



**Design, Fabrication, Supply, Installation &
Commissioning of Passenger Lift
for ITMT Building
at
CREST, Hosakote**

**Indian Institute of Astrophysics
Bangalore**

October 2017

Annexure - I

1. Introduction

The required passenger lift as per Table-1 will be installed I-TMT building at CREST campus of IIA, Hosakote, Bangalore. The technical specifications of passenger lift are given in tender document. The detailed view of the I-TMT building where the lift will be installed is as shown in annexure-II

2. Type of lift

8 Passenger lift with machine room.

3. Service condition

The proposed passenger lift will be installed close to a class 1,00,000 clean room. Hence any part of the lift material should not become the source of contamination to hamper the integrity of the clean room facility. The design of the elevators shall take into consideration fire prevention, elimination of dust and dirt traps, and easy accessibility for cleaning and routine maintenance .

Ambient Temperature & Relative Humidity : 4 Deg C(Min)- 50 Deg C(Max) & up to 95% RH

4. Scope of Supply

Scope of work: Design, Fabrication, Supply, Installation, Commissioning, packing, forwarding, transportation to I-TMT site, unloading, furnishing of final drawings and manuals ,handling at site, performance demonstration and performance acceptance etc. of 8 passenger capacity lift (AS PER THE TABLE 1), , to make the system complete in all respects and required civil work as per technical Specification & as per the tender document.

Table-1

CAPACITY (kgs)	8 persons.
SPEED (mps)	1 mps
RISE (m)	11.55m
STOPS	3 Stops With (all opening on the same side)
CONTROLLER TYPE	ACD3-MR
DRIVE	VF Regenerative (Closed Loop)
POWER SUPPLY	400/415 Volts (3 Phase AC) / or as per man specs.
OPERATION	Full collective operation
MACHINE	PM Gearless (Located above shaft)
TRACTION MEDIA	Flat Coated Steel Belt / or as per manufacturers specification
CAR FINISH	· Rear Panel =SS Hairline finish
	· Side Panels = SS Hairline finish
	· Front Panels = SS Hairline finish
FALSE CEILING TYPE	metallic with LED light fixtures
FLASE CEILING FINISH	Black Powder coated
VENTILLATION	Cross flow fan
HAND RAILS	Stainless Steel Mirror Finish Handrails on rear car panels
FLOORING	Heavy duty Vinyl Tiles
CAR DOOR FINISH	Stainless steel - Hairline finish
LANDING DOORS FINISH	Stainless steel - Hairline finish
FIRE RATED DOORS	Fire rating-60mins
HOISTWAY DIMENSIONS (W x D - mm)	2.0 m x 2.0m
CAR DIMENSIONS (W x D x H - mm)	As per manufacturer specs
CAR & HOISTWAY DOOR TYPE	Central opening (CO) doors
DOOR OPENING (W x H - mm)	800 mm W x 2100 mm H
DOOR OPERATOR	DC Door Operator
COP	Gien Buttons in Stainless Steel #4(Hairline)
CAR POSITION INDICATOR	(RED LED) Scrolling Display
HALL FIXTURES	to
HALL FIXTURE FACE PLATE	Stainless Steel #4(Hairline)
HALL BUTTON ARRANGEMENT	Hall Button with HPI
STANDARD FEATURES	Anti-nuisance Car Call Protection, Independent Service (for Duplex only), Overload Device, Nudging, Emergency

	Firemen's Service, Emergency Car Light Unit, Infrared Curtain Door Protection, Door Time Protection, Emergency Alarm Button, Extra Door Time of Lobby & Parking, Door Open/Close Button, Manual Rescue Operation, Belt Inspection Drive, Auto Fan Cut Off
OPTIONS REQUIRED	Automatic Rescue operation, Voice Synthesizer
OPTIONS REQUIRED	Mirror on rear side wall

Annexure - II

5. Standards

The following Indian Standard Specifications and Codes of Practice, currently applicable and updated as of date irrespective of dates given below, shall apply to the equipments and the work covered by this contract. In addition the relevant clauses of the Indian Electricity Act 1910 and Indian Electricity Rules 1956 as amended up to date shall also apply. Wherever appropriate Indian Standards are not available, relevant British and/or IEC Standards shall be applicable

1. Code of Practice for installation, operation and maintenance of electric passenger & goods lifts. IS-14665 (Part 2) Sec-1 :2000
2. Code of practice for installation, operation and maintenance of electric service lift. IS-14665 (Part 2) Sec-2 : 2000
3. Safety Rules Section-1 Passenger and Good lifts IS-14665 (Part 3) Sec-1 : 2000
4. Safety Rules Section-2 – Service Lifts IS-14665 (Part 3) Sec-2 : 2000
5. Outline dimension for electric lifts. IS-14665 (Part-1) : 2000
6. Inspection Manual for Electric Lifts IS-14665 (Part 5) : 1999
7. Electric Traction Lifts – Components
8. Installation And Maintenance of Lifts For Handicapped Persons (Code of Practice) IS-14665 (Part 4) Sec-1 to 9 :2001 IS 15330 :2003
9. Specification for lifts cables. IS-4289 (Par-1) : 1984 Reaffirmed 1991
10. Specification for hot rolled and slit steel tee bars. IS-1173-1978 Reaffirmed 1987
11. Method of loading rating of worm gear. IS-7443-1974 Reaffirmed 1991
12. Code of practice for selection of standard worn and helical gear box. IS-7403-1974 Reaffirmed 1991
13. Isometrics screw threads. IS-4218-(Part-II)1976 Reaffirmed 1996
14. Degree of protection provided by enclosure for low voltage switchgear and control gear. IS-2147-1962

15. Classification of insulating materials for electrical machinery and apparatus in relation to their thermal stability in service. IS-1271- 1985 Reaffirmed 1990
 16. Code of practice for earthing. IS-3043-1987
 17. Electrical installation Fire Safety of Building. IS-1646-1997
 18. PVC insulated electric cable for working voltage up to and including 1100 volts.IS-694-1990
 19. Code of practice for electrical wiring and installation IS-732-1989
 20. PVC insulated (Heavy Duty) electric cables for working voltage up to and including 1100 volts. IS-1554-1988 (Part-1)
 21. Flexible steel conduits IS-3480-1966
 22. Accessories for rigid steel conduit for electrical wiring IS-3837-1976
 23. Boxes for the enclosure of electrical accessories IS-5133-1969 (Part 1)
 24. Guide for safety procedures and practices in electrical work. IS-5216-1982 (Part-1)
 25. Conductors for insulated electric cables and flexible cordes IS-8130-1984
 26. Miniature Circuit Breakers IS-8828-1996
 27. Rigid steel conduits for electrical wiring (Second revisions) IS-9537-1981
 28. Methods of test for cables IS-10810-1998
 29. Earth Leakage Circuit Breakers. IS-12640-1988
 30. Moulded Case Circuit Breakers IS-13947-1993
 31. General requirement for switchgear and control gear for voltage not exceeding 1000 volts.IS-13947-1993
 32. 1100 volt grade XLPE insulated armoured cables IS 7098
 33. Specifications for hoistway door-locks IS 7754-1975
 34. Rules for design, installation, testing and operation of lifts, escalators and moving parts.IS 1735-1975
- In addition the relevant clauses of the following, as amended upto date shall apply.
- The Indian Electricity Rules 1956
 - The Indian Electricity Act 1910
 - Fire safety regulations pertaining to lifts

The tenderers shall also take into account local and State regulations as in vogue for the design and installation of lifts.

6. Technical Specifications - General

1. GENERAL REQUIREMENTS

The Elevators shall include all elements conforming to specifications or as amended herein. Elevators covered by these specifications shall be provided, installed, tested, commissioned, certified and approved as per statutory requirements of Lift Inspectorate. Elevator shall have its own driving machine.

The method of drive shall be Electric Traction with Gear less motor having VVVF Control.

The design of the Elevators shall take into consideration fire prevention, elimination of dust and dirt traps, and easy accessibility for cleaning and routine maintenance.

2. ELECTRIC TRACTION DRIVE SYSTEM

2.1 Traction Machine

The construction of all Elevator machines shall conform with IS-14665

2.2 Brake

- a) The Electro-magnetic brake with non-asbestos lining shall be spring applied and electrically released type having noiseless operation.
- b) The brake shall be capable of stopping and holding the Elevator car in its downward travel to rest with 125% of its rated load from the maximum governor tripping speed. In this condition the retardation of the Car shall not exceed that resulting from the operation of the Safety gear or stopping on the buffer.
- c) Springs used to apply the brake shoes (two nos.) shall be in compression and adequately supported.
- d) Brake linings shall be of renewable incombustible materials and shall be secured to the brake shoes such that normal wear shall not weaken their fixings. Band brakes shall not be used.
- e) No earth fault, short circuit or residual magnetism shall prevent the brake from being applied in the event of loss of power supply to the Elevator motor and control circuit.
- f) A means of adjusting the brake plunger stroke and releasing the brake in emergency shall be provided.
- g) The Elevator machine shall be fitted with a manual emergency device capable of having the brake released by hand and requiring a constant effort to keep the brake open.
- h) The fail safe break shall incorporate an approved design of brake switch i.e. pick up, hold, discharge. Brake coil shall be wired in series & their respective switches in parallel. The operation of brake shall be thyristor controlled from solid state drive in order to effect minimum pick up time and synchronized start.

2.3. Driving Mechanism

2.3.1 Lift Machine

The lift machine shall be suitable for 415 volt 3 phase 50 Hz AC supply with a voltage variation of +10% and -20% and shall be placed directly above the hoist way on steel beams resting on machine room floor slab. The lift machine shall have high efficiency and low power consumption and shall be designed to withstand peak currents in lift duties.

Means for manual operation of the lift car shall be made by providing winding wheel suitably marked to indicate the direction of the movement to enable the lift car to be brought to the nearest landing. There shall be a warning display for switching off electrical supply before the manual operations.

2.4 Driving Sheaves

- a) The sheaves shall be manufactured in steel or SG iron and fitted with sealed for life lubricated bearings.
- b) The sheaves shall have machined rope grooves that can be reworked for future wear.
- c) Adequate provision shall be made to prevent any suspension ropes leaving groove due to rope slack or introduction of foreign objects.

2.5 Alignment

- a) The brake plunger, collar, sleeve, motor, sheaves and all bearings shall be mounted and assembled so that proper alignment of these parts is maintained.
- b) The assembly shall be reviewed and rectified when excessive noise is emitted during operation.

2.6 Gearless Machines

The gearless machine shall consist of a motor traction sheave and brake drum or brake disc completely aligned on a single shaft. Gearless machine shall be AC gearless with VVVF drive.

2.7 Anti-Vibration Supports

The whole traction machine shall be mounted on appropriate anti-vibration supports to minimize noise and vibration.

3. CONTROL SYSTEMS

3.1 Description

The Lifts shall have state of art microprocessor based AC variable voltage variable frequency (ACVVVF) drive. Some of the technical parameters required are innumerate below.

- a) Starting current 1.2 - 1.5 times full load running current
- b) Power saving 50 - 55%
- c) Leveling accuracy ± 3 mm
- d) Acceptable voltage fluctuation +10 to - 20%

The controller shall be mounted on the side of the top of lift shaft, vertical, totally enclosed cubicle type with hinged doors on the front provide easy access to all components in the controller. Cubicle shall be well ventilated such that the temperature inside never exceeds the safe limits of the components at ambient room conditions. The controller shall operate within the supply voltage variation of plus 10% to minus 20% of the nominal voltage.

The Controller shall be include protection against the following abnormalities and shall cut off the power supply, apply the brake and bring the car to a rest in the event of any of the abnormalities occurring.

- a) Over current
- b) Under voltage
- c) Overvoltage
- d) Single phasing
- e) Phase reversal
- f) Earth leakage

3.2 Features

Control system features are detailed as below.

• Attendant Operation

lift shall be provided with attendant control facilities. A key switch for change of operation mode shall be provided in a lockable recess panel on the car operation panel. After gaining control on the lift, the attendant can direct the car to stop at any storey. The attendant can also by pass the landing calls (but not cancel them) or reverse the direction of travelling.

• Automatic By-pass

Load weighing devices located either on car top or under the car cage shall be

provided for all lifts. Whenever the load exceed 60-70% of the capacity load of the lifts, the lifts shall ignore all landing calls and only respond to car calls.

- **Over load device**

A load weighing devices shall operate when the load in the car exceeds the rated capacity. The operation of the device shall activate buzzer sound and flashing 'overload' signals. At the same time the car doors shall be prevented from closing. When the excess load has been removed from the car, the buzzer alarm shall be muted automatically and the car shall function normally. The sensitivity shall be 30 kg for Passenger lift.

- **Automatic self-levelling**

All lifts shall be provided with automatic self-levelling feature that shall bring the lift car level to within ± 3 mm for passenger elevators of the landing floor regardless of load or direction of travel. The automatic self levelling feature shall correct for over travel and rope stretch.

- **Possible future requirement of access control and BMS integration of the controller.**

7. TECHNICAL SPECIFICATIONS - LIFTS,LIFT CAR, DOORS AND SAFETY DEVICES

1 CAR ENCLOSURES

1.1 General Requirements

- **Frame**

Every lift car body shall be carried in a steel car frame assembly which shall have sufficient mechanical strength to resist the forces applied by the safety gear or impact of the car on the buffers. The deflection of the steel members carrying the platform shall not exceed 1/1000 of their span under static conditions when the rated load is evenly distributed on the platform

At least four renewable guide shoes or shoes with renewable linings or sets of guides rollers shall be provided two at the top and two at the top and two at the bottom of the car frame assembly.

• Enclosure finishes

The car enclosure, doors etc. shall be as per Table-1 enclosed. The following are to be provided.

- _Alarm System : An emergency alarm buzzer, including wiring shall be provided and connected to a plainly marked push button in the car operating panel. The alarm bell shall be located in central security room. The alarm unit shall be solid state siren type, to give a waxing and waning siren when the alarm button in the car is pressed momentarily
- Sealed Maintenance Free Nickel Cadmium Batteries capable of maintaining the following in each lift for 2 hrs after mains failure.
- - Emergency light of adequate illumination in car
 - Car Ventilation
 - Intercommunication System
 - Alarm bell
- One no. 16 amp switch socket outlet to IP 54 and a permanent weatherproof type luminaries to IP54 (with lighting switch) adequately protected shall be provided on the top of the lift car for maintenance
- One no. 16 amp switch socket outlet to IP 54 at bottom of lift car for maintenance

1.2 Operation Panel

A full length car operating panel incorporating following control/indications shall be provided on the return panel

- LCD Illuminated touch push buttons of micro pressure type corresponding to the floors served at Ground floor and Inside Car. For Other floors LED Illuminated touch push buttons of micro pressure type to be provided.
- Door open and door close button
- Emergency stop button with Alarm
- Two position key operated switch for 'with attendant' and 'without attendant' operation.

- Ventilation fan ON/OFF switch with auto OFF when there is no call after 120 seconds (Two Speed & concealed vents).
- Built in intercom of the hands free type as well as space for providing EPABX telephone instrument and 5 pair telephone trailing cable to communicate from car to Two Locations i.e. Operator's Room (at remote location) & Security Guard Room and vice-versa.
- Dynamic car direction display
- Car position indicator (digital)
- Audio/Visual overload warning indicator
- Digital voice synthesizer (Optional) for announcing special messages with background music.

1.3 Landing fixture

The landing fixtures shall be recess mounted on a base junction box in the wall by the side or on top of landing doors as required. Each landing fixtures shall consist of micro touch type landing call buttons with illuminated call acknowledge signal and illuminated digital type car position indicators on separate stainless steel face panels with hairline finish.

2. CAR AND LANDING DOORS

2.1 General requirements

All car doors shall extend to the full height and width of landing opening unless otherwise specified and shall be operated with variable frequency door operator. A similar imperforate door shall be provided for every landing opening in the lift hoistway enclosure. The top track of the landing and car doors shall not obstruct the entrance to the lift cars. All car and landing doors shall have a fire resistance of not less than 1 hours. In addition, all the car and landing doors shall meet the following general requirements.

a) Car door locking devices

Every car door shall be provided with an electrical switch to prevent the lift car from being started or kept in motion unless the car door is closed. A mechanical locking

device shall also be provided to prevent door opening from inside the car whilst the car is in motion.

b) Landing door locking devices

Every landing door shall be provided with a mechanical locking device to prevent opening of the door from the landing side in normal cases unless the lift car is in that particular landing zone.

c) Projections and recesses

Sliding car and landing doors shall be guided on door tracks and sills for the full travel of the doors.

d) Door locking devices

All doors locking devices, door switches and associated actuating rods, levers or contracts, shall be inaccessible from the landing or the car.

e) Protective devices

Protective devices shall be fitted to the leading edges of both car door panels. It shall automatically initiate reopening 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. The obstruction of either leading edge when closing shall actuate the protective device to function.

f) "Door open" alarm

"Door open" alarm shall be provided in the car to initiate alarm and a continuous buzzer if a car or landing door has been mechanically kept open for a present period. The period shall be adjustable from 0-10 minute.

g) Emergency landing door unlocking devices and key

- Every landing door shall be provided with an emergency landing door unlocking device. When operated by an authorized person with the aid of a key to fit the unlocking triangle, the landing door shall be unlocked irrespective of the position of the lift car for rescue purpose. When there is no "unlocking" action, the key shall only be able to stay in the locked position.

- In the case of coupled car and landing doors, the landing doors shall be automatically closed by means of weight or springs when the car is outside the unlocking zone.

2.2 Door Hangers and Tracks

The car and the landing doors shall be provided with two point suspension sheave type hangers complete with tracks. Sheaves and rollers shall be steel with moulded nylon collar and shall include shielded ball bearings. Tracks shall be of suitable steel section with smooth surface. The landing doors shall be complete with headers, sills, frames etc. as required.

2.3 Lift Door Protection

Multiple-Infra red door protection and mechanical shoes shall be provided for lift to control door movement which shall cover the entire door opening effectively.

2.4 Protective Hand Rail in the Car (Optional)

2.5 CABIN FAN

A noiseless pressure fan shall be provided in the lift cabin.

3. HOIST ROPES

Hoist way material shall be non-flammable (02 hrs fire rated) except travelling cables which shall be flame resistant.

Lift Ropes – IS 14665 (Part 4 / Sec 8)-2001

Round strand steel wires ropes made from steel wire ropes having a tensile strength not less than 12.5 tonnes/cm² and of good flexibility shall be used for lift. Lubrications between the strands shall be achieved by providing impregnated hemp core. The lift ropes shall conform to IS 14665-(Part-4-Sec. 8):2001 and the required factor of safety shall be adhered to. The minimum diameter of rope for cars and counter weight of passenger and goods lift shall be 8mm.

Rope fastenings

The ends of lift ropes shall be properly secured to the car and counter weight hitch plates as the case may be with adjustable rope shackles having individual tapers babbitt sockets, or any other suitable arrangement. Each lift rope shackle shall be

fitted with a suitable shackle spring, seat washer, shackle nut & lock & shackle nut split pin.

Guards for Lift Ropes

Where lift ropes run round a sheave or sheaves on the car and/ or counterweight of geared/ gearless machine suitable guards shall be provided to prevent injury to maintenance personnel.

Number & Size of Ropes

The contractor must indicate the number and size of lift ropes and governor ropes proposed to be used, their origin, type, ultimate strength and factor of safety. The contractor should furnish certificate or ropes from the rope manufacturers issued by competent authority.

4. COUNTER WEIGHT

The counter weight for lift cars shall be in accordance with clause 6 of IS 14665 (Part 4-Sec-3) : 2001 and shall be designed to balance the weight of empty lift car plus approximately 50 percent of the rated load. It shall consist of cast sections firmly secured in relative movement by at least two numbers steel tie rods having lock nuts/split pins at each end and passing through each section and Housed in a rigid steel frame work. Cracked and broken sub weights shall not be accepted. Counter weight for passenger lifts should be able to accommodate suitable weight Interior finishes. In case interior finishes material exceeds this provision, then the elevator contractor shall adjust the Counter Weight accordingly, however this will be decided and intimated much before the delivery of the elevators.

Counter Weight Guards

Guards of wire metal / mesh shall be provided in the lift pit to a suitable height above the pit floor to eliminate the possibility of injuries to the maintenance personnel.

5. GUIDES / Guide Rails

Car and counterweight guide shall be machined T section as per relevant Indian Standards IS-14665 of 2000 revised up to date. The guides shall be capable of withstanding forces resulting from the application of the car or counter weight safety devices The guide rails shall be minimum 16mm Tongued & Grooved type.

6. TRAILING CABLES

A single trailing cable for lighting control and signal circuit is permitted, if all the conductors of this trailing cables are insulated for maximum voltage running through any one conductor of this cable. The lengths of the cables shall be adequate to prevent any strain due to movement of the car. All cables shall be properly tagged by metallic / plastic tags for identification. Cable jacket should be suitable for immersion in water, salt water & oil etc.

7. SAFETY DEVICES

Safety devices shall be capable of operating only in the downward direction and stopping fully loaded car, at the tripping speed of the over speed governor, even if the suspension devices break, by gripping the guides, and holding the car there. Governor sheave in elevator pit shall be enclosed in a wire cage to a height of 2.40 mtr. All safety devices statutorily required by Lift Inspector, including but not restricted to the following shall be provided.

• Terminal slow down switches

These shall be provided and installed to slow down the lift car when approaching the top and bottom landings. The slow down switches shall act independently from the normal car operating device.

• Over travel limit switches

These shall be provided and installed to stop the car within the top and bottom clearance, independent of the normal car operating device. The bottom over travel limit switch shall become operative when the bottom of the car touches the buffer. When the over travel limit switches are operative, it shall be impossible to operate the car until the car has been hand would to a position within the normal travel limits.

• Pit Switch

An emergency stop switch shall be located in the pit which when operated shall stop the car regardless of the position of hoist way.

• Terminal Buffers

Suitable spring buffers mounted on RCC foundation blocks shall be provided in the pit in compliance with ANSI/ASME/CENEN-81 /JIS codes for stopping the car in case of mal-operation. Dowels for the purpose shall be left while casting the pit floor alternatively floor reinforcement could be exposed by chipping for welding additional reinforcement for Dowels. However clearance from underside of the car resting on a fully compressed buffer shall not be less than 1.20 mtr. Buffers shall be designed for

a design speed + 15%. Oil buffers shall be provided for the passenger elevators for speed of more than 1.75 mps and spring buffers for lower speed.

- **Interlocking**

Adequate interlocking is to be provided so that the car shall not move if the landing doors are even partially open and also the lift is overloaded.

- **Over speed governor**

Over speed governor shall be of centrifugal type and shall operate the safety gear at a speed at least equal to 115% of the rate speed and less than the over speed governors shall be driven by flexible wire ropes with the following requirements.

- The breaking load of ropes shall be related to the force required to operate the safety gear by the safety factor of at least 8
 - The nominal rope diameter shall be at least 7 mm
 - The ratio between the pitch diameter of the over speed governor pulley and the nominal rope diameter shall be at least 30
- The over speed governors shall be sealed after setting the tripping speed. The breaking or slackening of the governor rope shall cause the motor to stop by an electric safety device.

- **Alarm bells**

A Concealed 200 mm diameter alarm bell shall be installed in the main security area. The alarm bell shall sound when the alarm bell button in the car operating panel is pressed. The bell shall mute when the pressure on the alarm bell button is released.

- **Emergency Stop Switches**

An emergency stop for use by maintenance personal shall be provided in each lift car.

8 FIREMAN SWITCH

Lift shall have a Fireman switch with glass front for access by the Firemen. The operation of this switch shall cancel all calls to this lift and shall stop at the next nearest landing if traveling upwards. The doors shall not open at this landing and the lift shall return to the ground floor. In case the lift is traveling downwards when the fireman's switch is operated it shall go straight to the ground floor bypassing all calls enroute. The emergency stop button inside the car shall be rendered inoperative. The fireman's switch shall be located adjacent to the lift opening at the terminal floor and shall be at a height of approximately 2 m above the floor level. For easy identification of firemens lift which confirm to the local authorities requirements, a red and white diagonal striped backing shall be provided behind the glass of the firemen's switch.

A permanent notice of prominent size indicating the floors served shall be provided and displayed adjacent to the firemen's lift at the terminal floor. The notice shall be made of laminated plastic sheet or other approved materials with red letters on white background. Details of the notice shall be submitted to the Engineer-in-Charge for approval prior to fabrication.

9. CONTROL OF NOISE AND VIBRATION

9.1 General

The whole of the lift assembly, including the opening and closing of the car and landing doors shall be quiet in operation and shall be free of rattling or squeaking noises. Lift doors operation shall be smooth to avoid the transmission of impact noise to the surrounding structure. Noise level resulting from the operation of the lifts, including direct sound transmission, breakout noise and re-radiation of structure borne noise, shall not exceed the specified noise criteria of the adjacent spaces. Vibration resulting from operation of lifts of escalators shall not be perceptible in any occupied areas.

9.2 Car construction

All elements of the lift car construction shall be sufficiently rigid to avoid generation of noise by panel excitation as a result of movement. The total noise level in a moving lift car shall not exceed 45 dBA with the ventilation system operating.

9.3 Machinery

The gearless traction machine and compact PM motor are installed within the hoist way and the slim control panel is located on the shaft side wall. Provision shall be made for the control vibration isolation measures employed to ensure that structure borne noise resulting from the operation of the lift machinery is not audible in any occupied area. Lift machinery noise levels under normal operating conditions shall not exceed 70 dBA at 1 m from the equipment in free field.

9.4 Arrival chimes

Noise from arrival chimes shall not exceed 60 dBA.

The above levels shall be measured at 3 m from the arrival chimes using a noise meter set to 'fast' response. Chimes with adjustable loudness shall be provided.

10. FIRE SAFETY REQUIREMENTS

General requirements of lifts shall be as follows :

10.1 Landing doors in lift enclosures shall have a fire resistance of not less than one hour.

10.2 Lift car door shall have a fire resistance rating of one hour.

10.3 Grounding switch (es), at ground floor level, shall be provided on all the lifts to enable the fire services to ground the lifts.

8. TECHNICAL SPECIFICATIONS - LIFTS-ASSOCIATED WORKS

1. ASSOCIATED ELECTRICAL WORKS

1.1 Scope

Based on power requirements of lifts furnished by the lift contractor, power supply for the lifts machines, terminating in a Switchboard located at a desired location, shall be provided by IIA. The earth bar provided on this Switchboards shall be connected to the building earthing system also by Engineer-in-charge. All cabling /wiring/loop earthing beyond this Switchboard for interconnection with the lift controllers / motors/ indicators / push buttons / safety devices etc. shall be provided by the lift contractor and its cost shall be deemed to be included in the quoted rates.

1.2 Cabling

Cabling between switchboard and the controller /lift motor shall be with XLPE insulated HR PVC sheathed 1100 volt grade aluminium conductor armoured cables conforming to IS 7098 or PVC insulated, PVC sheathed, 1100 volt grade al conductor armoured cables conforming to IS 1554. Cables shall be terminated in glands fitted with armour clamps the gland body shall be provide with an internal conical sating to receive the armour clamping cone and clamping nuts which shall secure the armour wires. A PVC shroud shall be fitted to cover the gland body and exposed armour wires Trailing cables for the lifts shall be EPR insulated stranded copper conductor flexible cables conforming to IS 9968 Control cabling shall be with multi core stranded copper conductor PVC insulated and sheathed 1100 volt grade cables conforming to IS 8130. Minimum size of the cable shall be 2.5 sq mm. Where cables pass through walls or floor slabs, pieces of GI sleeves shall be provided for cast into the wall / floor and cable shall be drawn therein.

1.3 Wiring

All wiring shall be carried out with FRLS PVC insulated 1100 volt grade stranded copper conductor wires conforming to IS 694 drawn in MS rigid / flexible conduiting system and / or MS raceways. Minimum 2.5 sq mm size wires shall be used. Wires shall be cut only at terminations. Intermediate jointing shall not be permitted. Drawing, cutting and terminating of the wires shall comply with the relevant Indian standard specifications and shall be carried out in the most workman like manner as

per standard practice. All normal care like cutting the insulation with a pencil edge, taking care not to cut the strands and proper tightening of terminal connector screws to avoid loose connection or breaking of conductors etc. shall be taken. Heavy gauge black enameled screw type ISI embossed MS conduits with superior quality accessories approved by Engineer-in-Charge shall be used in the work. Conduits could either be recessed in floors / walls or fixed on surface with saddles and clamps. Final connections to vibrating the equipment shall be made with metal flexible conduits. Entire work shall be carried out in work man like manner as per standard practice

1.4 Earthing

Metal enclosures of all electrical equipment and devices including frames of motors, controllers, switchgear, conduits and raceways etc. shall be properly earthed so as to form an equi-potential zone. Loop earthing of vibrating equipment shall be done with flexible copper earthing braid or flexible cables. The lift motor frame shall be connected to the building earthing system termination at the switchboard by duplicate loop earthing conductors of appropriate size.

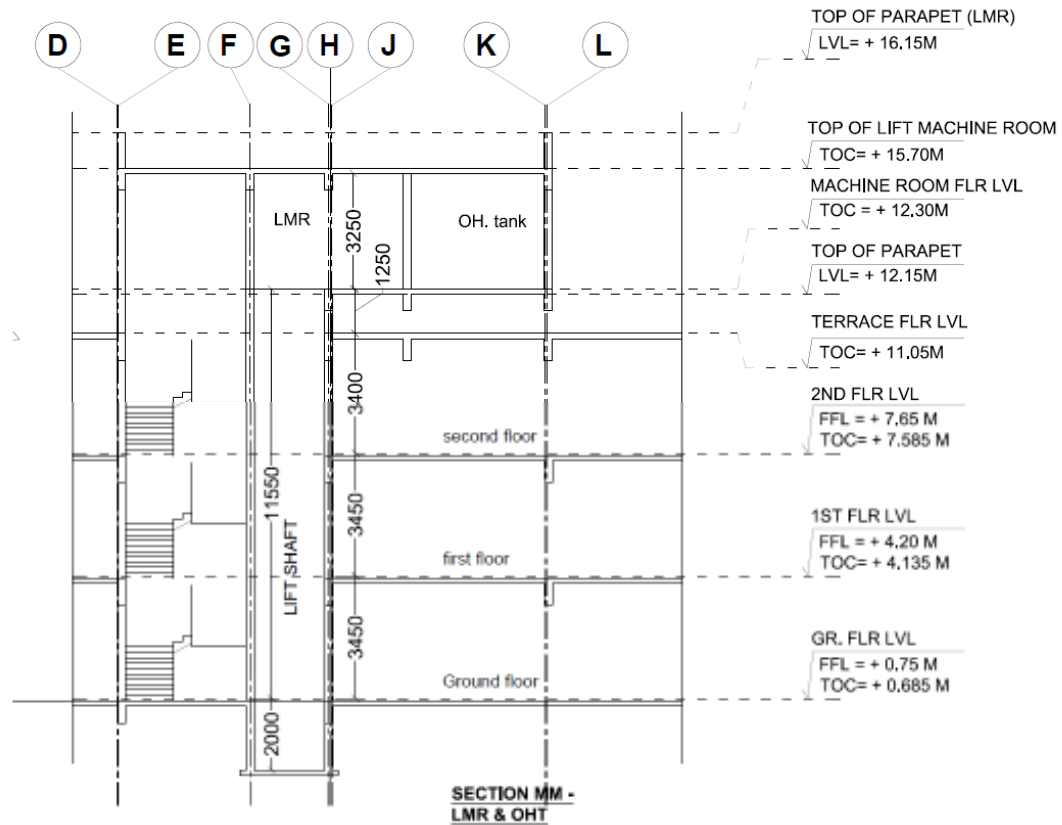
2. ASSOCIATED CIVIL & STRUCTURAL ITEMS

All civil and structural items of work associated with erection and operation of lifts shall be provided by the Contractor at his cost including (but not restricted to) the following.

- _ Hook for lifting lift equipments in the top of shaft.
- _ Temporary scaffoldings and safety barricades during lift installation in and around lift Lift wells
- _ Sill angels
- _ Bearing plates
- _ Buffer supports
- _ Checqured plates
- _ Fascia plates
- _ Ladders in pits (MS)
- _ Safety railing on car top
- _ Separator /stretcher beams if required .
- _ Dowels for terminal buffers in pit floor during casting.

The Contractor shall ensure erection and fixing of steel work in such a manner that no RCC wall or any other structural member is damaged.

9. Lift Shaft drawing



10. Note to the Vendor

1. The following Drawings of passenger lift is provided with lift shaft details IIA - SECTION OF LIFT SHAFT AND LMR.pdf
2. Power supply would be provided at one Point. The Lift vendor needs to provide us the details of specific Power requirement.
3. Materials should be offered strictly conforming to the specifications within acceptable tolerance level given in specifications / drawings given in tender document. Deviations, if any, should be clearly indicated by the bidder in their bid. The supplier should also indicate the Make/Type number of the materials offered and catalogues, technical literature and samples, wherever necessary should accompany the quotation.

4. Any fittings or accessories which may not be specifically mentioned in the Specifications or Particulars but which are usual or necessary for proper and efficient functioning of the Stores as per the specifications of the tender shall be supplied by the Contractor without extra charge to the Purchaser; the Stores supplied shall be complete in all respects.
5. IIA has the right to ask for the minor modifications at any stage even after the design is mutually agreed.. As from the date, the Stores shall be in accordance with the specifications, patterns and drawings so altered, which the contractor is bound to comply with. In the event of such alteration involving a revision in the cost, or in the delivery period, the same shall be discussed and mutually agreed to, taking into account the unit rates of similar items in the Contract. In case of disagreement, the decision of IIA, in the cost or the delivery period, shall be final and conclusive.
6. **Minor modifications / Additional Scope of Work:** Minor modifications /additional scope of work to the tune of 2% of the total contract value shall be carried out by the contractor without any extra cost to IIA.
7. **Subletting or Assignment of Contract:** The Contractor shall not sublet, transfer or assign the Contract or any part thereof or bills or any other benefits, accruing there from or under the contract without the prior written consent of IIA (All Subcontractors are required to be appraised and approved by IIA before placement of orders by the Contractor/Supplier). However, such consent shall not be unreasonably withheld by IIA, if such stores are not normally manufactured by the Contractor, such assignment or subletting shall not relieve the Contractor from any contractual obligation or responsibility under the Contract.

Any breach of this condition shall entitle IIA to cancel the Contract or any part thereof and to purchase from other sources at the risk and cost of the Contractor and shall recover from the Contractor damages arising from such cancellations.

In case the Contractor sublets, transfers or assigns any part of the Contract with the prior written consent of the Purchaser, all payments to the Sub-Contractor shall be the responsibility of the Contractor and any requests from such sub-Contractor shall not be entertained by IIA.

8. **Past performance:** In case the past performance of the tenderer is not found to be satisfactory with regard to quality, delivery, warranty obligation and non-fulfillment of terms and conditions of the contract, their offer is liable to be rejected by IIA.

9. Primarily this lift will be used to handle delicate optics. Hence designer should consider the best quality materials with required factor of safety with maximum possible compactness. Design should reflect the delicate handling of these optics. Fast movements, jerks etc are not permitted during any lifting/movement. These cranes will be used inside the clean rooms. It should not become the source of contamination inside the facility like particulate or molecular. Care shall be taken while deciding the secondary process like painting etc.,
10. Bidder should be a manufacturer and should have ISO Certificate and satisfactory evidence to show that they are licensed manufacturer, has adequate plant and manufacturing capacity and has a quality assurance programme. Copy of valid ISO certificate and manufacturing licence issued by the competent authority & company profile should be submitted as a proof.

Venodr must submit the following documents, without which, their bid will not be considered.

- a.. Registration Certificates.
- b. Factory License.
- c. Purchase Order Copies for 4 Ton and above capacity Single Girder EOT Cranes along with the Commissioning Certificates & Performance Certificates.
- d. Appreciation Letters from the Clients.
- e. ISO Certificate

11. Bidders should have prior work experience of similar kind of work and must have supplied and commissioned at least 1 lift of 8 people capacity or more in the past three years (2014--2017) and such lift is presently working satisfactorily for more than one year after commissioning. Copies of Purchase order with technical details along with work completion/installation certificate/performance certificate should be submitted as a proof.
12. Vendor may visit the project site to evaluate site requirements after obtaining prior permission from IIA.
13. Vendor shall arrange required lifting equipments, tools etc required during the installation. Transportation from factory to site is in vendor scope.
14. Vendor shall take responsibility of material stores at site.
15. Vendor shall provide safety devices (helmets, safety belts, gloves etc.) for

personnel carrying out installation as per the safety standards.

16. Vendor shall give the schedule for Procurement of raw materials, Testing, manufacturing, Assembly, Factory acceptance test, transportation to site, installation & commissioning at site, etc.,
17. The bidder is required to submit all supporting documents as proof for the compliance. Bids received without valid documents and/or incomplete and irrelevant documents are likely to be rejected.
18. IIA's decision to consider as to whether a vendor has met with the eligibility criteria or not is final.
19. The Equipment should be completely designed and made as per the relevant I.S. Specifications. IS 3177/807/800, AGMA / DIN Stds

20. **Testing**

Testing for the various items of equipment shall be performed at the contractor's cost and test certificate to be furnished by the contractor (for Motor, Machine Break-tests Controller & Steelwire Ropes). If required by the Engineer, the Contractor shall permit the Owner's authorized representative to be present during any of the tests. After notification to the Owner that the installation has been completed the contractor shall make under the direction and in the presence of the Engineer such test and inspections as have been specified or as the Engineer shall consider necessary to determine whether or not the full intent of the requirements of the plans and specifications have been fulfilled. In case the work does not meet the full intent of the specifications and further tests shall be considered necessary the contractor shall bear all the expenses thereof.

21. **Compliance of statutory observation.**

Complying with observations, if any, of Lift/Electrical Inspector and/or any other Statutory Authority after completion of work in order to obtain a categorical clearance to start beneficial use.

22. **Manuals, drawings etc.**

1. Along with the tender

Technical Parameters enclosed as Annexure-I duly filled in by the Tenderers along with technical catalogue etc. of the equipment offered.

2. Shop drawings on award of work before commencement

The Contractor shall submit GA drawings of Lift System to Architects/Owners for approval before commencement of work at site/fabrication/ manufacture.

3. Operation and maintenance manuals

Three sets of operation and maintenance manual with support drawings shall be submitted to the Owners after completion of work.

4. Training

Training of Owners personnel in operation, handling and maintenance of equipment.

5. The Contractor shall submit following documents

3 sets of operation and maintenance manual with support drawings shall be submitted to the owner after completion of work.

3 sets of test results of pre-commissioning test carried out at site.

3 sets of as built GA drawings.

23. Maintenance

Quoted rates shall be deemed to be inclusive of, free comprehensive maintenance (including spares) of lifts for a period of Two year from the accepted date of completion of the contract.

24. COMPLETION CERTIFICATE

On completion of the electrical installation a certificate shall be furnished by the Contractor countersigned by the Licenced Supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local supply authority. The Contractor shall be responsible for getting the electrical installation inspected and approved by the local and statutory authorities concerned and expenses if any shall be borne by the contractor.

25. WORKMANSHIP

Good workmanship is an essential prerequisite to be complied for this work. Entire work shall be carried out in the most workmanlike manner by skilled workers under competent supervision.

26. Submittals along with the offer

Vendor must submit the following documents, without which, their bid will not be considered.

- **Details covering ALL THE TECHNICAL SPECIFICATIONS motioned in Annexure -1 (Points 1 to 4 including Table-1)**
- **Company documents like**
 - a.. **Registration Certificates.**
 - b. **Factory License.**
 - c. **Purchase Order Copies of similar passenger lifts along with the commissioning Certificates & Performance Certificates.**
 - d. **Appreciation Letters from the Clients.**
 - e. **ISO Certificate**
- **Catalogue/GA drawings**
- **Wiring and control schematic and detail diagrams.**
- **Electrical requirements.**
- **Civil requirements**
- **Outline of the dimensions of the equipment.**
- **Details of equipment and controls.**
- **Installation details.**
- **Manufacturers name and catalogue number of any equipment number to be furnished**
- **Critical spare list for minimum period of 3 years**
- **COMPLIANCE TO THE POINTS MENTIONED IN ANNEXURE-2 (FROM PAGE 4 TO PAGE 24)**