Canadian space agency
St-Hubert (Quebec)

division 14
elevator 5
specifications

215038 r2

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SECTION 14 24 23: HYDRAULIC ELEVATOR

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Comply with section 14 20 00.

1.2 DATA TABLE

.1 Supply an elevator having the following characteristics:

Identification	5	
number of units	1	
application	passenger elevator	
rated speed (m/s, fpm)	0.25	50
capacity (kg, lb)	1589	3500
motor power (kW, HP)	15	20
loading class	C3	
operation	collective selective, automatic	
machine type	direct acting, hydraulic	
machine location	remote	
controller	microprocessor	
drive type	hydraulic	
emergency brake	overspeed valve	
car governor	(not required)	
equipment guarding	required	
guide-rails	standard «T» profile	
jack type	twin-post, holeless	
number of stops	2	
number of front openings	1	
number of rear openings	1	
hall door type	two speed, side opening	
hall door finish (typical)	stainless steel	
hall door finish (main floor)	stainless steel	
entrance width (mm, ")	1070	42
entrance height (mm, ")	2440	96
cab width (mm, ")	1676	66

Identification	5	
cab depth (mm, ")	2007	79
cab gross height (mm, ")	2743	108
car guiding	double spring-loaded roller-guides	
cab finishes	per architect drawings	
car top inspection station	required	
load weighing device	overload detector	
car top railing	as required per Code	
door operator	GAL MOVFR	
entrance protection	infrared multi-beam	
car station(s)	main only	
verbal annunciation	required	
car position indicator	required	
cab emergency lighting	in car operating panel	
cab communication	hands-free	
cab ventilation	fan on the car top	
cabinet in car operating panel	required	
in-car lanterns	required	
car call security	(not required)	
hall call security	(not required)	
hall stations	one per entrance	
hall position indicator	not required	
hoistway access switches	as required by Code	
entrance markings	required	
hall lanterns	(not required)	
CACF panel	(not required)	
monitoring system	(not required)	
firefighter's operation	phases 1 and 2	
firefighter's elevator	(not required)	
emergency power	battery lowering	
operating time	14.8	

.2 Arrange the elevator to meet the requirement for accommodating and providing adequate access for a patient stretcher in the prone position as required by the National Building Code.

.3 Number the floors as required by the architect.

.4 Number the elevator as required by the architect.

1.3 HOISTWAY DIMENSIONS

.1 Provide equipment to suit the hoistway and overhead dimensions shown on the architectural drawings.

.2 Provide equipment to suit the pit dimensions shown on the architectural drawings.

1.4 MACHINE ROOM LOCATION AND DIMENSIONS

.1 Provide equipment to suit the machine room dimensions and locations shown on the architectural drawings.

PART 2 - PRODUCTS

2.1 HYDRAULIC: JACK UNIT (HOLELESS)

.1 Provide two hydraulic jacks of sufficient size to lift the gross load the height specified.

.2 Factory test the jack unit to ensure adequate strength and freedom from leakage.

.3 Do not use brittle material, such as gray cast iron or semi steel, in the jack construction.

.4 Provide a jack unit consisting of the following parts: a plunger of heavy seamless steel tubing accurately turned and polished, a stop ring electrically welded to the plunger to positively prevent the plunger leaving its casing, an internal babbit-lined or bronze guide bearing, packing of suitable design and quality, a drip ring around the casing top, an outer casing made of steel tubing provided with a pipe connection with an air bleeder.

.5 Arrange the jacks so that they are contained within the hoistway, one on each side of the cab.

.6 Weld brackets to the jack casing for supporting the elevator on pit channels.

.7 Use packing of the single sealing edge type of teflon, roulon or similar material to reduce wear and friction.

.8 Provide an overspeed valve.

.9 Provide a shut-off valve in the pit.

2.2 HYDRAULIC: SCAVENGER PUMP

.1 Provide a scavenger pump to return oil leaking through the packing to the tank of the pumping unit by automatic means.

.2 Adequately filter the oil returned by the scavenger pump.

.3 Provide a float switch in the pit to shut off the scavenger pump in the event of high water level so as to prevent water being pumped into the tank.

.4 Provide a check valve at the hydraulic machine in the scavenger pump oil line to prevent oil flowing from the reservoir in the event the scavenger pump line is ruptured.

.5 Provide fire-resistant tubing for the scavenger pump oil line.

2.3 HYDRAULIC: PUMPING MACHINE UNIT

.1 Provide a pumping machine unit compactly and neatly designed with all the components as follows in a self-contained unit: drip pan, floating inner base for mounting motor pump assembly, oil reservoir with tight fitting tank cover, oil fill strainer with air filter, self-cleaning strainer in suction line, oil hydraulic pump, electric motor, oil control unit.

.2 Provide an oil level gauge that can be read without removing the tank cover.

.3 Provide, to measure the oil temperature, a thermometer that can be read without removing the tank cover.

.4 Provide a pump especially designed and manufactured for oil hydraulic service of the rotary positive displacement type inherently designed for steady discharge with minimum pulsations to give smooth and quiet operation.

.5 Provide a motor designed for oil hydraulic service.

.6 Provide equipment which will deliver its rated output continuously with a temperature rise not to exceed 50°C (120°F).

.7 Provide an oil control unit consisting of the following components: relief valve, safety check valve, levelling valve, manual lowering valve, tank shut-off valve.

.8 Design the equipment so that all adjustments are accessible and can be made without removing the assembly from the oil line.

.9 Provide variable flow bypass valves to give controlled high and levelling speed operation.

.10 Provide valves with individual adjustments, such that changing one adjustment does not affect other adjustments.

.11 Provide an externally adjustable relief valve capable of by-passing the total oil flow without increasing the back pressure more than 10% above that required to barely open the valve.

.12 Provide a 50 mm (2") pressure gauge, complete with isolating shut-off valve, for measuring the setting of the relief valve.

.13 Design the safety check valve to close quietly without permitting any reverse flow and to support the elevator on a positive locked column of oil when the car is at rest.

.14 Provide an externally adjustable up start valve to by-pass oil flow during initial start of the motor pump assembly, and to close slowly, gradually diverting oil to the jack unit, insuring smooth up starts, so as to relieve load on the motor during starting.

.15 Provide an externally adjustable lowering valve and levelling valve for drop away speed, lowering speed, levelling speed and stopping speed to insure smooth down starts and stops.

.16 Provide a manual lowering valve for manual lowering of the elevator car in the event of power failure and for use in servicing and adjusting the elevator mechanism.

.17 Provide shut off valves in the machine room and elevator pit for isolating oil in the power tank unit to facilitate servicing and adjusting the elevator mechanism without removing the oil from the tank.

.18 Provide self cleaning strainers to prevent foreign materials from lodging in the oil system.

.19 Provide an externally adjustable up stop valve to by-pass the oil flow for landing stops in the up direction.

.20 Provide temperature and pressure compensation so as to minimize speed variations.

.21 Arrange the equipment so that the car stops at the landing through controlled oil flow with the motor and pump running and so that the motor shuts off only after the car has come to rest at the landing.

.22 Use flexible hose on the pumping machine unit where required but only within the regulations of the governing safety codes.

.23 Provide a tank of sufficient capacity to contain, as a minimum, all of the oil in the hydraulic system (pipe lines and hydraulic cylinder) plus 10%.

2.4 HYDRAULIC: HEAT EXCHANGER

.1 Provide a heat exchanger to ensure that the temperature of the hydraulic fluid in the reservoir, pump and control valve does not exceed 40 degrees C (106 degrees F).

.2 Provide a thermostat control in the elevator hydraulic machine reservoir to start and stop the heat exchanger pump and fan as necessary to maintain the oil at the required temperature.

.3 Provide a unit capable of removing a minimum of 18,000 kJ (17,000 BTU) per hour from the hydraulic fluid.

.4 Provide, as an integral part of the heat exchanger, a fan to exhaust the heat to the outside of the machine room.

.5 Provide, as an integral part of the heat exchanger, a pump having a minimum capacity of 0.03 cubic metres at 5 bar (8 US gpm at 75 psi) driven by a single phase 560 W (3/4 hp) 110 volt 60 Hz motor.

.6 Provide a 10 micron filter in the hydraulic oil line together with a sight gauge to indicate when the filter needs to be changed.

.7 Mount the heat exchanger on the machine room wall remote from the hydraulic machine in a suitable location.

.8 Provide piping and wiring as required for the heat exchanger (a 110 volt 60 Hz 20 amp supply will be provided by others).

2.5 HYDRAULIC MOTOR STARTING

.1 Start the hydraulic pump motor after the doors start to close so that motor is running at full speed before the doors are fully closed.

.2 Stop the hydraulic pump motor if the door closing operation is interrupted.

.3 Provide solid state control of the starting operation so as to limit the motor starting current to not more than two times the full load running current.

.4 Energize the hydraulic machine up start valve, subject to the standard safety circuits, after the doors are closed and a signal is received from the solid state starter indicating that the motor is up to operating speed.

2.6 HYDRAULIC: TIME PROTECTIVE DEVICE

.1 Provide a time protective device.

.2 If the pump motor should run continuously for 20 seconds longer than the period of time necessary to move the elevator (in normal operation) from the bottom floor to the top floor, the time protective device will cause:

.1 Up direction relays and contactors to be de-energized.

.2 Automatic registration of a bottom floor call to bring the car to the lowest landing where it will remain with its doors open.

.3 No response to any further hall calls or car calls until the main line switch has been opened and closed again.

2.7 PIPING

.1 Provide pipes and fittings to connect the power unit to the jack unit.

.2 Provide a shut-off valve in the pit.

.3 Seal connections adequately to prevent any leakage or seepage of oil.

.4 Provide pipe of minimum 50 mm (2") nominal size to reduce oil velocity, noise and vibration.

.5 Provide sound-isolating pads between the piping and its supports to reduce transmission of vibrations to the building structure.

.6 Unless unpractical due to site conditions, run the oil lines are run above ground, suspending the oil lines with isolating hangers to reduce sound transmission.

.7 If the oil lines have to be run underground due to site conditions:

.1 Encase the buried lines in a sealed plastic pipe.

.2 Bury the plastic pipe in sand or other sound dampening medium so as to reduce sound transmission;

.3 Provide drawings indicating the trenching requirements for the oil lines from the machine room to the elevator hoistway;

.4 Install the oil lines in the trench and supervise the burying of the lines.

2.8 HYDRAULIC: MAIN LINE STRAINER

.1 Provide a main line strainer and shut off cock assembly of the self cleaning type, equipped with a 60 minimum mesh element, and a magnetic drain plug, in the oil line.

.2 Design the unit for a minimum 2800 kilopascals (400 psi) working pressure and provide easy access for cleaning.

2.9 CONTROLLER

.1 Provide a micro-processor based controller designed to give the required operation as herein specified.

.2 Mount panels securely on substantial, self supporting steel frames designed for floor or wall mounting.

.3 Provide completely enclosed controllers with covers.

.4 Do not mount equipment on the covers.

.5 Where relays are used, provide those having a design electrical life and mechanical life equivalent to thirty years operation in the given application, with their contacts designed for maximum conductivity and wiping action.

.6 Provide electronic time delay devices which employ stable capacitors or crystals as the time base.

.7 Install wiring on the controller, whether control or field wiring, in a neat workmanlike order and make connections to studs and terminals by means of solder or solderless lugs, or similar connecting devices.

.8 Mark relays, contactors, fuses, printed circuit boards and other components clearly and permanently with designations as shown on the schematics.

.9 Mount the designations for plug in components on the controller adjacent to the component; do not mount the designation on the plug in component.

.10 Provide a written guarantee from the control manufacturer that over the life of the installation software and firmware updates will be provided at no charge to the Owner

2.10 CONTROL CIRCUITS GROUNDING

.1 Arrange the control circuits so that one side of the control power supply for external circuits is grounded to facilitate testing and trouble shooting.

.2 An external circuit is defined as one wired outside micro-processors or solid-state devices, as for example, buttons, relays, lights, limits, locks and such similar devices.

.3 Arrange that accidental grounding in the control system will not defeat the safety

circuits.

2.11 SOLID-STATE HARDWARE

.1 Mount solid-state devices, except for high power silicon controlled rectifiers, on removable printed circuit boards.

.2 Gold plate the contact points of edge connectors.

.3 Use G10 glass epoxy with minimum equivalent 57 gram (2 ounce) copper.

.4 Coat the circuits with tin-lead.

.5 Provide a solder resist screen.

.6 Provide plated through holes for double sided boards.

.7 Make all connections to the printed circuits on the printed circuit boards by means of properly dimensioned pads.

.8 Do not provide "patched" connections.

.9 Design solid-state devices for a high level of noise immunity.

.10 Incorporate electrical noise suppression devices in the power supplies and the inputs and outputs associated with the solid-state circuits.

.11 Provide filters and circuits to limit the generated electromagnetic noise level at any frequency to not more than 0.1 dB above the ambient electromagnetic noise level, as measured in the centre of the machine room using a calibrated radio frequency receiver designed in accordance with CSA Standard C108.1.1 together with a calibrated rod or loop antenna.

.12 Provide filters and circuits to limit the generated electromagnetic noise level at 10 kHz to not more than 0.01 dB above the ambient electromagnetic noise level, as measured in the centre of the machine room using a calibrated radio frequency receiver designed in accordance with CSA Standard C108.1.1 together with a calibrated rod or loop antenna.

2.12 COMPUTING DEVICES

.1 Where computing devices are used, such as micro-processors or mini-computers, along with associated devices, design to the following requirements:

.1 Isolate the inputs from external devices (such as push-buttons) and isolate the

outputs to external devices (such as indicators) by means of relays or optical devices;

.2 Provide the control program on read-only-memory with spare capacity to allow for future programming modifications and extensions;

.3 Provide crystal regulation of frequency;

.4 Provide for separate regulated power supplies to serve each micro-processor system.

2.13 POWER INTERRUPTION RESTART

.1 Provide means so that the elevator system will restart automatically in the event of power interruption.

.2 Where volatile memories are provided for position and other data necessary to the continuing operation of the elevators, provide means of preserving this data on power failure or fading ('brownout') for a minimum of four hours and means of automatic recovery upon restoration of normal power.

2.14 MACHINE ROOM EQUIPMENT GUARDING FOR HYDRAULIC EQUIPMENT

.1 Provide guards for the hydraulic machine, high-voltage components, tripping hazards and any other machine-room items that present a hazard to personnel.

.2 As an alternative to individual guards for the external motor and belts, provide an expanded metal screen around the lower part of the hydraulic machine.

.3 Provide machine room equipment guarding in accordance with the prevailing regulations.

.4 Provide drawings of the guarding under the seal of a Professional Engineer.

.5 Where expanded metal screens are used for guards construct them of minimum 2.2 mm thick metal so supported and braced as to deflect not more than 15 mm when subjected to a force of 450 N applied horizontally to the screen at any point

.6 Arrange the guards so as to prevent hands, arms, or any other part of a worker's body from coming in contact with moving parts

.7 Affix the guards in a strong and substantial manner so that they cannot be accidentally removed.

.8 Construct the guards of durable materials that can withstand the workplace conditions.

.9 Arrange the guards to protect from falling objects so that no objects (such as tools) can fall into moving parts or into open electrical components.

.10 Ensure that the guards do not themselves create a hazard (such as shear point, a jagged or sharp edge).

.11 Provide removable guards such that regular maintenance procedures can be performed.

.12 Arrange the guards so as not to impede a worker from performing the work efficiently and conveniently.

.13 Wherever practicable, arrange the guards so that those devices requiring regular attention can be maintained without removing the guards.

.14 Wherever practicable, provide fixed guards that cannot be easily removed.

.15 Finish the metal components of the guarding devices in a bright yellow paint with one base primer coat and two finishing coats or, alternatively, in baked enamel, so as to make them highly visible.

.16 Where polycarbonate covers are used, add marking stripes of tape in bright yellow so as to make them highly visible.

.17 Provide protective guards for high voltage circuits.

.18 Arrange that those elements of the controller with potentials to ground in excess of 130 V are separated from the low voltage elements by means of barriers that can be removed for maintenance and repair purposes.

.19 Provide barriers consisting of clear polycarbonate covers (where consistent with the prevailing regulations), hinged so as to allow access without removing the covers.

.20 Arrange the barriers so that they are of sufficient dimension that the controller covers cannot be closed completely when the barriers are in the open position.

.21 Provide an entry in the elevator maintenance logbook confirming that the elevator controller covers and doors are closed and that the machine room guards are in place and functioning properly, this entry to be checked when performing regular maintenance.

2.15 GUIDE RAILS

.1 Provide standard section guide rails with tongued and grooved joints.

.2 Provide guide rails of structural strength and rigidity sufficient to limit the horizontal

deflection of the guide at any point to less than 0.6 mm (0.025") under normal conditions of operation.

.3 Use substantial machined finished plates to form the rail joints.

.4 Erect guide rails with a variation of not more than 1.6 mm (0.06") over any 6 m (20') section and with a maximum variation of not more than 0.8 mm (0.03") in 25 mm (1").

.5 Install guide rails in a strong and substantial manner using brackets affixed to the building structure.

.6 Clamp the guides to the bracket with clips.

.7 Arrange each clip so as to resist a vertical force of less than 4500 N (1000 pounds) and so as to allow the rail to slide if the vertical force exceeds 9000 N (2000 pounds).

.8 Arrange the clips to prevent any horizontal movement of the rail.

.9 Extend rails to within less than 300 mm (12") and more than 150 mm (6") of the pit floor and to within less than 300 mm (12") and more than 150 mm (6") of the underside of the overhead slab.

.10 Use all standard length rails unless shorter lengths are required to avoid bracket locations or to complete the rail run at the top of the hoistway.

.11 Install and locate the rails so that joints do not interfere with the supporting brackets and clamps.

2.16 LIMIT SWITCH DOWELLING

.1 After the final limit switches are adjusted and prior to the performance of safety tests and checks by the inspecting authorities, fasten, by throughbolting or dowelling, the final limit switches and final limit switch brackets so as to minimize the possibility of future incorrect adjustment.

2.17 CAR FRAME

.1 Provide a car frame of steel channels and angles securely welded, bolted or rivetted and substantially reinforced and braced so as to relieve the car enclosure of all strains.

2.18 CAR PLATFORM

.1 Provide a car platform of sufficient size to accommodate the cab and to give the required inside net area assuming typical 50 mm (2") wall thickness and 180 mm (7")

for doors, sill and return.

.2 Provide a car platform with a structural steel frame filled with wood, aluminum or steel flooring having a depression to receive the finished floor.

.3 Mount the car platform on isolating pads to prevent the transmission of noise and vibration from the car frame to the car platform.

.4 Install the equipment in such a way that there is no direct metal connection between the car platform or the car cab and the car frame except metallic flex, where required, run in such a way as to provide vibration isolation.

2.19 CLASS C3 LOADING

.1 Arrange the elevator for Class C3 heavy concentration Loading.

.2 Provide a car platform, car sling, machine, hall door sills and other elevator components to sustain the static load imposed during loading and unloading.

.3 Provide elevator equipment to sustain and level 150% of the rated elevator capacity.

.4 Arrange the equipment to sustain and level 150% of the rated elevator capacity.

2.20 ROLLER GUIDES: CAR (TANDEM)

.1 Equip the car with roller guides mounted at both the top and the bottom of the car frame.

.2 Spring load or flexibly mount the roller guides.

.3 Provide tandem rollers of 150 mm (6") minimum diameter with polyurethane tread.

.4 Provide these rollers with prelubricated sealed ball bearings.

.5 Design the roller to secure good contact with the rail.

.6 Provide rollers true and free from deformations of the surface so as to provide a smooth and even ride of the elevator.

.7 Grind the rollers within a tolerance of 0.05 mm (0.002") total indicator reading.

2.21 ENTRANCES

.1 Provide entrances consisting of frames, jambs, sills, sill support angles and brackets, struts, headers, fascias, toe guards, and sight guards and doors of approved design

and size complete with guides and bumpers and all other items necessary to provide a completed installation.

.2 Construct the doors of sheet steel a minimum of 1.3 mm (18 gauge) thick.

.3 Provide nickel-silver sills with buffed finish.

.4 Reinforce the sills so they can sustain a point load equal to the rated load of the cab.

.5 Provide a stainless steel finish for the frames and the door panels.

2.22 ENTRANCE: FIRE RATING

.1 Provide entrances bearing a 1.5 hours fire rating approved by authorities having jurisdiction.

.2 Provide a closure, including interlock mechanism and associated wiring, capable of operating for a period of at least one hour when the assembly is subjected to the standard fire exposure tests.

2.23 ENTRANCES: DOOR HARDWARE

.1 Supply hoistway door hardware consisting of door hangers and tracks, interlocks, door closers, relating mechanism, operating linkages, gibs, and all other hardware necessary for the installation and operation of the hoistway doors.

.2 Supply, for each sliding panel, sheave type, two point suspension hangers.

.3 Supply sheaves not less than 75 mm (3") in diameter with ball bearings, properly sealed to retain grease lubrication, and mounted on stands arranged for direct attachment to the panels.

.4 Equip hangers with adjustable ball bearing rollers to take the up-thrust of the doors.

.5 Arrange the tracks and sheaves so that there is no metal to metal contact, and so that the doors operate properly without any regular lubrication.

.6 Design all door hardware for a minimum of noise.

2.24 ENTRANCE INSTALLATION

.1 Assume undivided responsibility for the entire installation of the entrances.

.2 Handle, store, protect, install the entrances and associated equipment.

.3 Set door frames in perfect alignment with the elevator car platform.

.4 Fasten frames and headers to structural supports.

.5 Set frames and sills in place prior to building walls.

.6 Install frames within 1 mm (0.04") of plumb and sills within 2 mm (0.08") of level over the entrance width.

.7 Fasten frames securely at the sill and header.

.8 Fasten sills securely to the building structure by means of a support angle or substantial brackets.

.9 Install struts, fascias, toe guards and other associated equipment required to complete the installation of the entrances.

2.25 FASCIAS

.1 Provide fascias from the header of one entrance to the sill of the entrance above for the complete travel of the elevator including any express zone.

.2 Provide fascias extending below the sill of the lowest landing and above the header of the highest landing.

.3 Provide fascia plates extending on each side at least 80 mm (3") beyond the clear openings.

.4 Provide fascia plates of sheet steel of minimum 1.5 mm (16 gauge) thickness.

.5 Reinforce fascia plates properly.

.6 Provide all necessary supports required to secure fascia plates in place.

2.26 DOOR FRICTION

.1 Adjust the doors so that with the door closing device disconnected, the doors can be started into motion, from any position, with a force of less than 25 newtons (six pounds) per door panel applied horizontally at the mid-point of the door in line with the direction of movement of the door.

2.27 DOOR EQUIPMENT DOWELLING

.1 After the hangers, interlocks, relating devices, door operating clutches, rollers and other door equipment have been correctly adjusted, install dowels or pins to prevent

movement or unauthorized readjustment.

2.28 FLOOR MARKING: HOISTWAY

.1 Identify each landing by means of markings on the inside of the hoistway.

.2 Place these markings so that people in a stalled elevator will be able to readily see the floor marking upon opening partially the car door.

.3 Use a stencil to ensure that the floor markings are neat and uniform in appearance.

.4 Provide numerals and letters approximately 100 mm (4") high and of a clearly contrasting colour to the colour of the doors and fascias.

2.29 CAB DESIGN

.1 Provide a cab in accordance with the Drawings issued by the architect and including the following:

.1 a metal shell allowing the use of the elevator without any other wall covering;

.2 a nickel-silver car sill with buffed finish;

.3 a floor level with the car sill;

.4 a car door, front return and transom in stainless steel;

.5 light fixtures providing a minimum illumination of 200 lux to the buttons, the floor and the door sill;

.6 pad hooks for protective pads.

.2 Provide all components and accessories necessary for a complete installation, including mounting straps, stay plates, base and soundproofing material.

.3 Arrange for the installation of the car fixtures.

.4 Submit for review drawings showing the design and the cab finish.

.5 If a portable ladder is provided for accessing the car top (see 2.31):

.1 Provide, in the cab, next to the car top emergency exit panel, means for supporting a portable car top access ladder.

.2 Provide supporting means that will secure the ladder in place and prevent the

ladder from tipping or falling.

.3 Install the supporting means so as to have the ladder touching the floor when the ladder is secured in place.

.6 If a suspended ceiling is provided in the cab:

.1 Provide a movable section in the suspended ceiling that when moved allows unobstructed access to the car top emergency exit panel and allows for unobstructed use of the car top access ladder and ladder supporting means.

.2 Restrain the movable section of suspended ceiling from falling.

.3 Maintain a minimum clear headroom of 2030 mm (80") in the cab.

.4 Do not install lamps within the movable section of suspended ceiling that could shatter during moving.

.5 Provide a robust design for the movable section of suspended ceiling that is intended for regular use.

.6 Provide vibration isolation to eliminate any rattling or chatter between adjacent parts.

.7 Provide a straightforward method of moving the section of suspended ceiling (without requiring tools) that allows access to the car top emergency exit panel.

.8 Provide a method of securing the movable section of the suspended ceiling in the closed position.

.9 Provide a method of securing the movable section of the suspended ceiling in the open position.

.10 Ensure that the moving component does not interfere with any cab equipment, cab fixtures or the cab enclosure itself throughout the range of motion required.

2.30 CAR TOP EMERGENCY EXIT PANEL

.1 Provide a hinged car top emergency exit panel having minimum dimensions of 700 mm (27.5") by 500 mm (19.75").

.2 Arrange the car top emergency exit panel to open towards the elevator car top (i.e. away from the cab interior).

.3 Provide a method of securing the car top emergency exit panel in the open position.

.4 Install the car top emergency exit panel clear of other equipment such that the panel can be freely opened and closed.

.5 Install the car top emergency exit panel in a location where there is space available for standing adjacent to the panel when it is in the open position.

.6 Arrange that the car top emergency exit panel can be opened from the top of the car without the use of a key.

.7 Arrange that the car top emergency exit panel can be opened from within the car by a spring return cylinder-type lock and arrange that the key type is of Group 1 Security.

2.31 CAR TOP ACCESS LADDER

.1 Provide either a fixed or portable ladder inside the elevator cab for accessing the car top.

.2 If a portable ladder is supplied, provide a storage space in the machine room to store the ladder when not in use.

.3 Provide a ladder having the following characteristics:

.1 Equipped with rungs, cleats, or steps at least 400 mm (16") wide spaced 300 mm (12") - the width can be reduced to a minimum of 225 mm (9") if required by the elevator contractor.

.2 Providing a clear distance of not less than 115 mm (4.5") from the centerline of the rungs, cleats, or steps to the nearest permanent object in back of the ladder.

.3 Having a clear distance of not less than 115 mm (4.5") from each side rail centerline (if provided) to the nearest permanent object.

.4 Capable of sustaining a load of 135 kg (300 lb).

.5 Extending not more than 300 mm (12") from the cab floor.

.6 Extending not less than 1070 mm (42") above the car top emergency exit panel.

2.32 CAB INSTALLATION

.1 Assume undivided responsibility for the entire installation of the cab.

.2 Handle, store, protect and install the cab and all associated equipment.

.3 Install the elevator cab on the platform plumb and in alignment with the hoistway

entrances.

.4 Sound isolate the cab from the car frame.

.5 Provide additional material and labour as required for handling, storing and installing the cab so as to provide a complete job.

2.33 CAR STATION

.1 Provide one car station.

.2 Provide in the station the devices required for normal automatic operation, including the following:

.1 Floor push buttons;

.2 Door open button;

.3 Door close button;

.4 Phone button.

.3 Number the car call buttons to correspond to the floor served.

.4 Provide in conjunction with the car buttons a call registered light for each button to be lighted when the button is pressed and extinguished when the car stops at the selected floor.

.5 Arrange that, when a car button is pressed, an audible tone is generated having an adjustable volume level of between 55 and 70 decibels, as measured from within the elevator cab.

.6 Provide, only when required by the prevailing codes, a stop switch, arranged to stop the elevator and to duplicate the functions of the alarm button.

.7 Provide a locked service cabinet, located below the main car station, containing those devices, other than those used for normal automatic operation, required for the various control features, including the following:

.1 Light switch;

.2 Fan switch;

.3 Emergency lighting test switch.

.8 Engrave the car station with markings and signage such as car capacity, elevator

number, switch function and other markings required by the prevailing codes and local regulations.

2.34 CAR POSITION INDICATOR: DIGITAL READOUT

.1 Provide a digital car position indicator mounted above each car station.

.2 Arrange the indicator to display a number or symbol at least 50 mm (2") high.

.3 Indicate the position of the car at all times, corresponding to the landing through which the car is passing or at which it is stopped.

.4 Provide a segmented display using light emitting diodes with a minimum of 16 segments per character.

.5 Arrange the circuits so as to provide continuous indication of car position.

.6 Overlapping dual indication, when the elevator is between floors, is acceptable.

2.35 CAR SIGNAL LIGHTS

.1 Provide LED car position indicators and car call registered lights having a minimum contrast ratio of 8:1 throughout a life expectancy greater than 100,000 hours.

.2 The contrast ratio is to be determined by subtracting the brightness of the indicator background from the brightness of the marking and then dividing the result by the brightness of the background.

.3 Arrange that the variation in intensity and contrast ratio between position indicators within the car does not exceed 5 percent.

.4 Arrange that the variation in intensity and contrast ratio between car call registered lights within the car does not exceed 5 percent.

.5 All measurements are to be made in the normal ambient light of the cab.

2.36 OVERLOAD DETECTOR

.1 Provide elevator cab load-weighing devices, associated control software and in-car signalling equipment to provide an audible and visible overload warning.

.2 Arrange that the cab load-weighing devices and associated control software activate the in-car overload signalling equipment when 100 percent of rated elevator capacity is reached.

.3 Prevent the elevator from operating until the elevator cab load is decreased to a value below the overload threshold.

.4 Provide a light with visible text 'Overloaded Elevator' which illuminates and an audible warning which sounds when an overload condition exists.

.5 Extinguish the light and silence the audible warning when the overload condition no longer exists.

2.37 CAB VENTILATION: FAN MOUNTED ON CAR ROOF

.1 Provide an exhaust fan capable of developing 30 Pa (0.004 psi) static pressure differential with a minimum capacity of 200 L/s (450 cfm) with the elevator traveling at rated speed.

.2 Provide a three speed motor for the fan with the speed control located in the car operating panel (in the service cabinet if provided).

.3 Mount this fan on the cab roof outside of the perimeter of the emergency exit

.4 Protect the fan against damage.

.5 Provide neoprene isolators to minimize noise and vibration.

.6 Arrange that the noise level caused by the fan, measured in the car with the fan running, does not exceed 54 dBA assuming a maximum ambient noise level of 50 dBA.

2.38 EMERGENCY LIGHTING

.1 Provide a back-up battery power system for emergency cab lighting and car emergency signaling devices.

.2 Provide a lighting level of at least 11 lux of illumination at the car operating panels for a minimum period of four hours, using at least two lamps of equal rating.

.3 Cause the lamps to be immediately energized in the event of a power failure or electrical fault deenergizing the normal elevator lighting circuit.

.4 Provide for the automatic disconnection of the lamps and the automatic recharging of the lighting unit when normal power is restored to the elevator lighting circuit.

.5 Provide a rechargeable battery of the hermetically sealed type, or of a type which provides a reserve of electrolyte, capable of operating unattended and requiring no addition of water or electrolyte for a period of not less than three years, with provision for visual checking of the electrolyte level without opening the battery or removing caps

or fittings.

.6 Arrange the battery charging to operate automatically upon restoration of normal power to the unit, to remain in operation until the battery is fully recharged and to maintain the battery at full rated capacity at all times when the unit is not in operation.

.7 Provide a pilot lamp to indicate that the normal power supply to the unit and battery charging is in operation.

.8 Arrange that the unit can be conveniently tested and operated manually.

.9 Install the unit as part of the car so that it is not readily removed.

.10 Do not provide portable equipment.

.11 Install the lamps in the car station and protect them with a lens installed flush with the car station face plate.

.12 Provide an emergency lighting test switch in the car service cabinet or behind the car swing return.

2.39 CAR POSITION ANNUNCIATOR

.1 Provide automatic verbal announcement to announce the floors.

.2 Provide a unit to meet the requirements of the latest edition of the Code.

.3 Provide a keyswitch in the cab service cabinet (or in the car operating panel if no service cabinet is provided) to allow switching the unit on and off.

.4 Provide means to adjust the volume over a range from 55 and 70 decibels.

.5 Provide messages in French, then in English, delivered in a clear audible manner similar to radio news presenters.

2.40 TELEPHONE: HANDS-FREE OPERATION

.1 Provide a hands-free telephone with automatic dialer capable of initiating and receiving calls.

.2 Integrate the telephone into the car station.

.3 Provide a push button to initiate the telephone connection.

.4 Arrange that the telephone connection can be initiated by an external call.

.5 Provide an indicator light to confirm that communication has been established.

.6 Pierce the car station for the push button and indicator light with the indicator light mounted flush with the panel.

.7 Provide a speaker/microphone for communication.

.8 Pierce the car station in front of the speaker with multiple holes 3 mm (1/8") in diameter to allow passage of sound to and from the speaker.

.9 Identify the telephone and the button with a raised symbol and Braille.

.10 Provide wiring for the telephone from the cab to the machine room.

.11 Connect the wiring on the car to a terminal block mounted in or adjacent to the telephone box.

.12 Terminate the wiring in the machine room at a separate enclosed external terminal block mounted on the controller.

.13 Provide the terminal block and its enclosure and locate it so that personnel other than elevator mechanics can easily run their conduit and wiring to these terminals without interfering with or touching the elevator wiring or controls.

.14 Where more than one controller is in a common machine room bring wiring to one common terminal block.

.15 Clearly mark the terminal block.

.16 Provide wiring of the twin conductor shielded type with grounded shields.

.17 Provide equipment and wiring compatible with and acceptable to the telephone company providing service to the project.

2.41 IN CAR LANTERNS AND GONGS: PIERCED

.1 Provide in car lanterns complete with electronic gongs at each side of the elevator cab entrance to indicate the future direction of the elevator.

.2 Pierce the cab entrance columns for the lanterns in lieu of applied fixtures.

.3 Arrange the lanterns and circuits so that as the car doors start to open in response to a call, the lanterns illuminate and the gong strikes.

.4 Sound the gong once to indicate the up direction and twice to indicate the down direction.

.5 Maintain the lantern illuminated until the car has stopped and the door open time has elapsed.

.6 Do not illuminate the lantern on a door re-open unless the re-open is caused by a reversal of direction of travel of the car.

.7 Arrange the operation of the lanterns and gongs to comply with requirements for the handicapped.

.8 Provide LEDs for illumination.

.9 Design the fixture so that the lamps may be readily changed. Do not mount any equipment to the covers; arrange that the covers can be removed completely without disturbing the electric wiring.

2.42 PROTECTIVE PADS

.1 Provide one set of protective pads covering all exposed wall surface, attached to inconspicuous pad hooks at the top of the cab and reaching to within 100 mm (4") of the car floor.

2.43 CAR DOOR EQUIPMENT

.1 Provide car door header, hangers and tracks, door closers, door electrical contacts, master door operators, and all incidental devices necessary for the correct operation of the doors.

.2 Provide, for each sliding car door panel, sheave type, two point suspension hangers.

.3 Provide sheaves not less than 75 mm (3") in diameter with ball bearings, properly sealed to retain grease lubrication, and mounted on stands directly attached to the panels.

.4 Equip hangers with adjustable ball bearing rollers to take the up-thrust of the doors.

.5 Arrange the tracks and sheaves so that there is no metal to metal contact, and so that the doors operate properly without any regular lubrication.

.6 Design all door equipment and associated components for a minimum of noise.

2.44 CAR AND HOISTWAY DOOR SAFETY RETAINERS

.1 Provide safety retainers at the top and bottom of horizontally sliding doors to retain the closed door panel in position if the primary guiding means fail.

.2 Provide retainers that will prevent the displacement of the door panel top and bottom by more than 20 mm (0.8") when the door panel is subjected to a force of 5 000 N (1130 lbf) applied towards the hoistway at right angles to the panel over an area of 300 mm by 300 mm (12" by 12") at the centre of the panel.

.3 Provide retainers that will withstand, without detachment or permanent deformation, a force of 1 000 N (225 lbf) applied upward at any point along the width of the door panel together with an additional concurrent force of 1 100 N (250 lbf) applied at right angles to the door at the centre of the panel over an area of 300 mm by 300 mm (12" by 12").

.4 Arrange that the retaining means are not involved in the guiding of the panel and are not subjected to wear or stress during normal door operation.

2.45 DOOR OPERATOR

.1 Provide a door operator to open and close the car and hoistway doors simultaneously, capable of moving the door panels from the closed position to within 70 mm (3") of the fully open position at an average speed of not less than 700 mm (28") per second.

.2 Provide either:

.1 An alternating current motor, either standard or linear induction type, with associated variable voltage and variable frequency solid state drive to control the speed and torque of the door operator, or;

.2 A direct current motor with associated solid state drive to control the speed and torque of the door operator.

.3 Design the door operator and associated components for a minimum of noise.

.4 Provide GAL MOVFR or approved equivalent.

2.46 DOOR OPERATOR FEEDBACK SPEED CONTROL

.1 Provide a solid state door operator control incorporating negative feedback circuits for position, acceleration, velocity and torque.

.2 Provide an output from the door control for a pre-start command to the elevator speed control system.

.3 Provide a serial input to the door control to allow adjustment of speed, acceleration, torque and pre-start point using a notebook computer.

.4 Adjust the door closing speed to an average of 300 mm (12") per second, respecting the parameters for door force and door inertia as set out in the elevator code.

.5 Adjust the door opening speed to an average of 700 mm (28") per second.

.6 Provide, either in the door operator control or in the main elevator control, means to automatically recycle the doors in the event that they stall during the opening or closing operations

2.47 DOOR REOPENING DEVICE: MULTIPLE BEAMS

.1 Provide a multiple infra-red beam door reopening device.

.2 Design and locate the receivers and emitters so that the active area of the door opening, i.e. the full width and from within 25 mm (1") of the floor to a height of 1800 mm (6'), is protected, such that a person or object passing through the car entrance causes the doors to re-open.

.3 Position the receivers and emitters at least 25 mm (1") back from the leading edge of the door.

.4 Provide logic control to ensure that each receiver receives light from every emitter.

.5 Arrange that if the system fails to provide protection over the active area of the door opening, the elevator will park at the current floor with its doors open and the lights off, or the system will go over to nudging operation.

.6 Provide a signal on the unit or in the machine room to indicate that a failure has occurred.

.7 Should a door protective device be operated continuously for more than 20 seconds after the elapse of the normal door open time, cause the doors to go over to nudging operation.

.8 Arrange the nudging operation as follows:

.1 Cause the doors to close slowly under reduced power;

.2 Operate a buzzer in the car panel as a warning to the person obstructing the door;

.3 Cause the 20 seconds to be reduced to 6 seconds until a normal door cycle is performed.

.9 Supply a device, reliable and consistent in operation, not affected by dust or temperature changes, and having inherent long term reliability with minimum maintenance.

2.48 CAR INSPECTION DEVICES

.1 Provide, on the top of the car, a fixed lamp receptacle, with switch, outfitted with wire clamp guards, and a GFI duplex receptacle with safety ground connection.

.2 Provide, on the top of the car, an inspection station consisting of an emergency stop button, up, down and common inspection running buttons, on-off switch for the door operator and other devices necessary for top-of-car inspection operation.

2.49 HALL PUSH BUTTON STATIONS: SINGLE RISER

.1 Provide a single riser of hall push button stations.

.2 Provide one station for each floor.

.3 Provide at the intermediate floors, for each station, up and down push buttons located one above the other and call registered lights.

.4 Provide at the upper terminal and lower terminal, for each station, a single button and call registered light.

2.50 HALL STATION EMERGENCY RECALL SWITCH

.1 Provide in the main floor hall station a key switch for emergency recall operation.

2.51 MAIN FLOOR ELEVATOR MARKINGS

.1 Provide at the main floor, for each elevator designated as a Firefighter's Elevator, a suitable symbol such as a Firefighter's Hat.

.2 Provide at the main floor for each elevator a numeral indicating the number of the elevator.

.3 Provide markings as selected by the Owner.

.4 Provide samples for review.

2.52 ENTRANCE FLOOR MARKINGS

.1 Provide, on each hall entrance jamb, raised tactile and braille metallic markings to designate the floor in accordance with the Code.

2.53 HOISTWAY ACCESS SWITCH

.1 Provide a hoistway access switch in accordance with the Code.

.2 Locate the switch in the entrance frame or in the sight guard in an inconspicuous place.

2.54 ELECTRIC WIRING

.1 Provide wiring required to interconnect the equipment.

.2 Provide copper wire.

.3 Provide insulated wiring having a flame retarding and moisture resisting outer cover.

.4 Where flexible conduit is used, supply it in aluminium.

.5 Provide travelling cable to connect car operating panels and other car operating devices to the controller.

.6 Where shielded wire is specified, provide wire of not less than 0.52 mm^2 area (20 gauge) having individually shielded pairs with 100% shielding.

.7 Provide colour or number coded wires in multiwire cables.

.8 Provide waterproof terminal labels.

.9 Provide stranded field wire except for the individual wires in multiwire cables which may be either stranded or solid.

.10 Provide, if required by the inspecting authorities, additional disconnect means or stop switches and associated wiring.

2.55 TRAVELLING CABLE

.1 Provide travelling cables with flame-retarding and moisture-resisting outer covers and stranded conductors.

.2 Supply cables approved for elevator use.

.3 Provide in the travelling cables:

.1 14 AWG (1.5 square mm) conductors for constant current-carrying circuits;

.2 18 AWG (0.75 square mm) conductors for signal circuits;

.3 20 AWG (0.5 square mm) shielded pair conductors with shielding for

telecommunications circuits and data circuits;

.4 Coaxial cable for closed-circuit television;

.5 62.5/125 micron tight-buffered multimode optical fibre conductor.

.4 Provide ten percent additional minimum spare signal and current-carrying wires in each cable.

.5 Terminate cables using terminal blocks or suitable connectors having identifying numbers to facilitate replacement and service.

.6 Suspend light weight cables using a wire mesh sleeve to relieve strain in the individual conductors and heavier cables using a steel supporting strand if the suspended weight exceeds 35 kg (seventy-five pounds).

2.56 ELECTRIC WIRING INSTALLATION

.1 Install wiring in accordance with the prevailing codes.

.2 Run the wire in metal conduit, duct or electrical metallic tubing.

.3 Connect remote alarms, indicators and other similar items from the device to terminal blocks mounted on the controller or selector.

.4 Provide a separate junction box with terminals for the connection of 'non-elevator' devices, such as telephones and connect from the elevator controller to this junction box as required.

.5 Mount this junction box on the side of one controller in the machine room, or at some designated point in the hoistway conveniently located for the external connections to be made.

.6 Connect spares and shielded wires continuously from the point of origin to destination using car, hoistway, controller or other terminal blocks as necessary.

.7 For shielded wires use compatible connectors or terminal blocks designed to minimize signal deterioration.

.8 Check wires, including spares, for continuity and grounds.

.9 Mark each wire by a number and each group as to destination.

.10 Mark connections on intermediate terminal blocks with corresponding numbers.

.11 Mark individual wires by numbered adhesive waterproof markers.

.12 Label groups of wires and multiwire cables with waterproof markers.

.13 Mark terminals with waterproof labels.

.14 Make no splices.

.15 Attach waterproof, neat, legible lists, showing wiring runs, colour codes and number codes, to the controller.

PART 3 - EXECUTION

3.1 OPERATION: SELECTIVE COLLECTIVE

.1 Provide a micro-processor based automatic selective collective without attendant operation for the control of the elevator.

3.2 OPERATION: CALL INITIATION

.1 Control the elevator automatically by buttons in the car, marked to correspond with the respective landings served, and by the call buttons at the landing stations.

.2 Register a call by momentary pressure of a button.

3.3 OPERATION: INDEPENDENT SERVICE

.1 Provide independent service.

.2 On independent service:

.1 Remove the car from the automatic supervisory control system;

.2 Arrange the circuits so that the car does not respond to hall calls;

.3 Render the hall lanterns (if provided) inoperative;

.4 Cause the car to park with its doors open;

.5 Arrange the controls so that the car responds to any car calls registered if a button is held until the doors are closed and the interlocks made-up;

.6 Cause the doors to reopen if the button is released at any time up to the point at which the elevator starts to move;

.7 Render inoperative the normal door protective devices;

.8 Arrange the controls so that the attendant can select direction of travel;

.9 Cancel all registered car calls when the direction reverses or a car call is answered.

3.4 OPERATION: DOOR PROTECTIVE DEVICE

.1 Arrange the door protective device so that, should it detect a person or any object in its path, at any point during the door closing operation, it will cause the doors to return to the open position.

.2 Adjust both the detection device and the door operation so that an object or person in the way of the door will cause the doors to reverse without the door panel of either hall or car doors actually striking the object or person.

3.5 DOOR OPEN PAUSE TIME

.1 Arrange the circuits so that when the car is stopped in response to a hall call the doors remain open a predetermined length [approximately 5 seconds for an elevator whose entrances are within 3 meters (10') of the hall push button and approximately 6 seconds for an elevator whose entrances are further than 3 meters (10') from the hall push button].

.2 Arrange that this predetermined length of time is reduced to approximately 0.7 seconds if a person moves through the entrance (as indicated by the actuation of the door protective device).

.3 Unless otherwise specified (e.g. to allow for advance hall lantern warning), arrange the circuits so that when the car is stopped in response to a car registered call the doors remain open a predetermined length of time (approximately 3 seconds).

.4 Make the times separately adjustable over a range from 0.25 seconds to 15 seconds.

.5 Arrange the circuits so that the door open pause time is cancelled if a car call button is pressed or the door close button is pressed.

3.6 DOOR PROTECTIVE DEVICE BY-PASS (NUDGING)

.1 Initially, render inoperative the door reopening device only when required by Code (emergency recall).

.2 Provide the following characteristics, that can be rendered operative by changing the settings, without modifications to the equipment, if required by the owner:

.1 Should a door protective device be operated continuously for more than 20 seconds after the elapse of the normal door open time, cause the doors to close slowly under reduced power and operate a buzzer in the car panel as a warning to the person obstructing the door.

.2 Cause the 20 seconds to be reduced to 6 seconds until a normal door cycle is performed.

3.7 NOISE LEVEL: DOOR OPERATION

.1 Arrange the equipment so that the noise level, as measured within the cab, does not exceed 60 decibels at any time during a full door open, door close and door reversal cycle.

.2 Initiate the door reversal by triggering the door protective device.

.3 Measure the noise level using an ANSI type 2 sound level meter on the "A" scale with an "F" response.

3.8 NOISE LEVEL: CAB

.1 Arrange that, with the elevator travelling from one end of the hoistway to the other, the noise level as measured within the elevator cab does not exceed 55 decibels (assuming an ambient noise level at least 50 decibels).

.2 Measure this noise level with an ANSI type 2 sound level meter on the "A" scale with an "F" response.

3.9 NOISE LEVEL: MACHINE ROOM

.1 Design the equipment so that the noise level with the elevator running, as measured by a meter positioned in the center of the machine room, does not exceed 85 decibels.

.2 Measure this noise level using an ANSI type 2 sound level meter on the "A" scale with an "S" response.

3.10 LEVELLING

.1 Cause the car to stop automatically at floor level, without overshoot, regardless of load or direction of travel so that the car sill is level, within 6 mm (1/4"), with respect to the hoistway sill.

.2 When the elevator cab is stopped at a floor, correct for over travel or under travel or movement of the cab away from the floor, by returning the car imperceptibly to floor

level.

3.11 SPEED CONTROL: HYDRAULIC

.1 Provide a speed control system of the hydraulic-electric type in which control is accomplished by varying the oil flow to and from the hydraulic jack.

.2 Design and adjust the equipment and control so that an average acceleration over the total accelerating period of not less than 0.06 gravity is maintained and the acceleration peaks do not exceed 0.2 gravity.

.3 Arrange the equipment to run full load up within 5 percent of the rated speed under, and under any other condition of loading, except the case of overload.

3.12 OPERATING TIME

.1 Adjust the equipment so that the elapsed time to travel one typical floor does not exceed the time shown in the table above.

.2 Measure this time under the following conditions:

.1 A typical floor height of less than 2000 mm (6'-6");

.2 Floor levelling accuracy of ± 6 mm (1/4");

.3 Start time when the fully opened doors begin to close and stop time when the car is stopped level with the next floor and the car and hall doors are 800 mm (32") open;

.4 Time measured with full load in the car and in both directions of travel;

.5 Power door operation for the hall and car doors conforms to the elevator code requirements.

.3 Adjust the equipment so that the operating time is compatible with dependable, consistent operation without undue wear or excessive maintenance and so that this operating time can be readily maintained over the life of the elevator installation.

.4 Adjust the equipment so that, with the control functioning so as to give the required time, the elevator operates under smooth acceleration and retardation and provides a comfortable and agreeable ride.

3.13 EMERGENCY LOWERING: BATTERY OPERATED

.1 Provide battery operated emergency lowering.

.2 Provide, as a minimum, sufficient battery power to perform the following cycle of operation five times within a 30 minute period:

.1 Close the elevator doors;

.2 Run the car to the bottom floor;

.3 Open the doors;

.4 Close the doors.

.3 Cause the emergency lowering operation to be implemented in the event of a power failure or electrical fault de-energizing the normal elevator power supply.

.4 Under emergency lowering conditions cause the elevator to close its doors and travel down, without stopping, to the bottom floor, open its doors, and after the normal door open time has elapsed, close its doors and remain parked at the lowest floor.

.5 On emergency lowering operation, maintain operational all of the normal safety devices including door open buttons, and door protective devices.

.6 Provide for the automatic termination of the emergency lowering operation and the automatic recharging of the battery when normal power is restored.

.7 Provide a rechargeable battery of the hermetically sealed type, or of a type which provides a reserve of electrolyte, capable of operating unattended and requiring no addition of water or electrolyte for a period of not less than three years, with provision for visual checking of the electrolyte level without opening the battery or removing caps or fittings.

.8 Arrange the battery charging means to operate automatically upon restoration of normal power, to remain in operation until the battery is fully recharged and to maintain the battery at full rated capacity at all times when emergency lowering is not in operation.

.9 Provide a pilot lamp to indicate that the normal power supply and battery charging are in operation.

.10 Provide means for convenient manual operation and testing.

3.14 FIREFIGHTERS' EMERGENCY OPERATION

.1 Provide Firefighters' Emergency Operation including:

.1 Phase I automatic Emergency Recall Operation;

.2 Phase II Emergency In-Car Operation.

END OF SECTION