Bharat Heavy Electricals Limited

(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
An ISO 9001 Company
CAPITAL PURCHASE / MATERIALS MANAGEMENT / MANUFACTURING

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

	Enquiry Number:	**Enquiry Date:**	**Due date for submission of quotation:**
	2620700075	**13.08.2007**	**27.09.2007**
You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order			

Item	**Description**	**Quantity**	**Delivery (Item required at BHEL on)**
10	Tube Handling System – 72 Mtrs for Real Time Radiography for STBW II as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1 No.	30.01.2009

BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats along with technical specifications 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 "2620700075".

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 Purchase / MM / Manufacturing

PART A

SECTION – I : QUALIFYING CRITERIA

The BIDDER has to compulsorily meet the following requirements to get qualified for consideration of the technical offer for the *TUBE HANDLING UNIT for REAL TIME RADIOSCOPY STATION*

S. No.	REQUIREMENTS	VENDOR's RESPONSE
1	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. .	
2	The BIDDER / VENDOR shall have supplied Handling system for long tubes/rolled section within the last five years. Performance Certificate in the enclosed format (min ONE) and Complete technical details of such system(s) are to be submitted for assessment by BHEL.	
2.1	BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected.	

SECTION – I I

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

3.0	The BIDDER/VENDOR to furnish Reference List of Customers, with full address, details of contact person, where Handling system for long tubes/rolled section has been supplied in the past.	
6.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses 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 has to comply with the following, for accepting the Technical Offer for scrutiny by the Purchaser:

S. No.	PARTICULARS	VENDOR'S RESPONSE
8.0	The BIDDER / VENDOR shall submit the offer in TWO PARTS - Technical Offer [with PART A & PART B] & Commercial and Price Bid.	
9.0	The Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each clause. A just 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer.	
10.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue and Selection Criteria	
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	
12.0	BIDDER has to indicate the Country of Origin for the supply of main equipment / important bought-out items.	

PERFORMANCE CERTIFICATE

(On Customer's Letter Head)

1. Supplier of the Equipment :

2. Make & Model of the Equipment :

3. Month & Year of Commissioning :

4. Application :

5. Cross section of rolled section handled:
   Length of handling system :

6. Performance of the Equipment : Best in the market /
   (Strike off whichever is not applicable) Satisfactory /
   Good /
   Average /
   Not Satisfactory

7. 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 [72 M]

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
1.0	AREA OF APPLICATION	1. The proposed fully MECHANISED Straight Tube Handling System is meant for the transportation of long and straight tube from the tube dump to the (RTR) radiographic testing station and then to an Out-Feed & Storage Yard. 2. The butt welded joints coming in the long tubes will be tested by radioscopy in the RTR Station (Real Time Radioscopy Station) and hence the system shall have the capability to rotate the tube in either direction, while undergoing radiographic testing & evaluation	
2.0	SYSTEM CONFIGURATION	The Tube Handling System shall consist of a. In-Feed Side Tube Storage Tray b. In-Feed Side motorized Tube Kick-off and Feed Line c. Tube Rotating Device (with variable speed) d. Defective Weld Joint Marking and Rejected Weld Joint Drilling Unit e. Out-Feed Side Tube Drawing (Pulling) Unit f. Out-Feed Side Tube Segregation (Defective Tube & Okayed Tube) Device g. Inspected Tube Receiving Dump after Segregation **[Refer to the SCHEMATIC SKECTH given in ANNEXURE –A for lay-out guidance]**	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
3.0	**SEQUENCE OF OPERATION**	1. Collecting/Loading the welded tubes from Straight Tube Butt Welding Station roller stand and then transfer the welded tubes to the buffer stands 2. Transfer of the tubes from the buffer stand to the In-Feed Roller Stand 3. The In-Feed pinch roller drives the tubes to the RTR Station. 4. Position the tube weld to the RTR inspection point and gently rotate 360 degree for weld joint examination by a rotary chuck. 5. Repeat the above two points for the next and subsequent weld joints. 6. Accepted (okayed) tubes are being pushed / pulled and driven by the out feed pinch roller and ejected to the tube dump. 7. Rejected (defective) tubes are also being drawn by the same Out-Feed pinch roller conveyor and sprayed Paint marking on the defective joint and drilling is to be carried out on the defective weld. Then further pushed to the tube Out-Feed Roller Stand. 8. The defective welded tubes from the Out-Feed roller stand shall be kicked off to the rejected tube 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.**	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
5.0	**JOB DETAILS**	a. Tube OD Range : 31.8 mm to 76.1 mm [Normal Sizes : 31.8, 38.1, 44.5, 47.65, 51, 54, 57, 60.3, 63.5 and 76.1 mm Outer Diameter] b. Tube Wall Thickness : 3 mm to 15 mm c. Tube Length : 20 Mtrs. to 72 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 [continuously variable speed] f. The number of welds (coming in a tube of length 72 Mtrs.) is SIX – i.e., 6 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 (at the maximum)	
6.0	**TUBE HANDLING RATE**	1. The Handling System has to be designed to handle 120 Tubes [each tube of length 72 M, ϕ 63.5 mm x 10 mm – wall thickness] in a shift of 8 hours. 2. 120 Tubes (for one shift load) may have to be handled in batches and each batch may have upto 30 Tubes, at the maximum. 3. When the tube length is less than 72 mtrs., (normally 20 to 48 mtrs.) the total number of tubes (to be handled per shift) may exceed 120, but not more than 180.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
7.0	**EQUIPMENT CONFIGURATION**	The minimum desired elements are listed below : 1. Tube Storage Rack with Kick-In Unit. (Buffer stand to hold 25 tubes at a time) 2. In-Feed Kick-Off & Out-Feed Kick-Off Units 3. In-Feed, Out-Feed Roller Stand and Pinch Roller Drive 4. Idler Roller Stand in the RTR Station 5. Tube Rotation and Clamping System 6. Paint Spray and Rejects Cut/Drill Equipment 7. Dumping Stand (Accepted / Rejected)	
8.0	**OPERATING PARAMETERS**	a. Rate of linear travel of tube at the In-Feed Side : 15 to 18 metres / 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 metres / minute. d. Creep Speed at both In-Feed and Out-Feed Sides : 1 meter/minute (for positioning the weld joint in RTR Station)	
9.0	**ELEMENTS of TUBE HANDLING SYSTEM**		
9.1	In-Feed Side Tube Storage Rack/Stand	1. Shall be of Fabricated Steel Structure and of enough rigidity to withstand rough handling of tube bundles (like impact loading) a. Tube OD Range : 31.8 mm to 88.9 mm b. Tube Wall Thickness : 3 mm to 15 mm c. Tube Length : 12 Mtrs. to 72 Mtrs. d. Tube Weight : 5 kg. to 25 kg./mtr. length e. The stand shall hold 60 tubes of ϕ 63.5 mm. 2. The entire stand shall be leveled to the full length and grouted in the floor with expansion type foundation bolts.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
9.2	Kick-Off Unit at In-Feed & Out-Feed Sides	a. Only one tube shall be kicked-off at a time b. Kick off shall be done by a set of gear-motor and chain drive, spaced at equal distance. c. The gear motor shall be mounted on a steel platform grouted onto the floor. d. BIDDER has to furnish complete details with number of geared motors, capacity and power rating in the Technical Offer.	
9.3	Roller Stand and Pinch Roller Drive for In-Feed & Out-Feed Sides	1. The Roller Stand shall be fabricated out of heavy duty steel structurals. 2. Rollers shall have smooth curved 'V' Groove on OD [Outer Diameter] and of suitable surface finish and hardness so that the tube surface is not damaged. 3. The Rollers shall be of heavy duty class and shall be assembled with sealed bearings and shaft. 4. In the Rollers, Tubes are to be clamped - in both forward and reverse traverse directions - by hydraulic system. 5. The Pinch Roller shall be driven by hydro-motor and controlled by hydraulic power pack through DC Valves and Flow Control Valves. 6. The Roller Stand shall be leveled to the full length and grouted in the floor with expansion type foundation bolts. 7. The design shall be suitable for the system Operating Parameters specified under the **Clause Sl. No. 8.0**	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
9.4	Idler Roller Stand in the RTR Station	a. Entry of tube from In-Feed Side and Exit of Tube to Out-Feed Side, to and from the RTR Station, shall be through the windows provided in the RTR Station concrete walls. b. Idler Roller Stand shall be of steel fabricated structure and installed in the RTR Station cabin for a length of 5 meters - to hold the tube for radiographic inspection and for further transportation of tube. c. This Idler Roller Stand shall be aligned in line with the In-Feed and Out-Feed Roller Stands.	
9.5	Tube Rotation and Clamping System	1. The rotation speed of the tube for RTR inspection shall be 1 to 10 RPM. 2. The rotary motion shall be achieved through an AC Geared Motor with Variable Frequency Drive, to select the operating speed from the continuously variable speed range. 3. During the rotation, the tube shall be clamped by a rotary chuck driven by the AC Geared Motor. 4. Tube Clamping Chuck shall be adjustable in both the horizontal and vertical directions, so that the tube does not hit the chuck, while the tube is moved in the linear direction, by the Pinch Roller. 5. Centering of the tube for the proper chuck clamping shall be ensured. 6. BIDDER shall furnish the complete technical details for clamping and rotation, with the TECHCNIAL OFFER .	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
9.6	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 identifying the defective weld joints by the following two methods : a. Paint mark shall be done on the weld joint by a spray painting gun b. A hole of size of 6 mm shall be able to be drilled at the weld joint and necessary guiding mechanism shall be part of the system. 3. The above two defective joint marking facilities 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. 5. BIDDER can also suggest some other alternative system (with details) for the subject identification, it is more effective than the specified method.	
9.7	Size of Tube Dump Stands	A. Tube Dumping Stand for Accepted Tubes : (minimum) :- 1 meter (width) x 1 meter (height) x 75 meters (length) B. Tube Dumping Stand for Rejected Tubes : (minimum) :- 0.5 meter (width) x 1 meter (height) x 75 meters (length)	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
9.8	Tube Dumping Stands	1. Separate dumping stand is to be provided for collecting the Accepted and Rejected Tubes. 2. Tube Dumps shall be fabricated with heavy duty structural steel. 3. BIDDER has to furnish details on the means and methods adopted to arrest the noise/sound generated during the dumping operation. The noise level shall not exceed 85 dB. 4. 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]. 5. Both the dumping stands shall be erected, leveled and grouted using expansion type foundation bolts.	
10.0	**ELECTRICAL FEATURES & ELEMENTS for MACHINE CONSTRUCTION**		
10.1	Electrical Input Power Supply	a. The input electrical power supply shall be 415 ± 10 % V, 50 ± 3 % Hz, 3 Phase AC supply through a 3 Wire System [4th Wire for Protective Earthing. No Neutral Conductor.] b. BHEL will provide this supply at one point only and the supplier has to take care of all other electrical distribution network required for the Tube Handling System.	
10.2	Control Voltage	Control Circuit Voltage shall not exceed 24 V .	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
10.3	Electric Motors	All Electric Motors shall be of any of the following makes : SIEMENS / ABB / Bharat Bijlee or MAKEs conforming to IEC Standards	
10.4	Power Requirement	Bidder has to indicate the total tentative power requirement (including that required for all the sub-systems) in kVA with the offer.	
10.5	Drive Motor and VFD	1. AC Motor (coupled with VFD) makes – ABB/ Indramat/SEW/Siemens 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 , Halt / Re-Set 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.	
10.6	Field Elements	1. All the field sensors, proximity switches, limit switches, pressure switches, temperature controllers, should be suitable for heavy duty applications and wired up with flexible PVC insulated screened cables. 2. All Electromagnetic Clutches shall only be of 24 V DC control.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
10.7	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, 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 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 IN-FEED Side with linear speed variation f. Defective Tube Marking – spray paint application and/or drilling hole in the weld joint location	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
10.8	Electrical Wiring	a. All electrical motors, limit switches etc, on the machine shall be wired using PVC sheathed 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	
11.0	**MECHANICAL FEATURES & ELEMENTS for MACHINE CONSTRUCTION**		
11.1	Roller Stands	1.All rollers in the Roller Stands shall be of heavy duty class with 'V' roller groove, bearing mounted (on a shaft diameter not less than 40 mm). 2. The roller assembly shall be of the nature of easily removable from the roller stand. 3. The roller size shall be of outer diameter (O.D.) 300 mm and width 150 mm. 4. The roller pitch is around 400mm	
11.2	Machined Components	All machined components in the Tube Handling System shall be a per ASME Standard SA 193 B7 [High Strength Bolting].	
11.3	Fabrication	All structurals shall be made out of heavy duty, 'L' angles and channels. Preferred sizes of Angles and Channels to be used for the fabrication are respectively of (minimum) 100 mm and 150 mm.	
11.4	Roller Stand inside RTR Cabin	Portions of the In-Feed Roller Stand and Out-Feed Roller Stand coming inside the RTR Station Cabin shall be aligned in vertical and horizontal directions and leveled for the smooth travel of the tubes, for the whole stretch of tube travel.	
11.5	Tube Working Height	All the Roller Stands in the Tube Handling System shall be at a height of 1.20 meters from the floor.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
11.6	General Points	1. All Bearings shall be of standard make like FAG, SKF, NBC only. 2. All components and fasteners are to be in metric dimensions. 3. Complete set of components forming part of the facility shall be listed & offered. 4. Complete description of the main handling unit and all the sub-systems shall form part of the TECHNICAL OFFER.	
11.7	Machine Maintenance	The machine configuration and element/system arrangement should be such that they have easy accessibility, higher rigidity, self-aligning /fitting, locking & piloting arrangement of machine components and modules, to ensure the new concept of 'maintenance free' management.	
12.0	**FEATURES OF HYDRAULIC SYSTEM**		
12.1	Hydraulic Circuits	a. Hydraulics forming part of the machine and associated equipment shall be connected by reinforced synthetic rubber hoses of reputed makes and / or steel tubes of sufficient capacity. b. Hydraulic Circuit to originate from a common point on the Machine and provided with suitable oil filters, control valves and elements of reputed makes. c. All the hydraulic elements in the circuitry shall have easy access during the maintenance of machine.	

S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
12.2	Hydraulic Power Pack - Selection Criteria	Bidder to provide details on Rating / Specification and Selection of Hydraulic Power-Pack with Cylinders for the intended application/need coming in the handling system.	
12.3	Hydraulic Power Pack - Protection Controls & Make	1. To have suitable means and measures for Temperature Control, High & Low Pressure Control, Oil Level Sensing, etc. 2. All the Hydraulic Pumps & Valves shall be of Vickers or Bosch-Rexroth make.	
13.0	**MACHINE WORKING ENVIRONMENT**		
13.1	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.	
13.2	Machine Operation	The OFFERED Tube Handling System with all the Sub-Systems are to be designed for working in three shifts (8 hour shift) a day and all the 365 Days in a year, with the SUPPLIER recommended PREVENTIVE MAINTENANCNE MEASURES.	
13.3	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.	

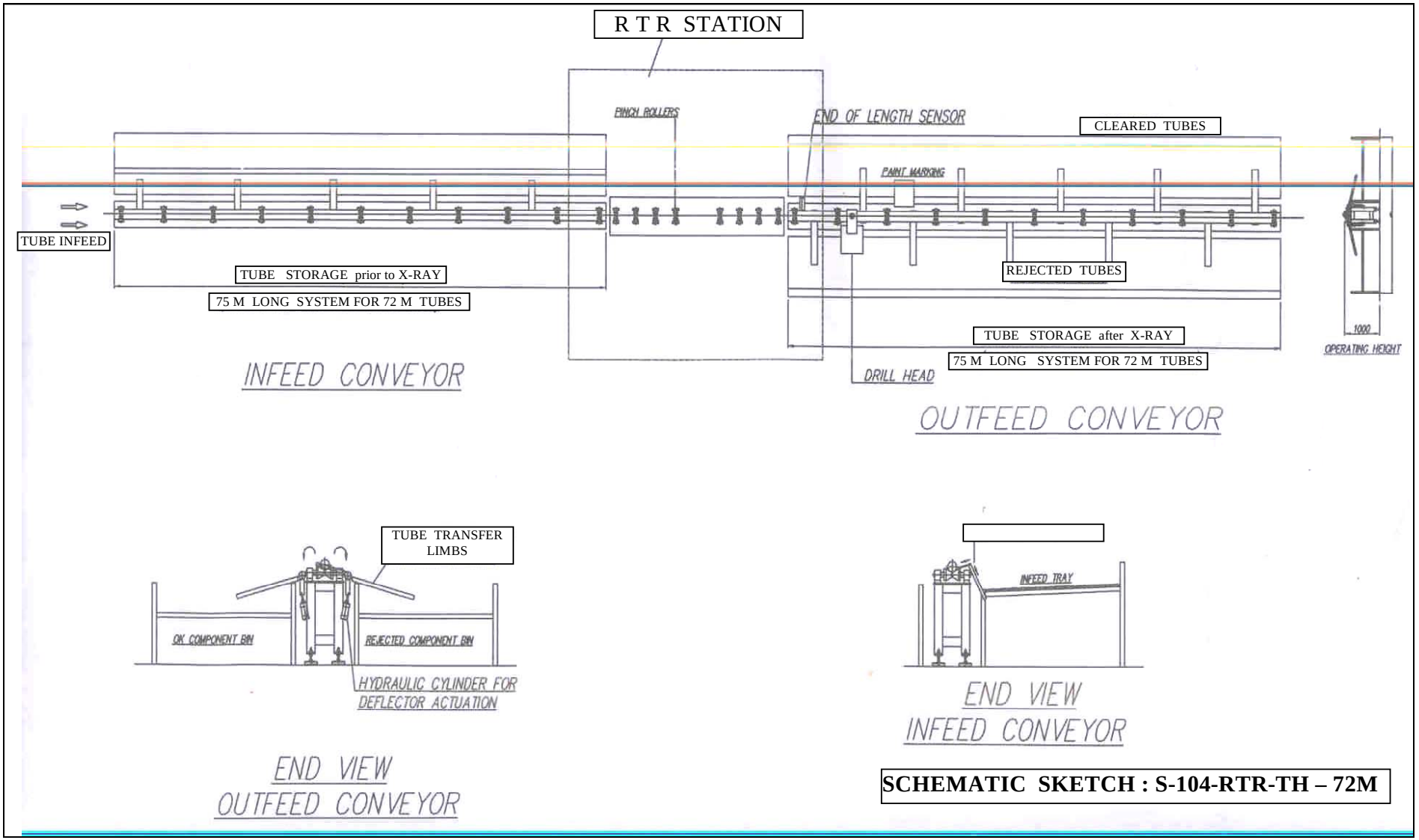
S. No.	PARTICULARS	BHEL SPECIFICATIONS	BIDDER's OFFER [with Complete Technical Details]
14.0	**PAINTING**	a. The heavier structural / machine parts are to be heat-treated (wherever necessary) after fabrication (including castings and forgings) and shot blasted for surface preparation prior to painting. b. One coat of Primer with 25 μ of DFT (Dry Film Thickness) and 48 hours of compulsory curing after painting. c. Two coats of Enamel Paint (Colour – Apple Green – RAL 6011) each with 25 μ of DFT and intermittent curing of minimum 16 hours.	
15.0	**MACHINE SPARES**		
15.1	OPERATING SPARE PARTS	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.	
15.2	COMMISSIONING 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. Spares for Hydraulics Power-Pack viz., 'O' rings, Sealing Rings, Hydraulic Valve 'O' rings, etc.. [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.]	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER's RESPONSE, OFFER & CONFIRMATION
16.0	**MACHINE INSPECTION & ACCEPTANCE**		
16.1	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 suitable tube samples – tube sizes selected will be based on a mutually agreeable criterion.	
17.0	**MACHINE ERECTION & COMMISSIONING**		
17.1	Mechanical Erection	Erection of the Equipment shall be done by SUPPLIER's SERVICE ENGINEERS and Working Personnel, as per the guidelines furnished in the Supplier's Erection Manual.	
17.2	Commissioning	Commissioning of the Equipment and Smooth Functioning of all the Sub-Systems (at BHEL Works) shall be the RESPONSIBILITY of the SUPPLIER.	
17.3	Machine Performance Prove-Out	After the successful commissioning of the machine and sub-systems, the COMMISSIONING ENGINEER and the APPLICATION 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**	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER's RESPONSE, OFFER & CONFIRMATION
18.0	**MACHINE DOCUMENTATION**		
18.1	O & M Manuals	a. Three Copies of the O & M [Operation and Maintenance] Manual to be given in Paper Bound Hard Copies with one copy in CD form (SOFT COPY), for each Tube Handling System. b. One Hard Copy of O & M Manual shall be submitted at the time of INSPECTION of the Tube Handling System by BHEL Officials, at the Supplier's Works . c. The following documents and details [given under the **Clause Sl. No. 18.2**] shall form part of the Operation & Maintenance Manual	
18.2	Documents and Technical Details	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. Hydraulic Circuit Diagram 6. PLC Ladder Diagrams (Hard & Soft Copy) with Flash Memory Card. 7. Complete PCB Schematics indicating check points (Test Points) for Electronic Controls 8. Specifications of All Bought-Out-Items 9. Warranty / Guarantee Card for all Bought-Out-Items 10. Trouble Shooting Chart for Main and all Sub-Systems 11. Total weight of the Tube Handling System	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER's RESPONSE, OFFER & CONFIRMATION
19.0	**TRAINING**	a. The Supplier shall train four of BHEL Staff in the Operation, Trouble Shooting and Maintenance of the Tube Handling System at the Supplier's Works. after the INSPECTION of the Equipment. b. The Supplier's Service Engineer/Application Engineer shall train of BHEL Staff in the Operation, Trouble Shooting and Maintenance of the Tube Handling System at BHEL Works, after the SUCCESSFUL COMMISSIONING of the Equipment, at BHEL Works.	
20.0	**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 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 Tube Handling System e. A schematic diagram showing the layout of the machine & associated systems with dimensions f. The operating sequence of the machine with broad outline of various operations involved	
21.0	**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 24 [twenty- four] months from the date of performance acceptance at BHEL Works.	

ANNEXURE –A



SCHEMATIC SKETCH : S-104-RTR-TH – 72M