PURCHASE SPECIFICATION

EM-PS-ELE-2912-13

PASSENGER ELEVATORS

MANGDECHHU HYDROELECTRIC PROJECT AUTHORITY (BHUTAN)

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1.0 INTRODUCTION

An Elevator (or lift) is a vertical transport vehicle that efficiently moves people or goods between floors of a building. They are generally powered by electric motors that drive traction cables and counterweight systems.-

2.0 SCOPE OF WORK

This scope of specification covers provision of all labour, tools, plant, materials and performance of all works necessary for the design, manufacture, quality assurance, quality control, shop assembly, shop testing, proper packing, delivery at site, site storage and preservation, erection testing and commissioning, performance testing, acceptance testing, training of owner's personnel, handing over to customer and guarantee for 2 years of elevator as per specifications hereunder, each complete with all auxillaries, spare parts and warranting a trouble free operation.

Scope of supply:

1 no. 20 passenger Elevator complete with control and accessories and Embedded parts, scaffolding, fire service switch, sound-reducing systems, safety devices, pit ladder, indicators, facia and alarms etc. along with spares as listed below:

S. No.	Description	Qty.
1	Motor of all type and size	1 no.
2	Brake lining	4 sets
3	Brake motor / Electromagnetic brake	1 no.
4	Fixed brake disc	1 no.
5	Car door guide rollers	2 sets
6	Landing door rollers	2 sets
7	Special Tools & Instruments for repair and maintenance	1 set

2.1 COMPLETENESS OF THE EQUIPMENT

All fittings and accessories of Elevator that may not have been specially mentioned in these specifications but are usually necessary for completion of equipment, shall be deemed to be covered by the specification and shall be indicated and furnished by the Vendor without any extra charges to the BHEL. Vendor is responsible for supply and E & C of the system at site for trouble free operation.

3.0 STANDARDS

The system and equipment shall be designed, built, tested and installed to the latest revisions of the applicable standards listed below or equivalent.

Sl. No.	Description	Applicable Standard
1.	Outline dimensions of Electric Traction Passenger Lifts.	BIS: 14665 : 2000 (Part I)
2.	Code of practice for Installation, Operation & Maintenance of Electric Traction Lifts for Passenger, Goods & Services.	BIS : 14665 : 2000 (Part 2 Sec. 1&2)
3.	Safety rules for Electric Traction Lifts for Passenger, Goods & Service.	BIS: 14665 : 2000 (Part 3 Sec. 1 & 2)
4.	Components Lift buffers, Lift Guide Rails & Guide Shoes, Lift Car Frame, Car Counter Weight and Suspension, Lift safety Gears & Governors, Lift Retiring Cam, Lift Doors, Locking Devices and Contacts, Lift Machines and Brakes, Lift Wire Ropes, Controller and Operating Devices.	BIS: 14665 : 2001 (Part 4 , Sec. 1 to 9)
5.	Inspection manual for Electric Traction Lift	BIS: 14665 : 1999 (Part 5)

4.0 GEOGRAPHIC DETAILS OF PROJECT SITE

The project is located at high altitude area with atmospheric temperature variation between (-) 7°C to (+) 36°C.Different systems of Elevator shall be suitably designed and materials for different components shall be selected suitably to remain undistorted under the wide variation of atmospheric temperature. **(Annexure – I).**

5.0 SPECIFIC TECHNICAL & FUNCTIONAL REQUIREMENT OF SYSTEM

	LIFT
1. Type of service	Passengers
2. No. of the passengers/load capacity of the lift	20 passengers / 1360 Kgs
3. Rated speed -	1.0 m/sec.
4. Total length of travel for serving	24 meter.
5. No. of floors to be served	At EL 1012.00, 1017.00, 1021.50, 1026.00, 1030.50, 1036.00 (As PER BHEL Bhopal REVISED Drawings "Power house longitudinal section" drg No 02000019257 REV 01 by mail dt.

	16.04.2014)
6. Method of control	Variable voltage and variable frequency (VVVF) control system.
7. Position of machine room	Directly above the lift well, above top most landing
8. Inner dimension of lift well	2345mm(W) x 2350mm (D) *
9. Construction, design -	Stainless steel paneling, one fan of suitable capacity and adequate lighting shall be provided in the car. The car floor shall be of stainless steel construction.
10. Car entrances	
a) Number & type	One number, made of stainless steel, auto Centre opening, sliding, double closed door
b) Method of operation	Electric power - operated with automatic door opening and closing devices.
11. Operation & interlocks	Selective or collective automatic operation with or without attendant. The lift operation shall meet the following requirements:
	i) Lift shall not move unless the car door, landing doors and all other protected openings connected with control circuit are closed.
	ii) Landing doors shall be interlocked so that the landing door of any floor shall not open when the lift is not on that floor.
	iii) Push button control inside the car for holding the doors open for any length of time required.
	iv) Push button control at all landings to call the car.
12. Signals	i) Digital direction and floor indications with Up/Down indications at all landing floors.
	ii) Digital direction and car position indicators inside the car.
	iii) Lift communication shall be connected to power house communication system.
	iv) Rechargeable battery operated alarm bell & emergency light.
	v) Inter communication system should be extended upto control room, so that message can be directly given to control room in case of accident, emergency, power failure, breakdown etc.
	vi) The following additional signals also to be provided: • Overload indication • Emergency stop button
	vii) Auditory signals, Braille symbols shall be incorporated in lift.
13. Electric supply	
a) Power -	AC 415V, 3 Phase, 50 Hz
b) Lighting and fan inside the car	AC 240V, Single Phase, 50 Hz
14. Braking arrangement	Electromagnetic brakes
15. Duty cycle	100 to 120 starts per hour
16. Safety system for closing and opening of the door.	Infra-red Light curtain system.

Note: * The lift well size is as per approved customer civil construction drgs.

5.1 GENERAL:

5.1.1 The construction of elevators shall be such that all motions shall take place smoothly and positively with no slippages, jerks and vibrations.

5.1.2 Elevator shall be provided with all safety devices, alarms, fire service switch etc.

5.1.3 Elevator shall be supplied in accordance with " General Technical Specification Annexure-A"

5.2 LIFT CAR:

5.2.1 Elevator car shall be carried in a complete **frame** of steel, sufficiently rigid to withstand the operation of the safety gear without permanent deformation to the car frame.
A solid **roof** capable of supporting two persons that is 2 x 68 kg shall be provided.
Car doors shall be constructed from at least 1.5 mm thick (16 gauge) sheet steel and stainless steel cladding.
Platform shall be of framed construction of steel. Car floor shall be of a flat non-slip surface or chequered surface
Car Interior Details:

- Material for car cabin SS 304, hairline finish 16SWG
- SS handrail one on the left and other on the right side
- Emergency exit of 650x400 size
- SS handrail near emergency exit
- LCD display
- Phone connected to EPBAX system
- Vision panel
- MS 10 SWG with antiskid PVC stud flooring in grey colour
- LED lights; 4 no's
- Pressure fans
- The operation of the doors shall be so arranged that car doors and landing door open simultaneously.
- A switch shall be provided inside the car, designed to open the control circuit to cause the lift car to stop during emergency.
- The car enclosure and doors (car door as well as landing doors), including their tracks of every lift car shall withstand a thrust of 345 N applied normally at any point, excepting any vision panel, without permanent deformation.
- A three-pin plug socket with switch for a hand lamp shall be fitted on the roof of the lift cars for use by persons working thereon.
- An annunciator to announce, inside the car, in case the lift is overloaded and announcement for the particular floor on arrival.
- Temperature indicator
- Time clock

5.2.2 The lift car shall be made of steel frame provided with closed roof. Any opening work in the roof of the lift car shall be sufficiently closed with casing to provide reasonable protection against falling articles to any person traveling in the car. The car floor shall be of stainless steel construction

5.2.3 The lift car shall be provided with adequate lighting and ventilation. The car shall be fitted with a fan of adequate capacity and it shall not run when the lift is not in use. A three-pin plug socket with switch for a hand lamp shall be fitted on the roof of the lift car. Vision to be provided in elevator for auto landing to nearest floor in case of power Failure.

5.2.4 Lift car platforms shall be of framed construction designed to suit the conditions of the landing. The minimum factor of safety shall meet the requirements of IS 14665.–Mechanical Pressure detection system for opening / closing of Landings and Car Doors.

5.2.5 Glass shall not be used in lift car except for covering the lighting fixtures and for the vision panels and mirrors. The total glass area in any case shall not exceed the limits specified in IS 14665.

5.2.6 The car doors shall be solid sliding type, Centre opening and shall be equipped with power operated automatic opening and closing devices. The operation of doors shall be so arranged that they cannot be opened, unless the lift car is within the landing zone. The doors shall be guided at top and bottom. The car door shall be so designed that their closing and opening is not likely to injure any person traveling in the car. The door shall be provided with sensitive reopening arrangements on the moving edges, which are likely to come in contact with person/ person entering or coming out of the car. The doors and their tracks shall be capable of withstanding thrust as IS 14665.

5.2.7 The car shall be provided with an emergency alarm push button in red colour.

5.3 LANDING DOORS:

5.3.1 Suitable inter-locks shall be provided for opening or closing of both the doors simultaneously.

5.3.2 All landing openings in the lift well enclosure shall be protected by providing the solid sliding doors, similar to the car doors and shall extend the full height and width of the landing opening. The doors shall be provided with automatic opening and closing devices.

5.3.3 Every landing door shall be fitted with a locking device to ensure that it shall not be possible to open the landing door from landing side until the lift is within that particular landing zone. The locking device for landing zone shall be so designed that the lock contact is not closed until the door is closed. The levers operating the locking device shall not interfere with the landing side or lift enclosures. Provision shall be made to prevent the opening of any landing doors when the car is passing that zone in response to call from another landing.

5.3.4 Note: All Car doors & Landing doors orientation shall be on same side.

5.4 Counter Weights

5.4.1 Suitable counter-weight of metal shall be provided as per IS 14665.

5.4.2 The counter weights shall withstand the effect of buffer impact.

5.5 Suspension Ropes

5.5.1 The car and counter-weight shall be suspended by traction steel ropes. Chains shall not be used for suspension. Car and counter-weight ropes shall be in one piece and without intermediate joints. All ropes shall be anchored to a winding drum which shall have not less than one complete turn of the ropes on the winding drum when the car or counter weight has reached the extreme limit of its travel. The hoist rope shall include adjustable self-aligning hitches.

5.5.2 The minimum factor of safety shall be five.

5.6 Shaft and Main Driving Gears

5.6.1 All shafts and axles shall be made of steel. They shall have sufficient rigidity and bearing surfaces.

5.6.2 No friction gearing, belt, chain, clutch or chain driven mechanism shall be used for connecting the main driving gear to the traction sheaves.

5.7 Guides for Car and Counter Weights

5.7.1 Guide rails for the counter weight shall be machined 'T' sections and continuous throughout the entire length and shall be provided with adequate steel brackets or equivalent of such designs and spacing that the guide rails shall not deflect more than 5 mm under normal operation.

5.8 Buffers

5.8.1 Buffers of oil/spring type shall be fitted under the lift car and counter weights directly or on the pit floor with suitable concrete or steel foundation. The buffers shall be capable of stopping the car or counter weight at the extreme limit of travel without permanent damage or deformation to itself or any part of the lift equipment.

5.9 Governors

5.9.1 The lift shall be equipped with an over speed governor device which shall apply the safety gear in the event if the speed of the lift car and counter weights in the descending direction exceed the predetermined limit specified in IS 14665.

5.10 Safety Gears

5.10.1 The lift shall be provided with suitable safety devices attached to the lift car frame and placed beneath the car. The safety devices shall be capable of stopping and sustaining the lift car with full rated load in the car at governor tripping speed or in the event of failure of suspension ropes.

5.10.2 Car and counter weight safety devices shall be actuated by separate governors. Vibration of the lift car frame shall not cause the safety gear to be applied.

5.10.3 Safety gear shall not stop ascending of lift or counter weight. The governor shall, however, open the motor circuit and apply the break in the event of over speed in the ascending direction. The safety gear shall meet all other requirements specified IS 14665.

5.10.4 Safety device like ARD (automatic rescue device) shall be provided as per latest practices

5.11 Electrical Equipment and Controls

The electrical equipment, control and interlocks shall be furnished complete for a fully automatic elevator. It shall provide smooth and uniform acceleration, retardation, and automatic slow down and stopping at all landings independent of the loading within its rated capacity. Electrical system shall consist of hoisting/lowering motors, brakes, automatic door operators, terminals and final limit switches, car lighting, signal lights and intercom set.

5.12 Variable Voltage Control Equipment

The control shall be variable voltage variable frequency (VVVF) control system, which shall be arranged to provide smooth and constant acceleration and retardation under all conditions of operation.

5.13 Electric Motors

The driving motors shall conform to I.S.325 and shall be of suitable capacity for the duties specified. The rated capacity and torque characteristics shall properly match the requirements of lift for the specified duties. All motors shall be squirrel cage induction type, suitable for operation at 415 volts, 3 phase, 50 Hz and shall give satisfactory continuous operation within the limits of voltage and frequency variations specified. The breakdown torque of the motor shall be not less than 225% of full load torque with rated voltage and frequency. The bearings of the motor shall have ample strength to withstand the heavy shocks and vibrations to which they may be subjected to in service without undue wearing. Motors shall be screen- protected type with class-F insulation or better.

5.14 Earthing

The lift structures, motor frames and metal cases and all electrical equipment, including metal conduits or cables armoring guards shall be sufficiently bonded and earthed to the earthing conductors provided in the machine room.

5.15 Brakes

The lift drive shall be equipped with automatic electro-magnetic brakes.

5.16 Control

The control shall be microprocessor based control with the operational card file containing a logic board with Microprocessor chip, Random Access Memory (RAM) and Erasable Programmable Read Only Memory (EPROM) chips to monitor and take over the commands of the elevator shall

be provided.The Motion control shall consist of high performance, fully digital control VF drive which shall directly control the torque and speed of the Elevator Motor; and thus provide constant speed control under all load condition and Pulse Width Modulation technique shall be used for speed control. A large number of user-friendly features shall be included in the microprocessor-based controller such as:

- Motor Over current protection (Built in inverter drive)
- Fast speed/ deceleration protection
- Passenger Overload Warning
- Overload non-starter

5.17 Car operating panel

At least the following facilities shall be included in the car operating panel of each elevator:

- Red push button / switch for emergency stopping,
- An Alarm button. Communication (speaker phone, grille, and push-to-call button).
- Overload indicator,
- Digital floor and direction indicators,
- Facility for transfer from normal passenger control to car preference feature by a key operated switch in the car,
- "DOOR OPEN" button, "DOOR CLOSE" button,
- Car fan and light switches,

5.18 Emergency exit

Car top for the elevators shall be manufactured with a hinged emergency exit panel held in place with non-removable fastening devices at each corner, and manually openable from top of the car and key-openable from inside. Exit shall be equipped with electrical contacts that will prevent operation of car when exit door is open and cause the alarm bell to ring.

5.19 Communications

A telephone system in stainless steel cabinet shall be provided for each elevator. A speaker type intercom with push-button to activate shall be installed in the car. In addition to above provision shall be there to install a telephone connected to power house EPBAX exchange

5.20 Audible signals

Audible signal at each floor landing and in the car shall sound coincident with the digital indicators. The audible signal shall be not less than 20db with a frequency not higher than 1500Hz.

5.21 Car lighting, ventilation, fan and other utilities

Each elevator car shall be fitted with a luminous ceiling light which shall be left burning during the whole time the elevator is available for use. Provisions shall be made for adequate ventilation, a fan, a battery operated emergency light and a battery operated emergency alarm inside the elevators.

5.22 Landing fixtures

At each landing, hall push buttons as per requirement shall be provided. A digital hall position indicator with direction Indication shall be installed at every landing. All hall push buttons shall illuminate after pushing until Elevator reaches the landing. Push buttons and indicators should be flushed with wall. A fire service switch for each elevator shall be located at every landing.

6.0 DELIVERY, INSTALLATION AND COMMISSIONING

The Vendor shall follow the requirements of Delivery, Installation and Commissioning. In order to avoid pilferage, misplacement, damage to the various elevator components, all items are to be duly packed in suitable size wooden boxes & then to be packaged in Container, before dispatch of material to site. All components are to be duly verified during inspection vis a vis packing list prepared by vendor, before sealing of container.

7.0 QUALITY ASSURANCE AND TESTING

The equipment offered shall be of proven design; materials utilized shall be of that which have been established for use in such applications. The Vendor shall follow the duly approved QAP during manufacturing, shop testing, E & C and final testing at site without any price implication at later stage Details of the tests are given bellow.

7.1 Type Tests

The contractor is required to carry out all type tests as per relevant IS / international standards on one apparatus of each type of similar rating and shall submit the reports to the employer not older than 5 years.

The type tests may not be mandatory if similar equipment has been type tested and test certificates for relevant tests are furnished and accepted by customer. However in absence of such type test reports / in case submitted reports are not approved by customer, bidder shall conduct all such type tests as per relevant standards & reports shall be submitted for BHEL / Customer approval without any price implication to BHEL.

7.2 Shop Tests

The components of Elevator shall be routine tested as per relevant IS with latest amendments. Following shop tests shall be carried out at the manufacturer works:

- Dimensional Checks for Car Assembly and
- Tests for Operation:
  - Satisfactory Operation of each controller, switch, contractor, starter, retiring, cam, relay and other control devices and the correct operation of all limit switches under the most unfavorable conditions,
  - Correctness of all circuits and Interlocks and sequence of operation.,
  - Satisfactory Operation of all Protective Devices,

- IR Test of Control Panel and
- H. V. Test of Control Panel.

The details of test mentioned above are given in Model Quality Assurance Plan of Elevator – Annexure B.

7.3 Field Tests

All field tests listed in the QAP, including tests during installation, pre- commissioning, and commissioning and field acceptance tests shall be conducted by the Vendor, in the presence of representative of BHEL / customer.

Procedure to be adopted for conducting the operational, precommissioning, Commissioning, performance and field acceptance tests shall be submitted well in advance, at least six (6) months before start of relevant testing, for approval of the customer.

7.4 Tests during Installation and Commissioning

The elevator shall pass at least the following tests when carried out at site before it is put normal service.

The necessary test weights and instruments shall provided by the vendor

- Test to determine that the insulation resistance between power and control lines and earth is not less than 0.5 M Ω when measured with a dc voltage of 500 V should be carried out with the conductors so connected together as to ensure that all parts of every circuit are simultaneously tested.
- Test to determine that the earthing of all conduit switch casings and similar metal work is continuous and of low resistance.
- Test to determine that the motor, brake, control equipment and door locking devices and limit switches function correctly,
- Brake to be tested to check whether it can sustain a car at rest with 25% of contract load,
- Test to determine that the elevator car raises and lowers rated load,
- Test to determine that the elevator car at least achieves the contract speed.
- Test to determine that the safety gear stop the elevator car with rated load,
- Over–speed tests shall be made with ropes attached and all electrical apparatus operative except the over-speed switch on the governor.

7.5 Field acceptance tests

Following field Test shall be carried out by the manufacturer/ contractor:

- Checking of clearance and alignments,
- Brake Testing (At 25% extra rated load),
- Earthing Test,
- Insulation Resistance Test for Panel and Elevator,
- The correctness of all circuits and interlocks and their sequence of operation.

8.0 DRAWINGS, DOCUMENTS AND DESIGN CALCULATIONS

The Vendor shall submit drawings and documents listed below after the award of contract.

8.1 The Vendor shall submit the design covering at least the following for review / approval by BHEL / Customer

- Detail dimension of wells,
- Calculation for selecting the rope, motor size and speed of the elevators, control & Protection
- GA Drawing for Lift, Machine room, Earthing, control panel,
- BOM, Catalogue

8.2 Construction methodology

The well for elevators shall be constructed by customer, however, scaffoldings any other equipment, material etc. required for the erection of the elevator shall be arranged by the Vendor. The Vendor is required to provide all dimensions of well for proper construction. If any chipping work is required the same shall be carried out by the assembly & commissioning of the equipment shall be done by skilled workers in workmanlike manner.

9.0 DOCUMENTS/ DATA REQUIRED TO BE SUBMITTED ALONG WITH BID

a) Catalogue of each item / machine along with the Data Sheet (**Annexure – III**) duly filled.

b) The Bidder shall submit **CHECK LIST** of the equipment as per data sheets at **Annexure –II** on placement of purchase order.

c) List of special accessories as listed in the specification in terms of numbers indicating sizes / rating with price.

d) Bidders to indicate number of packages of consignment with approximate size of packing box (L x W x H) and gross weight, package wise with bid.

e) Bidder to submit list of bought out items indicating their make in bidding document.

f) **The Bidder shall submit a list of similar installation of the equipment.**

g) **Deviations.** The Bidder shall indicate the deviation, if any, in Schedule of Technical Deviation, as per **Annexure – IV**, together with the justification for the deviation.

h) Signed & stamped copies of Quality Assurance Plans for manufacturing, erection, commissioning as specified in this specification.

10.0 DOCUMENTS REQUIRED TO BE SUBMITTED AFTER THE AWARD OF ORDER.

10.0 DOCUMENTS REQUIRED TO BE SUBMITTED AFTER THE AWARD OF ORDER.

a) All drawings shall include / show plan, elevation, side view, cross– section, skin section, blow – up view and all major self-manufactured, bought out items, standard as well as optional accessories which are covered under the bidder's scope of supply shall be labeled and included in BOQ / BOM in tubular form.

b) Requirement of withdrawal space for maintenance, if any, shall be shown in general arrangement drawing in dotted lines with dimensions from the reference point like edge / centre of the machine.

c) Recommended clearance / maintenance space around the machine shall be shown in the general arrangement drawing in dotted lines with dimensions from the reference point like edge / centre of the machine.

11.0 VENDOR TO INSURE SUBMISSION OF THE FOLLOWING DOCUMENTS ALONG WITH THE SUPPLIES

11.1 O & M Manual

11.2 **Model Packing List** indicating total number of accessories along with loose (which shall be assembled during erection), spares and tooling which were included in the bid by the vendor. It shall indicate quality and quantity of items as per the scope of supply under the purchase order.

11.3 **Test Certificates:** The vendor shall furnish all test certificate / factory test report along with supply of material.

11.4 **Performance Guarantee**: Vendor shall furnish a Performance Guarantee Certificate for all the equipments
Instruments along with material supply.

11.5 **Warrantee Certificate :** Vendor shall furnish Warrantee Certificate for a period of 18 months from the date of delivery or 24 months from the date of commissioning whichever is later.

ANNEXURE I

GEOGRAPHIC DETAILS OF THE PROJECT SITE

Project Name	MANGDECHHU HYDRO ELECTRIC PROJECT AUTHORITY (BHUTAN) 4X180 MW
Project Address	Near Chunjapang village, Gelephu-Trongsa Highway, Dist Trongsa Dzongkhag. Bhutan.
Nearest Rail Head	New Bongaigaon, Assam, India
Nearest Village	Chunjapang
Nearest Airport	Paro (Bhutan), Guwahati (Assam –India)
Latitude	27 ° 28' 48" N
Longnitude	90 ° 29' 41" E
Minimum *Winter* temp. at project site	(-) 7 °C
Max *Summer* temp. at project site	(+) 36 °C

ANNEXURE II

CHECK LIST FOR DOCUMENT TO BE SUBMITTED WITH BID.

(Bids are liable to be rejected if the Bidder does not furnish the technical data in the schedule given below)

SR. No.	Description	To be filled by Bidders
1	Submission of Data Sheets	**To be filled in the format given in Annexure III**
2	Equipment catalogue / drawing	
3	Reference List of similar installations submitted.	
4	List of all embedment parts / foundation details.	
5	List of special accessories.	
6	Type test reports.	
7	List of bought out items.	
8	Factor of Safety :: (IS : 14665)	
9	Relative Duty Factor (IS : 14665)	
10	Number of start ups per hour. (BS : 5655)	
11	Degree of Protection (IS : 14665)	
12	Type of Speed Control (IS : 14665)	
13	Confirm lift travel as per specification.	
14	Confirm number of landings as per specification	
15	Confirm orientation of lift doors as per specification.	
16	Confirmation for accepting QAP as per Specification.	
17	Technical Deviation if any.	

Seal

Signature of the Bidder

Annexure III

DATA SHEET TO BE SUBMITTED BY THE VENDOR

(Bids are liable to be rejected if the bidder does not furnish the technical data in the schedule given below)

Name of Project / Tech. Data	MANGDECHHU
No. of the passengers/load capacity of the lift	
Design Code	
Type of service	
Travel	
No. of floors to be served	
Method of control	
Position of machine room	
Inner dimension of lift well	
Size of Lift Car (Internal)	
Construction, design of car	
Car entrances	
Door operation	
Signals	
Hoist way entrance	

Electric supply	
Electric safety device	
Driving motor	
Braking arrangement	
Duty cycle	
Max live load on landings	
Orm gear	
Safety system for closing and opening of the door.	
Driving sheave	
Driving ropes	
Car ventilation	
Car lighting	
Levelling accuracy	

Seal

Signature of the Bidder

Annexure IV

TECHNICAL DEVIATIONS (IF ANY)

(Bidder to specify deviations, if any, along with their bids in format given below. Vendors seeking deviations after Bid opening shall amount to rejection of their bid). Deviation specified anywhere else in their offer shall not be considered.

Cl Ref.	DEVIATION

Seal

Signature of the Bidder

29 ELEVATOR

29.1 Scope of Work

Scope of work under this section covers the provision of labour, tools, plants, materials and performance of work necessary for the design, manufacture, quality assurance, quality control, shop assembly, shop testing, delivery at site, site storage and preservation, installation, commissioning, performance testing, acceptance testing, handing over to MHPA and guarantee for two years of elevator, as per the specifications hereunder, each complete with all auxiliaries, accessories, spare parts and warranting a trouble free safe operation of the installation.

The scope of work shall be a comprehensive functional system covering all supply and services including but not be limited to following:

29.1.1 Elevator

i) One (1) 20-passenger elevator for the powerhouse complete with control and accessories.

ii) Embedded parts, scaffolding, fire service switch, sound-reducing systems, safety devices, pit ladder, indicators, facia and alarms etc.

iii) Spare parts in accordance to clause 29.8 "Spare Parts" of this section.

iv) Tools and instruments in accordance to clause 29.9 "Tools and Instruments" of this section

Any other item(s) not mentioned specifically but necessary for the satisfactory completion of scope of work defined above, as per accepted standard(s) / best international practices.

29.2 Specific Parameters and Layout Conditions

29.2.1 Layout and General Arrangement

The construction of elevator shall be such that all motions shall take place smoothly and positively with no slippages, jerks and vibrations. The elevator shall be provided with all safety devices, alarms, fire service switch etc. There shall be provision in elevator for auto landing to nearest floor in case of power failure.

Matching frame for door openings in respect of all landings shall be provided by the contractor.

The well for the elevator shall be constructed by the civil Contractor.

The elevator shall have best and modern design with interior of aesthetically pleasing appearance and having adequate illumination and

shall suit to the industrial requirement. The interiors and exteriors shall be approved during detailed engineering.

29.2.2 Safety considerations

To ensure the safety, the car doors and the landings doors shall always open and close simultaneously.

In the case of an extreme variation in supply voltage (outside of the exceptional limits established in the specification elsewhere) all safety functions shall be ensured.

In case of flood or fire alert, a safety device shall ensure automatic return of the cabin to the floor access level. Automatic Rescue Device with voice announcement should be provided, which should get activated during emergency situations like power failure etc. Manual Hand winding rescue arrangement should be provided next to landing door at appropriate floors.

29.3 Rating and Functional Characteristics

S. No.	Type	Passenger
1.	Capacity	20 passengers (1360 kg)
2.	Well dimensions	2.5 m x 2.4 m
3.	Speed (m/s)	1.0
4.	No. of landings	6
5.	Top most landing level	EL 1036.00m
6.	Bottom most landing level	EL 1012.00m
7.	Home landing level	EL 1030.50m
8.	Intermediate landings	EL 1017, EL 1021.50, EL 1026.00, EL 1030.50
9.	Machine room level	EL 1041.00m

Assured levelling accuracy shall be less than ± 5 mm.

29.4 Performance Guarantee

The elevator along with all auxiliaries and accessories shall be capable of performing intended duties under specified conditions. The Contractor

shall guarantee the reliability and performance of the individual equipment as well as of the complete system.

29.4.1 Guaranteed performance

Guaranteed performance shall consist of the following characteristic quantities

i) Capacity,

ii) Speed,

iii) Levelling accuracy.

29.5 Design and Construction

29.5.1 Standards

The system and equipment shall be designed, built, tested and installed to the latest revisions of the following applicable standards. In the event of other standards being applicable they will be compared for specific requirement and specifically approved during detailed engineering for the purpose:

S.no.	Standards	Description
1.	IS 14665	Electric traction lifts

29.5.2 Constructional features

29.5.2.1 Car frames

The car frame shall be constructed of mild steel securely riveted, bolted or welded. The frame shall be sufficiently rigid to withstand the operation of the safety gear without permanent deformation.

29.5.2.2 Car enclosure

The car enclosures for elevator shall be constructed from interlocking panels of stainless steel. The car enclosure shall have at least, but not limited to the following features:

i) Side and rear walls shall have laminated panels over mirrored stainless steel.

ii) Car operating panel, inner car doors and handrail of stainless steel.

iii) Automatic car lighting and fan

iv) Temperature / Time indicator

v) A Telephone handset in Stainless steel cabinet

vi) Emergency Exit on the Car top

vii) Ventilation openings

29.5.2.3 **Car roof**

A solid roof capable of supporting two persons that is 2 x 68 kg shall be provided.

A three- pin plug socket with switch for a hand lamp shall be fitted on roof of the elevator car for use by persons working thereon.

29.5.2.4 **Car doors**

Car doors shall be constructed from at least 1.5 mm thick (16 gauge) stainless steel. Each door shall be reinforced to receive required operating mechanism and hardware. Seams, screws or binding strips shall not be visible from within the car.

The car doors shall be operated quietly and smoothly by an electric door operator mounted on top of car. An electrical lock on the car doors shall be provided to prevent elevator movement away from the landing unless the doors are in the closed position.

When doors are in full-open position, doors shall be unable to initiate closing if a person comes within the detection zone. The detection zone moves with the doors, so that if a person or object enters the zone after the doors have begun to close, the doors shall stop, and then reverse to reopen. The doors shall reclose after a brief time.

After a stop is made, the doors shall remain open for a time to permit passenger transfer, after which they shall close automatically.

29.5.2.5 **Landing doors**

Landing doors shall be of stainless steel and shall be installed in hoist way fixed on steel angles. The openings for the landing doors shall not be wider than that of the width of elevator car.

An electromechanical lock on the landing doors shall be provided to prevent elevator movement away from the landing unless the doors are in the closed position.

The door panels shall be finished with approved prime coat by the Employer.

29.5.2.6 **Platform**

The platform of elevator shall be high class, aesthetic/state of art with a stainless steel threshold having flat non slip surface or chequered surface.

29.5.2.7 **Car operating panel**

1) At least the following facilities shall be included in the car operating panel of elevator:

i) Red push button / switch for emergency stopping,

ii) An Alarm button,

iii) An overload indicator,

iv) Direction and digital floor indicator with voice announcement,

v) Facility for transfer from normal passenger control to car preference feature by a key operated switch in the car,

vi) "DOOR OPEN" button,

vii) "DOOR CLOSE" button,

viii) Floor buttons

ix) Non stop button

x) Car fan and light switches,

xi) Communication (speaker phone, grille, and push-to-call button).

xii) Call Registration Light In all buttons of the operating panel

xiii) Display of Car capacity

2) In addition to above following additional features but not limited to, may be provided:

i) Adjustable door opening and closing time

ii) Attendant operation

iii) Full load by pass service

iv) Fireman's emergency operation

v) Automatic self levelling

vi) All buttons on the car operating panel shall be of stainless steel for high temper resistant.

29.5.2.8 Counterweight, Wire rope , Guide shoes.

The counter weight, guide shoes shall be constructed of MS. The wire rope shall comply with the factor of safety requirements of IS 14665.

The safety of the lift shall conform to IS 9878, safety gears and governors for electric passenger and goods lifts.

29.5.3 Locking devices for landing doors

It shall not be possible to open the landing door from the landing side until the elevator car is within that particular landing zone. Provision shall be made for opening of the door in case of emergency by means of a special key.

There shall be electric lock for preventing the elevator movement away from landing unless all the landing doors are closed except when the car is coming to a stop at a landing within the levelling zone.

There shall be protective device to prevent the doors from closing should a person or object touch the door while it is closing.

29.5.4 Emergency exit

Car top for the elevator shall be manufactured with a hinged emergency exit panel held in place with non-removable fastening devices at each corner, and manually openable from top of the car and key-openable from inside. Exit shall be equipped with electrical contacts that will prevent operation of car when exit door is open and cause the alarm bell to ring.

29.5.5 Communications

A telephone system in stainless steel cabinet shall be provided for elevator. A vandal-resistant speaker type intercom with push-button to activate shall be installed in the car behind a stainless steel perforated grille and connected to a programmable auto-dialler located in machine room and control room. Auto-dialler shall be provided with a solid-state charger unit which will automatically provide emergency power and an immediate transfer in the event of failure of normal power supply. The push-button located in the car shall be identified as "Emergency phone (push to activate)". The telephone communications shall not be terminated until one of the communicating parties hangs up the receiver or manually disconnects the communication link.

In addition to above provision shall be there to install a telephone connected to power house EPBAX exchange.

29.5.6 Audible signals

Audible signal at each floor landing and in the car shall sound coincident with the digital indicators. The audible signal shall be not less than 20db with a frequency not higher than 1500Hz.

29.5.7 Car lighting, ventilation, fan and other utilities

Elevator car shall be fitted with a luminous ceiling light which shall be left switched on during the whole time the elevator is available for use. Lighting shall also be provided at the top and bottom of the elevator well for safety of maintenance when stepping on to elevator car top or into elevator pits.

Provisions shall be made for adequate ventilation, a fan, a battery operated emergency light and a battery operated emergency alarm inside the elevator. To permit switching off the power supply to the elevator without switching off the fan and light, a separate circuit with control in machine room shall be provided for fan and light. Ventilation openings shall be provided in the enclosure walls as per requirement.

29.5.8 Landing fixtures

At each landing, hall push buttons as per requirement shall be provided. A digital hall position indicator with direction indication shall be installed at every landing. All hall push buttons shall illuminate after pushing until elevator reaches the landing. Push buttons and indicators should be flushed with wall.

All the hall push buttons shall be of stainless steel for high temper resistant. A fire service switch & Emergency Alarm for elevator shall be located at every landing.

"Annexure B"

32. MODEL QUALITY ASSURANCE PLAN (QAP) FOR SERVICE ELEVATOR

Special instructions: -

1. Contractors/Manufacturers/Sub-suppliers are advised to submit QAP for equipments/ materials after incorporating all tests for bought out items, in process inspection and final inspections as per their latest manufacturing practice and Indian/ International Standards (with latest amendments, if any).
2. Contractors/Manufacturers/Sub-suppliers are required to use properly calibrated instruments /equipments during testing/inspection, for which necessary calibration certificates are required to be provided/presented to the Inspecting Officer.
3. Contractors/Manufacturers/Sub-suppliers have to make on their own all arrangements for testing facilities at their works for testing of equipments/materials.
4. One set of complete test certificates as per the requirement of QAP be made available to the Inspecting Officer at the time of inspection/testing.
5. All the records, as per the requirement of QAP are to be made available for review by the Inspecting Officer during inspection.
6. Field tests are to be carried out as per the requirements of the contract / purchase order.

QUALITY ASSURANCE PLAN (MODEL)

PROJECT : MANGDECHHU H.E.PROJECT
NAME OF EQUIPMENT : Elevator

CLIENT: MANGDECHHU HYDROELECTRIC PROJECT AUTHORITY.
VENDOR :
NIT/P.O. REFERENCE :

SR. NO.	ITEM /COMPONENTS & CHARACTERISTICS	NATURE OF CHECKS	QUANTUM OF CHECKS	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	RECORD FORMAT	INSP. AGENCY			REMARKS
							Perform	Witness	Verify	
A.	**Raw Material & Bought Out Items**									
1	**Plates, Flats, Channels, Guide Rail Section, Car**									
a)	Mechanical Properties	Test	Sample	Tech.Spec./Appd.drg./IS /IEC		TC	2/3	-	1	TC
b)	Chemical Properties	-do-	-do-	-do-		TC	2/3	-	1	TC
c)	Dimensional Checks	Measurement	-do-	-do-		TC	2/3	-	1	TC
2	**Rolled Bar of Shaft**									
a)	Sub Surface Defects (Ultrasonic Test)	Test	-do-	-do-		TC	2/3	-	1	TC
3	**Casting (Pully, Traction, Sheave, Gear housing)**									
a)	Surface Finish & Blow Holes	Visual	100%	Tech.Spec./Appd.drg./IS /IEC		TC	2/3	-	1	TC
b)	Mechanical Properties	Test	Sample	-do-		TC	2/3	-	1	TC
c)	Chemical Properties	-do-	-do-	-do-		TC	2/3	-	1	TC
d)	Dimensional Checks	Measurement	100%	-do-		TC	2/3	-	1	TC
e)	NDT of Material	Test	-do-	-do-		TC	2/3	-	1	TC
4	**3 Phase, 50 Hz, 415V, Sq.Cage AC Induction Motor**									
a)	Make & Rating	Visual	100%	Tech.Spec./ Appd.drg./ IS: 325		TC	2/3	-	1	TC
b)	Routine Test	Electrical	-do-	-do-		TC	2/3	-	1	TC
c)	Type Test	Test	Sample	-do-		TC	2/3	-	1	TC
5	**Worm Geared Machine (Winding Gear Assembly)**									
a)	Make & Rating	Visual	100%	Tech.Spec./Appd.drg./IS /IEC		TC	2/3	-	1	TC

Note: a. In 'Inspection Agency'column figure 1,2,or 3 to be filled. 1- will indicate 'MHPA', 2- will indicate 'supplier' & 3- will indicate 'sub-supplier'.
b. In 'Remarks' column following abbreviations shall be used - RR-Review of Records, T.C. - Test Certificate Submission & CHP - Customer Hold Point.
c. Test certificates shall be submitted at the time of final inspection.

Signature
MHPA (QC & A) DEPT.)

Signature & seal
(VENDORS Q.C. DEPT. OR REPRESENTATIVE)

QUALITY ASSURANCE PLAN (MODEL)

PROJECT : MANGDECHHU H.E.PROJECT
NAME OF EQUIPMENT : Elevator

CLIENT: MANGDECHHU HYDROELECTRIC PROJECT AUTHORITY.
VENDOR :
NIT/P.O. REFERENCE :

SR. NO.	ITEM /COMPONENTS & CHARACTERISTICS	NATURE OF CHECKS	QUANTUM OF CHECKS	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	RECORD FORMAT	INSP. AGENCY Perform	Witness	Verify	REMARKS
b)	Backlash of Gear	Test	100%	Tech.Spec./Appd.drg./IS /IEC		TC	2/3	-	1	TC
c)	Running Test	-do-	-do-	-do-		TC	2/3	-	1	TC
d)	Reduction Ratio	-do-	-do-	-do-		TC	2/3	-	1	TC
e)	Oil Leakage Test	Test	-do-	-do-		TC	2/3	-	1	TC
f)	No Load Running in Either Direction.	Electrical	-do-	Tech.Spec./Appd.drg./IS /IEC		TC	2/3	-	1	TC
g)	Vibration Check	Measurement	-do-	-do-		TC	2/3	-	1	TC
h)	Noise Level with Motor Assembly	-do-	-do-	-do-		TC	2/3	-	1	TC
6	**Molded Rubber items(Absorber)**									
a)	Dimensional Checks	Measurement	-do-	Tech.Spec./Appd.drg./IS /IEC		TC	2/3	-	1	TC
b)	Hardness	Physical	-do-	-do-		TC	2/3	-	1	TC
7	**Trailing Cable, Power Cable & Control Cable**									
a)	Make, Type & Rating	Visual	100%	Tech.Spec./ Appd.drg./ IS		TC	2/3	-	1	TC
b)	Acceptance Test	Electrical	-do-	-do-		TC	2/3	-	1	TC
8	**Controller**									
a)	Make & Rating	Visual	100%	-do-		TC	2/3	-	1	TC
b)	Functional Test	Test	-do-	-do-		TC	2/3	-	1	TC
9	**Rope**									
a)	Size, Make & Rating	Visual	100%	Tech.Spec./Appd.drg./IS:2365 & 2266		TC	2/3	-	1	TC
b)	Routine Test	Electrical	-do-	-do-		TC	2/3	-	1	TC
c)	Proof Load Test	Test	Sample	-do-		TC	2/3	-	1	TC
10	**Control panel** Routine Test	Electrical	100%	Tech.Spec./ Appd.drg./ IS:		TC	2/3	-	1	TC

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c. Test certificates shall be submitted at the time of final inspection.

Signature
MHPA (QC & A) DEPT.)

Signature & seal
(VENDORS Q.C. DEPT. OR REPRESENTATIVE)

QUALITY ASSURANCE PLAN (MODEL)

PROJECT : MANGDECHHU H.E.PROJECT
NAME OF
EQUIPMENT : Elevator

CLIENT: MANGDECHHU HYDROELECTRIC PROJECT AUTHORITY.
VENDOR :
NIT/P.O. REFERENCE :

SR. NO.	ITEM /COMPONENTS & CHARACTERISTICS	NATURE OF CHECKS	QUANTUM OF CHECKS	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	RECORD FORMAT	INSP. AGENCY Perform	Witness	Verify	REMARKS
11	**Speed Governing Assembly**									
a)	Make & Rating	Visual	1/type	Tech.Spec./ Appd.drg./ IS: 9878		TC	2/3	-	1	TC
b)	Performance Test	Test	-do-	-do-		TC	2/3	-	1	TC
12	**Telephone and Battery Charger**									
a)	Make & Rating	Visual	-do-	Tech. Specification & Appd. Drg.		TC	2/3	-	1	TC
b)	Functional Test	Test	-do-	-do-		TC	2/3	-	1	TC
13	**Spring Buffer/Oil Buffer**									
a)	Make, Rating & Marking	Visual	100%	Tech.Spec./Appd.drg./IS:14665 Part-4		TC	2/3	-	1	TC
b)	Mechanical Properties	Test	Sample	Tech.Spec./Appd.drg./IS /IEC		TC	2/3	-	1	TC
c)	Chemical Properties	-do-	-do-	-do-		TC	2/3	-	1	TC
d)	Dimensional Checks	Measurement	-do-	-do-		TC	2/3	-	1	TC
e)	Outside Dia.& Stroke	Measurement	100%	-do-		TC	2/3	-	1	TC
f)	Test Load (Spring Buffer)	Test	-do-	Tech.Spec./Appd.drg./IS:7906		TC	2/3	-	1	TC
g)	Spring Costant Compression	Physical	-do-	Tech.Spec./Appd.drg./IS /IEC		TC	2/3	-	1	TC
h)	Retardation Test(Oil Buffer)	Mechanical	-do-	Tech.Spec./Appd.drg./IS:14665 Part-4		TC	2/3	-	1	TC
i)	Strength Test(Oil Buffer)	Test	-do-	-do-		TC	2/3	-	1	TC
j)	Plunger Return Test(Oil Buffer)	Test	-do-	-do-		TC	2/3	-	1	TC
k)	Tests for Lateral Movement(Oil Buffer)	Test	-do-	-do-		TC	2/3	-	1	TC
14	**Car Assembely**									
a)	Visual(Check of bent,scratch)	Visual	1/type	Tech.Spec./Appd.drg./IS /IEC		TC	2/3	-	1	TC
b)	Dimensional Checks	Measurement	-do-	-do-		TC	2/3	-	1	TC

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Signature
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QUALITY ASSURANCE PLAN (MODEL)

PROJECT : MANGDECHHU H.E.PROJECT
CLIENT: MANGDECHHU HYDROELECTRIC PROJECT AUTHORITY.
NAME OF EQUIPMENT : Elevator
VENDOR :
NIT/P.O. REFERENCE :

SR. NO.	ITEM /COMPONENTS & CHARACTERISTICS	NATURE OF CHECKS	QUANTUM OF CHECKS	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	RECORD FORMAT	INSP. AGENCY			REMARKS
							Perform	Witness	Verify	
	FINAL INSPECTION									
B.	**Acceptance Tests at Manufacturer Works**									
1	BOM Check	Visual	1/type	Tech.Spec./ Appd.drg./ IEC		JIR	2/3	1	-	
2	Tests for Operation :									
i)	Satisfactory Operation of each controller, switch, contactor, starter, retiring cam, relay & other control devices and the correct operation of all limit switches under the most unfavourable conditions.	Electrical	-do-	Tech.Spec./ Appd.drg./ IS		JIR	2/3	1	-	
ii)	Correctness of all circuits & interlocks and sequence of operation.	Electrical	-do-	-do-		JIR	2/3	1	-	
iii)	Satisfactory Operation of all Protective Devices.	Electrical	-do-	Tech.Spec./ Appd.drg./ IS		JIR	2/3	1	-	CHP
iv)	IR Test of Control Panel	-do-	-do-	-do-		JIR	2/3	1	-	
v)	H.V. Test of Control Panel									
a)	Between the live parts & case or frame with all circuits completed.	-do-	-do-	-do-		JIR	2/3	1	-	
b)	Between main terminals or equivalent parts with all circuits open.	-do-	-do-	-do-		JIR	2/3	1	-	
c)	Between any live parts of independent circiuts.	-do-	-do-	-do-		JIR	2/3	1	-	

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