



An ISO 9001  
Company

## Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

<b>ENQUIRY</b>	Phone: +91 431 257 76 53 Fax : +91 431 252 00 31 Email : <a href="mailto:skaruna@bheltry.co.in">skaruna@bheltry.co.in</a> Web : <a href="http://www.bhel.com">www.bhel.com</a>
<b>NOTICE INVITING TENDER</b>	

<b>TWO PART BID</b> Tender to be submitted in two Parts	<b>Enquiry Number:</b> <b>2851300020</b>	<b>Enquiry Date:</b> <b>18.10.2013</b>	<b>Due date for submission of quotation:</b> <b>23.11.2013</b>
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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	<b>Tube Rotoblast Station with Tube Handling Facility</b> as per the technical specification & commercial conditions applicable (to be downloaded from web site <a href="http://www.bhel.com">www.bhel.com</a> or <a href="http://tenders.gov.in">http://tenders.gov.in</a> )	01 No.	31.12.2014	F.O.R, BHEL Stores, POWER EQUIPMENT FABRICATION PLANT, BHARAT HEAVY ELECTRICALS LIMITED, Mundipar- 441804, Sakoli Taluk, Bhandara District, Maharashtra State.

### Important points to be taken care during submission of offer

1. The rate of EMD for this Tender will be ( INR ) : 1,50,000/-
2. The Compliance Form for Commercial Terms & Conditions to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
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.

**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 above Enquiry reference.**

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 ROTOBLAST STATION  
PART A – QUALIFYING CRITERIA**

SINo	Requirements	Vendor's Response
<b>1.0</b>	<b>QUALIFYING CRITERIA</b>	
1.1	The BIDDER / VENDOR (OEM) shall have a minimum of TEN Years of Continuous Experience in the Design, Manufacture & Supply of “ <b>Custom Built Wheel blasting stations</b> ”. Vendor may indicate the actual no. of years of experience in the field	
1.2	<p>Only those vendors (<b>OEMs</b>), who have manufactured, supplied and commissioned at least one“<b>Custom built Wheel Blasting Station</b>”having all the following features:</p> <p><b>1. Continuous Tube blasting</b></p> <p><b>2.Shot blasting</b></p> <p><b>3. Surface finish – SA 2½ (as per Swedish standard)</b></p> <p><b>4. Speed of tube travel : Minimum 4 m/min</b></p> <p>in the past ten years are only eligible to quote.</p> <p>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	Vendor has to submit at least one Performance Certificate from their customers in India, for satisfactory performance of “ <b>Custom built Wheel Blasting Station</b> ” 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.	
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.	
<b>2.0</b>	<b>INFORMATION TO BE PROVIDED BY VENDOR</b>	
2.1	The BIDDER / VENDOR to furnish Reference List of Customers, with complete address, details of contact person, where <b>Custom built Wheel Blasting Stations</b> have been supplied in the past.	
2.2	Specify details of <b>Custom built Wheel Blasting Stations</b> supplied to other units of BHEL, if any (Year of commissioning, type of station, type of jobs shot blasted etc.)	
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.	

Suggestive Format of Performance Certificate:

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 Machine Details :
  - a) Length of tubes (m)
  - b) Blasting medium (Shot size)
  - c) Speed of tube travel (m/min)
  - d) Surface finish
- 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 ROTOBLAST STATION WITH TUBE HANDLING FACILITY**

**PART - B: Technical Specification**

**Note:-**

1. 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. The offer and all documents enclosed with offer should be in **English language** only.

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

**Scope:** - Supply, Erection & Commissioning of **Tube Rotoblast Station with Tube Handling Facility** for BHEL complying with the specification as below.

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR’S OFFER with complete technical details
<b>1.0</b>	<b>PURPOSE:</b>	Tube rotoblast station is intended for outer surface cleaning by shot blasting of seamless steel tubes of diameters ranging from 38.1 to 63.5mm that are used in high pressure boiler components.	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
2.0	<b>APPLICATION</b>	a) The shot blasting operation shall be carried out automatically by Impinging cast steel shots (S280 and S330) at high velocity through centrifugal blast wheel(s) mounted inside the blasting chamber. b) The machine shall have an integrated facility for tube in feed and out feed, Tubes rotation, shots loading, dust extraction, shots recovery and shots recycling, chimney. c) The basic machine with all the Sub-Systems, Accessories & Attachments are to be designed for working in three shifts (8 hour shift) a day.	
3.0	<b>PRODUCTIVITY</b>	The machine is expected to have a surface cleaning capacity of 3000 pass meters in total for dia. 63.5mm tubes, with in-feed of <b>Two tubes</b> at a time on an average - in a shift of 8 hours.	
4.0	<b>TUBE DETAILS</b>		
4.1	Tube Material	Carbon Steel and Alloy Steel	
4.2	Tube Outer Diameter Range	38.1 to 63.5 mm	
4.3	Tube max. thickness	15 mm	
4.4	Tube Length range	5000 mm to 15000 mm	
5.0	<b>SURFACE FINISH</b>		
5.1	Surface Finish after shot blasting	Surface finish required is equivalent to SA 2½ as per Swedish Standard SIS 0559 00-1967 uniformly over the tube surface.	
5.2	Shots size and grade	Cast Steel Shots – S330 (dia.0.84mm) and S390 (dia.0.99mm)	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
6.0	<p><b>MACHINE CONFIGURATION:</b></p> <p>The machine has to be configured with the following sub-systems, integrated in total to give the desired results :</p>	<ol style="list-style-type: none"> <li>1. Infeed Tube Storage Rack with stopper.</li> <li>2. Tube Kick-Off System 'lift and tube roll type' from Infeed tube storage rack to infeed roller conveyor.</li> <li>3. Tube In-feed Roller Conveyor system.</li> <li>4. Inlet vestibule chamber.</li> <li>5. Blasting chamber with blasting wheels.</li> <li>6. Outlet vestibule chamber.</li> <li>7. Tube out-feed Roller conveyor system.</li> <li>8. Tube kick off system from out-feed roller conveyor to finished tube storage rack.</li> <li>9. Finished tube storage rack with stopper facility at out-feed</li> <li>10. Steel shots loading, feeding, recovery and recycling system.</li> <li>11. Dust extraction system with integrated chimney.</li> <li>12. Centralized control unit for controlling the above systems.</li> <li>13. The rotoblast station shall be capable of blasting two / three tubes in one pass.                             <ul style="list-style-type: none"> <li>• 2 Tubes of OD 63.5mm, shall be blast cleaned together in one pass.</li> <li>• 3 Tubes of OD 38.1mm shall be blast cleaned together in one pass.</li> </ul> </li> <li>14. The equipment design should ensure <b>nilshot leakage</b> from any part of the shot blasting system / sub-system.</li> </ol>	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
<b>7.0</b>	<b>TUBE IN-FEED&amp;OUT-FEED TUBE STORAGE RACKS (Pl. Refer to Indicative general arrangement in Annexure – I)</b>		
7.1	In-feed side Tube Storage Rack with tube handling system	<ul style="list-style-type: none"> <li>a) Tubes will be loaded to the storage rack in the form of bundles</li> <li>b) At a time, TWO bundles may be loaded in the storage rack.</li> <li>c) Each tube bundle size will be equivalent to that formed by 20 tubes of OD 63.5 mm or 40 tubes of 38.1mm.</li> <li>d) Max. weight of two tube bundles loaded on rack : 10 Tons</li> <li>e) Storage rack shall have flat portion of minimum 1m width to load the bundles. Height of the flat portion from the ground shall be 1.5m.</li> <li>f) Storage Rack shall have Bundle Stops to hold the tubes in bundle form.</li> <li>g) Sloping rack shall start after the straight portion. Angle of slope shall be 2-3 degrees. Vendor to specify the angle</li> <li>h) Width of the sloping rack shall be 3m.</li> <li>i) Release of Bundle Stop shall spread the bundled tubes (single layer of tubes) on the sloping stand, without causing damage to the tubes and the storage system.</li> <li>j) Bundle stops to be operated by a centralised pneumatically actuating system.</li> <li>k) The in feed stand shall be lined with Teflon / nylon so that noise generated when tubes rolling over is minimum</li> <li>l) Pneumatically operated 'Lift and tube roll type' tube kick-off system to be provided to lift two or three tubes from storage rack and shift to the infeed conveyor. Vendor to furnish details.</li> <li>m) A stopper mechanism before kick-off facility. Vendor to specify</li> </ul>	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
7.2	Out-feed side Tube Storage Rack with tube handling system	a) The shot blasted tubes shall be smoothly kicked-out onto the out feed stand. b) The Out feed stand shall have a width 3m c) The Out feed stand shall be lined with heat resistant Teflon / nylon so that noise generated when tubes roll over is minimum d) The out feed stand shall have a stopper arrangement to hold the tubes as they are spread out on the stand e) The tubes from the out feed stand shall roll over smoothly into the storage dump, when the stopper is released. f) Storage dump shall have a width 1m g) The storage dump shall be so designed that the tubes can be bundled h) Wooden blocks to be provided in the storage dump so that the sound of tube falling into the dump can be dampened.	To be discussed and finalized.
7.3	Constructional Details	a) In-Feed side rack shall be made of stands & supports, including bundle stops with proper design so that no damage occurs with the style of impact loading and rough handling of tubes. b) The minimum thickness of sections and plates used for the structure construction should be NOT less than 7.5 mm. c) A schematic diagram shall be furnished with the offer for the In-Feed and Out-Feed Tube Feeding System.	
<b>8.0</b>	<b>TUBE IN- FEED AND OUT-FEED CONVEYORSYSTEM</b>		
8.1	Basic Configuration	a) The tube should rotate on its axis as it moves through the blast chamber for exposing the surface easily to the blast media. b) The tube feeding rollers should be supported outside the blasting chamber (with suitably projecting out) by the sealed bearing such that stray shots will not affect or clog the rollers.	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
		c) Tube Feeding Rollers should be supported on either side of the chamber. d) Width of the roller to be specified by vendor. e) Rollers within the blast cabinet shall be of 11%-14% austenitic manganese steel f) Number of rollers shall suit the length of tubes handled g) Rollers are to be positioned at a pitch distance of 300mm between rollers and the roller outer diameter shall not be less than 100mm. h) Roller plate thickness shall not be less than 6mm i) Roller Drive chain shall be provided with tension adjuster, for the entire length of roller conveyor so as to maintain roller & tube contact always, to maintain the feed rate. j) Suitable Guide roller arrangement on in feed and out feed conveyor system. Vendor to specify and furnish details.	
8.2	Conveyor Type	Skew – Roll Drive type Conveyor Angle of skew to be specified by the vendor.	
8.3	Line Speed (Tube Feed Rate)	Steplessly Variable up to 5m/min. [approx.] - to match the expected productivity level	
8.4	Line Drive	Infinitely Variable Speed	
8.5	Design Parameters	a) Vendor to furnish a schematic sketch of the Roller and Drive Arrangements b) Vendor to specify the Speed and Rating of Electric Motors and details of the Drives selected. c) Movement of loaded tubes in and out of the chambers should be uniform and not to roll over on each other.	
<b>9.0</b>	<b>INLET &amp; OUTLET VESTIBULE CHAMBERS</b>		
9.1	Material	Mild Steel with Structural reinforcement	

Tube Rotoblast Station with Tube Handling facility – Part B

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
9.2	Vestibule Wall Thickness	6 mm (minimum)	
9.3	Chamber lining	High wear resistant 3mm thick vulcanised rubber with 16 Gauge spring steel inserts.	
9.4	Vestibule Dimensions	Vendor to submit the dimensions for approval by BHEL	
9.5	End Curtains	High wear resistant Polyurethane flexible curtains of 6 mm thick with 40-45 shore hardness to prevent leakage of shots past the inlet and exit tube passage. Details of arrangement to be furnished with the offer.	
<b>10.0</b>	<b>BLASTING CHAMBER</b>		
10.1	Material – Chamber Wall	Mild Steel with structural reinforcement	
10.2	Chamber Wall Thickness	8 mm (minimum)	
10.3	Material-Inside back plate Lining	11 to 14% Austenitic Manganese Steel	
10.4	Back plate Lining Thickness	8 mm (minimum)	
10.5	Replaceable Liners (for the entire chamber)	Shall be of 11 to 14% Austenitic Manganese Steel (Minimum 10 mm thickness)	
10.6	Chamber Dimensions	Vendor to furnish, to meet the productivity level specified	
10.7	Service Doors for Inspection & Maintenance	To be provided with suitable safety interlock to stop the machine operation when doors are open.	
10.8	Suitable air vents and exhaust boxes shall be provided.	Vendor to confirm & provide details	
<b>11.0</b>	<b>BLAST WHEEL UNIT</b>		
11.1	Number of Blast Wheel Unit	Minimum - Two. Vendor to specify	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
11.2	Type	Centrifugal	
11.3	Shot Velocity	Preferred in the level of 80 m/sec. Vendor to furnish details	
11.4	No of Blades	Vendor to furnish details [with a minimum of 8 per blast wheel]	
11.5	Shot throughput in kg/min	Vendor to furnish details	
11.6	Motor Power	Vendor to furnish details	
11.7	Wheel Speed	Vendor to furnish details	
11.8	Blasting Surface Area	Vendor to furnish details	
11.9	Constructional Features	a) Centre fed impeller [Vendor to furnish details]. b) Angle adjustment with reference to surface finish of the control cage arrangement on outside the chamber. c) Clock dial type control cage to control shot feed. Should be easy & should not involve removal / shifting of any other item to gain access. d) Wear resistant & easily replaceable blades. Vendor to specify the blade material. e) Heavy steel plate wheel housing completely lined with wear plates assembled to overlap one another and prevent wear and abrasive leakage. f) Impeller blade life. Vendor to specify the life of offered blades.	
<b>12.0</b>	<b>ABRASIVE (STEEL SHOT) RECOVERY &amp; RECYCLING SYSTEM</b>		
<b>12.1</b>	<b>Hopper &amp; Screw Conveyor</b>		
12.1.1	Construction	a) 6mm thick gravity fed hopper supported on base frame beneath blast chamber b) Helicoids Conveyor with guard of suitable capacity.	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
		c) To convey spent steel shots and dusts from various chambers to the elevator boot section. d) Helicoid plate thickness should be 6 mm (min) with hard facing on the periphery. e) The conveyor support within the chamber shall be with sealed dust proof bearing system and easy approach from outside for easy maintenance. f) Chamber with a long rubber beaded door for inspection and opening	
12.1.2	Conveyor motor rating	Supplier to specify	
<b>12.2</b>	<b>Belt Type Bucket Elevator</b>		
12.2.1	Features	a) To convey spent abrasives from lower conveyor to the abrasive separator system. b) Provision to compensate for belt slackness outside the chamber c) Back-stop arrangement to prevent the belt from slipping down during sudden stoppage d) Bucket elevator to be housed in a ventilated dust-tight fabricated steel casing provided with inspection doors e) The boot section of the bucket elevator shall be at floor level	
12.2.2	Bucket material	Cast Iron – Vendor to confirm	
12.2.3	Belt material	Cotton fabric 6 ply, 15mm thick. Vendor to confirm	
12.2.4	Elevator motor rating	Vendor to specify.	
12.2.5	Design Parameters	Vendor to specify the following a) Bucket material and thickness b) Elevator motor rating	
<b>12.3</b>	<b>Abrasive Separator Unit</b>		

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
12.3.1	Minimum Constituents	The offered Abrasive Separator shall have : a) Counter flow air wash separator b) Removable screen for trapping coarse particles c) Refuse hopper for fines with non-return valves for discharge of fines d) Integral storage hopper for reclaimed abrasives [Vendor has to specify the hopper capacity] e) Abrasive level indicator	
12.3.2	Abrasive loading	Shall be designed at floor level for easy manual loading	
<b>12.4</b>	<b>Abrasive Feeding Unit</b>	a) By means of feed pipes connecting storage hopper and blast wheel unit b) Solenoid operated, pneumatic cylinder actuated control valve for feeding shots to the blast-wheel unit c) Manual shut-off valve for cutting-off shot feed to the blast-wheel unit during maintenance	
<b>12.5</b>	<b>DUST COLLECTOR</b>		
12.5.1	Basic Design Features	a) Type - Continuous automatic Pulse jet b) Filter media – by Cartridge filters c) Cleaning of Filters shall be by reverse air flow d) Cleaning cycles shall be Timer controlled / programmable e) Differential Pressure Sensing to initiate cleaning cycle f) Dust hopper with manual slide gate for dust removal g) Should include supporting structures for floor mounting h) Chamber shall be of water proof design to avoid the mixing of moisture with dust and forming paste during rainy seasons. i) Particulate emission at outlet shall be not more than 100mg/Nm <sup>3</sup> for particle size greater than or equal to 5 micron j) Suction Duct work from shot blasting chamber to the dust collector	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
		- For a separation distance of maximum 6 m. k) Side opening door for ease of approach for maintenance.	
12.5.2	Basic Design Parameters	Vendor to specify the following: a) Dust Collector Model & Make b) Capacity c) No of filter cartridges d) Filter area e) Capacity of Exhaust Fan suitable to purge the entire system f) Exhaust Fan motor rating & speed g) Ducting details from the Dust Collector to Exhaust Fan	
13.0	<b>CHIMNEY</b>	a) Height of Chimney shall be 25 m. b) Traverse ports shall be provided at two elevations. One at 5 m elevation and the other at 2/3 rd the height of chimney, from floor level. Suitable cowl at the top to be provided. c) At each elevation four ports shall be provided 90 degrees apart. Each port hole shall be of dia. 100 mm. At each port hole a standard pipe, 100mm long shall be welded. The other end of the pipe shall be provided with a bolted dummy flange. d) Platform shall be provided around the chimney, 1 m below each traverse plane, with hand rails, toe guard and approach ladder. e) A weather protection cowl should be provided at the top. f) The chimney drawings indicating the traverse ports shall be furnished to BHEL upon receipt of purchase order g) Lightning arrester to be provided.	
14.0	<b>SYSTEM INTERLOCKS</b>	a) All necessary interlocks to ensure safety of equipment & personnel operating the equipment b) Service doors to be interlocked with blast wheel unit such that the	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
		blast unit shuts off if service door is opened, during the blasting operation and the blast wheel unit cannot be started unless service door is fully shut.	
<b>15.0</b>	<b>OPERATION AND CONTROL SYSTEM</b>		
15.1	Machine Operation	The entire cycle of tube shot blasting operation shall be controlled automatically through suitable PLC control system. Manual operation of sub-systems, with safety interlocks, should be provided for trouble shooting.	
15.2	Control System	Controls shall be <b>PLC based</b> .	
15.3	PLC Make	PLC of MESSUNG, MITSUBISHI, SEIMENS, ABB, AB, L&T or reputed make acceptable to BHEL.	
15.4	PLC Model	Model - suitable and latest version shall be offered. Vendor to furnish details of the model.	
15.5	Operator Control Station	Operator's Panel having complete machine control system with suitable display unit of required configuration shall be provided for convenient and efficient operation. All switches should be within reach of operator. All displays/indications should also be conveniently placed. The control station shall be kept at a convenient location for setting the cycles and for operation.(Layout showing complete details should be submitted with the offer)	
15.6	Fault diagnostic system	Fault diagnostic system should be provided to show the faults on the display and detailed cause, and remedy for the faults related to mechanical and electrical maintenance.	
15.7	Alarm system	To display with alarm for the fault related to mechanical and electrical pneumatic systems	
15.8	Help guide	Help guide should be provided to use both diagnostic systems	
<b>16.0</b>	<b>LUBRICATION</b>	Details of the Lubrication provided in the machine to be furnished.	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
16.1	First Fill	First filling of Grease / Oil should be supplied by vendor. Indian equivalent shall be mentioned.	
<b>17.0</b>	<b>PNEUMATIC SYSTEM</b>	The pneumatic operated elements of the machine shall work efficiently with BHEL compressed air supply at a pressure of 4.5 to 5kg/cm <sup>2</sup> .	
17.1	Supply Point	BHEL will provide compressed air at only one point near / on the machine. All the other distribution lines are under supplier scope.	
17.2	FRL Unit	Vendor shall provide suitable filter-regulator-lubrication (FRL) unit at this point	
17.3	Air Dryer	Refrigerant type Air Dryer of suitable capacity. Vendor to provide details	
17.4	Pneumatic Piping	Pneumatic piping should be preferably metallic except places where flexible piping is essential with suitable pneumatic fittings for Polyurethane end connections. All the pipes required for the same shall be included in the standard scope of the machine.	
17.5	Pneumatic elements	Make shall be FESTO, SMC, NORGREN only	
<b>18.0</b>	<b>ELECTRICAL &amp; ELECTRONICS SYSTEMS</b>		
18.1	Electrical Power Input	AC 3 Phase supply, 415 V ± 10 %, 50 Hz ± 2 % through a 3 Wire System. No neutral conductor.	
18.2	Electrical Supply Point	Electrical power supply will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All cables, connections, circuit breakers etc. required for connecting BHEL's power supply to the machine shall be in the scope of vendor.	
18.3	Power Requirement	Vendor has to indicate the total tentative power requirement (including that for all the accessories and attachments) in kVA with the offer.	
18.4	Control Voltage	The Control Circuit Voltage shall be 24 V DC	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
18.5	Lighting for panels	All electrical and electronic panels should be provided with fluorescent lamps for sufficient illumination and power point of 220V, 5/15A AC. All adapters /receptacles should have compatibility with Indian equivalents.	
18.6	Earthing	Vendor should ensure the proper earthing for the machine and its peripherals.	
18.7	Cable Routing	Cables shall be routed through totally enclosed cable trays. There shall not be cable trenches.	
18.8	Tropicalization	All electrical / electronic equipment shall be tropicalized.	
18.9	Electrical Cabinet	All electrical components in the cabinets should be mounted on DIN Rail	
18.10	Electrical Cabinet protection	All electrical & electronic control cabinets & panels should be vermin and dust proof. All Electric enclosures shall have IP 54 protection	
18.11	AC for Electrical Cabinet	Air Conditioners with Dehumidifiers of suitable capacity to be provided for all Electrical/Electronic Panels/Cabinets. <b>Make:</b> Rittal/Warner & Finley or any other reputed make acceptable to BHEL. Vendor to provide details.	
18.12	Electrical & Electronic cabling	All feedback systems & field sensors, limit switches, proximity switches, pressure switches, temperature controllers, should be for heavy duty application and wired up with flexible PVC insulated screened cables. All field elements shall have easy accessibility for maintenance. External wiring from / to control panel, control desk, external motors etc. shall be by means of screened multi-core cables	
18.13	Electric Motors ( EFF 1)	All Electric Motors shall be of any of the following makes : SIEMENS / ABB / CROMPTON GREAVES/ BBL or makes conforming to IEC Standards	
18.14	Motors & Components	Motors & other electrical components shall conform to IEC or Indian Standards	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
18.15	Electrical drives system	VFD shall be from ABB, L&T, DANFOSS, SIEMENS, EUROTHERM (SSD) or reputed make acceptable to BHEL.	
18.16	Gear boxes	Make shall be from ELECON, SHANTHI GEARS, CROMPTON GREAVES, BONFIGLIOLI etc., or any other reputed make acceptable to BHEL.	
<b>19.0</b>	<b>Painting</b>	a) The heavier machine parts are to be heat-treated after fabrication and shot blasted for surface preparation prior to painting. b) One coat of Primer c) Two coats of Polyurethane Paint (Colour–Reseda Green–RAL 6011)	
<b>20.0</b>	<b>MACHINE SPARES</b>		
20.1	Operating Spare Parts	The Supplier shall LIST DOWN with the OFFER, the complete set of replaceable parts / items / components coming in the Machine and other Sub-Systems / Accessories / Attachments and shall QUOTE the Unit Price for each item.	
20.2	Commissioning Spares	Vendor has to COMPULSORILY quote for the spares of the following items with the OFFER : a) Blasting Blades – 4 Sets b) Elevator belt – 1 set	
<b>21.0</b>	<b>Pre-dispatch Inspection</b>	In case the Shot Blasting Station cannot be inspected in the assembled condition at supplier's works, the supplier has to offer the complete quantum of materials, semi-finished/finished machine components, sub-assemblies, bought-out items, spares, consumables, etc. required to build the shot blasting station in total, along with one set of O&M documentation for inspection, at the supplier's works, by BHEL Engineers prior to despatch from the supplier's works.	
<b>22.0</b>	<b>ERECTION &amp; COMMISSIONING</b>		
22.1	Mechanical Erection	Erection of the Equipment shall be done by the SUPPLIER'S SERVICE ENGINEER & Erection Crew	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
22.2	Commissioning	Commissioning of the Equipment and Smooth Functioning of all the Sub-Systems (at BHEL Works) shall be ensured and will be the SOLE RESPONSIBILITY of the Supplier.	
22.3	Performance Prove-Out at BHEL	After the successful commissioning of the machine and sub-systems, the COMMISSIONING ENGINEER of the Supplier have to establish the Performance Prove–Out for the Machine’s Capability and the Production Rate from the Machine, as given under the Specification <b>Clause S.No. 2.0</b>	
<b>23.0</b>	<b>MACHINE DOCUMENTATION</b>		
23.1	O & M Manuals	a) Three Copies of the Operation & Maintenance Manual with preventive maintenance checklist to be given in Hard Bound Paper Copies with one copy in CD form (SOFT COPY) b) The following documents and details [given under the Clause Sl. No. 23.2] shall form part of the Operation & Maintenance Manual	
23.2	Documents and Technical Details	a) GA Drawing of the Roto Blasting Station. b) GA Drawing of Individual Mechanisms. c) Sub-Assembly Drawings (without dimensions) for sub-systems for maintenance purpose. d) Electrical Wiring Drawings–Power &Control Circuits. e) Complete Printed Circuit Board Schematics indicating check points (Test Points) for Electronic Controls. f) Pneumatic Circuit Diagram g) Specifications/Ratings of All Bought-Out-Items. h) Warranty / Guarantee Card for all Bought-Out-Items i) Technical specification of the total equipment. j) Safety instructions k) Test certificates for all bought out items as applicable.	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
		l) Trouble Shooting Chart for Main and all Sub-Systems m) Steel Shots – Quantity, Mix, selection & specification n) Name and address of suppliers for rollers, liner plates, rubber items. o) Total weight of the Machine & Sub-Systems p) PLC software CD q) PLC programme both soft and hard copy. r) Programming manual in PDF format	
24.0	<b>TRAINING</b>	The Supplier's Service/Application Engineer shall train BHEL Engineers in the Operation, Trouble Shooting and Maintenance of the ROTO-BLAST Machine at BHEL Works for a minimum period of 10 Working Days, after the SUCCESSFUL COMMISSIONING of the Equipment, at BHEL Works.	
25.0	<b>TECHNICAL OFFER</b>	The Technical Offer shall contain the following : a) Complete Scope of Supply, including Main Equipment, Job Handling Unit, All Accessories and Attachments, etc. b) List of Operating Spares, Commissioning Spares, Foundation / Anchoring Materials c) Erection, Commissioning and Performance Prove-Out Details. d) Complete description of all systems & sub-systems forming part of the Roto-Blast Station e) A schematic diagram showing the layout of the machine & associated systems with salient dimensions f) The operating sequence of the machine with broad outline of various operations involved	
26.0	<b>DRAWING APPROVAL</b>	Vendor to submit all manufacturing drawings related to the equipment for BHEL approval within 1 month of ordering by BHEL. BHEL shall provide approval within 15 days after all the clarifications	

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
		sought have been submitted by supplier. Within one month after BHEL approval of manufacturing drawings, supplier to submit foundation drawing with details of static & dynamic loads including for chimney.	
<b>27.0</b>	<b>GENERAL</b>	The machine configuration and element arrangement should have easy accessibility, higher rigidity, self-aligning /fitting, locking & piloting arrangement of machine components and modules.	
<b>28.0</b>	Noise Level	The noise generated out of the machine and sub-systems, during its running, shall not exceed the level of 85 dB (A).	
<b>29.0</b>	Safety Guards	The Roto-Blasting Machine to have Safety Guards / Sliding Doors for protection against the splash/stray flying shots for the Machine Operators. Vendor to submit details on this arrangement.	
<b>30.0</b>	Ambient Atmospheric Conditions	a) The ROTO-BLAST Machine with all Sub-Systems shall be suitable for operation in an ambient temperature of 25 to 50°C and with a Relative Humidity of 85%. b) The entire equipment shall be tropicalized in Design and construction.	
<b>31.0</b>	<b>PERFORMANCE GUARANTEE</b>	The Performance of the Total Equipment and/or the Components / Sub-Assemblies / Bought-Out-Items shall be guaranteed for a minimum period of 12 months from the date commissioning at BHEL Works OR 18 Months from despatch.	
<b>32.0</b>	<b>SCOPE OF SUPPLY</b>		
32.1	Supplier Scope	1. Design, Manufacture, Supply, Erection, Commissioning and prove out of Tube Roto Blast Station 2. First fill of shots, oil, grease 3. All anchoring & foundation bolts, levelling plates for the complete machine and chimney	

Tube Rotoblast Station with Tube Handling facility – Part B

S. No.	PARTICULARS	BHEL SPECIFICATION	VENDOR'S OFFER with complete technical details
		<ol style="list-style-type: none"> <li>4. Levelling Instruments, Power Tools / Hand Tools for erection.</li> <li>5. Crane for chimney erection and other peripherals where there is no reach of shop EOT crane.</li> <li>6. Welding machines and consumables required for erection</li> <li>7. Commissioning Engineer with erection crew</li> <li>8. Job Quality and Productivity Prove-out</li> </ol>	
32.2	BHEL Scope	<ol style="list-style-type: none"> <li>1. Drawings approval</li> <li>2. Civil foundation work as per manufacturer's drawing</li> <li>3. Tube materials for trials and prove out</li> <li>4. EOT Crane inside shop</li> <li>5. Single Compressed air point at the location indicated in the drawing</li> <li>6. Single Electrical Supply point at the location indicated in the drawing</li> </ol>	

**INDICATIVE GENERAL ARRANGEMENT OF TUBE ROTO BLAST STATION**

