An ISO 9001 Company

Bharat Heavy Electricals Limited
(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY **NOTICE INVITING TENDER**	Phone: +91 431 257 79 38 Fax : +91 431 252 07 19 Email : tvenkat@bheltry.co.in Web : www.bhel.com

TWO PART BID Tender to be submitted in two Parts	**Enquiry Number:** **2620900203**	**Enquiry Date:** **23.09.2009**	**Due date for submission of quotation:** **02.11.2009**

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

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
10	**Tube Transfer and Feeding System (24 M) Tube Handling System for STBW – 24 M** as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	**2 Nos**.
20	**Tube Transfer and Feeding System (108 M) Tube Handling System for STBW – 108 M** as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	**1 No**.

Important points to be taken care during submission of offer:

1. **Delivery required 10 months from the date of purchase order.**
2. **Grace period of 2 months beyond the above delivery period will be considered.**
3. **Check-list to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.**

BHEL's General guidelines / instructions 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 **"2620900203".**

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 Manager / Capital Equipment / MM

PART A
TUBE HANDLING SYSTEM FOR STBW

SECTION – I : QUALIFYING CRITERIA

The BIDDER has to compulsorily meet the following requirements to get qualified for considering the technical offer:

S. No.	REQUIREMENTS	VENDOR's RESPONSE
1	Only those vendors (**OEMs**), who have supplied and commissioned at least **ONE Handling system for long tubes/rolled section** the past ten years (from the date of opening of Tender) and such machine is presently working satisfactorily for more than one year after commissioning (from the date of opening of Tender) should quote. However, if such machine had already been supplied to BHEL, then that machine should be presently working satisfactorily for more than six months after it's commissioning and acceptance (from the date of opening of Tender).	
	The vendor should submit following information where similar machine has been supplied for qualification of their 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	Application for which the machine is supplied	
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.**	
1.7	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.	
2.0	**DELIVERY** - The bidder shall quote the best possible delivery. However the delivery shall not exceed 10 months with an additional grace period of 2 months. The additional grace period will attract a penalty which is explained in the commercial terms of the enquiry. The delivery period shall be reckoned from date of purchase order to despatch from the vendor works.	

3.0	The BIDDER / VENDOR shall have a minimum of FIVE Years of Continuous Experience in the Design, Manufacture & Supply of Material Handling Systems for Engineering / Fabrication Industries. Indicate the actual experience.	

SECTION – I I

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

S. No.	REQUIREMENTS	VENDOR's RESPONSE
4.0	The BIDDER/VENDOR to furnish Reference List of Customers, with full address, details of contact person, where Handling system for long tubes/rolled section have been supplied in the past.	
5.0	Details of Handling system for long tubes/rolled section supplied to other BHEL units, if any. (Year of commissioning, Length, section size)	
6.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Address of Agents / Service Centers in South India.	
7.0	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

SECTION – III

The BIDDER to note:

S. No.	PARTICULARS	VENDOR'S RESPONSE
8.0	The BIDDER / VENDOR shall submit the offer in TWO PARTS. 1. Technical Offer [with PART A & PART B] & commercial offer 2. Price Bid.	
9.0	The Technical Offer shall contain a comparative statement of Technical **Specifications demanded by BHEL** and **Offer Details submitted by the Bidder**, against each clause. A just 'CONFIRMED' or 'COMPLIED' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement where specific details are required may lead to disqualification of the Technical Offer.	
10.0	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.	
11.0	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.	

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) Length b) Tube diameter/Section c) Application	
6. Performance of the Machine (Strike off whichever is not applicable)		Satisfactory **/** Good **/** Average **/** Not Satisfactory
7. After sales service (Strike off whichever is not applicable)		Satisfactory **/** Good **/** Average **/** Not Satisfactory
8. Any Other remarks		
Date:		Signature & Seal of the Authority Issuing the Performance Certificate

PART B

TECHNICAL SPECIFICATIONS for TUBE HANDLING SYSTEM for R T R STATION [24 M]

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
1.0	AREA OF APPLICATION	1. The fully MECHANISED Tube Handling System is meant for the transportation of the Butt welded 24 M long tubes from the rollers stands of Straight tube butt welding machine to the (RTR) radiographic testing station and then to Out-Feed the tubes to Storage dumps. 2. The butt welded joints in the long tubes will be tested by radioscopy in the RTR Station (Real Time Radioscopy Station) and hence the system shall have the facility to hold the tube and rotate in either direction, while undergoing radiographic testing & evaluation	
2.0	SYSTEM CONFIGURATION	The Tube Handling System shall consist of **IN-FEED Conveyor:** 1. Tube transfer / kick off system (pneumatic) to transport the welded tube to the buffer stand. 2. Buffer stand to store the tubes. 3. Tube transfer / kick off system (pneumatic) to transfer the welded tube from the buffer stand to the in-feed roller stand. 4. In-feed roller stands with mechanism (pinch roller) to transport the welded pipe to the RTR room for radioscopy test. **Tube rotating device** (variable speed) to hold tube and rotate.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
2.0		**Defective Weld Joint** Puncture making using abrasive wheel. **Idler roller stands** inside the RTR station to support the tubes during rotation for weldment examination. **OUT-FEED conveyor:** 1. Independent out-feed roller stand in alignment with in feed and out feed rollers with mechanism (pinch roller) to transport the weld tested tube from the RTR room. **2.** Kick-off system (pneumatic) to suitably segregate and transfer the accepted and rejected tubes. **3.** Tube dumps for receiving the accepted and rejected tube separately. **[Refer to the SCHEMATIC SKECTH given in ANNEXURE –1 for lay-out guidance]**	
3.0	**SEQUENCE OF OPERATION**	1. Transferring the welded tubes (24M) from the roller stand of Straight Tube Butt Welding Station to the buffer stands by kick off system 2. Transfer of the tubes from the buffer stand to the In-Feed Roller Stand by kick off system 3. Transportation of the welded tubes to the RTR Station by In-Feed roller with drive mechanism(pinch roller) 4. Positioning the welded spot at the RTR inspection point and hold the tube in rotary chuck then rotating gently by 360 degree on either direction for weld joint examination.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
		5. Repeat the above two points for the next and subsequent weld joints. 6. Weld Accepted tubes are transported out from RTR room by tube out feed roller mechanism (pinch roller) and transferred to the respective storage dump by Kick Off system (Pneumatic). 7. The Rejected (defective) tubes are punctured by using abrasive cutting wheel. Then transported out by out feed system and transferred to the Rejected / Defective tube storage dump.	
4.0	**DESIGN INPUTS**	**It is suggested that the BIDDER may make a visit to BHEL/TRICHY Works for an 'ON THE SPOT' study of the requirements of BHEL (based on the existing tube handling system), prior to submitting the technical offer.**	
5.0	**JOB DETAILS**	a. Tube OD Range: 31.8 mm to 88.9 mm [Normal Sizes: 31.8, 38.1, 44.5, 47.65,51, 54, 57,60.3, 63.5, 76.1 and 88.9 mm Outer Diameter] b. Tube Wall Thickness: 3 mm to 15 mm c. Tube Length: 12 Mtrs. to 24 Mtrs. [One batch will have tubes of same length only] d. Tube Weight: 5 kg. To 25 kg. /mtr. Length e. Tube Rotation Speed: 1 to 10 RPM [Steplessly variable speed]	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
5.0	**JOB DETAILS**	f. The number of welds (coming in a tube of length 24 Mtrs.) is THREE – i.e., 3 welds are to be tested in one handling cycle. g. The minimum distance at which the weld joint is located from the tube free end is 200 mm. h. The projection of material from the tube surface, due to the reinforcement at the weld joint, is 3 mm (maximum)	
6.0	**TUBE HANDLING RATE**	1. The Handling System has to be designed to handle 200 Tubes [each tube of length 24 M, ϕ 63.5 mm x 10 mm – wall thickness] in a shift of 8 hours. 2. 200 Tubes (for one shift load) may have to be handled in batches and each batch may have upto 60 Tubes, at the maximum. 3. When the tube length is less than 24 mtrs., (normally 12 to 20 mtrs.) the total number of tubes (to be handled per shift) may exceed 200, but not more than 250.	
7.0	**OPERATING PARAMETERS**	a. Rate of linear travel of tube at the In-Feed Side: 15 to 18 meters / minute. b. Speed of Tube Rotation (in either direction) for Testing : 1 to 10 RPM c. Rate of linear travel of tube at the Out-Feed Side: 75 to 80 meters / minute. d. Creep Speed at both In-Feed and Out-Feed Sides: 1 meter/minute (for positioning the weld joint in RTR Station)	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
8.0	**ELEMENTS of TUBE HANDLING SYSTEM**		
8.1	In-Feed : Tube Storage Rack / Buffer Stand	1. Shall be of Fabricated Steel (extruded) Structure and of enough rigidity to withstand rough handling of tube bundles (like impact loading) 2. Tube OD Range: 31.8 mm to 88.9 mm 3. Tube Wall Thickness: 3 mm to 15 mm 4. Tube Length: 12 Mtrs. to 24 Mtrs. 5. Tube Weight: 5 kg. to 25 kg./mtr. Length 6. The stand shall hold 60 tubes of ϕ 63.5 mm. 7. The entire stand shall be leveled to the full length and fixed n the floor with heavy duty expansion type anchor bolts. 8. The loading surfaces of the stands shall be fixed with hard nylon strips to prevent noise generated by tube falling.	
8.2	Kick-Off Unit at In-Feed & Out-Feed Sides	1. The in-feed Kick off system shall be independent for transferring welded tubes from STBW rollers stand to buffer stand and from buffer stand to in-feed roller stand. 2. Only one tube shall be kicked-off at a time 3. The Kick off shall be operated by a set of Pneumatic system, spaced at equal distance. 4. The Kick off system on the out feed side alone shall have suitable Integrated mechanism to transfer the accepted tube and rejected tube independently to the respective tube dumps. 5. BIDDER has to furnish complete details with arrangement, capacity and required air pressure rating in the Technical Offer.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
8.3	Roller Stand and Pinch Roller Drive for In-Feed & Out-Feed Sides	1. The Roller Stand for in-feed and out feed shall be fabricated out of heavy-duty steel structural. 2. Rollers shall be metallic core and polyurethane casing and have smoothed curved 'V' Groove on OD [Outer Diameter] and of suitable surface finish and hardness sufficient not to damage the tube surfaces. 3. The Rollers shall be of two halves design (vertical) heavy-duty class for easy dismantling and assembling. The polyurethane casing shall be of easily replaceable on damage. The bearing shall be of double sealed type 4. Another set of rollers for rotation of tube during weld check shall have common shaft connection levered suitably by pneumatic system to obtain the up and down movement in order to engage the rollers only during tube rotation. Otherwise these roller to be idle. 5. The Pinch Roller mechanism shall be driven by electrical motor and variable speed drive system. 6. The Roller Stand shall be leveled to the full length and fixed on the floor with heavy duty expansion type foundation bolts. 7. The design shall be suitable for the system Operating Parameters specified under the **Clause Sl. No. 7.0**	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
8.4	Idler Roller Stand in the RTR Station	a. The tube entry and exit from the RTR room is through the holes provided in the RTR Station concrete walls. b. Idler Roller Stand for tube transportation at the RTR room shall be of steel fabricated structure suitably designed and installed with heavy duty expansion type anchor bolts in the RTR room for a length of 5 meters – The idler rollers stand has to support and transport the tube inside the RTR room. c. This Idler Roller Stand shall be aligned in line with the In-Feed and Out-Feed Roller Stands. d. The roller configuration shall be same as that for the in feed and out feed rollers.	
8.5	Tube Rotation and Clamping System	1. The rotation of the tube for RTR inspection shall be between 1 to 10 RPM. 2. During the rotation, the tube shall be automatically clamped by a rotary chuck driven by the AC Geared Motor. 3. The rotary motion for the chuck shall be provided through an AC Geared Motor with Variable Frequency Drive equipped suitably to select the operating RPM steplessly variable in the above mentioned speed range. 4. Tube Clamping Chuck shall be of pneumatic operated and centre bore shall be min 150mm dia in order to permit free movement of the tube through the chuck adjustable in both the horizontal and vertical directions, so that the tube does not hit the chuck, while the Pinch Roller moves the tube in the linear direction.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
8.5	Tube Rotation and Clamping System	5. Interlock to be provided to permit rotation of the chuck only after the tube is clamped. 6. BIDDER shall furnish the complete technical details for clamping and rotation, in the TECHCNIAL OFFER.	
8.6	Defective Tube Marking Unit	1. During weld quality inspection, weld butt joints coming in the tube are tested for acceptance or rejection. The rejected tubes are to be identified by a permanent marking on the weld joints, before the tube is sent to the OUT-FEED side tube collection dump. 2. The intended system shall have a facility for making a puncture by using abrasive cutting wheel to identify the defective weld joints. Also should have paint marking system 3. The above facility shall be located in the OUT-FEED Line and preferably at the exist point from the RTR Station Cabin. 4. The BIDDER shall furnish technical details for the above marking system, with the TECHCNIAL OFFER.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
8.7	Size of Tube Dump Stands	A. Tube Dumping Stand for Accepted Tubes: (minimum): - 1 meter (width) x 1 meter (height) x 26 meters (length) B. Tube Dumping Stand for Rejected Tubes: (minimum): - 0.5 meter (width) x 1 meter (height) x 26 meters (length) c. Necessary slope shall be provided with nylon strip beadings to reduce noise during tubes falling.	
8.8	Tube Dumping Stands	1. Separate dumping stand is to be provided for collecting the Accepted and Rejected Tubes. 2. The Tube Dumping Stand shall be suitably designed, so that the removal of tubes in a bundle is made possible and easy, by using slings from an EOT Crane [i.e., enough clearance is available at the bottom for bundling the loose tubes into one single lot]. 3. Both the dumping stands shall be erected leveled and grouted using expansion type foundation bolts.	
9.0	**ELECTRICAL FEATURES & ELEMENTS for MACHINE CONSTRUCTION**		
9.1	Electrical Input Power Supply	a. The input electrical power supply shall be 415 with of ± 10 % V, 50 ± 3 % Hz, 3 Phase AC supply through a 3 Wire System b. BHEL will provide this supply at one point only near the equipment and the supplier has to take care of all other electrical distribution network required for the Tube Handling System.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
9.2	Control Voltage	Control Circuit Voltage shall not exceed 24 V.	
9.3	Electric Motors	All Electric Motors shall be of any of the following makes: Crompton, SIEMENS / ABB / Bharat Bijlee or MAKEs acceptable to BHEL	
9.4	Power Requirement	Bidder has to indicate the total tentative power requirement (including that required for all the sub-systems) in kVA with the offer.	
9.5	Drive Motor and VFD	1. AC Motor (coupled with VFD) makes – ABB/ Indramat/Siemens /danfoss/L&T are only to be used for tube rotation by roller drive mechanism. 2. Suitable feedback system has to be ensured between the AC Motor & VFD Control Drives. 3. All the PLC Relay out puts (with LED indication) shall be with and through relay board and control fuses. 4. The normal operating modes such as Auto / Semi-Auto / Manual, Start / Stop are to be ensured. 5. The online monitoring of each function and consequent alarm message is to be displayed. 6. The Trouble-Shooting Chart and Mode of editing of Programs for VFD to be provided. 7. The Sequence of Operation and Function Statement in Hard Copy (Literature) shall be furnished.	
9.6	Field Elements	1. All the field sensors, proximity switches, limit switches, pressure switches, should be suitable for heavy duty applications. 2. All Electromagnetic Clutches shall only be of 24 V DC control.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
9.7	Electrical Wiring	a. All electrical motors, limit switches etc, on the machine shall be wired using PVC sheathed copper cable running in conduits and converging to common terminal block b. External wiring from / to control panel, control desk, external motors, etc. shall be by means of screened multi-core cables	
9.8	Control Panel	1. The Main Electrical Control Cabinet shall be a box type and self-standing with a locking arrangement. 2. Two separate Operator Control Panels (pendant / remote box type) are to be provided with locking arrangement - one for the IN-FEED Unit and the second for the OUT-FEED Unit. 3. These pendant or remote control shall have facility for display, indication lamps and push buttons to operate the system in all the modes – viz., ON/OFF, Emergency Off, Forward & Reverse, Creep Feed, and Speed Variation for tube Travel. 4. Separate Operator Control Unit to be located inside the RTR Station, suitable for the following operations: a. ON/OFF an Emergency Stop b. Tube Feed (IN & OUT) from IN-FEED Side with linear speed variation c. Tube Clamping and Rotation in either direction and speed variation in rotary direction	

	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
9.8	Control Panel	d. Inching operation in Tube Creep Feed mode for accurate positioning of the Weld Joint for inspection inside the RTR Station. e. Tube Feed (IN & OUT) from OUT-FEED Side with linear speed variation f. Defective Tube Marking – making a puncture by using abrasive cutting wheel in the weld joint location	
10.0	**MECHANICAL FEATURES & ELEMENTS for MACHINE CONSTRUCTION**		
10.1	Roller Stands	1. All rollers in the Roller Stands shall be of heavy-duty class with 'V' roller groove, bearing mounted. 2. The roller assembly shall be of the nature of easily removable from the roller stand. 3.The roller pitch is around 500MM	
10.2	Fabrication	All structural shall be made out of heavy duty, rolled sections /extrusion of suitable size.	
10.3	Tube Working Height	All the Roller Stands in the Tube Handling System shall be at a height of 1.20 meters from the floor.	
10.4	General Points	1. All Bearings shall be of standard make like FAG, SKF, NTN and NBC only. 2. All components and fasteners are to be in metric dimensions. 3. The machine configuration and element/ system arrangement should be such that they have easy accessibility, higher rigidity, self-aligning arrangement of machine components 4. The OFFERED Tube Handling System with all the Sub-Systems are to be designed for working in continuous duty.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
11.0	**MACHINE WORKING ENVIRONMENT**		
11.1	Ambient Atmospheric Conditions	a. The offered Tube Handling System shall be suitable for operation in an ambient temperature of 25 to 50°C and with a Relative Humidity of 90% (both higher values do not occur simultaneously). b. The ENTIRE EQUIPMENT shall be TROPICALISED in Design and CONSTRUCTION.	
11.2	Safety Systems	1. Machine shall have Safety Guards / Sliding Doors and Mechanical and Electrical safety interlocks shall be ensured for personnel and equipment protection. 2. BIDDER to submit COMPLETE details on this arrangement with the Technical Offer.	
12.0	**PAINTING**	1. The machine parts are to be heat-treated (wherever necessary) after fabrication (including castings and forgings) and painted with One coat of Primer and Two coats of synthetic Enamel Paint (Colour – Apple Green – IS281) 2. Control Panel to be painted with Two coats of IS 281 Synthetic Enamel Apple Green Color Paint	
13.0	**MACHINE SPARES**		
13.1	List of Spares	The Supplier shall LIST DOWN with the OFFER, the complete set of replaceable parts / items / components coming in the Tube Handling System and shall QUOTE the Unit Price for each item.	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER's RESPONSE, OFFER & CONFIRMATION
13.2	Compulsory spares	Bidder has to COMPULSORILY quote for the following items with the OFFER : a. Mechanical wearing components due to linear movement & rotation. [Each 4 Nos.] b. Pneumatic spares like valves & repair kit [Each 4 Nos.]. c. Electrical & Electronic Items:- PCB & PLC I/O Cards, Digital to Analogue Card, Field Sensors (such as Encoders, Optical Sensors, Proximity Switch, Limit Switch), Display Unit, etc. [Each 4 Nos.]	
14.0	**MACHINE INSPECTION & ACCEPTANCE**		
14.1	Machine Performance Testing and Acceptance	1. The Tube Handling System shall be tested for its performance prove-out (after trial assembly) as per BHEL Specifications, at the Supplier's Works prior to despatch. 2. Tube Handling trials have to be done with tube sizes mutually agreed after order. The test tubes to be arranged by the vendor.	
15.0	**MACHINE ERECTION & COMMISSIONING**		
15.1	Mechanical Erection	SUPPLIER's SERVICE ENGINEERS and Working Personnel shall do erection and Commissioning of the Equipment. Necessary crane handling facility will be provided by BHEL free of cost. Erection equipments and consumables are in the scope of vendor. Any civil works required is in the scope of BHEL.	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER's RESPONSE, OFFER & CONFIRMATION
15.2	Machine Performance Prove-Out	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 System's Capability and the Handling Rate by the Machine, as given under the **Clause Sl. No. 3.0, 6.0 and 8.0**	
16.0	**MACHINE DOCUMENTATION**		
16.1	O & M Manuals	a. Three Copies of the O & M [Operation and Maintenance] Manual in English with one copy in CD form (SOFT COPY), for each Tube Handling System to be provided by the vendor.	
16.2	Documents and Technical Details	The following documents and details shall form part of the Operation & Maintenance Manual 1. General Arrangement Drawing of the Tube Handling System in total. 2. Sub-Assembly Drawings for sub-systems for maintenance purpose. 3. Electrical Wiring Drawings for Power and Control Circuits. 4. PCB Details and Circuit Drawings 5. PLC Ladder Diagrams (Hard & Soft Copy) with Flash Memory Card. 6. Complete PCB Schematics indicating check points (Test Points) for Electronic Controls 7. Specifications of All Bought-Out-Items 8. Warranty / Guarantee Card for all Bought-Out-Items 9. Trouble Shooting Chart for Main and all Sub-Systems 10. Total weight of the Tube Handling System	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER's RESPONSE, OFFER & CONFIRMATION
17.0	TRAINING	The Supplier's Service Engineer shall train of BHEL Staff in the Operation, Trouble Shooting and Maintenance of the Tube Handling System at BHEL Works for a min of 15 days after the SUCCESSFUL COMMISSIONING of the Equipment, at BHEL Works.	
18.0	TECHNICAL OFFER	The Technical Offer shall contain the following: a. Complete Scope of Supply, including Main Handling Equipment, Control Station, All Accessories and Sub-Systems, etc. b. List of Spares c. Complete description of all systems/sub-systems forming part of the Tube Handling System d. A schematic diagram showing the layout of the machine & associated systems with dimensions e. The operating sequence of the machine with broad outline of various operations involved	
19.0	PERFORMANCE GUARANTEE	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 of performance acceptance at BHEL Works or 18 months from the date of supply whichever is earlier.	
20.0	GENERAL POINT	The actual distance between centre line of in feed to buffer stand and in feed to RTR, RTR Out feed and Accepted/Rejection dump will be provided at the time of drawing approval. For Quotation purpose this may be taken as 3.0M each	

PART B

TECHNICAL SPECIFICATIONS for TUBE HANDLING SYSTEM for R T R STATION [108 M]

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
1.0	AREA OF APPLICATION	1. The fully MECHANISED Tube Handling System is meant for the transportation of the Butt welded 108 M long tubes from the rollers stands of Straight tube butt welding machine to the (RTR) radiographic testing station and then to Out-Feed the tubes to Storage dumps. 2. The butt welded joints in the long tubes will be tested by radioscopy in the RTR Station (Real Time Radioscopy Station) and hence the system shall have the facility to hold the tube and rotate in either direction, while undergoing radiographic testing & evaluation	
2.0	SYSTEM CONFIGURATION	The Tube Handling System shall consist of **IN-FEED Conveyor:** 1. Tube transfer / kick off system (pneumatic) to transport the welded tube to the buffer stand. 2. Buffer stand to store the tubes. 3. Tube transfer / kick off system (pneumatic) to transfer the welded tube from the buffer stand to the in-feed roller stand. 4. In-feed roller stands with mechanism (pinch roller) to transport the welded pipe to the RTR room for radioscopy test. **Tube rotating device** (variable speed) to hold tube and rotate.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
2.0		**Defective Weld Joint** Puncture making using abrasive wheel. **Idler roller stands** inside the RTR station to support the tubes during rotation for weldment examination. **OUT-FEED conveyor:** 1. Independent out-feed roller stand in alignment with in feed and out feed rollers with mechanism (pinch roller) to transport the weld tested tube from the RTR room. **2.** Kick-off system (pneumatic) to suitably segregate and transfer the accepted and rejected tubes. **3.** Tube dumps for receiving the accepted and rejected tube separately. **[Refer to the SCHEMATIC SKECTH given in ANNEXURE –1 for lay-out guidance]**	
3.0	**SEQUENCE OF OPERATION**	1. Transferring the welded tubes (108M) from the roller stand of Straight Tube Butt Welding Station to the buffer stands by kick off system 2. Transfer of the tubes from the buffer stand to the In-Feed Roller Stand by kick off system 3. Transportation of the welded tubes to the RTR Station by In-Feed roller with drive mechanism(pinch roller) 4. Positioning the welded spot at the RTR inspection point and hold the tube in rotary chuck then rotating gently by 360 degree on either direction for weld joint examination.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
		5. Repeat the above two points for the next and subsequent weld joints. 6. Weld Accepted tubes are transported out from RTR room by tube out feed roller mechanism (pinch roller) and transferred to the storage rack by Kick Off system (Pneumatic). 7. The Rejected (defective) tubes are punctured by using abrasive cutting wheel. Then transported out by out feed system and transferred to the Rejected / Defective tube storage dump.	
4.0	**DESIGN INPUTS**	**It is suggested that the BIDDER may make a visit to BHEL/TRICHY Works for an 'ON THE SPOT' study of the requirements of BHEL (based on the existing tube handling system), prior to submitting the technical offer.**	
5.0	**JOB DETAILS**	a. Tube OD Range: 31.8 mm to 88.9 mm [Normal Sizes: 31.8, 38.1, 44.5, 47.65,51, 54, 57,60.3, 63.5, 76.1 and 88.9 mm Outer Diameter] b. Tube Wall Thickness: 3 mm to 15 mm c. Tube Length: 60 Mtrs. to 108 Mtrs. [One batch will have tubes of same length only] d. Tube Weight: 5 kg. To 25 kg. /mtr. Length e. Tube Rotation Speed: 1 to 10 RPM [Steplessly variable speed]	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
5.0	**JOB DETAILS**	f. The number of welds (coming in a tube of length 108 Mtrs.) is NINE – i.e., 9 welds are to be tested in one handling cycle. g. The minimum distance at which the weld joint is located from the tube free end is 200 mm. h. The projection of material from the tube surface, due to the reinforcement at the weld joint, is 3 mm (maximum)	
6.0	**TUBE HANDLING RATE**	1. The Handling System has to be designed to handle 50 Tubes [each tube of length 108 M, ϕ 63.5 mm x 10 mm – wall thickness] in a shift of 8 hours. 2. 50 Tubes (for one shift load) may have to be handled in batches and each batch may have up to 20 Tubes, at the maximum. 3. When the tube length is less than 108 mtrs., (normally 60 to 90 mtrs.) the total number of tubes (to be handled per shift) may exceed 50, but not more than 80.	
7.0	**OPERATING PARAMETERS**	a. Rate of linear travel of tube at the In-Feed Side: 15 to 18 meters / minute. b. Speed of Tube Rotation (in either direction) for Testing : 1 to 10 RPM c. Rate of linear travel of tube at the Out-Feed Side: 75 to 80 meters / minute. d. Creep Speed at both In-Feed and Out-Feed Sides: 1 meter/minute (for positioning the weld joint in RTR Station)	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
8.0	**ELEMENTS of TUBE HANDLING SYSTEM**		
8.1	In-Feed : Tube Storage Rack / Buffer Stand	1. Shall be of Fabricated Steel (extruded) Structure and of enough rigidity to withstand rough handling of tube bundles (like impact loading) 2. Tube OD Range: 31.8 mm to 88.9 mm 3. Tube Wall Thickness: 3 mm to 15 mm 4. Tube Length: 60 Mtrs. to 108 Mtrs. 5. Tube Weight: 5 kg. to 25 kg./mtr. Length 6. The stand shall hold 40 tubes of ϕ 63.5 mm. 7. The entire stand shall be leveled to the full length and fixed n the floor with heavy duty expansion type anchor bolts. 8. The loading surfaces of the stands shall be fixed with hard nylon strips to prevent noise generated by tube falling.	
8.2	Kick-Off Unit at In-Feed & Out-Feed Sides	1. The in-feed Kick off system shall be independent for transferring welded tubes from STBW rollers stand to buffer stand and from buffer stand to in-feed roller stand. 2. Only one tube shall be kicked-off at a time 3. The Kick off shall be operated by a set of Pneumatic system, spaced at equal distance. 4. The Kick off system on the out feed side alone shall have suitable integrated mechanism to transfer the accepted tube and rejected tube independently to the respective tube dumps. 5. BIDDER has to furnish complete details with arrangement, capacity and required air pressure rating in the Technical Offer.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
8.3	Roller Stand and Pinch Roller Drive for In-Feed & Out-Feed Sides	1. The Roller Stand for in-feed and out feed shall be fabricated out of heavy-duty steel structural. 2. Rollers shall be metallic core and polyurethane casing and have smoothed curved 'V' Groove on OD [Outer Diameter] and of suitable surface finish and hardness sufficient not to damage the tube surfaces. 3. The Rollers shall be of two halves design (vertical) heavy-duty class for easy dismantling and assembling. The polyurethane casing shall be of easily replaceable on damage. The bearing shall be of double sealed type 4. Another set of rollers for rotation of tube during weld check shall have common shaft connection levered suitably by pneumatic system to obtain the up and down movement in order to engage the rollers only during tube rotation. Otherwise these roller to be idle. 5. The Pinch Roller mechanism shall be driven by electrical motor and variable speed drive system. 6. The Roller Stand shall be leveled to the full length and fixed on the floor with heavy duty expansion type foundation bolts. 7. The design shall be suitable for the system Operating Parameters specified under the **Clause Sl. No. 7.0**	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
8.4	Idler Roller Stand in the RTR Station	a. The tube entry and exit from the RTR room is through the holes provided in the RTR Station concrete walls. b. Idler Roller Stand for tube transportation at the RTR room shall be of steel fabricated structure suitably designed and installed with heavy duty expansion type anchor bolts in the RTR room for a length of 5 meters – The idler rollers stand has to support and transport the tube inside the RTR room. c. This Idler Roller Stand shall be aligned in line with the In-Feed and Out-Feed Roller Stands. d. The roller configuration shall be same as that for the in feed and out feed rollers.	
8.5	Tube Rotation and Clamping System	1. The rotation of the tube for RTR inspection shall be between 1 to 10 RPM. 2. During the rotation, the tube shall be automatically clamped by a rotary chuck driven by the AC Geared Motor. 3. The rotary motion for the chuck shall be provided through an AC Geared Motor with Variable Frequency Drive equipped suitably to select the operating RPM steplessly variable in the above mentioned speed range. 4. Tube Clamping Chuck shall be of pneumatic operated and centre bore shall be min 150mm dia in order to permit free movement of the tube through the chuck adjustable in both the horizontal and vertical directions, so that the tube does not hit the chuck, while the Pinch Roller moves the tube in the linear direction.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
8.5	Tube Rotation and Clamping System	5. Interlock to be provided to permit rotation of the chuck only after the tube is clamped. 6. BIDDER shall furnish the complete technical details for clamping and rotation, in the TECHCNIAL OFFER.	
8.6	Defective Tube Marking Unit	1. During weld quality inspection, weld butt joints coming in the tube are tested for acceptance or rejection. The rejected tubes are to be identified by a permanent marking on the weld joints, before the tube is sent to the OUT-FEED side tube collection dump. 2. The intended system shall have a facility for making a puncture by using abrasive cutting wheel to identify the defective weld joints. Also should have paint marking system 3. The above facility shall be located in the OUT-FEED Line and preferably at the exist point from the RTR Station Cabin. 4. The BIDDER shall furnish technical details for the above marking system, with the TECHCNIAL OFFER.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
8.7	Size of Tube Dump Stands	A. Tube Stock table for Accepted Tubes: (minimum): - 1 meter (width) x 1 meter (height) x 110 meters (length) B. Tube Dumping Stand for Rejected Tubes: (minimum): - 0.5 meter (width) x 1 meter (height) x 110 meters (length) c. Necessary slope shall be provided with nylon strip beadings to reduce noise during tubes falling.	
8.8	Tube Dumping Stands	1. Separate dumping stand is to be provided for collecting the Accepted and Rejected Tubes. 2. The Tube Dumping Stand shall be suitably designed, so that the removal of tubes in a bundle is made possible and easy, by using slings from an EOT Crane [i.e., enough clearance is available at the bottom for bundling the loose tubes into one single lot]. 3. Both the dumping stands shall be erected leveled and grouted using expansion type foundation bolts.	
9.0	**ELECTRICAL FEATURES & ELEMENTS for MACHINE CONSTRUCTION**		
9.1	Electrical Input Power Supply	a. The input electrical power supply shall be 415 with of ± 10 % V, 50 ± 3 % Hz, 3 Phase AC supply through a 3 Wire System b. BHEL will provide this supply at one point only near the equipment and the supplier has to take care of all other electrical distribution network required for the Tube Handling System.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
9.2	Control Voltage	Control Circuit Voltage shall not exceed 24 V.	
9.3	Electric Motors	All Electric Motors shall be of any of the following makes: Crompton, SIEMENS / ABB / Bharat Bijlee or MAKEs acceptable to BHEL	
9.4	Power Requirement	Bidder has to indicate the total tentative power requirement (including that required for all the sub-systems) in kVA with the offer.	
9.5	Drive Motor and VFD	1. AC Motor (coupled with VFD) makes – ABB/ Indramat/Siemens /danfoss/L&T are only to be used for tube rotation by roller drive mechanism. 2. Suitable feedback system has to be ensured between the AC Motor & VFD Control Drives. 3. All the PLC Relay out puts (with LED indication) shall be with and through relay board and control fuses. 4. The normal operating modes such as Auto / Semi-Auto / Manual, Start / Stop are to be ensured. 5. The online monitoring of each function and consequent alarm message is to be displayed. 6. The Trouble-Shooting Chart and Mode of editing of Programs for VFD to be provided. 7. The Sequence of Operation and Function Statement in Hard Copy (Literature) shall be furnished.	
9.6	Field Elements	1. All the field sensors, proximity switches, limit switches, pressure switches, should be suitable for heavy duty applications. 2. All Electromagnetic Clutches shall only be of 24 V DC control.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
9.7	Electrical Wiring	a. All electrical motors, limit switches etc, on the machine shall be wired using PVC sheathed copper cable running in conduits and converging to common terminal block b. External wiring from / to control panel, control desk, external motors, etc. shall be by means of screened multi-core cables	
9.8	Control Panel	1. The Main Electrical Control Cabinet shall be a box type and self-standing with a locking arrangement. 2. Two separate Operator Control Panels (pendant / remote box type) are to be provided with locking arrangement - one for the IN-FEED Unit and the second for the OUT-FEED Unit. 3. These pendant or remote control shall have facility for display, indication lamps and push buttons to operate the system in all the modes – viz., ON/OFF, Emergency Off, Forward & Reverse, Creep Feed, and Speed Variation for tube Travel. 4. Separate Operator Control Unit to be located inside the RTR Station, suitable for the following operations: a. ON/OFF an Emergency Stop b. Tube Feed (IN & OUT) from IN-FEED Side with linear speed variation c. Tube Clamping and Rotation in either direction and speed variation in rotary direction	

	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
9.8	Control Panel	d. Inching operation in Tube Creep Feed mode for accurate positioning of the Weld Joint for inspection inside the RTR Station. e. Tube Feed (IN & OUT) from OUT-FEED Side with linear speed variation f. Defective Tube Marking – making a puncture by using abrasive cutting wheel in the weld joint location	
10.0	**MECHANICAL FEATURES & ELEMENTS for MACHINE CONSTRUCTION**		
10.1	Roller Stands	1. All rollers in the Roller Stands shall be of heavy-duty class with 'V' roller groove, bearing mounted. 2. The roller assembly shall be of the nature of easily removable from the roller stand. 3.The roller pitch is around 500MM	
10.2	Fabrication	All structural shall be made out of heavy duty, rolled sections /extrusion of suitable size.	
10.3	Tube Working Height	All the Roller Stands in the Tube Handling System shall be at a height of 1.20 meters from the floor.	
10.4	General Points	1. All Bearings shall be of standard make like FAG, SKF, NTN and NBC only. 2. All components and fasteners are to be in metric dimensions. 3. The machine configuration and element/ system arrangement should be such that they have easy accessibility, higher rigidity, self-aligning arrangement of machine components 4. The OFFERED Tube Handling System with all the Sub-Systems are to be designed for working in continuous duty.	

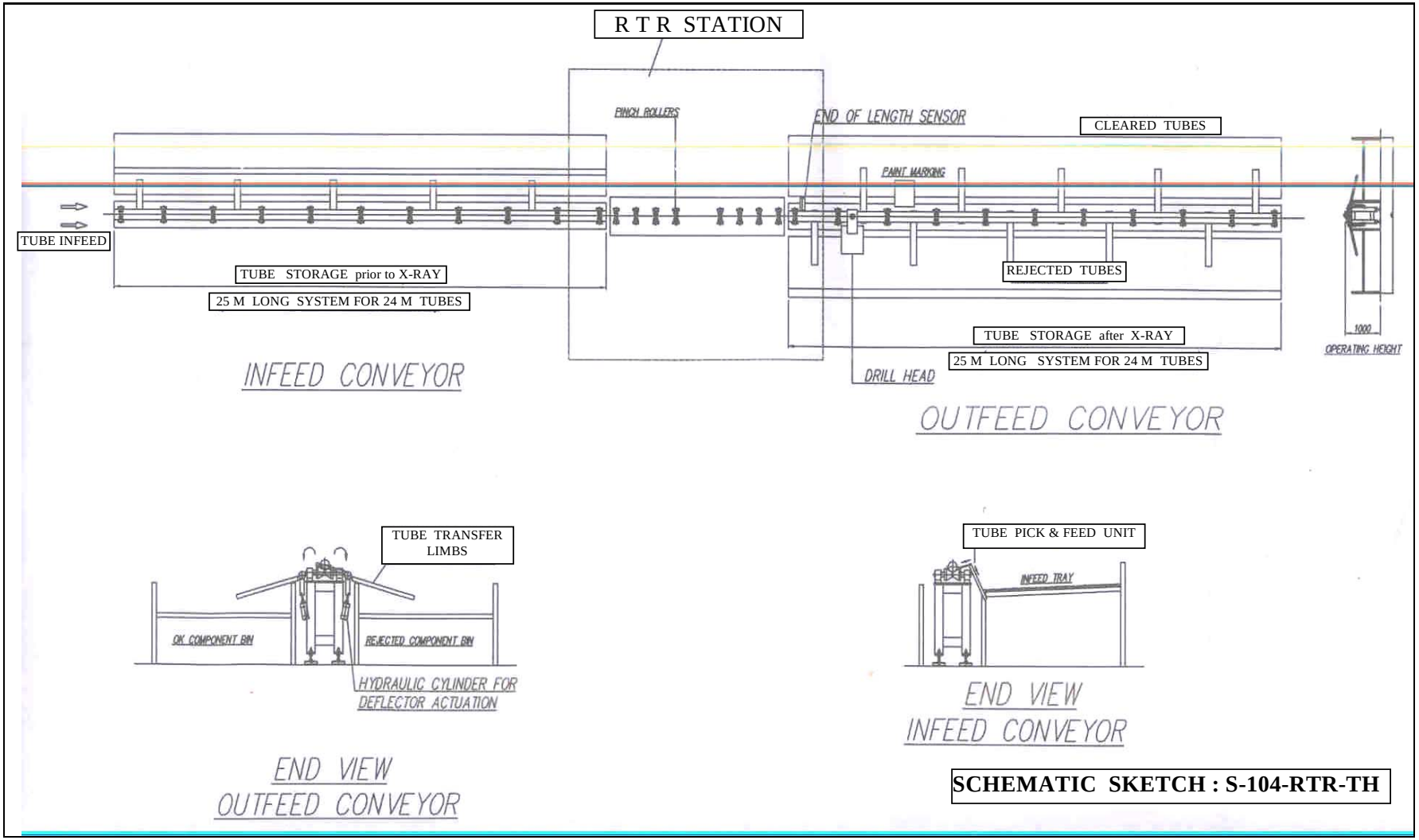
S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
11.0	**MACHINE WORKING ENVIRONMENT**		
11.1	Ambient Atmospheric Conditions	a. The offered Tube Handling System shall be suitable for operation in an ambient temperature of 25 to 50°C and with a Relative Humidity of 90% (both higher values do not occur simultaneously). b. The ENTIRE EQUIPMENT shall be TROPICALISED in Design and CONSTRUCTION.	
11.2	Safety Systems	1. Machine shall have Safety Guards / Sliding Doors and Mechanical and Electrical safety interlocks shall be ensured for personnel and equipment protection. 2. BIDDER to submit COMPLETE details on this arrangement with the Technical Offer.	
12.0	**PAINTING**	1. The machine parts are to be heat-treated (wherever necessary) after fabrication (including castings and forgings) and painted with One coat of Primer and Two coats of synthetic Enamel Paint (Colour – Apple Green – IS281) 2. Control Panel to be painted with Two coats of IS 281 Synthetic Enamel Apple Green Color Paint	
13.0	**MACHINE SPARES**		
13.1	List of Spares	The Supplier shall LIST DOWN with the OFFER, the complete set of replaceable parts / items / components coming in the Tube Handling System and shall QUOTE the Unit Price for each item.	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER's RESPONSE, OFFER & CONFIRMATION
13.2	Compulsory spares	Bidder has to COMPULSORILY quote for the following items with the OFFER : a. Mechanical wearing components due to linear movement & rotation. [Each 4 Nos.] b. Pneumatic spares like valves & repair kit [Each 4 Nos.]. c. Electrical & Electronic Items:- PCB & PLC I/O Cards, Digital to Analogue Card, Field Sensors (such as Encoders, Optical Sensors, Proximity Switch, Limit Switch), Display Unit, etc. [Each 4 Nos.]	
14.0	**MACHINE INSPECTION & ACCEPTANCE**		
14.1	Machine Performance Testing and Acceptance	1. The Tube Handling System shall be tested for its performance prove-out (after trial assembly) as per BHEL Specifications, at the Supplier's Works prior to despatch. 2. Tube Handling trials have to be done with tube sizes mutually agreed after order. The test tubes to be arranged by the vendor.	
15.0	**MACHINE ERECTION & COMMISSIONING**		
15.1	Mechanical Erection	SUPPLIER's SERVICE ENGINEERS and Working Personnel shall do erection and Commissioning of the Equipment. Necessary crane handling facility will be provided by BHEL free of cost. Erection equipments and consumables are in the scope of vendor. Any civil works required is in the scope of BHEL.	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER's RESPONSE, OFFER & CONFIRMATION
15.2	Machine Performance Prove-Out	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 System's Capability and the Handling Rate by the Machine, as given under the **Clause Sl. No. 3.0, 6.0 and 8.0**	
16.0	**MACHINE DOCUMENTATION**		
16.1	O & M Manuals	a. Three Copies of the O & M [Operation and Maintenance] Manual in English with one copy in CD form (SOFT COPY), for each Tube Handling System to be provided by the vendor.	
16.2	Documents and Technical Details	The following documents and details shall form part of the Operation & Maintenance Manual 1. General Arrangement Drawing of the Tube Handling System in total. 2. Sub-Assembly Drawings for sub-systems for maintenance purpose. 3. Electrical Wiring Drawings for Power and Control Circuits. 4. PCB Details and Circuit Drawings 5. PLC Ladder Diagrams (Hard & Soft Copy) with Flash Memory Card. 6. Complete PCB Schematics indicating check points (Test Points) for Electronic Controls 7. Specifications of All Bought-Out-Items 8. Warranty / Guarantee Card for all Bought-Out-Items 9. Trouble Shooting Chart for Main and all Sub-Systems 10. Total weight of the Tube Handling System	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER's RESPONSE, OFFER & CONFIRMATION
17.0	TRAINING	The Supplier's Service Engineer shall train of BHEL Staff in the Operation, Trouble Shooting and Maintenance of the Tube Handling System at BHEL Works for a min of 15 days after the SUCCESSFUL COMMISSIONING of the Equipment, at BHEL Works.	
18.0	TECHNICAL OFFER	The Technical Offer shall contain the following: a. Complete Scope of Supply, including Main Handling Equipment, Control Station, All Accessories and Sub-Systems, etc. b. List of Spares c. Complete description of all systems/sub-systems forming part of the Tube Handling System d. A schematic diagram showing the layout of the machine & associated systems with dimensions e. The operating sequence of the machine with broad outline of various operations involved	
19.0	PERFORMANCE GUARANTEE	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 of performance acceptance at BHEL Works or 18 months from the date of supply whichever is earlier.	
20.0	GENERAL POINT	The actual distance between centre line of in feed to buffer stand and in feed to RTR, RTR Out feed and Accepted/Rejection dump will be provided at the time of drawing approval. For Quotation purpose this may be taken as 3.0M each	

ANNEXURE –1



SCHEMATIC SKETCH : S-104-RTR-TH