

	<u>BHARAT HEAVY ELECTRICAL LIMITED,</u>		
	<u>PIPLANI, BHOPAL</u>		
		Rev	00
		Date:	25.04.2023
	NOTE:-		
	1. Vendor must submit complete information against clause sl. no. 58.0 (Qualifying Criteria). The offer meeting this clause would only be processed.		
	2. The "Offered" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.		
	3. The offer and all documents enclosed with offer should be in English language only.		
	4. All dimensions are in mm unless otherwise stated.		
Sl. NO	Description for BHEL requirement	Required Parameters/Documents	Remark
1.0	REQUIREMENT: One No. dedicated Column type CNC with Three independent spindle suitable to drill Tube sheet of dia upto 3000mm Max.,drill depth upto 1000mm, suitable to use both type of BTA/Gun drilling system. Weight of the job up to 15 metric Ton	Bidder to Note & confirm.	
1.1	SCOPE OF WORK : Design, fabrication, assembly, testing at manufacturer's works and supply, erection, commissioning, performance prove out of Machine at BHEL Bhopal works	Bidder to Note & confirm.	
2.0	BASIC MACHINE :		
2.1	Machine shall have Three independent spindles suitable for variable center distance between the Three spindles. The drilling carriage shall have BTA (STS), Gun drill system configuration .	Bidder to Note & confirm.	
2.2	Bed: Machine Bed shall be cast iron or thermally stablized fabricated steel .The guide way shall have fixed rack for column longitudinal movement .	Bidder to Note & confirm.	
2.3	Column base: Column base shall cast iron or fabricated steel structure thermally stablized. Its shall slide on the two preloaded hydrostatic guidway of the bed. It shall slide on the bed by a double pinion gear box with backlash compensation system	Bidder to Specify	
2.4	Column : Column shall be cast iron or fabricated steel thermally stablized with two vertical and ground guideways on which the spindle carriage slides. Between the guide ways it shall have recirculating ball screw with preloaded double nut for the vertical movement of the spindle carriage OR Rack & Pinion option is also acceptable.	Bidder to Note & confirm.	
2.5	Vertical slide: Vertical slide shall be of cast iron or fabricated steel structure, thermally stablized slide on vertical on the way of the column (Y-axis) on antifriction pads with automatic lubrication system. Optical sensor shall be provided to monitor the position of the pitch.	Bidder to Note & confirm.	

2.6	Three Drilling Spindle Carriages: Three drilling spindle carriage shall be cast iron or steel fabricated and thermally stablized sliding on the horizontal ways of the vertical slide.	Bidder to Note & confirm.	
2.7	Y-axis balancing system : Y-axis balancing system shall consist of a hydro cylinder to permit the balancing of the vertical moves during the Y-axis movement to ensure perfect positioning accuracy OR Electronic balancing system is also acceptable.	Bidder to Specify	
2.8	Geometrical auto compensation of drilling slide carriage: Geometrical auto compensation of drilling slide shall be hydraulic system to compensate the possible dropping down of the carriage which holds the drilling spindle slides and assure best accuracy during drilling operation.	Bidder to Note & confirm.	
2.9	All the drive system should be designed with backlash free arrangement.	Bidder to Note & confirm.	
3.0	Metallic Telescopic covers of rust resistant material shall be provided with wipers for guide ways of X.Walk on type telescopic cover is preferred for X-axis. For Y axis (Rubber/ or metallic) as per vendor is acceptable	Bidder to Specify	
3.0	AXIS STROKE		
3.1	Travel of column (X-axis):Effective drill hole range : Min. 5000mm	Bidder to specify	
3.2	BTA(STS)/Gun drill drilling effective vertical carriage stroke (Y-axis) in : Min.3000mm	Bidder to specify	
3.3	BTA(STS)/Gun drill drilling unit working horizontal travel (Z1, Z2 & Z3) in : Min. 1000mm	Bidder to specify	
4.0	STS(BTA)/ GUN DRILLING UNIT		
4.1	No of drilling spindles :Three Nos. independent	Bidder to Confirm	
4.2	Spindle orientation : Horizontal	Bidder to Confirm	
4.3	Total spindle drive motors : 3 Nos.	Bidder to Confirm	
4.4	Total feed motor motors(for Z1, Z2& Z3 axes) : 3 Nos.	Bidder to Confirm	
4.5	Power of each spindle drive motor :Min.35 kW	Bidder to specify	
4.6	Torque of each spindle drive motor :Min. 200 Nm	Bidder to specify	
4.7	Cutting force each spindle : Min. 6000 N	Bidder to specify	
4.8	Spindle nose taper :DIN 2079 ISO 50 or as per vendor recommendation is also acceptable	Bidder to specify	
4.9	Spindle RPM :Infinitely variable: Min 6 to 3000 or better range is also acceptable	Bidder to specify	
4.10	BTA(STS) hole drilling range diameter in mm : Min. 12 to 40 mm or better is also acceptable	Bidder to specify	
4.11	Gun drill hole drilling range diameter in mm : Min. 9 to 32 mm or better is also acceptable	Bidder to specify	
4.12	Deep hole effective drilling length :Min. 1000 mm	Bidder to specify	
4.13	Range of centre distance between Three spindles	Bidder to specify	
4.14	Hole pitch adjustment: Motorised with dimension read out on control panel :Infinitely variable	Bidder to specify	

4.15	Pitch between spindles should be of adjustable type in the range 200 to 300 mm or better.	Bidder to confirm & specify	
4.16	Machine Z axis drilling spindle shall be suitable to successfully drilling corner (Last hole/ Outer tube hole) having Tube sheet collar projection). Pl refer Annexure A. (Imp Note: Drilling shall be done from Channel side)	Bidder to note & confirm, requirement specified in Annexure A	
4.17	Pump pressure delivery (for each spindle) :upto 75 Bars or more	Bidder to specify	
4.18	Pump delivery in LPM for each spindle :Min 160 LPM or better	Bidder to specify	
4.19	Resolution on all axes : 1 Micron.	Bidder to note	
4.20	Number of independent drilling spindle with respective drive and Feed Motor : Three	Bidder to Confirm	
4.21	It should be possible to carry out the drilling operation with single spindle as well as in any combination of the three spindle at a time	Bidder to Confirm	
5.0	FEED RATES		
5.1	X-axis :Infinitely variable: 1-10000 mm/min or more	Bidder to specify	
5.2	Y-axis :Infinitely variable:1-10000 mm/min or more	Bidder to specify	
5.3	Z1, Z2-axes :Infinitely variable: 1-6000 mm/min.or more	Bidder to specify	
6.0	AXIS RAPID STROKE	Bidder to specify	
6.1	Rapid traverse of X-axis :~10000 mm/min or more	Bidder to specify	
6.2	Rapid traverse of Y Axis :~10000 mm/min or more	Bidder to specify	
6.3	Rapid traverse of Z1 & Z2 Axis :~ 6000 mm/min or more	Bidder to specify	
7.0	DRILLING ACCURACY		
7.1	Error between the spindles (Pitch accuracy between holes):max. 0.03 mm	Bidder to specify	
7.2	Roundness of drilled holes :max. 0.02mm	Bidder to specify	
7.3	Hole diameter quality :Min. IT7-IT8	Bidder to specify	
7.4	Ra of drill surface with BTA/Gun drill system : Min. 2.0 or better	Bidder to specify	
7.5	Hole deviation (measured from starting drill face): (a) Max.0.03mm/100mm depth (b) Max.0.08mm/300mm depth (c) Max.0.10mm/500mm depth	Bidder to specify	
7.6	Hole true positionon in all axis (Positional accuracy) : Max. 20 Micron mm Radially	Bidder to confirm	
8.0	POSITIONING ACCURACY AS PER VDI/DGQ3441		
8.1	X-axis Column travel :max. 0.03mm/5000 mm	Bidder to confirm	
8.2	Y-axis Vertical head travel :max. 0.02/3000 mm	Bidder to confirm	
8.3	Z1,Z2 & Z2 Horizontal Spindle Travel:max. 0.02/1000 mm	Bidder to confirm	
9.0	REPEATABILITY AS PER VDI/DGQ3441		
9.1	X-axis Column travel :max. 0.015/5000 mm	Bidder to confirm	
9.2	Y-axis Vertical head travel:max. 0.015/3000 mm	Bidder to confirm	
9.3	Z1&Z2 Horizontal Spindle Travel: max. 0.015/1000 mm	Bidder to confirm	

10.0	Work Table (Bed Plate/ Floor Plate) to be quoted separately (Indigenous make is also acceptable)		
10.1	Size of the Floor plate :Min. L=5M, W=3M	Bidder to confirm	
10.2	Max capacity of Floor plate :50 Ton/ m ² or more	Bidder to confirm	
10.3	Size of T-slot (X axis parallel):28 H 8 according to DIN 650 H12	Bidder to confirm	
11.0	JOB HOLDING FIXTURES		
11.1	Square Angle Plate : Two nos. job supporting square angle plates with 28 H8 T slots according to DIN 650 H12 shall be supplied with the machine. Ample no. of job holding studs, T nuts shall be supplied with the angle plates for holding the job. Square angle plate dimension each :Min.Height 4500 mm x width 1500 mm (Indigenous make is acceptable)	Bidder to note & confirm	
11.2	'V' Shape work piece support: 1No. Capacity: 20 Ton (Min.) Universal size to hold jobs of dia 800 to 3000mm All clamping items like T Nuts, studs, bolts etc. to clamp the work piece to floor plate shall be supplied in sufficient quantity . Imp Note: (Under BHEL scope however vendor shall submit the detail drawing after placement order for in house fabrication of 'V' Block	Under BHEL scope .Bidder to note , submit the drg. & confirm	
12.0	COOLANT SYSTEM		
12.1	Oil tank capacity :Min. 7000 L	Bidder to specify	
12.2	Degree of filtration:<20 microns or better	Bidder to specify	
12.3	Filtering capacity:Min. 700 LPM	Bidder to specify	
12.4	Discharge shall be infinitely variable & controled at operator panel	Bidder to confirm	
12.5	Tanks shall have Min & Max oil level indication	Bidder to confirm	
12.6	Coolant specification (Preferably Indian equivalent shall also be specified)	Bidder to confirm & submit details	
12.7	Inter locks shall be provided to protect over flow of the coolant oil from tanks	Bidder to confirm	
12.8	In case of filter failure over flow connection back to the tank shall be provided	Bidder to confirm	
12.9	Coolant collection and recirculation system should be leak proof & perfect to avoid any spillage on shop floor, trenches for cables & foundation pit of the machine etc. In no case the coolant oil shall mix up with hydraulic / Lubrication oil etc.	Bidder to confirm	
12.10	All types of coolant variants should be switchable through program as well as manually by push buttons provided on the Operator's control panel.	Bidder to confirm	
12.11	Coolant Flow Diagram showing filters, pumps, valves, tanks etc. (Required after placement order)	Bidder to confirm	
12.12	Coolant pumps & motor details etc. for all types of coolant variants. All function shall be visible on screen.	Bidder to confirm	
12.13	Pressure & rate of flow of coolant for different coolant variants for drilling operations should be furnished in the offer. The coolant should be able to reach tool tip at full pressure.	Bidder to specify	
12.14	Magnetic filter(Reusable after cleaning) shall be provided to arrest the chips to the mud tank	Bidder to confirm	

12.15	First filling of any oil, lubricant , grease, Hydraulic oil etc shall be supplied by vendor & under Vendor scope	Bidder to note	
13.0	HYDRAULIC SYSTEM		
13.1	Suitable hydraulic system shall be designed for bushing travel/ advance and for other auxiliaries of the machine as required shall be provided.	Vendor to note & confirm	
13.2	Hydraulic system should be centralized	Vendor to note & confirm	
13.3	All hydraulic components shall be of Make: Rexroth/ Vickers/ Sperry only. Latest version of pump, valves, accessories etc. to be supplied Seal shall be Merkel/Freudenberg/Parker/Bushak+Shamban/ Hunger/Smrit make.	Vendor to note & confirm	
13.4	Power pack should be energy efficient (Hi-low, system proper unloading during idling etc.). Suitable stand by pump unit , filter etc. shall be provided for critical area.	Vendor to note & confirm	
13.5	Technical specification and make of all the hydraulic component like pump, valve hydraulic cylinder , pressure switches , flow switches, pressure relief valve , hose pipe etc. to be specified.	Vendor to note & confirm	
13.6	Filtration system	Bidder to specify	
13.7	Failure indication	Bidder to specify	
13.8	Refrigerant type cooling system of sufficient capacity to maintain complete hydraulic system, including lubrication oil, Hydraulic oil and Gear Box oil etc. Bidder should submit the details.	Submit the detail.	
13.9	Stand by pump & filter unit with quick change over arrangement shall be provided.	Vendor to note & confirm	
14.0	CHIP CONVEYOR:		
14.1	Chip Conveyor Unit: A suitable chip conveyor system for effectively removal of chips up to the chip bin during operation as well as after drilling of workpiece shall be provided. The chip bin is to be located on the floor at the side of one end of the machine. Two chip bins of appropriate size, should also be supplied. The offer of chip bin to be submitted seperately (with option of Indigenous make is also acceptable)	Bidder to confirm	
14.2	Speed of conveyor	Bidder to specify	
14.3	Material of chip conveyor shall be rust resistant	Bidder to confirm	
14.4	Provision for smooth flow of chips on the conveyor.Chip conveyor should not jammed/stuck by chips .	Bidder to confirm	
14.5	Operation of chip conveyor (forward & reverse) through push buttons on operator's panel and at Chip Conveyor	Bidder to confirm	
15.0	LUBRICATION SYSTEM		
15.1	Centralised automatic lubrication unit for all axes slides, ball screw nuts, linear way bearings and other elements with metering units (flow control valve)	Bidder to confirm	
16.0	CNC SYSTEM AND FEATURES		
16.1	No. of axes to be controlled	Bidder to specify	

16.2	Make: latest FANUC/SIEMENS CNC drive system	Bidder to specify	
16.3	Type	Bidder to specify	
16.4	Model	Bidder to specify	
16.5	Details of Standard features. List to be submitted.	Bidder to submit	
16.6	Details of optional features, recommended by vendor, to be submitted.	Bidder to specify	
16.7	The system should have full alphanumeric keyboard, Min TFT 15" or latest higher size colour display, Machine Control Panel (MCP), RS232C serial interface, USB port for data input/output, network ready, 3D graphic simulation of job under drilling and on-screen PLC ladder display. All PLC input/output modules should be of FANUC/SIEMENS make. (Latest hardware & software versions, as available at the time of delivery, should be supplied).	Bidder to note & confirm	
16.8	During drilling, display of spindle speed, feed rate, coolant flow and current of the spindle and feed motors are displayed on the panel.	Bidder to note & confirm	
16.9	Complete manual control of machine with required control elements that include spindle override switch for spindle speed variation, feed override switch feed variation, Mode selector switch, Axes selector switch, Jog keys for axes and spindles, Push buttons for Boza slide forward and backward, Push button for chip conveyor on and off, Emergency stop switch, Push button with lamp for coolant on and off. Diagram/ Sketches for switches/ keys provided on operators pendant to be submitted.	Bidder to note , confirm & submit	
16.10	UPS of 15 minutes for CNC system with inbuilt cooling and charge status display (Battery charging /discharging time should be specified by vendor)	Bidder to note & confirm	
16.11	Standard hand held operation unit(B-MPI or other equivalent) with Emergency stop switch, Axes & Spindle selection switch, Jog keys for axes and spindles, Push buttons for Boza slide forward and backward, move the machine in Plus and Minus directions This shall be alongwith sufficient length of interfacing cable.	Bidder to note & confirm	
17.0	DIAGNOSTIC SYSTEM:		
17.1	Tele diagnostic service package consisting of Modem and other hardware with all necessary software package for remote diagnosis and resolution of faults of CNC System and PLC of the machine should be offered. With this facility, complete Graphic User Interface of CNC system can be looked at and operated from remote controlled PC of supplier so that errors can be recognized and changes or correction can be made from supplier's end. Tele-diagnostic service should be provided through International telephone lines.This should be provided free of charge for the guarantee period. Terms and conditions for the service after guarantee period should be informed by vendor. Subsequently, it should be possible to use other platforms, such as Internet or ISDN, subject to their availability in future.	Bidder to note & confirm	
17.2	Help guide should be provided to use both diagnostic systems shall be provided.	Bidder to note & confirm	
18.0	MOTOR AND DRIVE SYSTEM FOR SPINDLES		

18.1	Motors: AC Spindle motor. Make: Fanuc/Siemens. Details of Model, Type etc. to be submitted by Vendor. Motors should be totally protected from dust and pressurised mist coolant. Protection details like type of standard etc with catalogues should be provided with offer. The type and capacity of spindle motors and drives should be similar type and capacity.	Bidder to note & confirm & submit the catalogue	
18.2	Drives: Spindle drives shall be AC digital of make Fanuc/Siemens. Details of model, Type etc. to be submitted by Vendor.	Bidder to note , submit the detail. & confirm	
18.3	Feed back devices: Rotary encoders, Make: Fanuc/Siemens/Heidenhain (Details to be submitted by the vendor)	Bidder to note , submit the detail. & confirm	
19.0	FEED AND DRIVE SYSTEM FOR X,Y,W,Z1and Z2		
19.1	Motors: AC Servo motors with brake for X,Y,W ,Z1,Z2 & Z3, axes shall be either of Fanuc ai series or Siemens 1FT/FK series with inbuilt encoders. (Details of model, type etc. to be submitted).	Bidder to note , submit the detail. & confirm	
19.2	Drives: The AC Servo drives for X,Y,Z1,Z2 and Z3 shall be digital type of Fanuc or Siemens make. (Details of model, type etc. to be submitted).	Bidder to note , submit the detail. & confirm	
19.3	The Feed motors and matching drives for X,Y,Z1 ,Z2 and Z3 should be of adequate capacity.	Bidder to note & confirm	
20.0	FEED BACK SYSTEM		
20.1	Feed back system for X, Y,W axes: Heidenhain linear scales	Bidder to note & confirm	
20.2	Feed back system for Z1 ,Z2 and Z3 axes: Fanuc/Siemens/Heidenhain Rotary Encoders	Bidder to note & confirm	
21.0	MOTOR AND DRIVE SYSTEM FOR COOLANT APPLICATION		
21.1	Motors : AC Motor. Make: Fanuc/Siemens. Details of Model, Type etc. to be submitted by Vendor.	Bidder to note , submit the detail. & confirm	
21.2	Drives : AC Drives Make: Fanuc/Siemens . Details of Model, Type etc. to be submitted by Vendor.	Bidder to note , submit the detail. & confirm	
21.3	The coolant motors with matching drives should be of adequate capacity.	Bidder to note	
22.0	OPERATOR'S PANEL:		
22.1	Operator's panel having complete CNC and machine control system with all displays of required configuration shall be provided and suitably located for convenient, efficient and safe operation of the machine. All switches with suitable interlocks should be within reach of operator of height around 5.5 feet. All displays/indications should also be conveniently placed accordingly. The operator panel should be swivelable for ease of operation. Layout showing complete details should be submitted.	Bidder to note , submit the Layout detail & confirm	
23.0	INDEPENDENT OPERATOR'S PLATFORM:		
23.1	Air conditioned Operator Room and outside platform with perimeter safety railing shall be provided	Bidder to note & confirm	
24.0	AMBIENT CONDITIONS & THERMAL STABILITY :		

24.1	Total machine should work trouble free and efficiently under following operating conditions. Power Supply: Voltage: 415 V +10% / -15% Frequency:50Hz \pm 3% No. of phases = 3 Ambient Conditions: Temperature = 5 to 48 degree celsius Relative Humidity = 95% max.	Bidder to note , specify & confirm	
24.2	Weather conditions are tropical, Atmosphere may be dust laden during some part of the year. Machine shall be kept in the normal shop floor condition. Max. temperature variation is up to 25 deg Celsius in 24 hours.	Bidder to note & confirm	
24.3	Thermal Stability of the complete machine keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and trouble free operation of the machine should be ensured by vendor.	Bidder to note & confirm	
24.4	The machine, including Attachments and Accessories etc., should be suitable for 24 hrs. continuous operation to its full capacity for 24 hour a day and 7 days a week throughout. Vendor to ensure and confirm the same.	Bidder to note & confirm	
25.0	AIR CONDITIONERS / REFRIGERATION UNITS		
25.1	Door mounted Air Conditioners with Dehumidifiers of reputed international make who have after-sales spares support in India or of Indian make like Advance/ Werner Finley/ Rittal for all Electrical/ Electronic Panels/ Cabinets including Operator's Panel (One no.of sufficient capacity for each cabinet/ panel considering continuous operation at ambient temperature of 50°C). The blow of cool air from the air conditioners shall not fall directly on the electronic circuits/ modules. ACs must be incorporated with electrical/ refrigeration interlocks.	Bidder to note & confirm	
25.2	ACs unit must be mounted on the movable pendent with well-supported universal-head bolt. Two sets of cut-out labels are mandatory to be supplied with the units. The electrical connection of the AC unit must be with male-female connector, easily disconnected from the AC unit side. There has to be a MCCB to isolate the AC unit from the electrical panel.	Bidder to note & confirm	
25.3	For precise air/ oil temperature with energy-efficient operation, latest state-of-the-art technology features like constant pressure control, variable speed control of fan-motor, hot-gas bypass control, etc. needs to be incorporated in the above Unit (s).	Bidder to note & confirm	
25.4	Unit (s) must be designed to work in extremely harsh industrial environment and needs protection from heat, dust, fumes, corrosive or oily vapours, moisture, etc. The condenser coil must resist dust accumulation & must transfer heat efficiently.	Bidder to note & confirm	

25.5	Vendor to submit the following information about Air Conditioners and Chiller Unit (s) used in the machine: - Type of Air Conditioning/ Chiller Unit. - Capacity of the Unit. - Type of Compressor . - Type of Thermostatic Expansion Valve. - Fan size and flow in CFM (cubic feet meter) of the Condenser unit. - Specifications of the Evaporator Unit. - Functional requirement of temperature of cool air/ oil to be maintained between range +15°C to +40°C. - Type of Microprocessor-based Controller with LCD Display with complete functional details. Vendor have to provide leaflet/ catalogue of all the , refrigeration accessories and provide schematic layout of the system.	Bidder to note & submit the Leaflet, specification /schematic layout , catalogue	
25.6	Compressor, Refrigeration Spares Items, PHE (Plate-type Heat Exchanger), Gear Pump, etc. must be available in India and if possible can be repaired, locally.	Bidder to note & confirm	
26.0	ELECTRICAL SYSTEM :		
26.1	415V +/- 10%, 50HZ +/- 3 %, 3 Phase AC (3 wire system without neutral) Power Supply will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. Requirement of grounding/earthing with required material details should be informed by vendor well in advance so that same could be incorporated during construction of foundation.	Bidder to note & confirm	
26.2	Tropicalisation: All electrical / electronic equipment shall be tropicalized	Bidder to note	
26.3	Electrical cabinets should be (preferably of Rittal make) properly air conditioned and sealed from ingress of liquids and encroachment of rodents	Bidder to note	
26.4	All electrical and electronic panels including operator's panel should be provided with LED light for sufficient illumination and power receptacles of 220Volts, 5 Amp AC. All adapters/receptacles should have compatibility with Indian equivalents.	Bidder to note & confirm	
26.5	Motors shall conform to IEC or Indian Standards	Bidder to note & confirm	
26.6	All cables outside the electrical cabinets and operator pendant must be routed through flexible conduits capable of withstanding stress, chip hazard and ingress of oil/coolant. Additionally, all cables moving with traversing axes should be of trailing type and installed in caterpillar / cable drag chain.	Bidder to note & confirm	
26.7	Vendor should ensure the proper earthing for the machine and its peripherals.	Bidder to note & confirm	
27.8	The drives for the motors, their setting and control systems, all protection and error diagnostic shall be placed in electric cabinet.	Bidder to note & confirm	
27.9	All the electrical component shall be preferably of Siemens make . The electric system shall be in accordance with IEC or equivalent standard.	Bidder to note & confirm	
27.10	The electric cabinets have air conditioner with protection class IP54	Bidder to note & confirm	
27.11	In-cycle hour counter with reset facility.	Bidder to note & confirm	

28.0	MACHINE LIGHTS:		
28.1	Machine Lights for sufficient illumination of complete working area on both sides of operator's platform should be provided for clear visibility.	Bidder to note & confirm	
28.2	Any lights required in the foundation/ Pit area shall also be foreseen and supplied by the vendor.	Bidder to note & confirm	
29.0	ULTRA ISOLATION TRANSFORMER WITH SAFETY ENCLOSURE		
29.1	Indian make Ultra Isolation Transformer suitable for complete machine , its drives, controls, PLC etc. shall be supplied	Bidder to note & confirm	
29.2	Make	Bidder to specify	
29.3	Model and Rating	Bidder to specify	
29.4	Spares Package for the Ultra Isolation Transformer for 2 years working should also be offered.(To be quoted saperately)	Bidder to note & submit	
29.5	Catalogue of the Ultra Isolation Transformer shall be submitted with the offer.	Bidder to submit the catalogue	
30.0	SAFETY ARRANGEMENTS:		
30.1	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, workpiece and the operator due to the malfunctioning or mistakes. Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm and messages (with device identification) on CNC display and panels should be available.	Bidder to note & confirm	
30.2	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hinderance to machine operator's movement for effective use of machine.	Bidder to note & confirm	
30.3	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.	Bidder to note & confirm	
30.4	Emergency Switches at suitable locations as per International Norms should be provided.	Bidder to note & confirm	
30.5	Oil & water pipe lines should not run with electrical cable in the same trench.	Bidder to note & confirm	
30.6	Safety lights on moving column (preferably Flashing during X- travel)	Bidder to note & confirm	
31.0	ENVIRONMENTAL PERFORMANCE OF THE MACHINE :		
31.1	Maximum noise level shall be 75 dB(A) at normal load condition, one meter away from the machine with correction factor for back ground noise, if necessary. This will be measured as per international standards like DIN 45635 16. Supplier to demonstrate compliance to noise level, if so required.	Bidder to note & specify	
31.2	There shall not be any emissions from the machine except fumes of cutting fluid during machining.	Bidder to note & confirm	
31.3	There should not be any effluent from the machine. In case there are any effluents from the machine, requisite effluent treatment plant or pollution control device should be built into the machine by the supplier.	Bidder to note & confirm	
31.4	No hazardous chemicals shall be required to be used in the machine.	Bidder to note & confirm	
31.5	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Bidder to note & confirm	

31.6	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Bidder to note & confirm	
32.0	LEVELING & ANCHORING SYSTEM		
32.1	Complete anchoring system including foundation bolts, anchoring materials, fixators. leveling shoes etc should be supplied	Bidder to note & confirm	
33.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE :		
33.1	Any tools or equipment required for erection & comissioning of the machine shall be brought by the vendor. Necessary tools like Torque Wrench, Spanners, Keys, grease guns etc. for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer	Bidder to note & submit the list	
34.0	SPARES: (To be quoted saperately)		
34.1	Itemized breakup of mechanical, hydraulic, electrical and electronic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. (Unit price of each item of spare should be offered)	Bidder to note & submit	
34.2	All types of spares for total machine and accessories should be available for at least ten years after supply of the machine.	Bidder to note & confirm	
35.0	DOCUMENTATION : Three sets of Hard Copies (Print form) and three sets of soft copies of the following documents in English language should be supplied along with the machine . Note: All document , manual etc. required after placement order .	Bidder to note & confirm	
35.1	Operating manuals of Machine & CNC system	Bidder to note & confirm	
35.2	Programming manuals of machine & CNC system	Bidder to note & confirm	
35.3	Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Coolant / Hydraulic circuit diagrams. Drawings shall be supplied with part list also.	Bidder to note & confirm	
35.4	Operating Manuals, Maintenance Manuals including drawing & Catalogues for all the bought out items that include Voltage Stabilizer, Isolation Transformer, Air-Compressor and all supplied Accessories & wherever applicable	Bidder to note & confirm	
35.5	PLC program with symbols & comments in English.	Bidder to note	
35.6	Soft copy of complete machine data and PLC project with symbols and comments in English	Bidder to note	
35.7	Complete software back-up (Ghost) of hard disk (only in case of PC based CNC system) on DVD	Bidder to note & confirm	
35.8	One additional set of all the above documentation on CD ROM, wherever possible.	Bidder to note	
36.0	ERECTION & COMMISSIONING		
36.1	Commissioning :Complete commissioning of equipment & demonstration of all its features,control system & accessories at BHEL works is the sole responsibility of Vendor.	Bidder to note & confirm	

36.2	Supplier to take full responsibility for carrying out the erection, start up, testing of machine, it's control & all types of other supplied equipment. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by supplier in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL. Details of these requirements should be informed by vendor in advance.	Bidder to note & confirm	
36.3	Erection & Commissioning of Voltage stabilizer, Isolation Transformer & Air Compressor shall also be responsibility of the vendor.	Bidder to note & confirm	
36.4	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, as mentioned at clause 37.0 (Machine Acceptance) shall form part of the commissioning activity.	Bidder to note	
36.5	Schedule of Erection and Commissioning shall be submitted with the offer.(After placement of order)	Bidder to note & submit	
	ACCURACY TESTS:		
37.0	GEOMETRICAL ACCURACIES :		
37.1	Geometrical Accuracy Tests shall be in accordance with applicable standard. Detailed Test Charts for the same, clearly showing the accuracies to be achieved on the machine, shall also be submitted with the offer.	Bidder to note & submit	
37.2	All the above accuracies to be demonstrated to BHEL engineers during pre-acceptance tests at Suppliers works and during Erection & Commissioning at BHEL Works.	Bidder to note & confirm	
38.0	MACHINE POSITIONING & REPEATABILITY ACCURACIES : SHOULD BE MEASURED AS PER VDI/DGQ 3441(LATEST REVISION) USING LASER INTERFEROMETER.		
38.1	All the above accuracies to be demonstrated to BHEL engineers during pre-acceptance at Suppliers works and during Erection & Commissioning at BHEL Works	Bidder to note & confirm	
38.2	Final Calibration report shall be submitted after comissioing of machine.	Bidder to note , confirm & submit	
38.3	Note: Accuracy should remain within specified tolerance over a time period of 24 hours (Maximum temperature variation is 25 degree centigrade during peak summer)	Bidder to note & confirm	
39.0	Machine acceptance(Pre dispatch inspection) : Tests/Activities to be carried out at supplier's works on the machine before dispatch.		
39.1	Geometrical Accuracy Tests as per applicable test chart.	Bidder to note & confirm	
39.2	Positioning Accuracy & Repeatability Tests as per VDI-DGQ/3441 OR ISO 230 - 2	Bidder to note & confirm	
39.3	Demonstration of all features of the machine, CNC system and all Accessories.	Bidder to note & confirm	

39.4	<p>Drilling of test piece at Vendor works. Vendor to arrange test piece and tooling for drilling.</p> <p>Hole Size : 40 mm (as specified clause No. 4.10)</p> <p>Material : Austenitic Stainless steel</p> <p>Thickness : Min 500 mm</p> <p>Drill : BTA</p> <p>Nos of holes to be made during PDI : Min 15 holes (with utilization & combination of all three spindle)</p> <p>Note: BHEL prefer to perform the demonstration as much as higher thickness.</p>	Bidder to note & confirm	
39.5	<p>Measurement of Drill drift by optical instrument during PDI.</p> <p>Imp Note: Any alternate latest method for measurement of drift ,like by Laser etc.for checking drift directly on machine is also acceptable. In such a case vendor shall submit the detail of drift measurement method.</p>	Bidder to note & confirm	Optical instrument will be under Vendor scope
40.0	Machine acceptance (Final acceptance): Tests/Activities to be carried out at BHEL works while commissioning the machine & final acceptance of machine :	Bidder to note & confirm	
40.1	Geometrical Accuracy Tests as per applicable test chart.	Bidder to note & confirm	
40.2	Full load test (Max. drilling size 40 mm in BTA as specified in clause No.39.4) drill to demonstrate the maximum power & cutting capacity of the machine.	Bidder to note & confirm	Material / Test piece will be under BHEL scope
40.3	<p>Drift measurement by optical instrument, and other related drilling accuracy as per clause No.7.0 .</p> <p>Imp Note: Any alternate latest method for measurement of drift ,like by Laser etc.for checking drift directly on machine is also acceptable. In such a case vendor shall submit the detail of drift measurement method.</p>	Bidder to note & confirm	Optical instrument will be under BHEL scope
40.4	The machine shall be tested for continuous running for minimum 4 Hours & Max 24 Hrs.) If any break down occurs during drilling , the test should be repeated for 24 hrs from that time.(Under BHEL discretion & BHEL reserve the right of repetition & running hours test)	Bidder to note & confirm	
40.5	<p>Job material description :For full load test</p> <p>(a) Job (Tube sheet) material preferably of SA 182-F316L , OR SA 350 Gr. LF2, clad with Inconel 600 overlay of Thickness around 6mm to 13 mm.</p> <p>(b) Tube sheet thickness:Any thickness between 250 - 500 mm.</p> <p>(c) Material will be under BHEL scope however BTA drill of size 40 mm under Vendor scope .</p> <p>(d) Minimum Hole to be made : 15 Nos.(with utilization & combination of all three spindles)</p>	Bidder to note & confirm	
40.6	Demonstration of all features of the machine, CNC system & all accessories to the satisfaction of BHEL for their efficient and effective use.	Bidder to note & confirm	
40.7	Job prove out as specified in clause No.39.0 (Material arrangement under BHEL scope at BHEL Bhopal works).	Bidder to note	

40.8	Training of BHEL machine operators in operation of complete machine & accessories etc by the supplier's experts / engineers during their stay at BHEL works Note: Acceptance & commissioned of machine at BHEL Bhopal workes subject to cleared of Clause No. 37.7 to 37.15	Bidder to note & confirm	
40.9	INSPECTION: by BHEL Engineers at supplier's works prior to dispatch.As per Clause No. 37.0	Bidder to note & confirm	
50.0	PROVE OUT OF BHEL COMPONENTS :		
50.1	Tentative Drawing is attached for ready reference & will be likely proveout component. Job setting plan, drilling process plan & requirement of Tools etc. for drilling of proveout components shall be discussed and mutually agreed with vendor (Final proveout component drawing, Hole size ,Nos of holes , pitch etc. may change, however, the drilling features of the changed components shall be in line with the original component drawing). Complete drilling of prove out components shall be done by Vendor at BHEL works to the specified design accuracy and surface finish, using BTA/STS drills only .CNC programs to be provided by the vendor to prove the machine after complete erection, tests etc.Vendor shall submit final job setting plan, drilling process plan, for the proveout machining within two months after placement of order. Pl refer attached annexure for more details. i) Annexure A ii) Annexure B	Bidder to note & confirm	Any changes in the drawing will be informed by the BHEL in advance .
50.2	Vendor shall be fully responsible for drilling of proveout components as per drawing and other requirements specified by BHEL to the full satisfaction of BHEL. Clarifications, if any required by vendor, regarding accuracy requirements of the proveout components, whether specified or not, should be discussed and cleared by vendor during initial technical discussions.	Bidder to note & confirm	
50.3	Vendor shall be solely responsible, financially or otherwise, for any rejection in proveout component to the extent of cost of Casting/Forging, due to wrong drilling or malfunctioning of the machine .	Bidder to note & confirm	
50.4	TOOLING FOR FINAL ACCEPTANCE & PROVE OUT : Complete tooling & Test block or actual component to check out the performance , maximum drilling capacity , surface funish, tolerance etc shall be provided by BHEL for final acceptance.	Bidder to note	
51.0	TRAINING		

51.1	BHEL Persons should be trained at vendor's works for each machine for the area & period given below: (a) CNC Part Programming for the machine, application of all CNC Features, Programming for Measuring Systems & supplied accessories etc. (b) Electrical, Electronic & CNC maintenance for machine . (c) Mechanical & Hydraulic maintenance of the machine. (d) Operation of the machine & other supplied equipments Pre-dispatch inspection (Refer Clause No. 39.0) of the machine shall also be carried out by the team during their stay at vendor's works for the training. Vendor may specify days required for pre-dispatch inspection. BHEL reserves the right to choose no. of persons, field & period of training.	Bidder to note , specify & confirm	
51.2	Air-fare, boarding & lodging for the trainees shall be borne by BHEL.	Bidder to note	
51.3	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel.	Bidder to note	
51.4	Break up of training charges per person per day basis (if any)	Bidder to specify	
52.0	FOUNDATION:		
52.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within two month from the date of Letter of Intent (LOI)/ P.O., whichever is earlier. Soil condition data will be furnished by BHEL alongwith the approval. Complete Foundation Design including details, like Static/ Dynamic load details etc. and final Layout Drawings shall be submitted by the supplier within three months after getting BHEL's approval. The Layout should consist of all requirements pertaining to complete machine and all accessories, including space requirement for Voltage Stabiliser, Isolation Transformer, Air Compressor, Chip Bin & any other accessory. BHEL shall construct complete foundation for the machine under supervision of supplier and at supplier's responsibility. Vendor should arrange equipment required for the testing of foundation, if required by the vendor.	Bidder to note ,& confirm	
53.0	AFTER SALES SERVICE:		
53.1	Vendor should provide prompt after sales service to ensure smooth trouble free working of the machine and spares availability during and after guarantee period	Bidder to note ,& confirm	
54.0	PACKING:		
54.1	Sea worthy & rigid packing for all items of complete machine, all accessories and other supplied items to avoid any damage/loss in transit.	Bidder to note ,& confirm	
55.0	GUARANTEE :		
55.1	24 months from the date of acceptance of the machine.	Bidder to note ,& confirm	
55.2	Vendor shall provide free service of the machine once in 6 months during guarantee period	Bidder to note ,& confirm	
56.0	GENERAL :		
56.1	Machine Model	Bidder to specify	
56.2	Total connected load (KVA):	Bidder to specify	
56.3	Floor area required (Length, Width, Height) for complete machine & accessories	Bidder to specify	

56.4	Painting of machine/electrical panels: RAL Polyurethane paint as per vendor standard	Bidder to specify	
56.4	Total weight of the machine	Bidder to specify	
56.5	Manufacturer (OEM) can not source the machine from other countries.	Bidder to note ,& confirm	
56.6	Machine should be officially certified for its specification, parameter & performance.	Bidder to note ,certification & confirm	
57.0	TOUCH-UP PAINTS: Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor		
58.0	QUALIFYING CRITERIA		
58.1	<p>Only those bidder/OEM are eligible to quote who have manufactured ,supplied and commissioned at least One Column Type Deep Hole Drilling Machine with following details :</p> <p>(i)Deep hole effective drilling length (Depth) :Min. 1000 mm</p> <p>(ii) Minimum Three drilling spindles BTA</p> <p>(iii) Drilling dia capacity : Min 32 mm in BTA system or more</p> <p>(iv)Travel along X axis – 3m(Minimum);</p> <p>(v)Y axis – 3m (Minimum)</p> <p>(vi) Z1,Z2 & Z3(Drilling depth) : Min 1000 mm</p> <p>OR Higher Configuration in the last 15 years (as on the first date of Enquiry Due date) at any of their customer works either in India or in at least one country other than the country of origin.</p> <p>The name and contact addresses of the customers to whom the above said machines were supplied to be furnished with details like model, ,capacity , X & Y travel , year of supply , documentary evidence etc.</p> <p>Note: BHEL prefers Bidders should be OEM. The bidder should either be an Original Equipment Manufacturer(OEM) or an authorized Dealer of the OEM for the offered equipment.</p> <p>Dealers have to submit along with the offer a valid certificate of Authorization from OEM for quoting the equipment, along with declaration for support from</p>	Bidder to note , confirm & submit relevent document along with tender	
58.2	<p>Bidder has to submit at least ONE Performance Certificate from their customer (end user), for satisfactory performance of the machine , and meeting the following conditions:</p> <p>a) TheMachine must have been supplied within the last 15 years as on the first date of tender opening.</p> <p>EITHER in India OR in at least one country other than the country of origin</p> <p>b)The Machine must have performed satisfactorily for at least Minimum Two year during this period.</p> <p>For obtaining the Performance certificate, a suggestive format is provided at the Annexure C.</p>	Performance Certificate Required as per Attached format Annexure C	
58.3	<p>Following details shall be submitted along with offer.</p> <p>(i)Copy of Purchase Order in the name of OEM or an authorized dealer of the OEM for CNC Deep Hole drilling machine . OR</p> <p>Any other relevent docuemet like despatch detail, Commissioning report is also accetptable</p>	Vendor to submit	

58.4	BHEL reserves the right to verify the information provided by the Bidder. In case the information provided is found to be false/ incorrect, the offer is liable for rejection.	Vendor to Confirm.	
58.5	Financial PQC: Vendor should have average turnover of Rs.500 Lakhs minimum for last 3 consecutive years ending March 2021 , vendor to submit latest I.T.C.C, Annual Report (balance sheet and Profit & Loss account of last three years, shall be furnished as documentary evidence. In case of Foreign Bidder Annual report financial report from reputed agencies such as D & B/credit reform/ Experian report etc required.	Vendor to note , confirm & submit the document .	
59.0	For MSME & Start Ups: Only financial PQC relaxation is to be given to MSMEs and Startup vendors i.e average Turnover Shall be Minimum 150 Lakhs or more.		
	INFORMATION TO BE PROVIDED BY BIDDER		
59.1	Bidder shall provide contact details (Phone no & email ID) including the address of his authorized Agents / Service Centres in India.	Vendor to submit	
59.2	Details of Deep hole drilling machine supplied to other BHEL units if any	Vendor to specify	
59.3	The BIDDER to furnish Reference List of Customers .	Vendor to submit	
60.0	The BIDDER to note :		
60.1	The BIDDER shall submit the offer in Two Parts – 1. Technical 2. Commercial and Price Bid.	Vendor to note	
60.2	The Bidder's offer against each clause should be filled by the BIDDER .	Vendor to note	
60.3	The Technical offer shall be supported by Product Catalogue and Data Sheets and complete technical details / literature on the quoted/offered model of equipment.	Vendor to note	
60.4	BHEL reserves the right to verify information submitted by vendor. In case the information is found to be false/incorrect, the offer shall be rejected.	Vendor to note	
60.5	Technical evaluation of only those offers will be made who qualify as per the above qualifying conditions. Other offers shall not be considered.	Vendor to note	
61.0	OTHER FEATURES:		
	NETWORKING:		
61.1	Machine control should have necessary hardware and software for interfacing with gigabit Ethernet Local Area Network with 100 MB/sec through UTP cables for NC program and other related data transfer. This network to be connected to wide area network/Internet. The networking should have following capabilities.	Vendor to note & confirm	
61.2	a) The machine shall appear as a node in the Entire Network. (Network Neighborhood)	Vendor to note & confirm	
61.3	b) The program transfer shall be by simple copy and paste method provided sharing access is allowed between any PC and the machine across the network.	Vendor to note & confirm	
61.4	c) The program transfer between CNC system and network should also be possible in CNC Mode.	Vendor to note & confirm	
62.0	MACHINE MONITORING SYSTEM (MMS) SIGNALS		

62.1	Following MMS signals would be made available on a specifically earmarked terminal strip. These MMS signals should be sourced from a PLC output card separately.	Vendor to note & confirm	
62.2	a) Control ON	Vendor to note	
62.3	b) Cycle ON	Vendor to note	
62.4	c) Spindle Running	Vendor to note	
62.5	d) Feed Active (Any of the axes moving)	Vendor to note	
62.6	e) M30 (Program Stop)	Vendor to note	
62.7	f) Alarm Active	Vendor to note	
63.0	Scope of Supply		
63.1	1. CNC Deep Hole drilling machine : 1 No. 2. Angle plate : 2 Nos. 3. Work Table (Bed Plate/ Floor Plate) :1 No. 4.Leveling & anchairing bolts. 5. First filling of oil, Lubricant grease etc. 6. Document 7. Other Spare like Filter paper , seal etc as per vendor standard All other supply like Ultra Transformer etc as per specification.	As per specification Model no. to be specifed.	
64.0	POINTWISE CONFIRMATION:		
64.1	Vendor should confirm/clarify pointwise (all the points) as per specification and provide original technical leaflet, technical details, photographs, scope of supply etc. at the first instance.	Vendor to note	