



Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

An ISO 9001
Company

ENQUIRY NOTICE INVITING TENDER	Phone: +91 431 257 76 53 Fax : +91 431 252 00 31 Email : skaruna@bheltry.co.in Web : www.bhel.com
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TWO PART BID Tender to be submitted in two Parts	Enquiry Number: 2851300027	Enquiry Date: 05.11.2013	Due date for submission of quotation: 06.12.2013
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You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.

Please note that under any circumstances both **delayed offer** and **late offers** will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the Date of tender opening.

Item	Description	Quantity	Delivery Required	Delivery Terms Required
10	TUBE PARTING AND EDGE PREPARATION SYSTEM	01 No.	08 Months	F.O.R, BHEL Stores, POWER EQUIPMENT FABRICATION PLANT, BHARAT HEAVY ELECTRICALS LIMITED, Mundipar- 441804, Sakoli Taluk, Bhandara District, Maharashtra State.

The above items as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or <http://tenders.gov.in>)

Important points to be taken care during submission of offer:-

1. Checklist No. **IND 02A / IMP 02 and Annexure-II (Details of Company Performance)** as applicable to the vendor to be filled in and enclosed along with the offer failing which, their offer will not be considered for evaluation.
2. EMD for this Tender will be Rs. 2,00,000/-
3. All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.
4. The Period required for completion of Erection & Commissioning of the above items shall be 4 weeks from the date of intimation from BHEL requesting the supplier to depute Service Engineers about site readiness

BHEL's General guidelines / instructions (refer **MM / CE / GENL / 001 - EMD**) including bank guarantee formats and list of consortium banks, commercial terms check-list 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 "**2851300027**".

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**

Engineer / Capital Equipment / MM

TUBE PARTING AND EDGE PREPARATION SYSTEM

PART A –

S. No	REQUIREMENTS	VENDOR'S RESPONSE
1.0	QUALIFYING CRITERIA	
1.1	The BIDDER / VENDOR (OEM) shall have a minimum of TEN Years of Continuous Experience in the Design, Manufacture & Supply of “ TUBE PARTING AND EDGE PREPARATION SYSTEM ”. Vendor may indicate the actual no. of years of experience in the field	
1.2	<p>Only those vendors (OEMs), who have manufactured, supplied and commissioned at least one“CNC LATHE TYPE TUBE PARTING AND EDGE PREPARATION SYSTEM” having all the following features:</p> <ol style="list-style-type: none"> 1. Measuring, Parting & Edge preparation of Tubes up to OD 76 mm. 2. Automatic tube conveying and transfer system for minimum 12 meter length. <p>in the past ten years are only eligible to quote. Such supplied machine should at present be working satisfactorily for at least one year after its commissioning (as on the date of opening of this Tender). The name and contact addresses of the customers to whom the machine has been supplied has to be furnished with details.</p>	
1.3	<p>Vendor has to submit at least one Performance Certificate from their customers, for satisfactory performance of “TUBE PARTING AND EDGE PREPARATION SYSTEM”“as given in under clause 1.2 above, for a minimum period of one year (as on date of opening tender). For obtaining the Performance certificate, a suggestive format is provided.</p> <p>Overseas vendors should provide such a performance certificate from their customers located in India or outside their country of origin.</p>	
1.4	BHEL reserves the right to verify the above information provided by vendor. In case the information provided is found to be false/ incorrect, the offer shall be rejected.	

Part A – Tube parting and edge preparation system

S. No	REQUIREMENTS	VENDOR'S RESPONSE
2.0	INFORMATION TO BE PROVIDED BY VENDOR	
2.1	The BIDDER / VENDOR to furnish Reference List of Customers, with complete address, details of contact person, where “TUBE PARTING AND EDGE PREPARATION SYSTEM” have been supplied in the past.	
2.2	Specify details of “TUBE PARTING AND EDGE PREPARATION SYSTEM” supplied to other units of BHEL, if any (Year of commissioning, type of station, tube sizes handled, tube material typeetc.)	
2.3	Details on SERVICE-AFTER-SALES Set-up in India including the Address of Agents / Service Centres in India.	
2.4	Any Additional data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

Part A – Tube parting and edge preparation system

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

Suggestive Format of Performance Certificate

(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. Machine Details
 - a) Length of tubes (m) :
 - b) Max. Size of Tube Diameter :
 - c) Spindle Power :
 - d) CNC System :
5. Performance of the Machine : Satisfactory / Good / Average / Not Satisfactory
(Strike off whichever is not applicable)
6. After sales service : Satisfactory / Good / Average / Not Satisfactory
(Strike off whichever is not applicable)
7. Any Other remarks :

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

TUBE PARTING & EDGE PREPARATION SYSTEM
PART B – TECHNICAL SPECIFICATION

Note:-

- 1.0 The Column “**Vendor’s offer with Technical details & Remarks**” of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous or unsustainable information against any of the clauses of the specifications / requirements shall be treated as non-compliance.
- 2.0 The offer and all documents enclosed with offer should be in **English language** only.

Name & Address of the Vendor:	Name & Address of the Indian agent:
Telephone no.:	Telephone no.:
Fax no.:	Fax no.:
e-mail:	e-mail:

- 3.0 **Scope: - Design, Manufacture, Supply, Erection & Commissioning of TUBE PARTING AND EDGE PREPARATION SYSTEM for BHEL complying with the specification as below.**

S. No.	PARTICULARS & BHEL SPECIFICATION	BIDDER'S OFFER [with Complete Technical Details]
1.0	APPLICATION: This machine is meant for cutting to length, outside & inside chamfering and edge preparation of seamless steel tubes (as per Annexure-1) to form high-pressure components for Power Boilers and Industrial boilers for Process Industries. The machine shall be CNC Controlled. The End preparation of one end of tube is to be done in a single setting, while the other end is to be prepared on the same machine by loading the tube again. A lathe type cut-off and end preparation machine is envisaged. The machine shall have a tube storage rack and tube feeding system on the in-feed side and a finished cut tube collecting dump at the out feed side.	
2.0	JOB SPECIFICATIONS:	
2.1	Tube Diameters	Minimum: 28.0 mm Maximum: 76.1 mm
2.2	Tube Wall Thickness	Minimum: 3.2 mm Maximum: 16.51 mm
2.3	Reference Tube Size for establishing the machine capacity	(Diameter x Thickness) 69.85 x 16.51mm (Alloy Steel); 38.1 x 11.0 mm (Alloy Steel)
2.4	Raw Material Tube (Mother tube) lengths	Minimum: 2000mm Maximum: 15000mm
2.5	Finished Tube lengths	Minimum: 50mm Maximum: 3000mm
2.6	Edge Preparation	B, C, D, F, G, H, I and J style as per drawing Annexure-1
2.7	Max. ID boring required	Max. 150mm + Taper angle for smooth merging. Bore ID (d1) as given in the drg. CABS-3-03N-02 as Annexure 1 to be maintained. Normally 10-20 mm boring
2.8	Max. OD machining	5mm straight and Taper angle of 18° after that.

S. No.	PARTICULARS & BHEL SPECIFICATION		BIDDER'S OFFER [with Complete Technical Details]	
2.9	Machine production output required	Not less than 500 ends / shift (on 44.5 x 8.1 / SA 106 Gr C tubes)		
3.0	TUBE SIZES: All are OD (outer diameter) Controlled tubes with thickness tolerance of Maximum +15 %			
	S. No.	OD (in mm)	THICKNESS (in mm)	Max/Min ID (in mm)
	1	28.0	5.6 / (Rifle Tubes)	21.60/16.80
	2	31.8	4.0/4.57	25.40/22.60
	3	33.4	5.59 / 7.11	22.22/19.18
	4	38.1	4.57/5.59/7.11 / 9.65/ 10.67 / 11.0	28.96/16.10
	5	41.3	7.4 / 8.2	26.50/24.90
	6	42.4	4.57 / 5.59 / 6.6 / 7.11 / 7.62 / 8.6 / 9.1	33.26/24.20
	7	44.5	4.19 / 5.59 / 6.1 / 7.11 / 8.1 / 8.7 / 10.92	36.12/22.66
	8	48.3	6.6 / 8.1	35.10/32.10
	9	51.0	4.19 / 5.59 / 6.6 / 7.62 / 8.64 / 9.6 / 10.0 / (Rifle Tubes)	42.62/31.00
	10	54.0	9.14 / 13.49	35.72/27.02
	11	57.0	4.19 / 7.62 / 8.64 / 9.4 / 12.7 / 14.3 / 15.09	48.62/26.82
	12	63.5	3.81 / 4.19 / 4.57 / 5.59 / 8.64 / 12.7 / (Rifle Tubes)	55.88/38.10
13	69.85	4.57 / 15.09 / 16.51	60.71/39.67	
14	76.1	4.57 / 5.08 / 5.5	67.06/65.20	
4.0	MATERIALS: a) CARBON STEEL : SA 192, SA 209 Gr. T1, SA 210 Gr. A1/Gr. C (ASTM) b) ALLOY STEEL: SA 213 Gr. T23, T11, T12, T22, T91, T92 (ASTM) c) STAINLESS STEEL: SA 213 304H, 316L, 347H (ASTM)			

S. No.	PARTICULARS & BHEL SPECIFICATION		BIDDER's OFFER [with Complete Technical Details]
5.0	MACHINE SPECIFICATIONS		
5.1	<p>Machine configuration: The machine shall be a lathe type cut-off and end preparation machine in which the tube can be fed from the rear of the headstock through the bore of the chuck.</p> <p>Vendor to give details of the machine with Tube Rotating, Stationary Cutting tool post with tool holder's configuration.</p> <p>A general arrangement drawing of the machine to be provided along with the offer.</p> <p>Vendor to furnish details</p>		
5.2	<p>No. of Tool Slides (Sequence of operation has to be explained in the offer)</p>	Vendor to Specify	
5.3	Feed for Tool Slides - Servo controlled Ball Screws	Vendor to confirm	
5.4	Machining Operations	<ol style="list-style-type: none"> 1. Parting 2. Inside boring 3. Chamfering or Profile as per EP style 4. OD machining/turning <p>(Operations 1, 2 & 3 are to be done in a single setting of tools. Operations No 2 and 3 are to be carried out simultaneously)</p>	
5.5	TUBE FEEDING ARRANGEMENT:		
5.5.1.1	The tube stock table shall have a flat portion and a sloping rack. Vendor to Confirm		
5.5.1.2	<p>The flat portion shall be suitable for placing 2 tube bundles, each having 40 tubes of OD 51mm x 10mm thick of 15 metre length. Max. weight of the tube bundles around 13 Tons. The width of the flat portion shall be around 1200mm. Vendor to Confirm</p>		
5.5.1.3	<p>One tube bundle from above is opened so that tubes spread out on the sloping rack. The width of the sloping rack shall be suitable for 40 tubes of OD 51mm x 10mm thick. Max. weight of the tube bundles around 13 Tons. Length of the slanted portion of sloping rack shall be around 2000mm.</p> <p>Vendor to Confirm</p>		

S. No.	PARTICULARS & BHEL SPECIFICATION	BIDDER's OFFER [with Complete Technical Details]
5.5.1.4	Inclined Tube Storage Table, Tube Conveyor, Kick-in arrangement for feeding single tube at a time from the Storage Table to the Tube Conveyor, and Tube Conveyor drive for feeding tube to the in-feed side of the machine Vendor to furnish details & confirm	
5.5.2	Tube feeding system of the machine:	
5.5.2.1	Tube feeding shall be through spindle. Vendor to confirm	
5.5.2.2	Suitable positive tube feeding arrangement shall be provided at the rear of the head stock of machine to feed the tube through the spindle bore. The arrangement shall have both forward & reverse feeding of the tube. It should be possible to reverse the tubes of length greater than 3m. Refer also clause no 5.16.2. Vendor to specify	
5.5.2.3	Tube feed arrangement drive type and power rating. Vendor to specify	
5.5.2.4	The tube feeding should be interlocked with collet closing mechanism so that tube feeding is disengaged once collet clamps the tube. Vendor to confirm & furnish details of the offered system	
5.6	TUBE CLAMPING & LENGTH SETTING	
5.6.1	Tube Clamping by means of Hydraulic actuated self-centring collet chuck with single set of collet jaws for all size of tubes	
5.6.2	Hydraulic Clamping - Dual pressure – reduced pressure for thin wall. Vendor to confirm & furnish details.	
5.6.4	Tube lift adjustment	Mechanism to ensure that tube centre line coincides with the chuck centre line for various diameters of the pipes should be provided.
5.6.5	Length setting (For finished lengths mentioned in clause 2.5)	
5.6.5.1	Length setting shall be by a servo positioned tube stopper moving on a overhead beam in front of the headstock. The stopper should be rigid enough to take the impact loads.	
	(Details of the arrangement should be furnished in the offer) Vendor to confirm	
5.6.5.2	Tube stopper position setting - By CNC control	
5.6.5.3	Tube stopper Clamping at programmed position. Vendor to specify arrangement	

S. No.	PARTICULARS & BHEL SPECIFICATION		BIDDER'S OFFER [with Complete Technical Details]
5.6.5.4	The stopper should retract clear of the tube once the collet clamps the tube (Details of the arrangement should be furnished in the offer) Vendor to confirm		
5.6.6	Tolerance on length setting	± 0.2 mm	
5.7	SPINDLE		
5.7.1	Spindle speed (Infinitely variable)	Vendor to Specify	
5.7.2	No. of spindle speed ranges	Vendor to Specify	
5.7.3	Spindle speed range selection through CNC	Vendor to Confirm	
5.7.4	Power Rating(Continuous) of AC spindle drive motor - around 20 kW - the Spindle motor shall be energy efficient (Vendor to furnish complete technical details along with offer)		
5.8	CONTROLS		
5.8.1	CNC Control	Vendor to confirm	
5.8.2	Machine shall be operated in three modes viz., Automatic, semi-Automatic and Manual. Vendor to confirm		
5.8.3	All feedback systems & elements shall have easy accessibility for maintenance. Vendor to confirm		
5.8.4	All control logics used in the machine to be detailed out in the manual. Vendor to confirm		
5.8.5	Operator control shall be positioned for easy and safe operation of the machine. Vendor to confirm		
5.9	CNC SYSTEM & FEATURES:		
5.9.1	CNC System shall be Simple and user friendly. Features should include Storing of Pre-programmed styles of edge preparation in to the memory which could be selectable while keying in data of different Diameters and Thicknesses of tubes. Vendor to specify		
5.9.2	CNC features	No. of axis controlled by CNC to be specified by the vendor.	
5.9.3	Make	FANUC / SIEMENS. Vendor to specify	

S. No.	PARTICULARS & BHEL SPECIFICATION		BIDDER'S OFFER [with Complete Technical Details]
5.9.4	Model	Suitable and Latest version, as available at the time of ordering, should be supplied. Vendor to specify	
5.9.5	Details of Standard features		Vendor to specify
5.9.6	Details of optional features		Vendor to specify
5.9.7	Automatic diagnostic alarm feature with error display		Vendor to Confirm
5.10	AIR CONDITIONERS:		
5.10.1	Air Conditioners with Dehumidifiers of suitable / sufficient 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. The make & Detailed specifications to be submitted by the vendor.		
5.11	COOLANT SYSTEM		
5.11.1	Coolant system has to be provided for machining. An integral coolant return system to be provided to avoid coolant spillage. Vendor to Specify		
5.11.1.1	Coolant tank capacity		Vendor to Specify
5.11.1.2	Coolant flow rate		Vendor to Specify
5.11.1.3	Coolant pressure		Vendor to Specify
5.11.1.4	Coolant motor rating		Vendor to Specify
5.11.2	Coolant tank shall be easily removable		Vendor to confirm
5.12	HYDRAULICS		
5.12.1	The System should be centralized, modular / stacked valve construction having minimum number of pipes / pipe joints and located on ground level with easy accessibility of components for maintenance. Vendor to Furnish Details		

S. No.	PARTICULARS & BHEL SPECIFICATION	BIDDER'S OFFER [with Complete Technical Details]
5.12.2	Pumps, valves, accessories etc shall be of REXROTH / VICKERS make or equivalent reputed make acceptable to BHEL. The seals used in cylinders shall be of MERKEL / PARKER / BUSHAK + SHAMBAN / HUNGER / SMRIT make. Vendor to confirm & furnish details	
5.12.3	Each pump should have an independent motor. Tandem pumps shall be avoided. Vendor to confirm	
5.12.4	Suitable filtration system should be provided with Duplex / standby filter units. It is preferable to use re-usable type of filter elements in the system. The filter unit shall be of HYDAC / PARKER / REXROTH or equivalent reputed make acceptable to BHEL. Vendor to confirm & furnish details	
5.12.5	The flexible hoses used in the system shall be of GATES / AERROQUIP / PARKER or any other reputed make acceptable to BHEL. Vendor to specify	
5.12.6	Failure indication for oil level, temperature, pressure, filter clogging should be provided. Vendor to confirm & furnish details	
5.12.7	Refrigerated type cooling system of sufficient capacity to maintain complete Hydraulic System at a temperature not exceeding 50°C irrespective of the ambient conditions. BHEL prefers to have direct cooling of oil in the chiller rather than indirect water cooling type. Vendor to confirm and Complete details should be submitted with the offer.	
5.12.8	It should be possible to replace hydraulic elements like valves, manifolds etc without disturbing the associated pipelines. The positioning of hydraulic elements should allow easy maintenance. Vendor to furnish details	
5.12.9	Maximum Operating Pressure of hydraulic system	Vendor to specify
5.12.10	Main Pump flow in LPM and Motor Power in kW. (It is preferable to use standard 1450 RPM motor in the hydraulic system).	Vendor to specify
5.12.11	Reservoir capacity (in litres)	Vendor to specify
5.12.12	All oil pipelines shall be of seamless steel and should undergo pickling process.	Vendor to confirm

S. No.	PARTICULARS & BHEL SPECIFICATION	BIDDER's OFFER [with Complete Technical Details]
5.12.13	Pressure measuring minimess check points (preferably with ¼” BSP stud end) shall be provided for important pressure measurements from operation, trouble shooting and maintenance point of view. Two sets of hand held minimess pressure gauge of suitable range with minimess hose (1.0 to 1.5m length) also to be supplied along with the power pack. Vendor to furnish details	
5.12.14	All cylinders used in the machine should have standard bore and rod sizes. The piston rod shall be hard chrome plated. Vendor to furnish details	
5.12.15	Suitable stand-by pump unit, filter unit, etc. shall be provided for critical areas. Vendor to furnish details	
5.12.16	The Power pack should be designed taking into account the energy efficiency (Hi-low pump system, proper unloading during idling, etc.). The motor used for pumps shall be energy efficient ones. Vendor to furnish details	
5.12.17	All the pipe / hose end fittings shall be of standard weld nipple with O-ring seating type (DIN 3865 or equivalent) - female swivel nut with 24° cone and O-ring and no ferrule joints are to be used in the hydraulic system. All threaded connections shall be of metric sizes. Vendor to confirm	
5.12.18	Suitable vibro-mounts, compensators (flexible bellows), flexible hose at the pump outlet, polypropylene clamps for pipes & hoses, etc. are to be provided to minimize the vibration induced and transmitted to the hydraulic joints. Vendor to confirm	
5.12.19	The oil to be used shall be of standard ISO Viscosity Grades – 32 / 46 / 68. Vendor to specify	
5.12.20	The maximum pressure of the system should preferably not to exceed 310 bar. Vendor to specify	
5.12.21	The control voltages for all the Solenoids of the valves shall be of 24-V DC and all solenoid operated DC valves should have manual over-ride provision and light indicating solenoids. Vendor to specify	
5.12.22	The pipelines to be painted with standard colours as per the color coding accepted internationally for hydraulic systems. Vendor to furnish details	
5.12.23	All hydraulic pipelines, hoses and electrical control cables to be neatly laid out with proper clamps and flexible hose conveyors wherever required. Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATION	BIDDER's OFFER [with Complete Technical Details]
5.12.24	Suitable metallic tray to be provided for oil collection (in case of leakage) wherever required. Vendor to confirm	
5.12.25	All the components in the hydraulic power pack shall be provided with identification numbers, as per the hydraulic circuit and should be pasted with metallic identification number plates. Vendor to confirm	
5.12.26	First filling of all required Oils & Grease etc. should be supplied by vendor. Indigenous (Indian) source or Indian equivalent (Indian Oil Corporation make) and specifications of oils/ greases are also to be provided by the vendor. Vendor to confirm & provide Indian equivalents.	
5.13	Machine lubrication: Automatic centralized lubrication system with timer control and suitable metering cartridges to be supplied. Vendor to confirm & provide details	
5.14	ELECTRICAL:	
5.14.1	415V + 10% / -10%, 50HZ +/-3 Hz, 3 Phase AC (3 wire system without neutral) power supply will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All connections to the machine from the BHEL terminal point shall be in the scope of vendor. Vendor to confirm	
5.14.2	Tropicalization: All electrical / electronic equipment shall be tropicalized. Vendor to confirm	
5.14.3	All electrical & electronic control cabinets & panels should be dust and vermin proof. Vendor to confirm	
5.14.4	All electrical components in the cabinets should be mounted on DIN Rail. Vendor to confirm	
5.14.5	All electrical and electronic panels including operator's panel should be provided with fluorescent lamps for sufficient illumination and power receptacles of 220 Volts, 5/15 Amp AC. All adapters /receptacles should have compatibility with Indian equivalents. Vendor to confirm	
5.14.6	All motors shall be from reputed makers like FANUC, SIEMENS, ABB, Allen Bradley or equivalent conforming to IEC Standards. Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATION	BIDDER's OFFER [with Complete Technical Details]
5.14.7	All electricians shall be of reputed make LIKE SIEMENS / SEW / ROCKWELL ALLEN BRADLEY/ TELEMECHANIQUE/ DELTA conforming to IEC or Indian standards. Vendor to confirm	
5.14.8	All cables moving with traversing axes should be installed in caterpillar / Drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer. Vendor to confirm	
5.14.9	Vendor should ensure the proper earthing for the machine and its peripherals. Separate Earthing for CNC will not be provided. Earth electrode for CNC with suitable earth resistance value (preferably less than 1.5 ohm) is in the scope of supplier. The location for earth pit shall be indicated in the machine foundation drawing. Earth Electrode maintenance shall be mentioned in the O&M manual. Vendor to confirm	
5.14.10	In-cycle hour counter with reset facility should be provided. Vendor to confirm	
5.14.11	All Electric enclosures shall have IP 54 protection. Vendor to confirm	
5.15	Chip conveyor: Vendor to quote for a suitable chip conveyor. Vendor to confirm & furnish details	
5.16.1	Collecting dumps: Wheel mounted collecting dump to collect finished tubes from the machine. Vendor to confirm	
5.16.2	Tube kick off system along with suitable Collecting dumps should be provided on the tube In-feed side to enable the storing of tubes of length more than 3 meters. Tube infeed conveyor rollers should have forward & reverse motion facility. Indicative sketch of general layout of Tube Parting & Edge Preparation machine is enclosed.	
5.17	SAFETY ARRANGEMENTS:	
5.17.1	Following safety features in addition to other standard safety features should be provided on the machine:	
5.17.2	The stopper shall be provided with safety guard interlocked, such that the machine will start only when the safety guard is closed. Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATION	BIDDER's OFFER [with Complete Technical Details]
5.17.3	Machine should have adequate and reliable safety interlocks / 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 specify	
5.17.4	A detailed list of all alarms / indications provided on machine should be submitted by the Vendor. Vendor to specify	
5.17.5	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 for effective use of machine. Vendor to Confirm	
5.17.6	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations and suitably guarded. Vendor to Confirm	
5.17.7	Emergency Switches at suitable locations as per International Norms should be provided. Vendor to Confirm	
5.17.8	All lubricated parts like Bed, guide ways shall have provision for collecting the used Lubrication oil from machine guide ways and preventing them from spilling over on to the ground. Vendor to Confirm	
5.18	ENVIRONMENTAL PERFORMANCE OF THE MACHINE:	
5.18.1	The Machine should confirm to following factors related to environment:	
5.18.2	Noise level shall not exceed 85 dB (A) at normal load condition, 1 meter away from the machine with correction factor for background noise. Vendor to demonstrate compliance to noise level,	
5.18.3	There shall not be any emissions from the machine except fumes of cutting fluid during machining. Vendor to confirm	
5.18.4	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor. Vendor to confirm	
5.18.5	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant. Vendor to confirm	
6.1	ULTRA ISOLATION TRANSFORMER	

S. No.	PARTICULARS & BHEL SPECIFICATION	BIDDER's OFFER [with Complete Technical Details]
6.1.1	Vendor to provide the technical / capacity details of Ultra-Isolation Transformer suitable for the machine.	
6.1.2	Procurement of Ultra Isolation Transformer is in BHEL Scope. Vendor to note.	
6.2	SERVO VOLTAGE STABILISER (SVS):	
6.2.1	Vendor to provide the technical / capacity details of Servo Voltage stabiliser suitable for the machine.	
6.2.2	Procurement of Servo Voltage Stabiliser is in BHEL Scope. Vendor to note.	
7.0	TOOLING:	
7.1	No. of Tool Holders – Vendor to specify	
7.2	Tooling system should consist of ISO indexable carbide inserts, capable of generating all the edge preparation styles as indicated in annexure 1 & clause 5.4. (Sufficient number of tools and inserts of each type should be quoted for one month operation on 3-shift basis at the output rate specified. Quantity may be indicated in the technical offer and price in the price offer) Cutting speed: Up to 150 meters per minute. Vendor to specify.	
8.0	DIAGNOSTIC SYSTEM	
8.1	FAULT DIAGNOSTIC SYSTEM:	
8.1.1	Vendor's own diagnostic system with required hardware and software should be supplied and installed on the CNC system. This should include customized auto-diagnostic system with supporting hardware and software, which shows detailed cause, and remedy for the fault on the display for faults related to mechanical and electrical maintenance. Vendor to confirm	
8.1.2	Help guide should be provided to use both diagnostic systems. Vendor to confirm	
9.0	LEVELING & ANCHORING SYSTEM: Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc should be supplied. Vendor to Confirm	
10.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE:	
10.1	The Vendor shall bring special tools and equipment required for erection of the machine. A tool kit for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer. Vendor to confirm	

S. No.	PARTICULARS & BHEL SPECIFICATION	BIDDER's OFFER [with Complete Technical Details]
10.2	Any Test mandrel required for checking & alignment of the machine, machine parts etc. should be supplied along with the machine. Vendor to confirm.	
11.0	SPARES:	
11.1	Itemized breakup of mechanical, hydraulic, electrical and electronic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. The list to include following, in addition to other recommended spares: (Unit Price of each item of spare should be offered) . Vendor to confirm	
11.2	Mechanical & Hydraulic Spares: All types of Pumps, Valves, Pressure Switches, Transducers, Flow Switches, Filters, Seals, O-rings, Hydraulic Hoses etc. Vendor to confirm	
11.3	Electrical /Electronic / CNC Spares: All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, , spares for CNC, Servo Motors for Feed Drives, Power Module & Control Cards for Main Drive as well as Feed Drives etc. Vendor to confirm	
11.4	All types of spares for total machine and accessories should be available for at least ten years after supply of the machine. If machine or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure these in advance, if required. Vendor to confirm	
11.5	Recommended set of spares for all attachments are to be offered with details. Vendor to confirm	
11.6	Vendor to confirm that complete list of spares for machine and accessories, along with item part no / specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine. Vendor to confirm	
12.0	DOCUMENTATION:	

S. No.	PARTICULARS & BHEL SPECIFICATION	BIDDER'S OFFER [with Complete Technical Details]
12.1	GA drawings, Machine detailed constructional drawings with dimensions, Civil Foundation layout drawings, Hydraulic / Pneumatic / Electrical / Electronic circuits with BOM, are to be submitted within 45 days from the date of ordering (in case of an order) for approval by BHEL. Vendor to confirm	
12.2	Tooling drawings for the ordered tooling are to be submitted within 60 days from the date of placing order, for BHEL approval before manufacturing, in case of an order. Vendor to Confirm	

S. No.	PARTICULARS & BHEL SPECIFICATION	BIDDER's OFFER [with Complete Technical Details]
12.3	<p>The following documents in English language should be supplied along with the machine:</p> <p style="text-align: center;">Hard Copies - 3 Sets Vendor to confirm In CD form - 1 Set</p> <ul style="list-style-type: none"> a) Operating manuals of Machine & its CNC System b) Programming manuals of Machine & its CNC System c) Maintenance manuals with all drawings of machine assemblies / sub-assemblies with parts list. d) Electrical circuit diagrams with bill of materials. e) Hydraulic circuit diagrams with bill of materials. f) Pneumatic circuit diagrams with bill of materials. g) Maintenance & Interface manuals for Machine Control System. h) Preventive Maintenance check list for Electrical and Mechanical System. i) Manufacturing drawings for all toolings, ordered along with the machine, including Tool Holders, Spindle Mounting details, Adapters etc. j) Catalogues, O&M manuals for all bought out items used in the machine. k) Operating Manuals, Maintenance Manuals & Catalogues for all supplied Accessories. l) Detailed specification of all rubber items / hydraulic / lubrication fittings m) PLC program print-outs with comments in English n) PLC program and data on CD, Flash Memory Card. o) Complete back up of hard disk on GHOST CD and clear written Instructions (3 copies) to take back up and reloading of a new hard disk. p) Complete list of Alarm log, Error code, error messages & remedies and on line fault diagnostics to be provided by the vendor. q) Complete list of spares for machine, along with item part no / specification / type / model and make & address of the sub-vendor. 	

13.0	TRAINING:	
13.1	The Vendor shall train BHEL Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and CNC System) of the Machine at Vendor's works for a period of two working days. Vendor to confirm.	
13.2	The Vendor shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance during the commissioning of the Machine at BHEL works five working days. Vendor to confirm	
13.3	Airfare, board & lodging for BHEL officials shall be borne by BHEL. Vendor to confirm	
13.4	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel. Vendor to confirm	
13.5	The training shall include specialised coaching in <ul style="list-style-type: none"> a) Safety b) Operation of the machine c) CNC System Operation, d) Trouble-Shooting, e) Software Application f) All special features of the machine g) Electrical / Mechanical / Electronics systems 	Vendor to confirm
14.0	FOUNDATION: Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Purchase Order. Complete Foundation details including static / dynamic load shall be submitted by the Vendor within three months after getting BHEL's approval. The layout should consist of all requirements pertaining to complete machine including space requirement for, Isolation Transformer, & any other accessories. BHEL shall construct complete foundation for the machine as per the Vendor's recommendation and drawing. Vendor to confirm	

15.0	ERECTION & COMMISSIONING	
15.1	Vendor to take full responsibility for complete erection and commissioning of the machine. Vendor shall start up, test the machine, its controls & all types of other supplied equipment, carrying out machining of test pieces etc. Vendor to depute their commissioning Engineer along with erection crew for installation. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by Vendor in their foundation/layout drawings. Other requirements like material handling & lifting tackles (wherever the EOT crane reach is not there), erection crew shall in supplier's scope. Details of these requirements should be informed by vendor in advance.	
15.3	Successful proving of BHEL components by the Vendor shall be considered as part of commissioning. All tests, as mentioned in (clause 19.0) shall form part of the commissioning activity. Vendor to confirm	
15.4	Tools, Tackles, instruments and other necessary equipment including any Laser equipment required to carry out all above activities should be brought by the Vendor. Vendor to confirm	
15.5	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	
15.6	Special equipment, like test mandrel, straight edge, dial indicators etc., should be supplied along with the machine. Vendor to confirm	
15.7	Commissioning spares, required for commissioning of the machine within stipulated time, shall be arranged by the vendor. Vendor to confirm	
15.8	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 colours of paint used. Vendor to confirm	
15.9	Schedule of Erection and Commissioning shall be submitted with the offer. Vendor to confirm	
15.10	Charges, duration, terms & conditions for E&C should be furnished in detail separately by Vendor along with offer. Vendor to confirm	

16.0	AMBIENT CONDITIONS & THERMAL STABILITY:	
16.1	Total machine including CNC system and all supplied items should work trouble free and efficiently under the given operating conditions and should give specified accuracies. The machine shall be suitable for an ambient temperature of +50°C and relative humidity of 85 % respectively, but both do not occur simultaneously. Vendor to note.	
16.2	Weather conditions are tropical, Atmosphere may be dust laden during some part of the year. Machine shall be kept in the normal shop floor condition. Vendor to confirm	
17.0	INSPECTION: The Machine shall be offered for inspection and performance trials to test the design capabilities of the machine in the presence BHEL Engineers, at Supplier's works before Dispatch. Vendor to confirm	
18.0	PROVEOUT OF BHEL COMPONENTS AT BHEL WORKS: The prove-out trials of the edge preparation shall be for the tube sizes given by BHEL during the technical discussions / at the time of releasing the Purchase Order. Vendor to confirm	
19.0	MACHINE ACCEPTANCE: (Tests/Activities to be Performed by Vendor)	
19.1	Tests/Activities to be carried out at Vendor's works on the machine before dispatch:	
19.1.1	Geometrical accuracies as per applicable standard test chart recommended by the Vendor. Detailed Test Charts for the same, clearly showing the accuracies to be achieved on the machine, shall be submitted with the offer. Vendor to confirm	
19.1.2	Positioning accuracies as per Applicable standard method recommended by the Vendor. Vendor to confirm	
19.1.3	Full load test to demonstrate the maximum power & cutting capacity of the machine. Vendor to confirm	
19.1.4	Demonstration of all features of the machine, control system & accessories. Vendor to confirm	
19.1.5	The machine production output, as specified in 2.9 shall be demonstrated at the supplier's works, for around 30 minutes continuous operation of the machine. Tube material shall be arranged by vendor. Vendor to confirm	
19.1.6	Materials for inspection: Tube material shall be supplied by BHEL. Vendor to Note.	
19.2	Tests / Activities to be carried out at BHEL works while commissioning the machine:	

Part-B / TECHNICAL SPECIFICATION - TUBE PARTING & EDGE PREPARATION SYSTEM

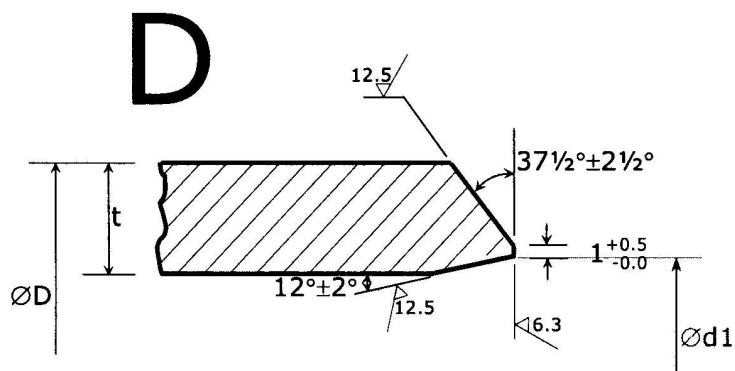
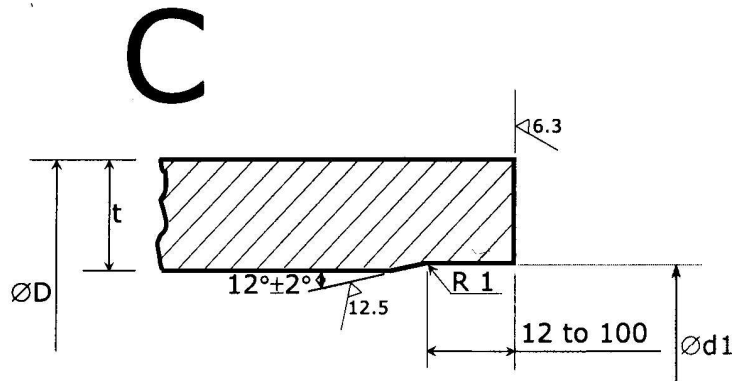
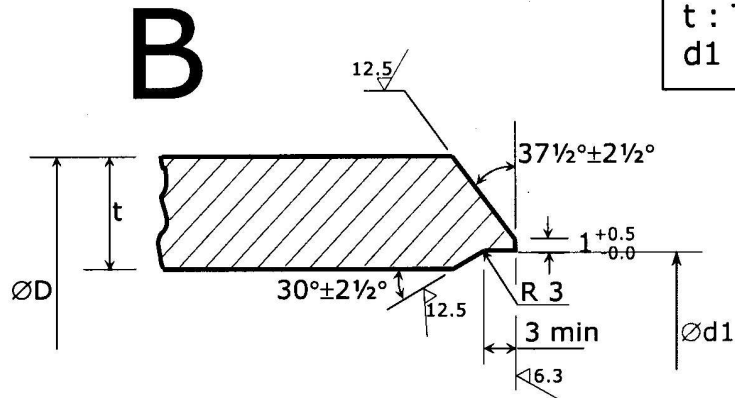
19.2.1	Geometrical accuracies as per. Applicable standard test chart recommended by the Vendor. Vendor to confirm	
19.2.2	Positioning accuracies as per Applicable standard method recommended by the Vendor. Vendor to confirm	
19.2.3	Full load test to demonstrate the maximum power & cutting capacity of the machine. Vendor to confirm	
19.2.4	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	
19.2.5	Machining of test pieces to perform the edge preparation profiles (As per Annexure 1) for minimum 3 tubes sizes of alloy steel / stainless steel . Vendor to confirm	
19.2.7	The production output of the machine shall be proved out by the commissioning Engineer at BHEL works for the Production rate mentioned in the specification. (Clause 2.9). Required Tubes will be supplied by BHEL. Vendor to Confirm.	
20.0	PACKING: Sea worthy & rigid packing for all items of complete machine, PC based PLC / 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 confirm	
21.0	GUARANTEE: Performance Guarantee to be given for 12 months from the date of commissioning. Vendor to confirm	
22.0	GENERAL:	
22.1	Machine Model No.	Vendor to specify
22.2	Total connected load (KVA):	Vendor to specify
22.3	Floor area required (Length, Width, Height) for complete machine & accessories	Vendor to specify
22.4	Machine lubrication: Automatic centralized lubrication system.	Vendor to specify
22.5	Hydraulic, Pneumatic & oil piping should be preferably metallic except places where flexible piping is essential. All the pipes required for the same shall be included in the standard scope of the machine.	Vendor to confirm
22.6	Painting of machine / electrical panel: RAL6011 Reseda Green (Polyurethane paint)	Vendor to confirm
22.7	All gears are to be hardened and ground	Vendor to specify.
22.8	Total weight of the machine (approx.)	Vendor to specify

Part-B / TECHNICAL SPECIFICATION - TUBE PARTING & EDGE PREPARATION SYSTEM

22.9	Weight of heaviest part of machine (approx.)	Vendor to specify	
22.10	Weight of the heaviest assembly / sub-assembly of the Machine (approx.)	Vendor to specify	
22.11	Dimensions of largest part/ sub-assembly/ assembly of the machine	Vendor to specify	
22.12	Detailed catalogues, sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.	Vendor to confirm	
23.0	SCOPE OF SUPPLY		
23.1	Supplier Scope		
	<ul style="list-style-type: none"> a) Design, Manufacture, Supply, Erection, Commissioning and prove out of Tube Parting & Edge Preparation System b) Tool Holders, & 100 Nos. of carbide inserts in each variety. c) All anchoring & foundation bolts, levelling plates for the complete machine d) Lifting tackles, material handling arrangement wherever the EOT crane reach is not there. e) Levelling Instruments, Power Tools / Hand Tools for erection. f) Welding machines and consumables required for erection g) Commissioning Engineer with erection crew h) Job Quality and Productivity Prove-out 		
23.2	BHEL Scope		
	<ul style="list-style-type: none"> a) Drawings approval b) Civil foundation work as per manufacturer's drawing c) Tube materials for trials and prove out d) EOT Crane inside shop e) Single Compressed air point at the location indicated in the drawing f) Single Electrical Supply point at the location indicated in the drawing g) Ultra Isolation Transformer & Servo Voltage Stabiliser 		

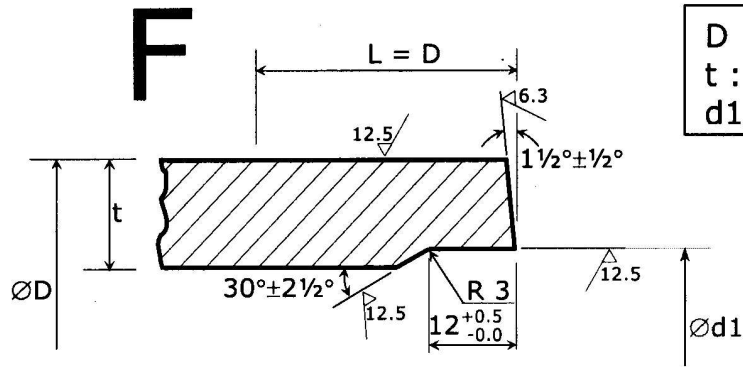
TUBE EDGE PREPARATION DETAILS

D : Tube OD
t : Tube thickness
d1 : Bore ID

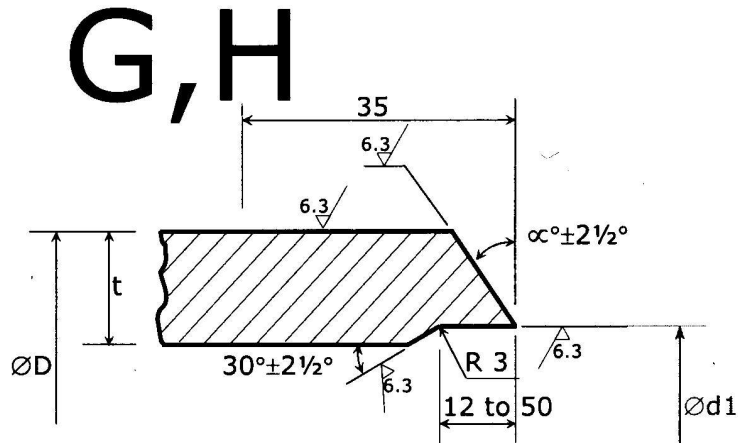


All dimensions are in mm
Drawing No. CABS-3-03N-01
BHEL, TIRUCHIRAPPALLI

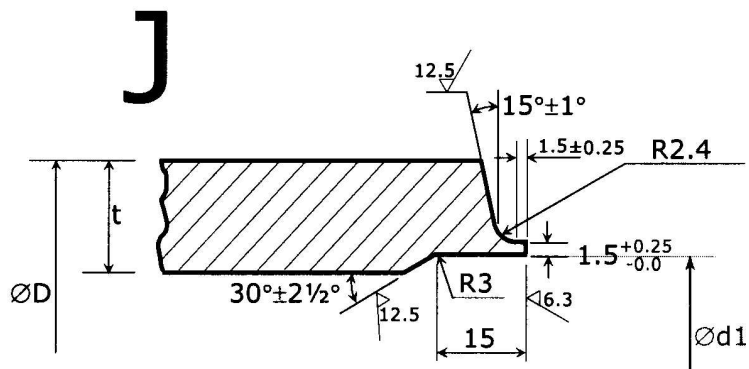
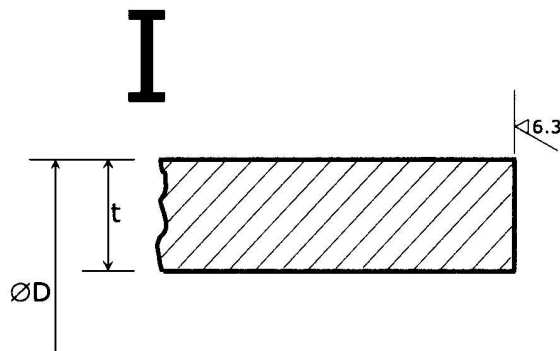
ANNEXURE - 1



D : Tube OD
 t : Tube thickness
 d1 : Bore ID

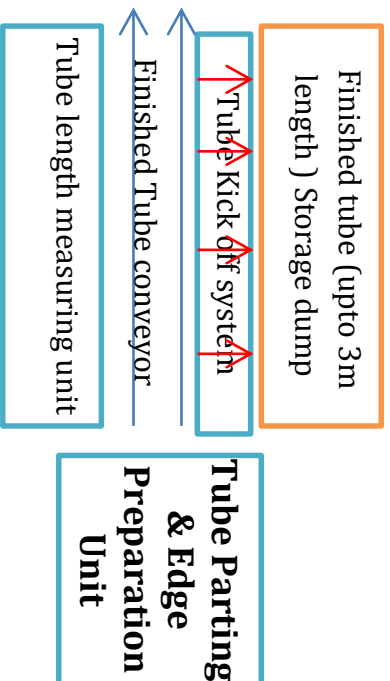


$\alpha = 45^\circ$ for $t \leq 5.6\text{mm}$ - G Style
 $\alpha = 37\frac{1}{2}^\circ$ for $t > 5.6\text{mm}$ - H Style



All dimensions are in mm
Drawing No. CABS-3-03N-02
BHEL, TIRUCHIRAPPALLI

Indicative sketch of General layout of Tube Parting & Edge Preparation machine



Tube Parting & Edge Preparation Unit

