PAKISTAN INSTITUE OF DEVELOPMENT ECONOMICS (PIDE)

BIDDING DOCUMENT FOR SUPPLY, INSTALLATION, TESTING AND COMMISSIONING OF ONE (01) NEW IMPORTED ELEVATOR (630 KG) ALONG WITH CONSTRUCTION OF ELEVATOR SHAFT AT PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS (PIDE) AT QUAID-E-AZAM UNIVERSITY (QAU) CAMPUS, ISLAMABAD

VOLUME-II

- **Special Provisions**
- **Technical Provisions**

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SECTION-I

SPECIAL PROVISIONS
FOR
ELEVATOR WORKS

1.0 SCOPE OF WORK

The scope of work given in relevant sections of equipment shall include but not necessarily be limited to the following:

- Preparation of all relevant installation/erection drawings, coordinated shop drawings, obtaining government and/or Employer approvals and/or certificates, fabrication, transportation to site, storage, installation, testing, commissioning, operation and maintenance thereafter for the stipulated period of equipment including training of Employer's staff.

- All wiring and controls including necessary material and accessories beyond the power supply point.

- All other miscellaneous equipment and/or work required to render the equipment ready for continuous, safe and efficient operation.

- All civil works as per BOQ, Construction of shaft, Cutting, patching and repairing of damaged civil works required during installation of new equipment. Repairing of damaged civil works and architectural finishes are also included in the scope of work.

- Inspection of already constructed related civil works immediately after award of work and confirmation of its suitability for the equipment.

- Regular operation & Maintenance 16 hours/day, 6 days/week and 300 days/year periodic servicing of equipment during defects liability period (i.e. 365 days) including greasing, oiling, cleaning etc. of parts as recommended by the manufacturer. Full time operational staff (trained experienced operator cum technician) is required.

- Provide all required installation, operation and maintenance manuals, spares lists, drawings and diagrams, inspection test certificates and submission of misc. requisite documentation.

- Providing training to Employer’s Staff at site regarding operation and maintenance of the equipment.

2.0 CODES AND STANDARDS

All equipment & materials under this works shall be furnished in conformity with latest edition of applicable standards of ANSI, ASME, BS/EN, AWS, NFPA, ASTM, NEMA, IEE, etc. and applicable Government and Local Codes governing the same. In case of conflict, the strict requirements shown/specified shall govern. All equipment shall be rated and tested as per relevant standard (latest edition).

Where possible, the same codes and standards shall be used throughout a particular facility. However, the final decision on which codes and standards shall be applied shall remain with the Engineer.

Abbreviation for codes and standards referred to in the contract are as under:

- EN European Norms
- ANSI American National Standard Institute, USA
- ASME American Society of Mechanical Engineers, USA
- AWS American Welding Society
- NFPA National Fire Protection Association
- ASTM American Society for Testing and Materials, USA
- NEMA National Electrical Manufacturer's Association
- IEE Institute of Electrical Engineers, London

3.0 QUALITY STANDARD

To guarantee a high quality standard in the field of designing, fabricating, installing and maintaining the said equipment, only manufacturers with a proven record of similar experience will be considered in Bid Evaluation. To verify the manufacturer’s experience, a reference list with completed projects should, therefore, accompany the Bidding documents.

4.0 PRODUCT HANDLING AND STORAGE

It will be the Contractor's entire responsibility to ensure that all necessary precautions are taken during transportation to avoid damage to any of the equipment.

The Contractor must arrange with the supplier of mechanical equipment, well in advance, that there is sufficient clear and load bearing passage at site to be used for shipping the equipment to the installation place. The Contractor shall also liaise with the equipment supplier with regard to adequate openings and lifting points.

Specific handling or storage requirements will be dealt with in the relevant parts of the specifications, where necessary.

5.0 INSPECTION AND CONTROL

A. General

The Contractor shall ensure that the manufacturer continuously conducts his own thorough inspections of all equipment during manufacturing, assembling and installation.

The Engineer shall have the power at any time to inspect, examine and test any part of the works, or any materials or plant intended to be used in the works, either on the site or at any factory or workshop where such parts, materials or plant are being constructed, manufactured or from which they are being obtained.

B. Pre-shipment Inspection by Third Party

All equipment to be supplied under this Contract shall be subject to inspection and testing by third party of international reputation and experience in elevators approved by the Engineer at its point of original manufacture or final shop assembly before its dispatch to site.

The Contractor shall submit tests procedures and results for approval of Engineer. The Contractor shall give at least three (03) weeks' notice to the Employer/ Engineer for approval of such inspections/ tests.

In addition, for foreign travel the contractor shall provide (for two persons) daily allowance in US$ for out of pocket expenses, at $ 200 per day per person. The number of days shall be actual days spent in travel calculated from the dates of travel from and to the hometown of the concerned representative nominated for inspection, but not less than five (05) days. The US$ in cash shall be provided before start of travel from hometown.

The Contractor shall submit inspection procedures for approval of Engineer well in advance to the set date of pre-shipment inspection. The Contractor shall give at least 3 (three) weeks' notice to the Employer/Engineer for attending such inspections/tests.

C. Inspection at Karachi Port/Dry Port

All major imported equipment will be inspected at Karachi port/Dry port The Contractor shall make necessary arrangements and provide all the facilities required for such inspection. The cost of travel, boarding and lodging of Employer, his authorized representative and the Engineer shall be the responsibility of the Contractor. In case of unavailability of such inspection, Engineer reserves the right to deduct suitable amount from Contractor's payment and subsequent inspection at dry port will be additional responsibility of the Contractor up to Engineer's satisfaction.

D. Inspection at Site Works

All equipment/materials supplied by the Contractor shall be inspected by the Engineer after delivery of the same at site to assess any damage or short of quantities and any other requirements of the specifications. The Engineer will issue an inspection certificate if the supplied items of equipment and material are found to be satisfactory.

The Engineer shall inspect the works in progress as and when considered necessary by the Engineer and the Contractor shall provide full access and assistance to the Engineer for carrying out inspection to verify the conformity of works as shown on Drawings and as specified. Such inspection if made shall not relieve the Contractor from any obligations under the Contract.

E. Damages, During Transportation, Storage & Installation

The Contractor shall be responsible for any damage of the Equipment/material during transportation to site, storage and installation until satisfactory handing over the works to the Employer. The Contractor shall replace any damaged equipment/materials at his own cost.

6.0 DRAWINGS AND SUBMITTALS

In general, the following submittals are required for the works covered under this section. However, the final decision with regard to what should be submitted, to what extent and at which time of the Contract period shall remain entirely with the Engineer.

A. Technical Data Sheets/Technical Submittal

Information submitted with the Bid is for reference only. Final model and details will be selected as per Technical Submittal submitted after the award of work. Technical data/submittal shall comprise of the following at the minimum, which shall be submitted within one (01) week from award of work:

1. Data Sheet as per Specifications
2. Catalogues/Brochures

3. Compliance Statement for Technical Provision (paragraph-wise)
4. Outline drawings
5. Structure drawings from Manufacturer
6. Installation drawings from Manufacturer
7. Full EN 81 Compliance Statement from Manufacturer
8. Warranty Statement from Manufacturer

B. Design Drawings/Shop Drawings

The Contractor shall submit Design Drawings/Shop Drawings within two (02) weeks from acceptance of Bid to the Engineer for approval.

The drawings must show in reasonable detail installation and design features such as:

i) Final arrangement of equipment keeping in view the dimensions provided in architectural drawings for civil construction of the Equipment.

ii) Maximum dynamic and static loads imposed on civil structure.

iii) Dimensions and locations of all services, openings in floors and walls, location of embedded parts and location of Employer's furnished electrical connection.

iv) The Contractor shall review the civil construction drawings related to the equipment and identify any major shortcomings/rectifications essentially required for equipment installation within above stipulated time period. Minor civil rectification and adjustment works are included in Contractor's Scope of Work.

v) Wiring and control logic diagrams.

vi) All other relevant information required by the Engineer.

Approval given by the Engineer is to be understood as an approval to proceed with the works. The approval does not in any way release the Contractor from his Contractual obligation to supply, install and maintain the equipment supplied by him as laid down in the specifications

C. As-Built Drawings

The Contractor will furnish As-Built Drawings separately. Such drawings, diagrams and schedules as will, in the opinion of the Engineer, provide an adequate record of the work "as installed" shall be submitted to the Engineer for approval before the issuance of Taking Over Certificate.

The drawings shall include particulars of all items of equipment, including wiring diagrams, etc. As-installed drawings shall be submitted to the Engineer at least thirty (30) days before issuance of Taking over Certificate.

The size of the drawings shall be minimum A1 size. Every item and dimensions in drawings must be legible.

D. Installation, Operation and Maintenance Manuals

Two (02) sets of installation manual for the equipment shall be supplied by the Contractor prior to commencement of installation of equipment.

At least 30 days prior to the scheduled date of practical completion, the Contractor shall supply a complete set of operating and maintenance manuals to the Engineer for approval. Once approved, the Contractor shall proceed to prepare and hand to the Engineer four (04) sets of the approved operating and maintenance manuals.

The manuals shall be neatly bound and provided with a suitably captioned hard cover. The contents shall be generally arranged in the following manner unless otherwise specified/required.

- Index
- General description of the complete facility.
- Operating instruction of the complete facility.
- Emergency directions of the complete facility.
- Safety control adjustment and settings of all safety protection equipment.
- List of equipment giving manufacturers and agents' name, and name plate data together with all data sheets published by the equipment manufacturer.
- Installation, operating and maintenance instructions for each item of equipment (including lubricating charts).
- Performa for Operational log of equipment as per manufacturer recommendation or Engineer’s approval.
- List of spare parts for each item of equipment as recommended by the manufacturer for at least five (05) years operation.
- List of essential tools recommended by the manufacturer for Operation and Maintenance.

- As-built drawings.

All above submission shall be signed and stamped by the Contractor prior to submission and all submission shall be in English. The approval by the Engineer of the above submission shall not be held to relieve the Contractor of any part of his responsibility to meet all of the requirements of this Contract.

7.0 QUALITY ASSURANCE

The Contractor shall submit with this Bid a written assurance that the materials and workmanship of the equipment installed will be according to recognized international standards and will conform to all contractual requirements of this specification.

8.0 OPERATION AND MAINTENANCE

A. Operation & Maintenance during Defects Liability Period

The Contractor shall include the operation, maintenance and guarantees of the whole of the Contract Works as laid down in the General and Special Conditions. During this term, the Contractor shall remedy and/or replace all defective parts or items and correct any omissions certified by the Engineer.

The Contractor will also be held liable for any costs of dismantling or re-erection which may have to be undertaken in order to replace defective parts.

Continuous service of operation shall be provided on a routine daily basis for 16 hours/day, 6 days/week and 300 days/year.

Services shall be performed by skilled personnel (operator cum technician) under the supervision of experienced supervisors.

The Operation & maintenance shall include continuous operation provision of spare parts by the Contractor during defects liability period, inspection of all equipment, lubrication of all bearings, the supply of all necessary oil and grease, cotton waste, running adjustments and keeping the installation and equipment in a clean condition unless otherwise specified/required by the Engineer.

B. Register of Service, Operation and Maintenance

The Contractor shall provide a register of service, operation and maintenance for the installation. Where such requirements are specially required by any regulation of authorities having relevant jurisdiction over this contract work this shall be complied with strictly.

The Contractor shall also provide and maintain a record of all services, maintenance and repair work carried out in detail. Such record shall be prepared

in duplicate and should be in the form of a maintenance/repair sheet with one copy to be retained by the Engineer upon the execution of such services.

All registers and records shall be kept by competent persons in the employment of the Contractor during the period for which he is responsible for maintaining the installation.

C. Operation and Maintenance Staff during Defects Liability Period

The Contractor shall provide elevator operator (Total One (01) for 16 hours/day, 6 days/week and 300 days/year during defects liability period of one (01) year. Operating personnel for complete system shall have at least one (01) year experience in operation and maintenance of similar works. The remaining staff list shall be provided to the Engineer for approval. The staff Nos, skills and experience shall be as per approval of Engineer. The Contractor shall also arrange to provide proper training to employer staff to operate the system to complete satisfaction of the Employer. All cost incidental to provide operating staff including staff salaries shall be deemed to be included in relevant item of Schedule of Prices. No separate payment shall be made to the Contractor for fulfillment of his obligations under this Clause.

9.0 TOOLS & INSTRUMENTS FOR TESTING, SERVICING, OPERATION AND MAINTENANCE

The Contractor shall supply and deliver to site a complete set of essential tools, test equipment, and other instruments necessary for proper testing, servicing, operation and maintenance of the equipment. Tools shall include special tools and instruments, which are necessary for maintenance repair and overhauls of the equipment. The Contractor will not use these tools for erection purpose, etc.

A. Spare Parts

All spare parts during defects liability period of one (01) year shall be provided by the Contractor and their cost shall be included in the main bid.

The Bidder shall also provide with the Bid recommended list of consumable and fixed spares for a period of one (01) years of operational duties beyond defect liability period. The list shall contain all consumable items, overhaul kits, fast moving spare e.g. fuses, bulbs, bulb covers, gaskets, oil filters and a full set of at least two spares for all lamps. All items to be separately listed and costed. The prices remain valid for one (01) year beyond defect liability period.

The Bidder shall also confirm in Bid his ability to provide a full range of spare parts and major components for the offered equipment. The Bidder shall provide a guarantee period of at least 20 years for the serviceability of equipment and supply of spare parts and indicate the same in his Bid.

10.0 PAINTING & FINISHES

All equipment, machinery, gears, controls, exposed and unexposed steel work shall be thoroughly cleaned, freed from oil, grease and other foreign substances detrimental to good finishing.

Apply approved primer, undercoats and finishing coats on a properly prepared surface in accordance with the paint manufacturer's recommendation and in accordance with recognized international standards.

The type and shade of paints, particularly of the finishing coat shall be subject to the Employer's/Engineer's approval.

Enamel shall also be applied according to the manufacturer's recommendation. Stainless steel finish shall be No.4 finish or equivalent, unless specified otherwise in the specification. If field touch-ups of abraded and damaged surfaces become necessary, the same type of paint used in the factory shall be employed.

11.0 TESTING AND COMMISSIONING

On the completion of the Work substantially in accordance with the Contract, the Contractor shall give the Engineer notice in writing thereof and before making the "Testing and Commissioning" shall give the Engineer and the local authority seven days' notice in writing of the date on which he will make the said tests of the work in accordance with relevant codes and in the manner prescribed by the Specification.

The final testing and commissioning of elevators shall be verified at site by manufacturer representative. No separate payment shall be made in this regard for their visit/accommodation etc and Contractor shall include price in the relevant SOP.

Unless otherwise agreed, the Contractor shall commence such tests upon the date and shall carry out the same, in the presence of the Engineer or his authorized representative, whose name shall previously have been communicated in writing to the Contractor and the local authority.

If any portion of the works fails under the tests to fulfill the Contract conditions, the Contractor shall inform the Engineer thereof in writing, and tests of the faulty portions shall, if required by the Engineer be repeated within a reasonable time upon the same terms and conditions.

If the "Testing and Commissioning" is not successfully made by the Contractor within one week after the date fixed by the Contractor for the completion for operational use or for the testing of the works, the Engineer may in writing call upon the Contractor under seven days' notice to make such tests, and on the

expiry of such notice such tests shall forthwith be made by some other agency appointed by the Engineer at the expense of Contractor.

The Contractor shall supply all necessary utilities, labour, apparatus and instruments necessary for the prescribed tests. The accuracy of the Contractor's instruments shall be demonstrated if required.

The Contractor shall make for payment of all or any fees charged by the local authorities for the above.

The installation will be under the charge of the Contractor during this period, at which time the Contractor shall instruct the Employer's personnel on the maintenance, servicing and trouble shooting of the various plants and system.

Should any failure occur due to, or arising from, faulty materials or workmanship or otherwise, sufficient to prevent the operational use of the installation, the reliability test period of one year shall recommence after the Contractor has remedied the cause of failure to the satisfaction of the Engineer.

12.0 TEST CERTIFICATES AND REPORTS

The Contractor shall provide copies of all test certificates/reports including the following:

(i) Test Certificates of critical materials
(ii) Factory test reports
(iii) Pre-shipment test report
(iv) Report of testing & commissioning of equipment

13.0 TRAINING

On completion of all works, but prior to final taking over, the Contractor shall arrange for free training and instruction to be provided to the Employer’s maintenance staff and operators. This training shall cover all aspects of the operation and maintenance of the plant/equipment and shall ensure that the trainee is provided with at least the necessary fundamentals required for the safe and efficient operation of the plant/equipment in question. The instructor(s) must be competent and experienced personnel, well acquainted with the task of lecturing. The schedule of offered training high lighting the details of syllabus indicating number of hours for training and field instruction subject to be taught and no. of Employer’s staff strength to be trained shall be enclosed with each Bid so as to allow for an evaluation by the Engineer.

14.0 MANUFACTURER WARRANTEE

The Contractor shall submit two copies of written warrantee from the manufacturer under his cover warrantee that the material and workmanship of the equipment installed is according to recognized international standards and

conform to all contractual requirements of this specification that he will make good without extra cost any defects not due to ordinary wear and tear or improper use, which may develop within one year from date of the installation being handed over to the Employer.

During the last month of the guarantee period, the Contractor shall demonstrate to the Engineer that all equipment and accessories are operating to the required specifications.

The manufacturer warrantee period shall be two years after final commissioning.

In case if equipment remains out of order for more than 10 days or more, warrantee/maintenance period will be extended accordingly.

15.0 MEASUREMENT AND PAYMENT

No measurement and payment shall be made for the works involved within the scope of this section of specifications unless otherwise specifically stated in the schedule of prices or herein. The cost thereof shall be deemed to have been included in the quoted unit rate price of other items of the schedule of prices.

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TECHNICAL PROVISION
FOR ELEVATOR WORKS

SECTION-II

TECHNICAL PROVISIONS FOR PASSENGER ELEVATOR

1.0 GENERAL

This section shall cover Elevators where indicated on the drawings and specified herein. Any conflicts between the requirements in this specification and the codes, drawings, standards and specifications referred to herein shall be brought immediately to the attention of the Engineer for resolution. The Bidder shall submit technical data sheets, outline drawing and printed technical literature to fully elaborate offered equipment. The Bidder is advised to visit the site to check the available elevator shaft, pit depth and machine room etc. to ensure that offered equipment will suit to existing conditions.

2.0 SCOPE OF WORK

Following elevator works are required for Pakistan Institute of Development Economics (PIDE) East academic block building at Quaid-e-Azam University Campus, Islamabad.

i) Construction of new Elevator shaft as per detail design drawings attached in bidding/tender documents complete in all respect.

ii) One (01) No. Brand new 630 kg passenger elevator fully-EN certified heavy duty MRL (Machine Room Less) Type with Simplex control serving Ground + Three (03) upper floors. Design to operate 16 hours/day, 6 days/week and 300 days/year.

iii) All associated civil, architectural and electrical works necessarily required for installation of elevator in the shaft.

iv) Making good any damage done to the civil works including supply and installation of matching paint, floor tiles, granite / marble wall finish etc, whichever is applicable as per site conditions and / or as directed by Engineer.

v) Supply and installation of exhaust fan propeller type of size 800 CFM (SP 0.2 inch of WG) are required for each Machine Room including complete electrical work.

vi) Supply and installation of Electric DB and related electrical works at elevator control panel on last floor and cables for elevator power supply and other electrical accessories required for proper installation of the elevator.

The scope of work shall cover design, supply, installation, testing & commissioning, operation and maintenance of entire new elevator equipment including construction of elevator shaft (Civil), hoisting machinery, sheaves and girders, controller, car, ropes, counterweights, supports, brackets and guides for car & counterweights, car & landing doors, door operator, switches & control, safety devices, signals, governor, safety gears, buffers, pit screens, well trimming girders, trap door and such related accessories complete in all respects as specified herein. The Contractor shall also furnish all labor, erection equipment, (i.e. winches, scaffolding etc.), erection tools, appurtenances, embedded parts and materials, etc. necessary to supply, install, test and commission the elevator all in perfect operating condition in accordance with these Specifications and Drawings.

The Contractor shall submit design drawings/shop drawings within two weeks after award of work for approval of Engineer. The drawings must show final arrangement of equipment, dynamic & static loads imposed on the building, openings, location of embedded parts etc. wiring and control logic diagrams.

The Contractor shall be responsible to make good any damage done to the civil works for erection or other purposes without cost to the Employer.

The Contractor shall also provide and install, from designated electrical power supply point, all required cabling, distribution boards and accessories without cost to the Employer.

The Contractor shall operate & maintain the works during defect liability period. In addition to routine periodic maintenance, the Contractor shall execute all such work of repair, rectification, parts replacement and making good defects occurring during this period. Design of equipment to be supplied by the Contractor shall also be the responsibility of the Contractor and/or his suppliers.

The Contractor shall also provide training to the staff of Employer regarding operation and maintenance of the equipment.

Prior to completion date, the Contractor shall submit 3 copies of Operating and Maintenance Manuals to the Employer/Engineer

3.0 Design Requirements

A. Elevator System General Requirements:

a) Elevators shall be designed specifically for the operation, loading and environmental conditions encountered in public buildings and shall have a minimum design life of 25 years.

b) The final assembly of all components shall not pose hazardous conditions to the public or maintenance personnel. Surface irregularities, sharp edges, or protrusions in public or maintenance areas shall not be permitted.

c) Provide convenient and safe equipment access for inspection, cleaning, maintenance, repair, and replacement.

d) All gaps and running openings within regulatory tolerances shall be properly closed by the use of appropriate sealant or another approved means installed in accordance with the manufacturers' instructions.

e) For parts and equipment subject to wear and requiring periodic replacement, the Contractor shall furnish key and seat, nut, screws, or other removable and replaceable type mechanical fasteners. Such replacements shall not diminish original structural integrity. Use of rivets or similar type fasteners requiring physical deformation during field positioning will not be permitted.

f) The elevator equipment shall be quiet and smooth running and shall not exceed the following maximum noise output levels during all phases of operation:

i) 70 dBA measured in the elevator car
ii) 70 dBA measured at the elevator hoistway entrances

g) Fire Protection: Contractor shall provide non-combustible materials for components including Halogen-free cables.

B. Seismic Criteria:

a) Installation and equipment designed for static and for seismic conditions shall be provided in accordance with regulatory requirements.

b) Provide hardware necessary to protect motors, drives and door operators

c) Seismic design shall be based on the assumption that structures and equipment will be subjected to a maximum horizontal ground acceleration of 0.7g (70 percent of gravity).

C. Power:

The main elevator power shall be 400 Vac, three phase, 50 Hertz.

D. Elevator Controller:

a) The controller for Elevators shall be a field programmable microprocessor based, collective selective control, automatic operation with open loop, variable voltage, variable frequency control.

b) Elevator operation shall be by means of LED Touch Panel in the car, numbered to correspond to landings served by LED Touch Panels Call at terminal landings, and by Up and Down LED Touch Panels at intermediate landings.

c) All options or parameters shall be field programmable without the need for external devices. Programmable settings shall be stored in non-volatile memory.

E. Elevator Door and Hoist way Door Operation:

a) Hoist way doors and car doors shall:

i) Open automatically and simultaneously when the car arrives at the destination landing.
ii) Be equipped for readily and independently adjustable door hold open times when car stops for a car or hall call. Main floor door hold times shall be adjustable independently of other floors.
iii) Close after hold open time interval has elapsed and no obstruction has been detected, or when the car is called or dispatched to another landing, or when either the car door close button or a car call is pushed.

b) Activation of the door close button in the car shall cancel door timer and close the doors provided there is no obstruction

c) All closing times shall be adjustable from 5 seconds to 30 seconds without exceeding closing force specified herein.

4.0 MATERIALS & WORKMANSHIP

4.1 Materials

All materials shall be of the highest grade, free from defects and imperfections, of recent manufacture and unused, and of the classification and grades designated, conforming to the requirements of the latest issue of the appropriate specifications and standards. All materials, supplies, and articles not fabricated by the Manufacturer shall be the products of recognized reputable manufacturers.

All materials including electrical wirings shall be weather proof.

4.2 Workmanship

All work shall be performed and completed in a thorough workmanlike manner and shall follow the best modern practice in the manufacture of high-grade machinery, notwithstanding any omissions from the Bid Documents. All work shall be performed by mechanics skilled in their various trades. All parts shall be made accurately to American Standard or other approved gage, where possible, so as to facilitate replacement and repairs. All bolts, nuts, screws, rivets, threads, pipes, gages and gears shall conform to applicable American or other approved standards.

4.3 Structural Metal Work

The fabrication of the Structural Steel shall be performed strictly in accordance with these specifications and shall otherwise conform to the latest revision of the American Institute of Steel Construction "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings". Surface finish shall conform to ANSI Standard B 64.1 Surface Texture. The Manufacturer shall be responsible for all errors of fabrication and for the correct fitting of the elements of the equipment. Structural Steel shall be thoroughly straightened by methods that will not result in injury. Sharp kinks or bends in members to be straightened will be cause for rejection. Completed work shall be free from kinks, bends or winds. Shearing shall be accurately done, with neat finish. Corners shall be square and true unless otherwise shown on the Drawings. Re-entrant cuts shall be made in a workmanlike manner and, where they cannot be made by shearing, a re-entrant punch may be used. Re-entrant cuts shall be filleted unless otherwise approved by the Engineer. Bends, except for minor details, shall be made with approved dies or bending rolls. Where heating is required, precautions shall be taken to avoid overheating the metal, and it shall be allowed to cool in such a manner as not to destroy the original properties of the metal. Steel with welds will not be accepted except where welding is definitely specified, called for on the Drawings, or otherwise approved. Low-carbon structural steel may be cut by machine-guided or hand-guided torches instead of shears or by saws. Flame cutting of material other than low-carbon steel shall be subject to approval and where proposed shall be definitely indicated on detailed drawings submitted to the Engineer. Where a torch is mechanically guided, no chipping or grinding will be required except where necessary to re-move the slag and sharp edges. Flame gouging will be permitted in preparation of welding where a torch is hand-guided. All cuts shall be chipped, ground or machined to sound levels.

5.0 PRODUCT DESCRIPTION

5.1 General

Elevators shall be installed by the Contractor in the shaft at location shown on the drawing. The dimensions of respective elevator wells and pits are also shown on the drawings.

The Contractor is recommended to visit the site to examine the existing space for construction of new elevator shaft verify and confirm suitability of the new structure to built for the installation of the equipment as per detail design drawings.

Any changes in the above planned elevators shaft and pit floor structure or other design details due to particular equipment requirement shall be submitted by the Contractor to the Employer/Engineer for approval within 15 days from the date of Award of the Contract. All such approved amendments shall be made by the

Contractor without any additional cost to the Employer. Similarly the elevator contractor must coordinate the installation with the other trades.

The elevator contractor shall also provide opening in Elevator well for suitable ventilation and for escape of gases and smoke in case of fire.

The control cabinet/ panel of MR type elevator shall be located in machine room and control cabinet/ panel of MRL elevator shall be located at the last serving floor. The dimensions/ location shall be given by the elevator Manufacturer.

The location of drive machinery and control cabinet shall suit the elevator orientation so as to allow easy access and sufficient space for maintenance work and to provide a good looking architectural outlook.

The Contractor shall acoustically insulate the elevator shaft and shall appropriately isolate the equipment to prevent disturbances in the surroundings area due to operating machinery.

- Sound reducing materials to isolate motor set from civil structure, balance rotating parts to eliminate vibrations and flexible electrical conduits shall be provided. The operation of elevator car and doors shall be completely free from all abnormal jerks, vibrations and sound. The maximum sound level within the car must be within comfortable limits defined in relevant standards/codes.

- The elevator Contractor must schedule his installation work in accordance with civil construction schedule.

The characteristic details of the elevator to be supplied under this contract are listed under para 6.0. The construction and functional details are given hereunder:

5.2 Civil Construction

A. Elevator Well

The elevator shall be installed in the newly built elevator wells of dimensions by the Contractor as available on site.

The top of the well shall be enclosed and watertight.

The Contractor shall be responsible to carry out minor correction for the purpose of installation of guides in perfect plumb and other equipment to ensure perfect installation and operation of the elevators without any cost to the Employer.

B. Pit Access Ladder

A rugged steel ladder for easy access to the pit shall be provided by the elevator Contractor and attached with the safety switch to main control panel of elevator.

C. Pit Screen

A suitable rigid screen shall be provided and fixed by the Elevator Contractor at the bottom of the elevator well where the counterweight comes down to its buffers and between elevators. The screen shall have a minimum height of 7 ft. as per code requirements.

5.3 Elevator Car

A. Car Frame & Platform

The car frame, consisting of upper yoke with cross yoke side braces and bottom frame shall be made of welded or bolted steel channel sections, sufficiently rigid to withstand the operation of the safety-gear without permanent deformation of the car frame. The elevator car, platform, door operating mechanism, safety doors, etc. shall be mounted on car frame.

The deflection of the members carrying the platform shall not exceed 1/1000 of their span under static conditions with the contract load evenly distributed over the platform.

Roller guides, mounted on car frame, shall have individual suspension to cushion jolts and minimize noise and vibration.

The platform shall be of fabricated frame of formed and structural steel shapes gusseted and rigidly welded, with provision for a floor covering as specified with the car body work. Rubber pads of sufficient size shall be provided between the car frame and the platform to provide sound and vibration isolation. The underside of the platform will be covered with sheet steel to provide adequate fire resistance.
An aluminum sill grooved to suit door spuds shall be fitted to the platform together with a toe-guard.

The car bodywork shall be carried on the platform with the top fixing to the car frame being suitably isolated.

All auxiliary equipment shall be mounted and supported from the car frame.

B. Car Body Work

The car bodywork shall be of steel construction with provision for interchangeability of décor finishes and ceiling designs. The roof shall

be constructed to withstand the weight of three men without deformation.

The car top shall have provision for emergency communication and roof trap door with micro-switch. A3 pin socket outlet shall be fitted on top of the Elevator car, besides two outdoor protected type lights one each at the bottom and top of the car operated through an MCB.

C. Finish

The car enclosure shall have decorative applied back painted glass or executive finish panels or as approved by the Engineer/Client. Recessed kick plate 6" high of back painted glass or executive finish panels shall be provided on the three walls of the elevator car. The floor shall be provided with sheet steel and granite flooring or as approved by the Client.

Ceiling shall be of removable type with modular light fittings or as approved by the Client.

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Handrails on two side walls shall be provided with satin finish standard stainless steel hollow section. Fixing brackets shall also be in stainless steel.

The design and finish of car interior together with suspended ceiling, light fittings, floor covering and other fittings shall be to the Engineer's approval. The Contractor shall offer various options of car finish with his bid.

D. Telephone

A telephone compartment shall be provided in each car in the front return panel above the car operating buttons. The compartment shall be provided with hinged door flush with the panel. The entire compartment and door shall be of stainless steel.

The Contractor shall also provide a telephone set in the compartment which shall be connected to the central control center. The intercom connection work with the Central Control Center included in elevator contractor scope of work.

E. Recessed Motion Sensing Unit

The motion sensor unit shall be recessed into the ceiling. Provide a mounting bracket flush to the ceiling for the motion detector unit. The motion detector shall be located and adjusted so that movement of the doors does not generate a false occupancy. Provide the 120 Vac-power supply to the power pack unit of the motion detector.

Programmed Operation: If after a programmable length of time, an elevator car call has not been activated and the sensor detects

elevator car occupancy, the car shall be programmable to proceed with either one of two courses of action. The choice of action shall be selectable by the motion detector switch in the service panel on the Car Operating Panel. The logic and circuitry of this alarm shall be incorporated into the controller circuit. Any auxiliary relay contact required to accomplish this feature shall be provided. This circuit shall be depicted in the schematic diagram of the controller. All occupancies, regardless of operation, shall be reported to the Communication Room.

Automatic Car Call Mode: Upon occupancy detection, the elevator shall automatically generate a car call to the opposite floor if a car call is not activated within an adjustable time of 5 to 30 seconds.

Nuisance Occupancy Mode: If an occupancy is detected without a car call for an adjustable time of 5 to 30 seconds, then the doors shall reopen and remain open with audible alarm until a car call or hall call is generated or the car is vacated.

F. Camera

A 360° camera shall be mounted in the ceiling corner on the front wall opposite of the side of the Car Operating Panel. The camera shall be adjusted to observe patrons inside the Car. The camera shall be housed in a vandal resistant enclosure. The display of the camera shall be available in the control room. All necessary hardware and software shall be provided by the Contractor. The connection work with the central control room included in elevator contractor scope of work.

5.4 Doors

A. Landing Doors

Each landing shall be provided with telescopic side opening doors. The doors, frames and architrave shall be made of stainless steel in satin finish. The door panels shall have a fire resistance rating of at least one hour. The panels shall be interconnected by a maintenance free self-tensioning synchronizing wire rope.

Each landing shall be equipped with a toe-guard apron at the hoist way entrance side. The toe-guard apron shall
be of sheet steel not less than 16 gauge thick, and shall extend not less than 50mm beyond the entrance jamb at each side. Toe-guard apron shall be approximately 2 feet deep, adequately fastened and braced, the lower edge turned inward.

The frames shall be of 14 SWG (min.) and panels fascia, toe-guards, dust and hanger covers shall be of 16 SWG. All other features not covered above shall be similar to that specified under Car Doors.

Each landing entrance shall be equipped with an approved type factory tested interlock as required by the code. The interlock shall be designed to prevent moving of the car away from the landing until the doors are locked in the closed position as defined by code and shall prevent opening of the doors at any landing from the corridor side unless the car is at rest at that landing or is in the leveling zone and stopping at that landing.

Landing door unlocking device as specified by the ANSI A17.l or B.S. 5655: part 1 Code shall be provided to permit authorized persons to gain access to hoist way when Elevator car is away from the landing.

Each Landing door or door panel shall be furnished with sheave type two-point suspension hangers and tracks complete in all respects. The sheaves shall have polyurethane tires with ball bearings sealed and lubricated for life. Hangers shall be provided with an adjustable slide to take the up-thrust of the doors. Tracks shall be of cold drawn steel shapes with smooth surface and shaped to conform to the hanger sheaves. Tracks shall be removable for replacement.

B. Car Doors

The car doors shall be side-opening type. The door-gear shall operate by a fractional kilowatt AC motor with VF drive. The door gear shall be built-in unit with the car door top track support, mounted on the car entrance column extensions.

A retractable car door coupling shall be provided to connect the car and landing doors to eliminate any backlash and ensure complete door synchronization.

The car doors, frame and front shall be of stainless steel (brush finish) with panel construction and other features such as fire rating, etc. similar to the Landing Doors.

The door panels shall be suspended from sheave hangers with polyurethane tires and sheaves running on a polished steel track, and guided at the bottom by non-metallic shoes sliding in an extruded aluminum threshold groove.

If the car is stationary at floor level with the doors closed, it shall be possible to open the car doors from inside the car by pushing the car door in the opening direction. To open the doors from the landings, the triangular key must be used.

C. Door Safety Devices

a) Full Width Light Curtain:

The car doors shall be fitted with light barrier system extending from 25mm above floor level upto a height of 1600mm,

operating between car and landing doors. The barrier system shall comprise of a transmitter and a receiver strip containing several pairs of transmitters & receivers generating a large number of invisible light rays. In case if any one of these rays is interrupted, the control unit immediately reverses the door motion. The light curtain shall recalibrate itself at regular interval to update its scanning cycle.

In addition to above, the car doors shall be provided with an additional safety such as Door closing force limiting device or photoelectric beam etc. to maintain operational safety in case of failure of the main light barrier system.

b) Door Open Timing Feature:

The door operation shall also have door open timing feature operation in conjunction with light rays to provide adjustable, reduced, hold open time once rays are broken and re-established. In the event rays are broken beyond an adjustable time, a buzzer shall sound and doors to close at reduced speed.

D. Door Operator

A variable frequency controlled variable speed door operating unit capable of opening and closing car and landing doors simultaneously shall be mounted on the car frame independent of the car bodywork. The mechanism shall be designed to achieve smooth acceleration and retardation of doors without the use of dashpots. All pivot and bearing points shall be of steel and nylon or bronze bushed pins, ball or roller bearings suitably lubricated shall be fitted.

The driving mechanism shall be designed such that:

The closing force applied to the doors shall meet the requirements of B.S. 5655: Part I.

The car doors can be opened by hand in the event of a mains failure.

The motion of the doors will be reversed if they meet an obstruction. An AC motor with VF drive to provide variable speed shall be provided to obtain the performance required by the control system.

Mechanical Control Station, carrying controls and equipment as specified in B.S. 5655 shall be fitted on the top of the operator.

5.5 Hoisting Equipment

A. General

The elevators shall be MRL (Machine Room Less) type. The complete drive machinery and convertor shall be installed in the overhead of the

shaft as indicated in drawings. The Contractor shall provide exact location of Drive Machinery and other equipment so as to allow sufficient access and space for maintenance work within fifteen (15) days after award of the contract.

Anchor bolts, templates, inserts, signal boxes, and sleeves for installation shall be furnished by the Contractor. Additional structural members such as steel angle, steel beam supports for governors, motors, controller, and rope guards shall also be supplied by the Contractor.

Each hoisting machine and corresponding controller shall be numbered with 100mm high numerals giving elevator numbers.

Sound reducing buffers of elastic material shall be provided under the base of the hoisting machines to isolate sound and vibrations from the building structure. The rotating parts shall be dynamically balanced to eliminate vibration.

B. Hoisting Machines

a) Gearless Traction Type:

The hoisting machine shall be of the permanent magnet gearless drive with motor, brake and other integral parts mounted as one assembly on steel bed plates so that proper alignment of these parts is maintained under all conditions.

Means shall be provided on all elevator machines to enable the elevator cars to be raised or lowered in an emergency by manual operation. The direction of winding corresponding to the raising and lowering of the elevator car shall be clearly indicated.

Manual operation shall be by a smooth-rimmed detachable, spoke less wheel fitted to the shaft.

b) Brakes:

The brake shall be spring actuated, electrically released and of adequate proportions for the duty involved and fitted with two self-aligning shoes actuated by compression springs.

The brake shall be instantly and automatically applied in the event of interruption of the power supply.

The brake shall be capable of bringing the car to rest smoothly, under maximum conditions of load and speed, and capable of sustaining static load of 150% of the contract load.

c) Motor:

The variable voltage (VVVF) variable frequency, motor specially designed to meet all elevator duty requirements shall have a duty cycle rating of a minimum of 180 starts per hour. The motor speed shall have controls to allow smooth transition between acceleration and deceleration phase. The motor shall be capable of stable operation at all speeds upto the stated maximum and no abrupt speed change shall be permitted. It shall have a drip proof enclosure and may be force ventilated.

The drive motor shall be rated to provide sufficient power to accelerate the elevator to full speed in the shortest period while maintaining passenger comfort.

The power system shall incorporate solid state equipment controlling the speed of the elevator motor. Smooth performance with stepless acceleration and deceleration are to be provided with a leveling accuracy of ± 0.25" and the final stop at floor level is to be achieved dynamically after which the machine brake shall be applied to hold the elevator car stationary.

5.6 Hoist-way Equipment

A. Suspension Ropes/Belts

Suspension ropes of high grade steel, specially designed for elevator duty shall be provided in conformity with the requirements of B.S. 329. The material of the rope shall conform to B.S. 2763. It shall be free from loose wires, distorted strands or other irregularities. All rope terminals shall comply with B.S. 461. Independent adjustment shall be provided for each rope.

The length of each rope shall be so adjusted that it loses traction with sheave when the counter-weight touches its buffers.

An automatic device shall be provided for equalizing the tensions of suspension ropes at least at one of their ends.

Suspension belts as per International Standards may be provided as an alternative to suspension ropes. However, Contractor will ensure trouble/ jerk free operation in suspension belt due to power break down problem.

All necessary equipment/ material shall be provided for trouble free operation. Manufacturer certificate on letter head for the same is required with use of suspension belts.

B. Guides, Fixings and Inserts

The guides shall consist of high quality 'T' section steel of adequate strength and dimensions suitable for travel, car weight, speed and elevator capacity. Guiding surfaces shall be accurately machined. The joints shall be spigotted and joined by machined steel finish plates.

Guides shall be of sufficient length to prevent any of the car or counterweight shoes from running off the guides.

All guides are to be securely fixed to the walls of the elevator well by steel brackets bolted to metal inserts or by other approved means. Rag bolts shall not be permitted. All metal inserts, fixings, guide rails, anchor bolts etc. shall be provided by the elevator Contractor.

Guides shall be so jointed and fixed to their brackets that they do not deflect by more than 3mm under normal operation.

Guides and their fixing shall withstand the application of the safety-gear without permanent deformation when stopping a fully laden car or the counterweight.

C. Guide Shoes

The sliding guide shoe shall comprise three slide elements, wherein each slide elements forms a respective. The arrangement shall be suitable for an oil-free mode of operation. Three fastening grooves each for preferably (with respect to the direction of insertion or longitudinal direction) mechanically positive reception of a respective slide element shall be provided in the support element. Support element shall comprise at least one bearing pin formed, preferably monolithically, at the support element. The guide shoe housing shall have a cut-out, which is complementary with the bearing pin.
The sliding guide shoe shall comprise a preferably separate protective element for protecting the slide surfaces from contaminations. The protective element in that case be positioned at the holding element on an inner side facing at least one slide element. In completely assembled position the protective element shall bear against the slide element or slide elements shall sealingly protects these.

D. Counterweight

A counterweight equal in weight to the car plus 40% to 50% of the specified load shall be provided to each elevator. Structural Steel frame shall support requisite number of cast iron weights. It shall be fitted with guide shoes and suspension arrangements and accessories suitable for specified elevator capacity.

E. Safety Gear and Governor

A friction type progressive safety gear actuated by centrifugal over speed governor shall be securely bolted to the car frame under the car platform.

The governor wire rope operating the safety gear mechanism shall not be less than 8mm diameter.

The tension weight fitted with an electrical safety device shall be provided to cause the hoist motor to stop should the governor rope break or slacken.

The governor shall be fitted with a direct driven unit to relay to the control system both the speed and position of the elevator in shaft.

The governor shall be equipped with two electrical switches, preset to operate progressively in case of over speeding to reduce the elevator speed in the first stage and it the elevator speed is not brought under control, operate to cut of power supply to the hoist machine and apply brakes.

If the car continues to travel downwards at excessive over speed, the mechanical trip shall operate causing the governor jaws to grip the rope to bring the safety gear mechanism into operation causing the jaws to grip the guide rails equally through self-aligning friction shoes thus bringing the car to rest gradually and smoothly. The governor and safety gear shall be released by raising the car.

The governor and safety gear shall be adjusted to operate as specified by B.S. 5655.

F. Buffers

Oil buffers of spring-return type shall be supplied and installed in pit under car and counterweight for each Elevator. The minimum total stroke of the buffer shall be based on the retardation of 32 feet/sec^2 based on 115% contract speed. The maximum rate of retardation of the oil buffers based on 115% contract speed shall be 80.5 feet/sec^2 excluding any transient declarations having duration not exceeding 0.04 sec.

The buffers shall be mounted on continuous channels securely anchored to the pit floor and fastened to the guide rails. The channels, anchors and any additional supports required for buffers shall be provided by the Contractor.

The buffers shall be fitted with means of ascertaining the correct amount of oil in the buffers.

Each buffer shall be permanently and legibly marked to indicate the type and quantity of oil to be used within the buffer.

The buffers shall be self-setting type fitted with safety device to ensure its return to their normal position after operation.

G. Final Limit Switches

The elevators shall be equipped with an automatic device arranged to bring the car to a stop at the terminal landings independent of the regular operating devices in the car. Final limit switches should stop the car and prevent normal operation should it travel beyond the normal stopping device.

Separate control devices for normal stopping and final limit switches shall conform to the requirements of BS 5655: Part I.

5.7 Controller & Control System

A. Controller

The controller shall be floor mounted, upright type enclosed in enamel finish steel cabinet with either hinged doors at the front and removable panels at back or hinged door both at front and back.

The control system shall be microprocessor based and fitted with all safety devices to protect equipment and motors from damage in the event of overload or other malfunction. Protection against phase reversal shall provided as per code.

The driving unit control module, comprising of power and command module, shall control drive performance parameters. The controller unit shall control acceleration & deceleration, speed and the jerk rates during change in acceleration or deceleration to provide stepless speed variation for maximum passenger comfort. The jerk rates shall be individually adjustable to user's satisfaction. Upon receiving signal to perform journey, the command module shall evolve optimum speed profile for each journey and trigger power module for AC/DC and DC/AC conversion for necessary drive current and voltage to obtain desired motor torque.

The controller shall control car motion on feedback from motor-mounted tachometer and operate the brakes of hoisting motor through the signals received from micro switches and load weighing devices.

The controller shall be arranged to cut off the power supply, apply the brake and bring the car to rest upon failure of operation of any of the electrical safety devices.

B. Control System

a) General:

The design of control system shall be based on functionally arranged section modules featuring high degree of efficiency, economy of operation, adaptability to changing operating conditions, safety and reliability in operation through maintenance free electronic circuitry.

The control equipment shall be microprocessor based electronic solid state. The total system shall be designed to operate in normal machine room ambience and incorporate full protection against noise and electrical interference generated within the power section, controller and switchgear. The system design shall allow the control algorithm to be reprogrammed by software changes.

The Controller shall be state-of-art microprocessor based controller capable of high- speed data transmission and analysis for optimization of traffic control.

All modules shall be tested at the manufacturer's works prior to installation. System component shall be subjected to environmental endurance, thermal shocks and salt spray in test chambers.

b) Supervisory Operational Mode:

The operational mode of the Passenger Elevator shall be automatic control as specified in para 6.0 with special operation features, viz emergency operation and fireman switch.

The control system shall be provided with a parking feature, which returns the car to the main floor when there are no calls in the system.

The elevator shall be provided with individual landing station and operated from interconnected landing buttons including two operating devices in the car. Single touch buttons shall be mounted at each terminal landing.

On touching car or landing LED touch panels, (other than those for landing at which car is standing) shall start the car provided interlock circuits are established and causes car to start traveling in the direction of registered call. Car shall stop at the designated landings for which calls are registered with stops made in order in which landings are reached, irrespective of sequence in which calls are registered, provided call for a given landing is registered sufficiently in advance of arrival of car at that landing to permit stop to be made.

If there are no car calls and car starts up in response to outside landing calls, car shall proceed first to the highest down call and then reverses to collect other down calls. Up landing calls shall be collected similarly when car starts down in response to such calls. If car stops for a landing call and a car call is registered within a predetermined interval after stop for a landing corresponding to direction car was travelling, car shall proceed in the same direction regardless of other landing calls registered.

If DOWN landing buttons are touched while car is travelling up, car shall not stop at these landings, but calls remain registered. After highest car and landing calls have been answered and door interlock circuit is established, car shall reverse automatically and respond to down car and landing calls. When travelling down, car shall not respond to up landing calls, but calls shall remain registered and answered on next up trip. No double door operation shall be permitted.

d) Load weighing:

Means shall be provided for weighing passenger load. Control system shall be designed to provide dispatching in advance of normal intervals and to provide landing call by-pass when the car is filled to approximately 80-90% of full capacity load.

Settings shall be individually adjustable. A buzzer shall be provided to indicate overload in elevator.

e) Door Operation:

Doors shall open automatically when a car arrives at a terminal to permit egress of passengers. When another car is at the terminal and is loading for departure or upon expiration of a timed interval, the doors shall close until car is designated for loading. In the event a passenger has entered the elevator, the doors shall reopen upon registration of call on the car button or by pressing the door open button. If no other car is at the terminal, an arriving car shall have its doors open until the car is dispatched or expiration of a timed interval with no demand.

f) Automatic leveling:

An automatic 2-way leveling device shall be provided, designed to govern the leveling of the car to within 6mm above or below the landing sill. The leveling operation shall avoid over-travel, under-travel, of the car and maintain the leveling accuracy regardless of the load in the car, direction of travel, rope slippage or stretch in ropes.

g) Independent Operation:

Controls shall be provided for operation of the elevator from car buttons only. A key operated switch shall be provided in each car.

h) Emergency Features:

i) Emergency operation: The Elevator shall be equipped with control system to operate and recall the cars in fire or other emergency conditions and to allow the elevator to run on emergency power supply.

The operation of elevator on emergency service shall be as follows:

- The Elevator shall be operable only by a person in the car.
- Elevator shall not respond to Elevator corridor calls.
- The Elevator will stop at the next level.

The opening of power operated doors shall be controlled only by buttons or switches. If the switch or button is released prior to the doors reaching the fully open position, the doors shall automatically re-close. Open doors shall be closed by either the registration of a car call or by "door close" switch or button.

Elevators shall be removed from emergency service by moving the emergency service key-operated switch in the car to the 'off' position with the car at the main floor.

ii) Emergency Lighting and Emergency alarm unit: An emergency light shall be included for each elevator car. An automatic change over switch shall be provided in the controller so that upon normal supply failure Emergency power supply shall be available for the light fixture, exhaust fan, and alarm unit.

The Contractor shall supply a suitable button in the car control wired to a terminal box fixed in the elevator shaft near the bottom floor served. A suitable alarm bell shall be provided and fixed including all necessary wiring connecting upto the terminal box.

The power for the emergency lighting, exhaust fan and alarm bell shall be from the same emergency supply consisting of rechargeable nickel cadmium battery unit with trickle charger and 10 years minimum life expectancy.

iii) Emergency power transfer: In the event of normal power failure, adequate power will be supplied through Employer furnished stand-by generator to run the Elevator.

iv) Operation under Standby Power: A control signal from the generator shall be provided to the elevator controller or elevator group to place the elevator or group of elevators in emergency power mode, which will cause the elevators to return to the designated floor and remain there with the doors open. If there are a group of elevators, power shall be provided to only one elevator at a time and automatically switch to the remaining elevators until all elevators have returned to the designated floor with the doors open.

v) Intercom: The Contractor shall install for each elevator, an intercom facility with control room or at location designated by Employer for 24 hours communication. All necessary cabling and conduiting is included in contractor's scope of works.

vi) Earthquake control: In the event of an earthquake, the elevator facility shall be provided with a seismic detector which will bring all cars to stop at the next floor and open the doors.

vii) Emergency Rescue Device (ERD): In the event of an power break down, the elevator shall be provided with ERD which will bring all cars to stop at the next floor till the power is resumed.

5.8 Signals & Fixtures

Contractor shall provide fixtures and signals as follows, test complete system, correct any deficiencies in wiring and function and make complete system fully functional. Location and arrangement of fixtures and signs shall comply with the ADA and other code requirements.

A. Integrated Hall Indicator

An integrated hall indicator consisting of digital car position indicator (revealing floor position of car) and illuminated arrows indicating the arrival and departing direction, as determined by the control system shall be installed above each individual elevator and at each landing. A two tone electronic gong shall also be provided for audible announcement of the arrival of the elevator car.

The digital car position indicator shall be either of 2 character 7/8 segment type with character height of 35-40mm.

The direction arrows shall be of acrylic and protrude from the faceplate for lateral visibility.

The integrated hall indicator shall be of horizontal configuration. The stainless steel face plate, min. 2mm thick, of satin finish containing the digital car position indicator and direction arrows. The hall indicator shall operate on 24 V D.C. supply.

B. Landing Call Station

Landing call station fitted with LED Touch Call Panels or stainless steel buttons or as approved by the Engineer/Client shall be installed at each landing. It shall be designed for mounting on the landing door frame or on adjacent side wall, subject to Engineers' approval.

The Call Panels shall be of glass/stainless steel as approved by the Engineer/Client panel suitable for long arduous duty. The translucent surround of the Call Panels shall illuminate to indicate acceptance of call signal.

The Call Panels of each landing station shall be inter-linked such that with the pressing of call button of any elevator, call buttons of elevators in the same direction shall light up and record the call.

C. Car Station

The car station shall be integral with the front return of the car and constructed from Glass LED Touch Panels/Stainless steel as approved by he Engineer/Client.

The hinged full height front panel of the car station shall carry the controls and indicators. The panel shall be fitted with a secret release, which can only be opened from the back of the trough. When the hinged panel is opened an isolate/ normal switch shall be available. The car operating panel shall be recessed in the wall of lift cabin and edges of car operating panel shall be flushed with the wall of lift cabin.

The car-operating panel shall contain at least the following controls with LED Touch Call Panels/stainless steel as approved by the Engineer/Client:

- Alarm button
- One floor button for each floor served
- Open door button/hold on button
- Key operated car independent service switch
- Key operated fan switch
- Digital car position indicator and direction arrows
- Intercom
- Speaker for position announcement

All Call Panels shall be set flush with the panel surface for maximum resistance against abuse. When operated, a LED illuminated halo shall highlighted the screen thereby informing that the call has been registered. The Call Panels shall be made of glass/stainless steel as approved by the Engineer/Client with the appropriate floor marking.

The digital car position indicator and direction arrows shall be positioned above the floor marking.

Separate Car Operating Panel for wheel chairs user with push buttons shall be provided in the car lift with all necessary features.

5.9 Power Supply & Electrical Installations

A. General

The power supply at load break switch will be available in the Elevator machine room. All further wiring, controls and providing proper distribution boards, along with necessary material and accessories beyond the power supply points shall be supplied and installed by the Contractor. The electrical installation and appliances shall comply with B.S. 5655: Part I.

B. Wiring Installation

All wiring shall be carried out in accordance with the IEE regulation, NEC standard and B.S.S. wherever applicable.

All cables shall be PVC insulated, and if required PVC sheathed also, single or multicore having tinned copper conductors. Cables for different voltage circuits which are run together must have the insulation rating, suitable for the highest voltage present. Wherever cables are subjected to high temperature such as termination to car light, it shall be protected by suitable heat resistant sleeve. At all terminations, cable ends shall have numbered ferrule to match with the mark on respective component and control drawings. All wiring shall be continuous between terminations.

Travelling cables between the elevator well and elevator car terminal boxes shall be suspended by looping over reels or by suitable clamps. The connections in the terminal boxes shall be marked for identification purposes.

Travelling flexible cables shall be fire resistant and shall comply with B.S. 6977

C. Trunking and Conduits

All wiring from machine room to motor controls at each floor and to other circuits shall either be run in 16 SWG galvanized steel conduit or trunking, the selection and route of which shall depend on the number

of cables and ease of installation and maintenance. If trunking is installed it shall have removable covers, and the trunking finished in dark grey enamel as per B.S. 381C. Fixing arrangements of conduit of trunking shall be vibration proof suitable for the existing conditions. All connections from trunking or conduits to motors or other equipment subjected to vibration shall be with flexible galvanized steel conduit. All trunking and conduit shall be continuous through out the length to ensure good earth continuity.

D. Earthing

Earthing of all equipment and metal work which can be subjected to dangerous voltage under normal operating and fault conditions shall be earthed in accordance with NEC Standard. One PVC insulated earth conductor of suitable size having yellow colour with green tracer shall be run along the trunking or conduit as main earth. All branch circuits in conduit or trunking and other metal work shall have branch earthing cable connected to main earth. All length of trunking shall also be bonded to main earth.

E. Testing

Testing of electrical installations shall be carried out to the satisfaction of the Engineer in accordance with standard practice and recognized international standards/codes.

5.10 Fire Protection

All precautions will be taken to eliminate the potential sources of fire and smoke sources and prevent flame propagation. In particular:

- Halogen-free cables will be used,
- Oil, grease and dust will be collected,
- No plastic materials shall be used in these systems.

Each elevator will be equipped with a fire and smoke detection unit and linked to the fire detection system.

5.11 Local Materials

A. Pit Screen

A suitable rigid steel screen shall be provided and fixed by the Elevator Contractor at the bottom of the elevator well where the counter-weight comes down on its buffers and between elevators. The screen shall have a minimum height of 7 ft. as per code requirements.

B. Separator Beams & Well Trimming Girders

Properly designed separator beams and trimming girders shall be supplied and installed at proper location in Elevator well by the elevator

contractor to suit fixing requirement of offered elevator. The separator beams and trimming girders installed in elevator shall be of at least 200mm rolled I-beams of prime quality structural steel (ASTM A-36 or equivalent).

C. Trap Door

The Contractor shall provide and install the trap doors of rugged construction in the machine rooms at location shown on relevant drawing to enable access of the hoisting machinery into the machine rooms. The trap door shall be strong enough to temporarily withstand/support heavy machinery. It shall be installed flush with the finished floor when closed and be lockable only from inside the machine room.

The Contractor shall include the above items in his bid price for the elevators.

6.0 TECHNICAL DATA

6.1 Passengers Elevators Schedule
Quantity 01 No.

Sr. No.	Description	Minimum Requirement
01	Type	Machine Room Less Type (MRL) heavy duty VVVF Passenger Elevator fully complied with EN81, EN 81-20, EN 81-50 and EN 81-70 standards.
02	Capacity	630 Kg
03	Elevator Speed	1.0 m/sec
04	Travel Height	As per BOQ
05	No of Stops/Openings	Ground + Three (03) upper floors (04 stops/04 openings)
06	Internal Car Sizes (w x d x h)	(1100mm x 1400mm) x 2300 mm
07	Machine Type	VVVF AC gearless drive
08	Car & Counterweight Guide Shoes	Sliding guide shoes
09	Drive Location	Above in shaft (MRL Type)
10	Control System	Collective selective control with Duplex control
11	Architraves	Full width of Stainless Steel satin finish at all floors.
12	Elevator Shaft Size (w x d)	1676mm x 2057mm
13	Pit Depth	1300mm
14	Head Room	4267mm
15	Buffers	Oil buffers of spring return type (Energy Dissipation type) or as recommended by EN 81 Standards
16	Door Size	900mm x 2100mm
17	Door Operation & Type	VVVF control, Power operated, Side opening stainless steel panel construction and fire rating of 2 hr

18	Indicators	- Digital car position indicator on each landing with direction arrows. - Digital position indicator inside car with direction arrows. - Two tone electronic gong announcing arrival of car.
19	Landing Call Station	- LED touch screen type glass/stainless steel panel with call acceptance illuminated indications.
20	Car Station (02 Nos stations each elevator) (One for wheelchair users as per EN 81-70)	- Integral with the car and constructed of glass/stainless steel and recessed/flushed with wall. Separate handicapped car operating panel with push buttons be included. - It shall include alarm buttons, floor call buttons, door open/hold button, key-operated attendant switch, fan switch, intercom, all buttons shall be of LED touch screen/stainless steel type as approved by the engineer
21	Car Design	- Back painted glass/stainless steel as approved by the client/employer. - Car door of stainless steel (hairline finish) construction as approved by the client/employer. - Full width half height mirror on rear wall or as per manufacturer design. - Ceiling removable type full extended poly carbonate diffuser with modular light fittings as approved by engineer - Ventilation Blower (Pre-Installed) - Handrails on two side - Granite Floor - Inter Telecommunication system - Emergency exit - Load measuring device with overload buzzer and inter-lock till overload is removed. - LED Lighting
22	Door Safety Devices	- Full height Light curtain protection (2D) - Door opening timing feature
23	Special Features	- Attendant control - Emergency operation and fireman switch. - Emergency lighting & alarm unit. - Earthquake control system - Voice guidance system - Connected with building control - Suitability for 40°C ambient temperature (but operate able up to 45°C ambient temperature) - Phase reversal failure indication & interlock - Manufacturer Security Cameras for surveillance (Connection with building safety/security is included in Contractor's scope) - ERD Device (Emergency Rescue Device with battery backup) - Manual Brake Release Lever - Halogen free cables

24	Interior Finish	Superior/Highest/Executive quality as per approval of engineer on submitted samples.
25	Minimum Functions	-Direct Leveling - Optimum travel curve - Re-running automatically when elevator is re-powered - Car location adjusted automatically - Load compensating - Travel Counter - Over/Under voltage protection - Phase trip protection - Over current protection - Over heat protection - Encoder trip protection - Contact adhered protection - Bi-directional over speed protection - Reversal protection - Travel over time protection - Final terminal protection - Over load protection - Anti door lock bridge - Automatic by-pass hall call while full load - Level for self-helping - Travel to next floor when open door trip - Emergency illumination in car - Emergency alarm - Automatic car fan - Automatic car lighting - Fire return feedback - Settable landing number - Automatic parking, parking floor -Car call cancelable -Parking key switch, landing - Fire return (Phase I), Main landing -Hoist way lighting - Car door button
26	Trips/hour	180 minimum
27	Power Supply	- 3 Phase / 400V / 50 Hz. - 1Phase/230V/50 Hz. (for lighting)

28	Ambient Condition	0°C to 40°C
29	Inspection & Test	English
30	Elevator Mode	Two Mode: - Normal Mode: From the car or from the landing. - Maintenance Mode: Low speed (inspection running).
31	Design Life	25 Years

NOTE:

1. Bidder is advised to visit the site to check dimensions of elevator shaft to be constructed, overhead and pit and confirm in his bid that offered elevators will suit to as design dimensions.

2. All leaflets properly signed/stamped in original to be submitted with the bids for the equipment including drive, controls, car design, doors & architrave, indicators landing and car station, safety devices etc. being offered.

3. Model Number and Technical Specifications mentioned in Technical Bid are considered for reference only. The Bidder/Contractor will submit Technical Submittal of the proposed model after award of work with full compliance of Bidding Documents for the Engineer's review and approval. No reference model and technical specifications accompanied with the Bid are supposed to be final until Engineer's approval of the Technical Submittal.

4. Any variation in the technical aspects of the offered model by the Bidder, against the above data, due to manufacturer's standards will be subject to Engineer's approval.

6.3 Major Elevator Parts with their Country of Origin for all Elevators

Following elevator parts shall be supplied from given origin and manufacturing factory location. This shall be complied by recommended manufacturer or approved equal manufacturer

Sr. No.	Description	Manufacturing Source
01	Machine	As per offered Country of Origin of Elevator
02	Controller	As per offered Country of Origin of Elevator
03	Governor	As per offered Country of Origin of Elevator
04	Safeties	As per offered Country of Origin of Elevator
05	Door Operator	As per offered Country of Origin of Elevator
06	Car Door	As per offered Country of Origin of Elevator
07	Floor doors	As per offered Country of Origin of Elevator
08	Door Protection Device	As per offered Country of Origin of Elevator
09	Traction Belt	As per offered Country of Origin of Elevator
10	Car Operation Panel	As per offered Country of Origin of Elevator
11	Hall Buttons & Fixtures	As per offered Country of Origin of Elevator
12	Car cabin	As per offered Country of Origin of Elevator
13	CWT filler	As per offered Country of Origin of Elevator
14	Car Rail	As per offered Country of Origin of Elevator
15	CWT Rail	As per offered Country of Origin of Elevator
16	Travelling Cable	As per offered Country of Origin of Elevator

7.0 INSTALLATION

A. General

The installation of elevator equipment including its electrical installations shall comply with applicable standards, manufacturers' instructions and recommendations. Electrical work required during installation shall comply with NFPA 70 or approved equivalent.

The scope of installation and civil works shall include the following:

- Providing and/or cutting all necessary holes, chases and openings and making good after installation of equipment.

- Supplying and fixing all supports, beams, ladders etc. necessary for the installation of the machinery, guide brackets, doors, buffers etc.
- Furnishing all necessary cement and/or concrete for 'grouting-in' brackets, bolts, etc.
- Providing and fixing suitable scaffolding and protection of work in progress.

B. Welded Construction

Welded construction shall be provided for installation of Elevators wherever bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, or replacement of worn parts. Welding workmanship and qualification of welding operators shall comply with American Welding Society (AWS) standards or approved equivalent.

C. Sound Isolation

Rotating and vibrating Elevator equipment and components shall be mounted on vibration - absorption mounts designed to effectively prevent the transmission of vibrations of the structure, and thereby eliminate the sources of structure - borne noise.

D. Lubrication

Operating parts of the system including ropes, guides, etc., shall be lubricated as per manufacturer's recommendation.

E. Alignment

Proper co-ordination of installation of hoistway entrances with the installation of elevators' guide rails shall be done for accurate alignment of entrances. Wherever possible the final adjustment of sills and doors shall be delayed until the car is operable in the shaft. The clearance shall be reduced to minimum, safe, workable dimensions at each landing.

F. Sills

Sill unit shall be set at each floor landing accurately aligned, slightly above structural floor, to suit level of scheduled floor finish.

G. Painting, Retouching & Re-finishing

After completion of installation and testing to the satisfaction of the Engineer-in-Charge, the Contractor shall carryout all finishing, retouching and refinishing operation on the entire equipment accessories and installation matching the original finish in an approved way. All auxiliary works carried out by the Contractor as the

finished installation shall also be painted in the approved standard after applying anticorrosive base.

8.0 TESTING AND INSPECTION REQUIREMENTS

The Contractor shall submit separate list of shop tests, to be conducted prior to shipment and field tests after installation prior to commissioning.

The Contractor shall arrange pre-shipment inspection of the equipment as per requirements given in clause of Sec.8510.

Testing after installation shall be carried out for each elevator before it is put into normal service in accordance with B.S. 5655 Part 10 and appropriate certificate shall be completed. The tests shall include but be not limited to the following:

- Functioning of all system and devices
- Operational test of all safeties
- Protection against false signals
- Earth fault test on cable/controller & switch gears
- Insulation resistance test for cables

A thorough inspection of all equipment shall also be undertaken at this stage and appropriate certificate shall be completed.

Elevator shall be periodically re-examined during defect liability period and at the end of guarantee/defect liability period appropriate certificate shall be completed to assess operational performance.

All equipment and personnel required to complete testing and inspection shall be provided by the Contractor. All erection work and tests shall be performed by the Contractor's erectors who shall be suitably qualified and experienced persons to the satisfaction of the Engineer.