

NTPC LIMITED

(A Govt. of India Enterprises)



FLUE GAS DESULPHURISATION (FGD) SYSTEM

KAHALGAON SUPER THERMAL POWER STATION

STAGE I & II (4X210 MW + 3X500 MW)

TECHNICAL SPECIFICATION – MECHANICAL PORTION

FOR

RACK & PINION TYPE ELEVATOR FOR CHIMNEY

SPECIFICATION NO.: PE-TS-481-503-A001



BHARAT HEAVY ELECTRICALS LIMITED

(A Govt. of India Undertaking)

POWER SECTOR


PROJECT ENGINEERING MANAGEMENT

PROJECT ENGINEERING INSTITUTE BUILDING

SECTOR-16A, PLOT NO. 25, NOIDA, INDIA

**SPECIFIC TECHNICAL REQUIREMENT****STACK ELEVATORS****SPECIFICATION NO. PE-TS-481-503-A001****VOLUME II B****SECTION C****SUB-SECTION A6****REV. 0****SHEET 1 of 5**

SECTION - C
SUB SECTION – A6
STACK ELEVATORS

<div><div>बी.एच.ई. लि.</div><div></div></div>	<div><div>SPECIFIC TECHNICAL REQUIREMENT</div><div>STACK ELEVATORS</div></div>	SPECIFICATION NO. PE-TS-481-503-A001	
		VOLUME II B	
		SECTION C	SUB-SECTION A6
		REV. 0	
		SHEET 2 of 5	

1.

SYSTEM DESCRIPTION

1.1

The Rack and pinion type stack elevator is 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 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, 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.

<div><div>बी.एच.ई. लि.</div><div></div></div>	<div>SPECIFIC TECHNICAL REQUIREMENT</div> <div>STACK ELEVATORS</div>	SPECIFICATION NO. PE-TS-481-503-A001	
		VOLUME II B	
		SECTION C	SUB-SECTION A6
		REV. 0	
		SHEET 3 of 5	
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	Any other equipment or accessories not specified, but required for the satisfactory operation of chimney elevator shall be in bidder's scope.		
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)		

<div><div>बी.एच.ई. लि.</div><div></div></div>	SPECIFIC TECHNICAL REQUIREMENT STACK ELEVATORS	SPECIFICATION NO. PE-TS-481-503-A001	
		VOLUME II B	
		SECTION C	SUB-SECTION A6
		REV. 0	
		SHEET 4 of 5	

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*)



SPECIFIC TECHNICAL REQUIREMENT

STACK ELEVATORS

SPECIFICATION NO. PE-TS-481-503-A001

VOLUME II B

SECTION C

SUB-SECTION A6

REV. 0

SHEET 5 of 5

DATA SHEET

1	Designation Elevator	:	Rack and Pinion Type Stack
2	Type of loading	:	Passenger cum goods
3	Quantity project requirement.	:	2 nos. for 180 M high Chimney. 3 nos. for 150 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	:	<u>For 150 M High Chimney=</u> Four (04) nos. including ground (0.0m, 47m, 92m, & last landing at 137m). <u>For 180 M high Chimney =</u> Five (05) nos. including ground (0.0m, 46m, 87m, 128m, & last landing at 169m).
9	Total vertical travel	:	137 m & 169 m.
10	Electrical power supply system	:	415 V, 3 ph, 50 Hz
11	Other accessories	:	As required



CLAUSE NO.	TECHNICAL REQUIREMENTS
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3.14.10**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 to the top of the chimney. 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.


LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE	TECHNICAL SPECIFICATION SECTION – VI BID DOC. NO.: CS-0011-109(4)-9	PART-B SUB-SECTION-IV-D CIVIL WORKS	PAGE 14 OF 67
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CLAUSE NO.	TECHNICAL REQUIREMENTS
	<p>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</p>

<p>LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE</p>	<p>TECHNICAL SPECIFICATION SECTION – VI BID DOC. NO.: CS-0011-109(4)-9</p>	<p>PART-B SUB-SECTION-IV-D CIVIL WORKS</p>	<p>PAGE 15 OF 67</p>
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**TITLE:****TECHNICAL SPECIFICATION
STACK ELEVATOR****SPECIFICATION NO. PE-TS-481-503-A001****VOLUME - IIB****SECTION "D"****SUB-SECTION A6****REV. 00****DATE:****Sheet 1 of 7****SECTION - D
SUB-SECTION – A6****STACK ELEVATOR**

<div><div>बी.एस.ई.एल.</div><div></div></div>	TECHNICAL SECIFICATION	SPECIFICATION NO.PE-TS-481-503-A001	
		VOLUME II B	
		SECTION D	SUB-SECTION A6
		REV. 0	
		Sheet 2 of 7	
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) metre 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.			

**TECHNICAL SPECIFICATION****STACK ELEVATOR****SPECIFICATION NO. PE-TS-481-503-A001****VOLUME II B****SECTION D****SUB-SECTION A6****REV. 0****Sheet 3 of 7**

- 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.

**TECHNICAL SPECIFICATION****STACK ELEVATOR****SPECIFICATION NO. PE-TS-481-503-A001****VOLUME II B****SECTION D****SUB-SECTION A6****REV. 0****Sheet 4 of 7**

- 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.

**TECHNICAL SECIFICATION****STACK ELEVATOR****SPECIFICATION NO. PE-TS-481-503-A001****VOLUME II B****SECTION D****SUB-SECTION A6****REV. 0****Sheet 5 of 7**

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

**TECHNICAL SPECIFICATION****STACK ELEVATOR****SPECIFICATION NO. PE-TS-481-503-A001****VOLUME II B****SECTION D****SUB-SECTION A6****REV. 0****Sheet 6 of 7**

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 gasketed. 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

**TECHNICAL SECIFICATION****STACK ELEVATOR****SPECIFICATION NO. PE-TS-481-503-A001****VOLUME II B****SECTION D****SUB-SECTION A6****REV. 0****Sheet 7 of 7**

- 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..

TENDER NO.: PSER-SCT-KGN-C2101-21			
CLAUSE NO.	MANDATORY SPARES		
1.00.00	<p>GENERAL</p> <p>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 Forms & Price Schedules. The general requirements pertaining to the supply of these spares is given below:</p>		
1.01.00	<p>MANDATORY SPARES</p> <p>a) The list of mandatory spares considered essential by the Employer is indicated in the list enclosed to this Sub-Section. The bidder shall indicate the prices for each and every item (except for items not applicable to the bidders design) 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 total population of each item for the project in the Bid Forms & Price Schedules. Whenever the quantity is mentioned in "sets" the bidder has to give the item details and prices of each item.</p> <p>b) Whenever the quantity is indicated as a percentage, it shall mean percentage of total population of that item in the station (project), unless specified otherwise, and the fraction will be rounded off to the next higher whole number. Wherever the requirement has been specified as a 'set' (marked by **) it will include the total requirement of the item for a unit, module or the station as specified. Where it is specified as 'set' (marked by*) it would mean the requirement for the single equipment / system as the case may be. Also one set for the particular equipment. e.g. 'set' of bearings for a pump would include the total number of bearings in a pump. Also the 'set' would include all components required to replace the item; for example, a set of bearings shall include all hardware normally required while replacing the bearings.</p> <p>c) The assembly / sub assembly which have different orientation (like left hand, right hand, top or bottom), different direction of rotation or mirror image positioning or any other regions which result in maintaining two different sets of spares to be used for subject assembly / sub-assembly shall be considered as different type of assembly/sub-assembly.</p> <p>d) The Employer reserves the right to buy any or all the mandatory spare parts.</p> <p>e) The prices of mandatory spares indicated by the Bidder in the Bid Proposal sheets shall be used for bid evaluation purposes.</p>		
<p>LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE</p>		<p>TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-0011-109(4)-9</p>	<p>SUB-SECTION-VII MANDATORY SPARES</p> <p>PAGE 1 OF 63</p>

TENDER NO.: PSER:SCT:KGN-C2101-21	
CLAUSE NO.	<div>MANDATORY SPARES</div> <div><div>एनटीपीसी</div><div>NTPC</div></div>
1.02.00	<div>f) 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.</div> <div>g) Wherever quantity is specified both as a percentage and a value, the Bidder has to supply the higher quantity until & unless specified otherwise.</div> <div>RECOMMENDED SPARES</div> <div>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 Forms & Price Schedules. This list shall take into consideration the mandatory spares specified in this Sub-Section 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.</div> <div>b) Prices of recommended spares will not be used for evaluation of the bids. The price of these spares will remain valid up to 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.</div>
	1.03.00
1.04.00	<div>The Bidder shall include in his scope of supply all the necessary Mandatory spares, Start-up and commissioning spares and indicate these in the relevant schedules of the Bid Forms & Price Schedules. The general requirements pertaining to the supply of these spares is given below:</div>
<div><div>LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE</div><div>TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-0011-109(4)-9</div><div>SUB-SECTION-VII MANDATORY SPARES</div><div>PAGE 2 OF 63</div></div>	

CLAUSE NO.	MANDATORY SPARES			
2.00.00	The Contractor shall indicate the service expectancy period for the spare 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 desiccators packs as necessary.			
4.00.00	All the spares (both recommended and mandatory) shall be manufactured along with 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 finalize order for recommended spares.			
6.00.00	Each spare part shall be clearly marked or labeled on the outside of the packing with its description. When more than one spare 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.			
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			
LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-0011-109(4)-9	SUB-SECTION-VII MANDATORY SPARES	PAGE 3 OF 63

CLAUSE NO.

MANDATORY SPARES

guarantee that before going out of production of spare parts of the equipment covered under the Contract, he shall give the Employer at least 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 Employer, 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.

CLAUSE NO.

MANDATORY SPARES



1.28.00

MANDATORY SPARES FOR CHIMNEY ELEVATOR

(Qty. indicated are for one (1) No. Chimney Elevator)

A.

BRAKE ASSEMBLY

Qty.

1. Brake Assembly complete

1 No.

TENDER NO.: PSER:SCT:KGN-C2101-21				
CLAUSE NO.	MANDATORY SPARES			
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		
LOT-4 PROJECTS FLUE GAS DESULPHURISATION (FGD) SYSTEM PACKAGE		TECHNICAL SPECIFICATION SECTION – VI, PART-A BID DOC. NO.:CS-0011-109(4)-9	SUB-SECTION-VII MANDATORY SPARES	PAGE 62 OF 63

CLAUSE NO.

MANDATORY SPARES




- | | | |
|-----|---|------------------------------|
| 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 |

	Title		Spec. No.: PE-TS-481-503-A001	
	STACK ELEVATOR		Volume III	SUB SECTION A6
	DATA SHEET 'B'		Sheet 1 of 11	

SUB-SECTION - A6

STACK ELEVATORS

	Title		Spec. No.: PE-TS-481-503-A-001			
	STACK ELEVATOR		Volume III		SUB SECTION A6	
	DATA SHEET 'B'		Sheet	2	of	11

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)

Name of Bidder / Vendor						
Project						
Revision No.	0	1	2	3	4	5
Signature of Bidder / Vendor / Authorised Representative						
Date						

	Title		Spec. No.: PE-TS-481-503-A-001			
	STACK ELEVATOR		Volume III		SUB SECTION A6	
	DATA SHEET 'B'		Sheet	3	of	11

- 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

Name of Bidder / Vendor						
Project						
Revision No.	0	1	2	3	4	5
Signature of Bidder / Vendor / Authorised Representative						
Date						

	Title		Spec. No.: PE-TS-481-503-A-001			
	STACK ELEVATOR		Volume III		SUB SECTION A6	
	DATA SHEET 'B'		Sheet	4	of	11


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

Name of Bidder / Vendor						
Project						
Revision No.	0	1	2	3	4	5
Signature of Bidder / Vendor / Authorised Representative						
Date						

	Title		Spec. No.: PE-TS-481-503-A-001			
	STACK ELEVATOR		Volume III		SUB SECTION A6	
	DATA SHEET 'B'		Sheet	5	of	11

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

Name of Bidder / Vendor						
Project						
Revision No.	0	1	2	3	4	5
Signature of Bidder / Vendor / Authorised Representative						
Date						

	Title		Spec. No.: PE-TS-481-503-A-001			
	STACK ELEVATOR		Volume III		SUB SECTION A6	
	DATA SHEET 'B'		Sheet	6	of	11

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

Name of Bidder / Vendor						
Project						
Revision No.	0	1	2	3	4	5
Signature of Bidder / Vendor / Authorised Representative						
Date						

	Title		Spec. No.: PE-TS-481-503-A-001			
	STACK ELEVATOR		Volume III		SUB SECTION A6	
	DATA SHEET 'B'		Sheet	7	of	11

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

Name of Bidder / Vendor						
Project						
Revision No.	0	1	2	3	4	5
Signature of Bidder / Vendor / Authorised Representative						
Date						

	Title		Spec. No.: PE-TS-481-503-A-001			
	STACK ELEVATOR		Volume III		SUB SECTION A6	
	DATA SHEET 'B'		Sheet	8	of	11

- 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

Name of Bidder / Vendor						
Project						
Revision No.	0	1	2	3	4	5
Signature of Bidder / Vendor / Authorised Representative						
Date						

	Title		Spec. No.: PE-TS-481-503-A-001			
	STACK ELEVATOR		Volume III		SUB SECTION A6	
	DATA SHEET 'B'		Sheet	9	of	11

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

Name of Bidder / Vendor						
Project						
Revision No.	0	1	2	3	4	5
Signature of Bidder / Vendor / Authorised Representative						
Date						

	Title		Spec. No.: PE-TS-481-503-A-001			
	STACK ELEVATOR		Volume III		SUB SECTION A6	
	DATA SHEET 'B'		Sheet	10	of	11

- 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.

Name of Bidder / Vendor						
Project						
Revision No.	0	1	2	3	4	5
Signature of Bidder / Vendor / Authorised Representative						
Date						

	Title		Spec. No.: PE-TS-481-503-A-001	
	STACK ELEVATOR		Volume III	SUB SECTION A6
	DATA SHEET 'B'		Sheet 11 of 11	


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

Name of Bidder / Vendor						
Project						
Revision No.	0	1	2	3	4	5
Signature of Bidder / Vendor / Authorised Representative						
Date						

	ELEVATOR ELECTRICAL SPECIFICATION KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500 MW)	VOLUME NO. : II-B SECTION : REV NO. 00 : DATE : 16.06.2020 SHEET : 1 OF 3
<p style="text-align: center;"> TECHNICAL SPECIFICATION FOR ELEVATOR (ELECTRICAL PORTION) </p>		

	ELEVATOR ELECTRICAL SPECIFICATION KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500 MW)	SPECIFICATION NO.
		VOLUME NO. : II-B
		SECTION :
		REV NO. 00 : DATE : 16.06.2020
		SHEET : 2 OF 3
<p>1.0 EQUIPMENT & SERVICES TO BE PROVIDED BY BIDDER:</p> <ul style="list-style-type: none"> a) Services and equipment as per “Electrical Scope between BHEL and Vendor”. b) Any item/work either supply of equipment or erection material which have not been specifically mentioned but are necessary to complete the work for trouble free and efficient operation of the plant shall be deemed to be included within the scope of this specification. The same shall be provided by the bidder without any extra charge. c) Supply of mandatory spares as specified in the specifications of mechanical equipments. d) Electrical load requirement for ELEVATOR. e) All equipment shall be suitable for the power supply fault levels and other climatic conditions mentioned in the enclosed project information. f) Bidder to furnish list of makes for each equipment at contract stage, which shall be subject to customer/BHEL approval without any commercial and delivery implications to BHEL g) Various drawings, data sheets as per required format, Quality plans, calculations, test reports, test certificates, operation and maintenance manuals etc shall be furnished as specified at contract stage. All documents shall be subject to customer/BHEL approval without any commercial implication to BHEL. h) Motor shall meet minimum requirement of motor specification. i) Vendor to clearly indicate equipment locations and local routing lengths in their cable listing furnished to BHEL. <p>2.0 EQUIPMENT & SERVICES TO BE PROVIDED BY PURCHASER FOR ELECTRICAL & TERMINAL POINTS:</p> <p>Refer “Electrical Scope between BHEL and Vendor”.</p> <p>3.0 DOCUMENTS TO BE SUBMITTED ALONG WITH BID</p> <p>3.1 The electrical specification without any deviation from the technical/quality assurance requirements stipulated shall be deemed to be complied by the bidder in case bidder furnishes the overall compliance of package technical specification in the form of</p>		

	ELEVATOR ELECTRICAL SPECIFICATION KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500 MW)	SPECIFICATION NO.
		VOLUME NO. : II-B
		SECTION :
		REV NO. 00 : DATE : 16.06.2020
		SHEET : 3 OF 3
<p>compliance certificate/No deviation certificate.</p> <p>3.2 No technical submittal such as copies of data sheets, drawings, write-up, quality plans, type test certificates, technical literature, etc, is required during tender stage. Any such submission even if made, shall not be considered as part of offer.</p> <p>4.0 List of enclosures :</p> <ul style="list-style-type: none"> a) Electrical scope between BHEL & vendor b) Specification for Elevator & LT Motors c) Specification for cable lugs and glands d) Quality plan for motors e) Electrical Load data Format f) BHEL Cable listing Format 		

REV: 00 DATE: 16.06.2020

STANDARD ELECTRICAL SCOPE BETWEEN BHEL AND VENDOR

PACKAGE: ELEVATORS

SCOPE OF VENDOR: SUPPLY , ERECTION & COMMISSIONING OF VENDOR'S EQUIPMENT

PROJECT : **KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)**


S. NO	DETAILS	SCOPE SUPPLY	SCOPE E&C	REMARKS
1	Isolating Switch	Vendor	Vendor	BHEL will provide two number 415 V (3ph, 4W) supply feeder only up to isolating switches for elevators. Any other voltage level (AC/DC) required will be derived by the vendor. Motor starter shall be part of elevator control panel.
2	Power cables, control cables, screened control cables and any special cables (if required) between equipment supplied by vendor.	Vendor	Vendor	Cable from supply feeder to isolating switch shall be in BHEL scope.
3	Cabling material (cable trays, accessories, cable tray supporting system, conduits etc).	Vendor	Vendor	
4	Equipment Earthing	Vendor	Vendor	All equipment metallic enclosures / frames, metal structure etc. shall be grounded at two points each to the nearest grounding points / risers provided by BHEL.
5	Motors	Vendor	Vendor	
6	Cable glands and lugs for equipment supplied by vendor	Vendor	Vendor	1. Double compression Ni-Cr plated brass cable glands 2. Solder less crimping type heavy duty tinned copper lugs for power & control cables.
7	a) Input cable schedules (C & I) b) Cable interconnection details for above c) Cable block diagram	Vendor Vendor Vendor	- - -	Cable listing for Control and Instrumentation Cable in enclosed excel format shall be submitted by vendor during detailed engineering stage.
8	Equipment layout drawings	Vendor	-	
9	Electrical Equipment GA drawing	Vendor	-	For necessary interface review.

Make of all electrical equipment/ items supplied shall be reputed make & shall be subject to approval of BHEL/customer after award of contract.

ELEVATOR ELECTRICAL

KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)

	TECHNICAL REQUIREMENTS
	ELEVATORS (ELECTRICALS)
1.00.00	CODES AND STANDARDS
1.01.00	All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions. In case of conflict between this specification and those (IS codes, standards, etc.) referred to herein, the former shall prevail. All work shall be carried out as per the standards/ codes as applicable.
2.00.00	Electric motor: The driving motors shall conform to IEC 60034 and suitable for the Variable Voltage Variable Frequency (VVVF) application. All motors shall be squirrel cage induction type, suitable for operation at 415V (+/- 10% variation) , 3 phase, 3 wire, 50HZ (+3% to -5% variation) supply. Motors shall be provided with thermal class 130(B) or better insulation
3.00.00	CAR ELECTRICAL ACCESSORIES The following accessories shall be provided : i) LED light fittings for illumination level of 100 lux on car floor. ii) Portable light and alarm bell with battery and charger ventilation fan with control. iii) Car control station with position indicator inside the car and at landing platforms (both visual and audio). iv) Emergency stop switch. v) 5/15A, 3 pin plug socket with switch on top of lift car. vi) Hand free speaker telephone set connected to plant network. vii) AUTOMATIC RESCUE DEVICE (ARD)-(BATTERY DRIVE) : Contractor to provide a modern Advanced electronic drive system of "RESCUING Passenger Trapped in a ELEVATOR". viii) EMERGENCY SAFETY DEVICES : The lift shall be provided with safety Device attached to the lift car frame and placed beneath the car. The safety device shall be capable of stopping and sustaining the lift car up at governor tripping speed with full rated load in car.
4.00.00	OPERATIONAL REQUIRMENTS: a. Contractor shall provide car operating panel with luminous buttons, car position indication in car (both visual and audio) combined with direction arrows, overload warning indicator, battery operated alarm bell and emergency light and fan & hands free speaker telephone set with suitable battery, charger & controls. b. Contractor shall provide emergency indicator to indicate the location of elevator in case of elevator being stuck up between the floors through automatic flashers (both audio & visual).
KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)	

CLAUSE NO.	<div data-bbox="680 201 1036 226" style="text-align: center;">TECHNICAL REQUIREMENTS</div> <div data-bbox="1273 186 1401 254" style="text-align: right;">  </div>
	<p>c. Contractor shall provide electronic door detector (Infra red curtain type).</p> <p>d. Digital hall position indicator at all floors, tell lights at all floors shall also be provided by the Contractor.</p> <p>e. For facilitating the movement of visually & hearing impaired persons, hall lantern and car arrival chimes shall be provided</p> <p>f. All fixtures shall be in stainless steel face plates.</p> <p>g. Push buttons shall be fixed in the car for holding the doors open for any length of the time required.</p> <p>h. All other safety/protection/operation interlocks as required by IS:14665 (latest edition).</p>
4.00.00	<p>POWER SUPPLY</p> <p>Each elevator shall be provided with a separate three phase, three wire 415V feeder of adequate rating</p>
5.00.00	<p>Controls:</p> <p>The controls shall be Variable Voltage and Variable frequency type and shall provide smooth and constant acceleration and retardation under all conditions of operation . Suitable control panel shall be provided in the machine room.</p>
6.00.00	<p>Cables and wiring:</p> <p>All the cables except trailing cables shall be as per IS:1554-1 or IS-7098-I. the PVC outer sheath of these cables shall be flame retardant, low smoke (FRLS) type with the following FRLS properties.</p> <p>a) Oxygen index of min. 29 (as per IS:10810 Part-58)</p> <p>b) Acid gas emission of max. 20% (as per IEC-754-I).</p> <p>c) Smoke density rating shall not be more than 60% (as per ASTM D-2843).</p> <p>The circular trailing cables shall be either in accordance with IS 4289 Part-I (Elastomer insulated) or IS-4289 Part-II (PVC insulated). The flat type trailing cables if offered shall be in accordance with IEC-60227-6.</p> <p>All wiring / cabling between the equipments in the lift machine room and that between the machine room and equipments in the lift well and at the landings shall be wired in HDP conduits/ galvanized steel conduits to be supplied by the contractor. Alternatively armored cables may be used.</p>
7.00.00	<p>Earthing:</p> <p>The elevator structures and all Electrical equipment, including metal conduits shall be effectively earthed with the earth conductors provided in the machine room as per IS: 3043.</p>
KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)	

MOTORS

KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)

	TECHNICAL REQUIREMENTS																				
	MOTORS																				
1.00.00	GENERAL REQUIREMENTS																				
1.01.00	For the purpose of design of equipment/systems, an ambient temperature of 50 deg. Centigrade and relative humidity of 95% (at 40 deg C) shall be considered. The equipment shall operate in a highly polluted environment.																				
1.02.00	All equipment's shall be suitable for rated frequency of 50 Hz with a variation of +3% & -5%, and 10% combined variation of voltage and frequency unless specifically brought out in the specification.																				
1.03.00	Contactors shall provide fully compatible electrical system, equipment's, accessories and services.																				
1.04.00	All the equipment, material and systems shall, in general, conform to the latest edition of relevant National and international Codes & Standards, especially the Indian Statutory Regulations.																				
1.05.00	Paint shade shall be as per RAL 5012 (Blue) for indoor and outdoor equipment.																				
1.06.00	The responsibility of coordination with electrical agencies and obtaining all necessary clearances for Contactors equipment and systems shall be under the Contactor scope.																				
1.07.00	Degree of Protection Degree of protection for various enclosures as per IEC60034-05 shall be as follows :- <table><tr><td>i)</td><td>Indoor motors</td><td>-</td><td>IP 54</td></tr><tr><td>ii)</td><td>Outdoor motors</td><td>-</td><td>IP 55</td></tr><tr><td>iii)</td><td>Cable box-indoor area</td><td>-</td><td>IP 54</td></tr><tr><td>iv)</td><td>Cable box-Outdoor area</td><td>-</td><td>IP 55</td></tr></table>	i)	Indoor motors	-	IP 54	ii)	Outdoor motors	-	IP 55	iii)	Cable box-indoor area	-	IP 54	iv)	Cable box-Outdoor area	-	IP 55				
i)	Indoor motors	-	IP 54																		
ii)	Outdoor motors	-	IP 55																		
iii)	Cable box-indoor area	-	IP 54																		
iv)	Cable box-Outdoor area	-	IP 55																		
2.00.00	CODES AND STANDARDS <table><tr><td>1)</td><td>Three phase induction motors</td><td>:</td><td>IS/IEC:60034</td></tr><tr><td>2)</td><td>Single phase AC motors</td><td>:</td><td>IS/ IEC:60034</td></tr><tr><td>3)</td><td>Crane duty motors</td><td>:</td><td>IS:3177, IS/IEC:60034</td></tr><tr><td>4)</td><td>DC motors/generators</td><td>:</td><td>IS:4722, IS/IEC:60034</td></tr><tr><td>5)</td><td>Energy Efficient motors</td><td>:</td><td>IS 12615, IEC:60034-30</td></tr></table>	1)	Three phase induction motors	:	IS/IEC:60034	2)	Single phase AC motors	:	IS/ IEC:60034	3)	Crane duty motors	:	IS:3177, IS/IEC:60034	4)	DC motors/generators	:	IS:4722, IS/IEC:60034	5)	Energy Efficient motors	:	IS 12615, IEC:60034-30
1)	Three phase induction motors	:	IS/IEC:60034																		
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KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)																					

	TECHNICAL REQUIREMENTS
3.00.00	TYPE
3.01.00	<p>AC Motors:</p> <ul style="list-style-type: none"> a) Squirrel cage induction motor suitable for direct-on-line starting. b) Continuous duty LT motors upto 200 KW Output rating (at 50 deg.C ambient temperature), shall be Premium Efficiency class-IE3, conforming to IS 12615, or IEC:60034-30. HT motors shall have minimum design efficiency of 95 %. However, tolerance on this efficiency value shall be applicable as per IEC 60034 c) Crane duty motors shall be slip ring/ squirrel cage Induction motor as per the requirement. d) Motor operating through variable frequency drives shall be suitable for inverter duty with VPI insulation. Also these motors shall comply the requirements stipulated in IEC: 60034-18-41 and IEC: 60034-18-42 as applicable. e) Motors operating through variable frequency drives shall also meet the requirements mentioned in subsection for VFD.
3.02.00	DC Motors Shunt wound.
4.00.00	RATING
	<ul style="list-style-type: none"> (a) Continuously rated (S1). However, crane motors shall be rated for S4 duty, 40% cyclic duration factor. (b) Whenever the basis for motor or driven equipment ratings are not specified in the corresponding mechanical specification sub-sections, maximum continuous motor ratings shall be at least 10% above the maximum load demand of the driven equipment under entire operating range including voltage and frequency variations.
5.00.00	TEMPERATURE RISE
	<p>Air cooled motors</p> <p>70 deg. C by resistance method for both thermal class 130(B) & 155(F) insulation.</p> <p>Water cooled</p> <p>80 deg. C over inlet cooling water temperature mentioned elsewhere, by resistance method for both thermal class 130(B) & 155(F) insulation.</p>
6.00.00	OPERATIONAL REQUIREMENTS
6.01.00	Starting Time
KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)	

	TECHNICAL REQUIREMENTS
6.01.01	For motors with starting time upto 20 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 2.5 secs. more than starting time.
6.01.02	For motors with starting time more than 20 secs. and upto 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be at least 5 secs. more than starting time.
6.01.03	For motors with starting time more than 45 secs. at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at highest voltage limit shall be more than starting time by at least 10% of the starting time.
6.01.04	Speed switches mounted on the motor shaft shall be provided in cases where above requirements are not met.
6.02.00	Torque Requirements
6.02.01	Accelerating torque at any speed with the lowest permissible starting voltage shall be at least 10% motor rated torque.
6.02.02	Pull out torque at rated voltage shall not be less than 205% of rated torque. It shall be 275% for crane duty motors.
6.03.00	Starting voltage requirement
	(a) Up to 85% of rated voltage for ratings below 110 KW
	(b) Up to 80% of rated voltage for ratings from 110 KW to 200 KW
	(c) Up to 85% of rated voltage for ratings from 201 KW to 1000 KW
	(d) Up to 80% of rated voltage for ratings from 1001 KW to 4000 KW
	(e) Up to 75 % of rated voltage for ratings above 4000KW
7.00.00	DESIGN AND CONSTRUCTIONAL FEATURES
7.01.00	Suitable single phase space heaters shall be provided on motors rated 30KW and above to maintain windings in dry condition when motor is standstill. Separate terminal box for space heaters & RTDs shall be provided. However for flame proof motors, space heater terminals inside the main terminal box may be acceptable.
7.02.00	All motors shall be either Totally enclosed fan cooled (TEFC) or totally enclosed tube ventilated (TETV) or Closed air circuit air cooled (CACA) type. However, motors rated 3000KW or above can be Closed air circuit water cooled (CACW). The method of movement of primary and secondary coolant shall be self-circulated by fan or pump directly mounted on the rotor of the main motor as per IEC 60034-6. However VFD driven motors can be offered with forced cooling type with machine mounted fan or pump driven by separate electric motor. Motors and EPB located in hazardous areas shall have flame proof enclosures conforming to IS:2148 as detailed below
KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)	

	TECHNICAL REQUIREMENTS
	<p>(a) Fuel oil area : Group – IIB</p> <p>(b) Hydrogen generation : Group - IIC or (Group-I, Div-II as per plant area NEC) or (Class-1, Group-B, Div-II as per NEMA /IEC60034)</p>
7.03.00	<p>Winding and Insulation</p> <p>(a) Type : Non-hygroscopic, oil resistant, flame resistant</p> <p>(b) Starting duty : Two hot starts in succession, with motor initially at normal running temperature.</p> <p>(c) 11kV, 6.6 KV & 3.3 kV AC motors : Thermal class 155 (F) insulation. The winding insulation process shall be total Vacuum Pressure Impregnated i.e resin poor method. The lightning Impulse & interturn insulation surge withstand level shall be as per IEC-60034 part-15.</p> <p>(d) 240VAC, 415V AC & 220V DC motors : Thermal Class (B) or better</p>
7.04.00	Motors rated above 1000KW shall have insulated bearings/housing to prevent flow of shaft currents.
7.05.00	Motors with heat exchangers shall have dial type thermometer with adjustable alarm contacts to indicate inlet and outlet primary air temperature.
7.06.00	Noise level for all the motors shall be limited to 85 dB(A) except for BFP motor for which the maximum limit shall be 90dB(A). Vibration shall be limited within the limits prescribed in IS:12075 / IEC 60034-14 . Motors shall withstand vibrations produced by driven equipment. HT motor bearing housings shall have flat surfaces, in both X and Y directions, suitable for mounting 80mmX80mm vibration pads.
7.07.00	In HT motors, at least four numbers simplex / two numbers duplex platinum resistance type temperature detectors shall be provided in each phase stator winding. Each bearing of HT motor shall be provided with dial type thermometer and minimum 2 numbers duplex platinum resistance type temperature detectors.
7.08.00	Motor body shall have two earthing points on opposite sides.
7.09.00	11 KV motors shall be offered with Separable Insulated Connector (SIC) as per IEEE 386. The offered SIC terminations shall be provided with protective cover and trifurcating sleeves. SIC termination kit shall be suitable for fault level of 25 KA for 0.17 seconds.
7.10.00	3.3/6.6 KV motors shall be offered with dust tight phase separated double walled (metallic as well as insulated barrier) Terminal box. Contractor shall provide termination kit for the offered Terminal box. The offered Terminal Box shall be
KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)	

	TECHNICAL REQUIREMENTS
	suitable for fault level of 250 MVA for 0.12 sec. Removable gland plates of thickness 3 mm (hot/cold rolled sheet steel) or 4 mm (non magnetic material for single core cables) shall be provided.
7.11.00	The spacing between gland plate & centre of bottom terminal stud shall be as per Table-I.
7.12.00	All motors shall be so designed that maximum inrush currents and locked rotor and pullout torque developed by them at extreme voltage and frequency variations do not endanger the motor and driven equipment.
7.13.00	The motors shall be suitable for bus transfer schemes provided on the 11kV, 6.6 KV, 3.3 kV /415V systems without any injurious effect on its life.
7.14.00	For motors rated 2000 KW & above, neutral current transformers of PS class shall be provided on each phase in a separate neutral terminal box.
7.15.00	The size and number of cables (for HT motors) to be intimated to the successful Contactor during detailed engineering and the Contactor shall provide terminal box suitable for the same.
8.00.00	<p>The ratio of locked rotor KVA at rated voltage to rated KW shall not exceed the following (without any further tolerance):</p> <p>(a) From 50KW & upto 110KW : 11.0</p> <p>(b) From 110 KW & upto 200 KW : 9.0</p> <p>(c) Above 200 KW & upto 1000KW : 10.0</p> <p>(d) From 1001KW & upto 4000KW : 9.0</p> <p>(e) Above 4000KW : 6 to 6.5</p>
10.00.00	TYPE TEST
10.01.00	HT MOTORS
10.01.01	The Contactor shall carry out the type tests as listed in this specification on the equipment to be supplied under this contract. The Contactor shall indicate the charges for each of these type tests separately in the relevant schedule of Section - VII- (BPS) and the same shall be considered for the evaluation of the bids. The type tests charges shall be paid only for the test(s) actually conducted successfully under this contract and upon certification by the Employer's engineer.
10.01.02	The type tests shall be carried out in presence of the Employer's representative, for which minimum 15 days notice shall be given by the Contactor. The Contactor shall obtain the Employer's approval for the type test procedure before conducting the type test. The type test procedure shall clearly specify the test set-up, instruments to be used, procedure, acceptance norms, recording of different
KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)	

	TECHNICAL REQUIREMENTS
10.01.03	<p>parameters, interval of recording, precautions to be taken etc. for the type test(s) to be carried out.</p> <p>In case the Contactor has conducted such specified type test(s) within last ten years as on the date of bid opening, he may submit during detailed engineering the type test reports to the Employer for waiver of conductance of such test(s). These reports should be for the tests conducted on the equipment similar to those proposed to be supplied under this contract and test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. The Employer reserves the right to waive conducting of any or all the specified type test(s) under this contract. In case type tests are waived, the type test charges shall not be payable to the Contactor.</p>
10.01.04	<p>Further the Contactor shall only submit the reports of the type tests as listed in "LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED" and carried out within last ten years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. However if the Contactor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the Contactor shall conduct all such tests under this contract at no additional cost to the Employer either at third party lab or in presence of client/Employers representative and submit the reports for approval.</p>
10.01.05	<p>LIST OF TYPE TESTS TO BE CONDUCTED</p> <p>The following type tests shall be conducted on each type and rating of HT motor</p> <ul style="list-style-type: none"> (a) No load saturation and loss curves upto approximately 115% of rated voltage (b) Measurement of noise at no load. (c) Momentary excess torque test (subject to test bed constraint). (d) Full load test(subject to test bed constraint) (e) Temperature rise test at rated conditions. During heat run test, bearing temp., winding temp.,coolant flow and its temp. shall also be measured. In case the temperature rise test is carried at load other than rated load, specific approval for the test method and procedure is required to be obtained. Wherever ETD's are provided, the temperature shall be measured by ETD's also for the record purpose.
KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)	

	TECHNICAL REQUIREMENTS
10.01.06	<p>LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED</p> <p>The following type test reports shall be submitted for each type and rating of HT motor</p> <ul style="list-style-type: none"> (a) Degree of protection test for the enclosure followed by IR, HV and no load run test. (b) Terminal box-fault level withstand test for each type of terminal box of HT motors only. (c) Lightning Impulse withstand test on the sample coil shall be as per clause no. 4.3 IEC-60034, part-15 (d) Surge-withstand test on inter-turn insulation shall be as per clause no. 4.2 of IEC 60034, part-15
10.02.00	LT Motors
10.02.01	LT Motors supplied shall be of type tested design. During detailed engineering, the Contactor shall submit for Employer's approval the reports of all the type tests as listed in this specification and carried out within last <i>ten</i> years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.
10.02.02	However if the Contactor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the Contactor shall conduct all such tests under this contract at no additional cost to the Employer either at third party lab or in presence of client/Employers representative and submit the reports for approval.
10.02.03	<p>LIST OF TESTS FOR WHICH REPORTS HAVE TO BE SUBMITTED</p> <p>The following type test reports shall be submitted for each type and rating of LT motor of above 100 KW only</p> <ul style="list-style-type: none"> 1. Measurement of resistance of windings of stator and wound rotor. 2. No load test at rated voltage to determine input current power and speed 3. Open circuit voltage ratio of wound rotor motors (in case of Slip ring motors) 4. Full load test to determine efficiency power factor and slip 5. Temperature rise test
KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)	

	TECHNICAL REQUIREMENTS
	<ol style="list-style-type: none"> 6. Momentary excess torque test. 7. High voltage test 8. Test for vibration severity of motor. 9. Test for noise levels of motor(Shall be limited as per clause no 7.06.00 of this section) 10. Test for degree of protection and 11. Overspeed test. 12. Type test reports for motors located in fuel oil area having flame proof enclosures as per IS 2148 / IEC 60079-1
10.03.00	All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.
10.04.00	The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, an endorsement sheet will be furnished by the manufacturer confirming similarity and "No design Change". Minor changes if any shall be highlighted on the endorsement sheet.
KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)	


TECHNICAL REQUIREMENTS																													
<p style="text-align: center;">TABLE - I</p> <p style="text-align: center;">DIMENSIONS OF TERMINAL BOXES FOR LV MOTORS</p> <table> <tr> <th>Motor MCR in KW</th><th>Minimum distance between centre of bottom terminal stud and gland plate in mm</th></tr> <tr> <td>UP to 3 KW</td><td>As per manufacturer's practice.</td></tr> <tr> <td>Above 3 KW - upto 7 KW</td><td>85</td></tr> <tr> <td>Above 7 KW - upto 13 KW</td><td>115</td></tr> <tr> <td>Above 13 KW - upto 24 KW</td><td>167</td></tr> <tr> <td>Above 24 KW - upto 37 KW</td><td>196</td></tr> <tr> <td>Above 37 KW - upto 55 KW</td><td>249</td></tr> <tr> <td>Above 55 KW - upto 90 KW</td><td>277</td></tr> <tr> <td>Above 90 KW - upto 125 KW</td><td>331</td></tr> <tr> <td>Above 125 KW-upto 200 KW</td><td>385/203 (For Single core cables only)</td></tr> </table> <p>For HT motors the distance between gland plate and the terminal studs shall not be less than 500 mm.</p> <p>PHASE TO PHASE/ PHASE TO EARTH AIR CLEARANCE:</p> <p>NOTE: Minimum inter-phase and phase-earth air clearances for LT motors with lugs installed shall be as follows:</p> <table> <tr> <th>Motor MCR in KW</th><th>Clearance</th></tr> <tr> <td>UP to 110 KW</td><td>10mm</td></tr> <tr> <td>Above 110 KW and upto 150 KW</td><td>12.5mm</td></tr> <tr> <td>Above 150 KW</td><td>19mm</td></tr> </table>		Motor MCR in KW	Minimum distance between centre of bottom terminal stud and gland plate in mm	UP to 3 KW	As per manufacturer's practice.	Above 3 KW - upto 7 KW	85	Above 7 KW - upto 13 KW	115	Above 13 KW - upto 24 KW	167	Above 24 KW - upto 37 KW	196	Above 37 KW - upto 55 KW	249	Above 55 KW - upto 90 KW	277	Above 90 KW - upto 125 KW	331	Above 125 KW-upto 200 KW	385/203 (For Single core cables only)	Motor MCR in KW	Clearance	UP to 110 KW	10mm	Above 110 KW and upto 150 KW	12.5mm	Above 150 KW	19mm
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KAHALGAON (FGD) STPP, Stage-I & II (4x210MW + 3x500MW)																													

Cable glands

Cable shall be terminated using double compression type cable glands. Testing requirements of Cable glands shall conform to BS:6121 and gland shall be of robust construction capable of clamping cable and cable armour (for armoured cables) firmly without injury to insulation. Cable glands shall be made of heavy duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 micron. All washers and hardware shall also be made of brass with nickel chrome plating Rubber components shall be of neoprene or better synthetic material and of tested quality. Cable glands shall be suitable for the sizes of cable supplied/erected.


Cable lugs/ferrules

Cable lugs/ferrules for power cables shall be tinned copper solderless crimping type suitable for aluminium compacted conductor cables. Cable lugs and ferrules for control cables shall be tinned copper type. The cable lugs for control cables shall be provided with insulating sleeve and shall suit the type of terminals provided on the equipments. Cable lugs and ferrule shall conform to DIN standards

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO. :	DATE:
			CUSTOMER :		QP NO.: PE-QP-999-Q-006, REV-02	DATE: 17.04.2020
			PROJECT:		PO NO.:	DATE:
			ITEM: AC ELECT. MOTORS UPTO 55KW (LV (415V))	SYSTEM:	SECTION: II	SHEET 1 of 2

S. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY	REMARKS
1	2	3	4	5	M	C/ N	7	8	9	**	
		1.WORKMANSHIP	MA	VISUAL	100%	-	MFG. SPEC.	MFG. SPEC.	LOG BOOK	P -	-
		2.DIMENSIONS	MA	VISUAL	100%	-	MFG. DRG./ MFG. SPEC.	MFG. DRG./ MFG. SPEC.	LOG BOOK	P -	-
1.0	ASSEMBLY	3.CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	MA	VISUAL	100%	-	MFG.SPEC./	MFG.SPEC.	LOG BOOK	P -	-
TENDER NO.: PSER:SCT KGN-C2101:21											
2.0	PAINTING	1.SHADE	MA	VISUAL	SAMPLE	-	MFG. SPEC/ APPROVED DATASHEET	MFG. SPEC/ APPROVED DATASHEET	LOG BOOK	✓ P	V -
3.0	TESTS	1.ROUTINE TEST INCLUDING SPECIAL TEST	MA	VISUAL	100%	-	IS-325 / IS-12615/ APPROVED DATA SHEET	IS-325 / IS-12615/ APPROVED DATA SHEET	TEST/ INSPN. REPORT	✓ P	V -
		2.OVERALL DIMENSIONS & ORIENTATION	MA	MEASUREMENT & VISUAL	100%	-	APPROVED DRG/ DATA SHEET	APPROVED DRG/ DATA SHEET	TEST/ INSPN. REPORT	✓ P	V -

BHEL				BIDDER/ SUPPLIER				FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING		QUALITY		Sign & Date		Sign & Date		Doc No:		Sign & Date	
Prepared by:	HEMA KHUSHWAHA	Checked by:	KUNAL GANDHI	Sign	Seal	Reviewed by:	Name	Seal			
Reviewed by:	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL			Approved by:					

	MANUFACTURER/ SUPPLIER NAME & ADDRESS		BIDDER/		STANDARD QUALITY PLAN		SPEC. NO. :		DATE:	
							CUSTOMER :		DATE: 17.04.2020	
							PROJECT:		DATE:	
							ITEM: AC ELECT. MOTORS UPTO 55KW (LV (415V))		SHEET 2 of 2	
		SYSTEM:		SECTION: II						

	3.NAMEPLATE DETAILS	MA	VISUAL	100%	-	IS-325 / IS-12615 / APPROVED DATA SHEET	SAME AS COL. 7	TEST/ INSPN. REPORT	✓	P	V	-
4.0	PACKING	MA	VISUAL	100%	100%	AS PER MFG. STANDARD / (#).	AS PER MFG. STANDARD / (#).	INSPC. REPORT	✓	P	W	-
(#) REFER NOTE-8												

TENDER NO.: PSER:SCT:KGN-C2101:21

NOTES:

1. Routine tests on 100% motors shall be done by the vendor. However, BHEL/ Customer shall witness routine tests on random samples. The sampling plan shall be mutually agreed upon.
2. For exhaust/ventilation fan motors of rating up to 1.5 KW, only routine test certificates shall be furnished for scrutiny.
3. In case test certificates for these tests on similar type, size and design of motor from independent laboratory are available, the same is valid for 5 years.
4. BHEL reserves the right to perform repeat test, if required.
5. After packing and prior to issue MDCC, photographs of items to be despatched shall be sent to BHEL for review.
6. In case of any changes in QP commented by customer at contract stage, same shall be carried out by bidder without any implication to BHEL/ Customer.
7. Project specific QP to be developed based on customer requirement.
8. For export job, BHEL technical specification for seaworthy packing to be followed.
9. Packing shall be suitable for storage at site in tropical climate conditions.
10. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) indicated in QP shall be referred.

LEGENDS:

*RECORDS, IDENTIFIED WITH "TICK"(✓) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,

** M: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, B: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, C: CUSTOMER,

P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE


MA: MAJOR, MI: MINOR, CR: CRITICAL

D: DOCUMENTATION

BHEL			
ENGINEERING		QUALITY	
Sign & Date	Name	Sign & Date	Name
Prepared by:	HEMA KHUSHWAHA	Checked by:	KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER			
Sign & Date			
Seal			

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
Reviewed by:	Sign & Date	Name	Seal
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN				SPEC. NO. :		
			CUSTOMER :		OP NO. : PE-QP-999-Q-007, REV-04				
			PROJECT:		PO NO.:				
			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))		SYSTEM:				
						SECTION: II		SHEET 1 OF 9	

SI No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check			Reference Document	Acceptance NORMS	FORMAT OF RECORD				AGENCY			
					M	6	C/N			9	D	M	C	N			
1.0	RAW MATERIAL & BOUGHT OUT CONTROL																
1.1	SHEET STEEL PLATES, SECTION, EYEBOLTS	1.SURFACE CONDITION	MA	VISUAL	100%	-	-	-	FREE FROM BLINKS, CRACKS, WARRIERS ETC	LOG BOOK		P	-	-			
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	-	-	MANUFACTURER'S DRG./SPEC	MANUFACTURERS DRG./SPEC	LOG BOOK		P	-	-			
		3.PROOF LOAD TEST (ETE BOLT)	MA	MECH. TEST	SAMPLE	-	-	MANUFACTURER'S DRG./SPEC	MANUFACTURERS DRG./SPEC	TEST REPORT		P/V	-	-			
1.2	HARDWARES	1.SURFACE CONDITION	MA	VISUAL	100%	-	-		FREE FROM CRACKS, UN- EVENNESS ETC.	TEST REPORT		P	-	-			
		2.PROPERTY CLASS	MA	VISUAL	SAMPLES	-	-	MANUFACTURER'S DRG./SPEC	MANUFACTURERS DRG./SPEC	TC		P/V	-	-		PROPERTY CLASS MARKING SHALL BE CHECKED BY THE VENDOR	
1.3	CASTING	1.SURFACE CONDITION	MA	VISUAL	100%	-	-	MANUFACTURER'S DRG./SPEC	FREE FROM CRACKS, SLIGHT HOLES ETC.	LOG BOOK		P/V	-	-			
		2.CHEM. & PHY. PROP.	MA	CHEM & MECH TEST	1*HEAT NO.	-	-	MANUFACTURER'S DRG./SPEC	MANUFACTURERS DRG./SPEC	TC		P/V	-	-		HEAT NO. SHALL BE VERIFIED	
		3.DIMENSIONS	MA	MEASUREMENT	100%	-	-	MANUFACTURER'S DRG.	MANUFACTURERS DRG.	LOG BOOK		P/V	-	-			
1.4	PAINT & VARNISH	1.MAKE, SHADE, SHELF LIFE & TYPE	MA	VISUAL	100% CONTINUOUS	-	-	MANUFACTURER'S DRG./SPEC	MANUFACTURERS DRG./SPEC	LOG BOOK		P/V	-	-			

BHEL				QUALITY			
ENGINEERING				Name		Sign & Date	
Sign & Date				Name		Seal	
Prepared by:		HEMA KHUSHWAHA		Checked by:			
Reviewed by:		PRAVEEN DUTTA		Reviewed by:			


FOR CUSTOMER REVIEW & APPROVAL			
Doc No:		Sign & Date	
		Name	
Reviewed by:			
Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS										STANDARD QUALITY PLAN				SPEC. NO. :		DATE:17.04.2020	
										CUSTOMER :				QP NO. : PE-QP-999-Q-007, REV.04			
										PROJECT:				PO NO. :			
										ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))				SYSTEM: II			
														SHEET 2 OF 9			
Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY						
1		3	4	5	6		7	8	9	D	M	C	N				
1.5	SHAFT (FORGED OR ROLLED)	1. SURFACE COND. 2. CHEM. & PHYSICAL PROPERTIES 3. DIMENSIONS 4.INTERNAL FLAWS	MA MA MA CR	VISUAL CHEM. & PHYSICAL TESTS MEASUREMENT ULTRASONIC TEST	100% 1/HEAT NO. OR HEAT TREATMENT BATCH NO 100% 100%	- - - -	- MANUFACTURER'S DRG./ SPEC. MANUFACTURER'S DRG./ SPEC. ASTM-A388	FREE FROM VISUAL DEFECTS MANUFACTURERS DRG./ STD. MANUFACTURERS DRG. MANUFACTURERS STD.	LOG BOOK TC LOG BOOK INSPECTION REPORT	P P/V P/V PW	- - - V	- -	- -	VENDOR'S APPROVAL IDENTIFICATION SHALL BE MAINTAINED FOR DIA OF 55 MM & ABOVE			
1.6	SPACE HEATERS, CONNECTORS, TERMINAL BLOCKS, CARBON BRUSH TEMP. DETECTORS, RTD, RTD'S	1. MAKE & MODEL 2. PHYSICAL COND. 3.DIMENSIONS (WHSOEVER APPLICABLE) 4.PERFORMANCE/	MA MA MA MA	VISUAL VISUAL MEASUREMENT TEST	100% 100% SAMPLE 100%	- - - -	MANUFACTURER'S DRG./STD. MANUFACTURER'S DRG./STD. MANUFACTURER'S DRG./ STD MANUFACTURERS DRG./ STD.	MANUFACTURERS DRG./STD. NO PHYS. DAMAGE, NO ELECTRICAL DISCONTINUITY MANUFACTURERS DRG. / STD.	INSPECTION REPORT INSPECTION REPORT INSPECTION REPORT TEST	P/V P/V P/V P/V	- - - -	- -	- -				

BHEL			
ENGINEERING		QUALITY	
	Sign & Date	Name	Sign & Date
Prepared by:		HEMA KHUSHWAHA	Checked by:
Reviewed by:		PRAVEEN DUTTA	Reviewed by:
			R.K. JAISWAL


	BIDDER / SUPPLIER
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO. :	
			CUSTOMER :		QP NO. : PE-QP-999-Q007, REV.04	
			PROJECT :		PO NO. :	
			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))		SYSTEM: II	
			DATE:17.04.2020			
			SHEET 3 OF 9			

SI No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY		
1	2	3	4	5	6		7	8	9	*	**		
					M	C/N				D	M	C	N
1.7	OTHER INSULATING MATERIALS LIKE SLEEVES, BINDINGS CORDS, PAPERS, PRESS BOARDS ETC.	1. SURFACE COND. ETC. 2.DIMENSION(BORE DIA, WALL THICKNESS, BOV AS RECEIVED, BOV AFTER FOLDING AT 180°	MA	VISUAL	100%	-	-	NO VISUAL DEFECTS	TEST REPORT		P/V	-	-
			MA	TEST	SAMPLE	-	MANUFACTURER'S STD.	MANUFACTURER'S STD.	LOG BOOK AND OR SUPPLIERS TC		P/V	-	-
1.8	SHEET STAMPING (PUNCHED)	1. SURFACE COND.	MA	VISUAL	100%	-	-	NO VISUAL DEFECTS (FREE FROM BURS)	LOG BOOK		P	-	-
		2.DIMENSIONS INCLUDING BURS HEIGHT	MA	MEASUREMENT	SAMPLE	-	MANUFACTURER'S DRG.	MANUFACTURER'S DRG.	LOG BOOK		P/V	-	-
		3.ACCEPTANCE TESTS	MA	ELECT. & MECH TESTS	SAMPLE	-	MANUFACTURER'S DRG./ STD.	MANUFACTURER'S DRG./ STD.	TC		P/V	-	-
1.9	CONDUCTORS	1. SURFACE FINISH	MA	VISUAL	100%	-	-	FREE FROM VISUAL DEFECTS	LOG BOOK		*P/V	-	-
		2.ELECT. PROP. & MECH. PROP	MA	ELECT. & MECH.TEST	SAMPLES	-	MANUFACTURER'S DRG./ SPEC.	MANUFACTURER'S / SPEC.	TC & VENDORS TEST REPORTS		P/V	-	-
													*MOTOR MANUFACTURER TO CONDUCT VISUAL CHECK FOR SURFACE FINISH ON RANDOM BASIS (10% SAMPLE) AT HIS WORKS AND MAINTAIN RECORD FOR VERIFICATION BY


BHEL			BIDDER/ SUPPLIER			FOR CUSTOMER REVIEW & APPROVAL		
ENGINEERING			Sign & Date			Doc No:		
Sign & Date	Name	Sign & Date	Name	Sign & Date	Seal	Sign & Date	Name	Seal
Prepared by:	HEMA KHUSHWAHA	Checked by:	KUNAL GANDHI			Reviewed by:		
Reviewed by:	PRAVEEN DUTTA	Reviewed by:	R K JAISWAL			Approved by:		

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO. :	
			CUSTOMER :		QP NO. : PE-QP-999-Q-007, REV-04	
			PROJECT:		PO NO.:	
			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))		SYSTEM: II	
					SECTION: II	
					SHEET 4 OF 9	

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD	AGENCY			
1		3	4	5	6		7	8	9	D	M	C	N
					M	CN							
1.10	BEARINGS	3.DIMENSIONS	MA	MEASUREMENT	SAMPLES	-	MANUFACTURER'S DRG./ SPEC.	MANUFACTURERS / SPEC.	LOG BOOK		P/V	-	-
		1.MAKE & TYPE	MA	VISUAL	100%	-	MANUFACTURERS DRG./ APPROVED DATASHEET	MANUFACTURERS DRG./ APPROVED DATASHEET	LOG BOOK		P/V	-	-
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	-	APPROVED DATASHEET	APPROVED DATASHEET/ MANUFS CATALOGUES	LOG BOOK		P/V	-	-
		3.SURFACE FINISH	MA	VISUAL	100%	-	-	FREE FROM VISUAL DEFECTS	LOG BOOK		P/V	-	-
1.11	SLIP RING (WHEREVER APPLICABLE)	1.SURFACE COND.	MA	VISUAL	100%	-	-	FREE FROM VISUAL DEFECTS	LOG BOOK		P	-	-
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	-	MANUFACTURER'S DRG	MANUFACTURERS DRG	LOG BOOK		P	-	-
		3.TEMP.WITH- STAND CAPACITY	MA	ELECT.TEST	SAMPLE	-	MANUFACTURERS STD./APPROVED DATASHEET	MANUFACTURERS STD./APPROVED DATASHEET	LOG BOOK		P/V	-	-
		4.HV/IR	MA	-DO-	100%	-	MANUFACTURERS STD./APPROVED DATASHEET	MANUFACTURERS STD./APPROVED DATASHEET	LOG BOOK		P/V	-	-
1.12	OIL SEALS & GASKETS	1.MATERIAL OF GASKET	MA	VISUAL	100%	-	MANUFACTURERS DRG/SPECS	MANUFACTURERS DRG/SPECS	LOG BOOK		P	-	-
		2.SURFACE COND.	MA	VISUAL	100%	-	-	FREE FROM VISUAL DEFECTS	LOG BOOK		P	-	-
		3.DIMENSIONS	MA	MEASUREMENT	SAMPLE	-	MANUFACTURERS DRG	MANUFACTURERS DRG	LOG BOOK		P	-	-

ENGINEERING			BHEL			QUALITY		
Sign & Date	Name		Sign & Date		Name			
Prepared by:	HEMA KHUSHWAHA		Checked by:		KUNAL GANDHI			
Reviewed by:	PRAVEEN DUTTA		Reviewed by:		R K JAISWAL			

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:	Sign & Date		Seal
Reviewed by:			
Approved by:			

		MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS				STANDARD QUALITY PLAN				SPEC. NO. : Qp NO.: PE-QP-999-Q007, REV-04 DATE:17.04.2020			
PROJECT:										PO NO.:			
ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))										SYSTEM: II			
SECTION: II										SHEET 5 OF 9			


SI No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check			Reference Document	Acceptance NORMS	FORMAT OF RECORD	AGENCY			
1		3	4	5	6			7	8	9	10			
					M	C/N					D	M	C	N
2.0	IN PROCESS	1.WORKMANSHIP & CLEANNESS	MA	VISUAL	100%			MANUFACTURER'S DRG	GOOD FINISH	LOG BOOK		PW	-	-
2.1	STATOR FRAME WELDING (IN CASE OF FABRICATED STATOR)	2.DIMENSIONS	MA	MEASUREMENT	100%			MANUFACTURER'S DRG	MANUFACTURER'S DRG	LOG BOOK		P	-	-
2.2	MACHINING	1.FINISH	MA	VISUAL	100%			-DO-	GOOD FINISH	LOG BOOK		P	-	-
		2.DIMENSIONS	MA	MEASUREMENT	100%			MANUFACTURER'S DRG	MANUFACTURER'S DRG	LOG BOOK		P	-	-
		3.SHAFT SURFACE FLOWS	MA	PT	100%			MANUFACTURER'S STD./APPROVED DATASHEET. ASTM E165	MANUFACTURER'S STD./APPROVED DATASHEET.	LOG BOOK	✓	P	V	-
2.3	PAINTING	1.SURFACE PREPARATION	MA	VISUAL	100%			MANUFACTURER'S STD./APPROVED DATASHEET	MANUFACTURER'S STD./APPROVED DATASHEET	LOG BOOK		P	-	-
		2.PAINT THICKNESS (BOTH PRIMER & FINISH COAT)	MA	MEASUREMENT BY ELCOMETER	SAMPLE			MANUFACTURER'S STD./APPROVED DATASHEET	MANUFACTURER'S STD./APPROVED DATASHEET	LOG BOOK		P	-	-
		3.SHADE	MA	VISUAL	SAMPLE			MANUFACTURER'S STD./APPROVED DATASHEET	MANUFACTURER'S STD./APPROVED DATASHEET	LOG BOOK		P	-	-
		4.ADHESION	MA	CROSS CUTTING & TAPE TEST	SAMPLE			MANUFACTURER'S STD./APPROVED DATASHEET	MANUFACTURER'S STD./APPROVED DATASHEET	LOG BOOK		P	-	-

BHEL				QUALITY			
ENGINEERING		Name		Sign & Date		Name	
Prepared by:		HEMA KHUSHWAHA	Checked by:				
Reviewed by:		PRAVEEN DUTTA	Reviewed by:				

BIDDER/ SUPPLIER			
Sign & Date			
Seal			

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:		Sign & Date	
		Name	
		Seal	
Reviewed by:			
Approved by:			


26 OF 31

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO. :	
			CUSTOMER :		Qp NO.: PE-QP-999-Q-007, REV-04	
			PROJECT:		PO NO.:	
			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))		SYSTEM: II	
					DATE:17.04.2020	
					SHEET 7 OF 9	

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD	AGENCY		
1	2	3	4	5	6		7	8	9	D	M	C
					M	C/N						
2.7	COMPLETE STATOR ASSEMBLY	4.DURATION 1.COMPACTNESS & CLEANLINESS	MA	PROCESS (ELECT. & VISUAL)	CONTINUOUS	-	MANUFACTURER'S STANDARD	MANUFACTURER'S STANDARD	LOG BOOK	✓	P	V
2.8	BRAZING/COMPRESSION JOINT	1.COMPLETENESS 2.SOUNDNESS	CR	VISUAL	100%	-	MANUFACTURER'S STANDARD	MANUFACTURER'S STANDARD	LOG BOOK	✓	P	-
2.9	COMPLETE ROTOR ASSEMBLY	3.HV 1.RESIDUAL UNBALANCE	CR	MALLETT TEST & UT	100%	-	MANUFACTURER'S STANDARD	MANUFACTURER'S STANDARD	TEST/INSPC. REPORT	✓	P	V
2.10	ASSEMBLY	2.SOUNDNESS OF DIE CASTING	CR	ELECT. TEST	100%	-	MANUFACTURER'S SPEC./ ISO 1940	MANUFACTURER'S DWG.	LOG BOOK	✓	P	-
		1.ALIGNMENT	MA	DYN. BALANCE	100%	-	MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	TEST/INSPC. REPORT	✓	P	V
		2.WORKMANSHIP	MA	ELECT. (GLOWLER TEST)	100%	-	MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	LOG BOOK	✓	P	-
		3.AXIAL PLAY	MA	MEAS.	100%	-	MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	LOG BOOK	✓	P	V
		4.DIMENSIONS	MA	MEAS.	100%	-	MANUFACTURER'S DRG./ MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	LOG BOOK	✓	P	-
		5.CORRECTNESS, COMPLETENESS DIMENSIONS/ MARKING/ COLOUR CODE	MA	VISUAL	100%	-	MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	LOG BOOK	✓	P	-
		6. RTD, BTD & SPACE HEATER MOUNTING.	MA	VISUAL	100%	-	MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	LOG BOOK	✓	P	V

BHEL			
ENGINEERING		QUALITY	
Sign & Date	Name	Sign & Date	Name
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Reviewed by:	PRAVEEN DUTTA	Reviewed by:	R K JAISWAL

FOR CUSTOMER REVIEW & APPROVAL			
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	<p align="center">MANUFACTURER/ BIDDER SUPPLIER NAME & ADDRESS</p>		STANDARD QUALITY PLAN		SPEC. NO. :
			CUSTOMER :		QP NO. : PE-QP-999-Q-007, REV-04
			PROJECT :		PO NO. :
			ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))		SYSTEM:
<p align="right">DATE: 17.04.2020</p>					
<p align="right">SHEET 8 OF 9</p>					

S/ No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY					
1	2	3	4	5	6		7	8	9	.	..	M	C	N		
					1/TYPE/SIZE	C/N										
3.0	TESTS	1.TYPE TESTS INCLUDING SPECIAL TESTS	MA	ELECT.TEST	1/TYPE/SIZE	IS-325/IS-12615/APPROVED DATASHEET	IS-325/IS-12615/APPROVED DATASHEET	IS-325/IS-12615/APPROVED DATASHEET	✓	TEST REPORT	✓	P	W*	-	* NOTE - 1	
		2.ROUTINE TESTS INCLUDING SPECIAL TEST	MA	ELECT.TEST	100%	-	IS-325/IS-12615/APPROVED DATASHEET	IS-325/IS-12615/APPROVED DATASHEET	IS-325/IS-12615/APPROVED DATASHEET	✓	TEST REPORT	✓	P	V [§]	-	§NOTE - 2
		3.VIBRATION & NOISE LEVEL	MA	ELECT.TEST	100%	-	IS: 12075 / IEC 60034-14 & IS-12065	IS: 12075 / IEC 60034-14 & IS-12065	IS: 12075 / IEC 60034-14 & IS-12065	✓	TEST REPORT	✓	P	V [§]	-	§NOTE - 2
		4.OVERALL DIMENSIONS AND ORIENTATION	MA	MEASUREMENT & VISUAL	100%	100%	APPROVED DRG/DATA SHEET	APPROVED DRG/DATA SHEET	APPROVED DRG/DATA SHEET &	✓	TEST/INSPC. REPORT	✓	P	W	-	
		5.DEGREE OF PROTECTION	MA	ELECT. & MECH. TEST	1/TYPE/ SIZE	-	IEC 60034-5/IS-12615	IEC 60034-5/IS-12615	APPROVED DATASHEET	✓	TC	✓	P	V	-	TC FROM AN INDEPENDENT LABORATORY,REFER NOTE-3
		6.MEASUREMENT OF RESISTANCE OF RTD & BTD	MA	ELECT. & MECH. TEST	100%	100%	IS-325/IS-12615/IEC-60034 PART-1/IS-12062	IS-325/IS-12615/IEC-60034 PART-1/IS-12062	IS-325/IS-12615/IEC-60034 PART-1/IS-12062	✓	TC	✓	P	V [§]	-	§NOTE - 2
		7. MEASUREMENT OF RESISTANCE, IR OF SPACE HEATER	MA	ELECT. & MECH. TEST	100%	100%	IS-325/IS-12615/IEC-60034 PART-1	IS-325/IS-12615/IEC-60034 PART-1	IS-325/IS-12615/IEC-60034 PART-1	✓	TC	✓	P	V [§]	-	§NOTE - 2
		8. NAME PLATE DETAILS	MA	VISUAL	100%	100%	IS-325/IS-12615& DATA SHEET	IS-325/IS-12615& DATA SHEET	IS-325/IS-12615 & DATA SHEET	✓	TEST/INSPC. REPORT	✓	P	V [§]	-	§NOTE - 2
		9.EXPLOSION FLAME PROOF NESS (IF SPECIFIED)	MA	EXPLOSION FLAME PROOF TEST	1/TYPE	-	IS 2148 / IEC 60079-1	IS 2148 / IEC 60079-1	IS 2148 / IEC 60079-1	✓	TC	✓	P	V	-	TC FROM AN INDEPENDENT LABORATORY, REFER NOTE-3
		10. PAINT SHADE, THICKNESS & FINISH	MA	VISUAL & MEASUREMENT BY YELLOMETER	SAMPLE	SAMPLE	SAMPLE	APPROVED DATASHEET	APPROVED DATASHEET	APPROVED DATASHEET	✓	TC	✓	P	W\$	-

ENGINEERING					BHEL		QUALITY		
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BIDDER SUPPLIER	
Sign & Date	
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				SECTION: II		SHEET 9 OF 9	

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check	Reference Document	Acceptance NORMS	FORMAT OF RECORD	AGENCY
1		3	4	5	6	7	8	9	**
					M	C/N		D	M C N
4.0	PACKING	SURFACE FINISH & COMPLETENESS	MA	VISUAL	100%	100%	AS PER MANUFACT. STANDARD / (#)	INSPC. REPORT	P W -

NOTES:

- 1 DEPENDING UPON THE SIZE AND CRITICALLY, WITNESSING BY BHEL SHALL BE DECIDED.
- 2 ROUTINE TESTS ON 100% MOTORS SHALL BE DONE BY THE VENDOR. HOWEVER, BHEL/CUSTOMER SHALL WITNESS ROUTINE TESTS ON RANDOM SAMPLES. THE SAMPLING PLAN SHALL BE MUTUALLY AGREED UPON.
- 3 IN CASE TEST CERTIFICATES FOR THESE TESTS ON SIMILAR TYPE, SIZE AND DESIGN OF MOTOR FROM INDEPENDENT LABORATORY ARE AVAILABLE, THE SAME IS VALID FOR 5 YEARS.
- 4 BHEL RESERVES THE RIGHT TO PERFORM REPEAT TEST, IF REQUIRED.
- 5 AFTER PACKING AND PRIOR TO ISSUE MDCC, PHOTOGRAPHS OF ITEMS TO BE DESPATCHED SHALL BE SENT TO BHEL PURCHASE GROUP FOR REVIEW.
- 6 IN CASE , ANY CHANGES IN QP COMMENTED BY CUSTOMER AT CONTRACT STAGE SHALL BE CARRIED OUT BY BIDDER WITHOUT ANY IMPLICATION TO BHEL/ CUSTOMER.
- 7 PROJECT SPECIFIC QP TO BE DEVELOPED BASED ON CUSTOMER REQUIREMENT.
- 8 FOR EXPORT JOB, BHEL TECHNICAL SPECIFICATION FOR SEAWORTHY PACKING TO BE FOLLOWED.
- 9 PACKING SHALL BE SUITABLE FOR STORAGE AT SITE IN TROPICAL CLIMATE CONDITIONS.
- 10 LATEST REVISION/ YEAR OF ISSUE OF ALL THE STANDARDS (IS/ ASME/ IEC ETC.) INDICATED IN QP SHALL BE REFERRED.

LEGENDS:

- *RECORDS, IDENTIFIED WITH "TICK(✓)" SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
- ** M: SUPPLIER/MANUFACTURER/SUB-SUPPLIER, B: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, C: CUSTOMER, P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE
- MA: MAJOR, MI: MINOR, CR: CRITICAL
- D: DOCUMENT

BHEL			
ENGINEERING		QUALITY	
Sign & Date	Name	Sign & Date	Name
Prepared by:	HEMA KHUSHWAHA	Checked by:	KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	Reviewed by:	R K JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:		Sign & Date	Seal
Reviewed by:			
Approved by:			

[illegible]

