

SPECIFICATION OF SPECIAL PURPOSE HORIZONTAL MILLING MACHINE **EMT-6735(REV-01)**

1.0 PURPOSE:

The Special Purpose Horizontal Milling machine shall be used for cutting the length of copper conductors of stator winding bars and for cutting bunch of copper conductors protruding beyond water box and face milling of conductors and water box of large size turbo generator winding bars. The water box is copper casting and already brazed to the end of formed stator winding bar about 10000 mm long.(Refer sketch of T.G. stator winding bar enclosed)

2.0 MACHINE SPECIFICATIONS:

2.1	Dimension of work piece	: 100 mm x 100 mm
2.2	Longitudinal slide travel	: 300 mm (+/- 150 mm from centre of the table)
2.3	Cross slide travel	: 300 mm (100 to 400 mm from table centre)
2.4	Vertical travel of milling head	: 350 mm from table top
2.5	Height of table top from floor	: 900 mm
2.6	Taper of spindle	: ISO-40.
2.7	Feed	: manual
2.8	Spindle speed	: 1500/1200/1000rpm.
2.9	Draw bolt	: M-16
2.10	Floor area	: Vendor to specify
2.11	Spindle power	: 3 HP
2.12	Spindle rotation	: +/- 90 deg. From horizontal axis
2.13	Rotation of milling head(vertical axis)	: +/- 90 deg.
TABLE		
2.14	Overall dimension of table (length x width)	: 300 x 300 mm
2.15	Overall clamping area	: vendor to specify.
2.16	Permissible load on table	: 100 KG or more
2.17	T – slots on table top	: table top should have provision for clamping the machine vice.

3.0 GENERAL FEATURES OF MACHINE:

- 3.1 Preferably the guide ways of all axis should have protective covers with adequate sealing on joints to prevent seepage of chips, oil etc.
Guide ways should be hardened steel with hardness HRC60 or more.
- 3.2 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.
- 3.3 A suitable, preferably centralized lubricating system for lubrication of all sliding surfaces, moving / rotating elements should be there.
- 3.4 Each axis should have limit switches interlocked with feed.
- 3.5 Graduations dials having 0.05 mm graduations for longitudinal, cross, vertical slides shall be provided.
- 3.6 The vertical and horizontal feed should be motorized with inching facility. Manual movement may be given additionally to see the movement of tool w.r.t. job.
- 3.7 Vendor to specify speed of the drive motor, and method used to achieve different speeds.
- 3.8 All the sliding surfaces should be provided with wipers.
- 3.9 There shall be clamping arrangement of head, slider and base so that once the position of head is fixed, the head is clamped rigidly.

- 3.10 Suitable safety guard, for the safety of operator from flying chips, should be provided.
- 3.11 Drive motor should be of reputed make. Vendor to specify the make of the motor.

4.0 ATTACHMENT & ACCESSORIES :

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| 4.1 Machine vices with fixed base, width of jaws 150 mm. | 1 No. |
| 4.2 Draw bolt M16 x 2P | 1 No. |
| 4.3 ISO40 Collate Holder | 1 No. |
| 4.4 16 mm Collate | 1 No. |
| 4.5 Work piece illumination light. | 1 No. |

5.0 POWER SUPPLY / ENVIRONMENT CONDITION :

- 5.1 The machine should be suitable for operation in the following conditions:-
- 5.2 Power supply for the machine : 415 V + 10% / -15% , 3 phase, 50 Hz +/-3%
- 5.3 Temperature : 5 to 45 deg.C.
- 5.4 Relative humidity : 95% max.
- 5.5 Compressed air : upto 5 Kg / sq.cm
- 5.6 Other conditions: Similar to tropical country.
- 5.7 power supply shall be provided by BHEL at single point near the machine. All types of cables, connections, circuit breakers required to connect to BHEL's power supply point, shall be supplied by the vendor.

6.0 FIRST FILLING OF OIL

First filling of all required Oils , Lubricants, & Grease etc. for the machine and auxiliary system to be supplied by vendor. The vendor shall also submit estimated annual consumption of all these items.

7.0 ANCHORING MATERIAL

Complete set of anchoring materials including foundation bolts, nuts, washers, fixators, levelling shoes etc for alignment and fixing of the machine on the floor shall be supplied by the vendor. Details to be submitted with the offer.

8.0 NOISE LEVEL

Noise level of the machine should be less than 85 dB (A) at one meter away from the machine.

9.0 SPARES

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| 9.1 Wipers | 1set |
| 9.2 Indicating lamps and push buttons | 5 No's each type |
| 9.3 Relays and contactors | 1No each type |
| 9.4 Limit Switches | 2 No's each type |
| 9.5 In addition in above vendor should also quote spares required for 2 years trouble free operation. | |

10.0 OPERATION AND MAINTENANCE MANUALS

- 10.1 4 copies of Operation & Maintenance manuals shall be supplied.
- 10.2 Electrical circuit diagram indicating the cables, terminal strip etc with part list and proper identification no. to be supplied.
- 10.3 Assembly drawings of each unit with marked list of each component with its specification & make will be provided.
- 10.4 Detail catalogue of bought out items with its specification & make will be provided.

11.0 INFORMATION TO BE FURNISHED WITH THE OFFER :

- 11.1 General arrangement drg. is to be submitted.
- 11.2 Total power requirement of the machine to be specified by the supplier.
- 11.3 Overall space required for the installation of the machine to be specified by the supplier.
- 11.4 Overall weight of the machine.
- 11.5 Vendor should submit clause wise information along with the offer.
- 11.6 Vendor should submit list of customers where similar machines have been supplied.
Technical specifications of the machines should also be furnished.

12.0 COLOUR OF THE MACHINE

The machine should be painted apple green (Polyurethane paint) as per IS: 5

13.0 PRE-ACCEPTANCE OF THE MILLING M/C AT VENDOR WORKS

The Special Purpose Horizontal Milling machine will be inspected at the vendor's works by BHEL Engineers before dispatch.

During Pre- Despatch Inspection vendor shall demonstrate accuracies as per test chart IS:2200(part-2):2002 and carryout machining of NASA / Test piece.

14.0 ERECTION AND COMMISSIONING OF THE SPECIAL PURPOSE HORIZONTAL MILLING MACHINE AT BHEL WORKS

- 14.1 Foundation drawing is to be submitted by supplier within 4 weeks of placement of LOI / P.O.
- 14.2 M/C will be erected by BHEL as per supplier's foundation drg. under the vendor's supervision and will be commissioned by the vendor's representative.
- 14.3 Vendor will carry out the accuracy test at BHEL works as per the standard test chart IS:2200(part-2):2002 and carryout machining of NASA / Test piece.
- 14.4 Vendor will also carry out successful machining of 3 nos. prove out component as per Drg.(No. 91350701000). The prove out machining will involve machining at face-x of water box (section A-A) to flatness 0.03 mm. For checking this accuracy on 3-D coordinate measuring machining one water box drg.(No. 21350701000) will also be machined separately. All the toolings required for this machining will be supplied by the vendor.

15.0 ACCURACY :

Various accuracies of Special Purpose Horizontal Milling Machine shall conform to IS:2200(part-2):2002. Vendor shall submit standard test chart with the offer. Vendor shall also submit drg. of NASA / Test piece to be machined during Pre-Despatch Inspection at vendor's work and during commissioning at BHEL.

16.0 GUARANTEE

The machine shall be guaranteed for 24 months from the date of commissioning and job proving at BHEL works.

17.0 PACKING

All the items and accessories of the machine shall be suitably packed in rigid wooden boxes to avoid any damage / loss in transit.

18.0 QUALIFYING CONDITION

Only those vendors (OEMs) should quote who have commissioned at least one Horizontal Milling.

Machine of same (Table size 300x300 mm or more, Spindle power 3 HP or more, Load capacity 100 Kg or more, Traverse X axis= 300 mm or more, Y axis= 300 mm or more, Z axis= 350 mm or more) in the past ten years (on the date of opening of Tender) and referred machine is presently working satisfactorily for more than one year after commissioning (on the date of opening of Tender).

The following information should be submitted by the vendor about the companies where similar machine(s) have been supplied. This is required from all the vendors for qualification of their offer.

1. Name of the customer / company where referred machine is installed.
2. Complete postal address of the customer.
3. Month & Year of commissioning.
4. Parameters of machine(s) supplied (Table size , Spindle power , Load capacity, Traverse X ,Y & Z axis) and application for which the machine is supplied.
5. Name and designation of the contact person of the customer.
6. Phone, FAX no. and e-mail address of the contact person of the customer.
7. 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.
8. BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false / incorrect, the offer shall be rejected.