SECTION - C
SUB SECTION – A6

STACK ELEVATORS

1. SYSTEM DESCRIPTION

1.1 The Rack and pinion type stack elevator are required for installation inside multi-flue or outside single flue chimney. The stack Elevator is normally used for the movement of the maintenance personnel and for materials such as refractory bricks, etc. for maintenance of chimney.

2. SCOPE OF SUPPLY AND SERVICES

2.1 The scope of supply and services covered under the specification are broadly described below:

2.1.1 One (01) No. Rack and Pinion type stack elevator complete with all other accessories and associated steel work.

2.1.2 Drive motor and control panel for Stack elevator

2.1.3 Control Panel

2.1.4 Equipment earthing

2.1.5 All power and control cables, trailing cables

2.1.6 Limit switches

2.1.7 Over speed governor

2.1.8 Alarm push button in the cage connected to battery operated alarm at elevator base.

2.1.9 Reverse phase relay connected to prevent operation of the cab with improper phase rotation or failure in any phase of power supply.

2.1.10 Continuous duty electrical torque motor recoil cable reels or cable trolley or any equivalent arrangement to maintain electrical power service to all electrical components of the elevator for complete travel of stack elevator.

2.1.11 One auxiliary panel shall be provided and mounted on the graded level enclosure equipped with a main ON-OFF selector switch, main contractor, breaker, relays, control transformer and fuses, tone frequency transmitter or equivalent arrangement, terminal blocks and all other accessories required for normal operation of the elevator.

2.1.12 One main control panel shall be furnished and mounted on top of the cab. Panel shall be in enclosure equipped with necessary equipment like rectifier, battery charger charger, tone frequency receiver, contactors, breakers, control transformer and fuses, thermal overload relays, and all other equipment and accessories required for normal operation of the elevator.

2.1.13 Cab shall be controlled by semi-automatic floor selection control system. Cab shall be furnished with 240 V grounding receptacle, emergency alarm push button with normally open contact, indicating light, limit switches, and all other necessary control devices required to ensure safe and continuous cab operation. One trailing cable shall connect the main control panel to aux. Panel at ground level. Cable shall supply the cab necessary power supply requirements. Cable guides shall be installed at every 6 m intervals to avoid entanglement of this cable. Control signal between the aux. Panel at ground level, the main control panel on the cab and the landings shall be provided with tone frequency receiver or any other equivalent arrangement by trailing control cable.

2.1.14 Each landing assembly shall include a limit switch and push button control station installed and wired to a landing junction box.

2.1.15 All power cable and race way shall be provided and installed by the bidder for interconnection of the main control panel, auxiliary panel and landing junction boxes. Trailing cables shall be as per relevant IS/IEC standard.

2.1.16 Bidder shall provide, install and connect a system equipment ground to owner's chimney grounding system. Equipment grounding system shall electrically connect panels and junction boxes which contain electrical devices, motors and elevator platform and structures. Raceway system shall not be considered as an equipment ground.

2.1.17 All enclosures containing electrical devices shall be provided with 240 V, single phase heaters with adjustable thermostat control.

2.1.18 Cab shall be equipped with a 240 V AC interior light and duplex outlet.

2.1.19 Cable accessories as required to install the cables in bidder's scope shall be provided by the bidders.

2.1.20 Complete erection, testing and commissioning including all erection materials, consumables and other tools and tackles required for erection along with commissioning spares.

2.1.21 All inserts, anchor bolts, sleeves, anchoring steel and any other items required to complete the job satisfactorily shall be in bidder's scope.

2.1.22 First fill of lubricant and consumables shall be in bidder's scope.

2.1.23 Satisfactory running and maintenance of elevator for a continuous period of 30 days including training of owner's operators.

2.1.24 Supply of One complete set of special maintenance tools and tackles shall be in bidder's scope.

2.1.25 A complete unused and new set of Mandatory Spare parts shall be supplied. The items supplied shall be of the best quality and specially protected against rusting in tropical climate. The minimum requirement of mandatory spare parts is listed in specification.

2.1.26 Recommended spares including instrumentation for 3 years of normal operation of stack elevator. (List to be furnished by the bidder and for which order shall be placed separately by owner as per their requirements)

2.1.27 Any other equipment or accessories not specified, but required for the satisfactory operation of chimney elevator shall be in bidder's scope.

3. SPECIFIC REQUIREMENTS

3.1 The equipment supplied, erected and commissioned shall meet the technical requirements of respective Section –D and Data Sheet-A.

3.2 Bidder shall note that all QP and Field quality plans shall be subject to purchaser's approval.

3.3 All equipment offered shall have suitable provision of termination and connection of power and control cables inclusive of cable boxes, lugs and glands, etc.

3.4 All the equipment shall be suitable for the power supply fault level and other climatic conditions as indicated in project information.

3.5 The bidder shall guarantee the rating and performance parameters of the system/equipment offered in accordance with specification requirements.

3.6 It is the responsibility of bidder to arrange license for operation of chimney elevator from statutory body of that area before handing over.

3.7 Bidder shall furnish deviation (clause wise) in the deviation schedule. In absence of dully filled deviation list, it will be presumed that offer is exactly in line with the technical specification.

3.8 Bidder shall furnish duly filled data sheet –B along with the offer. In absence of same, offer shall be treated as incomplete.

3.9 Bidder shall offer the stack elevator considering prevailing statutory and regulatory requirements of project location.

3.10 Bidder shall indicate degree of protection of various electrical equipment in the offer.

3.11 Makes of all bought out items shall subject to purchaser's approval after award of contract.

3.12 All drawings/documents shall subject to purchaser's approval after award of contract.

3.13 Please refer / comply customer- NTPC specification *(rack & pinion type elevator)*

DATA SHEET

1	Designation Elevator	:	Rack and Pinion Type Stack
2	Type of loading	:	Passenger cum goods
3	Quantity project requirement.	:	1 no. for 275 M high Chimney.
4	Carrying Capacity	:	400 Kg (approximately)
5	Pay load	:	400 Kg min.
6	Operating Speed	:	40 m/min.
7	Dimension of lift and lift well/cut out	:	As per IS: 3534
8	No. of landings	:	**For 275 M High Chimney** **G+6**
9	Total vertical travel	:	As per GA dwg of chimney.
10	Electrical power supply system	:	415 V, 3 ph, 50 Hz
11	Other accessories	:	As required.

CLAUSE NO.	TECHNICAL REQUIREMENTS
5.03.10	**Rack and Pinion Elevator** A rack and pinion elevator, with a load carrying capacity of 400 kg (min) (passenger cum goods), cabin floor size of 1100 mm x 1000 mm (min.) and an operating speed of 40 m/min. (approx.), shall be provided for travel from the grade level up to the platform just below the RCC roof platform. A landing platform shall be provided at all access/ platform levels. The elevator shall be of a proven and approved make. Enclosure shall be fabricated from tubular steel and expanded metal or wire mesh, 2.1 m high (Approx.). A Safety device comprising of an over speed governor in constant mesh with the rack by means of a flame hardened steel pinion shall be provided to protect the cab against over speed during the cab downward motion and the same shall actuate the brake mechanism and stop the down ward motion gradually. The lift shall be installed using anchor fasteners. The electrical requirement of the system shall conform to the main electrical specification. Drive motor shall be of S3 duty class with CDF of 25% and maximum number of 120 starts per hour in 55 degree Celsius ambient temperature. The motor shall be provided with internal 220V AC single phase space heaters or an alternate heating system. The elevator shall be supplied, installed, painted, tested, commissioned etc. complete with all mandatory spares (as specified in Part-F of this specification) and operation maintenance manual.
5.04.00	**DELETED**

SUB-SECTION–VI

MANDATORY SPARES

1.00.00 SPARES

The Bidder shall include in his scope of supply all the necessary Mandatory spares, start up and commissioning spares and recommended spares and indicate these in the relevant schedules of the Bid Form and Price Schedules. The general requirements pertaining to the supply of these spares is given below:-

1.01.00 **MANDATORY SPARES**

(a) The list of mandatory spares considered essential by the Employer is indicated in this chapter. The bidder shall indicate the prices for each and every item in the 'Schedule of mandatory Spares' whether or not he considers it necessary for the Employer to have such spares. If the bidder fails to comply with the above or fails to quote the price of any spare item, the cost of such spares shall be deemed to be included in the contract price. The bidder shall furnish the population per unit of each item in the Bid Forms and Price Schedules. Whenever the quantity is mentioned in "sets" the bidder has to give the item details and prices of each item.

(b) The Employer reserves the right to buy any or all the mandatory spares parts.

(c) The prices of mandatory spares indicated by the Bidder in the Bid Proposal sheets shall be used for bid evaluation purposes.

(d) All mandatory spares shall be delivered at site at least two months before scheduled date of initial operation of the first unit. However, spares shall not be dispatched before dispatch of corresponding main equipments.

(e) Wherever quantity is specified both as a percentage and a value, the Bidder has to supply the higher quantity until and unless specified otherwise.

1.02.00 **RECOMMENDED SPARES**

(a) In addition to the spare parts mentioned above, the contractor shall also provide a list of recommended spares for 3 years of normal operation of the plant and indicate the list and total prices in relevant schedule of the Bid Form and Price Schedules. This list shall take into consideration the mandatory spares specified in this Section-VI, Part-A and should be independent of the list of the mandatory spares. The Employer reserves the right to buy any or all of the recommended spares. The recommended spares shall be delivered at project site at least two months before the scheduled date of initial operation of first unit. However, the spares shall not be dispatched before the dispatch of the main equipment.

(b) Price of recommended spars will not be used for evaluation of the bids. The price of these spares will remain valid upto 6 months after placement of Notification of Award for the main equipment. However, the Contractor shall be liable to provide necessary justification for the quoted prices for these spares as desired by the Employer.

1.03.00	**START-UP & COMMISSIONING SPARES** Start-up and commissioning spares are those spares which may be required during the start-up and commissioning of the equipment/system. All spares used till the plant is handed over to the employer shall come under this category. The Contractor shall provide for an adequate stock of such start up and commissioning spares to be brought by him to the site for the plant erection and commissioning. They must be available at site before the equipments are energized. The unused spares, if any, should be removed from there only after the issue of Taking Over certificate. All start up spares which remain unused at the time shall remain the property of the Contractor.
1.04.00	The Bidder shall include in his scope of supply all the necessary Mandatory spares, start up and commissioning spares and recommended spares and indicate these in the relevant schedules of the Bid Form and Price Schedules. The general requirements pertaining to the supply of these spars is given below.
2.00.00	The Contractor shall indicate the service expectancy period for the spares parts (both mandatory and recommended) under normal operating conditions before replacement is necessary.
3.00.00	All spares supplied under this contract shall be strictly inter changeable with the parts for which they are intended for replacements. The spares shall be treated and packed for long storage under the climatic conditions prevailing at the site e.g. small items shall be packed in sealed transparent plastic with desecrator packs as necessary.
4.00.00	All the spares (both recommended and mandatory) shall be manufactured alongwith the main equipment components as a continuous operation as per same specification and quality plan.
5.00.00	The contractor will provide Employer with cross-sectional drawings, catalogues, assembly drawings and other relevant documents so as to enable the Employer to identify and finalise order for recommended spares.
6.00.00	Each spares part shall be clearly marked or labelled on the outside of the packing with its description. When more than one spares part is packed in a single case, a general description of the content shall be shown on the outside of such case and a detailed list enclosed. All cases, containers and other packages must be suitably marked and numbered for the purposes of identification.
7.00.00	All cases, containers or other packages are to be opened for such examination as may be considered necessary by the Employer.
8.00.00	The contractor will provide the Employer with all the addresses and particulars of his sub suppliers while placing the order on vendors for items/components/equipments covered under the contract and will further ensure with his vendors that the Employer, if so desires, will have the right to place order for spares directly on them on mutually agreed terms based on offers of such vendors.

MANDATORY SPARES FOR CHIMNEY ELEVATOR
(Qty. indicated are for one (1) No. Chimney Elevator)

A.	BRAKE ASSEMBLY		Qty.
	1.	Brake Assembly complete	1 No.
B.	GEAR ASSEMBLY		
	2.	Gear Assembly complete	1 No.
C.	DOOR FRONT		
	3.	Bearing	3 Nos.
	4.	Roller	3 Nos.
	5.	Bushing (if applicable)	2 Nos.
D.	LIMIT CAMS		
	6.	Sensor	3 Nos.
	7.	Switch arm	3 Nos.
E.	CAB		
	8.	Guide roller	100% of the total ones installed each type or min. 1 no. whichever is higher
	9.	Switch	3 Nos.
F.	SLIDING DOOR		
	10.	Rollers (if applicable)	4 Nos. each type
G.	MACHINERY		
	11.	Guide roller	2 Nos.
	12.	Pinion	2 Nos.

	13.	Rubber inserts (if applicable)	12 Nos.
	14.	Groove ring (if applicable)	6 Nos.
	15.	Brake motor	1 No.
H.		CABLE TROLLEY BEARING (if applicable)	
	16.	Bearing	3 Nos. of each type
I.		ELECTRICAL EQUIPMENTS	
	17.	Contactors	1 No. of each type
	18.	Auxiliary transformer	1 No.
	19.	Relays	1 No. of each type & rating
	20.	Switch	2 Nos. each type
	21.	Rectifier	3 Nos.
	22.	Limit switch	3 Nos. each type
	23.	Transmitter (if applicable)	1 No. if applicable
	24.	Receiver (if applicable)	1 No. if applicable
	25.	Battery charger	1 No.
	26.	Push Buttons	3 Nos. of each type
	27.	Timers	2 Nos. of each type & rating
	28.	Main drive motor with control system	1 Set

Wherever quantity has been specified as percentage (%), it shall mean percentage (%) of the total population of the item in the station (project), unless specified otherwise and the fraction will be rounded off to the next higher whole number.

CLAUSE NO.	MANDATORY SPARE
9.00.00	The Contractor shall warrant that all spares supplied will be new and in accordance with the contract Documents and will be free from defects in design, material and workmanship.
10.00.00	In addition to the recommended spares listed by the contractor, if the employer further identifies certain particular items of spares, the contractor shall submit the prices and delivery quotation for such spares within 30 days of receipt of such request with a validity period of 6 months for consideration by the Employer and placement of order for additional spares if the Employer so desires.
11.00.00	The Contractor shall guarantee the long term availability of spares to the Employer for the full life of the equipment covered under the contract. The Contractor shall guarantee that before going out of production of spares parts of the equipment covered under the Contract, he shall give the Employer atleast 2 years advance notice so that the latter may order his bulk requirement of spares, if he so desires. The same provision will also be applicable to sub-contractors. Further, in case of discontinuance of manufacture of any spares by the Contractor and/or his sub contractors, Contractor will provide the Employers, two years in advance, with full manufacturing drawings, material specifications and technical information including information on alternative equivalent makes required by the Employer for the purpose of manufacture/ procurement of such items.
12.00.00	Material Codification The bidder to provide datasheets/ assembly drawings of the manufacturer/ any other relevant document showing Bill of Material(s), Make, Model Number, Part Number etc. through which mandatory spares to be supplied can be uniquely identified. This would facilitate the Employer to assign a unique code to each of the mandatory spare as brought out in GCC. The bidder shall extend all necessary assistance in this regard.
13.00.00	Bidder shall not indicate “Not Applicable” against any of the spare (except for those items for which “if applicable” is specified). In case of not applicability, functionally equivalent spare to be mentioned with price in the relevant price schedules. Bidder shall not mention any remark other than price value in relevant price schedule.

SECTION - D
SUB-SECTION – A6

STACK ELEVATOR

1. DESIGN AND CONSTRUCTION

1.1 Stack Elevator - General

1.1.1 The stack elevator including mechanical and electrical components shall be installed outside/inside Single flue/ multi flue chimney. Since chimney is a free-standing structure, deflection of chimney top is expected during the normal operation, so the design of the elevator shall be in such a way that the elevator operation will be safe even with the expected maximum deflection of the chimney structure. The stack elevator shall lift a pay load as indicated against rated load as mentioned in Data sheet-A or its nearest as per manufacturer's present standard in addition to the weight of the car and its accessories and shall travel at a rated speed as indicated in the data sheet-A. Travel of the elevator car, number of landings and levels shall be as per Data sheet-A attached to this section.

1.1.2 Stack elevator mechanical and electrical operating devices and trailing cable shall be designed for operation indoors/out door with dusty and high humidity conditions and shall operate equally well in any ambient temperature encountered in the site conditions. Additionally, all mechanical and electrical components of the elevator shall be designed to withstand without damage a temperature of 100oC when the elevator is not operating.

1.1.3 Cage earthing shall be done through trailing cable.

1.1.4 Stack elevator shall be attached to the chimney shell using expansion type anchor bolts drilled in to chimney shell. Elevator shall be capable of operating from the ground floor to the top platform with intermediate stops at all platforms. Landing for elevator parking shall be one (1) meter above the stack ground floor. Suitable concrete/brick steps leading to the landing for entry to cabin shall also be provided,

1.1.5 The stack elevator shall be designed in line with recommendations contained in the latest editions of the applicable codes and standards.

1.2 Equipment Specification

1.2.1 Enclosures

i. A three-sided enclosure with one access door shall be provided at graded level. At each platform landing above graded level, a one-sided enclosure with access door shall be provided. Enclosures shall be fabricated from tubular steel and expanded metal or wire mesh, 2.1 m high and one coat of epoxy primer coated. Enclosure access doors shall be electrically and mechanically interlocked so that they remain closed and locked except when the Cab is at the landing. Doors shall be bi-parting and swinging type.

ii. Base of three-sided enclosure shall be securely anchored to the grade level floor slab using expansion type anchors.

1.2.2 Mast

i. Mast shall be provided in sections approximately 1.52 m in lengths considering of tubular sections and/or structural shapes welded together to form a frame work to which the rack is bolted. Mast shall be securely anchored to the concrete chimney walls.

1.2.3 Cab

i. Cab frame shall be fabricated from tubular steel and enclosed with expanded metal or wire mesh.

ii. Cab floor shall be of skid resistant glass fibre reinforced plywood or approved equal. Cab shall be attached to a framed structure and form integral part with the drive mechanism located atop the cab.

Framed structure shall include guide rollers and safety hooks to ensure positive engagement of the rack and pinion to prevent cab disengagement in case of roller failure.

1.2.4 Buffers

i. Sufficient numbers of buffers of spring loaded/hydraulic type shall be fitted below the cab. The buffers shall be capable of stopping the cab without permanent damage or deformation to themselves or any other part of the equipment. The number of buffers shall be so fixed as to ensure proper sharing of impact loads by all of them.

1.2.5 Drive unit and safety Device

i. Drive unit located on the top of the cab shall be complete with Ac squirrel cage induction motor, reduction gear, drive pinion and an over speed governor. Drive unit shall incorporate an electric disc brake and an external manual brake release. The brake on the electric motor will be of the electromagnetic single disc self-adjusting type with the mechanical compression spring being held off by the electromagnet.

ii. The hoist shall be provided with a centrifugal brake to prevent accidental tripping of safety device when the cage shall be taken to the ground by gravity in case of power failure.

1.2.6 Power and Control

i. All electrical components furnished with the elevator shall be completely wired, energised and checked. Necessary power distribution arrangement shall be provided by the contractor to feed the electrical power to the elevator.

ii. All electrical control devices shall be in enclosures. Equipment furnished shall also include the following:

a) Momentary contact push button for raise lower control.

b) Reversing combination motor starter with a moulded case circuit breaker for the motor. Starter shall be equipped with three thermal overload relays for motor protection. Operating handle for the combination starter circuit breaker shall be accessible from inside the cab and shall also serve as an emergency stop switch.

c) Electrical and mechanical interlocks on cab access door and landing level enclosure doors.

d) Over travel protection, emergency stop push button, over speed governors.

e) All electrical and mechanical interlocks on cab access door and landing level enclosure doors, phase reversal protection shall be provided.

f) An alarm push button shall be provided in the cage connected to a battery-operated alarm at the elevator base. Simultaneous alarm shall also sound at the plant control room in the event of any fault in the stack elevator for which one potential free contact shall be provided in each elevator for audiovisual alarm in PCR for “Stack Elevator fault” indication.

g) Reverse phase relay connected to prevent operation of the cab with improper phase rotation or failure in any phase in the power supply.

h) Continuous duty electric torque motor recoil cable reels as required to maintain electrical power service to all elevator electrical components throughout the limits of travel.

i) One auxiliary panel shall be furnished and mounted on the grade level enclosure. Panel shall be equipped with a main 'ON-OFF' isolating switch, main contactor, relays, control transformer and fuses, tone frequency transfer, terminal blocks and all other accessories required for normal operation of the elevator.

j) One main control panel shall be furnished and mounted on the top of the cab. Panel shall be equipped with necessary, equipped like rectifier, battery, charger, tone frequency receiver, contactors, MCBs, control transformer and fuses, thermal overload relays, and all other equipment and accessories required for normal operation of the elevator.

k) Control cabinets shall be sheet steel enclosed and shall be dust, weather and vermin proof. Sheet steel used shall be cold rolled and at least 2.0 mm thick and properly braced to prevent wobbling. Degree of protection of the control cabinets shall be IP-52 as per IS:2147. Control cabinets shall be provided with hinged door(s) with padlocking arrangement. All doors, removable covers and plates shall be gasket all around with neoprene gaskets, louvers, when provided, shall have screeners and filters. The screens shall be of fine wire mesh made of brass or GI wire. Suitable cable gland plate shall be supplied fitted on to this gland plate. All cable glands shall be screwed on type and made of brass.

l) Each motor to be controlled from the control cabinet shall be provided with 3 pole isolating switch. HRC fuses, contactors of AC4 duty class with thermal overload relays with single phasing preventer and other equipment required for satisfactory control motor. The isolating switch and contractor shall be rated at least 20% more than the connected motor full load current. Motors of 0.2 KW and above shall be rated for 415 V 3 Phase and below 0.2 KW will be 240 V single phase supply.

m) The controllers and resistors for motors shall conform to IS-8544 (latest edition) and IS-2959 (latest edition) and shall be continuously rated for 150% full load current of the motor. Switches shall be hand operated, air breaker heavy duty, quick make, quick break type conforming to IS-4064. The rating of switch shall be so chosen as to get complete protection by associated O/L relay or fuse under all normal / abnormal conditions such as full load, overload, locked rotor, short circuit. The incoming power supply isolating switch shall be inter-locked with the control cabinet door so as to prevent opening of the door when the switch is closed. Device for bypassing the door interlock shall also be provided. Switch handle shall have provision for locking in both fully open and fully closed positions.

n) All fuses shall be of the HRC cartridge type mounted on plug in type of fuse base having a prospective current rating of not less than 80 KA. Fuses shall be provided with visible operation indicators to show that they have operated. All accessible live connections shall be adequately shrouded and it shall be possible to change fuses with the circuit alive without danger of contact with live metal.

o) Contractor shall provide dry type transformers with class B insulation for control power supply, lighting and space heating. Control supply will be 240 V AC.

Transformer for control supply shall be provided with a control tap at 110 V, which will be earthed. Power and control supply to individual drives and users shall be distributed with separate isolating switches and primary and secondary fuses.

p) All push buttons shall be of push to actuate type having 2 “NO” and 2 “NC” self reset contacts. They shall be provided with integral escutcheon on plate engraved with their functions. Push button contacts shall be rated for 5 Amp at 415 V AC and 1 Amp. Inductive breaking at 250 V, DC. Mushroom type emergency push button to open the main contactor shall be provided in the operator’s cabin and two on the bridge platform within easy reach indicating lamps shall be of the filament type and low watt consumption lamps shall be provided with series resistors.

q) Strip type space heaters of adequate capacity shall be provided inside in each cabinet.

r) Control cabinets shall be supplied completely wired. All wiring shall be carried out with 650 V grade PVC insulated, stranded conductors. Power circuits shall be wired with stranded aluminum conductors of adequate sizes to suit the rated circuit shall be wired with stranded copper conductors of sizes not small than 1.5 Sq.mm. Control circuits shall be isolated from power circuits.

s) Cab shall be controlled by a semi-automatic floor selection control system. Cab shall be furnished with 240 Volt grounding type receptacle, emergency alarm push button with a normally open contact rated 0.5 ampere at 220 VDC volts, indicating light, limit switches, and all other necessary control devices required to ensure safe and continuous cab operation. One trailing cable shall connect the cab main control panel to the auxiliary panel at ground level. Cable shall supply the cab with all power requirements. Cable guides shall be installed at every 6 metres to avoid entanglement of this cable. Control signals between the auxiliary panel at ground level and the main control panel on the cab. Will be provided with the tone frequency receiver. However control and interlocks from the landings shall be connected to the auxiliary panels located at ground level through fixed armoured cables. The power and control cables and training power cables shall be FRLS type.

t) Each landing assembly shall include a limit switch for door interlock and push button control station installed and wired to a landing junction box.

u) Cable trolley with cable guides for recoil of cable on to cable reel to maintain electrical power service to all elevator components through out the limits of travel.

v) Contractor shall furnish, install, and connect a system equipment ground to the Owner’s existing chimney ground system. System equipment ground shall electrically connect panels and junction boxes, which contain electrical devices, motors, and elevator platforms and support structure. Raceway system shall not be considered as an equipment ground.

w) All enclosures containing electrical devices shall be provided with 240 Volt, single-phase space heaters with adjustable thermostat control.

x) All power cables and race way shall be furnished and installed by the Contractor for interconnection of the main control panel, auxiliary panel and landing junction boxes etc. Conductors included in the cable shall be as required to energise all electrical equipment furnished with the elevator. Transmission of

alarm signals is done by means of tone frequency equipment. Hence communication conductors are not required.

1.2.7 Electric Motor

i. Elevator drive motor shall be squirrel-cage induction type designed and fabricated to conform to the requirements indicated below.

ii. Motor shall be designed for operation at the required speed: 415 Volts, 3 phase, 50 hertz. And shall be suitable for full voltage starting, S4 duty class as per IS-4722 with CDF of 25% and maximum number of 120 starts per hour in 55 Deg. C ambient temperature. Motor shall be tested at the factory to determine that it is free from electrical or mechanical defects.

1.2.8 Raceway

i. General

a) Complete raceway system for the elevator shall be furnished and installed in accordance with this section and the Contractor's shop drawings as reviewed and accepted by the Engineer-in-Charge. The Contractor shall provide drawings for acceptance showing the routing of conduit and wiring for the control circuits associated with the elevator.

b) Raceway system is defined to include conduit and all related materials and devices required to support, secure and provide a complete system for support and protection of electrical cable and wiring.

ii. Materials

a) Raceway shall be rigid galvanized steel conduit, provided in accordance with IS-1653 (latest edition).

b) Steel conduit, couplings, and elbows shall be hot-dip galvanized rigid mild steel. Each length of threaded conduit shall be complete with a coupling on one end and a thread protector on the other. Thread protector shall have sufficient mechanical strength to protect the threads during normal handling and storage. Flexible conduits shall be plastic jacketed, liquid tight galvanized steel.

c) Galvanized iron or galvanized cast steel fittings shall be used with galvanized steel conduit. Fittings installed outdoors or in damp locations shall be sealed and gasketted. Outdoor fittings shall be of heavy cast construction.

1.2.9 PVC Insulated FRLS Cable

i. Materials

a) Electrical part of this specification shall be referred for FRLS cable. Unless specified otherwise, Contractor shall submit to the Engineer-in-Charge four copies of the manufacturer's test report on each cable furnished. Conductor accessories including terminal materials like glands, lugs etc. makers, tying materials and cable support shall be furnished and installed. Wire termination materials for conductors 10 Sq. mm and larger shall be pressure or bolted type. Terminals for conductors smaller than 10 Sq. mm shall be an insulated pressure connection in the shape of a ring.

ii. Installation

a) Power and control cable shall be routed as required by the drawings. Cables pulled into the wrong conduit or cut too short shall be replaced. Cables removed from one conduit shall not be installed in another conduit.

1.2.10 Earthing

i. General

a) Earthing system furnished and installed and include a complete earthing system for the elevator. Earthing equipment and materials shall be furnished and installed in accordance with the reference codes and standards these specifications and the contractor's shop drawings as reviewed and accepted by the Engineer-in-Charge.

ii. Materials

a) The earthing of all electrical items being supplied by the Bidder shall be in his scope. For earthing the various equipment, conductor sizes shall be as listed below:

- MCCs Motor above 90 KW : 50 x 6 Sq.mm G.I. flat
- Motors above 30 KW, upto 75 KW and lighting panel/ control panels/auxiliary panels : 25 x 6 Sq. mm G.I. flat
- Motor above 5 KW upto 30 KW : 25 x 3 mm G.I. flat
- Motors upto 5 KW and misc. : 8 SWG GI wire
- Small item like conduits,
- Junction boxes etc..

SUB-SECTION - A6

STACK ELEVATORS

1.01.00 **ELEVATOR PARTICULARS**

i) Load Carrying Capacity in Kg
ii) Type of loading for which the stack elevator is designed
iii) Type of stack elevator
iv) Rated Load in Kg
v) Speed in metre/minute
vi) Chimney height in metre
vii) Total travel height in metre
viii) No. of floors to be served
ix) Elevations of the floors to be served
x) Method of control
xi) Details of indicators and control
xii) Weight of cab complete without load in Kg
xiii) Weight of hoist cab in Kg
xiv) Efficiency of Elevator

1.02.00 GROUND ENCLOSURE

i) Size of the enclosure (Length x breadth x height)
ii) Material of construction
iii) Size of landing entrance
iv) Method of door operation
v) Electrical & mechanical interlocking Of the door provided.
vi) Method of fixing enclosure to chimney
vii) Any other details not covered above

1.03.00 LANDING ENCLOSURES

viii) Size of the enclosure

(Length x breadth x height)

ix) Material of construction

x) Size of landing entrance

xi) Method of door operation

xii) Electrical & mechanical interlocking
Of the door provided.

xiii) Method of fixing enclosure

xiv) Any other details not covered above

1.04.00 MAST

i) Material of mast

ii) Section of mast

iii) Size of each piece of mast

iv) Method of fixing of mast

v) Type of mast

1.05.0 CAB

i) Internal size
(Length x breadth x height)

ii) Material of construction

iii) Type of floor

iv) Size of the cab door

v) Method of operation of cab door

vi) Electrical & mechanical interlocking provided

vii) Escape hatch, electrically interlocked

viii) Guide roller and safety hooks provided

ix) Arrangement of light/fan inside the cab.

x) Indicators & controls inside the cab.

1.06.00 ELEVATOR DRIVE UNIT

i) Location of drive unit

ii) Name of components of drive unit

1.07.00 DETAILS OF ELECTRIC MOTOR

i) Manufacturer
ii) Equipment driven by motor
iii) Type
iv) Frame size, type & designation
v) Maximum load considered for
Sizing of motor
vi) Margin considered for sizing motor
vii) Rated power in KW
viii) Service factor
ix) Speed in rpm
x) Rated voltage in V
xi) Current at rated voltage
- Full load
- Locked rotor

xii) Insulation class
xiii) Type of bearing and type of lubricant
xiv) Space heater rating
xv) Duration considered for specified
Ambient temperature
xvi) Applicable standard to which motor conforms
xvii) Degree of protection
xviii) Efficiency at rated output
xix) Power factor
xx) Type of mounting

1.08.00 DETAILS OF REDUCTION GEAR

i) Make

ii) Material of the gears and hardness in BHN

iii) Type of gear

iv) Gear ratio

v) Gear power transmitted

vi) Input and output speed

1.09.0 DETAILS OF DRIVE AND PINION

i) Material

ii) Hardness

iii) Fixing arrangement

1.10.0 DETAILS OF RACK

i) Material

ii) Hardness

iii) Fixing arrangement

1.11.00 SAFETY DEVICE

i) Make

ii) Type of safety device

iii) Speed at which the safety device
Come into action

iv) Method operation

v) Other details

vi) Remote control for testing
The safety device

1.12.00 BRAKES

i) Manufacturer

ii) Types of brakes provided

iii) Method of operation

iv) Interlocking if any

v) Electromagnetic brake and external
Manual brake release

vi) Degree of protection

1.13.00 CENTRIFUGAL BRAKE

i) Make

ii) Details

iii) Remote control for testing

The safety device provided.

iv) Any other details of drive unit

Not covered above.

1.14.00 BUFFERS

i) No. and location of the buffers provided

ii) Type of buffers

iii) If the buffers are spring type

Furnish the following:

- Diameter of the spring in mm
- Max. Compression under extreme cond.
- No. of spring coil
- Sectional dimension
- Material of spring
- Compression /unit load

1.15.00 POWER CABLES Fixed Trailing

i) Manufacturer

ii) Type and material

iii) Rated voltage

iv) Rated current

v) Type of insulation

vi) No. of strands

vii) No. of cores

viii) Short circuit current rating

ix) Resistance per 1000 metres

x) Applicable standards

1.16.00 CONTROL CABLES

xi) Manufacturer

xii) Type and material

xiii) Rated voltage

xiv) Rated current

xv) Type of insulation

xvi) No. of strands

xvii) No. of cores

xviii) Short circuit current rating

xix) Resistance per 1000 metres

xx) Applicable standards

1.17.00 CONDUITS/ACCESSORIES AND FITTINGS

i) Material

ii) Manufacturer

iii) Applicable standard

1.18.00 CONTACTORS

i) Make

ii) Type

iii) Applicable standards

iv) No. of poles

v) Rated voltage

vi) Rated frequency

vii) Rated current

viii) Closing coil

- Rated voltage
- Current consumption
- Power consumption in KW
- Insulation class for electromagnet

ix) Rated duty

- Rated insulation category
- No. of operations per hour
- Rated breaking capacity
- Rated making capacity
- Short time rating in sec

ix) Limits of operation

- Supply voltage variations (%)
- Supply frequency variations (%)
- Drop out voltage (%)
- Min. pick up voltage (%)

x) Thermal overload relay setting range available

xi) Auxiliary contacts

- Numbers
- Current rating (Make and break)

xi) Rated utilization category as per IS 2459

xii) Max. recommended back up HRC fuse size

1.19.00 FUSES

i) Make

ii) Type

iii) Continuous current

iv) Rated voltage

v) Rated frequency

vi) Rupturing capacity

vii) Mounting details

viii) Fixing and removing arrangement

ix) Visual indication for fuses

x) Applicable standards

1.20.00 INDICATING LAMPS

i) Make

ii) Type

iii) Rated voltage

iv) Rated power consumption in Watt

v) Permissible voltage variation

vi) Series resistance provided

1.21.00 PUSH BUTTONS

i) Make

ii) Type

iii) Rating

- Voltage
- Continuous current

iv) No. of aux. Contacts

- Normally open
- Normally closed

v) Contact rating

vi) Colours

vii) Mounting arrangement

1.22.00 OVER TRAVEL LIMIT SWITCH

i) Make

ii) Type

iii) Material of contacts

iv) Contact rating

v) Numbers furnished

1.23.00 CONTROL TRANSFORMER

i) Make

ii) Type

iii) Output rating (VA)

iv) Ratio

v) Class of insulation

vi) Max. temp rise of winding over
Specified ambient temperature.

vii) One minute power frequency test voltage

viii) Applicable standards

1.24.00 CIRCUIT BREAKER AND ISOLATOR

i) Make

ii) Type

iii) Current rating in amps

iv) Interruption duty

v) Max. breaking capacity

vi) Operating voltage of tripping and closing coils

vii) Max. permissible variation of operating voltage

1.25.00 RACEWAY

i) Raceway as per specification

ii) Material of

- Indoor fittings
- Outdoor fittings
- Raceway support
- Junction boxes

1.26.0 EARTHING

i) Earthing conductor
   - Size
   - Material

ii) Material of earthing cable

iii) Clamps. Bolts, washers, nuts and another Hardware of iron steel are galvanized.

1.27.00 MOTOR STARTER

i) Make & Size

ii) Rating]

iii) Mechanically latched type

iv) Single phase prevention feature provided

v) Degree of protection

1.28.00 DETAILS OF CONTROL PANELS

i) No. of panels

ii) Type of enclosures (Degree of protection)

iii) Thickness of sheet metal

iv) Painting
   - Colour
   - Finish

v) Cable entry

vi) Manufacturer