ANNEXURE –C to Open tender ENQ. No. BAP/PUR/FGD/RACK & PINION ELEVATOR/4230523E dt.11.07.2013

S.NO	MATERIAL CODE	ITEM DESCRIPTION	SPECIFICATION REFERENCE	QUANTITY (NO)	DESTINATION
1	RFW900270000	RACK AND PINION ELEVATOR	FGD:BONG:ELEV:4-FW-000-00148-REV-01	3	NTPC BONGAIGAON SITE

1)SUPERVISION OF ERECTION AND COMMISSIONING CHARGES TO BE QUOTED ON PER MAN DAY BASIS ONLY WHICH SHOULD BE INCLUSIVE OF ALL CHARGES (BOARDING, LODGING, TRANSPORTATION CONVEYANCE & MISCELLANEOUS CHARGES). BHEL WILL DECIDE THE NUMBER OF DAYS FOR ERECTION AND COMMISSIONING FOR COMPARISION

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TECHNICAL SPECIFICATION

FOR

ELEVATOR

CUSTOMER : **NATIONAL THERMAL POWER CORPORATION LIMITED**

PROJECT : **BONGAIGAON 3X250 MW**

APPLICATION : **FLUE GAS DESULPHURIZATION SYSTEM**

FGD: BONG: ELEV: 4-FW-000-00148-REV-01

Flue Gas Desulphurization Group

Air Quality Control Systems

BAP :: BHEL :: Ranipet

TECHNICAL SPECIFICATION FOR ELEVATOR

Department	Prepared	Checked	Approved
Engineering	MANOJ K THAKUR 17/11/12 Engineer - FGD	SASHI KUMAR Sr.Engineer-AQCS	K.RAJAVEL SDGM- FGD
Rev 01 dated : 17 11 2012			

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1.0.0	**PROJECT INFORMATION**	
	▪ Owner	NTPC
	▪ Buyer	BHEL, Ranipet
	▪ Process / application	Wet Lime Stone FGD system
1.1.0	**SITE CONDITIONS**	
	▪ Ambient temperature (Guarantee)	27 Deg C
	▪ Ambient temperature (Design)	50 Deg C
	▪ Relative Humidity	60 %
1.2.0	**LOCATION AND APPROACH**	
	▪ Project location	
	▪ Place	Kumkuri near Salakati, Bongaigaon
	▪ District	Kokrajhar
	▪ State	Assam

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2.0.0 SYSTEM DESCRIPTION

The Rack and Pinion type Elevator is required for installation at the Absorber area, the Elevator is normally used for movement of maintenance personal/materials.

2.1.0 SCOPE OF SUPPLY AND SERVICES

Scope of supply and services covered under the specification are broadly described below: Scope of supply and service include supply of Rack and Pinion type on LSTK basis (Lump sum Turnkey Package) handing over to BHEL, after successful testing.

2.1.1. Three numbers Rack and Pinion type elevator complete with all other accessories and associated steel work.

2.1.2. Vendor to submit GA drawing with structure Arrangement and typical load data in the offer.

2.1.3. Drive motor and control panel for Elevator

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. Reversed 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 the elevator.

2.1.11. One auxiliary panel shall be provided and mounted on the enclosure equipped with a main ON-OFF selector switch, main contact, 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, 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 auxiliary Panel at ground level. Cable shall supply the cab necessary requirements. Cable guides shall be installed at every 6 m intervals or as may be required 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 Absorber 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 shall be in bidder's scope.

2.1.21. All inserts, anchor bolts, sleeves, anchoring steel and any other items required to complete the job satisfactorily.

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

2.1.26. Recommended spares including instrumentation for 3 years of normal operation of elevator. (1List to be furnished by the bidder and for which order shall be placed s00eparately by owner as per their requirements).

3.0 SPECIFIC REQUIREMENTS

3.1. The equipment supplied, erected and commissioned shall meet the technical requirements of respective Clause (clause form 4.0) and Data Sheet-A

3.2. Bidder shall note that the QP and Field quality plans shall be subject to purchaser's Approval.(QP format attached in Annesure-1)

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 elevator from statutory body of that area before handing over. BHEL shall extend assistance to vendor to obtain license.

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 -1 along with the offer. In absence of same, offer shall be treated as incomplete.

3.9. Bidder shall offer the 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.

4.0 DESIGN AND CONSTRUCTION REQUIREMENTS

4.1 General

This section covers the design, engineering, fabrication, installation, commissioning and testing of the rack and pinion type vertical lift elevator including required enclosures, hoist, mast and guide rail, cab drive unit machinery buffers, power cable, control cable, mechanical and electrical equipment. The design of the elevator shall be in such a way that the elevator operation will be safe at all times.

Elevator shall be located at suitable locations and shall be capable of operating from the ground floor to the top platform of FGD with intermediate stops at all platform levels.

All mechanical and electrical operating devices and Trailing cable shall be designed for outdoor operation with dusty and high humidity conditions and shall operate equally well in any ambient temperature as per project synopsis. Additionally, all mechanical and electrical components of the elevator shall be designed to withstand a temperature of 50°C ambient.

The design, manufacture, inspection and testing of Elevator shall comply with all the currently applicable statutes, regulations and safety codes in the locality where the equipment is to be installed. The Elevator shall conform to the latest edition of standards and codes. Other internationally acceptable standards/ codes, which ensure equal or higher performance than those specified, shall also be accepted. Nothing in this specification shall be construed to relieve the contractor of the required statutory responsibility. In case of any conflict in the standard and this specification, the decision of the Project Manager shall be final and binding.

The elevator including mechanical and electrical components shall be installed outside the absorber. The 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 cab and its accessories and shall travel at a rated speed as indicated in the data sheet-A. Travel of the elevator cab, number of landings and levels shall be as per Data sheet-A attached to this section.

Bidder shall design the structure required for elevator and submit to BHEL for approval, BHEL will arrange structure based on bidder approved drawing.

4.2 ENCLOSURES

A three-sided enclosure with one access door shall be provided for ground landing. At each platform landing above ground level, a one sided enclosure with access door shall be provided. Enclosures shall be fabricated from tubular steel and/or other structural shapes expanded metal or wire mesh of suitable height and primer coated with one coat of the manufacturer's standard primer and finish paint. The ground landing shall be provided at a suitable height above the foundation slab to ensure a safety space underneath the cage. The space under the landing shall be surrounded by foundation enclosure. The staircase shall be provided for access to the cage. Enclosure access doors shall be electrically and mechanically interlocked so that they remain closed and locked except when the cab is at a landing. Doors shall be bi-parting and swinging type.

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

4.3 MAST

Mast shall be provided in sections of suitable length, consisting of tubular sections and/or structural shapes welded together to form a framework to which the rack is bolted. Mast shall be securely anchored to the Structure.

4.4 CAB

Cab frame shall be fabricated from tubular steel and/or other structural shapes enclosed with expanded metal or wire mesh.

Cab floor shall be of 6 mm thick Aluminum chequered plate or approved equivalent. Cab shall be attached to a framed structure and form an 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.

Cab roof shall be provided with an escape hatch electrically interlocked with the hoist control system. Tubular steel handrail shall enclose the cab roof for maintenance operations.

Cab door and landing level enclosure doors shall be electrically and mechanically interlocked to prevent the cab from being operated unless the cab door and landing level enclosure doors are fully closed and to prevent the doors from being opened while the cab is in motion.

One cabin fan and two recessed fluorescent lamps along with the fittings to be provided with one no. emergency light with battery & battery charger.

4.5 BUFFERS

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.

4.6 DRIVE UNIT AND SAFETY DEVICE

Drive unit located on 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 self-adjusting type. In case of the power failure, the brake will be automatically applied & will stop the cab. A hand lever, which can be operated from the cage, is to be provided to enable the occupants to ease the brake and lower the age to the bottom level. Motor shall be connected to a reduction gear, which drives the pinion.

An over-speed governor must be incorporated to protect the cab against over speed during the cab downward motion. At a predetermined speed higher than normal, the brake, mechanism shall be actuated and stop the downward motion of the cab gradually. The brake should remain locked on following this action and has to be manually reset before normal elevator operation can be resumed.

A remote control shall be provided for testing the safety device. The Contractor shall ensure that no individual is in cab during the test.

The drive system shall be designed so that it will be capable to operate smoothly without any tendency to rock or judder with all vertical, horizontal forces as well as the moments through the rack. Suitable arrangement shall be provided to bring the cage safely to the ground by gravity in the event of power failure.

4.7 Power supply

Two incomers (One from Bus-A and One from Bus -B of the MCC) for the supply to each elevator shall be provided with castle key interlocks.

4.8 Power and Control Cabinets

All electrical components furnished with the elevator shall be completely wired, energized and checked.

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 three phase thermal overload relay for motor protection. However, the control circuit in the elevator will have miniature circuit breakers.

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

d. An ultimate three phase over travel limit switch which cuts off power and control supply in case of over travel. The switch can also be manually turned to off position.

e. Safety device as mentioned elsewhere in this specification.

f. An alarm push button shall be provided in the cage. Alarm signal will be transferred to the auxiliary panel at elevator base. The auxiliary panel at the base will have battery and battery charger for the alarm horn. Potential free contracts for remote alarm shall also be provided.

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. The cable shall be supported by brackets on the cage and guide rails. A cable trolley will keep it in tension and will be guided on the same rail as the cage. The trailing cable shall run through cable guides.

i. One auxiliary panel shall be furnished and mounted on the ground level enclosure. Panel shall be in enclosure equipped with a main "ON-OFF" switch, main Contractor,

relays, control transformer and MCB's, 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 cab. Panel shall be in enclosure equipped with necessary equipment like rectifier, battery, battery charger, contactors, breakers, control transformer and MCB's, thermal overload relays and all other equipment and accessories required for normal operation of the elevator.

k. Cab shall be controlled by a semiautomatic control system with push buttons for 'UP' 'Down' and 'Stop next landing'. The cab shall be controlled from inside and shall have painted placard located above the door. Cab shall be furnished with emergency alarm push button, 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 to supply the cab with all power requirements. An extra core of equal size shall be provided for earthing of cab. Cable guides shall be installed every 6 meters to avoid entanglement of this cable.

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

m. All enclosures containing electrical, devices shall be provided with 240 Volts, single phase space heaters with adjustable thermostat control.

n. Cab shall be equipped with a 220 Volts, 20W fluorescent lights, fan, 5A, 220V, 3 pin receptacle, emergency light, battery & battery charger.

o. Control cabinets shall be sheet steel enclosed dust, weather and vermin proof. Sheet steel used shall be cold rolled and at least 2.0 mm thick. Degree of protection of control cabinet shall be as per relevant electrical section. Control cabinet shall be provided with hinged doors (s) with pad locking arrangements. All doors, removable covers and plates shall be gasketted all round with neoprene gaskets.

p. Each motor to be controlled from the control cabinet shall be provided with 3- pole isolating switch. HRC fuses, contactors shall be of AC4 duty class with thermal overload relays with single phase preventer. The isolating switch and contactor shall be rated at least 20% more than the connected motor full load current. The controller and resistor for motor shall confirm to relevant IS and shall be continuously rated for 150% full load current of the motor.

q. 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.

r. All push buttons shall have 2NO and 2NC self-reset contacts.

4.9 Electric Motor

Elevator drive motor shall be squirrel-cage induction type designed and manufactured to conform to the requirements of this specification. Motor shall be designed for operation at the required speed, 415Volts, 3 phase, 50 hertz, and shall be suitable for full voltage

starting, frequent starting S3 duty class as per IS:4722 with CDF of 25% or S1 duty class with variable frequency converter and maximum number of starts 120/hour at 50°C ambient temperature.

Based on selection of motor, vendor shall give specific confirmation and furnish the following details

a. Motor shall be suitable for full voltage starting-i.e., 415V AC, 3 Phase supply.
b. Temperature rise when used for 120 starts/hr. with 50 Deg. C ambient at 40m/min shall be furnished. It shall be limited to insulation clause B for the insulation used in the motor.
c. Features considered/Provided for the S1 duty motor used with VFD.
d. KW rating, Insulation clause, Starting and full load current, type of cooling, Ingress protection class, suitability for outdoor duty shall be furnished.
e. List of customers where the elevator supplied with VFD which are in operation for more than one Year along with details of speed of lift, weight and number of start /Hr.
f. Motor characteristic curves (a) Speed - torque, (b) Current – speed, (c) Thermal characteristic for Hot and Cold start. (d) Efficiency for review.
g. Make, model number, Rating and type, power & control scheme of VFD along with relevant technical catalogue to be furnished for review.

Motor nameplate kW ratings shall not exceed when the equipment is operating within the limits of the maximum load requirements. Motor shall have class "F" no hygroscopic insulation with temp. rise limited to Class B (IS:325), Motor shall be totally enclosed and furnished with cast iron or Al alloy frame, brackets, gaskets conduit box & fan cover. Motor shall be furnished with grease pre lubricated, double-shielded, anti-friction bearing having life rating of not less than 42,500 hours under coupled service requirements. All exposed metal surfaces shall be protected with a polyester paint or coating which is moisture & corrosion resistant.

Motor shall be provided with internal 220 Volt AC single-phase space heaters or an alternate heating system to prevent condensation within the motor during extended periods of idleness.

Motor and driven equipment shall be direct coupled and mounted on a common base plate.

4.10 CABLES

Insulated armored power /control cable shall be FRLS - HR insulated, stranded copper / aluminum conductors and shall be provided in accordance with IS: 1753 (latest edition) and IS: 1554 (Part-I) (latest edition).

Trailing cables in the elevator shaft should be specially designed for the specific service and shall conform to IS. Trailing cables shall be EPR insulated for 1.1 kV and shall be neoprene jacketed flexible cord.

Conductor accessories including terminal materials like glands, lugs etc. markers, tying materials, and cable supports shall be furnished and installed.

4.11 Earthing

a. GENERAL

Complete earthing system shall be furnished for all equipments and accessories of the elevator as per relevant IS.

b. MATERIALS

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

1. Motor above 5 kW up to 30 kW 25 x 6 mm 2 GI flat
2. Motors up to 5 KW and misc. small item like conduits, junction boxes etc. 8 SWG GI wire
3. Cab earthing Additional core of trailing cable

The earthing strip/wire shall be connected to the earthing mat by the Contractor. Clamps and other hardware of iron or steel used with the grounding system shall be hot-dip galvanized. Bolts, washers, and nuts shall be hot-dip galvanized steel.

4.12 DATA SHEET FOR ELEVATOR (DATA SHEET-A)

a.	Designation	:	Rack and Pinion Type Elevator
b.	Type of loading	:	Passenger cum Goods
c.	Quantity	:	1 per Absorber - (Total 3 Nos)
d.	Carrying Capacity	:	1000 Kgs
e.	Operating Speed	:	25-40 m/min (Approx)
f.	No. of landings	:	1+5 (Refer Drg 2-FW-000-00098 Exact level of landing will be indicated after the award of contract.
g.	Total vertical travel	:	Approximately 35m.To suit the Absorber Height Refer Drg 2-FW-000-00098-for details
h.	Min.cab floor(inside)WXLXH	:	1.3m x 2.0m x 2.1m
i.	Clear Space	:	Clear space available is 2.9 X 2.9 (m). Supplier should accommodate his system within this clear space.
j.	Electrical power supply system	:	415 V, 3 ph, 4 wire, 50 Hz
k.	Other accessories	:	As required

5.0 CLAUSE-DATA SHEET-1 (TECHNICAL DATA SHEET TO BE FURNISHED BY THE VENDOR)

5.1 ELEVATOR PARTICULARS

1. Load Carrying Capacity in Kg
2. Type of Loading for which the Elevator is Design
3. Type of Elevator
4. Rated Load in Kg
5. Speed in meter/minute
6. Absorber Height in meter
7. No. of floor to be served
8. Elevation of the floor to be served
9. Method of control
10. Details of control and indicators
11. Weight of cab complete without load in Kg
12. Weight of Hoist cab in Kg
13. Efficiency of the Elevator

5.2 GROUND ENCLOSURE

1. Size of enclosure (Length X Breadth X Height)
2. Material of construction
3. Size of Landing entrance
4. Method of Door Operation
5. Electrical and mechanical interlocking of the door provided
6. Method of fixing enclosure to the Absorber
7. Any other details not covered above

5.3 LANDING ENCLOSURES

1. Size of enclosure
2. Size of enclosure (Length X Breadth X Height)
3. Material of construction
4. Size of Landing entrance
5. Method of Door Operation

6. Electrical and mechanical interlocking of the door provided
7. Any other details not covered above

5.4 MAST

1. Materials of Mast
2. Section of Mast
3. Size of each piece of Mast
4. Method of fixing of Mast
5. Type of Mast

5.5 CAB

1. Internal Size (Length X Breadth X Height)
2. Material of construction
3. Type of Floor
4. Size of Cab Door
5. Method of Operation of Cab door
6. Electrical and mechanical interlocking provided
7. Escape hatch, electrically interlock
8. Guide roller and safety hooks provided
9. Arrangement of light/ fan inside the cab
10. Indicators and controls inside the cab

5.6 ELEVATOR DRIVE UNIT

1. Location of drive unit
2. Name of components of drive unit

5.7 DETAILS OF ELECTRIC MOTOR

1. Manufacturer
2. Equipment driven by motor
3. Type
4. Frame size, type & designation
5. Maximum load considered for Sizing of motor
6. Margin considered for sizing motor
7. Rated power in KW
8. Service factor
9. Speed in rpm

10. Rated voltage in V
11. Current at rated voltage
12. Full load
    - Locked rotor
    - Insulation class
13. Type of bearing and type of lubricant
14. Space heater rating
15. Duration considered for specified Ambient temperature
16. Applicable standard to which motor conforms
17. Degree of protection
18. Efficiency at rated output
19. Power factor
20. Type of mounting

5.8 DETAILS OF REDUCTION GEAR

1. Make
2. Material of the gears and hardness in BHN
3. Type of gear
4. Gear ratio
5. Gear power transmitted
6. Input and output speed

5.9 DETAILS OF DRIVE AND PINION

1. Material
2. Hardness
3. Fixing arrangement

5.10 DETAILS OF RACK

1. Material
2. Hardness
3. Fixing arrangement

5.11 SAFETY DEVICE

1. Make
2. Type of safety device
3. Speed at which the safety device
4. Come into action

5. Method operation
6. Other details
7. Remote control for testing the safety device

5.12 BRAKES

1. Manufacturer
2. Types of brakes provided
3. Method of operation
4. Interlocking if any
5. Electromagnetic brake and external Manual brake release
6. Degree of protection

5.13 CENTRIFUGAL BRAKE

1. Make
2. Details
3. Remote control for testing the safety device provided,
4. Any other details of drive unit not covered above.

5.11 BUFFERS

1. No. and location of the buffers provided
2. Type of buffers
3. 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

5.15 POWER CABLES

1. Manufacturer
2. Type and material
3. Rated voltage
4. Rated current
5. Type of insulation
6. No. of strands
7. No. of cores
8. Short circuit current rating
9. Resistance per 1000 meters
10. Applicable standards

5.16 CONTROL CABLES

1. Manufacturer
2. Type and material
3. Rated voltage
4. Rated current
5. Type of insulation
6. No. of strands
7. No. of cores
8. Short circuit current rating
9. Resistance per 1000 meters
10. Applicable standards

5.17 CONDUITS/ACCESSORIES AND FITTINGS

1. Material
2. Manufacturer
3. Applicable standard

5.18 CONTACTORS

1. Make
2. Type
3. Applicable standards
4. No. of poles
5. Rated voltage
6. Rated frequency
7. Rated current
8. Closing coil
   - Rated voltage
   - Current consumption
   - Power consumption in KW
   - Insulation class for electromagnet
9. Rated duty
   - Rated insulation category
   - No. of operations per hour
   - Rated breaking capacity
   - Rated making capacity
   - Short time rating in sec
10. Limits of operation
    - Supply voltage variations (%)
    - Supply frequency variations (%)
    - Drop out voltage (%)

- Min. pick up voltage (%)

11. Auxiliary contacts
    - Numbers
    - Current rating (Make and break)

12. Rated utilization category as per IS 2459
13. Max. recommended back up HRC fuse size

5.19 FUSES

1. Make
2. Type
3. Continuous current
4. Rated voltage
5. Rated frequency
6. Rupturing capacity
7. Mounting details
8. Fixing and removing arrangement
9. Visual indication for fuses
10. Applicable standards

5.20 INDICATING LAMPS

1. Make
2. Type
3. Rated voltage
4. Rated power consumption in Watt
5. Permissible voltage variation
6. Series resistance provided

5.21 PUSHBUTTONS

1. Make
2. Type
3. Rating
    - Voltage
    - Continuous current
4. No. of aux. Contacts
    - Normally open
    - Normally close
5. Contact rating
6. Colors
7. Mounting arrangement

5.22 OVER TRAVEL LIMIT SWITCH

1. Make
2. Type
3. Material of contacts
4. Contact rating
5. Numbers furnished

5.23 CONTROL TRANSFORMER

1. Make
2. Type
3. Output rating (VA)
4. Ratio
5. Class of insulation
6. Max. temp rise of winding over Specified ambient temperature.
7. One minute power frequency test voltage
8. Applicable standards

5.24 CIRCUIT BREAKER AND ISOLATOR

1. Make
2. Type
3. Current rating in amps
4. Interruption duty
5. Max. breaking capacity
6. Operating voltage of tripping and closing coils
7. Max. permissible variation of operating voltage

5.25 RACEWAY

1. Raceway as per specification
2. Material of
   - Indoor fittings
   - Outdoor fittings
   - Raceway support
   - Junction boxes

5.26 EARTHING

1. Earthing conductor

2. Size
3. Material
4. Material of earthing cable
5. Clamps. Bolts, washers, nuts and another Hardware of iron steel are galvanized.

5.27 MOTOR STARTER

1. Make & Size
2. Rating]
3. Mechanically latched type
4. Single phase prevention feature provided
5. Degree of protection

5.28 DETAILS OF CONTROL PANELS

1. No. of panels
2. Type of enclosures (Degree of protection)
3. Thickness of sheet metal
4. Painting
   - Color
   - Finish
5. Cable entry
6. Manufacture

6.0 MANDATORY SPARES FOR ELEVATOR

Sl.No.	SPARES	NUMBERS
1	Friction block	2 nos.
2	Guide roller of each type	20% of total population or 3 nos. of type whichever is higher
3	Contactors of each type	2 nos.
4	Control transformer	1 no. of each type
5	Time device	2 nos. of each type
6	Rectifiers	2 nos. of each type
7	Overcurrent relay	2 nos. of each type
8	Auxiliary relay	3 nos. of each type
9	Resistor	3 nos. of each type
10	Fuses of each rating	20% of the total
11	Limit switches of each type	3 nos.
12	Push button	3 nos. of each type
13	Contact device (if applicable)	3 nos. of each type
14	Brake motor	2 nos. of each type
15	Transmitters	2 nos. of each type
16	Switches of each type	3 nos.
17	Receiver	2 nos. of each type
18	Bearings of each type & size	2 nos.
19	Roller of each type	3 nos.
20	Worm gear spares	
	a) 'O' rings	3 sets *
	b) Sealing ring of each type	3 sets *
21	Spares for brake	
	a) Fan	2 nos. of each type
	b) Magnetic coil	3 nos. of each type
	c) Brake disc	2 sets *

	d) Brake pad	2 sets *
22	Bushing (for door front)	2 sets *
23	Pinion	2 nos. of each type
	*** One set means one complete replacement for an equipment.**	

7.0 QUALITY ASSURANCE REQUIREMENTS

1. The bidder must submit the separate Vendor QPs of all the major bought out items (as listed in the Technical Specification) used in the Elevator System, for BHEL's review and verification.

2. All the QPs submitted must necessarily in BHEL's standard format. Please find attached a sample BHEL format for reference purpose only.

3. Regarding the electrical sub-items, approvals/clarifications to be taken from QA-Electricals. eg- Power Cables, Control cables, type test reports etc.

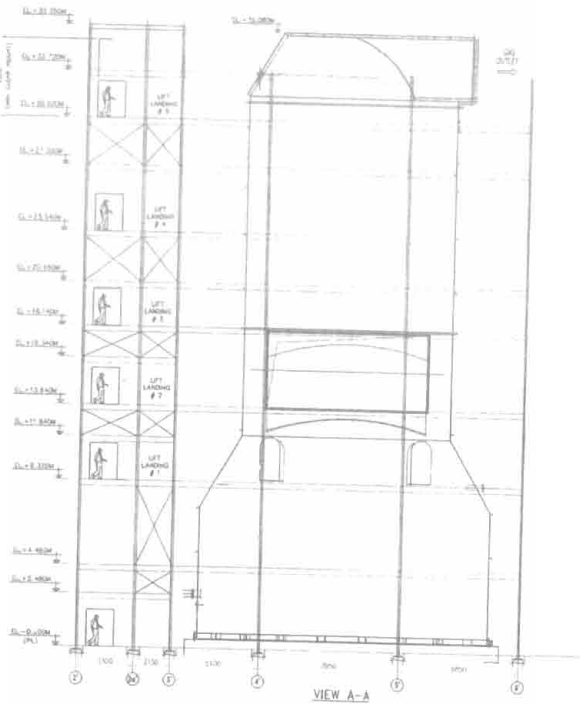
Ranipet	M/S BHEL: BAP : RANIPET TAMIL NADU-632 406	**MANUFACTURING QUALITY PLAN** Item/subsystem:	QP:No: Rev: No: Date: Page :	***Project:*** **PACKAGE:** **CUSTOMER :** **CONTRACTOR:**

SL NO 1	COMPONENT & OPERATION 2	CHARACTERISTICS 3	TYPE OF CHECK 4	QUANTUM OF CHECK 5	REFERENCE DOCUMENTS 6	ACCEPTANCE NORMS 7	FORMAT OF RECORD 8	Agency 9			
								M	B	C	
1.0	**RAW MATERIALS**										
2.0	**INPROCESS INSPECTION**										

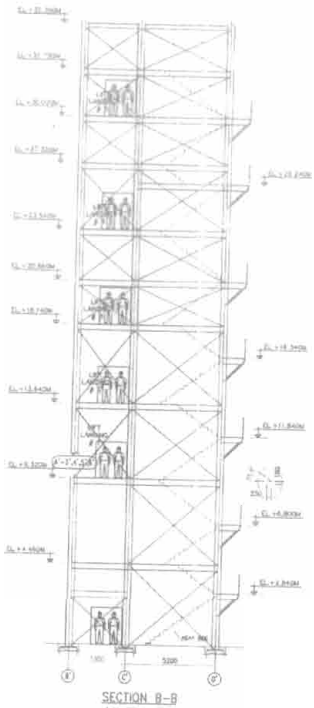
	PREPARED BY'	REVIEWED & APPROVED BY
M: MANUFACTURER /CONTRACTOR, B: BHEL/BHEL AUTHORISED INSPECTION AGENCY, **IC: CUSTOMER, P:** PERFORM, **W**-WITNESS, **V**- VERIFICATION, , TC-TEST CERTIFICATE Column-7 & 8 approved means BHEL approved		

Ranipet	M/S BHEL: BAP : RANIPET TAMIL NADU-632 406	**MANUFACTURING QUALITY PLAN** Item/subsystem:	QP:No: Rev: No: Date: Page :	***Project:*** **PACKAGE:** **CUSTOMER :** **CONTRACTOR:**

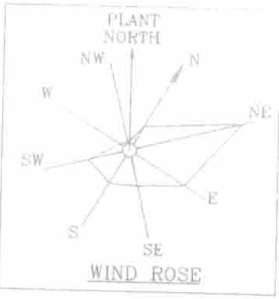
SL NO 1	COMPONENT & OPERATION 2	CHARACTERISTICS 3	TYPE OF CHECK 4	QUANTUM OF CHECK 5	REFERENCE DOCUMENTS 6	ACCEPTANCE NORMS 7	FORMAT OF RECORD 8	Agency 9			
								M	B	C	



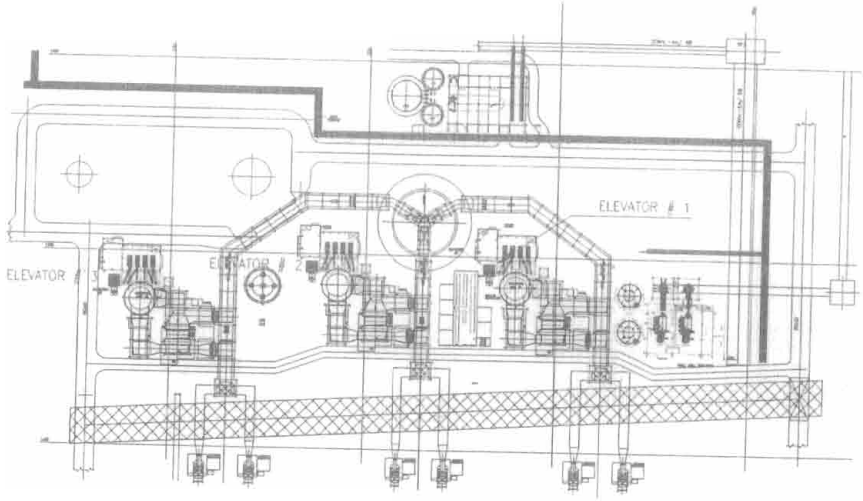
VIEW A-A



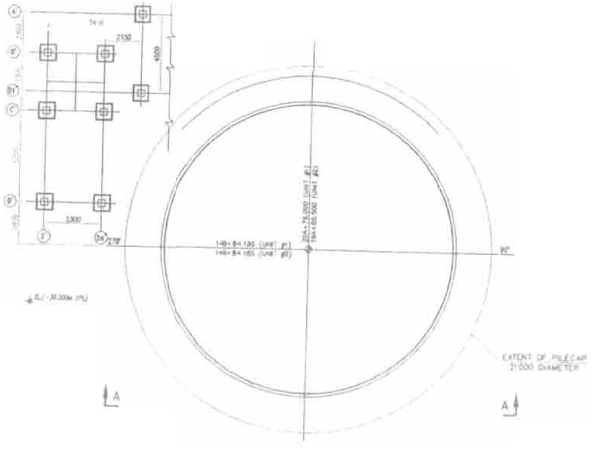
SECTION B-B
(LIFT LANDING LEVELS)



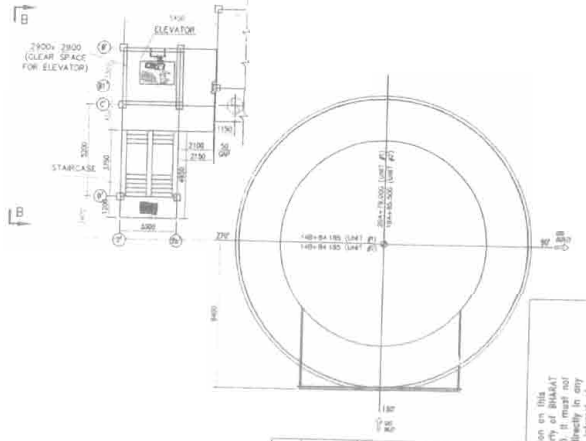
WIND ROSE



KEY PLAN



PLAN @ EL.0.000M



PLAN @ EL.(+)13.640M

ALL DIMENSIONS ARE IN MILLIMETRES

NAME OF CUSTOMER	NTPC / BONGAIGAON
CUSTOMER No.	R321,R322,R323

BHARAT HEAVY ELECTRICALS LTD.
UNIT: BOILER AUXILIARIES PLANT.
RANIPET – 632 406.

	NAME	SIGN	DATE
DRN	R.R		
CHD	M.K.T		
APPD	K.R		

DEPT	AQCS\FGD	SCALE	N.T.S
CODE	9789	WEIGHT (KG).	REF. TO ASSY/OLD DRG.

TITLE: LAYOUT OF RACK & PINION ELEVATOR

DRAWING NO.: 2-FW-000-00098 REV: 00

Size A2

REV	DATE	ALTERED
ZONE		CHECKED