

**TECHNICAL SPECIFICATIONS****PORTABLE UNIVERSAL DRILLING MACHINE, (DIA 50 MM)****1.0 PURPOSE:**

Portable Universal Radial Drilling Machine is required to drill, core drill, ream, counter bore and tap holes of different sizes upto dia. 50 mm having accuracy upto H7 grade and surface finish upto 1.6 Microns (Ra), on different components of Electrical Machines. This machine shall be used for drilling and reaming angular holes in various components as well as pinning /dowelling holes after assembly/testing of turbogenerators.

**2.0 WORK PIECE MATERIAL:**

The machine shall be suitable for drilling in components of Ferrous and non-ferrous metals like Carbon Steel, alloy steel, cast steel, cast iron, Bronze, Copper, Aluminum and similar other materials.

**3.0 MACHINE SPECIFICATIONS:**

3.1 Drilling capacity in steel (of 600 MPa tensile strength)	: Ø 50 mm or more
3.2 Tapping in steel	: M 48 or more
3.3 Taper in spindle nose	: Morse Taper-5
3.4 Spindle speed range	: 16-800 RPM (approx)
3.5 No. of spindle speeds	: vendor to specify
3.6 Spindle feed range	: 0.05 to 0.5 mm/rev (approx)
3.7 No of feeds	: Vendor to specify
3.8 Distance of spindle axis from column surface with spindle in vertical position	: 1200 to 2000 mm (approx.)
3.9 Distance between spindle face & floor level (with spindle retracted and in vertical position)	: 300 to 1500 mm (approx.)
(a) Vertical travel of spindle	: 300 mm or more
(b) Vertical travel of arm (motorized).	: 1200 mm approx.
(c) Speed of Vertical travel of arm	: Vendor to specify
3.10 Rotation of arm around column	: 360 Degree
3.11 Angle of Drill Head Rotation	: 360 Degree
3.12 Angle of drill head swivel from horizontal upwards & downwards	: 90 Degree
3.13 Power of spindle motor	: 3.7 KW or more
3.14. Horizontal traverse of arm (motorized)	: 600 mm
3.15 Distance between drilling spindle axis in horizontal position and floor level	: Vendor to specify
3.16 Column traverse along bed (motorized)	: 1000 mm (approx.)
3.17 Speed of column traverse along bed	: Vendor to specify.
3.18 Drilling radius with spindle in vertical position max/min	: vendor to specify
3.19 Total weight of the machine	: vendor to specify

- 3.20.Total size of the machine : vendor to specify  
3.21. Max.Torque at spindle : vendor to specify

#### **4.0 ACCESSORIES / OTHER ITEMS:**

Vendor to offer following indicating price of each item separately. List of other standard accessories included may also be mentioned with details :

- 4.1 Set of Reduction Sleeves MT-5, / MT-4, MT-5/ MT-3, (Qty. 1 of each)  
4.2 First filling of oil

#### **5.0 OTHER FEATURES:**

- 5.1 Machines should have provision for suitable clamping of column ,arm ,drill head & column slide. Vendor to submit details with the offer.
- 5.2 Powered head traverse
- 5.3 The machine should be capable of high stock removals with close tolerances on work piece. Metal removal rate in cc/min is to be specified by the vendor.
- 5.4 The machine must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal.
- 5.5 A suitable, lubricating system for lubrication of all moving / rotating elements should be available on the m/c.
- 5.6 Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper.
- 5.7 All the functions of the machine should be controlled through push buttons provided on the pendant panel.
- 5.8. All the motor should be of reputed make preferably ABB , Siemens. Vendor to specify the make of motors used.
- 5.9 If slip ring is used for carrying power & control signals then its successful functioning must be guaranteed for three year.

#### **6.0 ACCURACY TESTS:**

All standard accuracy tests to be conducted at vendor's /customer's work shall be intimated with full details, giving reference to ISO / DIN standards. Drawings of test piece with details of cutting - accuracy tests to be conducted shall also be intimated. Test Piece shall be supplied by the vendor.

#### **7.0 SPARES:**

Vendor should offer spares required for two years trouble free operations. Following spares may be included along with others.

- 7.1 Mechanical :
- 7.1.1 One number of valve and solenoid valve used in hydraulic and lubrication system.
- 7.1.2 One number /set of each type of oil seals used in machine..
- 7.1.3 One number of each type of rubber hydraulic hose pipes used in machine.
- 7.1.4 One complete set of Wipers and O rings.
- 7.1.5 Five nos.of filter inserts of all types if used in the m/c.
- 7.1.6 One no.of complete filter body along with element of each type if used in the m/c.
- 7.1.7 One set of clutch plates of all the types used in the m/c.

## 7.2 Electrical spares

One number of each type of pressure switches , flow switches, rotary switches , limit switches , push buttons , relays, contractor and other control units used in the machine.

## 8.0 POWER SUPPLY / ENVIRONMENT CONDITION

The machine should be suitable for operation in the following conditions:

- Power supply : 415 V +/-10 % , 3 phase, 50 Hz +/-3 %
- Temperature : 5 to 45 deg C
- Relative humidity : 95 % max.
- Other conditions : Similar to tropical country.

## 9.0 ENVIRONMENTAL PERFORMANCE OF THE MACHINE:

- 9.1 Maximum noise level shall be 85 dB(A) at normal load condition, 1 M 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.
- 9.2 There shall not be any emissions from the machine except fumes of cutting fluid during machining.
- 9.3 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.
- 9.4 No hazardous chemicals shall be required to be used in the machine.
- 9.5 If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.
- 9.6 Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.

## 10.0 MANUALS / DOCUMENTS

- 10.1 5 sets of documents for operation, maintenance and servicing manuals for machine to be provided in English language only.
- 10.2 Service manual should contain followings in addition to description & operation details.
  - (a) Assembly drawings of each unit with marked list of each component with its specification & make
  - (b) Electrical, Hydraulic, lubrication & coolant diagram with marked list of each component with its specification & make.
  - (c) Detail catalogues of all Electrical /Electronic circuit diagrams should have proper wire nos. bought – out items with its specifications & make.
- 10.3 Each document for operation, maintenance & service manual should be given on CD.
- 10.4 Complete list of all the parts used on the machine with detailed tech.specification , make, identification no/part no and ref. no. of drawing in which the part is used.

## 11.0 ACCEPTANCE & COMMISSIONING:

- 11.1 Pre-dispatch inspection will be carried out by BHEL representative at vendor's works including machining of test piece. However it will be at the discretion of BHEL. Final acceptance of the machine will be done at BHEL, Haridwar after carrying out successful erection & commissioning by the vendor at BHEL Haridwar. Commissioning shall include prove out of all the operations, successful demonstration of required accuracy tests and machining of test piece.
- 11.2 The manufacturer shall take the full responsibility for supervising the start up, testing and commissioning of machine its controls and other supplied equipment including test piece machining etc. at BHEL Haridwar.

## **12.0 OTHER REQUIREMENTS:**

- 12.1 Total power requirement of the machine to be specified by the vendor.
- 12.2 Overall space required for the machine to be specified by the vendor.
- 12.3 Color of the machine should be apple green RAL 6011.
- 12.4 The vendor is to submit a clause wise information/ deviation statement against each clause of this technical specification along with the offer. Vendor should also submit catalogue and other technical details of the offered machine.
- 12.5 Vendor to submit along with the offer, list of customers where similar machines have been supplied and are working satisfactorily.

## **13.0 QUALIFYING CONDITION**

Only those vendors (OEMs), who have supplied and commissioned at least one Portable Universal Drilling Machine of drilling capacity dia. 50 mm or more in steel, in the past ten years (on the date of opening of Tender) and referred machine is presently working satisfactorily for more than one year (on the date of opening of Tender) after commissioning, should quote. However, if referred machine (s) has/ had been supplied to BHEL, then the machine should be presently working satisfactorily for more than six months (on the date of opening of Tender) after its commissioning and acceptance in BHEL. The following information should be submitted by the vendor about the companies where referred machine (s) have been supplied. This is required from all the vendors for qualification of their offer.

- a. Name of the customer / company where referred machine is installed.
- b. Complete postal address of the customer.
- c. Month & Year of commissioning.
- d. Drilling capacity of the machine in steel
- e. Name and designation of the contact person of the customer.
- f. Phone, FAX no. and e-mail address of the contact person of the customer.
- g. Performance certificate from the customers regarding satisfactory performance of machine supplied to them (Original Certificate or Through E-mail directly from the customer). The original performance certificate may be returned after verification by BHEL, if required.

## **14.0 GUARANTEE:**

Vendor shall guarantee complete machine and all supplied accessories/ equipments for 24 months from the date of commissioning & final acceptance of the machine.

## **15.0 PACKING :**

Vendor shall carryout seaworthy, rigid packing of all the items of complete machine, control panel, accessories etc. to avoid any damage/ loss in transit.