

<b>RAIL COACH FACTORY, KAPURTHALA</b>			
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<b>DESCRIPTION</b>	<b>CNC VERTICAL TURNING LATHE</b>	<b>Rev:- Nil</b>	<b>Page 1 of 49</b>

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**IMPORTANT FEATURES OF THE TENDER**  
**INDIAN RAILWAYS**  
**RAIL COACH FACTORY, KAPURTHALA, PUNJAB**  
**TECHNICAL SPECIFICATIONS FOR CNC VERTICAL LATHE MACHINE**  
**SPECIFICATION No-Mech/M/UMBRELLA PROJECT/445**

**Section-I**

**1 INSTRUCTIONS TO TENDERERS FOR FILLING TECHNICAL BID**

- 1.1 Unless otherwise stated, latest alterations/ revisions of specifications/ standards/ drawings shall be applicable. In respect of safety standards and environmental standards relevant to the machine, the machine manufacturers shall ensure compliance with International (CE/ISO/DIN/JIS)/National standards (IS) (wherever applicable).
- 1.2 Tenderers should offer and quote for all the specified concomitant accessories, as these are considered essential for commissioning and utilization of the machine. Even if bidder does not recommend the purchase of any of these accessories, the price must be quoted for comparison purposes and their recommendation/suggestion to be indicated in the offer. Tenderers should also quote for optional accessories, spares and consumable spares as asked in the specifications.
- 1.3 In case, any item is required in sets, please specify nos. /pieces per set. This is essential for proper technical evaluation of the offer. Offers received without this may be considered as incomplete and liable to be rejected.
- 1.4 The bidder should quote only for the specified make of sub-assemblies and equipment wherever specified. Makes of sub-systems other than the specified ones will normally not be acceptable. In case, some other make is quoted, specific reasons for the same including its features/advantages over specified makes must be brought out in the offer.
- 1.5 In case there is a contradiction in any information provided (some parametric values given in the specification and those given in the brochure or some other document enclosed by the tenderer), unless specifically mentioned in the deviation cum confirmation statement, the values as given in the specification shall be taken as confirmed by the tenderer and offer evaluated accordingly.
- 1.6 Bidder or his authorized agent, in their own interest, should visit the consignees listed in Clause 3 SECTION I with prior appointment with Controlling Officer of the consignee and acquaint themselves with existing process of manufacturing/remanufacturing, site conditions, availability of material handling facilities etc.
- 1.7 The Purchaser may accept internationally accepted alternative specifications which ensure equal or higher quality than the specifications mentioned in the Technical Specification. However, the decision of the Purchaser in this regard shall be final. A copy of the alternative specifications offered should be sent along with the offer. The Tenderer should also furnish "Statement of Deviations" from tender specifications along with the offer.
- 1.8 *In order to assess the manufacturing capability of OEM and to be assured regarding OEM's manufacturing facility/ facilities in India and hence the ability of its Authorized Distributor to supply the said machine, a self certified Capability Assessment report of the OEM as per Annexure-G must be submitted by the bidder along with their offer. In addition to above, if felt necessary by the Purchaser, an inspection by actual visit to his works/ office can be carried out by representative of Purchaser/ Third party agency as nominated by the purchaser (TPI cost to be borne by the bidder) to verify the details furnished vide Annexure-G. The bidder is bound to comply with the same, without fail.*

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## 2. Description: CNC VERTICAL TURNING LATHE MACHINE

### 2.1 The machine shall have following configuration:

2.1.1 CNC VERTICAL TURNING LATHE MACHINE shall be capable of both rough and finish machining of solid wheels/tyres of various types as indicated in Annexure 'A' of Section-III .

2.1.2 The machine shall be supplied **Tooled up with all tools** capable of machining of solid wheels/ tyres of various types as listed in Annexure 'A' of Section-III .

2.1.3 The machine shall be supplied along with **CNC Part programs** for machining of solid wheels/ tyres of various types as listed in Annexure 'A' of SECTION III.

2.1.4 The machine shall be capable of carrying out following machining operations (as applicable) on various types of wheels discs specified in Annexure 'A' of SECTION III:

- i. Flange facing, Hub facing, rough boring, finish boring, radius on to face, thread turning & Rim facing
- ii. Hub facing and radius on bottom face.
- iii. Grooving & chamfering/Radiusing.
- iv. Grooving for indication of "limit diameter"
- v. OD turning & Profile turning (for rough rolled cast wheels).
- vi. Inside grooving in LHB wheels
- vii. Web Drilling, angular drilling and tapping operation for assembly of Brake Disc as per drawing

### 2.1.5 Fixture Requirement:

2.1.5.1 **Fixture for wheels** – Preferably common fixture to hold the wheels of each type from outside Diameter for hub boring in the first set-up and another common fixture for operations listed in Annexure 'A' of SECTION III for second set-up should be supplied. **Positive auto locking arrangement may be provided for proper holding the wheel so that there is no chance of wheel flying.**

2.1.5.2 Fixture should preferably be made from case hardened or nitrided material such as 20MnCr5/16MnCr5/ 90MnCrV8 (conforming to DIN standard or equivalent ISO standard) depending upon the requirement. Wherever required jig boring operation should be done to ensure the accuracy. The value of hardness of locating/resting surfaces should be in the range of 60 +/- 2 HRC.

2.1.5.3 The firm should guarantee the rigidity and accuracy of fixture throughout the working life of the machine. Design features and manufacturing details to achieve this objective should be clearly Highlighted in offer.

2.1.5.4 The schematic fixture design should be indicated in the offer. The final layout with detailed drawings shall be submitted to the consignee along with GA drg. for approval within time period, as specified in time schedule.

### 2.1.6 Operating Environment – The machine is required to work in tropical conditions i.e.

2.1.6.1 Maximum ambient temperature would be ranging from 0-50<sup>0</sup> C.

2.1.6.2 Rate of temperature variation may be 2 to 4<sup>0</sup> C per hour.

2.1.6.3 **Humidity** – Maximum humidity may reach up to 98% during monsoon season.

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## 2.2. Leading parameters (SCHEDULE-I):

### 2.2.1 Major parameters

(Note: No deviation is permitted in major parameters. The bidder should indicate the Actual parameters offered)

1	Table diameter	1500mm (minimum)
2	Turning diameter	1500mm (minimum)
3	Turning height above top of table	750mm (minimum)
4	Range of table speed (infinitely variable)	10 to 300 rpm
5	Range of feed (infinitely variable) in both axis(X & Z axes)	0.05 to 10mm/revolution
6	Horizontal traverse (cross travel) of Ram Head (X-axis)	50/700 mm (left/right from table center).
7	Vertical travel of Ram Head (Z- axis)	600 mm (minimum)
8	Rapid traverse of Ram Head in both axes (X & Z)	2000 mm/min. (minimum)
9	<b>MACHINE PERFORMANCE AND ACCURACY</b>	
9.1	Accuracy of X & Z axis as per VDI/DGQ 3441 or latest	0.012 mm over complete travel
9.2	Repeatability of X & Z axis as per VDI/DGQ 3441 or latest	0.007 mm
9.3	<b>Minimum Surface finish requirement for wheels</b>	
9.3.1	For turning	Ra 2.5 micron
9.3.2	For facing	Ra 1.6 micron
9.3.3	For boring	Ra 0.8 micron
9.4	<b>Accuracies</b>	
	a) Straightness of table surface b) Run out of table surface c) Run out of table side d) Parallelism of cross rail e) Straightness of up & down movement of rail head to table f) Perpendicularity of L & R movement of rail head to table g) Parallelism of table centre line to up/down movement of tool bar (L&R direction)	As per ISO 3655 Or DIN 8609
9.5	Taper on bore of 200 mm dia and 200mm length	Less than 0.02 mm
9.6	Ovality bore of 190 dia	Less than 0.04mm
9.7	Actual bore diameter deviation from machine readout	+/- 0.02 mm

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## 2.2.2 Other Parameters

2.2.2.1 Power supply : 415 V  $\pm$  10%, 50 Hz  $\pm$  3%

2.2.2.2 Table loading capacity : 2000 Kg. (minimum)

## 2.3 Performance Standards-

**Geometric and Performance Standards-** The machine shall conform to following standards in addition to the accuracy desired in this specification.

2.3.1 The maximum noise should not exceed 85 dB when measured at a distance of **1 meter** from the machine in the free field conditions as per IS: 4758-2002 and ISO test code 230 part-5.

2.3.2 The machine shall conform to ISO 3655 of 1986 or DIN 8609 or equivalent JIS Standard for Geometric and work piece accuracy test in addition to the accuracy desired in this specification and required for machining of wheels as listed in Annexure 'A' of SECTION III.

**2.3.3 Machine performance and accuracy chart should be supplied with the machine.**

## 2.4 Productivity:

**2.4.1 Productivity is to be achieved for the components listed in Annexure-A of SECTION III**

### Note:

- The productivity shall be proved out for the items at S.No. 1, 2, 3 & 4 in a shift of 8 Hrs with the 85% Availability of machine as per Annexure-A of section-III.*
- Loading and unloading time with the help of manual wheel handling system with jib cranes (having motorized radial and vertical smooth movement with wireless type pendant)*

## 2.5 Prove out at firm's premises:

2.5.1 In addition to the normal checks carried out during assembly and testing, as part of quality control measures of the firm, the firm is required to demonstrate the following at the time of inspection:

a. *The firm shall prove out the Qty mentioned for the type of wheels at S.No:1, 2, 3 and 4 of Annexure –A in section-III .For this purpose, consignee shall provide minimum five nos. of wheels to the Firm against Bank Guarantee. The firm or his authorized representative would collect these wheels (on returnable basis) from the consignee.*

b. Geometric and performance tests as per clause 2.3.

c. **No-load endurance test** – The firm is required to do 48 hours' continuous running at machine manufacturer's premises and in case of any defect developing, the firm shall take necessary corrective action and repeat the test for another 48 hours, till trouble free operation is achieved. Firm should indicate the details of endurance test carried out at manufacturer's premises.

d. **Maximum Horse Power or full load cutting test** – This shall be demonstrated for minimum 10 minutes for a depth of cut of minimum 8 mm. Details of proposed cutting parameters for the test, like depth of cut, speed and feed should be indicated in the bid.

e. **Vibration test** – The manufacturer should furnish the proposed test scheme for carrying out this test at their works.

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f. **Noise measurement tests** as per clause 2.3.1 of SECTION I.

## 2.6 Prove out at consignee's works:

2.6.1 *After successful installation and commissioning of machine at consignee's site, the supplier or his authorized agent shall be required to prove out the Qty mentioned for the type of wheels per shift(8hrs) with 85% machine availability at S.No 1,2,3 and 4 mentioned in Annexure-A of Section-III.* For this purpose, Consignee shall make available the wheels for the purpose of prove out. In case of non-availability of wheels of a particular type, consignee can satisfy himself about the capability of machine, by carrying out proving operations on other type of wheels.

## 3. QUANTITY & CONSIGNEE

S. NO.	CONSIGNEE	QUANTITY REQUIRED	Specification No.
1	<i>Dy CME/BOGIE/RCF</i>	1	Mech/M/UMBRELLA PROJECT/445

## 4. Scope of Supply:

4.1 The scope of supply shall include design, supply, installation, testing, commissioning and proving of machine on turnkey basis. It includes all the concomitant accessories/ equipments as detailed in the specification and other concomitant accessories/ equipment, which the manufacturer considers essential to make the machine fully operational, when installed and commissioned. It shall also include installation and commissioning of related equipment, training of personnel in operation and maintenance of machine and supply of technical documentation.

### 4.2 CONCOMITANT ACCESSORIES:

The machine should be accompanied with the following concomitant accessories:

- 4.2.1 Three-jaw hydraulically operated self-centering chuck with three sets of hard jaws and one set of soft jaws (ref. cl 1.2.7.3 of SECTION II).  
*Note : Necessary safety measure/mechanism must be provided to protect the table assembly including chuck, jaws, work holding fixtures from any damage due to accidental hitting*
- 4.2.2 Work holding fixture as per clause 2.1.5 of SECTION I and 1.2.17.4 of SECTION II.
- a ) Fixture(s) for holding all types of wheels for first set up One set
- b) Fixture(s) for holding all types of wheels for second set up One set
- Note: In order to save time and production loss, the changing mechanism of work holding fixtures should be of auto type or very simple, quick mechanism*
- 4.2.3 *ATC with 12 tool magazine (minimum)* One set
- 4.2.4 **Tooling items**
- a) Adopter, tool holders, boring bars and tools  
(Indexable type turning/facing/grooving tool/shank) required Two sets

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- for various machining operations specified in Clause 2.1 of SECTION I.
- b) Coated Inserts for each type of tool/shank 100 inserts each
- c) Any other cutting tool essential for machining of wheel sets mentioned in Annexure "A" in SECTION III. One Set
- d) Set of screws/Allen bolts Set
- e) Matching screw driver/Allen key set to be provided for inserts.
- The details of toolings should be furnished in the bid.**
- 4.2.5 First fill of grease, lubricating oil, coolant and hydraulic fluid (Quantity, Grade and Brand Name should be clearly indicated)
- 4.2.6 Air conditioning system with eco-friendly type of refrigerant for control cabinet. The tenderer should furnish details i.e. make, cooling capacity, type of refrigerant used etc along with the bid One No.
- 4.2.7 Chip conveyor system to remove swarf/chip generated by the machine out- side the machine area (ref. cl. 1.2.16 of SECTION II). One set
- 4.2.8 Refrigerant based cooling system for hydraulic system. The tenderer should furnish details i.e. make, cooling capacity, type of Refrigerant used etc along with the bid. Refrigerant used should be environment friendly. (ref. cl. 1.2.12.4 of SECTION II) One set
- 4.2.9 Foundation and leveling bolts/grip expansion bolts. (Details to be furnished by the tenderer) One set
- 4.2.10 Coolant system for cutting tools (ref. cl. 1.2.13 of SECTION II) One set
- 4.2.11 Maintenance and service tools One set  
(List to be submitted by the Bidder)
- 4.2.12 1.5 Ton capacity Jib Crane with tackles for loading and unloading of wheel discs (loading & unloading of job should be direct on clamping jaw with the help of jib crane independently) Two Nos
- 4.2.13 Any other accessory essential for machining of wheels for operations indicated in Annexure "A" in SECTION III should be quoted. One set
- 4.2.14 Servo controlled voltage stabilizer suitable for the plant as per specifications given in clause 2.13.2 of SECTION II. 1 no.
- 4.2.15 Ultra isolation transformer suitable for the plant as per specifications given in clause 2.13.3 of SECTION II. 1 no
- 4.2.16 Wheel disc handling equipment as per clause 1.2.19 of section-II 1 SET
- 4.2.17 Any other accessory/ equipment, which the manufacturer considers essential to make the machine fully operational, when installed and commissioned connected to power source and give the specified output/productivity. -

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4.2.18 *Air Gun with flexible type pneumatic pipe to clean the chuck area before and after machining* 2 Nos

4.2.19 *Electronics maintenance tool kit bag (Make- Taparia / Stanley) consist of following items.*

- a) *Double ended spanner set (mm) (Make- Taparia / Stanley )*
- b) *Box spanner set (mm) (Make- Taparia / Stanley )*
- c) *Screw Driver 12" (Make- Taparia / Stanley )*
- d) *Multi bit screw driver set(Make- Taparia / Stanley )*
- e) *Cutting Plier 6" (Make- Taparia / Stanley )*
- f) *Combination plier(Make- Taparia Stanley )*
- g) *Wire stripper*
- h) *Torex Screw Driver T-5, T-6,T-8,T-10 ,T-15,T-20 ,T-20L,T25,T-30,T-40 (Make- Taparia / Stanley )*
- i) *Allen key set (inch) (Make- Taparia / Stanley )*
- j) *Allen key set (mm) (Make- Taparia / Stanley )*
- k) *Aligner(Qty 02)*
- l) *Digital Multi meter , Model-179 or superior (Make Fluke)*
- m) *Ratchet Spanner Set (Make- Taparia / Stanley )*
- n) *Soldering iron 50Watt (Make Soldron )*
- o) *Hand held programming as per cl. 1.2.18 of SECTION II- one set*

### 4.3 Optional Accessories:

Following optional accessories will be quoted by the tenderer. Cost of optional accessories shall be quoted separately and shall not be included in the basic price of the machine. Cost of optional accessories will not be taken for commercial evaluation of the firms.

- 4.3.1 Remote diagnostic feature as per clause 1.2.15.37 of SECTION II One no.
- 4.3.2 Any other accessory which can improve the productivity, performance, reliability, efficiency, or enhance the capability of the machine as a whole or part thereof, should be quoted as optional accessory.
- 4.3.3 *Soft copy of all technical literature(maintenance and operation instruction manual, schematic wiring diagrams, circuit diagrams, wiring layout dimensional drawings, troubleshooting guide, PLC ladder diagram),all type of software and program of the machine and its downloading/uploading procedure for the complete machine, including imported and indigenously purchased components/sub assemblies shall be provided in portable SSD storage media of at least 1 TB size (make Seagate, WD elements, SanDisk)*

### 5. EVALUATION CRITERIA

Total value of the offer will be calculated based on

- (i) The cost of the basic machine.
- (ii) Cost of the concomitant accessories according to tender specifications.



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- (iii) Cost of any other accessory which in the opinion of supplier is essentially required for making the machine fully functional.
- (iv) Cost of Turnkey Charges viz. foundation, installation & commissioning etc.
- (v) Cost of Preventive Maintenance during 1<sup>st</sup> & 2<sup>nd</sup> year of Warranty Period.
- (vi) *Cost of Comprehensive AMC for 7 years after warranty shall not be part of Contract value, but will be considered for evaluation criteria.*
- (vii) Duties and taxes as quoted by the bidder, insurance and freight,

**6. OTHER ITEMS TO BE QUOTED:**

The following items will need to be quoted additionally though will not be part of commercial evaluation:

- (i) Optional Accessories with breakup of individual items as specified in clause 4.3 of SECTION I
- (ii) Consumables as per clause 6 of SECTION II with breakup of individual items as applicable.

**7. DELIVERY SCHEDULE CHART:**

In the event of acceptance of the offer, the machine(s) shall be supplied as per the following Milestone Chart:

Name of machine - **CNC VERTICAL TURNING LATHE MACHINE**

S.No.	Activity	Activity Code	Outer Limit of Time Schedule expected
1.	Issue of LOA	D1	-
2.	Submission of PBG By Successful Bidder	D2	D1+30 days
3.	Issue of PO / Contract By RCF (after verification of PBG)	D3	D2+30 days
5	Submission of GA drawing by Successful Bidder/Supplier along with information on power and other utilities required for machine.	D4	D3 + 45 days
6.	Approval of GA drawings by consignee (to be governed by clause 11.2 of Section-II).	D5	D4+ 45 days
7.	Confirmation of availability of clear site by consignee	D6	By D5 (i.e. at the time of approval of GA Drg.)
8	Completion of foundation	D7	D7+150 days or Latest by D8
9	Submission of BG and collection of components from consignee by the supplier for prove out of machine at manufacturer's works.	D8	<b>D5 + 60 days</b>
10	Supply/ Delivery of machine	D9	<b><u>D5 + 180 days</u></b>
11	Issue of Joint Receipt Note as per Annexure-C and railway to give call to supplier for the commissioning of machine.	D10	<b><u>D9 + 7 days</u></b>

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12	Generation of Receipt note through UDM by consignee for	D11	<b><u>D10 + 7 days</u></b>
13	Installation, commissioning and proving out of machine by supplier	D12	D10 + 180 days
14.	Issue of PTC by PLANT and Generation of CRN by consignee for release of balance payment.	D13	D12 + 30 days
15	Warranty by supplier	D14	D12 + 2 years.
16	CAMC	D15	D14+7 YERAS

Signature of the Bidder

**Note:** Notwithstanding the delivery period indicated elsewhere in the tender document, the delivery indicated in this schedule shall be taken as overriding and final.

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## **Section-II**

### **TECHNICAL SPECIFICATION**

#### **ABBREVIATIONS**

A-1,A-2, A-3, A-4	Standard paper sizes
AC	Alternating Current
AMC	Annual Maintenance Contract
AT	Acceptance of Tender
BG	Bank Guarantee
CME	Chief Mechanical Engineer
CME/PCM	Chief Mechanical Engineer/Post Contract Management
CNC	Computer Numeric Control
COFMOW	Central Organisation for Modernisation of Workshops
COS	Controller of Stores
Db	Decibel
DC	Direct Current
FA&CAO	Financial Advisor & Chief Accounts Officer
GA (Drawing)	General Arrangement (Drawing)
HRC	Hardness Rockwell 'C' Scale (value)
Hz	Hertz
IEC-Pub	International Electro technical Commission - Publication
JCN	Joint Commissioning Note
JRI	Joint Receipt Inspection
kW	Kilo Watt
LC	Letter of Credit
LD	Liquidated Damages
LOA	Letter of Acceptance
NC	Numeric Control
NIT	Notice Inviting Tenders
PBG	Performance Bank Guarantee
PDF	Portable Document Format
PLC	Programmable Logic Controller
PTC	Proving Test Certificate
PU	Production Unit (Any of the six Railway Production Units e.g. RCF, ICF etc.)
RDSO	Research Design & Standards Organization
SS	Solid state, stainless steel
WBG	Warranty Bank Guarantee

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<b>1.</b>	<b>BASIC DESIGN FEATURES:</b>
<b>1.1</b>	<b>Safety features:</b>
1.1.1	The machine shall incorporate all safety devices so as to provide complete protection to the operator and machine. Some of the important safety features, which should be available on the machine, are mentioned below:
	<b>a.</b> When feed hold is 'ON', all slide motions are to be inoperative.
	<b>b.</b> Software limit switches are to be provided to restrict the total slide travel, maximum feed velocity and maximum spindle speed. Hardware features should also be available for controlling the above movements.
	<b>c.</b> Improper job clamping in the spindle nose should inhibit spindle rotation and error is to be displayed on the control screen.
	<b>d.</b> The work piece should not get unclamped in the event of power failure or an emergency stop.
	<b>e.</b> Load meter should be provided to indicate the load on spindle drive motor, so that the load on the motor can be maintained within the safe limits. The safe zone should be indicated in green colour, the danger zone in red and intermittent zone in yellow colour.
	<b>f.</b> When any of the machine functions like spindle rotation, slide movement, etc. come to a stop without being programmed to stop, the machine should come to a stop and should be operative only in the manual mode till the fault is rectified.
	<b>g.</b> In case of failure of powered clamping system or sudden power failure, a suitable safety interlock system should be provided to prevent loosening of chuck jaws when table is rotating.
	<b>h.</b> Safety against ingress of Swarf on all sliding surfaces.
	<b>i.</b> All operating controls should be located preferably on a swivel able pendent or positioned within easy reach of the operator and should be of push button type clearly colour coded and marked with user friendly symbols.
1.1.2	Suitable interlocks should be provided to protect the machine in the event of hydraulic oil failure, lubrication failure, coolant failure, pneumatic system failure, fluctuation in voltage and frequency.
1.1.3	The safety feature shall include safety device against over loading of any drive, over travel of any slide and interlock against conflicting motions.
1.1.4	Mushroom type emergency stop shall be provided on the machine, which shall be easily accessible and capable of disabling the machine, drives in case of any emergency. <b>The offer should give specific details of the safety features incorporated in the machine</b>
1.1.5	Work area enclosure with transparent windows should be provided. The work area should be completely enclosed and interlocked so that no cutting operation in auto mode can take place as long as it is open except for motions in jog mode.  An "acrylic" shield swing open or shutter type table guard (with glass and protecting bars) should be provided to protect the operator from flying chips coming out of the revolving table. Adequate clearance should be provided between the column and the table to ensure uninterrupted flow of chips. The clearance provided should be indicated in the offer.

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1.1.6	<i>Pit under the machine table should have the sufficient space for at least 4 people with clear height of minimum 8 feet to repair the machine in standing position.</i>
1.1.7	<i>Inlet and outlet under the pit should be easy with electrical lighting &amp; provision of fans. It should also have the arrangement to dispose of rain water in case of water goes inside the pit. Additional pit may be provided in the pit for fitment of water lifting pump.</i>
1.1.8	<i>Safety guard /fencing should be provided around the table machine should have a positive clamping system. Job holding device should be electronic sensor as well as pressure switches for the safety of the job and operator in case of failure.</i>
1.2	<b>Specific characteristics:</b>
1.2.1	<b>General</b>
1.2.1.1	All the machine elements should be properly designed by using finite element method analysis (FEM techniques or equivalent software) to get optimum cross section and ribbing. The machine should be rigid and of sturdy construction, design to meet cutting forces at full load encountered in heavy-duty application under severe workshop conditions. The machines shall be free from excessive vibrations and noise at full load. The exact method followed for designing of machine elements may please be specified in the offer.
1.2.1.2	<p>All the major machine elements such as base, column, cross rail, ram head and table should be of thermo symmetric design. The elements should be made from highest quality, heavily ribbed, rigid gray cast iron and produced to BS-1452-1990 Grade 250 or Grade 25/30 conforming to DIN 1691. The casting should be suitably stress relieved and aged to ensure dimensional stability and freedom from distortion over the entire life of the machine. <b>The actual process followed for stress relieving should be detailed in the offer.</b></p> <p>All mating guideways of X and Z axis should be hardened (preferably induction) and precision ground. The hardness of guideways should be 58 +/- 2 HRC. The guideways should be lined with anti friction strips for stick slip free guide motion. The grinding of guideways should be carried out on precision grinding machine such as Waldrich-Coburg/ Forest line / Hitachi Seiki or equivalent precision grinding machines under controlled temperature conditions. <b>The method followed for maintaining controlled temperature conditions may be specified in the offer. The firm should indicate the value of grinding accuracy in micron/metre.</b></p> <p>The details of the various elements (base, column, cross-rail, ram head, table etc.) material, heat treatment cycle and maximum permissible inclusion level in cast iron shall be clearly indicated in the offer. Special design and constructional features of the elements (the bed, column, cross-rail, ram head, table etc.) must be fully explained in the offer.</p>
1.2.1.3	All the guideways for X and Z axis shall be suitably protected with wipers and heavy duty telescopic covers made of stainless steel conforming to Grade 3: ISO 683-13 to prevent ingress of coolant swarf and dirt. Telescopic cover should be preferably from reputed make like Sur Henning etc. Appropriate chip chutes should be provided for easy chip disposal.
1.2.1.4	Detailed drawing of the offered machine including isometric view clearly indicating the various machine parts and accessories should be submitted along with the offer.
1.2.2	<b>Base</b>
1.2.2.1	The machine bed should be made from a fabricated steel or casting. It should incorporate suitable design features for high damping, high rigidity and continued dimensional stability over the life of the machine i.e. thick wall, thermo symmetric feature optimum ribbing and full

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	<p>stress relieving The casting should be made of stabilized cast iron as per Gr GG25/GG30 of DIN 1691 or equivalent JIS standards or ISO standard.</p> <p>In case of fabricated structure the steel used for fabrication should be Fe360A conforming to ISO 630-95 or better grade. The fabricated structure should be subjected to stress relieving cycle.</p> <p>The details of the bed material and heat treatment cycle shall be clearly indicated in the offer. Special design and constructional features of the bed must be fully explained in the offer.</p>
1.2.2.2	The design of the bed shall be such as to provide the operator easy access for loading and unloading of jobs, gauging, tool changing and other related functions. <b>The offer shall explain how this is achieved.</b>
<b>1.2.4</b>	<b>Column</b>
1.2.4.1	The column construction should be of thermo symmetric design to minimize thermal distortion of the machine frame. The design should provide adequate rigidity.
1.2.4.2	The column should be of sturdy design to withstand heavy machining operations. It should be integral with the base or rigidly connected to it to ensure vibration free operation. Details of the special features, if any, should be explained in the offer.
<b>1.2.5</b>	<b>Cross Rail</b>
1.2.5.1	The cross rail shall be of fixed type.
1.2.5.2	Widely spaced guideways hardened and ground (to ensure square guidance of the head) and large front guideways (to take and dampen the main cutting forces) shall be provided. The arrangement should ensure the highest accuracy and rigidity. The guideways shall be properly lined with antifriction lining like turcite or hardened and ground steel plates of adequate thickness should be provided. Hardness of the guideways or steel plates should not be less than HRC 58 +/-2 & case depth of 1.5 -2 mm. Any other better arrangement for smooth movement of guideways like LM guideways can also be considered.
1.2.5.3	The cross rail guideways should be properly protected from ingress of dust and swarf. The wipers/telescopic covers of reputed make such as Henning conforming to CE/ISO standards.
<b>1.2.6</b>	<b>Ram Head</b>
1.2.6.1	The ram should be made of forged steel or SG cast iron. A ram head shall have enclosed type hardened and ground guide ways properly lined with antifriction lining like turcite or hardened and ground steel plates of adequate thickness should be provided. Hardness of the guideways or steel plates should not be less than HRC 58 +/-2 & case depth of 1.5-2 mm. The grinding accuracy should be 4-5 micron/metre or better. Any other better arrangement for smooth movement of guideways like LM guideways, as specified in 1.2.5.2 above can also be considered.
1.2.6.2	The tool holders shall be automatically clamped in the tool location of the ram head. The tool clamping system should provide high stiffness and tool change repeatability. Cutting forces should not influence the tool clamping. The ram head shall be hydraulically balanced.
1.2.6.3	A 12-station automatic tool changer with a round disc type magazine (cross rail mounted) shall be provided. Tool magazine movement shall be bi-directional. All the tool selection and transfer motors shall be completely automatic through CNC command.
<b>1.2.7</b>	<b>Table</b>

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1.2.7.1	The table should be provided with stiff and rigid machine base with large space for mounting the machine column. The table should be of thick wall construction, optimum ribbing and fully stress relieved.
1.2.7.2	The table shall be capable of taking the thrust and radial loads under maximum feeds/speeds, depth of cut and thereby ensuring high degree of accuracy during the life of the machine.
1.2.7.3	The table should be supported on a precision preloaded antifriction bearing system consisting of thrust roller bearing for vertical loads and precision taper roller bearing for taking up radial loads. Bearing should be of preferably P5/P6 Class of precision. Re-circulating lubrication system shall be provided for the table bearings.
1.2.7.4	<p>A hydraulically operated 3-jaw self-centering chuck which can be controlled through CNC program as well as through a foot operated switch should be provided. It should be possible to load concentric as well as non-concentric jobs on the table either with adjustable individual jaws on a 3 jaw self-centering chuck or with the help of a fixture directly mounted on face of the table.</p> <p>“Clamping and resting arrangement for wheel disc on the base should be such that wheel disc should not lift upwards while clamping through jaws”.</p> <p>The foot-operated switch should be ineffective while machine is working in CNC mode. It should be possible to adjust chucking pressure according to the job requirements.</p> <p><b>The details of arrangement and design features of fixtures, if provided should be explained in the offer.</b></p>
1.2.7.5	The radial chuck jaws shall be of quick setting type and include an arrangement for independent micro adjustment to maintain concentricity without re-grinding.
1.2.7.6	The clamping operation should be electrically/ hydraulically interlocked so that the table cannot be started when chuck jaws are unclamped.
1.2.7.7	Table should derive its rotation from the variable speed AC spindle motor through a two-stage gearing. The drive shall be further transmitted through flat belt & a two-speed gearbox. The speed range selection shall be through CNC system. Electric safety limit switch should be provided so that table does not rotate unless range selection has been completed.
1.2.7.8	The table drive elements such as pinion and gears should be made of Nickel chromium steel such as 18 Ni Cr Mo7 (as per DIN grade) /20 MnCr2/15 CrNi6 or equivalent ISO grade as per design requirement. The gear should be of helical type and should be hardened (preferably induction) and ground. The hardness value should be HRC 58 +/-2. The accuracy of gearing should be preferably DIN6 class or better.
1.2.7.9	Suitable dynamic or regenerative braking for quick stoppage of the table should be provided. The quantum of braking effort shall also be indicated.
1.2.7.10	Table drive elements such as Pinion & Gear should be properly lubricated. The details of the arrangement provided should be explained in the offer.
<b>1.2.8</b>	<b>Speed and Feed</b>
1.2.8.1	Adequate speed and feed ranges should be provided for machining different components.
1.2.8.2	The feed drive for vertical movement of the ram head and cross movement should be through hardened and ground precision pre-loaded recirculating ball screw of C3 class or better of adequate diameter. The ball screws should be supported on both ends by precision bearings.

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	The size, precision level and class of ball screws and their make should be indicated in the offer. The feed movement should preferably be transmitted from the motor to the ball screws through a direct coupling overload safety interlock or other latest device ensuring protection of machine elements. The actual arrangement provided should be explained in the offer.
1.2.8.3	The complete range of infinitely variable speed shall be operative for table movement and programmable over the entire range to ensure optimal cutting speeds. It shall be possible to change the speed while machining is in progress by over ride. The extent of change of speed by override may be explained in the offer
<b>1.2.9</b>	<b>Drive</b>
1.2.9.1	Feed drives for ram slide vertical and cross movements should be from digital control AC servomotors. The servo motor and associated control systems should be of the same make as that of CNC control system. The motor should be provided with inbuilt rotary encoders.
<b>1.2.10</b>	<b>Work Light</b>
1.2.10.1	<b><i>Two lighting unit for illumination of the working area, preferably with LED lamps, should be fixed at convenient location.</i></b> The minimum illumination at work/tool interface should be 300 lux or higher. The location and type of lamp used should be indicated in the offer. The firm should also indicate the operating voltage of lamps used on this machine.
<b>1.2.11</b>	<b>Measuring System</b>
1.2.11.1	The machine should be equipped with a suitable error actuated closed loop feedback system to ensure accuracies specified in Schedule-1.
1.2.11.2	Encoder should be provided to register slide positions within fine limits, commensurate with the requirement of the control system. The firm should furnish the actual details such as make, resolution and accuracy of measuring system provided to the various axis. Firm should also furnish the details of means provided for protection of linear scales. <b><i>Probe system is required for measurement of finish bore size.</i></b>
<b>1.2.11.3</b>	<b><i>Mandrel/Necessary suitable equipment for accuracy checking should be supplied with the machine.</i></b>
<b>1.2.12</b>	<b>Hydraulic system</b>
1.2.12.1	The hydraulic oil tank, pump, electric drive motor etc. shall be free standing to eliminate effects of hydraulic oil temperature on the machine.
1.2.12.2	The piping and fitting of hydraulic system should conform to DIN 2391/C.
1.2.12.3	Pump shall be used to supply oil for the various functions like clamping and unclamping of tool etc. <b>Refrigerant type cooling system should be used to control the temperature of hydraulic oil.</b>
1.2.12.4	<b>The refrigerant used in the cooling system shall be an environmentally-friendly type with zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP), complying with applicable international regulations for sustainable refrigerants.</b>
<b>1.2.13</b>	<b>Coolant System</b>
1.2.13.1	The coolant system will be required if wet cutting is offered. The machine should have its built-in filtration system for the coolant.



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1.2.13.2	It should be ensured that the coolant should not affect table bearings. Details of the arrangement provided should be explained in the offer.
1.2.13.3	<b><i>The machine should have inbuilt coolant filtration system and its motor should be placed at convenient location for maintenance accessibility.</i></b>
<b>1.2.14</b>	<b>Lubrication</b>
1.2.14.1	An automatic lubrication system covering all the bearings, driving gears, feed screws, guideways of the cross rails, saddle and slide ways and all other moving parts and components should be provided. Details of the lubrication system like make of system, no of lubrication points offered should be indicated in the offer.
1.2.14.2	Protection against over pressure and low lubrication oil pressure should be provided. Complete details in this regard should be fully explained in the offer
<b>1.2.15</b>	<b>CNC Control</b> The CNC control system should be of latest version of Fanuc FS 0i D with alpha i/beta i series AC Servo motors or latest version of Sinumerik 828 D of Siemens make. AC Servomotors, PLC's and AC drive control systems etc. should be of the same make as that of CNC control system. <b>The offered CNC Control System shall have the following features:</b>
1.2.15.1	The control system should have provision of <b>64 bit</b> or higher micro processor based integrated type of controller. Standard CNC system hard disk with <b>suitable</b> memory storage size should be provided.
1.2.15.2	It should have provision of <b>64 bit</b> or higher version of microprocessor based integrated type of controller. The other features are as under:- <ul style="list-style-type: none"> <li>•Disc <b>4 GB</b> RAM (Minimum) or better</li> <li>•Parallel interface with <b>300 GB</b> hard disc capacity (Minimum)</li> <li>•19" Flat operator Panel with 15" TFT/LCD colored screen and Alphanumeric keyboard with soft keys.</li> <li>•Block processing time should be less than 2.5 ms (milli-second).</li> <li>•Part program memory should be 1GB or higher.</li> </ul>
1.2.15.3	A memory of 1 MB or more should be available for storage of part program, tool offset and other off sets.
1.2.15.4	Facility for program and tool data transfer through <b>USB/RS 232/Ethernet</b> port should be available. Program running from external source through <b>USB/RS 232/Ethernet</b> port should also be available.
1.2.15.5	Loading and unloading of program through Ethernet port/PCMCIA Card/ flash disk/Pen drive should be possible.
1.2.15.6	Data protection key (password protection) shall be provided. It shall prevent the program offset parameters, data etc. from being registered, modified or deleted erroneously. All the passwords shall be given to consignee during commissioning of the machine. Bidders will certify that there is no such password in the machine, which has not been given to the consignee and the consignee has to approach the manufacturer for rectification later on/ at regular interval.
1.2.15.7	The offered CNC control system should have the provision of displaying the menu &

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	other contents preferably in HINDI in addition to the English language.
1.2.15.8	Facility should be available for tool retraction in case of emergency or power failure. Supplier should ensure necessary back up power availability for this purpose. <b>The firm should provide UPS of adequate for this purpose.</b> Details of UPS like make, Ampere- hour rating of battery, backup rating in minutes etc.
1.2.15.9	In case of interruption and subsequent restoration of power supply to the machine, it should be possible to resume operation from the point at which it was interrupted.
1.2.15.10	It should be possible to add, delete or modify program blocks. An axis key block should be provided to prevent tempering with program edit.
1.2.15.11	Back ground editing facility should be available such that when machine is executing a CNC program in Auto mode, the operator should be able to enter new program or carry out editing of the existing program.
1.2.15.12	Teach in mode should be available.
1.2.15.13	It should be possible to directly program CNC system from machine console.
1.2.15.14	Fixed cycle programming should be available for milling, boring, drilling, reaming and tapping. Graphical support for cycles should be provided.
1.2.15.15	Mirror imaging feature should be available for machining operation.
1.2.15.16	Inch/Metric program should be available for dimension input.
1.2.15.17	Linear and circular interpolation programming should be possible.
1.2.15.18	The control panel should have provision for manual over ride for speed and feeds from 0-120% of the program value.
1.2.15.19	Auxiliary hand pendant to be provided for jog/inching movement with push button/electronic pulse generator for movement of all axis with axis and increment selector switches and spindle rotation with following functionalities: <ul style="list-style-type: none"> <li>• Electronic hand wheel.</li> <li>• Incremental movements.</li> <li>• Axes selector</li> <li>• Tool locking</li> <li>• Tool unlocking</li> <li>• Spindle rotation</li> <li>• Emergency button head.</li> </ul>
1.2.15.20	Absolute/Incremental input – Program data may be in either absolute or incremental from selectable by G code.
1.2.15.21	Feed rate programming – Feed rate should be programmable in direct millimeters per minute (MMPM) or inches per minute (IPM). Feed rate should also be programmable in mm per revolution (MMPR) or inches per revolution (IPR) selectable by G codes.
1.2.15.22	Dwell – Programmable up to 99.9 seconds using G-code.
1.2.15.23	The control should be able to give error messages with diagnostic level up to PLC in case of malfunctioning of the system. The controller should also maintain a record of the error messages with date and time that are registered by the machine.

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1.2.15.24	Pitch error compensation through software should be accepted by the control.
1.2.15.25	The controller should be able to interface with tool Monitoring system installed for the purpose of monitoring the condition of the Tool.
1.2.15.26	Any other feature present in the CNC control should be explained in detail.
1.2.15.27	Tool Management details (Magazine configuration Screen).
1.2.15.28	PLC integrated with CNC control should be provided. Scan rate of PLC should be of the order of 3 microseconds per instructions.
1.2.15.29	Spindle control – CSS orientation. <i>Spindle orientation key/switch shall be provided over the operator panel for orientation of spindle table/bed to enable movement of loading/unloading of wheels in manual mode.</i>
1.2.15.30	All necessary back up data and program like NC, PLC,HMI and DP data/parameters, Fixed cycles and part programs, PLC program should be made available on PEN DRIVE of 16 GB capacity and ghost program should be made available on spare hard disk drive as fitted on the CNC Control.
1.2.15.31	Execution and PLC programs should be in F-EPROM so that power failure should not affect system execution and PLC program.
1.2.15.32	Ladder diagram/STL diagram with cross-reference listing of the PLC program should be displayed provided for ease in maintenance purpose. In case, this cannot be provided, the alternate documents/ means should be given to assist maintenance staff for troubleshooting.
1.2.15.33	Fanuc/ Siemens unit of the country which supplies CNC system should enter in to repair & Service contract with Fanuc/ Siemens India for attending the defects. Documents must be enclosed in the offer.
1.2.15.34	There should be provision of password protection for operator name, component number and data log registration in CNC system, using PMC (programmable machining controller). This provision should be developed by machine tool builders.
1.2.15.35	<i>Successful bidder shall provide passwords required to operate and maintain the machine to RCF during commissioning/training. Bidder shall also declare that there are no other hidden passwords essential to operate &amp; maintain the machine.</i>
1.2.15.36	<i>Machine shall be ready for Industry 4.0 support for remote monitoring of operation &amp; maintenance.</i>
<b>1.2.16</b>	<b>Chip Conveyor</b>
1.2.16.1	<p>The machine should be provided with a suitable motor driven swarf conveyor system for collection and removal of swarf from the machine without stopping it. The chip conveyor capacity should be adequate to cater for maximum metal removal rate. There should be provision to start and stop the conveyor either by manual mode or CNC Part programme through 'M-Code' functions. The chip conveyor should confirm to relevant DIN/ISO specifications, which may be indicated in the offer. The firm should furnish the following details of chip conveyor.</p> <ol style="list-style-type: none"> <li>Type and make of chip conveyor</li> <li>Width of chip conveyor</li> <li>Type of motor and its KW</li> <li>Drive speed in mm/min</li> </ol>

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	<p>e. Height of discharge of chip conveyor from the floor level</p> <p>f. Schematic layout of the system and sub-assemblies.</p> <p>g. Material composition and hardness values of the conveyor Components</p>
1.2.16.2	<p>The system should be designed in such a way that the coolant is completely drained off from the swarf without carrying any residual contents along with it to the coolant tank.</p> <p><b><i>The chip drain system should be automatic and easily drain chips to the pallet</i></b></p>
1.2.16.3	<b><i>The chips and coolant should not scatter outside the machine during machining. It should be leakage proof for the safety purpose.</i></b>
<b>1.2.17</b>	<b>TOOLINGS &amp; FIXTURES</b>
1.2.17.1	Complete pre-set toolings/qualified toolings to cover requirement specified Annexure "A" of <b>SECTION III</b> should be supplied with the machine. Details of toolings including tool post, boring bars, tool holders, and throw away carbide tipped inserts their grades should be indicated in the offer. Complete tooling should be listed out and described in detail with individual prices
1.2.17.2	The basic tool holder used should be with ISO 50/ BT 50 taper and pull stud design. In case any other tool holder taper is offered, complete justification shall be given. Spindle should also be such as to accept the basic holder of the offered type. The no. of machines in the past supplied with the offered spindle taper may also be indicated. Tooling should be modular type.
1.2.17.3	Tool holders and cutting tools offered should conform to ISO standards. The life of inserts should be indicated in the offer.
1.2.17.4	The design of the fixture should be such that it should be possible to do the machining of each types of wheels in one fixture. Holding device for fixture should be self-centering and there should not be any need of its manual adjustment. The tenderer is to offer the best design of the fixtures, which should utilize advance hydraulic clamps for quick clamping & de-clamping.
1.2.17.5	Clamping arrangement provided should be flexible for the full range of table so that different items can be loaded as needed.
<b>1.2.18</b>	<b><i>The supplier should quote a hand-held programming unit rigidly built for industrial use for uploading/downloading of software of CNC system</i></b>
1.2.18.1	<b><i>The configuration of the hand-held programmer unit should be Intel 12th Gen Processor 17 or latest, with 16GB RAM DDR4 3200MHZ, 1TB M.2 NVME SSD, FHD display (1920X1080), Windows 11 Professional, Wi-Fi 6, Bluetooth 5.1 or above along with licensed MS Office 2016 or latest.</i></b>
1.2.18.2	High level interactive use of MB program for preparation of part programs based on CAD drawings. The machine should be able to accept drawings on DXF file.
1.2.18.3	Features like graphic display of cutter path, calculation of machining time and other features available with the software should be explained in detail.
1.2.18.4	It should be possible for CNC maintenance / electronics section for loading and unloading the PLC program, machine data, change of parameter/ updation of parameters on a similar PC as at 1.2.18.1 above.

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<b>1.2.19</b>	<b><i>Wheel Disc Handling Equipment:</i></b>
1.2.19.1	Wheel disc handling equipment should have conveyor tables of approximate 5 meters length each on both sides of the machine. It should be such that it automatically picks up the wheel disc from the conveyor table and load on the machine table for machining operation. After machining operation is over the handling equipment should automatically unload the wheel disc from machine table and place on conveyor table on other end which shall carry the wheel disc to about 5 meters length away from machine centre. The equipment should be supplied complete and capable of handling all types of wheel discs as shown at S.No. 1, 2, 3 and 4 of Annexure-A. The system should be integrated with the machine shall be furnished in the bid.
1.2.19.2	Wheel disc handling equipment should also can be manually operated to picks up the wheel disc from the conveyor table and load on the machine table for machining using jib cranes with motorized radial and vertical smooth movement, and a wireless type pendant for manual operation .After machining operation is over the handling equipment should manually operated using jib cranes with motorized radial and vertical smooth movement, and a wireless type pendant for manual operation to unload the wheel disc from machine table and place on conveyor table on other end which shall carry the wheel disc to about 5 meters length away from machine centre.

## 2. GENERAL ELECTRIC SPECIFICATION

2.1	The provision of this General Specification shall apply, where ever relevant.		
2.2	All equipments and material shall comply with appropriate Indian Standards (latest), International Standards or National Standards of the country of origin provided the latter are equivalent to or better than the former. The tenderer shall indicate the Standards applicable. The following standards are applicable in particular. (Corresponding International Standards like ASA, NEMA, BSS, DIN etc. may also be quoted).		
IS :	325-1979 (latest)	-	Three phase induction motors (corresponding to IEC pub-34-1) (Latest).
IS :	1248 (Latest)	-	Direct acting indicating analogue electrical measuring instruments and their accessories (corresponding to IEC Pub-51) (Latest).
IS :	1231-1974 (Latest)	-	Dimensions of three phase induction motors (corresponding to IEC Pub-72-1) (Latest).
IS :	1271-1985 (Latest)	-	Classification of insulation material for electrical machinery & apparatus in relation to their thermal stability in service (corresponding to IEC-Pub-85) (Latest).
IS :	6875 (Latest)	-	Push Buttons and related control switches corresponding to IEC Pub/73) (Latest).
IS :	375-1963 (Latest)	-	Marking and arrangement of switch gear, bus bars, main connection & auxiliary wiring.
IS :	996-1979 (Latest)	-	Single phase small AC and universal electrical motors.
IS :	1356 (Latest)	-	Electrical equipment of machine tools.

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IS :	2516 (Latest)	-	Circuit breakers (corresponding to IEC Pub-56) (Latest)
2.3	Unless specified in the main specification, the AC motors and starters shall be of the following type. Tenderer is, however, free to give alternative proposal along with justification, if in his view alternative proposal in warranted by site conditions. Type of motor type of starter.		
	TYPE OF MOTOR	TYPE OF STARTER	
2.3.1	Any type of AC motor starting current of which does not exceed 75 amps.	Direct on line.	
2.3.2	AC squirrel cage, introduction motors, starting current of which is above 75 amps. if started direct on line	Star delta or Auto transformer type.	
2.3.3	AC slipring type motor	Resistance type air/fan Cooled.	
2.3.4	AC synchronous or synchronous induction motor.	Suitable makers standard.	
2.3.5	DC motor	Resistance type/Thyristor type.	
2.4	The control gear for AC/DC motors shall incorporate the following protection devices as concomitant accessories.		
2.4.1	<b>No Voltage Protection</b> - No voltage protection shall be provided so that machine will not start up again by itself when, following an interruption the supply is restored.		
2.4.2	<b>Short Circuit Protection</b> - To protect against short circuits due to insulation failure of faulty connections HRC fuses shall be provided for each motor. The rating of the fuse shall be such as to take care of the over current due to motor starting.		
2.4.3	<b>Over Load Protection</b> - To prevent motors from overloading, overload protection shall be provided separately for each motor. Three phase motors shall be protected by overload tripping devices on each phase.		
2.4.4	<b>Single Phasing Protection</b> - A separate current sensitive delayed action single phasing preventor shall be provided for each motor separately. Overload protection shall not be treated as single phasing preventor.		
2.5	Control equipment shall be mounted in separate drip proof enclosures. Control enclosures and compartments are to be so designed as to give adequate protection against ingress of dust, oil, coolant or chips. All control devices like contractors etc. shall be front mounted on a rigidly fabricated metal panel for ease of operation. All other electrics shall be installed that they are readily accessible when the doors and covers are opened. Hinged covers shall be interlocked with the machine tool control to prevent operation of the machine when cover is open.		
2.6	The motor shall be totally enclosed with or without fan cooled frame. Screen protected drip proof type motor may be provided if it is mounted inside protective enclosures.		
2.7	The electrical equipments shall comply with the requirement of Indian Electricity Act and Rules (latest).		
2.8	All instruments shall be of the Industrial Grade “A” (IS-1248) switch board type the range of the instrument shall be such that the maximum load expected in the circuit shall produce a		

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	deflection of 60% to 80% of the full scale.		
2.9	The supplier shall furnish 3 sets of complete electrical and electronic wiring diagrams in full details to enable the maintenance staff to locate faults in the circuits, 3 sets of part catalogues, maintenance manuals operating instructions with details of coils and windings, used in the equipment to facilitate repairs and maintenance should also be supplied.		
2.10	For main motor class minimum "B" Class insulation shall be provided. If any other class of insulation is proposed, detailed justification for providing different class of insulation shall be given.		
2.11	Motors shall be designed to withstand frequent starts, stops and reversals as demanded in the operation of the machine.		
2.12	Two earthing terminals shall be provided on all electric motors including the control gear.		
<b>2.13</b>	<b>POWER SUPPLY</b>		
2.13.1	The machine shall be suitable for operation on 415 volts 3 phase 50 cycles AC 3 wire or 4 wire system with neutral solidly earthed. The supply voltage may vary up to +10% -20%. The frequency may vary up to $\pm 3\%$ . However, full rated power of the motor shall be available at the lower voltage. Firm should confirm satisfactory performance of the machine at incoming power supply in the range 415V+10%-20% and 50HZ $\pm 3\%$ frequency or should provide voltage stabilizer as specified against clause 2.13.2 below of required capacity.		
2.13.2	The voltage stabilizer, if required, shall conform to :		
i)	Input Voltage	-	320 to 460 volts 3 phase 4 wire supply.
ii)	Out put Voltage	-	415 volts
iii)	Regulation	-	$\pm 1\%$ from No load to Full load.
iv)	Rate of correction	-	20 volts per second per phase.
v)	Wave from distortion	-	NIL
vi)	Efficiency	-	Not less than 97%.
vii)	Winding and class of insulation	-	Copper wire wound with "B" class of insulation or better.
2.13.3	In case of machines equipped with NC, SS, CNC, Thyristor controlled devices and other sophisticated electronic gadgets including microprocessors etc. which are susceptible to power line spikes and surges, a suitable voltage stabilizer and ultra isolation transformer of adequate capacity to cover for the entire electrical load of the machine shall be offered as a concomitant accessory conforming to Specification for voltage stabilizer as mentioned in clause 2.13.2 above and isolation transformer to the parameters mentioned below.		
i)	Transformer ratio	-	1:1
ii)	Winding	-	Copper wire wound with "F" class insulation or better.
iii)	Protection	-	To arrest spikes and surges to the order of 3 KV for 200-400 micro seconds duration.
iv)	Common mode	-	120 dB

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	rejection ratio		
v)	Isolation	-	Capacitance 005 Pf: resistance greater than 1000 Mega Ohms.
2.13.4	Voltage stabilizer shall be equipped with a protective relay to trip to trip the AC power supply to the machine instantaneously with audio and visual indication to the operator. Settings of the protective relay for low and high voltage shall be 320 volts and 460 volts respectively.		
<b>2.14</b>	<b>ATMOSPHERIC CONDITIONS</b>		
2.14.1	The ambient temperature at the site at which the machine will be installed may vary from -4°C to +50°C over the year. The relative humidity may be as high as 98%. The atmosphere is expected to be dusty. The machines offered shall be suitably tropicalised to work under these atmospheric conditions without any adverse effect on their performance.		
2.15	The temperature rise shall not reach such a value that there is a risk of injury to any insulating material or adjacent parts.		
2.16	The drive shall be capable of operating at any one of the speed required independent of the load in accordance with the requirements of the machine.		

### 3. GENERAL CHARACTERISTIC

<b>3.1</b>	<b>RIGIDITY AND STABILITY</b>
3.1.1	The machine shall be robust, rigid and of sturdy construction. It shall be designed to meet heavy duty demands of various operations on the machine under normal Workshop environment for such machines. It shall be free for vibrations even when working at full capacity.
3.1.2	All machine castings shall be made of close grained high grade cast iron like Mechanite or equivalent materials meeting IS-210 Standards to ensure durability and rigidity. The casting shall be thermal stress relieved to ensure stability and continued accuracy.
3.1.3	All machine fabrications of critical load bearing assemblies like beds, columns etc. shall be adequately strengthened and stress relieved.
3.1.4	Change in ambient temperature shall not affect the performance of the machine.
3.1.5	There shall be no change in the performance of the machine either on switching on the machine or after continuous running.
3.1.6	There shall be no resonant vibrations throughout the working range of the machine at all load levels.
<b>3.2</b>	<b>SAFETY CONTROLS</b>
3.2.1	The machine shall incorporate safety devices to provide protection to the operator and machine against all possible operational and machinery failures.
3.2.2	Suitable interlock shall be provided to prevent machine operations in the event of:
3.2.2.1	Faulty sequence of operation.
3.2.2.2	Fluctuation in supply voltage.
3.2.2.3	Resumption of power supply after power failure.



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3.2.2.4	Non-positioning of safety guards.
3.2.2.5	Failure of hydraulic system (where applicable)
3.2.2.6	Failure of lubricating system (In case of automatic including drop in pressure lubrication)
3.2.3	A fault or damage in the control circuit or interruption re-establishment after an interruption of fluctuation in whatever manner in the power supply to the machinery must not lead to dangerous situations in particular.
3.2.3.1	The machinery must not start unexpectedly.
3.2.3.2	The machinery must not be prevented from stopping if command has already been given.
3.2.3.3	No moving part of the machinery or piece held by the machinery shall fall or be ejected.
3.2.3.4	The protection devices must remain effective.
3.2.4	The machine shall be fitted with an emergency stop device to enable actual or impending danger to be averted. This device must be:-
3.2.4.1	Conveniently located.
3.2.4.2	Clearly identifiable.
3.2.4.3	Stop the machine as quickly as possible without causing additional hazards.
3.2.4.4	The emergency stop must remain engaged. It should be possible to disengage it only by appropriate operation. Disengaging the control must not restart the machinery but only permit restarting.
3.2.5	Safety features shall also include.
3.2.5.1	Safety device against overload for all mechanical and electric items to the extent possible.
3.2.5.2	Safety stops against over-running of slides.
3.2.6	Guard and protection devices shall protect exposed persons against risks related to moving transmission parts (such as pulleys, belts, gears, rack and pinion, shafts etc.) and moving parts directly involved in the process to the extent possible. This shall meet the following requirements:-
3.2.6.1	Be of robust construction
3.2.6.2	Not give rise to any additional risk
3.2.6.3	Not be easy to by pass or render non-operational
3.2.6.4	Be located at an adequate distance from danger zone
3.2.6.5	Cause minimum obstruction to the view of the production process.
3.2.6.6	Rigidly connected and not prone to rattling
3.2.6.7	Enable essential work to be carried out without the guard or protection device having to be dismantled
3.2.7	A load meter shall be provided to indicate the load on the machine. The meter shall have a suitable mark to indicate the maximum load the machine can take. Full details of the above and other safety features indicating how each one functions must be explained in the offer.
<b>3.3</b>	<b>OPERATIONAL CONTROLS</b>
3.3.1	The operation of the machine shall be by push buttons or levers. The basic rules for the direction of operation of controls and the corresponding direction of movements of the

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	machine tools shall be as per IS: 2987-1985(Latest).
3.3.2	The control devices shall be
3.3.2.1	Clearly visible and identifiable.
3.3.2.2	Ergonomically positioned for safe operation without hesitating or loss of time, and without ambiguity.
3.3.3	CNC Controls (where applicable) - The general requirements of CNC controls are given at Schedule-IV.
<b>3.4</b>	<b>LIGHTING</b>
3.4.1	Integral lighting suitable for the operations concerned where its lack is likely to cause a risk despite ambient lighting of normal intensity shall be provided.
3.4.2	The manufacturer must ensure that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects due to lighting provided by the manufacturer.
3.4.3	Integral parts requiring frequent inspection and adjustment and maintenance areas must be provided with appropriate lighting.
3.4.4	The machine lighting should be of low voltage so as to prevent any hazard to the operator.
<b>3.5</b>	<b>MACHINE MAINTAINABILITY</b>
3.5.1	The machine shall be so designed as to require minimum possible maintenance and to give trouble free service.
3.5.2	All assemblies/parts of the machine shall be easily accessible for maintenance.
3.5.3	The machine shall not require major dis-assembly for checking and replacement of a particular part, especially for parts requiring periodical check up and replacement.
3.5.4	The manufacturer must provide means of access e.g. stairs, ladders, cat walks etc. to allow access safety to all areas used for production, adjustments and maintenance operations.
<b>3.6</b>	<b>WEAR COMPENSATION ADJUSTMENT</b>
3.6.1	The original built in accuracy of the machine shall be capable of being maintained conveniently and economically by suitable adjustments for taking up wear on slides, bearings and lead screws. The system of adjustments incorporated shall be explained in the offer.
<b>3.7</b>	<b>COOLANT SYSTEM (WHERE APPLICABLE)</b>
3.7.1	Suitable coolant system with pump, motor, tank, filter etc. shall be provided. The coolant pump shall be as per IS: 2161-2001. The filter shall be of reusable type and indigenously available. If reusable filter cannot be offered the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare. Details of the coolant system shall be indicated in the offer.
3.7.2	The supply of coolant shall be in ample volume. Provision to re-circulate the coolant shall be available. A chip and coolant tray shall be provided. The volume of coolant flow shall be indicated. It shall be adjustable.
3.7.3	An enclosure shall be provided to prevent the coolant from splashing outside the machining zone. Details of enclosure shall be provided. Specific requirements of coolant system for grinding machines etc. shall be clearly indicated.

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<b>3.8</b>	<b>LUBRICATION SYSTEM (WHERE APPLICABLE)</b>
3.8.1	The machine shall be provided with an automatic lubricating system for ensuring delivery of adequate quantity of lubricant to areas requiring continuous lubrication. Suitable arrangements must be provided for indication of failure of the lubricating system.
3.8.2	The system shall be provided with interlock to prevent machine operating/starting in the event of the failure lubrication system.
3.8.3	Reusable filters capable of filtering chips, dust particles etc. shall be provided. Indicators for showing clogged condition of filters shall be available. The filters shall be indigenously available. If reusable filter cannot be offered the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare.
3.8.4	Lubrication and filter cleaning chart shall be displayed on a metal plate at a conspicuous location on the machine indicating :-
(a)	Specific location of points on the machine to be oiled lubricated/greased.
(b)	Periodicity of lubrication of these points.
(c)	Filter to be cleaned.
(d)	Periodicity of cleaning filters.
(e)	Periodicity of replenishing lubricating oil for the centralized system.
(f)	Any other similar relevant information.
3.8.5	Points where manual lubrication is needed shall be separately indicated. Frequency of lubrication shall be also clearly mentioned.
3.8.6	Lubricating oils used in the machine shall be available in India. Successful tenderer will be required to indicate brand names of approved oils manufactured by various Indian Oil Companies.
3.8.7	First fill of lubricating oils used in the machine shall be provided with the machine. Details of lubricating system provided shall be indicated.
<b>3.9</b>	<b>PNEUMATIC SYSTEM (WHERE APPLICABLE)</b>
3.9.1	The compressed air supply will be provided by the customer at the machine within pressure range of 4.5 to 7.5 kg/cm <sup>2</sup> and moisture content or 1000 ppm. The pneumatic system of the machine should be designed accordingly. An alarm shall be provided for low air pressure.
3.9.2	Suitable filter/moisture trap shall be provided by the contractor in the system of pneumatic air intake. The filter shall be reusable type and indigenously available. If reusable filter cannot be offered, the filter cartridge shall be easily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare.
3.9.3	Air pressure regulator, if necessary, shall be provided by the tenderer.
3.9.4	The make of pneumatic control equipment shall be of reputed make. The makes shall be indicated.
<b>3.10</b>	<b>HYDRAULIC SYSTEM (WHERE APPLICABLE)</b>
3.10.1	Hydraulic circuit must be equipped with the following safety and inspection equipments:
(a)	Pressure gauges at all places where pressure has to be set up or inspected.

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(b)	Safety valves for hydraulic circuit if relief valve does not fulfill this function.
(c)	Equipment for checking of temperature in the circuit or in the pump wherever necessary.
(d)	Arrangement to show if the filters (including those in the pump set) are choked and need cleaning. The filters shall be of reusable type and indigenously available. If reusable filter cannot be offered, the filter cartridge shall be readily available in India. Source of supply shall be indicated. Adequate no. of filters for 2 years working on double shift basis shall be offered as spare.
(e)	Alarm for low oil level.
3.10.2	The sump aggregate shall have the following:
(a)	Oil level sight gauges or any other equipment showing the minimum and maximum oil levels in sump.
(b)	A drain plug at the lowest portion of the tank.
(c)	It shall be possible to drain the oil from the tank without disconnecting any pipes or other fittings.
3.10.3	The temperature of oil in hydraulic circuits shall not exceed 60 degrees C in any case. Suitable arrangement shall be incorporated to ensure that the oil is not overheated under local weather conditions at continuous normal working of the machine. <b>Alarm for rise in temperature of hydraulic oil should be provided.</b>
3.10.4	Facilities for bleeding of air in case of air lock shall be provided.
3.10.5	The hydraulic reservoir, pump and allied equipment shall be suitably segregated from the machine in order to remove major source of heat.
3.10.6	Hydraulic oils used on the machine shall be available in India. Successful tenderer will be required to indicate brand names of approved oils supplied by various Indian Oil Companies.
3.10.7	First fill of hydraulic oils used on the machine shall be provided with the machine.
<b>3.10.8</b>	<b><i>Portable hydraulic oil cleaning unit should be provided.</i></b>
<b>3.10.9</b>	<b><i>Auto drain valve for moisture drain should be provided at the intake of air.</i></b>
<b>3.10.10</b>	<b><i>All pressure switches should be digital type. Hydraulic circuit should be printed on metal sheet and fixed on the hydraulic tank or any other place clearly indicating pressure of each line and set pressure of pressure switches.</i></b>
<b>3.10.11</b>	<b><i>All the hydraulic system should have sufficient capacity of chiller unit and heating unit to maintain the temperature of hydraulic oil in summer as well as winter season.(as the ambient temperature at RCF varies from -4°C to 50°C).</i></b>

#### 4.0 TECHNICAL LITERATURE:

- 4.1 One copy of the printed illustrative catalogue showing features of the machine and its elements must be enclosed with each copy of the bid.
- 4.2 The technical literature shall be provided for the complete machine, including imported and indigenously purchased components / sub- assemblies. The successful tenderer will have to furnish 4 (four) copies each of the following manuals directly to the consignee along with the

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machine. Out of these 04 sets, the bidder shall be required to submit one set of all documents in best available condition one month prior to the training for the machine. One set of technical literature should cover the following details:

- i. Operational & Maintenance manual of the machine.
  - ii. Operational & Maintenance manual of the servo controlled voltage stabilizer.
  - iii. Operational & Maintenance manual of the ultra isolation transformer.
  - iv. Instruction & Maintenance manual for Hydraulic Oil Cooling Unit.
  - v. User manual for Tool changer system (if provided).
  - vi. Technical & Maintenance manual for Hydraulic System
  - vii. Technical & Maintenance manual for Lubrication System.
  - viii. Operator Guide for CNC Control System (if provided).
  - ix. Programming Guide for CNC Control System (if provided).
  - x. Diagnostic & Trouble shooting Guide for CNC Control System (if provided).
  - xi. Start-up Guide for CNC Control System (if provided).
  - xii. Machine Software listing (if provided).
  - xiii. Soft and hard copies of PLC Program in ladder form with cross reference listing and PLC project file.
  - xiv. Drawings of tooling & fixtures, hard copies in A-2 size as well as soft copy in PDF format.
  - xv. Wiring diagram, in which length of wires must be mentioned, hard copies in A-3 size as well as soft copy in PDF format.
  - xvi. Mechanical drawings (spindle assembly, table assembly, column assembly), hard copies in A-1 size as well as soft copy in PDF format.
  - xvii. Spare part manual including part lists no., hard copies in A-4 size as well as in PDF format.
  - xviii. Lay out drawings in A-1 size, which clearly shows the position of all type of electrical components in machine.
  - xix. *To provide PDF copy of the manual which must include all necessary data including hydraulic circuit, pneumatic circuit, lubrication circuit, electrical circuit, electronic circuit, assembly drawings with components part number, make, quantities etc.*
  - xx. ***All hydraulics, Pneumatics and lubrication circuit should be laminated.***
- Note: All manual and literature should be in English/Hindi.**

## 5.0 SPARES

- 5.1 Since the machine will be under comprehensive preventive maintenance during warranty period of two (02) years and under AMC for Ten (10) years after the warranty period, it is the sole responsibility of bidders to stock such spares as required for smoother execution of PMC during warranty and AMC in order to achieve response time in compliance to machine availability as per stipulated requirements.

- 5.2 ***A complete spare part catalogue giving the part list number of each component and assembly drawings shall also be provided with machine.***

## 6.0 CONSUMABLES:

- 6.1 The list of consumable spares shall be furnished and quoted along with their unit rate.
- 6.2 Consumables shall be supplied along with the machine or as per agreed time table, if ordered.

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## 7.0 SPECIAL FEATURES:

7.1 Special features incorporated in the machine, if any, shall be indicated separately in the bid clearly indicating the advantages.

## 8.0 DEVIATIONS:

8.1 The tenderer shall certify that the offered machine fully meets the specification. Various design features incorporated in the machine to fulfill different technical performance requirements shall be fully explained in the offer. However, minor deviations from these specifications which do not affect or in any way interfere with the stipulated performance standards or would result in improved safety/ reliability or would reduce recurring maintenance/operating cost of the machine, can be considered for acceptance. The tenderer in such eventuality shall clearly indicate the details of these deviations and their implications.

8.2 All Deviations shall be clearly indicated in the deviation statement.

## 9.0 INSPECTION AND TESTING AT MANUFACTURER'S WORKS:

9.1 The machine shall be inspected and tested during different stages of its manufacture starting from raw material till the completion of machine, by the purchaser or his authorized representative at the supplier's or his sub-supplier's works. The Quality Assurance Programme as per Annexure-F shall be submitted along with the bid. The bidder must submit the exhaustive QAP incorporating the tests as given in Annexure-F along with other tests /stage inspection as followed by them.

9.2 A load and functional test like no load test and maximum Horse Power test must be carried out at the manufacturer's works. Rigidity of the machine shall be demonstrated to the satisfaction of appointed inspector or inspecting agency.

9.3 Manufacturers must have suitable facilities at their works for carrying out various performance tests on the sub-assembly/assembly/machine. The tenderer shall clearly confirm that all facilities exist and shall be made available to the inspecting authority.

9.4 A Sample Inspection Chart for inspecting the equipment shall be supplied along with the bid. The inspection chart should indicate all the tests that are carried out during the machine manufacture and also the tests to be offered to inspecting agency. The standard to which this inspection chart conforms should be clearly indicated. Against each test, acceptable limit/ range of values shall be indicated.

## 10. TRAINING:

10.1 Free training by the firm shall be imparted in operation and maintenance of the machine. The training to be imparted shall cover operation, troubleshooting and repair of all mechanical, hydraulic, electrical & electronics equipments (CNC Control & AC Drives) and CNC/PLC part programming. This training shall be provided to 03 persons nominated by the consignee, for a period of 01 week free of cost at the manufacturer's premises. One weeks training will also be provided to one person free of cost from M&P/RCF, in design and construction of the machine. All charges pertaining to travel, boarding and lodging shall be borne by Indian Railways.

10.2 Subsequently, technical experts from the manufacturer will fully and adequately provide training to operators and maintenance staff nominated by the consignee at RCF at the time of commissioning and prove out of machine.

10.3 The supplier will be responsible for co-coordinating with the consignee the travel plans of trainees to ensure that the training is imparted on the machine at its assembly and testing stage. The bidder shall also submit training schedule along with the offer.

**Note: All training should be imparted in English/Hindi only.**

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## 11. FOUNDATION & RELATED DRAWINGS

### 11.1 SUBMISSION OF GA, FOUNDATION & RELATED DRAWINGS FOR APPROVAL:

**11.1.1** For each machine, the supplier shall first submit 01 copy of GA & foundation drawings with details of construction of foundations, complete layout of machine elements like bed, hydraulic tank, coolant tank, electrical panel, Servo Controlled Voltage Stabilizer etc. and other related diagrams (Mechanical, Hydraulic, Electrical & Electronics) along with machine weight, overall dimensions, electrical load with length of 3 phase, 415 V AC electric power cable for approval as per time schedule specified in Section-I to each consignee for approval and to enable the consignee for making necessary arrangements for Installation & Commissioning of Machine on receipt. After getting approval from consignee, the supplier shall supply directly to each consignee 6 copies of approved GA foundation drawings and related diagrams for each machine as per time schedule specified in Section-I from the date of approval of GA drawing for information only. This information should be furnished on the pattern indicated in detail in the following IS Specifications (Latest) or relevant international standards

- i) IS: 2974 (Pt.I Para 4.1) for reciprocating type machine.
- ii) IS: 2974 (Pt.III Para 3.1) for rotary type machine (medium & high frequency).
- iii) IS:2974 (Pt.IV para 4.1) for rotary type machines of low frequency.
- iv) IS: 2974 (Pt.V para 3.1) for impact type machines other than hammers

#### Turn-Key contracts:-

**11.1.2.1** The supplier shall arrange certification by a RCC Consultant, who should be a Chartered Engineer registered with the Institution of Engineers, that:-

- a) The design of the machine foundation &
- b) Construction of the foundation.

is in accordance with the latest version of the relevant part of the Indian Standard for Code of Practice for design & construction of machine foundation as specified in IS:2974.

The original certificate issued by the consultant for certification of both the design & construction of the foundation and a copy of his registration certificate from the Institution of Engineers shall be submitted by the supplier to the consignee.

**11.1.2.2.** The supplier shall stand a warranty for the foundation along with the machine. He shall arrange to rectify any defects (e.g. sinking or cracking) occurring during the warranty period in the foundation. He shall also be responsible for uprooting and reinstalling the machine if so required for carrying out the repairs to the foundation. The warranty period would be extendable by the time period for which the machine remains out of commission due to the defect in the foundation or a period of one year, whichever is more.

**11.1.2.3.** The payment for the construction of the foundation and installation & Commissioning of the machine would be released only after submission of a certificate as required as per clause 11.1.2.1 above, which has to be certified by the consignee. This certification shall be done while issuing the PTC for the machine.

**11.1.2.4.** Detailed specifications of the quantity and quality of the material etc. of the turnkey is to be specified by the firm along with the offer so that these can be incorporated in the contract to ensure right quality as well as quantity of the material etc

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## **11.2 APPROVAL OF GA DRAWING (Applicable for machines wherever delivery period is linked with approval of GA drawing)**

To be governed by Time Schedule in clause 7 of Section-I and following stipulations.

**11.2.1** General Arrangement Drawings will be sent by the 'Contractor' to the Consignee as per Time Schedule clause 7 of Section-I. The 'Contractor' should ensure that drawings sent to consignee are complete in all respects as specified in technical specification. The GA drawings shall be approved by the consignee and given back to the contractor, as per the Time Schedule in clause 7 of Section-I.

**11.2.2 Delays in submission of drawings by Contractor will be added to the delay in supply of machine** in case submission of GA drawing is delayed beyond stipulated time as per time schedule and LD will be levied **as per IRS condition of contract**. Thus the number of days delay in submission of GA drawing plus the number of days delay in supply of machine together will be taken as the delay in supply of machine for the purpose of calculations of LD. However, if the contractor supplies the machine before original delivery period as per contract the number of days by which machine has been supplied earlier than original delivery period that many days will be subtracted from the delay in submission of GA drawings and LD will be levied **accordingly**. Delays in approval of the drawings by consignee will not be on account of Contractor, except as detailed below.

**11.2.3** In case Consignee finds some deficiencies in the Drawings and returns the same for rectification to the 'Contractor', the contractor must return the rectified drawings within 30 days from the date of issue of letter by Consignee. This period will not be counted towards LD calculation. The consignee shall ensure that all deficiencies in the Drawings shall be pointed for clarification to the firm together at one time only instead of piecemeal multiple reference

**11.2.4** A repeat back reference(s) by Consignee to Contractor pointing out further defects/deficiencies in the Drawings, will be considered a delay on account of the contractor, except for special circumstances like change in location, review of arrangement etc. Thus, Contractors must take utmost care in ensuring completeness as per requirements of the Consignee.

**11.2.5** Where GA Drawing cannot be approved by consignee due to clear site not being available etc., the Consignee must inform Contractor, explaining the exact delay. However, initiative must be taken by Contractor to obtain such a certificate from Consignee.

**11.2.6** In their own interest, contractor must maintain a log of events in this respect with clear dates and regularly inform consignee to avoid wrong levy of LD. Consignee must cooperate with contractor by providing all assistance, including clear information about any expected delays in site availability, promptly and in writing

**11.2.7** If an order has been placed on the firm, the firm will have to advise the consignee well in advance regarding requirement of road permit and assistance required from the consignee, if any, so that delay on this account is avoided. Firm should also visit the site before dispatch of machine to assess the condition of path to be used for movement of trailer.

## **11.3 DISPATCH OF THE MACHINE FROM MANUFACTURER WORKS:**

**11.3.1** The supplier should normally dispatch the machine only after successful completion of Third party inspection at the manufacturer premises and after the foundation has been ready for installation and commissioning of the machine on arrival at RCF.



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**11.3.2** In case of delay on part of consignee in providing the clear site for construction of foundation or any other facility as specified in the contract to the supplier, the supplier will report the matter to consignee.

**11.3.3** In case proving of component at manufacturer works, the supplier should request for the materials/parts as soon as possible after receiving contract-keeping allowance of transit time etc. and approximately 60 days for consignee to handover the parts after receipt of the request accompanied by appropriate and valid bid guarantee. In the event of consignee certifying the non availability of prove out components, such components will be deemed to have been proved out at manufacturers works. However the firm will prove out these components at consignee premises during commissioning, subject to the availability.

## **12.0 INSTALLATION, COMMISSIONING AND PROVING TESTS: (ON TURNKEY BASIS)**

**12.1 Joint Check** – The contractor or his agent would be required to carry out a joint check at consignee's end, along with the consignee, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages. It is necessary that this joint receipt inspection be done immediately on receipt of the machine by consignee & bidder's representative to avoid commissioning delays due to shortages/transit damages. After receipt of the machine as above a Joint Receipt Inspection note (JRI) as per Annexure-B of SECTION III shall be prepared by the consignee and the firms representative indicating the tentative time schedule for various activities of installation and commissioning. For Indian manufacturers, JRI note shall accompany the bill for 80% payment.

## **12.2 RESPONSIBILITIES OF CONSIGNEE AND BIDDER**

12.2.1 The **consignee** shall be responsible for-

- i. Provision of a clear covered (except where shed is in the scope of contract) site for construction of foundation as per the schedule to ensure its readiness before arrival of machine at site
- ii. In case where construction of shed is also in the scope of contractor the consignee shall ensure site is encroachment and encumbrance free
- iii. Electricity, water and compressed air for installation and commissioning of machine shall be provided free of cost within one week of arrival of machine at site.
- iv. Wherever a road mobile crane has to be arranged by the supplier for material handling, a clear approach for it up to the site has to be provided.
- v. Clear covered space for storage of material/equipment required for working/ construction of foundation and installation of the machine etc.
- vi. The consignee shall arrange the raw material for prove out at their end within 15 days of the dry run of the machine (installation, power connection, auxiliary connection like air, water connection) failing which such components will be deemed to have been proved out. The components supplied by the consignee in time will be required to be proved out within specified time schedule thereafter.

The bidder shall be responsible for-

- i. Design of foundation as well as flooring (if required) of sufficient thickness, suiting local soil conditions at the site.

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ii. Advise consignee in time regarding schedule for requirement of clear site for construction of foundation and other infrastructure, resources & facilities required.

iii. Construction of foundation as well as flooring (if required) of sufficient thickness suiting local soil conditions, for machine shall be completed by the bidder at the site provided by the consignee before receipt of the machine at their premises.

iv. Provision of all tools and equipment, technical and unskilled manpower, material handling accessories/ equipment and material for installation and commissioning.

v. Unloading of the machine on receipt (both imported and indigenous machine) and its movement to the site of installation including provision of road mobile crane.

vi. The bidder should ensure the proper earthing for the machine and its peripherals/accessories.

12.3 Consignee will provide only 415 V+10%-15%, 3 phase 50 Hz+3% AC supply at a single point (mains). All types of cables, connections, circuit breakers etc. required for connecting power supply point to different parts of the machine/control cabinets, shall be the responsibility of the bidder. Requirement of grounding/earthing with required material shall also be incorporated by the bidder during construction of foundation.

Electrical work like laying of power/electrical cables & Earthing wires from mains to machine control panel (up to 20 meters) as well as within the machine, with supply of all materials shall also be carried out by the supplier.

12.4 The supplier shall demonstrate machine performance and prove out the claimed capability for successful commissioning at the consignee's works as per clause 2.4 of Section-I. The M&P shall be deemed to be "commissioned" at consignee premises on the date when it is tested and meets with the specified capabilities/functions according to the technical specifications. In addition to above, in case of tooled-up M&P, the M&P shall be deemed to be "Commissioned" at consignee premises on the date when "prove out" components specified as per the relevant clause of technical specification have been successfully proved out meeting the productivity requirements of Technical specification. The consignee shall arrange the raw material for prove out at their end within 15 days of dry run of the machine (installation, power connection, auxiliary connections like air, water etc.) failing which such components will be deemed proved out. The components supplied by consignee in time will be required to be proved out within as per specified time schedule thereafter. Any delay in providing the "raw material or any other input" for proving out shall not be logged on supplier's account.

A Joint Commissioning Note (JCN) to this effect shall be made as per the format at Annexure-C of Section-III. After issue of JCN the performance shall be watched for a period of one month, after which the PTC shall be issued. The issue of PTC cannot be delayed by more than 60 days from the issue of JCN. If some minor breakdowns are noticed after the issue of JCN, these shall be attended as per warranty obligations and suitable extension of the warranty period.

12.5 If an assembly/sub-assembly requires to be taken back to the manufacturer's premises for repair/replacement either before commissioning or during warranty, the manufacturer or his agent would be required to submit BG of suitable amount. In case the entire machine has to be taken back, a Bank Guarantee for the cost of the machine would have to be submitted. The bank guarantee should be of adequate value so as to cover the cost of the assembly/sub-assembly/paid up cost of the machine.

### **13.0 SERVICE FACILITY IN INDIA AND TECHNICAL SUPPORT**

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13.1 The tenderer will clearly spell out in the offer the facilities available with him or his agent for providing adequate after-sales service in India during warranty period. The complete details such as organization for after sales service, availability of technically competent engineers and warehousing facilities for spares should be clearly indicated. Bidders not offering complete servicing/repair facilities in India to ensure quick response to maintenance/ servicing calls are not likely to be considered.

13.2 After the warranty period and AMC period, if any, the manufacturer or his agent shall agree to provide service supports for trouble shooting and obtaining spare parts. The manufacturer shall be obliged to provide spare parts required by the purchasers for a period of 20 years from the date of commissioning of the machine at the consignee premises to safeguard against obsolescence.

13.3 Tenderer who are OEM, shall undertake to supply spare parts for a period of expected life of machine. Other tenderers shall submit undertaking from OEM for supply of spare parts for a period of expected life of the machine.

13.4 During warranty period, the supplier or his authorized agent shall attend for break down as and when receipt of intimation of the breakdown as soon as possible, but in no case later than 24 hours of receipt of intimation of the breakdown. For this suppliers shall ensure the availability their technician at RCF during warranty period.

#### **14.0 BOUGHT OUT ITEMS**

14.1 The bidder shall furnish along with the offer a list of all critical items/ sub-assemblies which are bought out by the bidder and proposed to be used, along with the manufacturer's name, brand model etc. The successful bidder may be required to produce invoices to ensure genuineness of such products / verification by the Inspecting agency.

14.2 The bidder should clearly indicate that in case of components/sub assemblies taken from reputed companies such as Vickers, Rexroth, RITTAL, THK, and Shenburger etc., the parent company has already entered into contract with their Indian units/affiliates for undertakings repairs/after sales service during warranty and post warranty.

<b>S.No.</b>	<b>Sub-assembly</b>	<b>Make</b>
1.	CNC & Drive Controller	SIEMENS/FANUC/Heidenhain
2.	Hydraulic system	Rexroth/Vickers/Yuken/Atos/Parker
3.	Feed back devices	Heidenhain, Fagor, Siemens, Fanuc
4.	Ball screws	THK/INA/Tsubaki/Rexroth/Steinmeyerstar/ Gamfior / Schenburger/Shuton.
5.	Air conditioner for Control cabinet	RITTAL/Warner Finley/Kelvin
6.	Spindle Bearings	FAG/SKG/Timken/NTN/KOYO
7.	Lubrication System	Cenlub/Dropco/Vogel/ Rexroth
8.	Electrical Control Cabinet	RITTAL/ Siemens or of other reputed make with IP55 Protection level
9.	Servo Controlled Voltage Stabilizer	Neel/Servomax/Consul/Aplab
10.	Ultra Isolation Transformer	Neel/Servomax/Consul/Aplab
11.	Electromagnetic clutch	Vortex /Ghatge Patil
12.	A.C. Motors	NGEF/BBL/ABB/KEC/Crompton/ Siemens/ Allen Bradley
13.	Brake motors	Siemens/KEC/Crompton/NGEF/BBL

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14.	Proximity Switch	Elap/Schneider/Omron/Scanner
15.	Contactors	Siemens/BCH/ABB/Schneider/L&T
16.	Limit switches	BCH/Siemens/L&T/Teknic/Euchener/Honeywell, USA
17.	Push button	Teknic/Siemens/ Schneider/BCH
18.	'O' Rings & rubber seals	Merlin/Parker/Busak/Hunger/Merkel/Soloseal/Walkersolo/Halite
19.	Pneumatic Control Equipment	Festo/Shavo Norgen/Shradder Scovil/Electro Pneumatics/Parker/SMC Pneumatics
20.	Control gears	L&T/Siemens/BCH/ABB/Schneider
21.	Cable/wire	Siemens/Indramat/ Hubershnuer/ Finolex/Havells
22.	Gear reducer	Elecon/Greaves/Shanthi/ZF/New Allenbury/ Bongfilivali
23.	AC Drive	Fanuc/Siemens/ABB/Allen Bradley /Schneider
24.	AC servo motor	Fanuc/Siemens/ABB/Allen Bradley /Schneider
25.	PLC	Siemens/Fanuc/Mitsubishi/Messung/Hitachi/ABB/Allenbr adley/Schneider
26.	Air circuit breaker	Siemens/L&T
27.	Connectors	Harting/Kontakt/L&T/Omron
28.	Hydraulic seamless tubes	Parker/Maharashtra seamless/Indian seamless
29.	MCCB	Schneider/ABB/Siemens/L&T
30.	Cutting tools	SANDVIK/KENNAMETAL – WIDIA/ISCAR/ TAEGU-TEC

**Note: 1.** In case any other reputed make is offered, satisfactory justification for the same will have to be given in the offer.

**2.** The bidder should explicitly mention "Not applicable", against the items, indicated above; which ever is not applicable in the offered machine.

**15.0 COLOUR:** The machine and its accessories shall be painted in Apple Green Colour No.281 to IS: 5-1978,(if any specific colour code standardized by BIS is available, the same be given). The machine can also be painted in equivalent RAL/DIN/other International Standards. If there is a standard color scheme of the manufacturer, the same can also be considered and may be specified.

**16.0 WARRANTY OBLIGATION** –The following conditions regarding Maintenance and reliability shall also apply:-

**16.1** The machine under consideration shall be designed to have a life expectancy of 20 years. Both the structural components of the machine and its foundation shall be mandated to withstand normal operational conditions for a minimum of 20 years, safeguarding against cracks, breakages, and etc. during the course of normal operations. Tenderer would submit suitable undertaking.

**16.2** In addition to warranty obligations as per IRS condition of contract (i.e. the equipment offered should be warranted against defective design, material, workmanship etc. for a period of 30

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months from the date of delivery at ultimate destination or 24 months from the date of commissioning and proving test at destination, wherever, the contract stipulates, or from the date of placement in service whichever is earlier provided defects and/or claims are notified to Contractor within 2/3 months of such date) the warranty period would also cover comprehensive preventive maintenance, which will be inclusive of all spares, material and labour cost. All maintenance consumables like lubricants and grease except hydraulic oil / machine coolants shall form part of the scope of the preventive maintenance during the warranty. The cost of preventive maintenance to be carried out during warranty period should be quoted separately

- 16.3** *If at any point of time during the first 20 years post commissioning including during the warranty/CAMC period or otherwise, in case the machine develops cracks in the main frame/beam for any reason including on account of failure/cracking of welded joint, the machine shall be liable to be replaced by the supplier with an equivalent new machine at no additional cost to the purchaser. Such replacement would normally be arranged at the earliest but in no case any later than 6 months from the date when a demand for such replacement has been communicated to the supplier by the purchaser.*
- 16.4** The payment of preventive maintenance schedule carried out during warranty period shall be made by consignee annually at the end of each year after completion of the work and issue of certificate by the consignee as per annexure-D of Section-III.
- 16.5** The machine shall at all times give contractual out-put and accuracy. Any deficiency or break down for a total of 01 hr. or more for a day would be treated as failure for the day, for the purpose of extending warranty period in terms of IRS condition of contract.
- 16.6** The tenderer shall ensure that in case a failure is reported by a consignee qualified service engineers shall visit the site within 24 Hours from the date of complaint on calendar day basis. The period of 24 Hours (Excluding date of complaint) after the failure reported shall be treated as grace period, which will not count towards breakdown time for up to one failure per month and a maximum 3 failures per quarter. In case the number of failure exceeds one failure per month or three during any quarter of warranty, grace period of only one day will be permissible for such additional failures. Complaints shall be lodged by consignee by fax, phone, and email whatsapp message or per bearer at address given by the tenderer.
- 16.7** The details of preventive maintenance to be provided during warranty period shall be indicated by the tenderer giving details of type of preventive schedule, periodicity on items to be checked, items to be replaced and expected plant down time. Preventive maintenance schedules shall be conducted on weekends as far as possible or any other day through mutual agreement with consignees. Total breakdown hours shall be calculated after discounting grace period and preventive maintenance period.
- 16.8** Maximum permissible down time till it is restored back to the contractual output and accuracy levels, in any quarter of the year during the warranty period, shall be 150 hrs. To ensure this a record of breakdown (duly signed by shop in charge) in hours on quarterly basis should be maintained by the consignee and joint report with the contractor shall be made for each breakdown attention. At the end of first and second year of warranty, these details of breakdown hours during warranty period should be prepared as per performance appraisal report given in Annexure – E of section –III. The firm will then request RCF for release of WBG annexing the performance appraisal report as per Annexure-E of Section-III and the breakdown details mentioned above.
- 16.9** Penalty will be levied on the bidder for breakdown period on working days basis (excluding holidays) after discounting for the grace period. Penalty will be calculated as percentage of annual preventive maintenance charges and will be deducted from the respective annual payments as under.

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Breakdown period	Applicable penalty
Up to 150 hours in each quarter and not exceeding 500 hours annually	Nil
Exceeding 150 hours - up to 200 hours in any quarter and not exceeding 500 hours annually	5 % of annual preventive maintenance charges
Exceeding 500 hours - up to 750 hours annually	10% of annual preventive maintenance charges
Exceeding 750 hours - up to 1000 hours annually	25% of annual preventive maintenance charges
Exceeding 1000 hours annually	50% of annual preventive maintenance charges and Encashment of Warranty Bank Guarantee besides other action like noting adverse performance of the bidder and/or agent for future tenders and their offer in the subsequent tenders will not be considered for placement of any order.

**Note: - Bidders to ensure for availability of 02 manpower, One expert in CNC programming and operation to effectively program and operate the CNC vertical turning lathe machine and for the PMC and to attend the breakdown of machine immediately for 24x7 Hours during the warranty period. In the event that the aforementioned manpower should not be associated with a Railway employee, particularly an RCF (Rail Coach Factory, Kapurthala) employee, the firm is required to submit undertaking before deploying the said manpower and obtain approval of the Railway Authority for the tendered machine.**

- 16.10 The Contractor shall warrant that everything to be furnished hereunder shall be free from defects and faults in design, material, workmanship and manufacture and shall be of the highest grade and consistent with the established and generally accepted standards for goods of the type ordered and in full conformity, with the contract specifications and samples if any and shall if operatable, operate properly.
- 16.11 This warranty shall survive inspection of, payment for and acceptance of the goods and shall expire after 24 months from the date of commissioning of machine at ultimate destination, Any approval of acceptance by purchaser of the Stores or of the material incorporated here in shall not in any way limits the contractor's liability.
- 16.12 The contractor's liability in respect of any complaints defects and or claims shall be limited to the furnishing and installation of replacement parts free of any charge or the repair or defective parts only to the extent that such replacement or repairs are attributable to or arise from faulty workmanship or material or design in the manufacture of the stores, provided that the defects are brought to the notice of Contractor with in 3 (Three) months of their being first discovered during the warranty period or 3 (Three) months from the date of expiry of warranty period or at the option of the Purchaser to the payment of the value, expenditure and damage as hereafter mentioned.
- 16.13 The contractor shall, if required, replace or repair the goods or such portion thereof as is rejected by the Purchaser free of cost at the ultimate destination or at the option of the purchaser, the contractor shall pay to the purchaser value thereof at the contract price or in the absence of such price at price decided by the Purchaser, and such other expenditure and damages as may arise by reason of the breach of the condition herein specified.

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- 16.14 All replacement and repairs that the purchaser shall call upon the contractor to deliver or perform under this warranty shall be delivered and performed by the contractor within 1 (one) weeks, promptly and satisfactorily. The warranty period will be extended by the number of days the machine remains under breakdown during the warranty period and the warranty Bank Guarantee would be returned at the end of such extended warranty period for the full machine.
- 16.15 If the Contractor so desires, the replaced parts can be taken over by him or his representative in India for disposal as he deems fit at the time of replacement of goods/parts. No claim whatsoever shall lie on the Purchaser for the replaced parts thereafter.
- 16.16 The warranty herein contained shall not apply to any material which shall have been repaired or altered by the Purchaser, or on his behalf in any way without the consent of the Contractor, so as to effect the strength, performance or reliability or to any defects to any part due to misuse, negligence or accident,
- 16.17 The decision of the Purchaser in regard to Contractor's liability and the amount, if any, payable under this warranty shall be final and conclusive.
- 16.18 The warranty period in the offer shall survive for a period of 24 months from the date of commissioning of machine. If the offer is found with less than 24 months or ambiguous/uncertain on warranty conditions, the tender is liable to be rejected.
- 16.19 The Purchaser, without prejudice, shall be entitled and it shall be lawful on his part to forfeit the amount of the Guarantee Bond furnished in respect of Warranty in whole or in part in the event of any default, failure or neglect on the part of the Contractor in the fulfillment or performance in all respects of the warranty provisions under reference or failure to extend the validity of Guarantee Bond for the period of break down occurred during warranty period and for such part(s) replaced and/or repaired and part(s) immediately connected thereto as per clause 16.14.

## 17.0 ANNUAL MAINTENANCE CONTRACT

- 17.1 Tenderers are required to quote for a comprehensive Annual Maintenance Contract for the machine supplied against this specification for a period of **"Seven years"** on yearly basis giving the rates for each year i.e. first year, second year & So on, which will be inclusive of all Maintenance spares, material and labour costs. The duties and taxes as applicable should be indicated separately. All consumables spares and materials shall form a part of the scope of comprehensive AMC.
- 17.2 AMC shall be operated, managed and paid by the consignees indicated under clause 3 of Section I. The consignee shall indicate the bill payment authority & custodian of the AMC BG. No further agreement is required for operating AMC at consignee end.
- 17.3 AMC is a part of scope of supply, in case of concomitant requirement and included in commercial evaluation criteria vide clause 5 of Section-I. The detailed terms and conditions of CAMC shall be as given in following clauses.
- 17.3.1 The duration of AMC shall be 7 years from the date of expiry of warranty. Rates for AMC shall be quoted by the tenderer on yearly basis, which will remain applicable during the duration of AMC and not subject to any variation except any statutory changes in taxes and duties as compared to quoted rates.
- 17.3.2 The tenderer must provide AMC services at the consignee location without any precondition. The AMC should include complete responsibility for the bought out sub assemblies and components like CNC system, diesel engine, AC unit etc. AMC Services by qualified Service Personnel of OEM only.

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- 17.3.3. The details of preventive maintenance services including cleaning of machine to be provided under AMC shall be provided by the tenderer in the following format.

S.No.	TYPE OF PREVENTIVE SCHEDULE	PERIODICITY	ITEMS TO BE CHECKED	ITEMS OF REPLACEMENT	EXPECTED PLANT DOWN TIME
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- 17.3.4 Preventive maintenance shall preferably be conducted on weekends through mutual agreement with the consignee. Each preventive maintenance schedule normally shall not exceed one day. The total shutdown time for preventive maintenance should be kept as low as possible but not more than 60 hours/month (averaged over the quarter) including time for cleaning, weekly, fortnightly, monthly, quarterly schedules etc. The preventive maintenance regime offered must be aimed at achieving minimum 90% uptime of the plant excluding the plant down time for preventive maintenance schedules.
- 17.3.5 *The tenderer shall ensure 24x7 Availability of qualified service engineer (at least one) at the consignee premises throughout the year to attend the Breakdown and restoration of machine under production.*
- 17.3.6 In case preventive maintenance is carried out along with breakdown maintenance schedule; preventive maintenance time will be deducted from breakdown time of the plant.
- 17.3.7 Penalty Clause: Penalty shall be levied on the tenderer for maintaining plant up time below the limit of 90% calculated on working days basis, after discounting for grace period and preventive maintenance period. Penalty shall be calculated as %age of quarterly payment and will be deducted from the respective quarterly payments. Penalty calculation will be done over quarterly payment period.

S.No	Availability Slab	Applicable Penalty
1.	90% to 80%	0.5% for every 1% (or part there of) reduction in availability of plant below 90%.
2.	Below 80%	1% for every 1% (or part there of) reduction in availability of plant below 80%.

- 17.3.8. A Bank Guarantee equal to 25% of annual value (highest of the annual values if the rates offered for various years are different) of AMC subject to a minimum value of 1.25% of the quoted cost of machine including concomitant accessory (in case the annual AMC rate quoted is less than 5% of the cost of machine), will be submitted by the tenderer to the consignee 90 days before the expiry of warranty. AMC will have the validity of 7 years 6 months. The bidder can submit multiple BG for lesser duration to cover the period of 7 years 6 months ensuring the uninterrupted validity of the AMC BG for 7 years 6 months. The confirmation for the submission of this BG will be returned on completion of AMC period. In case, the tenderer fails to provide AMC services successfully, the AMC BG will be forfeited. This will be in addition to penalty as per clause 17.3.7 above. This provision would not be applicable where the advance payment is made.
- 17.3.9 Plant up time of less than 60% for two consecutive quarters will constitute complete failure of tenderer to provide the AMC services successfully and will result in forfeiture of AMC BG, besides other action like noting adverse performance of the bidder and/or agent for future tenders and their offer in the subsequent tenders will not be considered for placement of any order. This will be in addition to penalty clause 17.3.7 above for the period of actual performance.



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- 17.3.10 As per clause 5 of section I, where AMC is part of evaluation of offer, it is the sole responsibility of bidders to stock all spares and materials as required for smoother execution of AMC in order to achieve response time in compliance to machine availability as per stipulated requirements.
- 17.3.10.1 In all cases of plant failure except as mentioned in clause 17.3.10.2, any other spare part or material necessary to restore the plant to proper working order will be arranged by the tenderer as a part of AMC.
- 17.3.10.2. In case of damage to the machine on account of any external factor, viz., floods, earthquake, fire, arson or sabotage, entire cost of spare parts and material necessary for repair of the plant shall be borne by the railways. However, the tenderer shall provide services of their engineers free of cost as a part of AMC to restore the plant to working order.
- 17.3.10.3. In case of damage to the plant as mentioned in Para 17.3.10.2, any spare parts and material necessary to restore the plant to proper working order shall be arranged by the tenderer and charged on actual basis duly certified by authorized railway official in the next quarterly bills. The rates charged for such spare parts shall be based upon the spare part rate list provided by tenderer in compliance of clause 5.2 or any other valid document. The tenderer shall furnish documents to support the rates charged for spares used for repair under Para 17.3.11(a).
- 17.3.11. Normally quarterly payment (@ 1/4<sup>th</sup> of the annual quoted rates) under AMC will be made to the tenderer within 30 days from the end of that quarter subject to submission of the following documents by the tenderer to the paying authority assigned by the consignee:
- Consignee's certificate for work done with calculation of down time and penalty applicable.
  - A certificate by consignee that no spare part is due with the tenderer as per clause 17.3.10 above.
  - Bills submitted by the tenderer & accepted by consignee.
  - Attested photocopy of the AMC BG.
- 17.3.12 The AMC contract can be terminated in following ways:
- Consignee may terminate the AMC in the event of failure of tenderer to provide AMC services of the AMC agreement in addition to encashing of AMC BG as per clause 17.3.8.
- 17.3.13 Other general conditions shall be governed by IRS Condition of contract/ General Condition of Contract.

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### SECTION-III

#### **ANNEXURE-A** **LIST OF COMPONENTS TO BE LOADED ON THE MACHINE**

#### **Annexure -1**

**Revised list of Wheels to be proved out on CNC Vertical Turning Lathe machine .**

S.No.	Type of Wheels	Machining operation to be done	Raw material Drawing No.	Drawing No.(Finished)	Qty to be proved out in 02 Shift (16Hrs) with 85% m/c availability
1.	LHB coaches	Finish Boring (Hole) , Radius, Chamfering and Groove .	MI006615	MI006590Alt-b	60
2	3-Phase MEMU/TC/DMC coaches .	Finish Boring (Hole) , Radius, Chamfering .	RDSO/SK-K4004 Alt-3	RDSO/SK-K4004 Alt-3	60
3	Train set Motor car & Trailer coaches ( Vande Bharat)	1. Finish Boring (Hole), Radius, chamfering , Hub machining ,Complete profile machining of Wheel web on both side with outer groove & inner groove of Bore 2 .Web Drilling , Angular drilling and Tapping.	AAA02173	MT18Br2001481-04 Bore dia MC=212mm TC= 190mm	01
4	Train set Motor car & Trailer coaches ( Vande Metro)	1. Finish Boring (Hole), Radius, chamfering , Hub machining ,Complete profile machining of Wheel web on both side with outer groove & inner groove of Bore 2 .Web Drilling , Angular drilling and Tapping.	AAA02161	455.0.164.000.30	01

NOTE:— 1) Prove out components are based on the RCF current production programme ,If any components is not available at the time of commissioning then any other suitable components from the revised production Plan may be taken.

2) Firm will prove out Qty in 02 shift (16 Hrs) as per Annexure-1 , Set up time, Machining time , loading time, unloading time & inspection time including in proved out Qty.

*(Aly)*  
SSE/P&P/MFG.  
25/05/2024

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## ANNEXURE-B

### JOINT RECEIPT INSPECTION NOTE

Date.....

**Sub: Receipt of consignment for machine.....**

**Ref: Contract No.....**

1.	Name of consignee/Railway	
2.	Machine name	
3.	Quantity	
4.	Name of supplier	
5.	Consignment of the machine received on	

It is certified that the consignment of the machine has been received complete and in good condition as per specification shown in the contract.

**Tentative plan for installation and commissioning of the machine is as under:**

1.	Date of clear site provided	
2.	Contract	Turnkey/Non-turnkey
3.	<b>Status of readiness of foundation:</b>	
3(a)	Already constructed on	
3(b)	Under construction & likely date of its completion	
3(c)	Construction yet to be started from ..... and & likely date of its completion	
4.	Status of availability of electrical power, water and compressed air etc.	Available/Not-available
5.	Number of components to be proved out on the machine	
6.	Likely date for start of erection	
7.	Likely date for switch-on the machine	
8.	Likely date of completion of commissioning of the machine	

Representative of firm  
Designation

Representative of consignee  
Designation  
(Minimum Gazetted level)

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### ANNEXURE –C

#### JOINT COMMISSIONING NOTE

Date:.....

**Sub:** Commissioning of (name of machine).....

**Ref:** PO No .....

1.	Name of consignee/Railway	
2.	Machine name	
3.	Quantity	
4.	Name of supplier	
5.	Machine received on	

6. All the parameters of the machine are found okay. The proving test on the machine was conducted from ..... to ..... and machine is working satisfactorily.
7. Machine has finally been commissioned on..... . The machine has been handed over for regular use and kept under one month observation to watch its performance.
8. Following minor deficiencies (if any) found during joint observation trials are to be attended/rectified by the firm during one month observation and before issuing the PTC for the machine:
  - a.
  - b.
  - c.

Representative of firm  
Designation

Representative of consignee  
Designation  
(Minimum Gazetted level)

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**ANNEXURE-D**  
**PROFORMA OF CERTIFICATE TO BE ISSUED BY CONSIGNEE AFTER SUCCESSFUL PROVE OUT /**  
**COMMISSIONING OF THE MACHINE**

No. ....

Dated .....

M/s .....

**Sub: Certificate for commissioning/prove out of machine.**

Ref: **RCF PO NO.....**

1. This is to certify that the machine as detailed below, has been received in good condition along with all the concomitant / standard and special / optional accessories & spares in terms of above referred AT (subject to remarks in Item No. 2) and the same has been installed and commissioned:

- a) Description of the Machine (s): -----
  - b) Machine No. (s) : -----
  - c) Quantity : -----
  - d) Bill of lading No. : -----
  - e) Name of the vessel : -----
  - f) RR / LR / Despatch particulars: -----
  - g) Name of the consignee : -----
  - h) Date of first submission of GA/foundation drawings (if applicable): -----
- Indicate delays in number of days: On Railways account: Nil  
On Firm's account : Nil  
Total : Nil

- i) Date of final approval of GA/foundation drawings (if applicable): -----
- Indicate delays in number of days: On Railways account: -----  
On Firm's account : -----  
Total : -----

- j) Date of receipt of the machine: -----

- k) Date of Joint verification : -----

- l) For machines ordered on non-turnkey basis: **Not Applicable**

- i) Date of power supply provided for the machine by the Railways: -
- ii) Date of call to the contractor after site/foundation /Installation etc is ready by the Railway: -

- m) For machines ordered on turnkey basis

- i) Date of Intimation of readiness of site for starting foundation Work: -----
- ii) Date of readiness of foundation by the contractor: -----
- iii) Date of readiness of other infrastructure facilities like shed, track linkage etc. -----
- iv) Date of power supply provided for the machine: -----

- v) Indicate delays in number of days: On Railways account: -----  
On Firm's account: -----  
Total: -----

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- n) Time allowed for commissioning after date of call as per L (ii) above or after date of readiness of site as per m (iv) above. Number of days allowed ----- days from the date of receipt.
- o) Date of commissioning of the machine: -----  
Indicate delays in commissioning in number of days: ----- days.
- i) On firm's account due to reasons such as non arrival of engineer, problem in machine/toolings etc.:-----
- ii) On Railway's account due to reasons such as non provision of Raw/Trial material, Crane, staff, measuring tools/gauges etc:----
- p) Whether delay in supply of the machine (if any), has caused any loss / inconvenience to the Railways (Yes / No) -----  
If Yes, extent of loss in monetary terms Rs. ....- ----  
(Details to be enclosed if loss is quantifiable. However, if loss is not quantifiable then indicate "Not Quantifiable" in the space provided)
2. Details of Accessories / Spares not yet supplied and recoveries to be made on that account.....
3. The proving test has been done to our entire satisfaction and the operators have been trained to operate the machine as per provisions of A/T. If not, the amount to be recovered on this account. Rs. ....
4. You have failed to fulfill the contractual obligations with regard to the following;  
a) .....  
b) .....
5. The amount of recovery on account of non-supply of accessories and spares is given under para no. 2, 3 above and loss/damage on account of your failure to fulfill the contractual obligations as given in para 4 above will be advised to you. These shall be recovered from your bills / performance guarantee bond. in terms of General Conditions of contract,.
6. The issue of commissioning/PTC certificate proves only the technical acceptability and functioning of the machine on the date of issue of the certificate. This issue of PTC does not amount to wavier of any of the terms and conditions of the contract or delay in supply of drawings, machine or commissioning thereof and it does not absolve the supplier of its liability for any loss or damage suffered by the Railways do to the same.

Signature: \_\_\_\_\_  
Name: \_\_\_\_\_  
Designation: \_\_\_\_\_

Office Stamp: \_\_\_\_\_

Copy to:-

- 1) PCMM/RCF,
- 2) PFA/RCF,
- 3) PCME/RCF,
- 4) CPE/RCF.

Signature: \_\_\_\_\_  
Name: \_\_\_\_\_  
Designation: \_\_\_\_\_  
Office Stamp: \_\_\_\_\_

Note: Sr. Scale Officer having independent charge is also authorized to sign this certificate.

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**ANNEXURE –E**  
**PERFORMANCE APPRAISAL FORM/ WARRANTY DISCHARGE CERTIFICATE**  
**APPRAISAL ON COMPLETION OF WARRANTY PERIOD**

Dated:.....

To, M/s. ....

1.	RCF PO No.	
2.	Consignee/Railway	
3.	Name of supplier	
4.	Machine Name	
5.	Machine received on	
6.	Machine commissioned on	
7.	PTC issued on	
8.	Warranty period expired on	
9.	<b>Performance during warranty period:</b>	
9(a)	Total number of breakdowns	
9(b)	Total downtime in number of days	
10(a)	Any warranty complaint pending on date	Yes/No
10(b)	If yes, then the date and nature of defect(s)	

11. In case, Reliability clause of the machine during warranty period is also given in Bid Document, then following details of breakdown hours for preceding eight quarters may also be furnished.

Quarter	Period From -----To-----	Breakdown hours
1		
to		
8		

In view of the foregoing, the successful Warranty Completion, all obligations in respect of Warranty for the said machine on part of \_\_\_\_\_ (Supplier Name) stand discharged/ not discharged as on \_\_\_\_ (date)

Signature-----

Name-----

Designation: DY.CME (User Shop)  
Office Stamp

PCMM/RCF  
PFA/RCF  
CPE/RCF

Note:

i.) This appraisal may please be sent immediately on completion of warranty period. If any extension of warranty period required, may please also be mentioned with details.

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**ANNEXURE-F**  
**QUALITY ASSURANCE PLAN**

**MACHINE DESCRIPTION**

Category	S. No.	Component/ Process	Sample Size	Type Of Check	Quality record	TYPE OF CHECK	REMARKS
Bought Out Raw Material		Steels	1 Sample / Size	Chemical & Mech.	TC & INV.	CHP	
Bought Out Components		Bearings	100%	Visual	Inv	CHP	
		Electric Motors	100%	Review of TC	TC & INV	V	
		Hydraulic Pumps & Elements	100%	Review of TC	TC & INV	V	
		Rubber Seals, O Rings & Seals	100%	Visual	TC & INV	V	
		Controllers	100%	Review of TC	TC & INV	V	
Bought out sub assemblies		Ball Screw	100%	Visual	IIR	V	
		Weld joints					
		Load Bearings	100 %	RT	IR	CHP	
		Others	5 %	DPT	IIR	V	
		Hardness and	100%	Hardness	IIR	V	
In process Inspection stage							
		Heat Treatment	100%	Review of Inv.	IIR	V	
		Castings	100%	Visual	IIR	V	
		Spindles	100%		IIR	V	
		surface finish of components	Random	Surface	IIR	V	
		Noise level	100 %	Sound	IIR	CHP	
		Temperature rise	100 %	Measurement	IIR	V	
		Structures Geometry alignment, Guide ways	100%	Relevant ISO/DIN/IS/JIS standard	IR	CHP	

INV - Invoice

TC – Test Certificate

V – Verification    CHP – Customer Hold Point

IIR – Internal Inspection Report    IR – Inspection Report



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### ANNEXURE-G

PROFORMA FOR ASSESSING MANUFACTURING CAPABILITY OF THE OEM TO MANUFACTURE CNC VERTICAL TURNING LATHE

Tender No. ....

Date of Opening.....

1. NAME OF THE OEM/ BIDDER

2. LOCATION & ADDRESS

Postal Address

i) Head Office

ii) Works/Factory

Telephone No. (with STD code)/ Mobile Number

i) Regd. Office

ii) Works/Factory

3. DESCRIPTION OF FACTORY/WORKS

i) Total Land area (in Sq. meters)

ii) Total covered area(in Sq. meters)

iii) Different Sub-units (with details of covered/uncovered area, etc.)

iv) Special features, if any:

4. NO. OF PERSONNEL EMPLOYED (CATEGORY-WISE)

i) Managerial\*

ii) Supervisory\*

iii) Skilled artisans

iv) Unskilled

\* The qualification may also be indicated.

5. GENERAL INFORMATION- TECHNICAL

Description of different departments in the Factory/Works along with an organization chart

Detailed description of machinery and plant in each department (make and year of procurement).

For special type of equipment /machinery, copy of pamphlet/ write-up bbe furnished to support the description.

Details of raw-materials held in stock (state whether imported/indigenous).

Production capacity of the quoted items

i) Per month

ii) Per year

List of other items, which the firm regularly manufactures and corresponding production capacity.

6. DESIGN CAPABILITY

Details of Qualified Personnel (indicating qualification and experience) Other facilities available.

7. MANUFACTURING PROCESS

Level of in-house facilities

Important items for which work done by outside vendors.

Brief details of manufacturing process relevant to the items quoted.

8. QUALITY ASSURANCE

Does the factory have an established Quality Assurance Programme? If yes, please enclose a copy of the write up? If not, what plans are there if any for setting it up?

Details of Quality Assurance Organization.

Quality Control Testing Facilities and Laboratory equipment available. In-house facilities available for inspection and QC.

Availability of gauges (details to be furnished)

9. AFTER-SALES-SERVICE

Facilities available at works and branch offices/ authorized service centres/ service delivery partners.

Signature.....