GENERAL PURCHASE SPECIFICATION
FOR
PASSENGER CUM GOODS ELEVATORS

(BOILER ELEVATOR)

DOC NO. – TDC:TCI:263:RC/REV 03

BHARAT HEAVY ELECTRICALS LIMITED
ELECTRIC MACHINE REPAIR PLANT, MUMBAI.

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PREPARED BY	CHECKED & APPROVED BY

CLAUSE NO	TECHNICAL DELIVERY CONDITIONS	VENDOR COMPLIANCE (Refer Note: 1)

1.0 **SITE CONDITIONS**

Altitude above MSL	Less than 1000m
Relative humidity	100%.
Design Ambient Temp	50 deg.C
Atmosphere	Tropical, Dusty, Corrosive and highly polluted.
Wind loads @ 10 metres above sea level	As per IS-875(Part 3) / 1987

2.0 **GENERAL**

This specification is intended to cover the design, engineering, manufacture, inspection, delivery, erection, commissioning, and maintenance & services before handing over to customer of Passenger Elevator and Goods cum Passenger Elevator for boiler applications.

Vendor shall ensure accurate, reliable and trouble-free operation in corrosive, dusty conditions and environments.

3.0 **PRE QUALIFICATION REQUIREMENT (APPLICABLE IN CASE OF OPEN TENDER)**

The elevator offered shall be in satisfactory operation for similar applications in fossil fuel fired power plants of unit rating 250MW or above. Vendor shall submit a list of reference thermal plants (with elevator capacity, landing levels and travel) where their elevator is in satisfactory operation for more than one year. Commissioning and service support for the elevator shall be available in India. For Vendors already registered with BHEL and having a permanent vendor code PQR is not applicable.

4.0 **STATUTORY REQUIREMENTS**

All registration and statutory inspection fees if any, in respect of his work pursuant to this contract shall be to account of the elevator vendor. However any registration, statutory inspection fees lawfully payable under the provision of any statutory laws and its amendments from time to time, during erection in respect of the plant equipment ultimately to be owned by owner shall be to the account of the owner. Should any such inspection or registration need to be re-arranged due to the fault of the vendor or his sub-contractor, the additional fees for such inspection and / or registration shall be borne by the vendor. While the statutory payment shall be made by the owner for any registration, statutory inspection etc. during erection, the vendor shall be responsible for carrying out and co-ordinating various activities with the statutory authority as well as for obtaining the clearance and registration of the equipment.

5.0 **REFERENCE STANDARDS**

The Elevators shall be designed in line with the recommendation contained in the latest editions of Standards **IS: 14665: 2000 (All Parts)**.

The equipment shall comply with latest revision of Indian standard and wherever 'IS' is not available, it shall comply with the generally accepted international codes and practices.

6.0 **SCOPE OF WORK**

i) Design, engineering, manufacture, inspection, delivery, erection, commissioning, successful handing over.
ii) Maintenance & services during guarantee period.
iii) Any necessary erection / commissioning spares and consumables shall be included in vendor scope.
iv) Necessary tools and tackles required for maintenance or testing or inspection shall be covered in vendor scope.
v) Necessary chain and pulley block along with hand operated geared trolley arrangement for horizontal movement across the monorail, hoist, rope and hook arrangements at the machine room ceiling to carry out the maintenance and erection of equipment shall be supplied by Elevator vendor. The necessary mono-rail beam will be supplied by purchaser (BHEL).
vi) A steel ladder has to be provided for access to the pit by the Elevator vendor.
vii) Guard to protect the hoist way including temporary barricades at hoist way openings by Elevator vendor.
viii) Scaffolding as per erection requirement shall be provided by the Elevator vendor. After completion of handing over activities, the scaffolding materials may be taken back by the vendor.
ix) All the electrical equipment including Lift well, Hoist way & machine room lighting with fittings, Power/control/trailing cables, MCCB/MCB & ELCB for 415 V AC 3ph supply and 240 V AC single phase supply (to receive the incoming feeders provided by customer) shall be included in the Elevator vendor scope.
x) The vendor shall assume all responsibility in proper design and operation of each and every component of the elevator as well as the elevator as a whole. Complying with Indian electricity

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rules & Indian electricity acts and applicable statutory requirements (of Government of India and applicable States) and design as well as procedural formalities also shall be taken care by the Elevator vendor.

7.0 **EXCLUSIONS**

Works not included in elevator contract, but furnished by others in accordance with local codes and regulations and the approved drawing of the Elevator vendor.

i) Civil works associated with the Elevator pit.
ii) Furnishing and installation of steel beams (Hoisting beams) in the machine room to lift equipment during installation and to facilitate maintenance.
iii) Machine room civil works including concrete flooring.
iv) Steel structures for Columns and associated bracings and approach platforms up to landing doors at each level.
v) Supporting steel material between hoist way & car will be provided by BHEL.

8.0 **ELEVATOR PARTICULARS & DESIGN PARAMETERS**

i) Passenger & Goods cum Passenger Elevator shall be provided with 1 no. fireman's switch (Alarm Switch).
ii) The Elevator shall be located on the side of the boiler as indicated in the plant layout drawing which will be provided during detailed engineering.
iii) Entry to the Elevator shall be indicated in the enquiry. Foundation plan and elevation with landing levels shall be as per purchaser (BHEL) drawings.

9.0 **Design Criteria and Equipment specification for Passenger Elevator & Goods Cum Passenger Elevator.**

i)	Type of service	Passenger Elevator & Goods cum Passenger Elevator (as per enquiry)
ii)	Number required	As per enquiry
iii)	Load on the Elevator	As per enquiry
iv)	Rated speed	As per enquiry
v)	Total travel	As per enquiry
vi)	No. of floors to be served (Landing levels)	As per enquiry
vii)	Entrances	One number in each floor
viii)	Entrances and Platform size	As per IS: 14665-2000
ix)	Method of control Motor Speed Control: Logic Control:	Variable Voltage variable frequency (VVVF) control. Microprocessor based Control with automatic level adjustment. **The control system shall be of field proven design and having satisfactory track record.**
x)	Flooring of Car	Chequered plate (6 mm thick). Car floor shall comprise of a smooth non-slip surface
xi)	Position of Machine room	Directly above the Lift shaft
xii)	Design, construction and finish of car	MS sheet fabricated, smooth finish, spray painted to approved shade. If SS (ASTM-304 No: 4 Hairline finish) is required as per enquiry vendor to consider the same in their offer.
xiii)	Car door	MS sheet fabricated, smooth finish, spray painted to approved shade. If SS (ASTM-304 No: 4 Hairline finish) is required as per enquiry vendor to consider the same in their offer.
xiv)	Landing door	MS sheet fabricated, smooth finish, spray painted to approved shade. If SS (ASTM-304 No: 4 Hairline finish) is required as per enquiry vendor to consider the same in their offer.
xv)	Car Enclosure	MS sheet fabricated, smooth finish, spray painted to approved shade. If SS (ASTM-304 No: 4 Hairline finish) is required as per enquiry vendor to consider the same in their offer.

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	xvi) Lighting and fan in the car	Cabin fan and CFL suitable for operation on 240 V, 50 Hz, AC single phase power supply shall be provided. Adequate ventilation and illumination of car to be ensured.	
	xvii) Method of operation of car	Power operated type – automatic, Horizontal Centre opening / closing car and landing doors. If vertical bi-parting doors are required as per enquiry, vendor to consider the same in their offer.	
	xviii) Operation of Elevator	Automatic, simplex, selective, collective with and without attendant, through illuminated pushbutton station located inside the car with provision for locking control in Auto or attendant position.	
	xix) Signals / Indicator	Car position indicator in car, hall position indicator at all floors, Up & down travel direction position indicator, tell-tale lights at all floors. Battery operated alarm bell and emergency light with suitable battery and battery charger and controls. Audio annunciation for car position indication shall also be provided inside the car. Overload warning indicator with visual & audio annunciation.	
	xx) Shaft lighting	The Elevator shaft shall be suitably illuminated by providing CFL fittings at every 3m (three metres) from bottom of Lift well.	
10.0	**DETAILS OF SPECIAL TREATMENT FOR ELEVATOR** As the Elevators are to be installed in a heavily polluted and dusty area in a thermal power station, the Elevator components shall be given special corrosion treatment as indicated below.		
	i) Cars & Counter weight	Anti-corrosive epoxy paint	
	ii) Fish plates	Anti-corrosive epoxy paint	
	iii) Car & Counter weight buffer	Anti-corrosive epoxy paint	
	iv) Supports(Buffer)	Anti-corrosive epoxy paint	
	v) Rail Brackets	Anti-corrosive epoxy paint	
	vi) Bracket & rail fasteners	Zinc-passivated with epoxy painted	
	vii) Tie down bolts	Zinc-passivated with epoxy painted	
	viii) Machine	Anti-corrosive epoxy paint	
	ix) Brake adjusting screw & coupling fasteners	Zinc-passivated	
	x) Bracket	Anti-corrosive epoxy paint	
	xi) Controller cabinet	Anti-corrosive epoxy paint as per industry standard.	
	xii) Hall buttons	Dust-proof with aluminium face plate or stainless steel hardware.	
	xiii) Car operating panel	Dust proof contact & button with aluminium face plate and SS hardware. Main face plate SS.	
	xiv) Governor	Cover and casting epoxy painted. Other components zinc plated.	
	xv) Governor Tension frame	Hot dip galvanised and anti-corrosive epoxy paint with M.S. shaft for sheave.	
	xvi) Car frame, level brace rods and counter weight frame	Epoxy paint as per IS-1477 Part 1 & 2.	
	xvii) Safety equipment (Linkages)	Zinc-plated	
	xviii) Safety switch and car gate switch	IP-65. Dust proof heavily zinc plated arm, stainless steel shaft and housing as per vendor standard.	
	xix) Guide shoe	Zinc-plated	
	xx) Cam bar mountings and channels	Zinc-plated and anti-corrosive epoxy paint	
	xxi) Counter weight frame	Anti-corrosive epoxy paint	
	xxii) Guide shoe with Nylon ribs	Zinc-plated	
	xxiii) Filter weights	Anti-corrosive epoxy paint	
	xxiv) Rope fasteners	Zinc-passivated and chromate dipped	

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xxv)	Hoist rope	Ungalvanised and greased, Self-lubricating
xxvi)	Governor rope	Ungalvanised and greased, Self-lubricating
xxvii)	Car enclosure, interior gate, car door and landing door	Anti-corrosive two coats baked enamel paint
xxviii)	Alarm and door open bells (Electronic hooter)	Painted.
xxix)	Junction box	Metallic body - dust proof with Anti-corrosive epoxy paint
xxx)	Hall position indicator and car position indicator	Dust proof with stainless steel enclosure and Face plate.

11.0 **MECHANICAL EQUIPMENT**

11.1 **ELEVATOR CAR**

The car platform frame and sling shall be of steel construction. The platform shall be suitably isolated from its sling. The car shall be enclosed with suitably braced and reinforced sheet metal panel. The sheet metal panel shall have ventilation slots at the base. The car interior, the car doors and the landing doors shall be finished with two coats of baked enamel. All other exposed steel or cast surfaces shall be painted with one coat of suitable metal primer and two coats of machinery enamel paint. The car shall be provided with the following accessories:

i) Car control station with position indicator inside the car and at landing platforms.
ii) An emergency stop switch (shall have two sets of potential free contact. Second one shall be taken and terminated in machine room for further connection by owner)
iii) A three pin plug & socket with switch on top of Elevator car for use by persons working there on.
iv) Telephone instrument shall be provided inside the car. Connection from the same shall be brought up to the machine room for further connection to plant network by customer. Telephone instrument provided inside the car shall have provision for hands free operation also, i.e. Speaker phone shall be provided for hands free operation.
v) For better safety, elevator vendor to provide car top barricade on car top to ensure that service personnel stay inside the car region. A selector switch and a set of push buttons shall be provided on the top above the ceiling of the car to operate the elevator locally for inspection and maintenance. The selector switch when set to position "inspection" shall exclude control from other places and movement of the car in the desired direction shall be effected by the push buttons. For normal operation of the elevator, the selector switch shall be set to the position working. It shall be possible to operate the elevator only when the appropriate button is kept in pressed condition. The roof shall be strong enough to support at least two persons.
vi) Adequate lighting and ventilation shall be provided in the Elevator car. The car shall be fitted with fan of adequate capacity and lighting with decorative fittings. The car platform shall be robust in construction and elegant in appearance.
vii) The car shall be provided with an emergency alarm push button inside the Elevator car which shall be clearly marked. The alarm shall be clearly audible outside the Lift way in order to obtain assistance in case of breakdown or failure between the floors.
viii) Car shall be equipped with handrails on three sides.

11.2 **CAR DOOR**

The car door shall be of hollow metal construction minimum 1.5mm thick sheet steel. Sides of the door shall be flush with all seams continuously welded. Guide shoes shall be rubber or roller type designed for operation on un-lubricated guides. The car door shall be provided with locking gear of heavy and robust construction, so arranged mechanically and interlocked that the doors cannot under any circumstance be opened unless the Elevator car is within a particular landing zone. Conversely the Elevator shall not move until all the landing doors are closed and interlocked properly.
Width of Car Entrance shall conform to IS:14665.

The live load shall be taken into consideration while designing doors, door frame and hanger tracks.
The car doors shall be designed such that their closing and opening is not likely to injure a person. A retractable safety shoe shall extend the full height and project beyond the front edge of the car, to open the closing door if and when it touches a person or an object. Alternatively opening of car by means of optical sensing shall also be provided.

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11.3 **LANDING DOORS**

All landing openings in the Lift well enclosure shall be protected with doors which shall extend the full height and width of the landing opening. The type of door provided shall be similar to the Elevator car door. Every landing door shall be fitted with a locking device. The door shall be suitably interlocked so that they cannot open unless the car is within a particular landing zone. The locking device is closed until the door is closed. The levers operating the locking devices shall not interfere with the landing side or Elevator enclosures. Landing doors of the elevators shall have fire resistance of at least one hour. These doors shall also be smoke tight as far as possible.

11.4 **LOAD PLATE**

A load plate displaying the rated load of the Elevator in terms of persons and kilograms shall be fitted in the car in a conspicuous position.

11.5 **SUSPENSION ROPES**

The car and the counter weights shall be suspended by steel wire ropes. Chain shall not be used for suspension. Not less than four independent stranded steel wire suspension ropes shall be used for car or counter weights of the Elevator with traction drive. The minimum diameter of the stranded rope shall not be less than 12.5 mm and minimum factor of safety shall not be less than 12. The suspension ropes shall conform to latest edition of IS 2365 – "Specification for steel wire suspension ropes for Lifts and hoists" or equivalent International Standards.

11.6 **SHEAVES AND PULLEYS**

All driving sheaves and pulleys fixed to and revolving with the shaft shall be fixed by means of sunk keys of sufficient strength and quality. Sheaves and pulleys shall be made of cast steel to IS: 1030 and free from cracks, sand holes and other injurious defects. They shall have suitable flanges and smoothly machined rope grooves. The diameter of the sheave or pulley shall be as specified in the latest edition of IS 14655 or equivalent International Standards.

11.7 **SHAFT**

Shafts and axles shall be forged steel. They shall have sufficient rigidity and bearing surface. Any shaft when stepped shall be turned to a reasonable radius at the point of reduction.

11.8 **COUNTER WEIGHTS**

The Elevator shall be provided with suitable counter weights located in the Lift shaft. The counter weight shall be designed for smooth and easy operation of the Elevator and shall be in accordance with Indian Standard (or) equivalent International Standard. Suitable counter weight screen shall be provided in the Elevator shaft. The counter weights shall consist of cast iron weight contained in structural steel frame. The traction should be such that no appreciable slip may occur but that slip shall be free to take place upon the landing of either the car or the counter weights.

11.9 **GUIDE RAILS**

Guide rails for the car and counter weights shall be machined 'T' sections and continuous throughout the entire length and shall be provided with adequate steel brackets or equivalent fixing of such design and spacing between brackets shall be such that to avoid any deflection during the normal operation. Guide rails section shall be adequate to withstand the forces resulting from the application of the safety gear when stopping the counter weights or fully loaded car. The guide shoes or their lining shall be easily renewable, adjustable and self-lubricated. Guides shall be of such length that it shall not be possible for any of the car or the counter weight shoes to run off the guides.

11.10 **BUFFERS**

Sufficient number of buffers of spring loaded type shall be fitted below the Elevator car and counter weights. The buffers shall be capable of stopping the car or counter-weights without permanent damage or deformation to itself or any part of the Elevator equipment. The number of buffers shall be so fixed as to ensure proper sharing of the impact loads by all of them.

11.11 **EMERGENCY SAFETY DEVICES AND BRAKES**

The Elevator shall be provided with safety device attached to the Elevator car frame and placed beneath the car. The safety device shall be capable of stopping and sustaining the Elevator car up to governor tripping speed with full rated load in car. The application of the safety device shall not cause the Elevator platform to become out of level in excess of 3 cm/m measured in any direction. Slack rope switches, if necessary, shall also be provided. The Elevator vendor shall also provide personnel evacuation system during the power failure to the Elevator.

The Machine shall be provided with direct current spring set, solenoid release double shoe brakes of sufficient capacity to stop the car at any position with the design load. These brakes shall be designed in such a way that it gets applied automatically in the event of power failure.

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11.12 **AUTOMATIC RESCUE DEVICE (ARD)-(BATTERY DRIVE)**

Contractor shall provide a modern advanced electronic drive system of "RESCUING Passengers Trapped in an ELEVATOR" in case of power failure.

In addition to the above, bell and cranking device to be provided with hand wheel connected with motor shaft for manual lowering of elevator to the nearest landing level. For all Elevators with ARD, an audio & visual indicator shall be provided inside the Elevator car to alert the person trapped inside that he/she is being rescued. Capacity of battery shall be such that minimum three rescue operations can be performed without recharging. ARD panel shall be suitable for floor mounting. Vendor shall indicate the size of ARD panel (Length x Depth x Height) in the offer.

11.13 **OVERLOAD DEVICE**

Every passenger Elevator shall be provided with an overload device, which will prevent the Elevator from starting in case the Elevator car is loaded to 110 percent of the rated capacity of the Elevator or more. Elevator shall remain stationery with door open. Audio & visual warning device (Load weighing device) shall be provided to alert the passenger in case of overload.

11.14 **OVER SPEED GOVERNOR AND GOVERNOR ROPES**

Governor shall be located where there is sufficient room for their proper operation and where they cannot be struck by the Elevator car or counter weight in the event of over run. Each governor shall be marked with tripping speed in terms of car speed in m/sec and the motor control and brake control circuit shall be opened before or at the time the governor trips. As per IS 14665 (part4/Sec 4):2001, the nominal rope diameter for over speed governor shall be minimum 6mm. However for elevators where travel height is more than 90 meters, the nominal rope diameter for over speed governor shall be minimum 8mm.

11.15 **LEVELLING DEVICE**

The Elevator shall be provided with a two way automatic levelling device. The levelling device shall take care of overrun and under run of the car and rope stretch, such that car floor is within 6.0 mm from the landing level at all floors while in operation. Aprons of sufficient depth shall be fitted to the car floor to ensure that no space is permitted between the threshold and the landing while the care is being levelled to floor.

11.16 **MACHINE ROOM AND OVERHEAD STRUCTURES**

All the overhead machinery shall be supported on beam to be furnished by the contractor. The machinery support beam shall rest on top of or be designed to be framed into the contractor's structural steel frame for the boiler house.

The Elevator drive controller and all other apparatus and equipment of Elevator installation, except such apparatus and equipment which function in the machine room shall be located at the top of the Lift well. Adequate machine room and hoist way lighting shall be provided by the Elevator vendor. The maximum loads transmitted by the single heaviest equipment both during erection and maintenance of the Elevator to the machine room floor and other structures like guides etc. shall be furnished by the Elevator vendor within 15 days of placing the award letter. Sound reducing materials below machines in machine room shall be provided.

Machine room shall be provided with minimum 200 Lux illumination.

11.17 **TERMINAL STOPPING AND FINAL LIMIT SWITCHES**

The Elevator shall be equipped with an automatic stopping device arrangement to bring the car to a stop at the terminal landings independent of the regular operating device in the car. Such stopping device shall act independently of the operating device, the final limit switches and buffer.

Final limit switches shall be provided to stop the car automatically within the top and bottom clearance independent of normal operating device and the terminal stopping device. The final limit switch shall act to prevent movement of the car under power in both directions of travel and shall after operating, remain open until the Elevator car has been moved by a hand operating mechanism within the limits of normal travel.

Elevator shall be suitable for continuous 24 hours round the clock operation.

12.0 **ELECTRICAL EQUIPMENT AND CONTROLS**

12.1 **OPERATION AND INTERLOCKS**

The operation of the Elevator shall be simplex, selective, collective, and automatic, with or without operator. The Elevator operation shall conform to the following requirements.

i) The operation of the Elevator shall be through a push button station located inside the car.

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ii) The Elevator shall not move unless the car door, landing door and all other protected openings connected with the control circuit are closed.

iii) Two push buttons, one for upward and the other for downward movement at each intermediate landing and one push button at each terminal landing shall be shall be provided in the landing floors in order to call the car.

iv) The landing doors shall be interlocked so that the landing door at any floor shall not open when the Elevator is not on that floor.

v) Push button shall be fixed in the car for holding the doors open for any length of time required

12.2 **ELEVATOR DRIVE**

The Elevator drive shall be equipped with automatic electromagnetic coil type brakes. The Elevator shall be driven by a drive suitable for method of control offered by the Elevator vendor. No friction gearing or clutch mechanism shall be used for connecting the main driving gear to the sheaves.

12.3 **ELECTRIC MOTORS**

Motors shall be as per IS 325 suitable for frequent starting with S4 duty class, CDF 40% , Maximum 150 starts per hour at 50 Deg. C ambient and with IP 54 protection class. Motor pull out torque shall be at least 275% of rated torque. Motor shall be of TEFC type. Motor insulation shall be class F or superior with temperature rise limited to class B.

Motor paint shade shall be RAL 5012 if called for in the enquiry.

Motor datasheet prepared by OEM shall be submitted along with the offer.

12.4 **CONTROLLERS**

The controllers shall be designed to start, accelerate, stop and reverse the Elevator when the appropriate push buttons are pressed. It shall be arranged so as to provide maximum convenience to the operator. Contact finger buttons shall be easy to adjust and replace. The speed control device shall be such as to give smooth, easy and accurate speed control. The Elevator controls shall be housed in dust and vermin proof enclosures. The controls shall be wired with stranded copper conductor cables. All equipment mounted shall be neatly labelled as per wiring diagram. Ventilating louvers are to be provided in the panels. Control panel shall be suitable for floor mounting.

12.5 **CABLES AND INTERNAL WIRING**

Wiring shall be done as required to interconnect all Elevator electrical equipment including all power wiring from the main supply source in the machine room. Power cables shall be 1100 V grade multi core, stranded with XLPE insulation, FRLS type ST2 inner sheathed, galvanised steel wire armoured and overall extruded FRLS, Type ST2 PVC sheath. If the cable is run through steel trunking unarmoured cable shall be provided instead of armoured cables. The trailing cables shall conform to IS 4289. All other cables shall conform to latest edition of IS: 7098, IS:1554 & IS:5831.

12.6 **CABLING AND EARTHING**

Earthing shall be carried out as per IS 3043 and Indian Electricity Rules. The Elevator structures, motor, frames, metal cases and all electrical equipment including conduit, cable armouring and guards shall be properly bonded and earthed by two separate and distinct connection. The Elevator vendor shall provide 25 x 3 mm GI flat for control panel and 50 x 6 mm GI flat earth bus in the machine room and connect all earth points to the same. The earth bus will be connected to the station earth mat by the owner.

12.7 **POWER SUPPLY**

One three phase 415V, AC, 50 Hz UPS Supply for Elevator main motor, and one single phase 240V, AC, 50Hz supply feeders for lighting, Air conditioner and control panels will be provided in the machine room by BHEL. The exact Power requirement in kVA of three phase supply and single phase power supply shall be indicated in the offer itself by the vendor.

The junction box having MCCB/MCB Isolation of adequate rating shall be arranged by the vendor to receive the above supplies. The Elevator vendor shall also indicate the proposed location of junction box in the machine room. All further cabling and wiring from the junction box shall be carried out by the Elevator vendor.

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The vendor shall arrange to tap power supply required for constructional purposes from the point terminated by the owner.

13.0 **OTHER REQUIREMENTS**

Electric high speed door operators for the opening and closing of the car doors and landing doors shall be furnished and installed. The car and landing doors shall be mechanically connected and shall move simultaneously in opening and closing. The car door and landing door shall be power closed and shall be controlled in opening and closing by oil cushioning mechanism built into the gear unit. Necessary lockable switches shall be provided in the Elevator machine room to control the operation of the door. Should the electric power fail, it must be possible for the doors to be manually opened from within the car.

Overload relays shall be provided to protect the drive motor against overload or a power failure. Suitable protection shall be provided on the controller to protect the Elevator equipment from phase reversal, low voltage.

Suitable arrangement shall be provided to intimate unit control room during emergency in the form of audio-visual alarm.

Complete set of special tools and tackles required shall be supplied along with Elevator. Each tool and tackle shall be stamped so as to be identified easily for its use and size. Tools shall be supplied in a steel tool box. The list of tools and tackles shall be furnished along with the offer.

One number Fire extinguisher (suitable for electrical fire) shall be provided along with each elevator.

MACHINE ROOM Air conditioning

Machine room shall be provided with 5 tonnes or with 1 No. of two tonne and 2 nos., of 1.5 tonne capacity A/C units (minimum) to make the machine room dust proof. If higher capacity of A/C is required for proper cooling, the same is to be indicated in the offer. Vendor to indicate the power consumption of A/C units in the offer.

14.0 **SPARES**

The vendor shall furnish the List of start-up, mandatory and recommended spare parts and indicate separately in the offer with item wise price under the title "Schedule of Spare Parts".

The spares recommended above with unit prices shall be valid for at least for three years of normal consumption for operation of the plant. The vendor shall also indicate the service expectancy for these spare parts under normal operating conditions before the replacement is necessary.

All the spares offered shall be strictly interchangeable with the parts for which they are intended for replacement. The spares shall be treated and packed for long storage under the climatic conditions prevailing at site. Each spare part shall clearly be marked or labelled on the outside of the packing in single case. The general description of the contents shall be shown on the outside of such cases. All cases, containers and other packages shall be marked suitably and numbered for the purpose of identification.

All cases, containers and other packages are liable to be opened for such examination as may be felt reasonable by the purchaser. The vendor shall bear in mind the shipment of the plant having ball or roller type bearings for which the following special provisions shall apply:

i) If temporary transit bearings are fitted to such plant, then, additionally, two complete sets of service bearings shall be included and shipped with such plant.
ii) If the item of the plant is shipped with service bearings in position, then additionally one complete set of service bearings shall be included and shipped with such plants. In either or both of the above provisions, the cost of the additional sets of bearings shall be included in the offer.
iii) If replacement of any bearing is required due to damages during shipment or other causes, the spare bearings shall be used to replace at free of charge.

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15.0 **DRAWINGS / DOCUMENTS**

The following preliminary documents / drawings should be enclosed along with the offer without fail.

i) Detailed description of the system offered.
ii) List of thermal power where the offered system is in operation.
iii) Performance certificate of the system offered.
iv) Write-up on interlocks, controls and safety devices provided.
v) Typical General Arrangement of Elevator (including hoist way, pit well etc.)
vi) Typical General Arrangement of machine room and equipment in machine room.
vii) Electrical control scheme with legend and write-up.
viii) Machine room Air-Conditioning details.
ix) Foundation and loading details of machine room floor and the concrete structure.
x) Filled in vendor data sheet for Elevator, Main motor and Door operator motor.
xi) Filled in vendor quality plan.
xii) The major components of Elevator with weight details to be indicated by the vendor in the offer itself.
xiii) The make, type, capacity, range of all bought out items
xiv) Any deviation from the enquiry specification shall be indicated in the "Sub-delivery Enquiry Deviation Format" attached along with the enquiry. No deviations, unless explicitly taken up by vendor in the enquiry stage itself in the said format and accepted by BHEL in writing, shall be considered after firm order. In case no deviations are there, vendor to indicate "No-deviation" in the fully filled up format.

The following documents / drawings shall be submitted within 15 days from the firm order.

i) Elevator General Arrangement drawings for BHEL/Customer approval.
ii) Elevator Technical Datasheet

Separate contract-wise drawing approvals shall be obtained by vendor before manufacture of elevators.

16.0 **WARRANTY**

The Elevator Vendor shall guarantee that the materials, workmanship and performance of the apparatus installed under this specification is perfect in every respect and that they will make good of any defects (not due to careless operation) which may develop within 18 months from the date of formal handing over of the equipment.

17.0 **MAINTENANCE**

After the completion of the installation, maintenance and service for the equipment furnished under this specification shall be provided by the vendor for a period of eighteen months. This service shall include monthly inspections of the installation during regular working hours by trained employees and shall include all necessary adjustments, greasing and oiling, cleaning, supply of genuine standard parts to keep the equipment in proper operation except any part made necessary by misuse, accidents or negligence caused by others.

18.0 **ACCEPTANCE**

After erection, the performance of the Elevator shall be tested for ascertaining the conformity with the specification and upon satisfactory completion of the tests, the Elevator will be taken over. The responsibility for obtaining commissioning and handing over protocol signed by the customer lies with the Elevator vendor.

19.0 **QUALITY ASSURANCE AND TESTING**

19.1 **For NTPC Contracts**

i) Vendor shall prepare Quality plan in NTPC format (copy enclosed) along with enquiry. This QP will be reviewed by BHEL and if any comments given by BHEL shall be incorporated by vendor.
ii) In case of order receipt, this QP will be submitted for NTPC approval. Any comments given by NTPC shall be incorporated by vendor for further approval by NTPC.
iii) In case of vendor having NTPC approved Reference Quality Plan (RQP), Endorsement sheet shall be submitted by vendor for getting NTPC approval.
iv) Elevators are subject to inspection by BHEL & NTPC and inspection call shall be given 15 days in advance.
v) Materials can be despatched only after obtaining CHP clearance & MDCC clearance from NTPC.

CLAUSE NO	TECHNICAL DELIVERY CONDITIONS	VENDOR COMPLIANCE (Refer Note 1)

19.2 **For Non-NTPC Contracts with BHEL Inspection**

i) Vendor shall prepare Quality plan in the BHEL standard Quality Plan format (copy enclosed) along with enquiry. Such a QP shall contain all the required quality checks right from the raw material stage through in process, Assembly, Testing & Final inspection. Any comments given by BHEL shall be incorporated by vendor.

ii) In case of order receipt, this QP will be approved by BHEL.

iii) Elevators are subject to inspection by BHEL and inspection call shall be given 15 days in advance.

19.3 **For Non-NTPC Contracts with BHEL & Customer Inspection:**

i) All the points covered under Clause no. 19.2 are applicable for this category.

ii) The QP will be approved by customer & elevator will be subject to inspection by customer. Any additional points indicated by customer have to be carried out by the vendor.

20.0 **O&M MANUALS**

Vendor to furnish standard O&M manuals for each capacity of elevator, immediately after the release of first purchase order for BHEL's further use (Two copies of CD-ROM). The O&M manual prepared shall be such that the same shall be usable along with the relevant drawing for each project.

Project wise O&M manuals along with project-wise details, if any, has to be updated by vendor and handed over to site (Customer & BHEL/Site, after commissioning of elevator) in necessary format as desired by customer

21.0 **LIST OF ELEVATOR OPTIONAL PRICES**

The following optional prices to be indicated along with offer for arriving at the base price of elevator.

i) Rate for addition / deletion of 1 number landing.
ii) Rate for addition / deletion of 1Mtr. in travel height.
iii) Extra price for having 0 75mps & 1mps speed of goods elevator instead of 0.55 mps for 3Ton elevator
iv) Extra price for having 0 75mps & 1mps speed of goods elevator instead of 0.55 mps for 2Ton elevator
v) Extra price for Car with SS (ASTM 304 No: 4 Hairline finish) for
    1) 3 Ton elevator
    2) 2 Ton elevator
    3) 1 Ton elevator
    4) 1088 Kg Passenger Elevator
vi) Extra price for Landing door with SS (ASTM 304 No: 4 Hairline finish) for
    1) 3 Ton elevator
    2) 2 Ton elevator
    3) 1 Ton elevator
    4) 1088 Kg Passenger Elevator
vii) Additional price of Automatic Rescue Device (ARD) for increased height of 15 Mtrs.
viii) Auto annunciation in the form of metres
ix) Extra price for 1500mm car door clear opening for 2Ton & 3Ton goods elevator
x) Extra price for 1800mm car door clear opening for 2Ton & 3Ton goods elevator
xi) Extra price for 1500mm landing door clear opening for 2Ton & 3Ton goods elevator
xii) Extra price for 1800mm landing door clear opening for 2Ton & 3Ton goods elevator
xiii) Extra price for fire resistant landing doors (1 hour as per BS:476 (Part 20 & 22))
xiv) Emergency exit of adequate dimensions on the top of car.
xv) Extra price for providing vertical bi-parting doors instead of horizontal centre opening door.

NOTE:

1) In 'Vendor Compliance' column vendor to indicate 'YES', 'NO' or 'NOT APPLICABLE.
2) IS latest version shall be referred.