Drive	Maximum THD (%)	
$I < 40A$	35, for electrical supply direct from building's feeder circuit	40, for electrical supply NOT direct from building's feeder circuit
$40A \leq I < 80A$	35.0	
$80A \leq I < 400A$	22.5	

$$\text{Total Harmonic Distortion (THD)} = \frac{\sqrt{\sum_{h=2}^{\infty} I_h^2}}{I_1}$$

where I_1 = r.m.s. value of fundamental current (A)
 I_h = r.m.s. value of current of the h^{th} harmonic order (A)

B4.2 PROVISION FOR FUTURE ENERGY AUDIT

Digital multifunction metering devices or permanent provisions for connection of such devices as shown on the Drawing(s) and/or stated in the Particular Specification shall be provided in all lift, escalator and passenger conveyor installations for the purpose of energy management, monitoring and audit. Accessibility and sufficient space for these devices shall be allowed for.

Such devices or provisions shall be provided at each electricity supply feeder for the lift, escalator and passenger conveyor installations, and at the electrical supply circuit for each motor drive in case a feeder supplies more than one lift, escalator or passenger conveyor or a feeder supplies to other auxiliary equipment besides the lift motor drive. The measurements shall include the electrical loads of the motor drives, the auxiliary loads such as ventilation and lightings, voltages (phase-to-phase and phase-to-neutral), currents (line currents and neutral currents), total power factor, energy consumption (kWh), power (kW) and maximum demand (kVA).

Unless otherwise specified, digital multifunction metering devices installed in lift machine room or lift equipment room/cabinet or installed after the power supply point of the Electrical Contractor shall be provided by the Contractor.

Digital multifunction metering devices shall comply with the Electrical General Specification. The metering device shall be equipped with interfacing hardware facilities and connection ports such as RS232/RS485/Ethernet and shall be able to communicate with a remote display device/system or a PC-based building management system via a common network protocol for reading/logging/recording/analysis/downloading of the energy and performance data recorded, by means of plugging in communication module without further modification of the basic unit.

Digital multifunction metering device shall be installed at a location easily accessible by the building management and maintenance staff wherever possible. When digital multifunction metering device is installed at a location not easily accessible by the building management and maintenance staff and there is no indication that a building management system is to be provided within the building for connection to the metering devices, the Contractor shall provide all necessary plugging in communication module and hardware for the digital multifunction metering devices for its ready connection to a future remote device/system.

In case the metering device for lift, escalator and passenger conveyor installation is specified to be provided by other parties in the Particular Specification or Drawings,

the Contractor shall coordinate with relevant parties on the most suitable location(s) for the installation of digital multifunction metering devices.

Digital multifunction metering devices and fixed remote display device/system shall be housed in lockable housing(s) or cabinet(s) by the Contractor when they are not placed within a normally locked up area.

The connection and removal of the metering devices shall not entail a stoppage or disruption to the operation of the lift, escalator and passenger conveyor installation.

B4.4 MAXIMUM ALLOWABLE ELECTRICAL POWER

(a) Maximum Allowable Electrical Power of Traction Lifts

The running active electrical power of the motor drive of traction lift system carrying a rated load at its rated speed in an upward direction shall not exceed the maximum allowable values specified in Table B4.4–(1), (2) and (3).

Table B4.4–(1) - Maximum Allowable Electrical Power of Traction Lifts ($V_c < 3$)

Rated Load (kg)	Maximum Allowable Electrical Power (kW) of Traction Lift Systems for various Ranges of Rated speed (V_c) in m/s				
	$V_c < 1$	$1 \leq V_c < 1.5$	$1.5 \leq V_c < 2$	$2 \leq V_c < 2.5$	$2.5 \leq V_c < 3$
$L < 750$	6.7	9.5	11.4	15.2	17.1
$750 \leq L < 1000$	9.5	11.4	16.2	20	22.8
$1000 \leq L < 1350$	11.4	16.2	20.9	25.7	30.4
$1350 \leq L < 1600$	14.3	19	25.7	30.4	36.1
$1600 \leq L < 2000$	16.2	23.8	30.4	37.1	43.7
$2000 \leq L < 3000$	23.8	35.2	44.7	56.1	66.5
$3000 \leq L < 4000$	31.4	45.6	59.9	74.1	87.4
$4000 \leq L < 5000$	39.9	57	74.1	92.2	109.3
$L \geq 5000$	$0.0079L + 0.475$	$0.0112L + 0.95$	$0.0148L + 0.48$	$0.0180L + 1.9$	$0.0217L + 0.475$

Table B4.4–(2) - Maximum Allowable Electrical Power of Traction Lifts ($3 \leq V_c < 7$)

Rated Load (kg)	Maximum Allowable Electrical Power (kW) of Traction Lift Systems for various Ranges of Rated speed (V_c) in m/s				
	$3 \leq V_c < 3.5$	$3.5 \leq V_c < 4$	$4 \leq V_c < 5$	$5 \leq V_c < 6$	$6 \leq V_c < 7$
$L < 750$	20	21.9	23.8	28.5	32.3
$750 \leq L < 1000$	25.7	29.5	30.4	37.1	43.7
$1000 \leq L < 1350$	34.2	38	42.8	49.4	57
$1350 \leq L < 1600$	40.9	46.6	49.4	58.9	68.4
$1600 \leq L < 2000$	50.4	57	61.8	71.3	83.6
$2000 \leq L < 3000$	75.1	85.5	90.3	109.3	125.4
$3000 \leq L < 4000$	98.8	114	123.5	142.5	166.3
$4000 \leq L < 5000$	123.5	142.5	152	180.5	209

Table B4.4–(3) - Maximum Allowable Electrical Power of Traction Lifts ($V_c \geq 7$)

Rated Load (kg)	Maximum Allowable Electrical Power (kW) of Traction Lift Systems for various Ranges of Rated speed (V_c) in m/s		
	$7 \leq V_c < 8$	$8 \leq V_c < 9$	$V_c \geq 9$
$L < 750$	37.1	42.8	$4.643V_c + 0.0013V_c^3$
$750 \leq L < 1000$	49.4	57	$6.192V_c + 0.002V_c^3$
$1000 \leq L < 1350$	66.5	76	$8.357V_c + 0.002V_c^3$
$1350 \leq L < 1600$	78.9	90.3	$9.905V_c + 0.0025V_c^3$
$1600 \leq L < 2000$	99.8	114	$12.381V_c + 0.0013V_c^3$
$2000 \leq L < 3000$	147.3	166.3	$18.572V_c + 0.0029V_c^3$
$3000 \leq L < 4000$	194.8	223.3	$24.762V_c + 0.0036V_c^3$
$4000 \leq L < 5000$	242.3	275.5	$30.953V_c + 0.0046V_c^3$

Exception: Lifts with rated speed not less than 9 m/s serving a zone of over 50-storey or over 175 m between top/bottom-most landing and principal/ground landing, and designated as fire service lifts or sky lobby shuttles serving two principal stops.

(b) Maximum Allowable Electrical Power of Hydraulic Lifts

The running active electrical power of the hydraulic oil pump motor of any hydraulic lift system carrying a rated load at its rated speed in an upward direction shall not exceed the maximum allowable values specified in Table B4.4–(4).

Table B4.4–(4) - Maximum Allowable Electrical Power of Hydraulic Lifts

Rated Load (kg)	Maximum Allowable Electrical Power (kW) Under rated conditions
$L < 1000 \text{ kg}$	26.6
$1000 \text{ kg} \leq L < 2000 \text{ kg}$	50.4
$2000 \text{ kg} \leq L < 3000 \text{ kg}$	71.3
$3000 \text{ kg} \leq L < 4000 \text{ kg}$	92.2
$4000 \text{ kg} \leq L < 5000 \text{ kg}$	115
$L \geq 5000 \text{ kg}$	$0.023L$

(c) Maximum Allowable Electrical Power of Escalators & Passenger Conveyors

The running active electrical power of the steps driving motor of escalator/passenger conveyor operating under no load condition shall not exceed the maximum values specified in Table B4.4–(5) (for escalator other than public service escalator), Table B4.4–(6) (for public service escalator), Table B4.4–(7) & (8) (for passenger conveyor other than public service conveyor), and Table B4.4–(9) & (10) for public service passenger conveyor).

Table B4.4–(5) - Maximum Allowable Electrical Power of Escalator Other Than Public Service Escalator Operating under No-load Condition

Step Width (mm)	Rise of Escalator (m)	Maximum Allowable Electrical Power in Watt for Various Ranges of Rated Speed (Vr) in m/s		
		Vr < 0.5	0.5 ≤ Vr < 0.6	0.6 ≤ Vr < 0.75
600	R < 3.5	1283	1473	1853
600	3.5 ≤ R < 5	1520	1805	2233
600	5 ≤ R < 6.5	1758	2138	2613
600	R ≥ 6.5	209R+432	247R+530	302R+652
800	R < 3.5	1425	1615	1948
800	3.5 ≤ R < 5	1710	1995	2423
800	5 ≤ R < 6.5	1995	2375	2898
800	6.5 ≤ R < 8	2328	2755	3373
800	R ≥ 8	230R+588	253.6R+694	312.5R+853
1000	R < 3.5	1520	1805	2185
1000	3.5 ≤ R < 5	1900	2185	2708
1000	5 ≤ R < 6.5	2214	2660	3230
1000	6.5 ≤ R < 8	2613	3040	3753
1000	R ≥ 8	268R+653	349.6R+771	346.7R+997

Table B4.4–(6) - Maximum Allowable Electrical Power of Public Service Escalator Operating Under No-load Condition

Step Width (mm)	Rise of Escalator (m)	Maximum Allowable Electrical Power in Watt for Various Ranges of Rated Speed (Vr) in m/s		
		Vr < 0.5	0.5 ≤ Vr < 0.6	0.6 ≤ Vr < 0.75
800	R < 3.5	1995	2375	2945
800	3.5 ≤ R < 5	2375	2850	3515
800	5 ≤ R < 6.5	2755	3278	4085
800	6.5 ≤ R < 8	3135	3705	4608
800	R ≥ 8	291.6R+795	347.7R+952	433R+1183
1000	R < 3.5	2138	2518	3135
1000	3.5 ≤ R < 5	2518	3230	3705
1000	5 ≤ R < 6.5	2898	3468	4275
1000	6.5 ≤ R < 8	3278	3895	4893
1000	R ≥ 8	305.6R+837	346.7R+1109	456.9R+1251

Table B4.4–(7) - Maximum Allowable Electrical Power of Passenger Conveyor Other Than Public Service Passenger Conveyor at an inclination up to 6° from horizontal Operating under No-load Condition (Vr<0.75)

Step Width (mm)	Nominal Length of Conveyor (m)	Maximum Allowable Electrical Power in Watt for Various Ranges of Rated Speed (Vr) in m/s		
		Vr < 0.5	0.5 ≤ Vr < 0.6	0.6 ≤ Vr < 0.75
800	L < 8	1093	1450	1900
800	8 ≤ L < 12	1568	2100	2750
800	12 ≤ L < 16	2043	2750	3500
800	16 ≤ L < 20	2518	3900	4400
800	L ≥ 20	120.6L+97	186L+149	211L+169
1000	L < 8	1235	1650	1900
1000	8 ≤ L < 12	1995	2700	3050
1000	12 ≤ L < 16	2660	3550	4000
1000	16 ≤ L < 20	3278	4400	4950
1000	L ≥ 20	155.8L+124	209L+168	237L+190

Table B4.4–(8) - Maximum Allowable Electrical Power of Passenger Conveyor Other Than Public Service Passenger Conveyor at an inclination up to 6° from horizontal Operating Under No-load Condition ($0.75 \leq V_r < 0.90$)

Step Width (mm)	Nominal Length of Conveyor (m)	Maximum Allowable Electrical Power in Watt for Various Ranges of Rated Speed (V_r) in m/s
		$0.75 \leq V_r < 0.90$
800	$L < 8$	2138
800	$8 \leq L < 12$	3088
800	$12 \leq L < 16$	4085
800	$16 \leq L < 20$	5035
800	$L \geq 20$	$240L+192$
1000	$L < 8$	2138
1000	$8 \leq L < 12$	3468
1000	$12 \leq L < 16$	4560
1000	$16 \leq L < 20$	5653
1000	$L \geq 20$	$270.7L+216$

Table B4.4–(9) - Maximum Allowable Electrical Power of Public Service Passenger Conveyors Operating under No-load Condition ($V_r < 0.75$)

Step Width (mm)	Nominal Length of Conveyor (m)	Maximum Allowable Electrical Power in Watt for Various Ranges of Rated Speed (V_r) in m/s		
		$V_r < 0.5$	$0.5 \leq V_r < 0.6$	$0.6 \leq V_r < 0.75$
800	$L < 8$	1283	1663	1900
800	$8 \leq L < 12$	1568	1995	2612
800	$12 \leq L < 16$	2043	2613	3325
800	$16 \leq L < 20$	2518	3705	4180
800	$L \geq 20$	$120.6L+96$	$176.7L+141$	$200.4L+160$
1000	$L < 8$	1378	1758	1995
1000	$8 \leq L < 12$	1995	2565	2898
1000	$12 \leq L < 16$	2660	3373	3800
1000	$16 \leq L < 20$	3278	4180	4703
1000	$L \geq 20$	$155.8L+124$	$198.5L+159$	$225L+180$

Table B4.4–(10) - Maximum Allowable Electrical Power of Public Service Passenger Conveyors Operating Under No-load Condition ($0.75 \leq V_r < 0.90$)

Step Width (mm)	Nominal Length of Conveyor (m)	Maximum Allowable Electrical Power in Watt for Various Ranges of Rated Speed (V_r) in m/s
		$0.75 \leq V_r < 0.90$
800	$L < 8$	2233
800	$8 \leq L < 12$	3088
800	$12 \leq L < 16$	4085
800	$16 \leq L < 20$	5035
800	$L \geq 20$	$240.3L + 192$
1000	$L < 8$	2328
1000	$8 \leq L < 12$	3468
1000	$12 \leq L < 16$	4560
1000	$16 \leq L < 20$	5653
1000	$L \geq 20$	$270.7L + 216$

B4.6 ENERGY MANAGEMENT OF LIFT

The following energy management provisions shall be included in the lift control system for a bank of lifts:

- (a) Under normal operating status, at least one lift car of a lift bank shall operate under a parking mode during low traffic period when the traffic demand on the vertical transportation system is low.
- (b) Under a parking mode of operation, a lift car shall not respond to passenger calls until it returns to the normal operation mode.
- (c) For each lift car within a lift bank, when it has been idling for 2 minutes, time period adjustable, with the lift doors closed or during parking mode of operation, the lift car's ventilation, air conditioning and lighting shall be shut off automatically until the lift car is activated again by passenger call.

B4.8 SERVICE-ON-DEMAND ESCALATOR/PASSENGER CONVEYOR CONTROL

Where specified in the Particular Specification and/or on the Drawings, the Contractor shall provide service-on-demand control for escalators/passenger conveyors which shall be actuated by means of contact mat, motion sensor or other presence detection devices. Lightray sensor and contact mat shall be arranged at

least 1300 mm and 1800 mm (from the outer edge of the contact mat) before the comb intersection line respectively. The length of the contact mat in the direction of travel shall be at least 850 mm. Contact mat reacting to weight shall respond before the load reaches 150 N, applied to a surface of 25 cm² at any point. Construction measures shall discourage circumvention of the control elements. The escalator/passenger conveyor shall start automatically from stop or crawl speed upon detection of personnel movement within the landing zone of the escalator/passenger conveyor. The escalator/passenger conveyor shall start to move before the person walking reaches the comb intersection line.

Motion sensors shall be installed at the exit of the service-on-demand escalator to detect whether there is any passenger approaching the escalator in opposite direction. Upon detection of passenger approaching in the opposite direction, the escalator shall immediately start up and run in the predetermined direction for an adjustable period of not less than 10 seconds. Concurrently audible signal shall be provided to alert the passenger not to step onto the escalator.

The escalator/passenger conveyor shall be stopped or reduced to a crawl speed automatically after a preset period of time (which shall be adjustable) which shall be at least the anticipated passenger transfer time plus 10 seconds after the passenger has actuated the automatic starting device. The stopping of the escalator shall be gradual with no jerk.

A clear visible signal system shall be provided at both ends indicating to the user whether the escalator/passenger conveyor is available for use, and its direction of travel. Electronic signage display shall also be provided at each of the ingress/egress points of escalators/passenger conveyors in order to notify the users of the travel direction.

The service-on-demand control and associated components for outdoor escalator/passenger conveyor shall be of weatherproof construction. The design shall be 'fail-safe' such that in case of the failure of the service-on-demand control or any of its detection devices and sensors, the escalator/passenger conveyor shall continue to operate normally without stopping.

B4.9 COMPLIANCE WITH ENERGY CODES

The lift, escalator and passenger conveyor installation shall comply with, or perform better than, the latest edition of all energy codes issued by the Electrical and Mechanical Services Department, the Government of the HKSAR including the following:

- (a) Code of Practice for Energy Efficiency of Lift and Escalator Installations;
- (b) Code of Practice for Energy Efficiency of Electrical Installations;
- (c) Code of Practice for Energy Efficiency of Air Conditioning Installations;
- (d) Code of Practice for Energy Efficiency of Lighting Installations; and
- (e) Performance-based Building Energy Code where applicable.

SECTION B5

REQUIREMENTS FOR LIFT RIDE QUALITY

B5.1 GENERAL

The lift ride quality generally applies to passenger lifts with speed less than 8 m/s. For passenger lifts having speeds in the range of 6 to 8 m/s, a multiplier of 1.5 should be applied to the vibration limits. The requirements for judging the lift ride quality are stated in the following clauses.

B5.2 LATERAL AND VERTICAL VIBRATION

Lateral and vertical vibrations of a lift car are the two main motion elements and the perceptible levels of which will affect the riding comfort perceived by the passengers. For passenger lifts with speed less than 6 m/s, the acceptable maximum peak-to-peak lateral vibration and vertical vibration are both 0.25 m/s^2 . A multiplier of 1.5 should be used for the passenger lifts having speeds in the range of 6 to 8 m/s.

PART C - ELECTRIC & HYDRAULIC LIFT

SECTION C1

GUIDES AND FIXING

C1.2 REQUIREMENTS

- (a) The strength of the guides, their attachments and joints shall comply with EN 81-1:1998 and ISO 7465:2007 and be sufficient to withstand the forces imposed due to the operation of the safety gear and deflection due to uneven loading of the car; and
- (b) The guides shall have machined surfaces for rated speeds exceeding 0.4 m/s.

SECTION C4

SUSPENSION

C4.1 SUSPENSION ROPES

Cars and counterweights shall be suspended from steel wire ropes of best quality, the size and number being in accordance with EN 12385-5:2002. The factor of safety for the suspension ropes shall be not less than 12 in the case of traction drive with three ropes or more.

The suspension ropes shall be constructed to comply with EN 12385-1:2002, EN 12385-5:2002 and ISO 4344:2004 EDTN2 and shall have a life expectancy of at least 6 years for application on similar lifts. The suspension ropes shall be manufactured to ISO 9001:2000 by a reputable manufacturer. The Contractor shall submit relevant test certificates and test reports issued by laboratories accredited by the Hong Kong Laboratory Accreditation Scheme (HOKLAS) or other recognized accredited laboratories for approval.

C4.4 COMPENSATING ROPE

For travels over 30 m, the Contractor shall provide compensation for hoisting ropes. For speeds of 2.5 m/s or below, quiet operating chains or similar devices may be used as the means of compensation. For speeds above 2.5 m/s, compensating ropes with tensioning pulleys shall be provided.

For speeds over 3.5 m/s, anti-rebound devices shall be provided in addition.

C4.5 PROTECTION FOR TRACTION SHEAVES, PULLEYS AND SPROCKETS

For traction sheaves, pulleys and sprockets, provisions shall be made according to EN 81-1:1998 to avoid:

- (a) the ropes/chains leaving the pulleys and sprockets, if slack;
- (b) the introduction of objects between ropes/chains and pulleys/sprockets;
and
- (c) body injury.

SECTION C8

CAR ENCLOSURES

C8.4 INTERNAL CONSTRUCTION OF PASSENGER LIFT CAR

Unless otherwise specified in the Particular Specification and/or on the Drawings, passenger lift car enclosure shall be of steel with 4 mm studded rubber floor to colour and pattern as approved by the Architect. The whole of the internal face of the car shall be of 1.5 mm thick hairline stainless steel sheet with etched pattern or mirror surface etched finished stainless steel sheet as approved by the Architect. A stainless steel handrail shall be provided on three sides of the lift car, extended to within 150 mm of all corners and a stainless steel skirting panel approximately 100 mm deep shall be provided. Hairline finished stainless steel false ceiling with concealed fluorescent or Light Emitting Diode (LED) luminaires as approved by the Architect and ventilating fan complete with metal ceiling diffuser shall be provided. The layout of the false ceiling and lighting fittings shall be subject to the approval by the Architect.

The fan shall be of quiet running type having a noise level not greater than 55 dBA when measured at a distance of 1 m from the fan and it shall be capable of handling at least 20 air changes per hour of lift car volume, with car doors closed. The effective area of ventilation apertures situated in the upper part of the car shall be at least 1% of the available car area, and the same applies for any apertures in the lower part of the car.

The car ventilation fan, air conditioning and the lighting, shall be switched off automatically within a time period of 2 minutes which shall be adjustable up to 15 minutes after the last registered call is answered. The lift door shall also be closed.

C8.5 INTERNAL CONSTRUCTION OF GOODS LIFT CAR IN MARKETS AND ABATTOIRS

Unless otherwise specified, the complete enclosure of the lift car shall be constructed in stainless steel and as detailed below:

(a) Car walls

All car wall panels shall be of 1.5 mm thick stainless steel sheet. The side and rear wall panels shall each be provided with three-equally-spaced full length lateral protective oak battens of 200 mm wide by 25 mm thick. The surface of the wood battens shall be covered with 1.0 mm thick stainless steel sheet fixed by stainless steel screws. The top battens shall be fixed at a height of 1100 mm above finished car floor level.

(b) Car roof

The car roof shall be of 1.5 mm minimum thickness stainless steel sheet. It shall be able to support the weight of two persons, i.e. to withstand a vertical force of 2000N at any position without causing permanent deformation.

Ceiling lights shall be of recessed energy efficient type and be protected by stainless steel metal bars.

A recessed ceiling fan complete with heavy duty metal diffuser and capable of providing 20 air changes per hour in the car shall be provided. The fan when running shall have a noise level not greater than 58 dBA measured at a distance of 1 m from the fan.

The internal clear height of the car shall be not less than 2500 mm.

(c) Car floor

The car floor shall be constructed of stainless steel plate with 2 mm high multi-grip non-slip pattern, making a total thickness of 5 mm. The floor construction shall be in the form of a metal drain pan, the rear and side edges shall be folded up by 100 mm from the floor to form the drain pan. All joints and the corners of the pan shall be welded to prevent water leakage. The finished car floor level shall be made to fall to a drain outlet located at a rear corners position. A stainless steel drain water storage tank of not less than 0.035 m³ holding capacity shall be provided at a suitable location under the drain pan to collect water from the drain outlet. The tank shall be completed with a mechanically operated automatic emptying device as shown in Annex III.

(d) Drain water storage tank

The drain water storage tank shall be constructed with 1.5 mm thick stainless steel and of sizes 350 x 350 x 300 mm(H) approximately. The tank cover of sizes 250 x 250 mm with stainless steel flat bar grating on top shall be removable to facilitate future maintenance and shall form part of the car floor. Holes of approximate 4 mm diameter shall be drilled through the cover for draining of water into the tank. A 25 mm dia. stainless steel pipe shall be provided with one end connected to the bottom of the tank and the other end left open-ended but controlled by a stop valve. The stop valve shall be kept close by a spring on one side and a roller connected to the other side. A metal bar of 450 mm long approximately shall be fixed at the bottom of the lift pit and when the lift reaches its lowest floor, the roller will be pressed by the metal bar which then open the stop valve and release the water collected in the tank into the lift pit. A float switch shall be provided in the water storage tank which upon operation shall transmit a signal to call for the car to descend to its lowest floor position. Water collected in the pit will be pumped away by submersible pump provided by others.

A sketch showing the tank arrangement is attached at Annex III.

(e) Control and indication

Car control buttons shall be the push button type as specified in Clause C9.5 and shall also be made of vandal resistant stainless steel.

Position indicators shall be of vandal resistant type securely mounted to the back of the faceplate which shall be of tamper-proof type. Legends shall be etched into stainless steel faceplate in black 13 mm high characters.

C8.7 INTERNAL CONSTRUCTION OF SERVICE LIFT CAR

Unless otherwise specified, the entire internal surfaces of the service lift car shall be 1.5 mm thick stainless steel sheet. A recessed energy efficient ceiling light shall be provided. A removable stainless steel shelf shall also be provided unless otherwise specified.

C8.8 MAINTENANCE FACILITIES

A 13A 3 pin switched socket outlet protected by residual current circuit breaker (R.C.C.B.) shall be provided on both the top and bottom of the lift car. The R.C.C.B. will be provided by the Electrical Contractor. A permanent fluorescent light, suitably protected and separately switched, shall also be fitted on top of the lift car.

C8.9 CAR ILLUMINATION

Unless otherwise specified, every lift car shall be adequately illuminated by a minimum of two energy efficient T5 electric fluorescent luminaires with separate electronic ballast or LED luminaries as approved by the Architect. The illumination level shall not be less than 120 lux on the lift floor level and 150 lux minimum at the car controls. For accessible lift, the illumination level shall not be less than 150 lux on the lift floor level and at the car controls.

C8.10 EMERGENCY LIGHTING

Every lift car shall be provided with emergency lighting operated by a rechargeable battery supply. The lighting shall be automatically switched on in the event of failure of normal power supply to the lift. At least one of the fluorescent or LED luminaries as specified in Clause C8.9 shall be self-maintained emergency type with rechargeable batteries having a capacity sufficient to maintain the lighting for two hours upon failure of the normal lighting supply.

C8.11 EMERGENCY ALARM DEVICE

An emergency alarm push button together with a buzzer (or an alarm bell), an intercom, an indicating light and a closed circuit television (CCTV) camera shall be provided in the lift car and be connected to the building management office or the caretaker's office, and the lift machine room, such that the person inside can speak to the building management office or the caretaker's office as the case may be.

In the building management office or caretaker's office with 24 hours attendance, there shall be a buzzer, indication light(s) (one for each lift) and an intercom connected to the lift car(s). A reset switch shall be provided for the buzzer and the indication light.

There shall be another buzzer (or alarm bell) connected to the alarm push button in the lift car provided at high level on the landing of designated point of entry (refer to Section C20 for detailed requirements).

The pattern of lift alarms shall be distinguishable from that of fire alarms and shall be of the following two-tone pattern:

Low frequency:	600 Hz ($\pm 15\%$)	Duration: 600 ms ($\pm 20\%$)
High frequency:	920 Hz ($\pm 15\%$)	Duration: 300 ms ($\pm 20\%$)

The indication light in the lift car shall be for acknowledgement in the form of a blinking light adjacent to the intercom speaker. A notice 'When light blinks, it indicates your emergency call has already been received. Please be patient and wait for the rescue' (in English and Chinese) as approved by the Architect shall be provided next to the indication light.

The pressing of the emergency alarm push button inside the lift car shall actuate both buzzers and indication lights. The buzzer inside the car shall sound only when the emergency alarm push button is pressed. The emergency alarm push button shall have tactile marking of a bell and coloured yellow.

The electricity supply for these alarm devices and the system including the CCTV camera shall be backed up by rechargeable batteries as stated in Clause B2.8 and where emergency power supply is available, be also fed by an emergency power supply.

SECTION C9

CONTROL AND INDICATION IN CAR

C9.1 CONTROL STATION IN CAR

Each lift car shall have a flush mounted control station comprising:

- (a) Call buttons with acceptance signals engraved in Arabic number to correspond with the landing served;
- (b) An alarm push button with indicating light and buzzer, and with protection from being operated accidentally; the colour of this button shall be yellow;
- (c) 'door open' and 'door close' push buttons;
- (d) Audible and visible signals in connection with the overload device;
- (e) Light switch, alarm reset switch, fan switch and cleaner's 'Stop-switch' keeping the car door open in the form of key switches or housed in a recessed metal box with hinged or sliding lid which will be key-locked; and
- (f) Two-way intercom speaker - the intercom system shall be as specified in Clause C20.3.

All wordings shall be engraved in both English and Chinese characters. The material for the control station shall be stainless steel with a thickness of not less than 2.5 mm. The control station shall be fixed onto the car panel by stainless steel screws of secret-head type.

C9.2 ADDITIONAL CONTROL STATION

For passenger lifts of 21 persons capacity or larger, and all accessible lifts, two car control stations, one on either side of the car doors, shall be provided such that one station shall have the above functions (a), (b) and (c) only and one station shall have all the functions (a) to (f).

Additional control stations in lift car shall be provided in case there is more than one car door.

C9.4 CAR DIRECTION AND POSITION INDICATOR

The direction indicators shall be of illuminated directional indicator with an illuminated area not less than 1125 mm² and height not less than 50 mm. The position indicator shall be of digital type display unless otherwise specified.

The characters on the position indicator shall have a minimum height of 50 mm and easy to read even from a wide angle of view and under an illumination level of 50 lux to 500 lux.

The indicators shall be securely mounted onto the back of faceplates.

Voice annunciator shall be provided for passenger lift, bed/passenger lift, accessible lift and goods lift to announce the floor due to be stopped. Unless otherwise specified, the announcement shall be in Cantonese, Putonghua and English. Voice synthesiser or similar device shall be submitted to demonstrate the quality of announcement and a voice tape shall also be submitted to verify the context of the announcement prior to installation.

C9.5 PUSH/ELECTRONIC TOUCH BUTTON

All push buttons except for cars in office buildings shall be vandal-resistant design and flush mounted construction.

Micro-movement push buttons shall be provided in place of vandal-resistant buttons for passenger lifts in office buildings and where specified in the Particular Specification. Electronic touch buttons are not preferred as they may not suit the visually impaired and blind people.

Both the halo and number of the button shall be illuminated in acknowledgement of the call. The halo and number shall be formed with flame retarding materials. Shock loads due to pressing of the button must be borne by the body of the unit and not by the contacts.

C9.7 INFORMATION DISPLAY SYSTEM

The Contractor shall be responsible for the supply and installation of information display system with colour Liquid Crystal Display(LCD) monitor(s) or similar slim type monitor(s) approved by the Architect for audio and video (AV) information display inside the lift car at the location(s) as specified in the Particular Specification or Drawings, or as instructed by the Architect.

The system shall display the floor position, lift travelling direction, the lift status messages as stated in Clause C11.5, as well as floor directory and date/time. Separate car direction and position indicator(s) as stated in Clause C9.4 is/are not required but the provision of voice announcement as stated in Clause C9.4 shall still be complied with.

At least two sets of input ports in a popular system shall be provided in the Information Display System to exclusively allow other information providers to input other information signals such as, but not limited to, news, weather data etc. The Contractor shall provide the necessary software and programming to allow the smooth display of all the basic and other information mentioned above.

The monitor shall meet the following minimum technical requirements:

Screen size	≥ 250 mm (10 inches) or as specified in the Particular Specification or Drawings, further or as instructed by the Architect
Protective coating	Anti-glare polarizer, hard coat
Resolution	≥ 800 X 600 pixels, or as specified in the Particular Specification or Drawings, further or as instructed by the Architect
Video input interface	Analog & Digital
Audio input	Stereo
Speakers	2 nos.
Control buttons & On-screen controls	normally disabled, only able to be enabled by authorized personnel
Electrical safety standard (including any associated adapter)	EN 60950:2006 or equivalent
Standard for electromagnetic emission/radiation	TCO'06 or its latest version

The Contractor shall also be responsible for the following associated provisions:

- (a) all necessary audio & video equipment, data input stations and software;
- (b) all necessary power supply, other than those specified to be supplied and installed by other parties in the Drawings or Particular Specification, to the monitor with an 'on/off' switch inside the service cabinet of the lift car operation panel;
- (c) all necessary power and signal cables, conduits and trunkings, other than those specified to be done by other parties in the Drawings or Particular Specification, connected to the monitor;
- (d) fibre optic cables (to be used as the traveling signal cables), or other types of cable specified in the Particular Specification or Drawings, or other types of cable approved by the Architect, and all necessary noise reduction and signal booster devices in order to eliminate the signal losses and noise to the monitor; and
- (e) attendance and coordination with other parties for installation, testing & commissioning and maintenance of the complete information display system.

SECTION C10

CAR AND LANDING DOORS

C10.1 GENERAL REQUIREMENTS

Each car entrance shall be provided with an imperforated car door which shall extend the full height and width of the car opening. The top track of the door shall not obstruct the car entrance.

All landing openings in lift well enclosures shall be protected by imperforated doors which shall extend the full height and width of the landing opening. The top track of landing door shall not obstruct the entrance to the lift car. Every such door shall have an F.R.P. of not less than one hour.

Where lift landings are not isolated by fire resisting enclosures or lifts that are completely surrounded by stairwells (as stipulated in paragraph 11.2 of the Codes of Practice for Fire Resisting Construction 1996 issued by the Buildings Authority), the Contractor shall provide lift doors that are constructed to satisfy both the criteria for integrity and insulation in accordance with BS 476 Part 20:1987 & Part 22:1987 (or EN 81-58:2003 or EN 1634-1:2008 as appropriate) unless otherwise specified.

Any projections on or recesses in the exposed parts of the car doors or landing doors shall be kept to a minimum in order to avoid finger trapping between sliding parts of the door and any fixed part of the car or landing entrance.

For all automatic power operated horizontally sliding car doors, means shall be provided to minimize the risk of dragging the children's hands into the gaps between the car door panels and uprights.

The clearance between panels or between panels and any fixed part of the car or landing entrance shall not exceed 6 mm.

Sliding car and landing doors shall be guided on door tracks and sills for the full travel of the doors. The distance between the car and landing sills shall not exceed 35 mm.

The clear height of all entrances on car and landings shall not be less than 2 m.

C10.9 DOOR OPERATOR

The door operator shall open and close the car and landing doors in a safe, smooth and quiet manner and shall be able to achieve the door operating time as specified in the Particular Specification. The maximum closing force and kinetic energy shall comply with the requirements as stipulated in the Code of Practice on the Design and Construction of Lifts and Escalators issued by the Electrical and Mechanical Services Department, the Government of the HKSAR. The door re-opening device shall be as specified in Clause C10.12.

The door motor and drive shall be of AC motor with variable voltage variable frequency (VVVF) control unless otherwise specified in the Particular Specification. Other proven types of door motor and drive may also be used subject to the approval by the Architect.

C10.12 DOOR RE-OPENING DEVICE

Door re-opening device shall be provided which shall automatically initiate re-opening of the door in the event of a passenger being struck (or about to be struck) by the door in crossing the entrance during the closing movement.

Dual function safety edge shall be used unless otherwise specified in the Particular Specification or as approved by the Architect. The requirements for dual function safety edge are as follows:

- (a) Dual function safety edge shall incorporate both mechanical and electronic type sensitive devices for providing automatically re-opening feature to the car door. When either one of the mechanical and electronic type sensitive devices or both of them is/are actuated in the event of a passenger being struck (or about to be struck) by the door in crossing the entrance during the closing movement, re-opening of the door shall be automatically initiated;
- (b) The dual function safety edge shall be installed at the leading edge of each car door panel. It shall be so designed and installed that for centre opening doors the obstruction of either leading edge when closing will cause it to function;
- (c) The mechanical device shall extend from not more than 25 mm above the sill (measured to the extended position of the protective device) to a minimum height of 1800 mm above the sill;
- (d) The electronic device shall be of curtain type composed of not less than 24 infrared beams, or other technology specified in the Particular Specification or Drawings, or other technology approved by the Architect. The detection field of the curtain shall cover the entire car opening width and extend from not more than 25 mm above the sill to a minimum height of 1800 mm above the sill. The electronic device shall be EMC compliance to the latest editions of EN 61000-6-3:2007 for electromagnetic emission and EN 61000-6-1:2007 for electromagnetic immunity; and
- (e) The electronic device shall be inoperative when the fireman mode of fireman's lift is activated.

Where specified in the Particular Specification or approved by the Architect, entirely mechanical type or electronic type safety edge may be accepted provided that it meets the above-mentioned requirement nos. (a) and (b) for both types of safety edges, requirement no. (c) for mechanical safety edge and requirement nos. (d) and (e) for electronic safety edge. However, dual function safety edge shall be used unless otherwise specified in order to cater for the elderly and disabled people.

C10.15 EMERGENCY DOOR IN LIFT WELL

Where there is a long stretch of lift well without a landing door, an emergency door shall be provided at a distance apart not exceeding 11000 mm for evacuating the passengers. The emergency doors shall, unless otherwise specified, be provided by others, except item (e), and the Contractor shall coordinate with the party responsible for the work, to check and ensure that the doors provided comply with the following:

- (a) have minimum dimension 1800 mm x 500 mm with an F.R.P. of not less than one hour;
- (b) not open towards the interior of the lift well;
- (c) be located in a position readily accessible to rescuers;
- (d) be provided with a lock of such a type that it can be opened from the outside with a key only and from the inside without a key and can be re-locked and re-closed without a key;
- (e) be provided with an electrical safety device by the Contractor of such a type to secure that the lift cannot be set or kept in motion unless the door is fully closed; and
- (f) bear on its outside surface a permanent notice in English and Chinese.

C10.16 ARCHITRAVE

At each landing entrance, the Contractor shall provide, unless otherwise specified, architraves of 1.5 mm thick stainless steel of hairline or mirror finish or heavy gauge sheet steel profiled to an approved design and spray painted to an approved colour, as approved by the Architect and shall include all packing and filling (or grouting) as necessary. All surfaces of architrave shall be formed true and gaps between sections will not be allowed. Bolts shall not be visible on the exposed surfaces of the architraves. The architraves shall extend to enclose the thickness of the enclosing front wall.

SECTION C11

LANDING FIXTURES

C11.1 POSITION AND CONSTRUCTION

Unless otherwise specified in the Particular Specification a landing fixture will be mounted adjacent to the lift landing entrance for 'simplex' control lift and between the landing entrances for 'duplex' control lifts, or group supervisory control lifts.

This fixture shall consist of landing call push button(s) and illuminated call acceptance signal, with a stainless steel cover plate. The button(s) shall be of vandal-resistant design and flush mounted construction similar to the buttons inside lift car. Micro-movement push buttons shall be provided for office buildings and where specified in the Particular Specification. Electronic touch buttons are not preferred as they may not suit the visually impaired and blind people

C11.2 EMERGENCY KEY SWITCH FOR BED/PASSENGER LIFT

- (a) An emergency key switch system comprising the following facilities shall be provided for bed/passenger lifts:
 - (i) An on-off key switch above the landing fixture at each landing and on the lift car control station; and
 - (ii) 'Emergency Use' indicator both in Chinese and English at each landing and on the lift car control station.
- (b) The emergency key switch shall be operated as follows:
 - (i) When the key switch at the required landing is operated, the lift will immediately stop at the next floor in the direction in which it is travelling. Lift doors will remain closed and lift will immediately go to the floor at which the key switch has been operated. Should the lift be already travelling in the direction of the floor where the key switch has been operated the lift will go to that floor without stopping. At the same time of the key switch operation, an indicator will illuminate on the car control station, and on each landing to warn the passengers that the lift is required for 'Emergency Use' only;
 - (ii) On arrival at the requesting floor the lift will stop, doors open and remain open until the same key is used to operate the key switch in the lift car. Should the key switch in the lift car is not operated for an adjustable period up to 5 minutes, the lift shall return to its normal operation;

- (iii) With the same key to operate the key switch in the lift car, the person requiring the lift will gain full control over the lift. The lift shall return to its normal operation when the key switch in lift car is returned to its 'off' position; and
- (iv) The key at each landing shall be of the spring-loaded type to ensure that the switch returns to 'off' position. The key in lift car shall be withdrawn at 'off' position only. The operation of key switch in lift car shall override the 'on' position of key switch at any landing. The 'Emergency Use' indicators shall remain illuminated until all the key switches are returned to their 'off' positions or when the pre-set period of time has been expired.

This emergency key switch shall not override the Fireman's Switch.

C11.3 DIRECTION AND POSITION INDICATOR

Audible and visual direction indicators shall be provided on each landing. The indicator shall sound once for an arriving lift that is travelling upwards and twice for downwards. Audible signal shall be at least 58 dBA measured at 1 m from the landing door while the visual signal shall be an illuminated directional indicator with an illuminated area not less than 1125 mm² and the characters on the position indicator shall have a minimum height of 50 mm. The visual direction indicator shall be designed with a minimum protrusion of 10 mm to give a better visual effect to the passengers waiting.

For automatic group supervisory control systems mentioned in Clause C18.7, illuminated position indicator shall be provided at the landing of the designated point of entry only unless otherwise specified. For all other automatic control systems mentioned in Section C18, illuminated position indicator shall be provided at the landing of the designated point of entry and on all other landings unless otherwise specified. The construction of the position indicator shall be as Clause C9.4 or formed by a section of the message indicator as in Clause C11.5.

C11.4 PRE-ARRIVAL SIGNAL FOR GROUPED PASSENGER LIFTS

For group supervisory control of two or more lifts, the audible and visual signal provided for each passenger lift at each landing shall be activated before the arrival of each lift. The time between activation of the signal and the arrival of the lift shall not be less than 2 seconds.

C11.5 MESSAGE INDICATOR FOR PASSENGER LIFT

An illuminated indicator digital type display shall be provided for each lift except service lift at each landing to display messages such as 'Out of service', 'Overload', 'Full load', 'Used by firemen', 'On emergency service', 'This lift serves the following floors'. The indicator shall be able to display up to at least 32 messages. These messages shall be displayed alternatively in English and Chinese. The contents, display sequence and display patterns of these messages

shall be on site programmable. The luminous intensity of the indicator shall be at least 3500 μ cd. Message indicator is still required at each landing for each lift under group supervisory control when position indicator is not provided.

SECTION C13

LOAD PLATES, NOTICE BOARDS AND INSTRUCTIONS

C13.3 NOTICE BOARDS

The following stainless steel notice boards engraving conspicuously in both English and Chinese characters shall be provided and rigidly mounted:

- (a) The name of the company, telephone number and emergency instructions at the terminal landing lift lobby; and
- (b) 'IN CASE OF FIRE DO NOT USE THE LIFT' with letter height of not less than 15 mm in each car and on each landing floor.

SECTION C14

SAFETY GEAR AND OVERSPEED GOVERNOR

C14.9 PROTECTION AGAINST UNINTENDED CAR MOVEMENT

Protection against unintended car movement of the lift car away from the landing with the landing door not in the locked position and the car door not in the closed position shall be provided. It shall meet the requirements of Amendment No. 1 of 2010 Edition to Code of Practice on the Design and Construction of Lifts and Escalators (2010 Edition) and all its subsequent amendments if any and shall also conform to the following:

- (a) Micro-switch or similar mechanical type detecting device shall not be used as a means to detect the open/close status of lift doors; and
- (b) Be tested and examined at least once annually after commissioning.

C14.10 PROTECTION AGAINST EARTHQUAKE

Where specified in the Particular Specification and/or shown on the Drawings, seismic operation control shall be provided to safeguard passengers from danger in the event of earthquake. Seismic detection sensors shall be installed in the lift machine room and other locations as specified or proposed by the Contractor and approved by the Architect to detect the primary wave (P-wave) and secondary wave (S-wave) of an earthquake.

When the seismic detection sensors detect the P-wave and/or low level of S-wave of an earthquake, the lift shall cancel all car calls and stop at the nearest landing in the direction of travel complying with Clause C16.8.

When the seismic detection sensors detect the S-wave above the high setting, the lifts, which are located outside the express zone, shall cancel all car calls and stop at the nearest landing in the direction of travel complying with Clause C16.8.

The lift in the express zone shall stop immediately once the seismic detection sensor detects the S-wave above the high setting. Unless there is operation of other safety device of the lift which can initiate an emergency stop and/or further lift operation will lead to a dangerous situation and/or there is a loss of electrical power and control, the lift shall re-start, after a preset adjustable time delay of 15 to 180 seconds, and travel with the lowest speed to the nearest landing in the direction for which the lift car moves away from the counterweight. The lift shall stop at the nearest landing complying with Clauses C16.8 and C16.9. During the travel period, if any safety device of the lift operates or further lift operation will lead to a dangerous situation, the lift car shall stop.

Audio and visual alarm indications shall be provided on the supervisory control panel for the actuation of the seismic detection sensors and the stopping/re-starting of the lift cars.

The Contractor may propose alternative acceptable seismic operation control arrangement and other additional means that can better safeguard passengers from danger or facilitate their rescue in the event of earthquake for approval by the Architect.

SECTION C16

LIFT MACHINERY

C16.4 EMERGENCY OPERATION BY ELECTRICAL SWITCH

For gearless lift machines as well as machines where the manual effort to raise the car together with its rated load exceeds 400N, an electrical switch for emergency operation shall be installed in the machine room.

For machines already fitted with manual operation wheel as required in Clause C16.3, the electrical switch for emergency operation shall also be installed, where technically feasible and available, for added protection.

The emergency electrical switch with directional push buttons protected against accidental operation shall be provided in the machine room such that when the emergency electrical switch is operated, the car can be moved up or down by applying constant pressure on the buttons. The car speed under the emergency operation shall not exceed 0.63 m/s.

The emergency electrical switch and its push buttons shall be so placed that the machine can readily be observed during operation. Also see Clause C13.4.

Where emergency power supply is provided in the building for fireman's lift(s) and/or other lifts, the electrical switches for emergency operation shall be backed up by the emergency power supply. In case the capacity of emergency power supply is only sufficient for the fireman's lift(s), the electrical switches for emergency operation shall be disconnected from the emergency power supply during fire alarm mode and at the operation of the fireman's switch. The operation of the fireman's lift(s) shall not be affected in any case.

C16.5 ELECTRO-MECHANICAL BRAKE

Every lift machine shall be provided with a brake which is capable of stopping the machine when the car is downward travelling at its rated speed and with the load equivalent to 125% (150% in case of industrial truck loaded freight lift and vehicle lift) of the rated load. It shall also be fitted with a manual emergency operating device capable of having the brake released by hand while a constant manual pressure is required to keep the brake open.

C16.8 STOPPING AT THE NEAREST LANDING

In addition to the home landing requirements as stipulated in Clauses C21.3, C21.4 and C21.5, the lift shall automatically cancel all car calls and stop at the nearest landing floor in the direction of travel with door open to release the passengers and with alarm in the supervisory control panel under the following fault conditions:

- (a) actuation of any of the safety device of respective lift which has not initiated an emergency stop;
- (b) flooding of respective lift pit as detected by the water level sensor if any;
- (c) breakdown of the ventilation fan in lift car; and
- (d) actuation of the seismic detection sensor.

The nearest landing in Clause C16.8 and C16.9 shall mean, as appropriate, the next available landing floor in the direction of travel, or a pre-designated nearest landing floor assigned for a lift car position in a direction of travel, or the nearest landing floor that a lift can practically stop at without jerk after deceleration.

The faulty lift shall not resume normal operation until positive reactivation. The ventilation fan, air conditioning and lighting of the faulty lift car shall be switched off and the lift door shall be closed after a preset adjustable period of time. Door open push button and safety edge shall however remain effective. Where there is “Out of Service” indication in the message indicator in the landing fixtures, it shall be turned on. Where required, the home landing key switch in Clause C21.3 shall be able to bring an empty faulty lift to the landing at the designated point of entry after all passengers are released and the lift door is closed, if further lift operation will not lead to a dangerous situation. On arrival at the designated point of entry, the faulty lift shall however not resume normal operation until positive reactivation.

C16.9 MOVE TO THE NEAREST LANDING AFTER EMERGENCY STOP

After an emergency stop, if there is no actuation of other safety and protection devices preventing the lift operation and further lift operation will not lead to a dangerous situation, the lift shall re-start automatically upon a preset adjustable time delay for the following scenarios:

- (a) When the lift is brought to an emergency stop due to voltage dips, the lift shall restart after the elapse of an adjustable time period of 5 to 60 seconds and upon the restoration of normal power supply. The lift shall move to the nearest landing with door open to release the passengers. If there is no actuation of other safety devices, the lift shall resume normal operation after another adjustable time period of 1 to 5 minutes. If the lift does not restart and/or resume normal operation, an alarm shall be indicated in the supervisory control panel together with “Out of Service” indication in the message indicator in the landing fixtures; and
- (b) When the lift is brought to an emergency stop due to the actuation of seismic detection sensors, the lift shall restart with the lowest speed after a preset adjustable time period of 15 to 180 seconds and move to the nearest landing with door open to release the passengers as stipulated in Clause C14.10. The lift shall however not resume normal operation until positive reactivation as stipulated in Clause C16.8.

SECTION C18

AUTOMATIC CONTROL SYSTEM

C18.7 AUTOMATIC GROUP SUPERVISORY CONTROL FOR 2-8 INTER-CONNECTED PASSENGER LIFTS

This group supervisory control system when specified in the Particular Specification shall incorporate a micro-computer or other similar solid state devices which continuously monitor the transportation demand and automatically adjust the group operation to suit the prevailing traffic pattern and to optimize passenger waiting time.

In the case of a fundamental change in the use or occupancy of the building, the system shall be re-programmable to cater for revised traffic pattern without inconvenient hardware modifications.

Facilities shall be provided in the system such that the fault record and the actual traffic pattern of the lifts could be printed out when required.

Control system features to be included are generally as described below but by no means exhaustive which may be either included as standard or specified elsewhere in the Particular Specification.

(a) Flexible service sectors

The lifts shall operate as an interconnecting collective group and the system shall arrange for cars to answer demands in accordance with priorities established by recording the time that calls have been registered. The lifts are to operate as completely flexible units and shall not therefore invariably make round trips, or park at specific floors, or operate to specified programmes, or in accordance with despatch times.

Landing calls shall be grouped into 'UP' and 'DOWN' sectors, the number of floors included in each sector depending on the anticipated traffic and the degree of priority to be accorded to the occupants of the floors. The priority of each sector shall be determined by the length of time that calls have been registered in the sector. It shall be possible to increase or reduce the priority of a sector by reducing or increasing the units of time for a sector.

When not answering calls, cars shall park with doors closed at the floor at which the last passenger is discharged. When a call is registered, the nearest parked car shall answer the call and when travelling to the floor at which the call is registered it shall by-pass calls in sectors through which it may have to pass. Should there be more than one call in sectors embracing several floors the car shall travel to the highest call in a 'DOWN' sector or the lowest call in an 'UP' sector.

When a car has answered all the landing calls in a sector to which it is assigned and the resulting car calls, it shall park at the final floor and

become available for further assignment. When under normal condition of two way traffic, any car which has answered the calls in its assigned sector and is not fully loaded, shall answer landing calls in the same direction in any sector through which it is passing while answering the car calls resulting from the assignment. The presence of an intense local demand shall be detected and additional cars assigned to this demand as required, provided always that elsewhere are of lower priority.

(b) Heavy 'Up' traffic

The heavy 'Up' traffic shall be detected through a load-weighing device and when cars loaded to 60% or more at the landing of designated point of entry two cars shall be assigned automatically to the landing of designated point of entry for a specific period. When lifts assigned to the landing of designated point of entry arrive, they shall stand with their doors in the open position with direction arrow illuminated. Cars not assigned to the landing of designated point of entry shall continue to answer demands elsewhere in the building in the normal manner.

(c) Heavy 'Down' traffic

When heavy 'Down' traffic is experienced, the condition shall be detected when downward travelling cars are loaded to 80% capacity. Under this condition the despatching system shall ensure that lift service is equally distributed through the building and fully loaded cars shall automatically bypass landing calls in order to prevent unnecessary stops.

(d) Light traffic

As traffic requirements diminish, cars shall complete their assignments and park with closed doors wherever they happen to be. After a preset period the M.G. sets if provided shall shut down. Any subsequent landing calls shall cause the M.G. set of the nearest car to the call to start up.

(e) Pre-arrival chiming system

See Clause C11.4.

(f) Traffic sentinel

An electronic detection system shall be incorporated to reduce the preset waiting time to landings and to supplement the operation of the door safety edge. After an adjustable period of time, the starting of the car shall be initiated immediately when the detection system detects that passenger movement across the threshold has ceased.

Should the sensor of the traffic sentinel be failed for an excessive period, the doors shall commence to close slowly after a pre-determined time delay.

(g) Car preference

It shall be possible to withdraw any car or cars from service for maintenance purposes or for attendant control by means of a key operated switch. Under this condition, other cars in the bank shall continue to answer calls in the system. If required, a car or cars shall be able to be withdrawn from the group and assigned to serve a selected floor/floors only.

(h) Car separation

An out-of-order car or cars shall be automatically separated from the group, while the remaining ones shall continue to operate under group supervision.

(i) Group operation of lifts under emergency power supply

Where a group of lifts are to be operated from the same emergency power source which is not sufficient to operate all the lifts at the same time, the Contractor shall provide an automatic selector switch such that upon the availability of emergency power, one lift at a time shall travel to and park at the landing of designated point of entry to release passengers. After all lifts are parked at the landing of designated point of entry, the emergency power supply shall remain connected to one of the lifts.

In case where the group of lifts consists of fireman's lift(s), sufficient emergency power shall be available for the operation of the fireman's lift(s) and the sequential returning of the other non-fireman's lift(s) of the group to the designated point of entry at the same time. The operation of the fireman's lift(s) shall not be affected in any case.

The Electrical Contractor will provide conduit/trunking facilities for the interconnections between different lift machine rooms, where applicable. The interconnecting control cables shall be provided by the Contractor.

SECTION C19

POWER SYSTEM APPLICATION

C19.4 HYDRAULIC LIFT

Except where specified in the Particular Specification, all hydraulic lifts shall have a maximum speed not exceeding 0.5 m/s with levelling accuracy of ± 5 mm. The hydraulic system shall be rated for at least 45 motor starts per hour.

SECTION C20

ALARM BUZZER / BELL SYSTEM, SUPERVISORY CONTROL PANEL, INTERCOM SYSTEM, TELEPHONE AND CLOSED CIRCUIT TELEVISION

C20.1 ALARM BUZZER / BELL SYSTEM TO BE PROVIDED

Where additional alarm device is specified in the Particular Specification and/or on the Drawings in addition to the system as specified in Clause C8.11, The Contractor shall be responsible for the provision of all cabling, buzzers (or alarm bells) and indicator board(s) in connection with all alarm system as specified in this General Specification and the Particular Specification.

The alarm buzzers/bell and indicator board(s) shall also be connected to the batteries as specified in Clause B2.8.

The indicator board(s) shall have visual and audible alarms for all lifts and shall include a mute switch for silencing the alarm buzzer(s) / bell(s) and a reset switch to reset the alarm. The alarm buzzer(s)/bell(s), after muting, shall have audible signal again when there is a second alarm. The indication light(s) shall remain on until all alarms are cleared and reset at the indicator board(s).

C20.2 SUPERVISORY CONTROL PANEL

Where supervisory control panel is specified in the Particular Specification and/or Drawings, the Contractor shall be responsible for the provision of all cabling, visual and audible signal components, and controls for the supervisory control panel from all lifts to the supervisory control panel that is located in the caretaker's office or building management office as the case may be at the landing of designated point of entry unless otherwise specified.

The supervisory control panel shall include at least, but not exclusive, the following basic facilities:

- (a) 'In service/Out of service' LED lights for each lift;
- (b) Floor/position indicators for each lift;
- (c) Up/Down direction indicator arrows for each lift;
- (d) System fault alarm buzzer / bell and LED indication lights;
- (e) Mute button for alarm buzzer / bell and alarm reset button;
- (f) Power on indicator;
- (g) Lamp test button;

- (h) Repeater master unit for an intercom system as specified in Clause C20.3; and
- (i) 'Under Fireman control' LED light for each Fireman's lift.

C20.3 INTERCOM SYSTEM FOR PASSENGER, BED/PASSENGER AND GOODS LIFTS

An intercom system, or similar device powered by the emergency battery supply as specified in Clause B2.8 shall be provided by the Contractor for all passenger, bed/passenger and goods lifts between the lift car and the lift machine room, and between the lift car and the building management office or the caretaker's office as the case may be. The intercom system shall comprise a 2-way speaker in each lift car station and master control station located in the lift machine room. A repeater master station with 2-way speaker shall also be provided in the building management office or the caretaker's office as the case may be. Also refer to Clause C8.11. The master control station shall have the following facilities:

- (a) A 2-way speaker to allow communication between lift cars and the master control stations;
- (b) A master switch of spring return type to allow simultaneous communication between the master control stations and all lift cars; and
- (c) Selective switches of spring return type to allow communication between any master control station and each lift car, one at a time.

The conduit/trunking facilities outside the lift machine room and lift well to the building management office or the caretaker's office will be provided by the Electrical Contractor or others. All cabling shall be carried out by the Contractor.

C20.5 CLOSED CIRCUIT TELEVISION

For all passenger lifts, bed/passenger lifts and goods lifts, the Contractor shall supply and install a colour Closed Circuit Television (CCTV) system which shall have the following facilities:

- (a) a CCTV camera mounted on the ceiling of the lift car;
- (b) a colour CCTV monitor of LCD type or similar slim type approved by the Architect located at the lift machine room;
- (c) a colour CCTV monitor of LCD type or similar slim type approved by the Architect located at the building management office or the caretaker's office or at a location as specified in the Particular Specification and/or on the Drawings;

- (d) separate and independent lift travelling audio/video cable(s) for the CCTV system connecting between the CCTV camera installed in the lift car (with the corresponding power supply MCBs in the MCB boards in the lift machine room) and the CCTV monitor(s) respectively;
- (e) a suitable CCTV camera mounting frame/provision on top of the lift car for the installation of the CCTV camera;
- (f) a suitable CCTV monitor mounting frame/provision in the room as specified in the Particular Specification and/or on the Drawings for the installation of the CCTV monitor;
- (g) all the conduit and trunking facilities inside the lift well and the machine room (conduit and trunking facilities outside lift well and lift machine room will be provided by others unless otherwise specified); and
- (h) the following provisions are required when interfacing with the display monitor(s) of burglar alarm and security system is specified in the Particular Specification:
 - (i) The supervisory control panel of lift/escalator/passenger conveyor installation shall be installed adjacent to the security control console. The exact location of the panel shall be subject to the Architect's direction on site; and
 - (ii) Sub-clauses (c) and (f) above are no longer applicable. The Contractor shall not be required to install an independent set of CCTV display monitor adjacent to the security control console. The images captured by the lift CCTV camera shall be displayed at the monitors of the security control console. The Contractor shall integrate a set of CCTV video signal and emergency alarm signal output connection sockets on the supervisory control panel of lift/escalator/passenger conveyor installation for others to connect the signal output through appropriate plugs to the display monitors of the security control console based on the following conditions:
 - (1) the security control console will be supplied and installed by others;
 - (2) the emergency alarm signal shall be the one from the emergency alarm bell inside each lift car as specified in Clause C8.11 and it shall enable the security control console to immediately switch a monitor to display the lift car image on receiving such alarm;
 - (3) the CCTV video signal and emergency alarm signal output connection sockets on the lift supervisory control panel shall be BNC panel sockets;

- (4) the Contractor shall supply associated connection plugs, which shall suit the BNC panel sockets on the supervisory control panel of lift/escalator/passenger conveyor installation and shall not be less than the sockets in quantity, to the security control console specialist contractor who shall then be responsible for the wiring from the security control console to the plugs;
- (5) the BNC connection plugs and sockets shall be of 75 ohm impedance type, service voltage up to 500 V peak and frequencies up to 4000 MHz, and accept common RF cable;
- (6) the video signal shall be 1.0 V p-p composite; and
- (7) the Contractor shall also co-ordinate with the security control console specialist contractor to ensure that the video signal and alarm signal outputs are compatible with the security control console by providing all necessary built-in transducers (the signal outputs to the security control console shall be either analogue or digital as specified in the Particular Specification).

In addition to the above requirements, the CCTV system shall also comply with the latest version of the General Specification for Monochrome and Colour Closed Circuit Television Systems (Specification No. ESG14) issued by the Electrical and Mechanical Services Department, the Government of the HKSAR.

The CCTV system shall be supplied, installed and maintained by licensed security contractor or workers under the Security and Guarding Services Ordinance, Cap. 460 employed by the Contractor.

SECTION C21

FIRE SERVICE REQUIREMENTS

C21.3 HOME LANDING OPERATION

Every lift shall be provided with a facility to bring the lifts to the designated point of entry in case of fire by manually operated key switch installed at the designated point of entry. The key switch shall also be used to bring the lift to the designated point of entry after normal office hours for parking with lighting, air conditioning and ventilation fan off and door close after releasing the passengers.

C21.4 ALL LIFTS TO RETURN TO LANDING OF DESIGNATED POINT OF ENTRY UPON ACTUATION OF FIRE ALARM SYSTEM

Where specified in the Particular Specification and/or on the Drawings, the Contractor shall connect the lift control to the fire alarm system so that all lifts shall return to the landing of designated point of entry upon actuation of the fire alarm devices (other than smoke detectors) at the appropriate zone. Upon reset of the alarm system, the lifts shall only return to normal service after positive reactivation. In case the main power supply is also interrupted, the lift shall return in sequence to the landing of designated point of entry, one at a time, upon availability of the emergency power supply.

C21.5 RELEVANT LIFTS TO RETURN TO LANDING OF DESIGNATED POINT OF ENTRY UPON ACTUATION OF FIRE ALARM SYSTEM

Where specified in the Particular Specification and/or on the Drawings, the Contractor shall connect the lift control to the fire alarm system so that upon actuation of the fire alarm devices (other than smoke detectors) at the particular zone, all lifts serving that zone shall return to the landing of designated point of entry. Upon reset of the alarm system the lifts shall only return to normal service after positive reactivation. In case the main power supply is also interrupted, the lifts shall return in sequence to the landing of designated point of entry, one at a time, upon availability of the emergency power supply.

SECTION C22

REQUIREMENTS FOR BARRIER FREE ACCESS

C22.1 GENERAL

The requirements for barrier free access in this Section C22 shall be complied by all passenger lifts except those requirements specified only for the accessible lifts.

All passenger lifts shall comply with the Design Manual: Barrier Free Access 2008 issued by the Buildings Department, the Government of the HKSAR.

Accessible lift(s), serving every floor, shall be provided in compliance with the Design Manual: Barrier Free Access 2008. All requirements for passenger lifts shall also be applicable to the accessible lift. The accessible lift car shall have minimum dimensions of 1500 mm x 1400 mm with a clear minimum door width of 850 mm unless otherwise specified or approved.

Unless otherwise specified, all passenger lifts shall suit the use by the elderly people in addition to the disabled people. The recommendations and guidelines as stipulated in Chapter 6 of Design Manual: Barrier Free Access 2008 shall be followed except with the approval of the Architect.

C22.2 LIFT CONTROL BUTTONS

Essential lift control buttons such as the emergency alarm button, intercom button, door opening button, and call buttons for the landing in all passenger lift cars as well as call buttons at all the landings, shall not be lower than 900 mm or higher than 1200 mm above finished floor level. Braille and tactile markings shall be placed either on or to the left of the control buttons. Such markings shall be minimum 15 mm in height and 1 mm raised. All lift control buttons shall have a minimum dimension of 20 mm.

Control buttons shall be of micro-movement push button type and as specified in Clause C9.5 unless otherwise specified.

The graphics for tactile markings for 'Door Open', 'Door Close', 'Emergency Alarm', and 'Main Entrance Floor' shall be as shown in Figure 41 of Design Manual: Barrier Free Access 2008 unless otherwise specified. The tactile markings shall be of high contrasting colour background. The 'Main Entrance Floor' is the floor of the designated point of entry or as specified.

Where one of the lifts in a bank under group supervisory control is designated as the accessible lift, a separate call button for the accessible lift shall be installed on each floor to ensure that the accessible lift will stop at the called floor. Priority of attendance to the call for accessible lift shall be assigned to this button. This separate call button shall be identified with an approved Braille and tactile international symbol of accessibility on the floor panel. When floor

buttons other than the separate call button are pressed, the accessible lift will be under the group supervisory control same as all other lifts in the same bank.

The accessible lift car shall have two lift control stations, one on either side of the car door, as specified in Clause C9.2.

C22.3 HANDRAIL

A tubular stainless steel handrail not less than 32 mm and not greater than 40 mm in external diameter shall be provided on 3 sides of all passenger lift cars, extending to within 150 mm of all corners. The handrail shall be not less than 30 mm or more than 50mm clear of walls and other obstructions. The gripping surface of the top of the handrail shall be not less than 850 mm or more than 950 mm above the finished floor level.

C22.4 LANDING AND CAR DOORS

On arrival of the passenger lift to a landing in response to a car call or landing call, the landing and car doors shall be opened automatically and be kept open for a pre-determined period before closing. This period shall be adjustable from 3 seconds to 30 seconds. The time period shall be suitably adjusted to allow sufficient time for wheelchair users or persons with a disability or the elderly to enter and leave the lift car. An audible signal shall be provided to signify the closing action of the doors. A sensitive door re-opening device shall be provided to automatically initiate the re-opening of the doors in the event that any obstacle is about to be struck by the doors in crossing the entrance during the closing movement. There shall be detection devices positioned at a height between 500 mm to 600 mm above the floor of the lift car as well as other heights. Also see Clause C10.12. The landing and car doors shall be of automatic power operated horizontally sliding type.

C22.5 EMERGENCY ALARM PUSH BUTTON AND INTERCOM

There shall be an emergency alarm push button together with an indication light, a buzzer and an intercom inside all the lift cars such that the person inside can speak to the building management office or the caretaker's office as the case may be. Details are stipulated in Clause C8.11.

C22.6 DOOR JAMB

Tactile and Braille floor designations shall be provided on the jambs on both sides of each lift entrance, by means of Arabic numerals, minimum 60 mm high, raised 1 mm, and at 1200 mm above the finished floor level.

C22.7 IDENTIFICATION

The accessible lift and all lifts complying with same barrier free access requirements shall be identified by at least one international symbol of accessibility at each landing served by each lift. Where there is only one lift in the building or all the lifts in the building are designed for barrier free access, at least one international symbol of accessibility shall be provided at each lift lobby on the designated point of entry of the building.

Unless otherwise specified, the international symbols of accessibility for accessible lift shall be supplied and installed by the Contractor where there is only one accessible lift and only the accessible lift in the lift lobbies of all floors is required to have the international symbol of accessibility. For other cases or where there is more than one lift in any lift lobby required to have the international symbol of accessibility, the symbols will be supplied and installed by the Building Contractor unless otherwise specified.

Tactile warning tiles or similar shall be placed in front of the lift door of the accessible lift at each landing. Unless otherwise specified, tactile warning tiles will be provided by the Building Contractor.

The Contractor shall coordinate with the Building Contractor to check and ensure that the requirements are complied.

C22.8 MIRROR IN ACCESSIBLE LIFT

Where the dimensions of accessible lift car is less than 1500 mm x 1400 mm with a size that does not allow a wheelchair user to turn around within the lift car conveniently, a mirror shall be provided inside the lift with the bottom edge of mirror set at 900mm above the finished floor level. The size and location of mirror shall be made to facilitate a wheelchair user to check the conditions behind the wheelchair in reversing out of the lift and to see which level the lift has reached.

SECTION C24

REQUIREMENTS FOR SERVICE LIFT

C24.11 INSTRUCTIONS FOR EMERGENCY OPERATION

In the machine room or the interior of the machine enclosure, the Contractor shall provide a framed notice of reasonable size with detailed instructions to be followed in the event of lift breakdown particularly concerning the use of the device(s) provided for manual emergency movement and the unlocking key for landing doors. Details of the framed notice shall be approved by the Architect.

The direction of movement on the car shall be clearly indicated on the machine.

SECTION C25

REQUIREMENTS FOR MACHINE-ROOM-LESS LIFT

C25.2 STATUTORY REQUIREMENTS

The machine-room-less lift shall be of a type approved by the Electrical and Mechanical Services Department, the Government of the HKSAR.

When the proposed machine-room-less lift does not comply fully with the statutory codes and requirements, the Contractor shall be responsible for preparing and arranging all necessary submissions to the relevant authorities for applying exemptions/modifications of the requirements, and where applicable provide all necessary information and assistance to the Architect for applying such exemptions/modifications.

The Contractor shall make early submissions in order to obtain all the necessary approvals matching with the project programme.

In addition to the new construction requirements, the Contractor shall check the requirements in statutory regulations and codes to ensure that all the necessary exemptions/modifications including those related to maintenance and safety requirements to suit the machine-room-less lift installation are included in the submissions to the relevant authorities.

The Contractor shall incorporate adequate maintenance facilities and safety measures, so that the operational safety and reliability of machine-room-less lift shall not be lower than the lift with machine room, and are to the approval of the Electrical and Mechanical Services Department, the Government of the HKSAR and the Architect.

The Contractor's registered lift engineer shall confirm in writing that any future maintenance, repair, major alteration, replacement, examination and testing of the machine-room-less lift can be carried out inside the lift well safely and without difficulty, complying with all the occupational safety and health requirements of the Labour Department, the Government of the HKSAR.

C25.3 SPECIFIC REQUIREMENTS

Unless specific requirements on alternative arrangement are given in this Section C25, machine-room-less lift shall comply with all the requirements for electric lift installation as detailed in other sections of this General Specification.

In the absence of lift machine room, the provision of a lift equipment room by Building Contractor is essential and shall be planned in order to house all the equipment of machine-room-less lift located outside the lift well.

All the controls, devices, panels and facilities of machine-room-less lift located outside the lift well as stipulated in Clauses C25.3, C25.4 and C25.5 shall be housed centrally in the lockable lift equipment room outside the lift well.

Where there is no lift equipment room provided by the Building Contractor as specified in the Particular Specification and/or shown on the Drawings, the Contractor shall supply and install a lockable lift equipment cabinet with hinged doors for housing all such controls, devices, panels and facilities of machine-room-less lift outside the lift well.

Position of the lift equipment room/cabinet shall be as stipulated in the Particular Specification and/or on the Drawings, or proposed by the Contractor and approved by the Architect. It shall be near or adjacent to the lift well and near to the overspeed governor and motor brake as required in (b) below. The lift equipment room/cabinet shall be accessible by authorised person only.

Locating the lift equipment cabinet at the lift lobby of the occupied floor should be avoided, and where it is unavoidable it shall be positioned and constructed to minimise the disturbance and obstruction to the occupants during maintenance and inspection. The frequency and details of maintenance and inspection work at the lift equipment cabinet shall be submitted so that the occupants of the occupied floor can be consulted where necessary.

The lift equipment cabinet provided by the Contractor shall be constructed from stainless steel frame and stainless steel sheet of minimum 1.5 mm thick with finishes approved by the Architect unless otherwise specified. It shall be of adequate size for housing all the equipment including the tools under Clause C25.5.

The door(s) of lift equipment room/cabinet shall not open towards the control panel or other devices installed inside the room/cabinet and shall be fitted with a lock that can be opened without a key from inside (for room/cabinet accessible by people) and can be locked without a key from outside. It shall bear on the outside face a notice in English and Chinese in letters and characters not less than 25 mm high as follows:

UNAUTHORIZED ACCESS (OPENING) PROHIBITED
LIFT EQUIPMENT ROOM (CABINET)
CLOSE AND LOCK THIS DOOR
不得擅進 (打開)
升降機設備室 (櫃)
請關閉並緊鎖此門

The following specific requirements for machine-room-less lift shall also be complied with:

- (a) Maintenance, repair, major alteration, replacement and examination of the overspeed governor and machine shall be able to be carried out on the car roof safely and without difficulty;
- (b) Both the overspeed governor and motor brake shall be able to be observed through a window of the control panel provided by the Contractor outside the lift well or by an inspection door at the lift well provided by the Building Contractor. The position and dimensions of such inspection door shall be designed by the Contractor and approved by the Architect;

- (c) Tripping and re-setting of the overspeed governor shall be able to be remotely controlled outside the lift well, in the lift equipment room/cabinet, or where required at a position approved by the Architect;
- (d) The motor brake shall be able to be remotely released outside the lift well, in the lift equipment room/cabinet or where required at a location approved by the Architect;
- (e) When the counterweight buffer is completely compressed, the over-travel of the lift car above the upper terminal landing floor level shall not exceed a dimension that will hinder the release of passengers in a safe manner;
- (f) Sufficient energy efficient lighting shall be provided for illumination of the overspeed governor, motor brake and machine in the lift well;
- (g) The electro-mechanical brake shall be capable of stopping/holding a fully laden machine-room-less lift car traveling downward at its rated speed and with the load equivalent to 125% of the rated load. The safety gear shall be capable of stopping/holding a fully laden machine-room-less lift car traveling downward at the tripping speed of the overspeed governor, even if the suspension devices break;
- (h) Lift machinery drive when placed inside the lift well shall be of low-fire-risk construction so that the fire hazard and fire risk in the lift well shall not be increased when compared with a lift with machine room, and the fire resistance period required for the lift well shall not be affected;
- (i) Intercom system in lift machine room required under Clauses C8.11 and C20.3, and CCTV monitor in lift machine room required under Clause C20.5 shall be installed in the lift equipment room or cabinet;
- (j) Lift equipment, when located outside the lift well, shall comply with Clause C16.6; and
- (k) The platforms and works areas inside the lift well shall be adequate and able to support the weight of at least two persons and additional tools and equipment for carrying out the maintenance and repair.

C25.4 CONTROL PANEL

Position of the control panel shall be as specified in the Particular Specification and/or shown on the Drawings, or proposed by the Contractor and approved by the Architect. When the control panel is located outside the lift well, it shall be placed in the lift equipment room or in the lockable lift equipment cabinet provided by the Contractor. When the control panel is located inside the lift well, it shall be located at a position that will enable the lift maintenance personnel to carry out inspection and maintenance work in a safe and efficient manner. All necessary working platform and access to the control panel shall be provided by the Contractor.

C25.5 PROVISIONS FOR RESCUE OF PASSENGERS

Machine-room-less lift shall be provided with emergency electrical switch and push button with the same functions and provisions as described in Clause C16.4. The emergency electrical switch and push button shall be installed in the lift equipment room/cabinet, together with clear instruction of its use.

To cater for power failure and breakdown of the lift car, in addition to the provision of emergency electrical switch in Clause C16.4 and the controls for releasing the brake as described in Clause C16.5, the following facilities shall be provided by the Contractor and be readily available for use by the rescue personnel:

- (a) Car lifting tool for moving the car in case it is stuck; and
- (b) Weights for adding to the car in case of balanced loading condition where the car cannot be moved by releasing the motor brake, or other means to move the lift car as approved by the relevant Authorities and the Architect.

A suitable lockable container for storage of the above facilities, together with clear instructions on the method for releasing the brake and moving the lift car in an emergency, shall be provided by the Contractor and placed inside the lift equipment room/cabinet. The container shall bear on the outside face a notice 'Emergency release operation shall only be undertaken by authorized person'.

C25.6 FIRE RESISTING CONSTRUCTION

The lift machinery of machine-room-less lift is located inside the lift well. The fire resistance period of lift well shall comply with the Code of Practice for Fire Resisting Construction issued by the Buildings Authority. Lift machinery of machine-room-less lift shall be of low-fire-risk construction/type. The Contractor shall check and confirm to the Architect that the presence of lift machinery in lift well does not increase the fire hazard and fire risk in the lift well so that the fire resistance period of lift well is not required to be increased to align with the fire resistance period requirement of lift machine room in the Code. Where necessary and agreed by the Architect, approval for exemptions/modifications of the statutory codes and requirements shall be obtained from the relevant authorities. In particular, lift well constructed from glass and other low fire resistance material shall be checked to ensure its compliance with the relevant codes and requirements.

C25.7 ENERGY EFFICIENT LIFT

Machine-room-less lift shall be energy efficient type using high efficiency gearless drive or better and approved. The Contractor shall provide detailed supporting quantitative information to substantiate the higher energy efficiency of machine-room-less lift as compared with other conventional energy efficient lift with equivalent functions and performance.

The Contractor shall provide digital multifunction metering devices for each machine-room-less lift as specified in Clause B4.2.

PART D - ESCALATOR AND PASSENGER CONVEYOR INSTALLATION

SECTION D4

LANDING PLATE

D4.3 TACTILE WARNING STRIPS

Tactile warning strips are required at the top and bottom ends of an escalator or at both ends of a passenger conveyor. Unless otherwise specified, the tactile warning strips will be provided by the Building Contractor. The Contractor shall coordinate with the Building Contractor to check and ensure that the requirements are complied.

SECTION D7

HANDRAILS

D7.6 HANDRAIL CLEARANCE

The horizontal distance between the outer edge of the handrail and walls, adjacent criss-cross escalators or other obstacles shall under no circumstances be less than 80 mm and shall be maintained to a height of at least 2100 mm above the steps, pallets or belt of the escalator/passenger conveyor.

The vertical distance between the handrail and step nose, pallet surface or belt surface shall not less than 900 mm and not exceed 1100 mm.

SECTION D17

MAINTENANCE FACILITIES AND NOTICES

D17.7 NOTICES NEAR ENTRANCES OF ESCALATOR/PASSENGER CONVEYOR

The following notices for the user shall be fixed in the vicinity:

- (a) Small children must be held firmly;
- (b) Dogs must be carried;
- (c) Stand facing the direction of travel; keep feet away from sides;
- (d) Hold the handrail; and
- (e) Transportation of bulky and heavy loads not permitted.

Whenever possible, these notices shall be given in the form of pictographs. The minimum size of the pictographs shall be 80 x 80 mm. Pictographs shall be used as defined in Annex IV.

Where there is an accessible lift providing alternative access route for persons with a disability, a sign posted at the entry of the escalator for indicating the alternative access route shall be provided. The sign will be provided by the Building Contractor unless otherwise specified. The Contractor shall coordinate with the Building Contractor to check and ensure that the requirements are complied.

SECTION D18

ALARM BUZZER/BELL

D18.3 AUDIO INDICATOR FOR DISABLED

Escalators and passenger conveyors are not considered part of a barrier-free route. However, where specified in the Particular Specification and/or on the Drawings, audio indicator shall be provided in the escalator and passenger conveyor for providing clear and consistent signal for going up / down or moving forward indication at both ends to assist persons with visual impairment to use the escalators and passenger conveyors. Adequate warning and guarding shall be provided alongside and at each end of the escalators and passenger conveyors.

PART E - POWERED VERTICAL LIFTING PLATFORM INSTALLATION

SECTION E1

REQUIREMENTS FOR POWERED VERTICAL LIFTING PLATFORM INSTALLATION

E1.2 STATUTORY REQUIREMENTS

The vertical lifting platform proposed by the Contractor shall be of a type approved by the Electrical and Mechanical Services Department, the Government of the HKSAR.

The Contractor shall be responsible for preparing and arranging all necessary submissions for applying modifications/exemptions from relevant government departments, where applicable. All cost incurred shall be borne by the Contractor.

The vertical lifting platform shall comply with the Design Manual: Barrier Free Access 2008 issued by the Buildings Department, the Government of the HKSAR unless otherwise specified.

The vertical lifting platform shall comply with the requirements of powered vertical lift platform as stipulated under Circular No. 4/2007 issued by the Electrical and Mechanical Services Department, the Government of the HKSAR.

E1.3 SPECIFIC REQUIREMENTS

The following specific requirements shall be complied with:

- (a) The rated loads of vertical lifting platforms shall be between 250 to 500 kg;
- (b) The rated speed shall be at least 0.08m/s and not exceed 0.15 m/s;
- (c) The clear platform floor area shall be at least 1100 mm x 1400 mm and not exceed 2 m²;
- (d) The clear door/gate width shall be at least 900 mm;
- (e) The vertical travel shall not exceed 4000 mm;
- (f) The operation type shall be either attendant-operated or self-operated as specified in the Particular Specification and/or on the Drawings. Where it is not specified, the vertical lifting platform shall be constructed for self-operated.

In case the maximum vertical travel of the vertical lifting platform installation exceeds 1980 mm, the installation shall also comply with the following additional requirements:

- (g) The lift well shall be made up of four side walls and a floor. The height of enclosure shall be of minimum 2500 mm above the upper landing or with full height to the ceiling;
- (h) A ventilation louvre of not less than 0.15 m² net free area shall be provided at the lift well for lifting platforms where the lift well of which is not required to contribute to the protection of the building against the spread of fire.

SECTION E2

LIFT WELL

E2.1 GENERAL PROVISIONS

The platform, ram, leadscrew, guides and suspension of a powered vertical lifting platform shall be installed in a lift well.

When the lift well is required to contribute to the protection of the building against the spread of fire, it shall be totally enclosed and comply with the relevant provisions of Building (Planning) Regulations (Chapter 123), Building (Construction) Regulations (Chapter 123), the Code of Practice on the Design and Construction of Buildings and Building Works for the Installation and Safe Use of Lifts and Escalators, and the Code of Practice for Fire Resisting Construction issued by the Building Authority.

When the lift well is not required to contribute to the protection of the building against the spread of fire, it does not need to be totally enclosed. The walls of the lift well shall be formed from non-fire rated panels which have a mechanical strength such that when a force of 300 N being evenly distributed over an area of 500 mm² in round or square section, is applied at right angles to the wall, at any point, from the inside of the lift well towards the outside, the wall shall:

- (a) resist without any permanent deformation; and
- (b) resist without elastic deformation greater than 10 mm.

The enclosure of the powered vertical lifting platform shall be imperforate.

E2.4 REQUIREMENTS OF DIFFERENT VERTICAL RISE TRAVEL

The lifting platform shall be provided with a mechanical blocking device in the lift pit such that when the mechanical blocking device is set to operate the running of the lifting platform drive nut will be stopped by means of an electrical safety device.

The mechanical blocking device shall be capable of supporting the platform with its rated load and obstructing the platform from descending to below 1000 mm as measured from the floor, for lifting platforms having a travel exceeding 1100 mm to allow works in the lift pit to be safely carried out. Where the travel of the lifting platform exceeds 600 mm but does not exceed 1100 mm and the maintenance and checking of components can be performed within the lift well while the lifting platform is fully descended, the requirement of mechanical blocking device can be omitted. Otherwise, the vertical clearance below the platform by application of the mechanical blocking device shall be not less than 500 mm.

If the travel of the lifting platform exceeds 1100 mm but does not exceed 1980 mm, the enclosure forming the lift well shall terminate at a height of not less than 1100 mm above the upper landing.

If the travel of the lifting platform does not exceed 1100 mm, enclosure other than for the platform underside protection is not required.

Skirt guard shall be provided instead of rigid enclosure for lifting platform the travel of which does not exceed 600 mm to prevent hazard due to the descending platform. The lifting platform shall allow maintenance and checking of its components when the platform is fully descended.

Where hydraulic ram is used for the raising and lowering of the lifting platform, insertion of the ram into the ground or other structural cavity shall be avoided, unless otherwise specified in the Particular Specification and/or on the Drawings and approved by the Architect.

E2.5 LIFT PIT/RAMP

A lift pit/ramp/pit drainage will be provided by the Building Contractor for the vertical lifting platform installation. If a pit is not available, ramps shall be fitted on the platform access edges incorporating a step greater than 15 mm height. They shall have an inclination, which shall not be greater than 1:12 on a vertical rise above 100 mm. A step up to 15 mm high is permissible at the leading edge of any ramp.

SECTION E3

LIFTING PLATFORM CARRIAGE

E3.2 HANDRAIL

An 'easy grip bar' handrail of cross-sectional dimensions between 32 mm and 40 mm extending up to 150 mm away from corners. The handrail shall be installed with its top at 900 ± 50 mm as measured from the finished floor level and with the clearance between the gripping part and the side panel maintained at not less than 30 mm and not more than 50 mm.

SECTION E4

LANDING DOORS/GATES

E4.1 ENTRANCE

Lift well entrance shall be protected by landing door or gate as specified in the Particular Specification and/or on the Drawings. The clear access height onto and over the platform shall not be less than 2000 mm. The clear width of the entrances shall not be less than 900 mm. Landing door sills shall be provided in accordance with the Code of Practice on the Design and Construction of Buildings and Building Works for the Installation and Safe Use of Lifts and Escalators issued by the Building Authority, the Government of the HKSAR.

E4.2 DOOR/GATE

In order to prevent roll away of a wheelchair, the platform with travel less than 1980 mm shall be protected by a gate of at least 1100 mm in height at landing entrance, and if the travel is more than 1980 mm, the platform shall be protected by a door of at least 2000 mm in height at landing entrance.

Doors/Gates shall be made of Grade 316 mirror stainless steel/hairline stainless steel/baked powder coated steel/aluminum or material having equivalent functions or performance as approved by the Architect. Doors/Gates shall be single or 2-door design and be operable by application of a low level manual effort and conform to the following:

- (a) they are self-closing but can be stable in open position;
- (b) do not open into the lift well;
- (c) require a force to open them which is not more than 30 N at the handle;
- (d) provided with a vision panel when the door/gate is made of non-transparent material and is over 1100 mm in height, the bottom edge of the vision panel shall be located between 300 mm and 900 mm above the floor level of the landing;
- (e) the vision panel shall be made of an approved material or glass of a laminated type/tempered type and with minimum thickness of 6mm and a width of at least 60 mm;
- (f) the size and shape of the vision panel shall be such that it will not permit the passage of a sphere having a diameter of 100 mm, have a minimum glazed area per landing door of 0.015 m² with a minimum of 0.01 m² per vision panel; and
- (g) if they are of glass, visual markings between 1400 mm and 1600 mm above the floor shall be provided.

E4.3 DOOR/GATE LOCK

Door/Gate lock with mechanical and electrical interlocks shall be of a type approved by the Electrical and Mechanical Services Department, the Government of the HKSAR.

Interlocking features shall perform the following requirements:

- (a) Entrance door/gate lock shall be closed properly before the vertical lifting platform installation starts to move;
- (b) Powered vertical lifting platform installation shall stop moving if the doors/gates are not closed and locked properly; and
- (c) An unlocking key or other special service tool shall be required for opening the doors/gates in case of emergency.

SECTION E6
OPERATION CONTROL SYSTEM

E6.4 NOTICE AND MARKING OF POWERED VERTICAL LIFTING PLATFORM

Conspicuous instruction plates and direction labels shall be displayed to state the user guide, procedure of normal operation and manual (emergency) operation. The labels shall be of stainless steel with characters/letters engraved in English and Chinese. The size, arrangement and wording of the labels shall be submitted to the Architect for approval prior to ordering.

The rated load in person and kilograms; vertical lifting platform installation number; name and telephone number of the maintenance service company, and emergency instructions shall be engraved in English and Chinese in a stainless steel notice plate permanently fixed inside the installation or on the side of the lift entrance.

The rated load shall also be indicated on a sign installed at a prominent position next to the platform control station.

E6.5 USER GUIDE AND OPERATION MANUAL

User guide and operation manual containing operating instructions, general information and warning notices in English and Chinese in compliance with the requirements of the Electrical and Mechanical Services Department, the government of the HKSAR shall be provided and affixed at a conspicuous location at the vertical lifting platform installation. The guide and the manual shall be laminated with plastic protective sheets.

SECTION E7

SAFETY DEVICES

E7.1 SAFETY DEVICES

Safety devices of the vertical lifting platform installation shall include but not limited to the following:

- (a) Mechanical blocking device with an electric switch shall be provided which detects the operation of the mechanical blocking and disables the operation of the vertical lifting platform installation;
- (b) Pressure relief valves shall be fitted in the hydraulic drive system to prevent the possibility of system over loading and over pressure;
- (c) Rupture valve and/or restrictor shall be fitted and be capable of stopping the platform in downward movement in case of failure;
- (d) Manual (emergency) operating valve shall be fitted to lower the platform to the lower landing in case of power failure. A hand-pump which causes the platform to move in the upward direction shall be permanently installed for every vertical lifting platform installation whose platform is fitted with a safety gear or a clamping device;
- (e) Slip resistant floor covering on the Powered Vertical Lifting Platform Installation shall be provided;
- (f) Positively operated safety switches on all safety systems shall be provided;
- (g) Door/Gate lock with mechanical and electrical interlocks shall be provided to ensure that the vertical lifting platform installation cannot be operated until the entrance doors are fully closed; and
- (h) An 'easy grip bar' handrail shall be fixed on one or more non-entrance sides of the platform.

SECTION E9

BATTERY POWERED OPERATION AND FIRE EMERGENCY SERVICE

E9.1 BATTERY POWERED OPERATION

In case of power failure, the vertical lifting platform installation shall be automatically switched over to the battery powered operation to allow the passenger to travel to the exit landing at entrance level and leave the platform. The platform shall then park at that landing until normal power is resumed. When the normal power is resumed, the vertical lifting platform installation shall be automatically switched back from battery powered to normal power supply. The electricity supply for the vertical lifting platform under battery powered operation shall be fed from the batteries in Clause B2.8.

Battery charging shall be carried out at points where the vertical lifting platform is expected to be stationary between journeys. Usually this is at each end of the rail. If the vertical lifting platform installation is stopped at a position, there shall be alarm indications to the passenger and at the location as specified on the Drawing and/or in the Particular Specification.

PART F - STAIRLIFT INSTALLATION

SECTION F1

REQUIREMENTS FOR STAIRLIFT

F1.1 GENERAL

The stairlift shall be of a type approved by the Electrical and Mechanical Services Department, the Government of the HKSAR.

The stairlift shall comply with the Code of Practice on the Design and Construction of Lifts and Escalators and Circular No. 5/2005 issued by the Electrical and Mechanical Services Department, the Government of the HKSAR.

Platform carriage shall be provided for a stairlift installation to support the platform on the guide rails and direct the platform up and down the guide rail system. The platform carriage shall be provided with handrails to the passenger for easy grabbing. The platform shall be finished with non-slip platform deck and ramp surfaces.

The platform shall negotiate vertical and horizontal bends and landing transitions smoothly without transfer of the passenger. A smooth start/stop shall be provided when entering/departing landing zone.

The clear height above the platform shall be not less than 2 m long its whole journey.

Ramps provided at the platform access edges shall be minimum 150 mm high.

Kick plate(s), minimum 150 mm in height, shall be provided at non-access side(s).

A removable lockout cover shall be provided for the folded platform.

3 numbers of 'Common Key' for the key-operated switch shall be provided.

F1.4 SAFETY FEATURES

Provisions of the safety features for the stairlift installation shall include but not limited to the following:

- (a) The main control key-operated switch installed at all operation call stations and on the carriage shall be provided to allow the operation of the control switches. The control switches shall be effective only when the key is in the 'On' position. The key shall be removable only from the 'Off' position;
- (b) The ramps fitted to the platform access edges shall be operated automatically. Before any movement of the stairlift, the ramps shall be in the raised position. The ramps shall remain in the raised position whenever the stairlift is not at landing. Bi-directional pressure sensors shall be fitted to the ramps to stop the movement of the stairlift when the wheelchair rolls against the ramp or the ramp comes to contact with an obstacle. The sensors shall also operate when the platform is in the folded position. The stairlift shall stop within 25 mm of travel after the first contact with an obstacle;

- (c) Sensitive surfaces in full size shall be fitted under the platform and the platform carriage, and in areas where there are potential shearing, crushing, trapping or abrading hazards to stop the movement of the stairlift when the surface comes to contact with an obstacle. The stairlift shall stop within 25 mm of travel after the first contact with the obstacle;
- (d) Emergency stop buttons of the 'push-to-stop, pull-to-run' type shall be provided at the platform carriage and the operation call stations at all landings to deactivate the stairlift installation manually;
- (e) Two safety barrier arms in length of full width of the platform shall be fitted to the platform access sides for stability of the passenger. Position of the lowered arms shall be at height between 800 mm and 1,100 mm above the platform. The arms shall be mechanically locked down in the lowered position when the stairlift is not at landing. The arms shall be raised up only at landing position;
- (f) Final limit switches shall be provided at the uppermost and the lowest landings to prevent the movement of the stairlift travelling beyond its normal stopping positions. Activation of the switches shall disconnect the power supply to the motor in the direction of travel. The switches shall be adjusted to maintain level tolerance within 13 mm regardless of load size or direction of travel. The switches shall be designed to withstand possible abuse from adverse domestic cleaning activities;
- (g) Audio-visual Bystander Alert Devices including an audio chime and flashing amber strobe shall be provide to alert the bystander when the platform is in motion or in unfolding at intermediate landing position(s) ;
- (h) Fault control interlock shall be provided to prevent the stairlift from travelling when there is a fault;
- (i) Security lock shall be provided to prevent unauthorized unfolding and accidentally unfolding of the platform; and
- (j) In the event of power failure or fault, electro-mechanical brake of the stairlift installation shall be able to be manually released by the use of the spokeless wheel or other approved means. The stairlift installation shall then be able to be raised or lowered to the nearest landing.

F1.5 DISPLAY OF INFORMATION

User guide and operation manual containing operating instructions, general information and warning notices in English and Chinese in compliance with the requirements of the Electrical and Mechanical Services Department, the Government of the HKSAR shall be provided and affixed at a conspicuous location at the stairlift installation and the management office respectively. The guide and the manual shall be laminated with plastic protective sheets.

Rated load in person and kilograms, stairlift number, name and telephone number of the service company, and emergency instructions shall be engraved in English and Chinese in a plastic notice plate permanently fixed to the platform.

SECTION F2

OPERATION CALL STATIONS

F2.1 GENERAL REQUIREMENTS

Operation call stations shall be located at all landings, mounted on the adjacent wall or integrated into the driving box, and be safely away from the flight path of the stairlift such that the stairlift can be safely and conveniently unfolded.

The operation call station shall be user-friendly and shall incorporate but not limited to the following features:

- (a) Indication lamp to indicate power supply is 'On';
- (b) Indication lamp to indicate the activation of call station;
- (c) Indication lamp to indicate fault signals;
- (d) Emergency stop button shall be provided;
- (e) Call for help push button with protection from being operated accidentally together with a buzzer and an indication lamp shall be provided;
- (f) Indication lamp to indicate the position of the stairlift. [Note: If the whole journey of the stairlift installation can be observable at any one landing, this requirement may be omitted as determined by the Architect.];
- (g) Constant pressure operated control switches for calling and sending the stairlift. [Note: If the whole journey of the stairlift installation cannot be observable at any one landing, this requirement will be omitted. However, for self-operated stairlift installation, the whole journey of the stairlift shall be designed and made to be observable by the passenger at either upper, intermediate and lower landing to allow it to be self-operated.]; and
- (h) Constant pressure operated control switches for folding and unfolding the stairlift. [Note: The control switch for carrying out folding and unfolding functions may be combined with the control switch for carrying out calling and sending functions.].

For self-operated stairlift installation only, the control panel on the platform carriage shall be user-friendly and shall incorporate but not limited to the following features:

- (a) Indication lamp to indicate power supply is 'On';
- (b) Indication lamp to indicate the activation of call station;
- (c) Indication lamp to indicate fault signals;
- (d) Emergency stop button;
- (e) Emergency alarm push button in yellow with protection from being operated accidentally together with an alarm and an indication lamp; and
- (f) Constant pressure operated control switches for moving the stairlift.

F2.3 CONTROL & OPERATION FOR SELF-OPERATED STAIRLIFT INSTALLATION

Where specified in the Particular Specification and/or on the Drawings, self-operated stairlift(s) shall be provided in lieu of attendant-operated stairlift(s).

Operation call stations for self-operated stairlift(s) shall be located at a height not less than 900 mm and not more than 1200 mm above the finished floor level at landings. The operation call stations shall be located at convenient positions away from the whole flight path of the stairlift such that the stairlift being called by the passenger can be safely unfolded at the landing being served.

Emergency stop buttons shall be provided at the operation call stations at all landings and on the platform carriage.

Key-operated switch with common key system as approved by the Electrical and Mechanical Services Department, the Government of the HKSAR shall be provided to activate/deactivate the control system of the stairlift installation.

Labels shall be provided to assist the passenger and the public in using the operation call station and the control panel on the platform carriage. The labels shall be of stainless steel with characters/letter engraved in English and Chinese. The arrangement and wordings of the labels shall be approved by the Architect prior to ordering.

PART G - INSPECTION, TESTING AND COMMISSIONING DURING CONSTRUCTION PERIOD

SECTION G1

GENERAL REQUIREMENTS

G1.1 GENERAL

The Contractor shall carry out all necessary inspection, testing and commissioning during construction period to ensure that all components and systems are in a satisfactory and safe condition and to demonstrate that the equipment installation can meet the functional, performance as well as statutory requirements. The testing and commissioning shall be carried out with reference to the Code of Practice on the Design and Construction of Lifts and Escalators, the Code of Practice for Lift Works and Escalator Works, relevant Testing and Commissioning Procedures issued by the Architectural Services Department, the Government of the HKSAR and the manufacturers' recommendations and specifications. When such inspection, testing and commissioning are required to be witnessed by the Architect's Representative, the Contractor shall give due advance notice of such intention and provide details of the event to be performed. Inspection reports, test and examination certificates as shown in the Appendices of Building Services Branch Testing and Commissioning Procedure No. 4 for Lift, Escalator and Passenger Conveyor Installation in Government Buildings of Hong Kong Special Administrative Region shall be submitted together with the relevant statutory forms upon completion of the inspection, testing and commissioning, and statutory examination and testing.

The Contractor shall provide supervision and support to the Registered Lift/Escalator Engineer in the inspection, testing and examination of the lift, escalator/passenger conveyor, powered vertical lifting platform and stairlift installations.

The Contractor shall have the responsibility to ensure that the inspection, testing and commissioning of the lift, escalator/passenger conveyor, powered vertical lifting platform and stairlift installations are carried out in a safe manner in order to protect the safety and health of other persons in the site.

Throughout the execution of the installation, the Contractor shall be responsible for ensuring compliance with the relevant Ordinances and Regulations and shall notify the Architect or his/her representatives of any infringement which directly or indirectly detracts from the safe and satisfactory operation of the lift, escalator/passenger conveyor, powered vertical lifting platform and stairlift installations. All sub-standard works or defects found during inspection, testing and commissioning shall be rectified or replaced to the satisfaction of the Architect.

Prior to any testing and commissioning works, the Contractor shall check the completion of the works, the associated builder's works, the associated building services installations and all other prerequisites to ensure that testing and commissioning can be proceeded in a safe and satisfactory manner without obstruction.

SECTION G2
INSPECTION AND TESTING

G2.1 VISUAL INSPECTION AND CHECKING

Visual inspection and checking of 'work in progress' will be made by the Architect or his/her representatives from time to time during the construction period. Visual inspection and checking shall include verification of the installation being an approved model recognised by the Electrical and Mechanical Services Department, the Government of the HKSAR. The Contractor shall submit evidence or approval document to demonstrate that the on site installation is the approved model as accepted by the Architect or his/her representatives.

The Contractor shall be responsible for arranging adequate provisions to facilitate site inspections of the work in progress to be carried out by the Architect or his/her representatives from time to time. The Contractor shall keep such inspection records for checking from time to time.

The Contractor shall give due advance notice to the Architect or his/her representatives prior to the inspection.

Works to be permanently covered up shall be subject to inspection before covering up. During the inspection if the Architect or his/her representatives discovers any work that has been covered up before inspection, this work shall be uncovered for inspection to the satisfaction of the Architect or his/her representatives. Any cost incurred to uncover the work, inspect and re-conceal the work together with any consequential economic losses shall be borne by the Contractor.

Any defective works or sub-standard works found during visual inspection shall be rectified or replaced before proceeding with further tests.

SECTION G4

MANDATORY INSPECTION/TEST

G4.1 GENERAL REQUIREMENTS

The Contractor shall carry out all mandatory inspection, examination and testing and submit to the Architect the test and examination certificates as shown in the Appendices of Building Services Branch Testing and Commissioning Procedure No. 4 for Lift, Escalator and Passenger Conveyor Installation in Government Buildings of Hong Kong Special Administrative Region.

The Contractor shall be aware that completion of testing and commissioning and, if applicable, the associated statutory inspections by the Electrical and Mechanical Services Department, the Government of the HKSAR is one of the major consideration for certifying completion and handing over of the complete installation.

**PART H- TRAINING, INSPECTION, ATTENDANCE AND OPERATION AND
MAINTENANCE DURING MAINTENANCE PERIOD**

SECTION H1

GENERAL REQUIREMENTS

H1.1 ADMINISTRATIVE REQUIREMENTS

The Contractor shall provide training and on-site demonstration to users and operation and maintenance staff; attend to emergency services, faults and complaints; and carry out inspection, operation and maintenance during the Maintenance Period as described in the following sections. When such inspection, test, repair, replacement and maintenance are required to be witnessed by the Architect's Representative, the Contractor shall give due advance notice of such intention and provide details of the event to be performed.

The Contractor shall ensure that all lift and escalator/passenger conveyor works are carried out in compliance with the statutory regulations to safeguard persons, including workers, users and any persons in the vicinity of the installation, against the risk of any accident including fire accident associated with the works.

The Contractor shall supervise and remind its lift workers to take necessary safety precautions in carrying out maintenance and repair works, in particular when any safety circuit is bypassed or interfered affecting the safety of the lift users. The Contractor shall ensure that the following lift works (other than for stairlifts and vertical lifting platforms) are carried out by two or more lift workers as required, at least one of them shall be a competent worker as required in the statutory regulations:

- (a) Attending any lift breakdown call;
- (b) Releasing passengers trapped in a lift which stopped outside the unlocking zone;
- (c) Manually releasing the brake of the traction machine of an electric lift, or operating the manual emergency lowering or ascending device of a hydraulic lift;
- (d) Works in the lift pit;
- (e) Maintenance of the counterweight assembly;
- (f) Carrying out maintenance works, while the lift is in motion, which cannot be performed by the worker who is controlling the motion of the lift;
- (g) Lubricating the suspension ropes;
- (h) Inspecting the conditions of the car top sheave;
- (i) Measuring the braking distance of electric traction lift;
- (j) Disassembling and checking the machine brake; and
- (k) Testing the electrical safety device of the landing door or car door lock.

All actions taken and work done shall be recorded in the log book before the workers leave.

H1.4 ALLOWANCE FOR INSPECTION

The Architect or Architect's representatives will, at his discretion, carry out inspection on any lift/escalator at any time, in particular, after major repair or periodic testing and examination of lift/escalator or upon receipt of the complaint. The Contractor shall dispatch adequate and sufficient technical staff on site for the smooth progress of inspection upon request. The Contractor is deemed to have allowance in the Contract for all cost incurred in the inspection.

SECTION H3

EMERGENCY SERVICES AND ATTENDANCE TO FAULT CALLS

H3.3 ATTENDANCE TO FAULTS AND COMPLAINTS

The Contractor shall attend to faults and complaints arising from defective work materials, equipment and/or system operation within one hour at any time during the Maintenance Period. The Contractor shall also be responsible for rectifying all defects leading to faults or breakdown of the equipment and/or system within reasonable time or as specified.

In attending a passenger entrapment call, the Contractor shall arrange two or more lift workers to arrive at the scene to release the passengers trapped in the lift. For lift breakdown call, the Contractor shall arrange two or more lift workers to attend the call and the lift workers shall check whether there is any passenger trapped inside the stalled lift. They shall ascertain that no passenger is trapped inside the lift, by physical inspection of the interior of the lift car, before leaving the scene. There shall be one or more competent workers in attending the above mentioned fault calls and the competent worker shall record the actions taken in the log book before he leaves the scene.

If any passenger is injured as reported, the Registered Lift/Escalator Engineer of the Contractor shall arrive at the site within two hours to conduct detailed investigation of the incident and examination of the lift/escalator thoroughly.

SECTION H4

INSPECTION, OPERATION AND MAINTENANCE REQUIREMENTS

H4.2 PLANNED MAINTENANCE

The Contractor shall be responsible for:

- (a) any repairs necessary to maintain the installation in good and safe working order at all times;
- (b) carrying out periodic inspections, tests, repairs, adjustments and maintenance of the installation during the Maintenance Period;
- (c) supplying all lubricants, cleaning materials, rope preservatives etc.;
- (d) replacing all burnt out lamp bulbs/tubes with bulbs/tubes of correct rating;
- (e) renewing the suspension ropes for lift installation at no additional cost to the Employer due to normal wear and tear as in the Contractor's judgement and/or manufacturer's recommendation is necessary to maintain an adequate factor of safety and/or as required based on the replacement criteria in the statutory codes and circulars issued by the Electrical and Mechanical Services Department, the Government of the HKSAR and/or as required in Annex IA to IE of this General Specification; and
- (f) providing, repairing or replacing at no additional cost to the Employer such mechanical and electrical parts of the installation necessary for the safe and normal operation of the installation.

When a suspension rope needs to be replaced, other suspension ropes on the same sheave or in the same set shall also be replaced complying with the requirements in the statutory codes and circulars issued by the Electrical and Mechanical Services Department, the Government of the HKSAR.

H4.5 RECORD OF MAINTENANCE

After each routine inspections, tests, repairs, replacements and maintenance services, the Contractor shall record the event on a logbook provided by the Employer. The Contractor shall be responsible to record every event in the log book together with a detailed description of work including description of the component and equipment concerned, rectification action and follow up action. The Contractor shall also be responsible to obtain signature from the representative of the occupant for each entry in the logbook to signify the occupant acknowledging and accepting the visit, attendance, repair and maintenance work. This logbook shall be retained in the lift machine room, or a location such as Security Counter, Building Management Office, General Office as designated by the Architect. The format of the logbook is as shown in Annex IIA. Instructions, as shown in Annex IIB, for filling the logbook are provided inside the logbook.

In addition, the Contractor shall state on the log book the anticipated duration for performing routine maintenance for installations.

The Contractor shall submit, quarterly, to the Architect an inspection report on the conditions of each lift and escalator/passenger conveyor and a summary report of all the major repair/alteration carried out in the last quarter. Any repeated breakdown of service shall also be included in the summary report.

H4.6 FINAL JOINT INSPECTION

At the end of the Maintenance Period, the Contractor shall carry out the final inspection, testing and maintenance of the installation and to provide such copies of the test reports, duly signed by Registered Lift/Escalator Engineer. A thorough test shall be carried out by the Contractor and any defects found shall be rectified by the Contractor without charge to the Employer. The test shall include the periodic examination and periodic testing of each lift, escalator and passenger conveyor installation covering all the safety equipment and shall be carried out within one month prior to the end of the Maintenance period. In addition to the statutory submissions, the Contractor shall submit a test/examination report following the format given in the Appendices to the Code of practice for Lift Works and Escalator Works together with copy of Form EMSD/LE11 and/or Form EMSD/LE12 for the installation to the Architect one week before the end of the Maintenance Period.

The installation shall not be deemed to be acceptable for handover to the Architect until the installation is in good working order and all as-built drawings, operation and maintenance manuals, spare part lists, test reports, test certificates etc. have been submitted to the Architect.

The Contractor shall ensure that the installation is in good working order, safe and satisfactory operation condition at the time of handover.

ANNEX IA

MAINTENANCE SCHEDULE **FOR ELECTRIC PASSENGER, GOODS AND SERVICE LIFTS**

Schedule No.	Description of Job	Frequency
2	(a) Inspect lift machine gearing and bearings. Ensure keys and fixing bolts are secure.	Monthly
	(b) Inspect brake coupling and linings for wear. See that keys and fixing bolts are secure. Check that brake release gear and hand winding wheel are readily available.	Monthly
	(c) Check drums, sheaves and pulleys for visible cracks, ensure keys and fixing bolts are secure. Inspect bearings and sheave grooves. See Note No. 3.	Monthly
	(d) Check condition of wire ropes (including suspension ropes). Ensure wire ropes are evenly tensioned. See Note No. 4.	Monthly (new wire ropes shall be checked fortnightly for at least 2 months after installation)
	(e) Inspect overspeed governor for wear. Ensure keys and fixing bolts are secure.	Monthly
	(f) Extract dust from interiors of motors and generators. Inspect bearings, ensure fixing bolts are secure.	Monthly
	(g) Inspect floor selector bearings. Check connections and flexes. Inspect driving rope, tape or chain for wear and correct tension.	Monthly
	(h) Inspect and operate by hand the slack rope switch, safety-gear switch, broken tape or rope switch and overspeed governor switch.	Monthly
	(i) Inspect guides for wear and ensure fixings are secure.	Monthly

Schedule No.	Description of Job	Frequency
	<p>(j) Check counterweight clearances for rope stretch. Inspect rope equaliser. Ensure main tie bolts are secure. Inspect guide shoes for wear and 'float'. Ensure filler weights are properly positioned and secure. Check safety-gear for guide clearance and free movement.</p> <p>(k) Open, clean and inspect limit switches, direction switches. Inspect fixed ramps and inductor plates.</p> <p>(l) Ensure spring buffers are secure. Clean oil buffers and top up. Check for oil leaks.</p> <p>(m) Inspect conditions of landing and car sill nosings and check car clearance. Inspect lock beaks, door rollers and spindles for wear. Inspect door inter-connecting wires or chains for wear and correct tension.</p> <p>(n) Ensure car frame bolts are secure. Check guide shoes for minimum 'float'. Ensure car body is secure in frame. Check safety-gear for guide clearance and free movement. Check tension of safety rope. Inspect door operating mechanism for wear and ensure driving sprockets, keys and fixing bolts are secure. Ensure that the 'pick-up' between car and landing doors is correctly aligned. See Note 5.</p> <p>(o) Open, clean and inspect car controls, floor switches, door switches. Check action of emergency opening and movable floor. Inspect car lighting.</p> <p>(p) Inspect travelling cables and their anchorages.</p> <p>(q) Open, clean and inspect landing button boxes and ensure that they and any indicator boxes are securely fixed.</p>	<p>Monthly</p> <p>Monthly</p> <p>Monthly</p> <p>Monthly</p> <p>Monthly</p> <p>Monthly</p> <p>Monthly</p> <p>Monthly</p>
4	<p>(a) Renew wire ropes (including suspension ropes). See Note No. 4.</p> <p>(b) Test overspeed governor, safety gear, ascending car overspeed protection device, uncontrolled car movement protection device and rope break protection device on no load.</p>	<p>(i) After major repair or major replacement that affects the operations of the</p>

Schedule No.	Description of Job	Frequency
		device.
		(ii) Every year
	(c) Test overspeed governors, safety gear, ascending car overspeed protection device, uncontrolled car movement protection device and rope break protection device on full load.	(i) After major repair or major replacement that affects the operations of the device.
		(ii) Every 5 years
	(d) Test by simulation of overload device.	Every year
	(e) Test by simulation of homing key switch.	Every year

NOTES TO ANNEX IA

The attention of all personnel engaged on lift maintenance services is drawn to the need for the proper observance of all safety rules, regulations and statutory requirements. It is essential that all apparatuses are rendered, and kept, safe during servicing operations. Protective clothing and other safeguards shall be worn or used by the maintenance personnel. All defects in tools, steps, ladders and other items are to be reported immediately and the equipment shall not be used until the fault is rectified.

The lubricants used shall be of the brands and grades recommended by the component manufacturer or their approved equivalents. Ensure adequate lubrication, but avoid excessive. Spillage shall be wiped off. Oily rags or waste shall be removed.

The following items are general guidance for the proper maintenance of the lift installation. These items are by no means exhaustive. The maintenance personnel shall follow all instructions and guideline as recommended by their relevant manufacturer.

1. A brake operating solenoid shall be adjusted to the shortest stroke that will expand the brake bands equally with minimum clearance, consistent with free running of the brake drum.
2. It is essential that a lift will not operate with a car or landing door open, and that landing doors are kept locked except when a car is standing at that floor.
3. (a) Wear on rope grooves of sheaves shall not be such as to cause rope slip.

(b) All grooves must be equal, i.e. all ropes shall sit to the same depth.

Sheave grooves shall only be allowed to be re-cut once to satisfy the above conditions.

4. Wire ropes (including suspension ropes) shall be renewed when any one of the following conditions exists:
 - (a) Where undue stretching occurs after the initial stretch has taken place ;
 - (b) There is corrosion/rust;
 - (c) There is birdcaging of strands;
 - (d) The rope has been damaged;

- (e) The rope is more than six years old;
- (f) The replacement criteria for wire ropes as stipulated under the statutory codes and Circular No. 18/2009 issued by the Electrical and Mechanical Services Department, the Government of the HKSAR are met. The replacement criteria shall include, but not limited to, the following:

Conditions	Rope replacement criteria	
	6x19 rope type	8x19 rope type
Reduction in diameter	10%	10%
Broken wires randomly distributed among the outer strands	>24 per rope lay	>32 per rope lay
Broken wires concentrating in one or two outer strands or when severe rusting is observed	>12 per rope lay	>16 per rope lay
Adjacent broken wires in one outer strand	>4 and the number of broken wires per rope lay > 12	>4 and the number of broken wires per rope lay > 16

- (g) The discarded criteria of lift manufacturer(s) for wire ropes are fulfilled.
- (h) When it is considered necessary by the Contractor to replace the wire ropes from maintenance and/or safety viewpoint.

If any rope on a sheave needs to be replaced, all other ropes on that sheave shall be replaced. When one wire rope of a set has been damaged during installation or acceptance testing prior to being subjected to lift service, it is permissible to replace a single damaged rope with a new rope provided that the requirements as stipulated under the statutory codes and Circular No. 18/2009 issued by the Electrical and Mechanical Services Department, the Government of the HKSAR are met.

Wire ropes shall be well lubricated during manufacture and have a certain amount of reservoir lubricant. If no lubricant is apparent in the interstices between wires, apply a thin coating of a dressing recommended by the rope maker, or approved equivalent, i.e. an acid-free grade material such as petroleum jelly.

5. Where a power limiting device is incorporated in the door operating mechanism, it shall be clear of the safety edge and operate at a force not exceeding 150N when the door is obstructed.
6. Door locks are to be examined internally at least once every six months (except if fitted with transparent covers, permitting observation of working parts and no defects are apparent). The opening up and internal examinations are to be carried out in sequence and spread evenly over the period.

Remarks: The word 'Door' in the Schedule means any sliding or hinged part which gives access to the car or lift well enclosure.

ANNEX IB

MAINTENANCE SCHEDULE
FOR HYDRAULIC LIFTS

Schedule No.	Description of Job	Frequency
2	(a) Ensure that keys and fixing bolts of sheaves and pulleys are secure and check for visible cracks and corrosion. Inspect bearings and rope grooves.	Monthly
	(b) Check condition of wire ropes (including suspension ropes). Ensure wire ropes/suspension chains are evenly tensioned. Clean and lubricate. See Note No. 2.	Monthly (new wire ropes shall be checked fortnightly for at least 2 months after installation)
	(c) Ensure ram head bolts and cylinder fixing bolts are secure. Check for visible signs of corrosion. Check action of air release cock and anti-syphonic valve.	Monthly
	(d) Ensure pipework, joints, bolts and fixings are visibly sound and free from corrosion and leaks. Check stop valve. Inspect oil reservoir and pump.	Monthly
	(e) Open, clean and inspect: control valves, pilot and levelling valves. Check overrun and cut-off devices. Check over-load relief valve.	Monthly
	(f) Inspect pump motor when operating and stationary.	Monthly
	(g) Inspect floor selector bearings. Check connection and flexes. Inspect driving rope, tape or chain for wear and correct tension.	Monthly
	(h) Inspect safety gear switch and operate it by hand.	Monthly
	(i) Check counterweight clearances for rope stretch. Ensure main tie-bolts and filler weights are secure. Check guide shoes for wear and 'float'.	Monthly
	(j) Inspect 'Jigger' counterweight assembly for visible signs of corrosion. Ensure fixings are secure. Check guide shoes for wear and 'float'.	Monthly
	(k) Inspect travelling cables and their anchorages.	Monthly

Schedule No.	Description of Job	Frequency
	<p>(l) Inspect guides for wear and ensure fixings are secure. Check spring buffers.</p> <p>(m) Inspect condition of landing and car sill nosings and check car clearances. Inspect lock beaks, door rollers and spindles for wear.</p> <p>(n) Ensure car frame bolts are secure. Check guide shoes for wear and 'float'. Ensure car body is secure in frame. Check safety gear for running clearance and free movement. Check tension of safety rope.</p> <p>(o) Open, clean and inspect car controls, door switches and levelling switches. Check operation of emergency opening. Inspect car lighting.</p> <p>(p) Open, clean and inspect landing button boxes and ensure that they and any separate indicator boxes are securely fixed.</p> <p>(q) Open, clean and inspect landing door locks. See Note No. 3.</p>	<p>Monthly</p> <p>Monthly</p> <p>Monthly</p> <p>Monthly</p> <p>Monthly</p> <p>Monthly</p>
4	<p>(a) Renew wire ropes (including suspension ropes). See Note No. 2.</p> <p>(b) Test safety gear on no load.</p> <p>(c) Test safety gear on full load.</p>	<p>-</p> <p>(i) After major repair</p> <p>(ii) Every year</p> <p>(i) After major repair or major replacement that affects the operation of the device.</p> <p>(ii) Every 5 years</p>

NOTES TO ANNEX IB

The attention of all personnel engaged on lift maintenance services is drawn to the need for the proper observance of all safety rules, regulations and statutory requirements. It is essential that all apparatuses are rendered, and kept safe during servicing operations. Protective clothing and other safeguards shall be worn or used by the maintenance personnel. All defects in tools, steps, ladders and other items are to be reported immediately and the equipment shall not be used until the fault is rectified.

The lubricants used shall be of the brands and grades recommended by the component manufacturer or their approved equivalents. Ensure adequate lubrication, but avoid excessive. Spillage shall be wiped off. Oily rags or waste shall be removed.

The following items are general guidance for the proper maintenance of the lift installation. These items are by no means exhaustive. The maintenance personnel shall follow all instructions and guidelines as recommended by their relevant manufacturer.

1. It is essential that a lift will not operate with a car or landing door open, and that landing doors are kept locked except when a car is standing at that floor.
2. Wire ropes (including suspension ropes) shall be renewed when any of the following conditions apply:
 - (a) Where undue stretching occurs after the initial stretch has taken place;
 - (b) There is corrosion/rust;
 - (c) There is birdcaging of strands;
 - (d) The rope has been damaged;
 - (e) The rope is more than six years old;
 - (f) The replacement criteria for wire ropes stipulated under the statutory codes and Circular No. 18/2009 issued by the Electrical and Mechanical Services Department, the Government of the HKSAR are met. The replacement criteria shall include, but not limited to, the following:

Conditions	Rope replacement criteria	
	6x19 rope type	8x19 rope type
Reduction in diameter	10%	10%
Broken wires randomly distributed among the outer strands	>24 per rope lay	>32 per rope lay
Broken wires concentrating in one or two outer strands or when severe rusting is observed	>12 per rope lay	>16 per rope lay
Adjacent broken wires in one outer strand	>4 and the number of broken wires per rope lay > 12	>4 and the number of broken wires per rope lay > 16

- (g) The discarded criteria of lift manufacturer(s) for wire ropes are fulfilled;
- (h) When it is considered necessary by the Contractor to replace the wire ropes from maintenance and/or safety viewpoint.

If any rope on a sheave needs to be replaced, all other ropes on that sheave shall be replaced. When one wire rope of a set has been damaged during installation or acceptance testing prior to being subjected to lift service, it is permissible to replace a single damaged rope with a new rope provided that the requirements as stipulated under the statutory codes and Circular No. 18/2009 issued by the Electrical and Mechanical Services Department, the Government of the HKSAR are met.

Wire ropes shall be well lubricated during manufacture and have a certain amount of reservoir lubricant. If no lubricant is apparent in the interstices between wires, apply a thin coating of a dressing recommended by the rope maker, or approved equivalent, i.e. an acid-free grade material such as petroleum jelly.

- Door locks are to be examined internally at least once every six months (except if fitted with transparent covers, permitting observation of working parts and no defects are apparent). The opening up and internal examinations are to be carried out in sequence and spread evenly over the period.

Remarks: The word 'Door' in the Schedule means any sliding or hinged part which gives access to the car or lift well enclosure.

ANNEX ID

MAINTENANCE SCHEDULE
FOR POWERED VERTICAL LIFTING PLATFORMS

Schedule No.	Description of Job	Frequency
2	(a) Check the main power switch.	Monthly
	(b) Inspect the major relays in control panel.	Monthly
	(c) Inspect and clean the electrical components in control panel.	Monthly
	(d) Check the main power cable, earth bonding and wiring connections.	Monthly
	(e) Check the control timer if provided.	Monthly
	(f) Ensure no leakage from oil tank.	Monthly
	(g) Ensure the oil amount in oil tank at desirable level.	Monthly
	(h) Clean the hydraulic pump and motor unit running condition.	Monthly
	(i) Ensure the hydraulic valves in operation and in good condition.	Monthly
	(j) Inspect the pressure gauge.	Monthly
	(k) Test the hand pump.	Monthly
	(l) Test manual lowering valve.	Monthly
	(m) Inspect the car frame.	Monthly
	(n) Inspect the guide shoes. Lubricate.	Monthly
	(o) Inspect the safety gear and electrical switch.	Monthly
	(p) Inspect the platform side wall(s) and surface.	Monthly
	(q) Test and inspect the door locking device.	Monthly
	(r) Test the control key switches.	Monthly
	(s) Test the platform control buttons.	Monthly
	(t) Inspect the platform lighting fixtures.	Monthly

Schedule No.	Description of Job	Frequency
	(u) Check the guide rail fixings and brackets.	Monthly
	(v) Lubricate the guide rails.	Monthly
	(w) Inspect the flexible cables and cable clips.	Monthly
	(x) Inspect and test the limit switches.	Monthly
	(y) Inspect and test the final limit switches.	Monthly
	(z) Check the suspension chain / wire ropes condition.	Monthly
	(aa) Check the diversion pulleys condition.	Monthly
	(bb) Ensure no oil leakage from hydraulic cylinder.	Monthly
	(cc) Check oil pipe / flexible hose.	Monthly
	(dd) Check lift pit condition, clear debris.	Monthly
	(ee) Check all labels, notice(s) and signage in proper condition.	Monthly

ANNEX IE

MAINTENANCE SCHEDULE
FOR STAIRLIFTS

Schedule No.	Description of Job	Frequency
2	(a) Check the main power switch.	Monthly
	(b) Inspect the major relays in control panel.	Monthly
	(c) Inspect and clean the electrical components in control panel.	Monthly
	(d) Check the main power cable, earth bonding and wiring connections.	Monthly
	(e) Inspect the platform carriage.	Monthly
	(f) Inspect the guide shoes.	Monthly
	(g) Inspect the safety gear and electrical switch.	Monthly
	(h) Test the control key switches.	Monthly
	(i) Test the platform control buttons.	Monthly
	(j) Check the guide rail fixings and brackets.	Monthly
	(k) Lubricate the guide rails.	Monthly
	(l) Inspect the flexible cables and cable clips.	Monthly
	(m) Inspect and test the final limit switches.	Monthly
	(n) Check the suspension chain / wire ropes condition if provided.	Monthly
	(o) Check the rack and pinion gear condition if provided.	Monthly
	(p) Check the screw and nut gear condition if provided.	Monthly
	(q) Check all labels, notice(s) and signage in proper condition.	Monthly

ANNEX IIB

NOTES ON ENTRY OF LOG BOOK

Front Page of Log Book- State the anticipated duration for performing routine maintenance.

Column 1 Date and time at which call-out is received by Contractor.

Column 2 Date and time at which mechanic arrived on site.

Column 4 Plant identity, e.g. Lift No. X, motor No. Y, etc.

Column 8 Comment on the cause of any abnormal fault (e.g. vandalism), reason for non-clearance of fault, etc.

Points to note:

1. For passenger entrapment call, two or more lift workers shall be deployed to attend the scene to release the passengers trapped in the lift. At least one of the workers attending the fault calls shall be a competent worker and he shall record the actions taken in the log book before he leaves the scene.
2. In attending a lift breakdown call, the lift shall be checked to ascertain there is no passenger trapped inside the stalled lift by physical inspection of the interior of the lift car. The actions taken shall be recorded in the log book.
3. A chop print shall be stamped on the log book complying with the statutory codes and the requirements in Circular No. 3/2009 issued by the Electrical and Mechanical Services Department, the Government of the HKSAR and showing the anticipated duration for maintaining the lifts.

ANNEX V

LIST OF TECHNICAL STANDARDS QUOTED IN THIS GENERAL SPECIFICATION

Standard	Description	Clause No.	Remarks
EN 81-1:1998	Safety rules for the construction and installation of lifts Part 1: Electric lifts	C1.2, C4.5, C10.14, C12.1, C14.4, C14.5, C17.2	Incorporating Corrigendum September 1999, Amendments A1:2005 and A2: 2004
EN 81-2:1998	Safety rules for the construction and installation of lifts Part 2: Hydraulic lifts	C12.1	Incorporating Corrigendum September 1999, Amendments A1:2005 and A2: 2004
EN 81-40:2008	Safety rules for the construction and installation of lifts. Special lifts for the transport of persons and goods. Stairlifts and inclined lifting platforms intended for persons with impaired mobility	A2.1.2	
EN 81-58:2003	Safety rules for the construction and installation of lifts. Examination and tests. Landing doors fire resistance test.	C10.1	
EN 1634-1:2008	Fire resistance and smoke control tests for door, shutter and, openable window assemblies and elements of building hardware. Fire resistance tests for doors, shutters and openable windows	C10.1	
EN 10025:2004	Hot-rolled products of structural steels	B3.6	
EN 10029:1991	Specification for tolerances on dimensions, shape and mass for hot rolled steel plates 3 mm thick or above	B3.5, B3.6	
EN 10048:1997	Hot rolled narrow steel strip. Tolerances on dimensions and shape	B3.5	
EN 10088-1:2005	Stainless steel. List of stainless steel	B3.5	

Standard	Description	Clause No.	Remarks
EN 10095:1999	Heat resisting steels and nickel alloys	B3.5	
EN 10210:2006	Hot finished structural hollow sections of non-alloy and fine grain steels	B3.6	
EN 10210-2:2006	Hot finished structural hollow sections of non-alloy and fine grain structural steels	B3.6	Replacing BS4848:Part 2
EN 12385-1:2002	Steel wire ropes Safety Part 1:General Requirements	C4.1	
EN 12385-5:2002	Steel wire ropes Safety Part 5:Stranded ropes for lifts	C4.1	Replacing BS 302:Part4
EN 50214:2006	Flexible cables for lifts	B2.5	
EN 55014:2006	Electromagnetic compatibility. Requirements for household appliances, electric tools and similar apparatus. Emission. Product family standard	B2.9	
EN 60335-2-29 :2004	Specification for safety of household and similar electrical appliances. Particular requirements. Battery chargers	B2.8	
EN 60947-4-1 :2001	Low-voltage switchgear and controlgear. Contactors and motor starters. Electromechanical contactors and motor-starters	F1.10	
EN 60950:2006	Safety of information technology equipment	C9.7	
EN 61000-6-1 :2007	Electromagnetic compatibility (emc) - Part 6-1	C10.12	
EN 61000-6-3 :2007	Electromagnetic compatibility (emc) - Part 6-3	C10.12	
EN 61951-2:2003	Secondary cells and batteries containing alkaline or other non-acid electrolytes. Portable sealed rechargeable single cells. Nickel-metal hydride	B2.8	
IEC 60034:1992	Rotating electrical machines	F1.10	

Standard	Description	Clause No.	Remarks
IEC 60085:1984	Electrical insulation - Thermal classification	F1.10	
IEC 60939-1:2005	Passive filter units for electromagnetic interference suppression - Part 1: Generic specification	B2.9	Incorporating Corrigendum 1
IEC 60939-2:2005	Passive filter units for electromagnetic interference suppression - Part 2: Sectional specification	B2.9	Replace BS 613:1977
ISO 4344:2004 EDTN2	Steel wire ropes for lifts – Minimum requirements	C4.1	
ISO 5457:1999	Technical product documentation - Sizes and layout of drawing sheets	A4.2.2, A4.3.2	
ISO 7465:2007	Passenger lifts and service lifts -- Guide rails for lift cars and counterweights – T-type – Fourth Edition	C1.2	Replacing BS 5655:Part 9
ISO 9386-1:2000	Power-operated lifting platforms for persons with impaired mobility – Rules for safety, dimensions and functional operation – Part 1 : Vertical lifting platforms	A2.1.2	
ISO 9445: 2002	Continuously cold-rolled stainless steel narrow strip, wide strip, plate/sheet and cut lengths. Tolerances on dimensions and form	B3.5	Replacing BS EN 10258:1997 and BS EN 10259:1997
BS 4-1:2005	Structural steel sections. Specification for hot-rolled sections	B3.6	
BS 476 Part 20:1987 & Part 22:1987	Fire tests on building materials and structures: Method for determination of the fire resistance	C10.1	For Part 20, incorporating Amendment No.6487: April 30, 1990

Standard	Description	Clause No.	Remarks
BS 2633:1987	Specification for Class I arc welding of ferritic steel pipework for carrying fluids	C23.3	Incorporating Amendment No. 6969: July 1992, Amendment No. 5798: February 1998, Amendment No. 9800: February 1998 and Amendment No. 10065: September 15, 1998
BS 5776:1996	Specification for powered stairlifts	F1.2	
BS 6440:1999	Powered Lifting Platforms for Use by Disabled Persons	A2.1.2	
BS 7668:2004	Weldable structural steels. Hot finished structural hollow sections in weather resistant steels. Specification	B3.6	
ASME A18.1:2008	Safety Standard for Platform Lifts and Stairway Chairlifts	A2.1.2	
ICC/ANSI A117.1:2003	Accessible and useable buildings and facilities	F1.2	
ASME A17.1:2004	Safety code for elevators and escalators	F1.2	Incorporating Addenda A:2005
TCO'06	TCO'06 Media Displays – a certification standard and test methods for flat panel TV or multifunction display in respect of visual ergonomics, emissions, electrical safety and ecology	C9.7	Ver. 1.2