



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

MATERIALS MANAGEMENT / CAPITAL EQUIPMENT

ENQUIRY

Phone: +91 431 257 70 49

Fax : +91 431 252 07 19

Email : csguna@bheltry.co.in

Web : www.bhel.com

	Enquiry Number:	Enquiry Date:	Due date for submission of quotation:
	2620800082	22.08.2008	24.09.2008

You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order

Item	Description	Quantity	Delivery (Item required at BHEL on)
10	Slant Bed CNC Lathe as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	01 No.	30.06.2009

BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats can be downloaded from BHEL web site <http://www.bhel.com> or from the Government tender website <http://tenders.gov.in> (public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference “2620800082”.

Tenders should reach us before 14:00 hours on the due date
Tenders will be opened at 14:30 hours on the due date
Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present

Yours faithfully,
For BHARAT HEAVY ELECTRICALS LIMITED

Sr.Manager / MM / Capital Equipment

PART A**SLANTBED CNC LATHE****SECTION – I : QUALIFYING CRITERIA**

The BIDDER has to compulsorily meet the following requirements to get qualified for considering the technical offer for the SLANTBED CNC LATHE.

S. No.	REQUIREMENTS	Vendor's Response
1	<p>Only those vendors (OEMs), who have supplied and commissioned at least one Slantbed CNC Lathe with</p> <p>1. Spindle power 20KW or more and</p> <p>2. Turning length between centers 1500 mm or more</p> <p>in the past ten years and such machine should be working satisfactorily for a minimum period of one year after commissioning, as on the date of opening of this Tender are eligible to quote.</p> <p><i>(However, if such machine is already supplied to BHEL, then that machine should be working satisfactorily for a minimum period of six months after commissioning, as on the date of opening of this Tender.)</i></p>	
The vendor should submit the following information where similar machine has been supplied, for qualification of this offer.		
1.1	Name and postal address of the customer or company where similar machine is installed.	
1.2	Name and designation of the contact person of the customer.	
1.3	Phone, FAX no and email address of the contact person of the customer.	
1.4	Month and Year of commissioning of the machine.	
1.5	Parameters of machine supplied, viz. Spindle power, Max Turning length etc and the application for which the machine is supplied.	

PSG

TVN

KPL

SSP

RDR

AVC

NRM

1.6	Along with the Technical offer, the Vendor should submit one Performance certificate from the customer for the satisfactory performance of the machine supplied to them. For obtaining the Performance certificate, a suggestive format is provided in SECTION – IV .	
2.0	BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected.	

SECTION – I I

The BIDDER / VENDOR is requested to provide the following information:

S. No.	REQUIREMENTS	Vendor's Response
3.0	The BIDDER/VENDOR to furnish Reference List of Customers, with full address, details of contact person, where Slantbed CNC Lathes have been supplied in the past.	
4.0	Details of Slantbed CNC Lathes supplied to other BHEL units, if any. (Year of commissioning, Turning length and Spindle power).	
5.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Address of Agents / Service Centers in South India.	
6.0	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

PSG

TVN

KPL

SSP

RDR

AVC

NRM

SECTION – III

The BIDDER to note:

S. No.	PARTICULARS	Vendor's Response
7.0	<p>The BIDDER / VENDOR shall submit the offer in TWO PARTS.</p> <ol style="list-style-type: none"> 1. Technical Offer [with PART A & PART B] and Commercial offer. 2. Price Bid. 	
8.0	<p>The Technical Offer shall contain a comparative statement of Technical Specifications demanded by BHEL and Offer Details submitted by the Bidder, against each clause.</p> <p>A just 'CONFIRMED' or 'COMPLIED' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer.</p>	
9.0	The Technical Offer shall be supported by product Catalogues & Data Sheets and also technical details of Bought-Out-Items with copies of Product Catalogue to the extent possible.	
10.0	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation.	

PSG

TVN

KPL

SSP

RDR

AVC

NRM

SECTION – IV

The performance certificate should be produced **on Customer's Letter Head.**

PERFORMANCE CERTIFICATE

1. Supplier of the machine			
2. Make & Model of the M/C			
3. Month & Year of Commissioning			
4. Application for which M/C is used			
5	a) Spindle Power in Kw (cont. rating) b) Spindle nose c) Swing over carriage d) Max Turning length between centers		
6. Performance of the Equipment (Tick whichever is applicable)		Best in the market	
		Satisfactory	
		Good	
		Average	
		Not Satisfactory	
7. Any Other remarks			
<div style="display: flex; justify-content: space-between;"> <div>Date:</div> <div>Signature & Seal of the Authority Issuing the Performance Certificate</div> </div>			

PSG

TVN

KPL

SSP

RDR

AVC

NRM

TECHNICAL SPECIFICATION FOR SLANT BED CNC LATHE

Clause No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details															
1.0	<p>PURPOSE: This Lathe is intended for machining and threading of conventional valve components. Operations of Turning, Boring, Single / multi start threading (external / Internal) shall be carried out on valve Spindles and Sleeves.</p> <p>For details, refer Annexures-1, 2 & 3</p>	Vendor to confirm																
1.1	<p>WORK PIECE DETAILS:</p> <table><tr><th>Specification</th><th>Condition</th><th>Hardness</th></tr><tr><td>A182 F6A CL 3</td><td>Normalized and Tempered</td><td>280 BHN</td></tr><tr><td>OHTARON</td><td>Quenched and Tempered</td><td>350 BHN</td></tr><tr><td>Aluminium Bronze</td><td></td><td>200 BHN</td></tr><tr><td>Ni-Resist</td><td></td><td>300 BHN</td></tr></table> <p>Max weight of Work-piece = 500 Kg</p>	Specification	Condition	Hardness	A182 F6A CL 3	Normalized and Tempered	280 BHN	OHTARON	Quenched and Tempered	350 BHN	Aluminium Bronze		200 BHN	Ni-Resist		300 BHN	Vendor to confirm	
Specification	Condition	Hardness																
A182 F6A CL 3	Normalized and Tempered	280 BHN																
OHTARON	Quenched and Tempered	350 BHN																
Aluminium Bronze		200 BHN																
Ni-Resist		300 BHN																
2.0	MACHINE CONSTRUCTION:																	
2.0.1	Vendor to furnish constructional details of the machine including explanatory drawings of various components/ assemblies like Head stock, carriage, Turret, Tailstock, Machine Bed, Feed Transmission System, Feed back System etc. of the machine with details of material & their hardness. The main spindle of the machine shall be hollow to allow long stems with large diameters to be fed inside.	Vendor to specify																
2.0.2	Video images on CD / Hard copy of literature with photographs & drawings explaining the technical features shall be enclosed with the offer	Vendor to specify																

Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.0.3	Sliding Chip / Splash Guard with sufficient transparent windows should be provided to view the machining and to avoid splash of Coolant and scattering of Chips.	Vendor to specify
2.0.4	Machine should be metric execution.	Vendor to confirm
2.1	MACHINE SPECIFICATION:	
2.1.1	Max. Possible Turning Diameter between centers: (Chucking dia of job = 300 mm max)	Vendor to specify
2.1.2	Swing Over Carriage (SOC):	Vendor to specify
2.1.3	Turning Length between centers: Maximum 2000 mm	Vendor to specify
2.1.4	Turning Length between centers: Minimum	Vendor to specify.
2.1.5	Max. Weight carrying capacity with tailstock	Vendor to specify.
2.1.6	Max. Weight carrying capacity with tailstock and steady rest	Vendor to specify
2.1.7	Boring diameter range: 25 to 120 mm	Vendor to specify
2.1.8	Max boring depth: 400 mm	Vendor to confirm
2.1.9	Chuck Type: 3 Jaw power operated hollow chuck with hard Jaws.	Vendor to confirm
2.1.10	Chucking dia range (other Jobs) = 30 to 300 mm	Vendor to confirm
2.1.11	Chucking dia range (only stems) = 30 to 120 mm (Refer annexure 1 & 2)	Vendor to confirm
2.1.12	Through bore in the chuck (minimum 135 mm required)	Vendor to specify
2.1.13	Chuck size (consider 2.1.10, 2.1.11 & 2.1.12)	Vendor to specify
2.1.14	Chuck clamping range- External: Max / Min:	Vendor to specify
2.1.15	Chuck clamping range - Internal: Max:/ Min:	Vendor to specify
2.2	HEAD STOCK:	
2.2.1	Headstock shall have a hollow spindle with through bore to facilitate job holding as shown in annexure-1& 2.	Vendor to confirm.
2.2.2	Spindle nose: A2-15"	Vendor to confirm
2.2.3	Spindle Bore (minimum 180 mm required)	Vendor to specify
2.2.4	Spindle Motor Rating-AC, S1 Continuous Duty: Around 37 KW	Vendor to confirm.
2.2.5	Spindle Motor Make: Fanuc or siemens & Model No:	Vendor to specify

Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.2.6	Spindle speed (Infinitely variable): 20 to 1200 rpm	Vendor to confirm
2.2.7	Number of speed ranges (Selectable through program):	Vendor to specify.
2.3	MACHINE BED:	
2.3.1	Configuration:	Slant Bed
2.3.2	No. of Guide ways:	Vendor to specify.
2.3.3	Distance between Guide ways	Vendor to specify
2.3.4	Type of Guide ways	Vendor to specify.
2.4	FEEDS AND DRIVE SYSTEM:	
2.4.1	Feed Rate in X, & Z Axes (Infinitely variable):	Vendor to specify
2.4.2	Rapid Feed Rate in X,& Z Axes:	Vendor to specify
2.4.3	Feed drive motors [AC servo motors] shall be digital type of Fanuc or Siemens. (Details of model, make, type etc. to be submitted with the offer)	Vendor to specify
2.4.4	Feed back system for X, & Z axes: Fanuc / Siemens / Heidenhain encoders (Details to be submitted with the offer.)	Vendor to specify
2.4.5	Mechanism for locking / clamping the axes:	Vendor to specify
2.4.6	Type of power transmission: Pre-loaded backlash-free re-circulating ball screw drive for feed drive axes. Detailed Specification for all ball screws used in the machine shall be submitted. The specification shall address the following points: (a) Diameter, (b) Pitch (c) Length (d) Make (e) Model	Vendor to specify
2.4.7	<u>Metallic Telescopic Covers</u> of rust resistant material shall be provided with wipers for guide ways of traversing axes. Provision should be made to avoid mixing of coolant & hydraulic oil.	Vendor to specify
2.5	ROLLER STEADY REST:	
2.5.1	Hydraulic self- centering steady rest	Vendor to confirm
2.5.2	Steady rest supporting dia range:	Vendor to specify
2.5.3	Mounting of Steady Rest on Base shall be through quick-clamp fastener.	Vendor to specify.

Clause No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.6	TAIL STOCK:		
2.6.1	Quill: Built-in type, rotating tailstock quill.	Vendor to confirm.	
2.6.2	Quill stroke:	Vendor to specify.	
2.6.3	Quill movement by Hydraulic	Vendor to confirm.	
2.6.4	Quill diameter:	Vendor to specify.	
2.6.5	Quill taper:	MT5	
2.6.6	Tail stock center- cone angle	60 degree	
2.6.7	Number of tailstock centers required for the entire range of jobs as per Annexure-1& 4.	Vendor to specify	
2.6.8	Detail of Positive Clamping & Unclamping of tail stock on bed:	Vendor to specify.	
2.6.9	Max thrust on the Quill:	Vendor to specify.	
2.7	CARRIAGE:		
2.7.1	Z-axis travel:	Vendor to specify	
2.8	TURRET:		
2.8.1	Type: Disc VDI 60 with hydraulic Indexing	Vendor to confirm	
2.8.2	No. of tool stations:	12	
2.8.3	Turret indexing: bi-directional, Random:	Vendor to confirm	
2.8.4	Type of Tool Holders: VDI 60	Vendor to specify	
2.8.5	Shank size of Facing & Turning tools: 32mm × 32mm	Vendor to confirm	
2.8.6	Holding dia of Boring bars: 20, 32, 40, 50 and 60 mm	Vendor to confirm	
2.8.7	Model, & make of turret:	Vendor to specify	
2.8.8	Provision for coolant to reach up to tool tip in all types of tool holders:	Vendor to confirm	
2.8.9	Automatic operation / selection / indexing of turret through CNC program:	Vendor to confirm	
2.8.10	Additional manual operation / selection through push buttons:	Vendor to confirm	

Clause No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.9	OPERATION AND CONTROL SYSTEM:		
2.9.1	OPERATOR'S PANEL:		
2.9.2	Preferably Swiveling type operator's panel having complete CNC and machine control system with CRT of required configuration shall be provided at an ergonomically suitable location. All switches should be within reach of operator for easy & safe operation. All displays/indications should also be conveniently placed accordingly. Layout showing complete details should be submitted.	Vendor to submit	
2.10	CNC SYSTEM & FEATURES:		
2.10.1	Make: Fanuc / Siemens	Vendor to specify	
2.10.2	Type: PC based latest version (With Simultaneous interpolation of two axes)	Vendor to Confirm	
2.10.3	Model: Suitable and Latest version, as available at the time of ordering, should be supplied.	Vendor to specify	
2.10.4	Details of Standard features: List to be submitted by Vendor.	Vendor to specify	
2.10.5	Details of optional features, recommended by vendor:	Vendor to specify	
2.10.6	The system should have full alphanumeric keyboard, TFT colour display (preferably 17"), additional draw-out type QWERTY Key Board and mouse in suitable enclosure, Ports for printer, network ready for LAN, electronic hand wheels for all axes, CD/DVD drive unit with CD/DVD writer for data input/output, hard disk of sufficient capacity (not less than 80 GB), graphic simulation and preinstalled system software & other required software etc. (Details should be submitted by Vendor).	Vendor to confirm & submit details	

Clause No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.11	MANUAL CONTROL:		
2.11.1	Complete manual control of machine with required switches/ keys should be provided on operator's panel for selection of required axis, axis direction, cutting feed, spindle speed, cutting feed on/off, display of axis position values etc. for manual operation without using CNC program, CNC option Manual Turn or MDI mode. Diagrams/ sketches for switches/ keys provided on operator pendent should be submitted.	Vendor to confirm	
2.12	UPS FOR CNC SYSTEM:		
2.12.1	UPS of 30 minutes for CNC system with inbuilt cooling and charge status display	Vendor to specify	
2.13	MACHINE LIGHTS:		
2.13.1	Machine Lights for sufficient illumination of complete working area should be provided for clear visibility.	Vendor to confirm	
2.13.2	A magnetic base portable spotlight with sufficiently long cable should also be provided.	Vendor to confirm	
2.13.3	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Vendor to confirm	
2.13.4	Flashing / rotary type End of Cutting and Program Stop Light.	Vendor to confirm	
2.13.5	Voltage shall be 24V for the hand lamp	Vendor to confirm	
2.14	AIR CONDITIONERS:		
2.14.1	Air Conditioners with Dehumidifiers of suitable capacity to be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions. Make: Rittal / Warner & Finley or any other reputed make acceptable to BHEL. Specification to be submitted.	Vendor to Confirm Vendor to submit	

Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.15	HYDRAULIC SYSTEM:	
2.15.1	Make: Rexroth / Vickers Sperry or any other reputed make acceptable to BHEL	Vendor to specify
2.15.2	Hydraulic system should be centralized. Hydraulic Tank shall preferably be located at floor level All hydraulic pipelines to be neatly laid out. (Details should be furnished at contract stage)	Vendor to confirm
2.15.3	Hydraulic circuits shall be designed with minimum number of control valves and to suit oil of ISO VG 46 or 68 only. Also minimum number of check- points to be provided wherever pressure is required to be measured for setting and trouble shooting. MINIMESS Pressure Gauge - 1 No with Connecting Hose to be provided.	Vendor to confirm
2.15.4	The control voltage for all solenoid operated valves shall be 24V DC	Vendor to confirm
2.15.5	Filtration System:	Vendor to specify
2.15.6	Failure indication:	Vendor to specify
2.15.7	Automatic shut off provision.	Vendor to submit
2.15.8	Refrigerated type cooling system of sufficient capacity to maintain complete Hydraulic System, including lubrication oil, hydraulic oil and gearbox oil, etc. at a temperature not exceeding 50 °C irrespective of the ambient conditions. Vendor should submit complete details.	Vendor to specify
2.15.9	Hydraulic pump capacity (flow / pressure):	Vendor to specify
2.15.10	Each pump should have an independent motor.	Vendor to confirm
2.16	First filling of all required Oils & Grease etc. Should be supplied by vendor. Oil grade: ISO VG46 or 68 Grease: Servo gem grade 2 (preferred.) Indigenous (Indian) source or Indian equivalent and specifications of oils/ greases are also to be provided by the vendor.	Vendor to specify

Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.17	COOLANT SYSTEM:	
2.17.1	Recirculating type Coolant System for all 12 positions of turret with all accessories shall be provided.	Vendor to confirm
2.17.2	Coolant operation shall be enabled through program.	Vendor to confirm
2.17.3	Coolant on / off by push buttons on the Operator's panel also.	Vendor to confirm
2.17.4	Coolant Pressure:	Vendor to Furnish
2.17.5	Coolant flow rate:	Vendor to Furnish
2.17.6	Coolant collection and recirculation system should be leak proof to avoid spillage on shop floor.	Vendor to Confirm
2.17.7	Coolant Filtration System: Re-circulating type with suitable filtration unit. Vendor shall give details of offered filtration unit.	Vendor to submit
2.17.8	Coolant flow diagram showing filters, pumps, valves, tanks etc. to be submitted.	Vendor to submit
2.17.9	Coolant pump & coolant motor detail to be submitted.	Vendor to submit
2.17.10	Coolant Tank Capacity:	Vendor to specify
2.17.11	The coolant tank should be fitted with skimmer for regular cleaning of coolant from contamination with tramp oil.	Vendor to Confirm
2.18	ELECTRICAL:	
2.18.1	415V \pm 10%, 50 HZ \pm 3 HZ, 3 Phase AC (3 wire system with out neutral) Power Supply will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. Requirement of grounding/earthing with required material details is to be informed by vendor well in advance so that the same could be incorporated during construction of foundation.	Vendor to Confirm
2.18.2	Tropicalisation: All electrical / electronic equipment shall be tropicalized.	Vendor to Confirm

Clause No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.18.3	All electrical & electronic control cabinets & panels should be dust and vermin proof and shall have IP 54 protection.	Vendor to Confirm	
2.18.4	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to Confirm	
2.18.5	All electrical and electronic panels including operator's panel should be provided with fluorescent lamps for sufficient illumination and power receptacles of 220Volts, 5/15 Amp AC. All adapters/receptacles should have compatibility with Indian equivalents.	Vendor to Confirm	
2.18.6	Motors shall conform to IEC or Indian Standards	Vendor to Confirm	
2.18.7	All cables moving with traversing axes should be installed in caterpillar / Drag chain. Additionally, all the cable trays required for laying cables should be included in the offer.	Vendor to Confirm	
2.18.8	Vendor should ensure proper earthing for the machine and its peripherals.	Vendor to Confirm	
2.18.9	In-cycle hour counter with reset facility and digital energy meter shall be provided	Vendor to Confirm	
2.19	SAFETY ARRANGEMENTS:		
2.19.1	Machine should have adequate and reliable safety interlocks or devices to avoid damage to the machine, work piece and the operator due to the malfunctioning or mistakes. Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on CNC display and panels) should be available.	Vendor to Confirm	
2.19.2	A detailed list of all alarms / indications provided on machine should be submitted by the supplier.	Vendor to specify	
2.19.3	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator's movement.	Vendor to Confirm	
2.19.4	All the rotating parts used on machine should be guarded and statically & dynamically balanced to avoid undue vibrations.	Vendor to Confirm	

Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.19.5	Emergency Switches at suitable locations as per International Norms should be provided.	Vendor to Confirm
2.19.6	Oil & water lines should not run with electrical cable in the same tray / trench.	Vendor to Confirm
2.20	ENVIRONMENTAL PERFORMANCE OF THE MACHINE:	
2.20.1	Noise level shall not exceed 85 dB(A) at normal load condition, 1 meter away from the machine.	Vendor to Confirm
2.20.2	There shall not be any emissions from the machine except fumes of cutting fluid during machining.	Vendor to Confirm
2.20.3	There should not be any effluent from the machine. In case there are any effluents from the machine, requisite effluent treatment plant or pollution control device should be built into the machine by the supplier.	Vendor to Confirm
2.20.4	No hazardous chemicals shall be used in the machine.	Vendor to Confirm
2.20.5	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to Confirm
2.20.6	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Vendor to Confirm
2.21	CHIP CONVEYOR:	
2.21.1	A chip conveyor to carry both short and curly chips efficiently and effectively to the chip bin. Two chip bins of appropriate size of Indian make, with wheels and handle for movement, should also be supplied.	Vendor to confirm
2.21.2	Type of chip conveyor:	Vendor to specify
2.21.3	Width of conveyor	Vendor to specify
2.21.4	Elevation of chip conveyor for chip bin:	Vendor to specify
2.21.5	Material of chip conveyor	Vendor to specify
2.21.6	Provision for smooth flow of chips to the conveyor:	Vendor to specify
2.21.7	Operation of chip conveyor (forward & reverse) through push buttons on operator's panel should be possible.	Vendor to confirm

Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.21.8	Layout showing location of chip conveyor should be submitted.	Vendor to submit
3.0	ULTRA ISOLATION TRANSFORMER:	
3.1	Indian make Ultra Isolation Transformer suitable for complete machine, its drives, controls, PLC etc. shall be offered.	Vendor to confirm
3.2	Make: NEEL / DELTA / AEI / POWER AID	Vendor to specify
3.3	Model & Rating:	Vendor to specify
3.4	Spares Package for the Ultra Isolation Transformer for 2 years working should also be offered.	Vendor to confirm
3.5	Catalogue of the Ultra Isolation Transformer shall be submitted.	Vendor to submit
4.0	SERVO VOLTAGE STABILIZER:	
4.1	Indian make Oil / Air Cooled servo Controlled Voltage Stabilizer suitable for complete machine, its drives, controls, PLC etc with no undesirable Harmonics in the stabilizer output.	Vendor to specify
4.2	Make. : NEEL / DELTA / AEI / POWER AID	Vendor to specify
4.3	Model & Rating (Suitable for the machine load. Vendor to specify the noise level also)	Vendor to specify
4.4	Spares Package for the Voltage Stabilizer for 2 years working should also be offered.	Vendor to Confirm
4.5	Catalogue of Voltage Stabilizer to be submitted.	Vendor to Submit
5.0	COMPRESSED AIR POINTS:	
5.1	Compressed air at 60 to 70 psi will be made available at one point if required. The vendor shall indicate the inlet point for compressed air in the layout drawing of the machine.	Vendor to Confirm
6.0	TOOLING:	
6.1	Turning tool holder on turret	2 Nos
6.2	Facing tool holder on turret	2 Nos
6.3	Threading tool holder on turret (for external threading)	3 Nos
6.4	Threading tool holder on turret (for int. threading / boring bar)	3 Nos
6.5	Tool holder on turret (for holding 32 mm U drill)	2 Nos
6.6	Reduction sleeves for Boring Bars of dia 20, 32, 40 and 50 mm	Each 2 Nos

Clause No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
7.1	ACCESSORIES:		
7.1	List of standard accessories supplied along with the machine.	Vendor to furnish	
7.2	4 Jaw manual chuck with Jaws – (With min through bore of 135 mm). Vendor to specify the chuck size:	1 No. Vendor to specify	
7.3	Additional Hard jaw for 4 Jaw manual chuck	1 set	
7.4	Additional Hard jaw for 3 Jaw self centering hydraulic chuck	1 set	
7.5	Soft jaws for 3 Jaw self centering hydraulic chuck	3 sets	
7.6	Spare rollers / bearings for steady rests:	2 sets	
7.7	Tail stock centers:	3 Nos	
8.0	FAULT DIAGNOSTIC SYSTEM:		
8.1	Supplier's own diagnostic system with required hardware and software should be supplied and installed on the CNC system. This should include standard auto-diagnostic system with supporting hardware and software which shows detailed cause and remedy for the fault on the display and supplier's smart diagnostic system for full video diagnostic help for faults related to mechanical and electrical maintenance.	Vendor to confirm	
8.2	Help guide should be provided to use both diagnostic systems	Vendor to confirm	
9.0	PORTABLE DATA LOADING DEVICE: (optional) Portable Data loading device with sufficient length of interface cable, HDD of size not less than 40GB, CD Drive, TFT Display of size 14" and suitable preinstalled software for loading PLC program, RS 232 Port, Ethernet chord, USB port, Machine data and CNC part programs shall be supplied with the machine. Vendor should furnish details.	Vendor to confirm	
10.0	LEVELING & ANCHORING SYSTEM:		
10.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc should be supplied.	Vendor to confirm	

Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
11.0	TOOLS FOR OPERATION & MAINTENANCE:	
11.1	Necessary tools like Torque Wrench, Spanners, Keys, grease guns etc for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer.	Vendor to confirm Vendor to submit
12	SPARES:	
12.1	<p>1) The Vendor shall recommend and submit list of spares required for the machine for two years of trouble free operation on three shifts /day basis under two headings as</p> <p>a) Mechanical & hydraulic spares and</p> <p>b) Electrical & electronic spares.</p> <p>The list shall generally include the following items.</p> <p>a) Mechanical & Hydraulic Spares: All types of pumps, All types of Valves, All types of pressure switches / transducers, All types of filters, All types of seals</p> <p>b) Electrical & Electronic Spares: All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, Scanning Heads for Linear Scales, MMC module, NCU module, Operator's panel with Display Unit, Floppy Disk Unit, I/O Cards for PLC, Servo Motors for Feed Drives, Power Module & Control Cards for Main Drive as well as Feed Drives etc.</p> <p>c) Un-priced list of spares with quantities, specified at a&b above, should be submitted with this technical offer.</p> <p>d) Unit Price of each item figuring in c shall be submitted with the price bid.</p>	Vendor to Submit
12.2	All types of spares for the machine and its accessories should be available for minimum ten years, after supply of the machine. If any spares or controls are likely to become obsolete within this period, the vendor should inform BHEL and provide details of it's suppliers to enable BHEL to procure them in advance.	Vendor to Confirm

Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
12.3	In case of ordering, a complete list of spares for the machine and its accessories along with spares specification / type / model, and name & address of the spare supplier shall be submitted along with documentation while supplying the machine.	Vendor to confirm
13.0	DOCUMENTATION:	
13.1	3 sets of following documents (3 Hard copies) in English language should be supplied along with the machine	Vendor to confirm
13.2	Operating manuals of Machine & CNC system	Vendor to confirm
13.3	Programming Manuals of Machine & CNC system	Vendor to confirm
13.4	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Coolant / Hydraulic circuit diagrams.	Vendor to confirm
13.5	Maintenance, Interface & commissioning manuals for CNC system, spindle & feed drives.	Vendor to confirm
13.6	Manufacturing drawings for all supplied tool holders, coolant connections, adapters, sleeves, fixtures etc.	Vendor to confirm
13.7	Catalogues / O&M Manuals of all bought out items.	Vendor to confirm
13.8	Detailed specification of all rubber items and hydraulic/lube fittings	Vendor to confirm
13.9	Bearings: Make& Specification for all bearings used in the machine.	Vendor to Specify
13.10	Ball Screws: Detailed Specification for all ball screws used in the machine shall be submitted. The specification shall address the following points: (a) Diameter, (b) Pitch, (c) Length, (d) Make (e) Model	Vendor to specify
13.11	Operating Manuals, Maintenance Manuals & Catalogues for Isolation Transformer and voltage stabilizer.	Vendor to confirm
13.12	PLC program printouts (Ladder diagram & Statement list) with comments in English.	Vendor to confirm
13.13	PLC program on CD, NC data & PLC data on CD.	Vendor to confirm

Clause No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
13.14	Complete back up of hard disk on GHOST CD and clear written Instructions (1 copy) to take back up and reloading of a new hard disk.	Vendor to confirm	
13.15	The vendor shall submit complete Master List of parts used in the machine.	Vendor to Submit	
13.16	One additional set of all the above documentation on CD ROM, wherever possible.	Vendor to confirm	
14.0	TRAINING:		
14.1	The Vendor shall train Two BHEL Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and CNC System) of the Machine at Vendor's works for a period not exceeding 5 working days.	Vendor to confirm	
14.2	Airfare, boarding & lodging for the BHEL Engineers will be borne by BHEL		
14.3	The Vendor shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance after the commissioning of the Machine at BHEL works for not less than 6 working days	Vendor to confirm	
14.4	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel	Vendor to confirm	
14.5	Vendor to quote on the basis of per man per day for training at vendor's works.	Vendor to specify	
15.0	FOUNDATION:		
15.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Letter of Intent (LOI). Vendor shall submit complete foundation details including static and dynamic loads within three months after getting BHEL's approval. The layout should consist of all requirements pertaining to complete machine including space requirement for Voltage Stabilizer, Isolation Transformer, & any	Vendor to confirm	

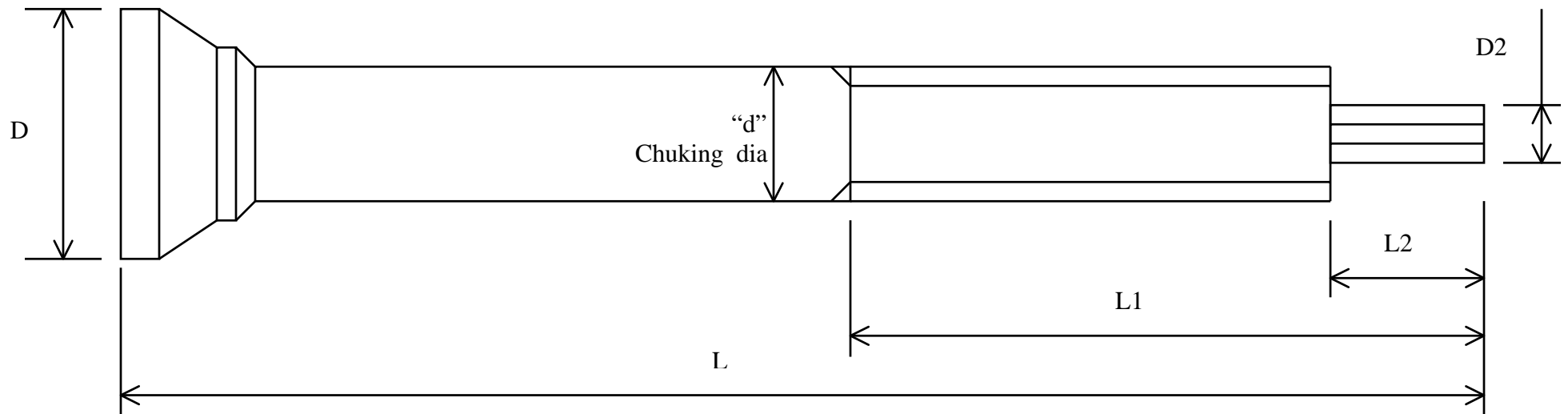
	other accessories. BHEL shall construct complete foundation for the machine.		
Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details	
15.2	The Vendor shall indicate detailed specifications of grouting compound and Grouting procedure etc. for foundation bolts of the machine.	Vendor to Specify	
16.0	ERECTION & COMMISSIONING:		
16.1	<p>1.Supplier to take full responsibility for supervision of the erection. Start up, testing of machine, it's control system & all types of other supplied equipment, machining of test pieces etc. are the responsibility of the supplier.</p> <p>2.Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by supplier in their foundation/layout drawings.</p> <p>3.Other requirements like crane and helping personnel shall also be provided by BHEL, free of cost.</p>	Vendor to confirm	
16.2	Erection & Commissioning of Voltage stabilizer, Isolation Transformer shall also be responsibility of the vendor.	Vendor to confirm	
16.3	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, mentioned under clause (Machine Acceptance) shall form part of the commissioning activity.	Vendor to confirm	
16.4	Tools, Tackles, Test Mandrels, instruments and other necessary equipment including Laser equipment required to carry out all above activities should be brought by the supplier.	Vendor to confirm	
16.5	The supplier shall arrange commissioning spares required for commissioning of the machine.	Vendor to confirm	
16.6	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various	Vendor to confirm	

	colors of paint used.		
Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details	
16.7	Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to confirm	
16.8	Duration, terms & conditions for E&C should be furnished with this technical offer in detail. Charges for the same shall be submitted with the price bid.	Vendor to confirm	
17	ACCURACY TESTS:		
17.1	GEOMETRICAL ACCURACIES:		
17.1.1	Geometrical Accuracy Tests shall be in accordance with ISO 13041 standard or equivalent applicable standard.	Vendor to confirm	
17.1.2	Head Stock Spindle run out (Radial & Axial):	Vendor to specify.	
17.1.3	All other accuracies to confirm to ISO 13041 (Latest Revision) or Suppliers Test chart whichever is finer.		
17.1.4	Tail stock Quill taper run-out:	Vendor to specify.	
17.1.5	Cylindricity of turning:	Vendor to specify.	
17.1.6	True roundness of turning:	Vendor to specify.	
17.1.7	Facial run-outs:	Vendor to specify.	
17.1.8	All the above accuracies should be demonstrated to BHEL engineers during pre-acceptance at Suppliers works and during Erection & Commissioning at BHEL Works.	Vendor to confirm	
17.2	MACHINE POSITIONING ACCURACIES & REPEATABILITY: Should be measured as per VDI/DGQ 3441 using LASER INTERFEROMETER.	Vendor to confirm	
17.2.1	Positioning accuracy in X axis (Pa) per 1000 mm:	± 0.010 mm	
17.2.2	Positioning accuracy in Z axis (Pa) per 1000 mm:	± 0.040 mm	
17.2.3	Repeatability in X axis (Ps): per 1000 mm	± 0.005 mm	
17.2.4	Repeatability in Z axis (Ps): per 1000 mm	± 0.020 mm	

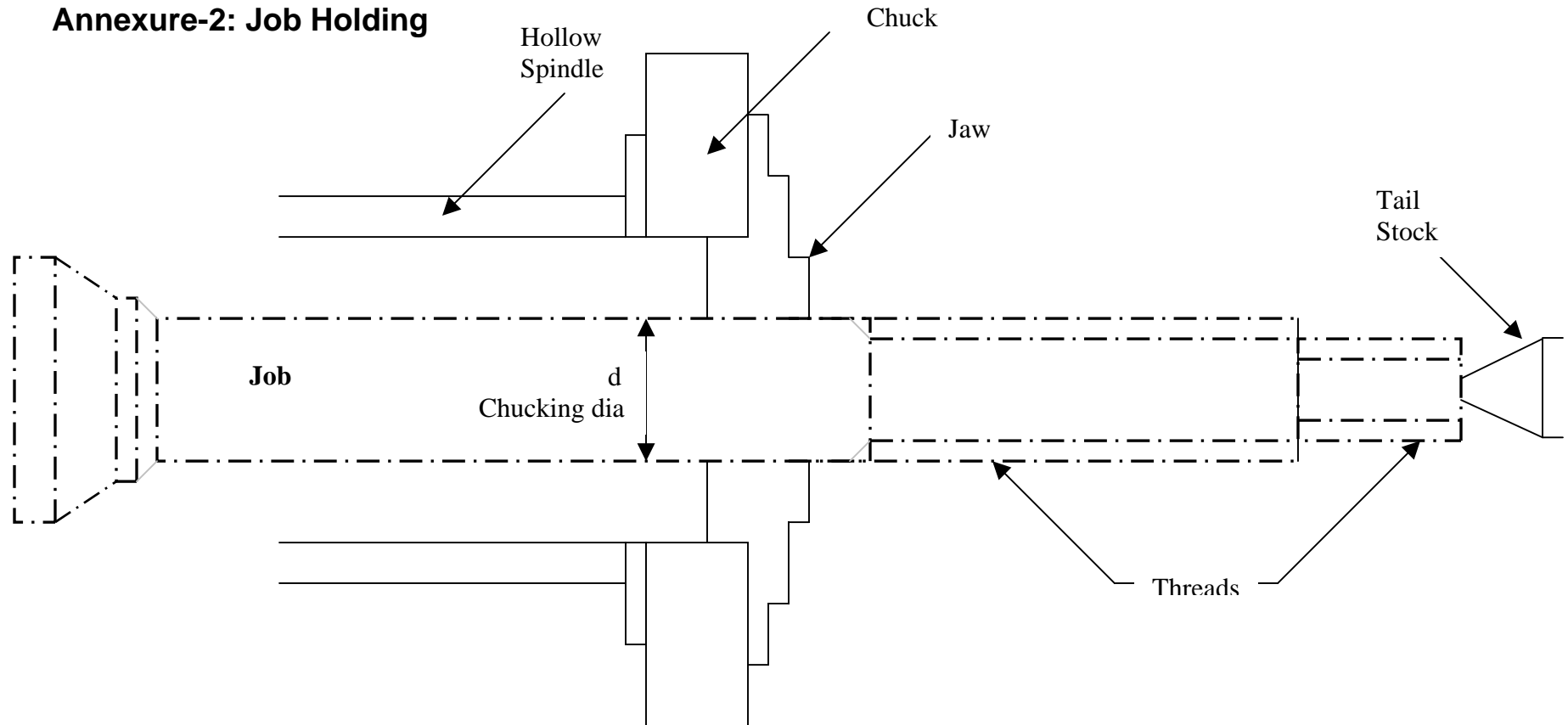
Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
18.0	AMBIENT CONDITIONS & THERMAL STABILITY:	
18.1	Power Supply : AC 415 V \pm 10% Frequency : 50 Hz \pm 3HZ Phases : 3 phase 3 wire system Compressed air supply: 60-70 psi Ambient Temperature: max 45 °C Relative Humidity = 85% Vendor to confirm that machine is suitable for above conditions	Vendor to confirm
18.2	Weather conditions are tropical. Atmosphere may be dust laden during some part of the year. Machine will be installed in the normal shop floor condition. Vendor to confirm that machine is suitable for above	Vendor to confirm
18.3	Thermal Stability of the machine shall be good enough to withstand the specified ambient conditions in order to meet the accuracy requirements of BHEL components. Vendor to confirm for trouble-free operation of the machine.	Vendor to confirm
18.4	The Vendor should confirm that the machine and its accessories is suitable for continuous operation at its full capacity for 24 hours a day and 7 days a week through out	Vendor to confirm

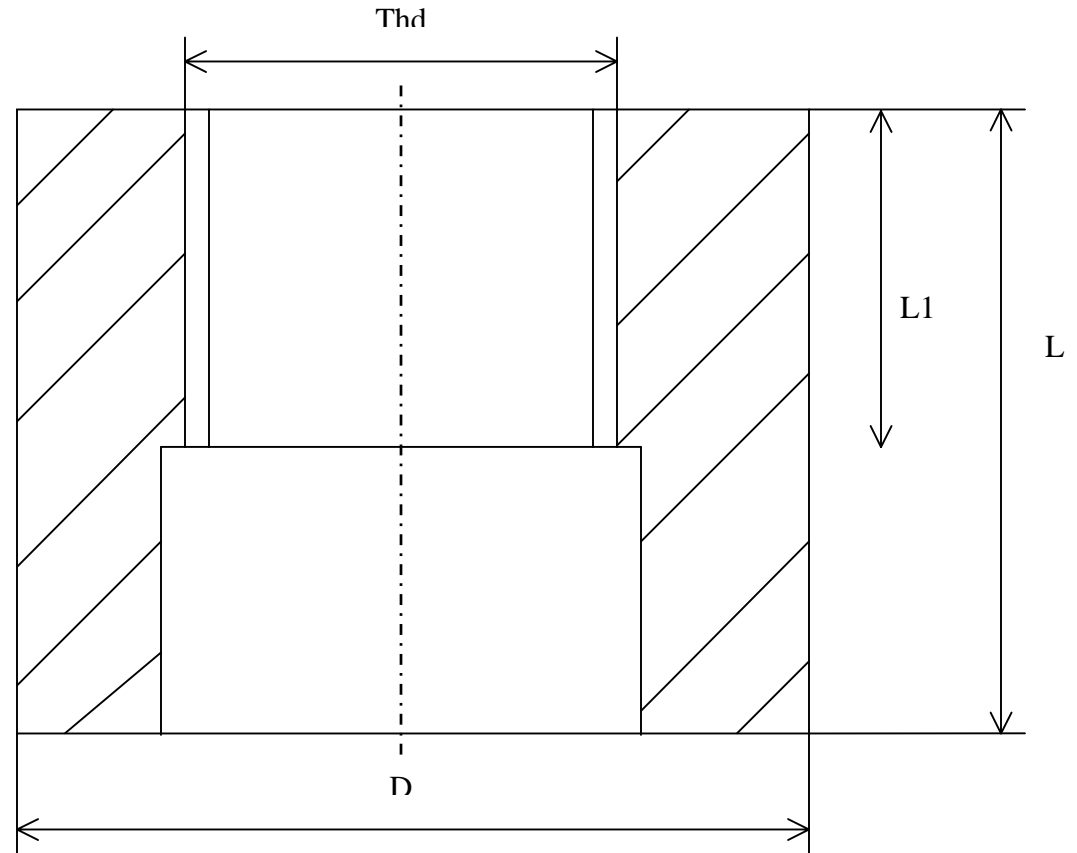
Clause No	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
20.1.2	Machine positioning accuracies & repeatability should be measured as per VDI/DGQ 3441 / ISO 230 – 2 (latest revision) using laser interferometer.	Vendor to confirm
20.1.3	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from restarting.	Vendor to confirm
20.1.4	Demonstration of all features of the machine, control system & accessories.	Vendor to confirm
20.1.5	Machining of test piece as per NAS/AFNOR/ISO. Vendor to supply test piece and tooling for it's machining.	Vendor to confirm
20.2	Tests/Activities should be carried out at BHEL works while commissioning the machine:	
20.2.1	Geometrical accuracies as per test chart.	Vendor to confirm
20.2.2	Machine positioning accuracies & repeatability should be measured as per VDI/DGQ 3441 / ISO 230 – 2 (latest revision) using laser interferometer.	Vendor to confirm
20.2.3	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor to confirm
20.2.4	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from restarting.	Vendor to confirm
20.2.5	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine	Vendor to confirm
20.2.6	Prove-out machining.	Vendor to confirm
20.2.7	Machining test piece as per NAS/AFNOR/ISO. Vendor to arrange Test pieces and tooling for it's machining.	Vendor to confirm

Clause No	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
21.0	PACKING:		
21.1	Sea worthy & rigid packing for all items of complete machine, CNC System, all Accessories and other supplied items to avoid any damage/loss in transit. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes.	Vendor to specify	
22.0	GUARANTEE:		
22.1	24 months from the date of acceptance of the machine at BHEL.	Vendor to confirm	
23.0	GENERAL:		
23.1	Machine Model:	Vendor to specify	
23.2	Total connected load (KVA): Vendor to specify	Vendor to specify	
23.3	Floor area required (Length, Width, Height) for complete machine & accessories: Vendor to specify.	Vendor to specify	
23.4	Painting of Machine / Electrical Panels: RAL 6011 Apple Green (Polyurethane Paint)	Vendor to confirm	
23.5	Total weight of the machine: Vendor to specify	Vendor to specify	
23.6	Weight of heaviest part of machine: Vendor to specify	Vendor to specify	
23.7	Weight of the heaviest assembly / sub-assembly of the Machine: Vendor to specify	Vendor to specify	
23.8	Dimensions of largest part/ sub-assembly/ assembly of the machine: Vendor to specify	Vendor to specify	

Annexure-1: Job profile (Spindle)

	D	d	D2	L	L1	L2
MIN	40	30	20	400	100	40
MAX	175	120	50	3000	1500	200

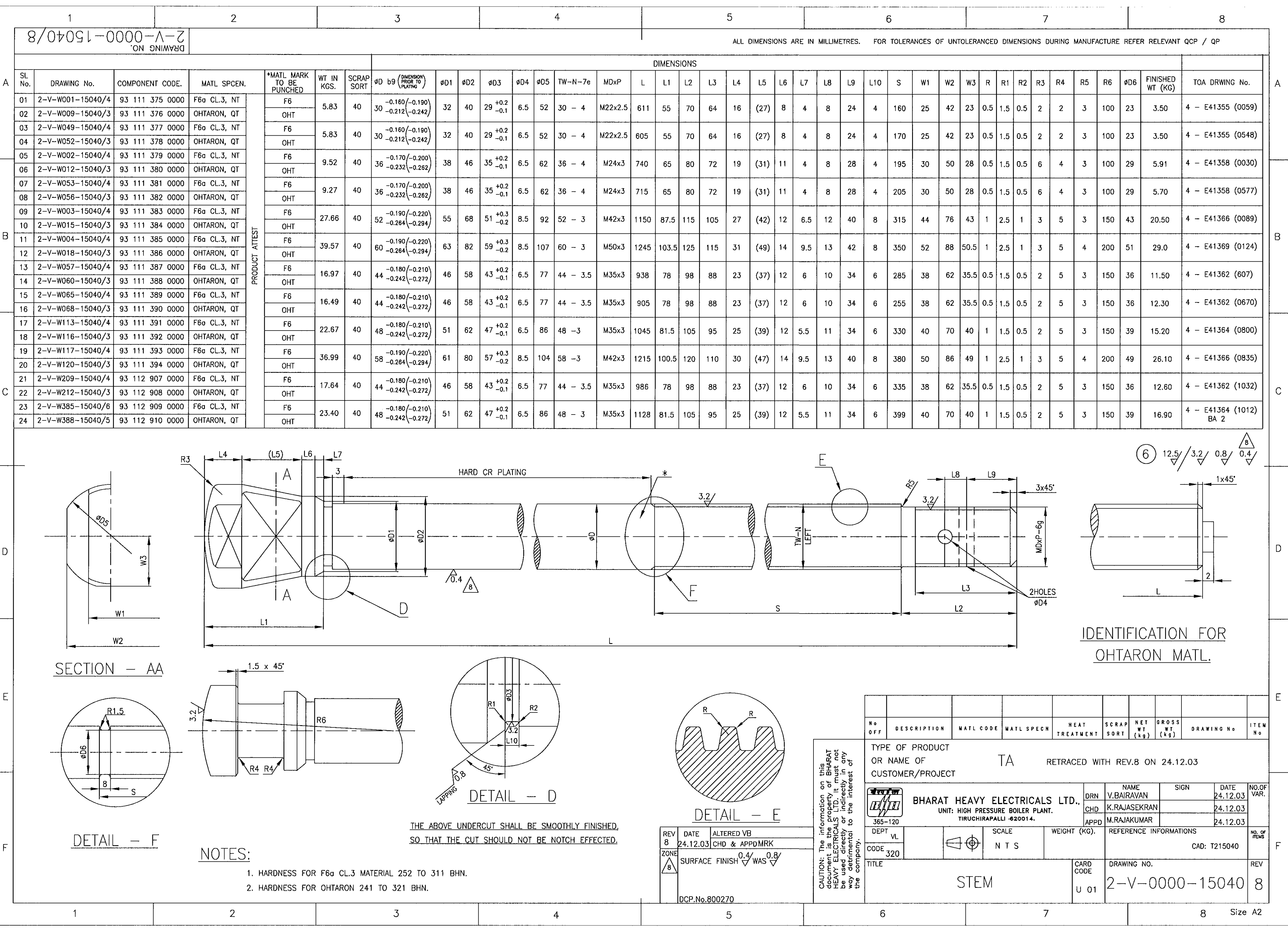
Annexure-2: Job Holding

Annexure-3: Job Profile (Sleeve)

	D	Thd	L	L1
MIN	80 mm	50 mm	80 mm	35 mm
MAX	250 mm	120 mm	575 mm	215 mm

ANNEXURE - 4**Prove out Job details for SLANT BED CNC LATHE**

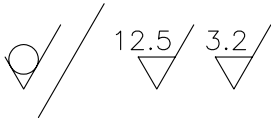
Sl. No	Job Description	Size	Drawing No.	Prove out Qty	Operations
1	Stem -W049	GV 2 1/2 -1500	2-V-W049-15040	1	Threading
2	Stem-V097	GV 8 -1500	2-V-V097-16197	1	Threading
3	Stem-V353	GV 14 -2500	2-V-V353-16415	1	Threading
4	Stem-W112	GV 20- 2850	2-V-W112-15574	1	Threading
5	Stem-N826	GV 32 -150	3-V-N826-23549	1	Threading
6	Sleeve-L113	ELBD 12- 2000	3-V-L113-20405	1	Threading
7	Sleeve-V353	GV 14- 2500	3-V-V353-20337	1	Threading
8	Sleeve-W112	GV 20- 2850	3-V-W112-20337	1	Threading



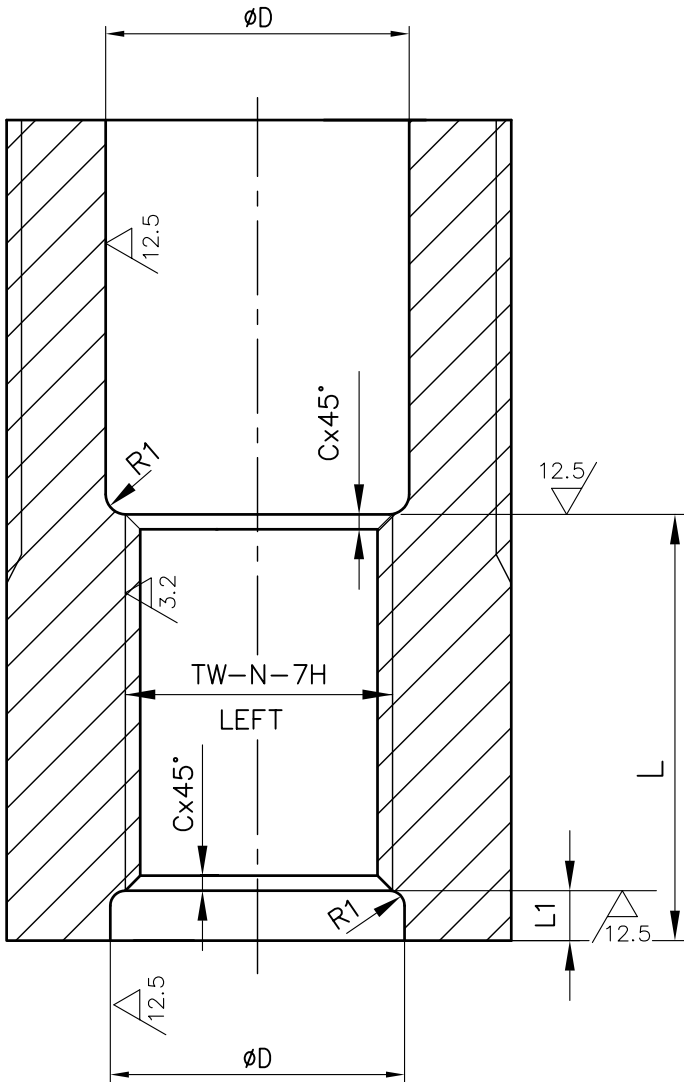
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP.

DRAWING NO. 92/72202-0000-V-3		DIMENSIONS						
SL. NO.	DRAWING NO.	ACTUATOR SPECN.	TW-N / NO OFF START	L	L1	ØD	C	COMPONENT CODE
01	3-V-W005-20337	SMB-3	70 - 3/2	155	15	72	3	93 113 025 0000
02	3-V-W006-20337	SMB-3	80 - 3/2	175	15	82	3	93 113 026 0000
03	3-V-W061-20337	SMB-3	62 - 3/2	140	15	64	3	93 113 027 0000
04	3-V-W385-20337	SMB-1	48 - 3/2	115	15	50		93 113 028 0000
05	3-V-W281-20337	SMB-4	80 - 3/3	175	15	82	3	93 113 029 0000
06	3-V-W080-20337	SMB-4	100 - 3/3	215	15	102	3	93 113 920 0000
07	3-V-W069-20337	SMB-4	90 - 3/3	195	15	92	3	93 115 238 0000
08	3-V-W193-20337	SMB-2	48 - 3/2	115	15	50	3	93 115 484 0000
09	3-V-W297-20337	SMB-3	70 - 3/3	155	15	72	3	93 115 517 0000
10	3-V-W527-20337	SMB-3	75 - 3/2	165	15	77	3	93 115 536 0000
11	3-V-W535-20337	SMB-4	70 - 3/3	155	15	72	3	93 115 574 0000
12	3-V-W077-20337	SMB-4	100 - 3/3	215	15	102	3	93 115 816 0000
13	3-V-W201-20337	SMB-2	58 - 3/2	135	15	60	3	93 115 838 0000
14	3-V-W305-20337	SMB-3	62 - 3/3	140	15	64	3	93 115 868 0000
15	3-V-W409-20337	SMB-3	65 - 3/3	145	15	67	3	93 115 888 0000

SL. NO.	DRAWING NO.	ACTUATOR SPECN.	DIMENSIONS						COMPONENT CODE
			TW-N / NO OFF START	L	L1	ØD	C		
16	3-V-W024-20337	SMB-3	80 - 3/3	175	15	82	3	93 115 912 0000	
17	3-V-W284-20337	SMB-4	80 - 3/2	175	15	82	3	93 115 914 0000	
18	3-V-W543-20337	SMB-3	65 - 3/2	145	15	67	3	93 116 084 0000	
19	3-V-E394-20337	SMB-3	100 - 3/3	215	15	102	5	93 116 239 0000	
20	3-V-W481-20337	SMB-2	58 - 3/3	135	15	60	3	93 116 723 0000	
21	3-V-W105-20337	B5	100 - 3/2	215	15	102	3	93 116 816 0000	
22	3-V-W112-20337	SMB-4	100 - 3/2	215	15	102	3	93 118 120 0000	
23	3-V-W205-20337	SMB-3	58 - 3/3	135	15	60	3	93 118 551 0000	
24	3-V-W290-20337	SMB-3	60 - 3/3	135	15	62	3	93 119 282 0000	
25	3-V-W063-20337	SMB-2	62- 3/2	140	15	64	3	93 120 531 0000	
26	3-V-V178-20337	SMB-3	70 -3.5/2	155	15	72	3	93 121 348 0000	
27	3-V-V179-20337	SMB-3	70 -3.5/3	155	15	72	3	93 121 371 0000	
28	3-V-V353-20337	SMB-4	80 -3.5/3	175	15	82	3	93 121 448 0000	
29	3-V-V356-20337	SMB-3	80 -3.5/3	175	15	82	3	93 121 685 0000	
30	3-V-V335-20337/1	SMB-3	55 -3.5/3	125	15	57	3	93 121 705 0000	
31	3-V-V354-20337	SMB-4	80-3.5/2	175	15	82	3	93 121 985 0000	
32	3-V-W411-20337	SMB-2	65 - 3/2	145	15	67	3	93 123 019 0000	
33	3-V-V311-20337	SMB-1	48 -3.5/2	115	15	50	3	93 123 022 0000	



99



REV	DATE	ALTERED VB
26	14.03.06	CHD & APPD KRS & MRK
IN SL. NO. 30 DIMENSION 57 WAS 82. DCP No.800572		
REV	DATE	ALTERED VB
25	14.12.05	CHD & APPD KRS & MRK
SL. NO. 33 INCLUDED.		
REV	DATE	ALTERED VB
24	07.11.05	CHD & APPD KRS & MRK
SL. NO. 32 INCLUDED.		
REV	DATE	ALTERED VB
23	30.06.05	CHD & APPD KRS & MRK
SL. NO. 31 INCLUDED.		
REV	DATE	ALTERED VB
22	27.05.04	CHD & APPD MRK
SL. NOS. 29 & 30 INCLUDED.		
REV	DATE	ALTERED VB
21	22.01.04	CHD & APPD MRK
SL. NO. 28 INCLUDED.		
REV	DATE	ALTERED VB
20	19.09.03	CHD & APPD MRK
SL. NO. 27 INCLUDED.		

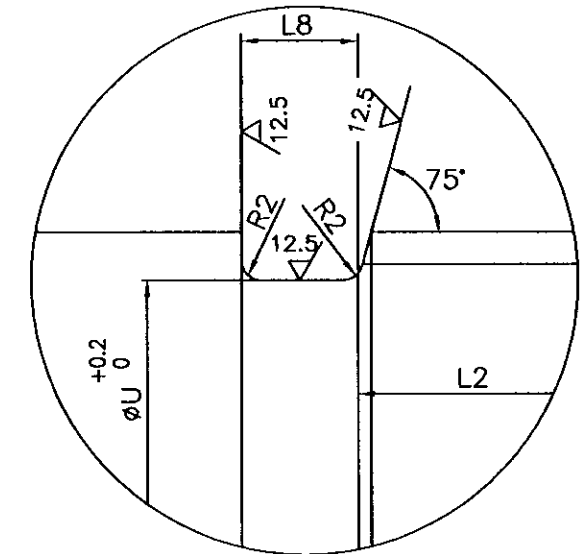
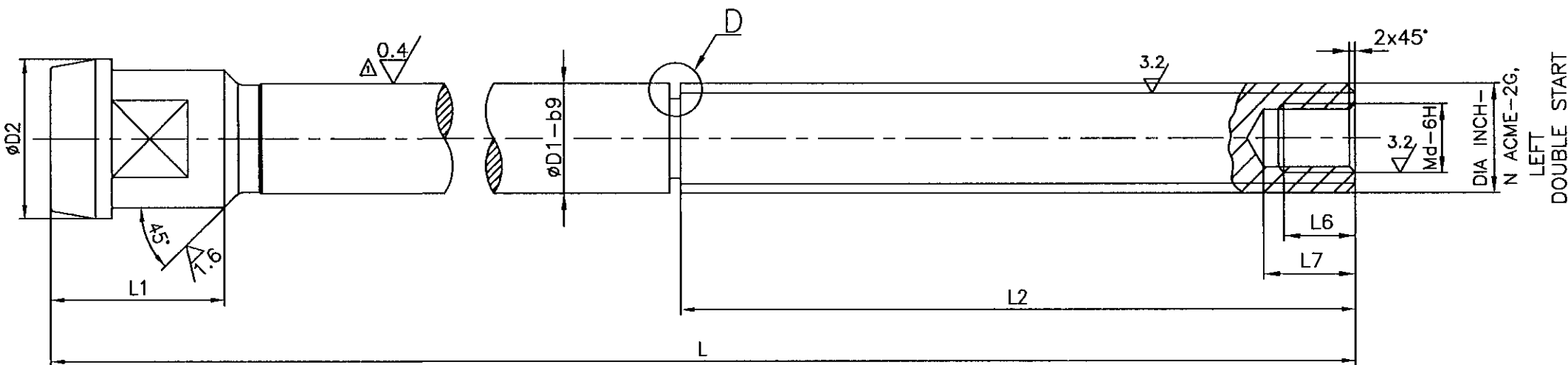
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

NOTES:—

- THIS COMPONENT IS SUPPLIED ALONG WITH ACTUATOR WITHOUT TW THREAD.
- THIS PART IS TO BE REMOVED FROM THE ACTUATOR AND MACHINING TO BE DONE AS INDICATED IN THE TABULAR COLUMN AND TO BE REFIXED IN THE ACTUATOR IN CORRECT POSITION.
- FOR TOLERANCE & GAUGE MANUFACTURE REFER STD ANSI B1.5

DRAWING REDRAWN WITH REV.20 ON 19.09.03

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT									
TA									
BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI 620014.									
365-121									
DRN									
NAME									
SIGN									
DATE									
NO.OF VAR.									
CHD									
K.RAJASEKARAN									
19.09.03									
—									
APPD									
M.RAJAKUMAR									
19.09.03									
—									
DEPT VL									
SCALE									
WEIGHT (KG).									
REFERENCE INFORMATIONS									
NO. OF ITEMS									
CODE 320									
CAD:3V20337									
—									
TITLE									
CARD CODE									
DRAWING NO.									
REV									
SLEEVE (MULTI START THREAD)									
U 01									
3—V—0000—20337									
26									

DETAIL-D

REV	DATE	ALTERED VB
01	01.08.03	CHD & APPD MRK

Size A3



1 SCREW HOLE M8
MACHINE TOGETHER WITH
(38) NUT

31



$$\begin{array}{r} 3.2 \\ 12.5 \end{array}$$

φ165 h7	0
φ170 h7	-0.040



1	3-V-L113 - 20405/03	IS:305 GF. AB1 CERTIFY	93 113 319 0000	60
			COMPONENT CODE	SCRAP
			MATERIAL CODE	SHORT
SL.NO	DRAWING NUMBER	MATL. SPECN.		

BHARAT HEAVY ELECTRICALS LTD.,
BOILER PLANT UNIT, TIRUCHIRAPALLI-14

 FIRST ANGLE	 SCALE	NTS	DRAWN	R. KANNAN	TOTAL NET WT. (KG)	89.8
			CHECKED	M. R. K. M. L. S.	TYPE	
			APPROVED	V. B.		
			DATE	20/11/84	70A DRG. NO.	4 - E 66 990 (184)

CAUTION

THE INFORMATION CONTAINED IN THIS
DRAWING IS THE PROPERTY OF
ARAT HEAVY ELECTRICALS LTD.,
MILER PLANT UNIT, TIRUCHY-14
AND SHALL NOT BE USED WITHOUT THEIR
EXPRESS WRITTEN PERMISSION IN ANY
FORM OR PART THEREOF FOR ANY
OTHER PURPOSE THAN FOR WHICH
IT IS SENT TO YOU.



33-115

3-V - L113 - 20405

REVISION



REV. 03	DATE 9.7.94	ALT. R.L. <i>Q. S. R. L.</i> CHRD. M.R.K. <i>Q. S. R. K.</i>	REV 02	DATE 7-3-91	ALTRD. K.R.S.K. <i>4-2-90</i> CHRD. SK <i>8R</i>	REV. 01	DATE 30.6.88	ALTERED R.L. <i>Q. S. R. L.</i> CHECKED VLS <i>Long</i>
IS 305 GR. AB1 WAS			A	TW 100-3, 7H LEFT HAND			TW 100-3, 7H WAS TR 100x8-7E	
IS 305 GR. 2.				WAS TW 100-3, 7H			DCN No. TA 0043.	
DCN. NO. TA0359			DCN No. TA 0145					