Bharat Heavy Electricals Limited
(High Pressure Boiler Plant)
Tiruchirappalli – 620014, TAMIL NADU, INDIA
An ISO 9001 Company
CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY **NOTICE INVITING TENDER**	Phone: +91 431 257 79 38 Fax : +91 431 252 00 31 Email : tvenkat@bheltry.co.in Web : www.bhel.com

TWO PART BID Tender to be submitted in two Parts	**Enquiry Number:** **2851400010**	**Enquiry Date:** **20.01.2014**	**Due date for submission of quotation:** **10.03.2014**

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 Schedule	Delivery Terms Required
10	**STBW with 24 Metres Tube Handling System with Tube In-feed by Water fall rack** as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	**1.00 No**	**8 Months from date of PO**	**F.O.R, BHEL Stores, Trichy.**
20	**STBW with 24 Metres Tube Handling System with Tube In-feed by Water fall rack, Qty 2 Nos** and **STBW with 24 Metres Tube Handling System with Tube In-feed by simple tube rack, Qty 1 No.** as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	**3.00 Nos**	**10 Months from date of PO**	**F.O.R, BHEL Stores, PEFP Bhandara.**

Important points to be taken care during submission of offer

1. **Compliance Form No. BND/IMP/01 & BND/IND/01A and Annexure II (Details of Company Performance) to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.**
2. **Material shall be delivered to**

→ **For Item Sl.No.10 (1 No.): FOR ,BHEL Stores, HIGH PRESSURE BOILER PLANT, BHARAT HEAVY ELECTRICALS LIMITED, Tiruchirappalli- 620014, Tamilnadu State.**

→ **For Item Sl.No.20 (3 Nos.): FOR, BHEL Stores, POWER EQUIPMENT FABRICATION PLANT, BHARAT HEAVY ELECTRICALS LIMITED, Mundipar- 441804, Taluka: Sakoli, District: Bandara, Maharashtra State.**

3. **Offer shall be evaluated both items (Sl.Nos.10 & 20) as a Single Package (over all L1 basis). Hence, both items should be quoted without fail any, otherwise your offer will not be considered.**
4. **Erection & Commissioning period required 3 Weeks for Item Sl.No.10 (1 No.) and 6 Weeks for Item Sl.No.20 (3 Nos) from the date of intimation by BHEL to Vendor for deputation of their Engineers for E&C.**
5. **EMD for this Tender will be (₹) : 2,00,000.00**
6. **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 Enquiry reference "2851400010".

Tenders should reach us before 14:00 hours on the due date Tenders will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present	Yours faithfully, For BHARAT HEAVY ELECTRICALS LIMITED Sr. Manager / Capital Equipment / MM

T. VENKATESWARAN
Senior Manager
Capital Equipment / MM
BHEL, Tiruchirappalli - 620 014.

PART – A – QUALIFYING CONDITIONS

STBW Station with 24m Out-feed Tube Handling System

SECTION- 1: Qualifying Criteria

The BIDDER has to compulsorily meet the Qualifying Criteria indicated in **Section 1** to get qualified. Otherwise the technical offer will not be considered.

S NO.	REQUIREMENTS	VENDOR'S RESPONSE
1.1	The BIDDER / VENDOR (**OEM**) shall have a minimum TEN Years of Continuous Experience in Design, Manufacture & Supply of "**Straight Tube Butt Welding Machine with Water fall Rack and Tube handling system.**" Vendor shall indicate the actual number of years of experience in the field.	
1.2	Only those vendors (**OEMs**) fulfilling the following conditions should quote: who have commissioned in the last 10 years (as on the original date of tender opening) at least **ONE "Straight Tube Butt Welding Machine capable of welding tubes of up to 76.1mm for tube length build-up of 24m or more by GTAW and GMAW process with Stacked Rack type In-feed system"** **EITHER** (i) In at least any one country other than the country of origin to establish vendor's global business activity. **OR**(ii) In India and the referred machine is presently working satisfactorily for more than one year after commissioning (as on the original date of tender opening). The name and contact addresses of the customers to whom the above mentioned machines were supplied to be furnished with details.	
1.3	Vendor has to submit at least ONE PERFORMANCE CERTIFICATE from their customers in India or from the customers to whom the machine was supplied outside the country of origin, for satisfactory performance of the machine, referred under clause 1.2 above, for a minimum period of one year from the date of commissioning(as on the original date of tender opening). Performance certificate as Original Certificate or E-mail directly from the customer may be submitted. The original certificate may be returned after verification by BHEL, if required. For obtaining the Performance certificate, a suggestive format is provided at the end of Part A.	
1.4	BHEL reserves the right to verify the information provided by the Vendor for the referred STBW Machine at their referred customer's works. It shall be the responsibility of the vendor to facilitate the visit of BHEL's team at their referred customer works. The Travel, Board and Lodging expenses for BHEL Personnel shall be borne by BHEL. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected. BHEL reserves the right to accept or reject the OEMs based on the assessment of their technical and financial capability.	

SECTION - 2:

The BIDDER / VENDOR are requested to provide the following information:-

S NO.	REQUIREMENTS	VENDOR'S RESPONSE
2.1	The BIDDER / VENDOR to furnish Reference List of Customers, with complete address, details of contact person, where STBW Machinehas been supplied in the past.	
2.2	Specify details of STBW Machine supplied to other units of BHEL, if any (Year of commissioning with details 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.	

SECTION – 3:

The BIDDER to note:

S NO.	REQUIREMENTS	VENDOR'S RESPONSE
3.1	The BIDDER / VENDOR shall submit the offer in TWO parts. 1. Technical Offer [**with PART A & PART B**] 2. Commercial Offer and Price bid.	
3.2	The Technical Offer shall contain complete details against all clauses of Technical Specifications given by BHEL.	
3.3	The Technical Offer shall be supported by copies of product Catalogues, DataSheets and technical details of Bought- Out- Items.	
3.4	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.	

Suggestive Format of Performance Certificate:

The Performance should be certified by the customer on **Customer's Letter Head**and submitted along with the offer.

PERFORMANCE CERTIFICATE

1.0	Straight Tube Butt Welding Machine with Water fall Rack and Tube handling system Supplied by : (Manufacturer's name)	
2.0	Make & Model number of the Machine	
3.0	Month & Year of Commissioning	
4.0	Application for which The Machine is used	
5.0	**Machine Details**	
5.1	Number of MIG/TIG Torches	
5.2	Max /Min Tube Diametercan be weld on the machine.	
	Max /Min Tube Thickness can be weld on the machine	
5.3	Tube materials weld	
5.4	Max length can be built	
5.5	Loadhandling capacity of Platform with counter weightin waterfall rack.	
6.0	Performance of the Machine (Please tick the appropriate option)	Satisfactory
		Not Satisfactory
7.0	Service after sales (Please tick the appropriate option)	Satisfactory
		Not Satisfactory
8.0	Other remarks (if any)	
Date:		Signature & Seal of the Authority Issuing the Performance Certificate

PART B – TECHNICAL SPECIFICATION

Straight Tube Butt Welding Station with 24 metre out-feed tube handling system

Note:-

1.0 The Column **"Vendor's offer with Technical details & Remarks"** of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous or unsustainable information against any of the clauses of the specifications / requirements shall be treated as non-compliance.

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

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

3.0 Scope: - Design, Manufacture, Supply, Erection & Commissioning of

Straight Tube Butt Welding Station with 24 metre out-feed tube handling system – 4 Nos

With Tube In-feed by water fall rack – 3 Nos

With Tube In-feed by Simple tube rack – 1 No

for BHEL complying with the specification as below.

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
1.0	**APPLICATION**	a) This machine is meant for butt-welding of straight tubes with edge prepared ends (without tack welding) using • Entirely by Pulsed GMAW Welding-(The predominant method) • Pulsed GTAW root welding followed by Pulsed GMAW Welding, • Entirely by Pulsed GTAW with Hot wire. IMPORTANT NOTE: b) The machine is intended for Tube Build-up to 24 meters with ONE GTAW Head consisting of ONE TIG Torch with TWO Hot wire feeders and ONE GMAW Head consisting of THREE MIG Torches with Three Cold Wire feeder. c) Scope includes STBW station with Water Fall Rack / Simple Tube feed Rack, Tube in Feed roller stand, Tube out Feed roller Stand 24m, Pinch rollers, LPG pre-heating system etc. d) Welding of tubes of similar or dissimilar materials in steel (like carbon steel to alloy steel, alloy steel to stainless steel,Inconel etc.) e) Welding of tubes of various outer diameters and thicknesses. f) Torch has to be employed, exclusive for TIG/MIG/combination of TIG & MIG welding process and using two/three types of filler wire respectively for different material combination butt-welds. g) The welds produced using the above system should pass Radiography Test (RT) / Ultrasonic Test (UT) as stipulated in ASME sec. IX, ANSI B31.1, and B31.3 for welding high- pressure tube butt joints of power plant.	

<table>
<tr><th>S. No</th><th>PARTICULARS</th><th>SPECIFICATION/DESCRIPTION</th><th>VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]</th></tr>
<tr><td>2.0</td><td colspan="3">JOB DETAILS</td></tr>
<tr><td>2.1</td><td>Nature of Job</td><td colspan="2">Only Seamless Steel Tubes (All are Outer Diameter controlled tubes with a tolerance of maximum 12% on tube wall thickness)</td></tr>
<tr><td>2.2</td><td>Tube Outer Diameters</td><td colspan="2">
<table>
<tr><th>S.No</th><th>OD, in mm</th><th>THICKNESS, in mm</th><th>Max/Min ID, in mm</th></tr>
<tr><td>1</td><td>28.0</td><td>3 / 5.6</td><td>21.60/16.80</td></tr>
<tr><td>2</td><td>31.8</td><td>4.0 /4.57</td><td>25.40/22.60</td></tr>
<tr><td>3</td><td>33.4</td><td>5.59 / 7.11</td><td>22.22/19.18</td></tr>
<tr><td>4</td><td>38.1</td><td>4.57/5.59/7.11 / 9.65/ 10.67 / 11.0</td><td>28.96/16.10</td></tr>
<tr><td>5</td><td>41.3</td><td>7.4 / 8.2</td><td>26.50/24.90</td></tr>
<tr><td>6</td><td>42.4</td><td>4.57 / 5.59 / 6.6 / 7.11 / 7.62 / 8.6 / 9.1</td><td>33.26/24.20</td></tr>
<tr><td>7</td><td>44.5</td><td>4.19 / 5.59 / 6.1 / 7.11 / 8.1 / 8.7/ 10.92</td><td>36.12/22.66</td></tr>
<tr><td>8</td><td>47.63</td><td>5 / 6.3 / 8 / 10</td><td>37.63/27.63</td></tr>
<tr><td>9</td><td>48.3</td><td>6.6 / 8.1</td><td>35.10/32.10</td></tr>
<tr><td>10</td><td>51.0</td><td>4.19 / 5.59 / 6.6 / 7.62 / 8.64 / 9.6/ 10.0</td><td>42.62/31.00</td></tr>
<tr><td>11</td><td>54.0</td><td>9.14 / 13.49</td><td>35.72/27.02</td></tr>
<tr><td>12</td><td>57.0</td><td>4.19 / 7.62 / 8.64 / 9.4/ 12.7/ 14.3/ 15.1</td><td>48.62/26.82</td></tr>
<tr><td>13</td><td>63.5</td><td>3.81 / 4.19 / 4.57 / 5.59 / 8.64 / 12.7</td><td>55.88/38.10</td></tr>
<tr><td>14</td><td>69.85</td><td>4.57 / 15.09 / 16.5</td><td>60.71/39.67</td></tr>
<tr><td>15</td><td>76.1</td><td>4.57 / 5.08 / 5.5</td><td>67.06/65.20</td></tr>
</table>
</td></tr>
<tr><td>2.3</td><td>Tube Wall Thickness</td><td colspan="2">Minimum : 3mm
Maximum : 16.5mm</td></tr>
</table>

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
2.4	Raw Tube Length	Tubes ends are edge prepared suitable for welding (as given under clause 2.7) before loading on the tube In-feed stands Minimum - **2 meters** Maximum **- 15 meters**	
2.5	Raw tubes – Important Note	Note: a) Small tubes known as inserts of length 80mm / 110mm with straight gripping length of 30mm have to be welded to the longer tubes. The machine to be suitable for gripping these inserts in the chucks and weld them to the longer tubes. b) Tube lengths less than 2 meters will be loaded manually.	
2.6	Tube Material	a) Carbon Steel: SA192, SA210Gr.A1, SA210 Gr.C b) Alloy Steel : SA213 T11, SA213 T22, SA213 T23, SA213 T91, SA213 T92 c) Stainless Steel: Super 304H, SA 213TP321H, SA 213 TP347H d) Inconel: Alloy 617	
2.7	Tube End Edge Preparation Style and Weld Groove Design	a) SA210 Gr.C, SA213 T11, T22 b) SA213 T91 and Stainless Steel c) Combination of T91/SS with T22 45.0Deg for Tube wall thickness up to 5.6 mm 37.5Deg for Tube wall thickness above 5.6 mm [Refer to ANNEXURE for Edge Preparation details]	
2.8	Root gap	Tube butt joints to be welded **WITHOUTROOT GAP** in GTAW and GMAW process.	
2.9	Weld Consumables	a) Grade C, SA213 T11, T22 ER80S-B2 Wire sizes 0.8,1.0,1.2 mm by Pulsed GMAW process b) SA213 T91,T92 ER 90S-B9 Wire sizes 0.8,1.0,1.2 mm by TIG process c) Inconel Alloy ER Ni Fe-7A,ER Ni Cr-3 Wire Sizes 0.8,1.0,1.2 mm by GMAW and GTAW process	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
3.0	**PRODUCTIVITY**		
3.1	No.of Joints / Shift of 8 Hours	Number of radiography quality weld joints expected per shift of 8 hours, for following tubes of 10 or 15m length.Bidder has to confirm and to be proved out including tube loading & handling. 1. 80 joints / shift of OD 47.63mm x Th. 6.0mm/SA213 T11 with 0.8mm ER80S-B2 wire by Pulsed GMAW process to build a length of 24m. 2. 60 joints/shift of OD 47.63mm x Th 6.0mm SA 213 T91 with 1.2 mm ER 90S-B9 wire by Pulsed Hot wire GTAW process to build a length of 24 m.	
4.0	**QUALITY OF WELD JOINTS**		
4.1	Quality testing	The welds produced using the above system should pass Radiography Test (RT) / Ultrasonic Test (UT) as stipulated in ASME sec. IX, ANSI B31.1, and B31.3 for welding high- pressure tube butt joints of power plant. The tube weld joints are tested by online Real Time Radiography or Film radiography.	
5.0	**WELDING MACHINE CONFIGURATION**		
5.1	Dual headstock	Welding lathe with dual headstocks driven by one AC servo motors with variable chuck rotation speed of 0.6 to 6 rpm to ensure synchronised rotation of both tubes clamped between chucks.	
5.2	Three Jaw Chuck	Both headstocks fitted with three jaw self-centring chucks equipped with actuating pneumatic cylinder to hold and rotate the tubes having diameter range from 28 to 76.1 mm. BHEL will supply 4.5 to 5 kg/sq.cm air pressure in ¾ inch Tube for pneumatic system. Vendor to specify a suitable Booster, if required.	
5.3	Tube Rotation speed	Variable Tube rotation speed for Butt Welding Operation 0.6 RPM to 6.0 RPM (Synchronized rotation of the two tube clamping chucks are to be ensured)	
5.4	Movable Headstock	One headstock shall be fixed and the other headstock shall be movable along the bed. This horizontal movement of the movable headstock should be pneumatically operated and its action should be programmable through PLC. The distance between chucks shall be adjustable from 350 to 400 mm	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
5.5	Horizontal Travel of Chucks	Bidder to give Technical Details with stroke length (in mm) for movable chuck, after clamping the tube, to butt against the tube in the fixed jaw. The stroke shall be long enough to butt against the tube inserts of 80mm length as mentioned under clause 2.5.	
5.6	Accuracy of speed of rotation of Job Holding Chuck	Bidder to Specify the accuracy with minimum and maximum error (in terms of percentage of the set speed with reference to actual)	
5.7	Tube Rotation drive	AC Servo Drive. Motor rating and controller rating greater than 1.5 Nm. Bidder to Specify the make and rating.	
5.8	Tube Clamping	a) Bidder to Specify the type of tube clamping in chuck (Hydraulic / Pneumatic / Electrical) b) The movable chuck shall exert a constant pressure on the joint during welding in order to get uniform root fusion and penetration to the tune of 1.50 mm in height all around the circumference that merges without any start-stop gap or irregularity.	
5.9	Machine Lifting Stroke	Vertical stroke of 30 mm or more for aligning the tube centre of various diameters on roller stand. Bidder to Specify the stroke.	
5.10	Machine Lifting Mechanism	By motorized gear box with stay foot. Bidder to Confirm.	
5.11	Welding Return Current Collector	Bidder to give Technical Details on the weld current return rings on each chuck. Bidder to provide a sketch.	
5.12	Stopper	Bidder to give Technical Details for stopping the tubes for joint alignment with torch. The stopper to be sturdy enough to take the impact load of the tubes hitting it. The stopper to be positioned behind the chuck and preferably lift upwards so that the bottom side is free for arranging a burner for preheating the joint.	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
5.13	Machine Mounted Arc Shield	The Weld zone shielding door has to protect the air flow with large size Welding shield glass. The inner side of the welding shield glass facing the welding to be protected against spatter with a plain glass that can be replaced at frequent intervals. Bidder to provide 10 spare plain glasses.	
6.0	**WELDING HEADS IN GTAW AND GMAW PROCESS**		
6.1	Number of Weld Head	GTAW – Hot Wire Welding Process GMAW – MIG/MAG Solid Wire Welding Process	
6.2	Number Torches / Wire Feeders	GTAW Process: One GTAW Torch with Two HOT WIRE Feeders GMAW Process: Three GMAW Torches with Three Wire Feeders [Preferably all the wire Feeder sheath to be positioned in a single line with PLC controls]	
6.3	Positioning of Weld Head/wire Feeder sheath head.	a. The Weld head has to be preferably in the centre such that the time taken for moving the selectedwire Feeder sheath horizontally will be minimum. b. Quick positioning ofwire Feeder sheath head for the selected wire to be engaged. c. By Pneumatic and AC Servo System for quick up-down movement with creep speed. d. The time taken by the wire Feeder sheath head to move to home position and back to the weld position shall not exceed 5 seconds	
7.0	**VERTICAL SLIDE UNIT FOR GTAW AND GMAW PROCESS**		
7.1	Type	AC Servo Motorized / Pneumatic. Motor rating and controller rating not less than 1 Nm– Bidder to Specify	
7.2	Vertical Stroke	AC servo motor controlled vertical slide assembly unit for moving the torch and entire wire Feeder sheath head vertically in Z -axis with inbuilt sensors for end position sensing. [Stroke length 300mm / Max Speed: 1000 mm/min). Bidder to Specify the stroke of the Torch and entire wire Feeder sheath head.	
7.3	Stroke of eachwire Feeder sheath head	Up/Down stroke of the torch to be Pneumatically operated. Fine adjustment shall be Motorized.	
7.4	Fine Adjustment	Fine adjustment to be provided by Joystick Bidder to Specify the fine adjustment stroke.	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
7.5	Height Adjustment	The position of the TIG torch tip for different diameters to be adjustable such that the torch will not collide with the tube.	
7.6	Interlock for collision	Fool proof arrangement to be provided such that the torch shall not descend over the chuck and collide.	
7.7	Vertical guide ways	Vertical individual wire Feeder sheath head sliding guide-ways shall be of steel or LM guide-ways**.** It should be provided with slim and compact head**. Aluminium or any other metal is not acceptable.**	
8.0	**HORIZONTAL SLIDE UNIT FOR GTAW AND GMAW PROCESS**		
8.1	Type	AC Servo Motorized / Pneumatic. Motor rating and controller rating not less than 1 Nm – Bidder to Specify	
8.2	Movement of Torch and Positioning of wire Feeder sheath head.	AC Servo Motor controlled horizontal slide assembly unit for moving the torch and wire Feeder sheath head with selected wire along the tube axis with inbuilt sensors for end position sensing. [Stroke length 300mm / Max Speed: 2500 mm/min].	
8.3	Horizontal Stroke	Bidder to Specify the stroke of the entire head mounted with Torch and of wire Feeder sheath heads.	
8.4	Fine Adjustment	Horizontal Fine adjustment (Left/Right) to be provided in the same Joystick provided for Vertical fine adjustment. Bidder to Specify the fine adjustment stroke.	
8.5	Horizontal guide ways	Horizontal Torch and wire Feeder sheath head sliding guide-ways shall be of steel or LM guide-ways. It should be provided with slim and compact head. **Aluminium or any other metal is not acceptable. Ball screws to be used in case of motorized movement.**	
8.6	Oscillation Function	Bidder to give Technical Details	
8.6.1	Oscillation frequency	6 to 200 cycles / minute	
8.6.2	Oscillation Width	0 to 40 mm (20 mm on either side of the centre of joint)	
8.6.3	Dwell Time at Both Ends	0 to 9.9 sec (Separately Adjustable)	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
9.0	**POWER SOURCE FOR PULSED GTAW WITH ACCESSORIES**		
9.1	Type	Inverter Controlled (IGBT Based) - DC Welding Power Source with CC/CV characteristics and with high frequency start.	
9.2	Make	OTC DAIHEN CORPORATION, Japan/PANASONIC, Japan	
9.3	Model	Bidder to Specify	
9.4	Current Rating	400 A @ 100% duty cycle; 600 A@ 60% duty cycle.	
9.5	H F Unit for TIG Welding	Bidder to give Technical Details	
9.6	GTAW Torch Make	Binzel / Bernard	
9.7	Tungsten Electrode Size	Diameter : 2.0 / 2.4 / 3.2 mm	
9.8	Cooling system	Water Cooled-Chiller refrigerant type	
9.9	AVC Function for TIG Welding	Bidder to furnish Technical Details	
9.10	Operating Features	a) Standard and Pulsing current mode selection facility.	
		b) Straight DC current.	
		c) Pulsing current.	
		d) Adjustable base and peak current.	
		e) Adjustable upslope and down slope	
		f) Current pulse frequency range	
		g) Digital display of current and voltage as well as Hot wire feed rate,hot wire current.	
9.11	Interlocks required in this System should stop and give alarm in the event of stoppage of	a) Shielding gas flow	
		b) Cooling water supply- Chiller refrigerant type	
		c) Hot wire feed	
		d) Chuck rotation	
		e) Oscillation	
		f) AVC function	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
10.0	**POWER SOURCE FORHOT WIRE AND FEEDER**		
10.1	Power Source Type	Inverter Controlled (IGBT Based) Welding Power Source for continuous and Pulsed feeding of Hot wire.	
10.2	Make	OTC DAIHEN CORPORATION, Japan/PANASONIC, Japan	
10.3	Model	Bidder to Specify	
10.4	Rating	a. Current : 140 A or more b. Voltage : 15-36 V	
10.5	Duty Cycle	100% or more	
10.6	Hot Wire Feeder	Continuous feeding and Pulsed feeding. 0 to 10 m/min and 150 Hz(Variable)	
10.7	Guide assembly	Hot wire guide assembly attached to GTAW torch. GTAW torch equipped with hot wire guide with pneumatic positioning mechanism.	
10.8	Feeder Motor Capacity	Bidder to Specify	
10.9	Weight of Wire Spool	Suitable for loading 25kg Wire Spools. Bidder to Confirm	
10.10	Tilting adjustment	Tilting adjustment to be provided to complete torch unit including hot wire assembly.	
10.11	Offset adjustment	Offset adjustment provided to complete Torch unit including hot wire assembly.	
10.12	Wire size	Wire diameters to be accommodated: 0.8,1.0 and 1.2 mm.	
10.13	Wire material	Wire material to be accommodated: carbon steel, stainless steel and Inconel. [Wire Spool diameter: 300 mm as per AWS 5.18.]	
10.14	Connections	Set of wire sheaths and sheath connections.	
10.15	Scope of Supply	Complete cable bundle with Power cable, Water hose, AVC, oscillation, wire and gas.	
11.0	**POWER SOURCE FOR SYNERGIC PULSED GMAW**		
11.1	Type	Inverter Controlled (IGBT Based) Welding Power Source for Synergic Pulsed GMAW	
11.2	Make	OTC DAIHEN CORPORATION, Japan/PANASONIC, Japan	
11.3	Process	Synergic Pulsed GMAW preprogramed for 0.80, 1.0, 1.2 mm Wire of CS, AS & SS with gas shielding [Argon (95-98%) +CO_2 (5-2%) Mix]. Gas mixture unit digital type is preferable.	
11.4	Model	Bidder to Specify	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
11.5	Rating	a. Current : 350 A or more b. Voltage : 15-36 V	
11.6	Duty Cycle	100%	
12.0	**GTAW WELDING TORCH**		
12.1	Type	Water Cooled	
12.2	Make	Binzel /Bernard	
12.3	Model	Bidder to Specify	
12.4	Rating	400 A or more @ 100% Duty Cycle	
12.5	AVC Function for TIG Welding	Bidder to furnish Technical Details	
12.6	Tungsten Electrode Size	Diameter : 2.0 / 2.4 / 3.2 mm	
12.7	Electrode type	Ceriated	
12.8	Torch cable Length	Welding cable size and length to be carefully selected in order to avoid any problem of wire feeding during, before or after the welding process and to nullify problems like early failure of wire liner, wire getting struck inside liners etc.(Torch bending angle to be less) Bidder to Confirm	
13.0	**GMAW WELDING TORCH**		
13.1	Type	Water Cooled	
13.2	Make	Binzel / Bernard	
13.3	Model	Bidder to Specify	
13.4	Rating	450 A or more @ 100% Duty Cycle	
13.5	Wire size	Torch fitted with Accessories for 0.8, 1.0, 1.2 mm steel wire.	
13.6	Wire feed speed	0 to 8m/min (variable from 0 to maximum)	
14.0	**GTAW WIRE (HOT WIRE) FEEDER - 2 Nos**		
14.1	Type	Bidder to Specify type & rating	
14.2	Make	Bidder to Specify	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
14.3	Model	Bidder to Specify	
14.4	Wire size	0.8, 1.0 and 1.2 mm.	
14.5	Wire Feed Speed	0 to 2 m/min (Variable)	
14.6	Feeder Motor Capacity	Bidder to Specify	
14.7	Weight of Wire Spool	Suitable for loading 25kg Wire Spools. Bidder to Confirm	
14.8	Scope of Supply	Bidder to Confirm supply of complete unit with cables, gas hoses, end connectors & protective sheath	
15.0	**GMAW WIRE FEEDER – 3 Nos**		
15.1	Type	Bidder to Specify type & rating	
15.2	Make	Bidder to Specify	
15.3	Model	Bidder to Specify	
15.4	Wire size	0.8,1.0,1.2 mm	
15.5	Drive	4-Roll Drive (Rollers to be suitable for 0.8mm wire)	
15.6	Wire Feed Speed	8 m/min or more (variable from 0 to maximum)	
15.7	Feeder Motor Capacity	Bidder to Specify	
15.8	Weight of Wire Spool	Suitable for loading 25kg Wire Spools. Bidder to Confirm	
15.9	Scope of Supply	Bidder to Confirm supply of complete unit with cables, gas hoses, end connectors & protective sheath and Feed Rolls for 0.8,1.0,1.2 mm wire.	
16.0	**TORCH ACCESSORIES**		
16.1	Torch cable Length	Welding cable size and length to be carefully selected in order to avoid any problem of wire feeding during, before or after the welding process and to nullify problems like early failure of wire liner, wire getting struck inside liners etc. Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
17.0	**WATER CHILLER UNIT FOR GTAW & GMAW TORCHES**		
17.1	Bidder to Specify the Design Parameters	a) Type – Refrigerant type water chiller	
		b) Water Chiller Cooling Capacity (in Tons of refrigeration)	
		c) Tank Capacity – more than 10 litres preferred	
		d) Flow rate and pressure (in litres/min and psi or kg/cm_2)	
		e) Type of Coolant – to ensure no scale/sediment formation	
		f) Bidder to Specify the number of Water chillers provided	
		g) Chiller cooling system should be direct type with inbuilt safety measures to be incorporated with indication lamp.	
17.2	Operating Features	Cooling water flow sensor & interlocks to ensure fool-proof flow of water. Welding should stop automatically in case there is any interruption in cooling water flow.	
18.0	**GAS MIXING UNIT**		
18.1	Make and Model	Make: Preferably Gentec. Any other make acceptable to BHEL. Bidder to Specify the make and model quoted. Digital gas mixer is preferable.	
18.2	Gases to be mixed	Argon and CO_2	
18.3	Mixing Ratio	Argon : 95 - 98% CO_2 : 5 - 2%	
18.4	Operating Features	Bidder to Specify : a) Type of Mixing Unit & its Accuracy b) Flow Rate (adjustable) for Argon & CO_2 c) Mixed Gas Flow Rate d) Inlet Pressure e) Outlet Pressure	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
18.5	Scope of Supply	Scope of Supply shall include the following: a) Gas Mixing Unit, b) Gas Flow Meters, c) Regulators, d) CO_2 Heaters, e) Gas Solenoid Valves, f) Gas Flow Sensors and g) Interlocks to ensure fool-proof flow of gas. h) Gas Cups/Nozzles, i) Contact tips for 0.8,1.0 and1.2 mm wire, j) Tip Adapters & Ferrules	
19.0	**PRE-HEATING ARRANGEMENT**		
19.1	Requirement	Tube joints of SA213 T 91 / T92 / T23 require pre-heating upto 200 deg C	
19.2	Method of heating	Heating shall be through LPG from industrial cylinder or pipeline supply.	
19.3	Arrangement	Suitable nozzle for heating tube joint prior to welding to be provided. The nozzle to be suitably located such that the nozzle moves up and down vertically OR front and back horizontally from behind. The nozzle to be positioned between chucks to heat the tube at the joint location. The movement may be achieved by electric motor (rack and pinion). Bidder to explain the arrangement.	
19.4	Interlock	The gas nozzle shall retract back as soon as the welding torch starts to advance for welding.	
19.5	Ignition	The gas shall be manually ignited. The regulator may be provided separately. Handheld gas ignitor may be provided. 5m Hose and regulator to be provided with the machine.	
20.0	**CONTROL SYSTEM**		
20.1	Type	Industrial PC based PLC. Bidder to Confirm.	
20.2	Make	Bidder to Specify the Make of the PLC Control System. Preferred make – Fanuc / Siemens / Mitsubishi or Any other reputed makes acceptable to BHEL	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
20.3	Model	Model (suitable and latest version, as available at the time of purchase order placement, shall be supplied).	
20.4	HMI / MDI	Touch Screen Panel. Bidder to Specify the Make and Model with15 inch or more of panel size.	
20.5	Communication	Bidder to Specify.	
20.6	Memory	Sufficient Memory to store and recall programmed data of minimum 500 programs.	
20.7	Technical Features	Control should include all interlocks, manual, semi auto and auto.	
20.8	Feed back	Open loop and closed loop with selector switch is required for Current/Voltage/Wire feeding encoder feedback to power source.	
20.9	Controls / Meters	All ammeters, voltmeters, gas flow meters shall be located near the operator control station	
20.10	All controls	All controls for the In-Feed & Out-Feed conveyors, hydraulic/pneumatic unit & other peripheral units should be available the operator control station.	
20.11	Laptop	Latest version Laptop with pre-loaded software for PLC for maintenance to be supplied with the machine – 1 No	
20.12	Conveyor controls	In-feed and out-feed conveyors, Tube kick off from storage rack / Water fall rack controls shall be delinked from welding program controls. Operator must be able to independently control the movements with separate set of switches on the operator control panel / separate controller in case of water fall rack.	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
20.13	Programming design	a) A database to be provided to store programs identifiable by unique number for each weld joint of different combinations of materials / tube sizes. b) Operator has to select only the program number, which he chooses to activate and recall the program from the database, for welding a particular joint and the torch number with which the operator intends to weld, for a particular sequence of welding to build up the tube length. c) The program should be capable of welding a sequence of more than 10 joints or more in a row to build up one tube length of up to 24 metres. d) For welding a joint with new combination, programming of the parameters shall be done with a unique number and stored in the database. e) Provision to correct the original program whenever fine tuning of parameters are done to improve the quality of the joint. f) Display of all critical weld parameters – programmed and actual real time data on the screen is essential. g) Fine tuning of critical weld parameters during welding is under progress to be made possible.	
20.14	Pre-heating cycle / To observe weld	Provision for rotating the tube before welding for pre-heating by LPG and one rotation after welding for visual check of welding. This may be programmable.	
20.15	Programming features	a) Torch Selection – Programmable Same torch may be selected for different joints with different programs. Similarly different torches may be selected for different joints. b) Switch over from TIG to MIG should be possible c) Pre-heating by LPG and subsequent welding by MIG/TIG process to be possible.	
21.0	**FAULT DIAGNOSTIC SYSTEM**		
21.1	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.	
21.2	Help guide	Help guide should be provided to use both diagnostic systems. Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION		VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
22.0	**GTAW - WELDING PROGRAMMABLE DATA (COMMON TO ALL PASSES)**			
22.1	TIG Welding facility will be used for welding and also for pre-heating.		Bidder to Confirm	
22.2	Program Number		Bidder to furnish range	
22.3	Gas Pre-Flow & Post-Flow Time		Bidder to Specify	
22.4	Initial Current		Bidder to Specify	
22.5	Initial Current Time		Bidder to Specify	
22.6	Current Up-Slope & Down-Slope Time		Bidder to Specify	
22.7	Tube Revolution Start & Stop Delay Time		Bidder to Specify	
22.8	Wire Feed Start & Stop Delay Time		Bidder to Specify	
22.9	AVC Delay Time		Bidder to Specify	
22.10	Oscillation Delay/Dwell Time at both ends independently adjustable.		Bidder to Specify	
22.11	Crater Current		Bidder to Specify	
22.12	Crater Current Time		Bidder to Specify	
23.0	**GTAW WELDING PROGRAMMABLE DATA (FOR EACH PASS)**			
23.1	Technical Details a) Pass Number range b) Pulse Current c) Pulse Duration d) Base Current e) Base Duration f) AVC g) Wire Feed Pulse Speed h) Wire Feed Base Speed		Bidder to furnish details	
23.2	Tube Revolution Speed		Bidder to Specify	
23.3	Oscillation Width		Bidder to Specify	
23.4	Oscillation Speed		Bidder to Specify	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
23.5	Oscillation Dwell Time on both ends (Independently adjustable)	Bidder to Specify	
23.6	Overlap Angle - Variable and programmable	Bidder to Specify	
23.7	Overlap Speed – Variable and programmable	Bidder to Specify	
23.8	Torch Shift per revolution of weld	Bidder to Specify	
23.9	Torch shift speed	Bidder to Specify	
24.0	**GTAW FINE ADJUSTMENT OF WELDING PARAMETERS (DURING WELDING)**		
24.1	Fine Adjustment of Torch centering /Vertical position / Parameters while welding is in progress	Bidder to Confirm	
24.2	The changes through fine adjustment made during welding may or may not be used to modify programmed data at end of welding cycle.	Bidder to Confirm	
24.3	Fine adjustment must be only by knob or joy stick not by numerical inputs.	Bidder to Confirm	
24.4	TIG Welding parameters	Bidder to furnish range	
24.5	Pulse Current	Bidder to Specify	
24.6	Base Current	Bidder to Specify	
24.7	Tube Revolution Speed	Bidder to Specify	
24.8	Torch Oscillation Width	Bidder to Specify	
24.9	Torch Oscillation Speed	Bidder to Specify	
24.10	Provision of display of wire feed rate	Bidder to Confirm	
24.11	Filler Wire Feed Speed	Bidder to Specify	
25.0	**GMAW WELDING PROGRAMMABLE DATA (COMMON FOR ALL PASSES)**		
25.1	Program Number	Bidder to furnish range	
25.2	Gas Pre-Flow & Post-Flow Time	Bidder to Specify	
25.3	Initial Current	Bidder to Specify	
25.4	Initial Current Time	Bidder to Specify	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
25.5	Current Up-Slope & Down-Slope Time	Bidder to Specify	
25.6	Initial Voltage	Bidder to Specify	
25.7	Arc Start Delay Time	Bidder to Specify	
25.8	Tube Revolution Start Delay Time	Bidder to Specify	
25.9	Oscillation start Delay Time	Bidder to Specify	
25.10	Crater Current	Bidder to Specify	
25.11	Crater Current Time	Bidder to Specify	
25.12	Crater Voltage	Bidder to Specify	
25.13	Burn-Back Control to avoid globule formation on wire tip	Bidder to provide details	
25.14	Synergic MIG welding Program based on wire diameters 0.8 mm for CS/AS/SS.	Bidder to Specify	
25.15	Any other feature required to result in a defect free weld joint as seen in Real Time Radiography test.	Bidder to Specify.	
26.0	**GMAW WELDING PROGRAMMABLE DATA (FOR EACH PASS)**		
26.1	Pass Number	Bidder to furnish range	
26.2	Welding Pulse Current	Bidder to Specify	
26.3	Welding Voltage	Bidder to Specify	
26.4	Tube Revolution Speed	Bidder to Specify	
26.5	Overlap Angle for each pass –Variable and programmable	Bidder to Specify	
26.6	Overlap speed for each pass –Variable and programmable	Bidder to Specify	
26.7	Oscillation Width	Bidder to Specify	
26.8	Oscillation Speed	Bidder to Specify	
26.9	Oscillation Dwell Time on both ends (Independently adjustable)	Bidder to Specify	
26.10	Torch shift for each pass – Variable and adjustable. Provision for Torch centre shifting during welding in progress.	Bidder to Specify	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
26.11	Torch shift speed	Bidder to Specify	
26.12	Crater Pulse Current	Bidder to Specify	
27.0	**GMAW FINE ADJUSTMENT OF WELDING PARAMETERS (DURING WELDING)**		
27.1	Welding Current	Bidder to Specify	
27.2	Welding Voltage	Bidder to Specify	
27.3	Tube Revolution speed	Bidder to Specify	
27.4	Torch Oscillation Width	Bidder to Specify	
27.5	Torch Oscillation Speed	Bidder to Specify	
TUBE HANDLING SYSTEM			
28.0	**IN-FEED & OUT-FEED TUBE ROLLER CONVEYORS FOR 24m**		
28.1	Bidder to provide General Arrangement drawing	Bidder to provide	
28.2	In-feed tube conveyor to be suitable for transporting tubes of 2m to 15m lengths. Pitch between rollers to be specified. Shall not be greater than 750mm	Bidder to Confirm	
28.3	Out-feed tube conveyor to be suitable for transporting built up tubes of 2m to 24 m lengths	Bidder to Confirm	
28.4	Both In feed and Out feed conveyors shall have row of idle rollers for transporting tubes. The diameter of rollers shall be 200mm or more. The bearings used shall be of reputed make. Width of the roller to be specified.	Bidder to Confirm	
28.5	Rollers shall be made of cast steel – wear resistant and shock absorbing material.	Bidder to Confirm	
28.6	Approximate of working height of tube from shop floor level to be 1000 to 1100mm. Bidder to specify.	Bidder to Confirm	
28.7	The structures carrying rollers shall be rigid and anchored to the floor with the help of anchoring bolts, secured to the floor by drilling and pouring quick setting cement. No separate foundation is acceptable.	Bidder to Confirm	
28.8	Rollers of IN-FEED and OUT-FEED shall be chain driven. All the rollers shall be connected with single chain driven by Electric motor positioned at one end.		

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
29.0	**PINCH ROLLER DRIVE**		
29.1	Pinch Roller driving mechanism to be deployed for transporting the tube on either sides of the STBW machine i.e one at the end of In-feed roller stand and another at the start of Out-feed roller stand. The structure shall be rigid to handle the loads.	Bidder to Confirm	
29.2	The Pinch Roller mechanism shall be driven by electrical motor and variable speed drive system and should enable forward and reverse movement of tube	Bidder to Specify	
	The pinch roller drive to be shall have pneumatically actuated clamping and electrically driven.		
29.3	The pinch roller drive unit adjacent to the welding machine on either sides must have four rollers	Bidder to Confirm	
29.4	The pinch roller drive farther away from the welding machine may have two rollers. Bidder to choose two or four roller depending on their design	Bidder to Specify	
29.5	The axes of pinch rollers shall be vertical to the floor	Bidder to Confirm	
29.6	To withstand Heat and Wear the pinch rollers shall be Metalon rollers	Bidder to Confirm	
29.7	Adjustable to accommodate the range of tube diameters	Bidder to Specify	
29.8	The pinch roller diameter shall be 175mm or more and having width of 80mm or more.	Bidder to Confirm	
29.9	The maximum speed of transporting tube shall be 60m/min. The speed shall be adjustable	Bidder to Confirm	
29.10	The speed of tube shall be reduced (creep speed) while approaching the stopper, at the centre, to avoid impact loading on the stopper.	Bidder to Confirm	
29.11	Bidder to Specify total number of Pinch roller drives units on the in-feed side and out-feed side.	Bidder to Specify	
29.12	Pinch roller drive unit shall be anchored to the shop floor as explained under Clause 25.6.	Bidder to Confirm	
30.0	**TUBE STORAGE RACKS**		
30.1	**Water fall type tube storage In-feed rack for 3 Nos STBW machines**		
30.1.1	The top most point of entire Water fall type tube storage In-feed rack shall not be higher than 6.5metres. Bidder to design the height of the rack much lower than 6.5m. Bidder to specify the height.	Bidder to Confirm	
30.1.2	Raw tubes have to be stacked in water-fall type tube storing racks. The structure shall be rigid to hold tubes.	Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
30.1.3	The water-fall rack shall have **FIVE Decks** Vertically arranged (one above the other) for storing tubes of Five different tube sizes / specifications.	Bidder to Confirm	
30.1.4	The minimum length of tube shall be : 2m The maximum length of tube shall be : 15m	Bidder to Confirm	
30.1.5	Each deck shall have the capacity to hold around 38 tubes of OD 63.5mm spread in a single row with pneumatically operated centrally located intermediate stopper. The width of each deck shall be 2500mm. Supporting members in each storage deck shall be lined with Nylon or Teflon for reducing the noise level.	Bidder to Confirm	
30.1.6	The clear gap between the decks for the tubes to stack in a row shall be 175mm or more.	Bidder to Confirm	
30.1.7	The water fall rack shall have a suitable tube bundle loading system – to transfer the bundle of tubes placed on the platform to various tube storage decks, as desired by the Machine Operator. The platform shall be capable of transferring tube bundle weighing Six Tons. The width of the platform shall be 2000mm. All the tubes shall be rolled into the selected deck as a lot by release of stopper and NOT one by one.	Bidder to Confirm	
30.1.8	Bundle transferring platform shall be balanced with adequate counter balance weights to lift 6 tons of tubes and self-weight of the platform. Bidder to specify the counter balance provided.		
30.1.9	The tube from each rack shall be transferred from the deck on to the In-feed conveyor by means of Chain conveyor. The speed of Chain conveyor shall be variable.	Bidder to Confirm	
30.1.10	The controls should enable operator to choose different tubes each from different decks to be loaded on to the chain conveyor simultaneously. The chain conveyor then transfers each tube one after the other on to the in-feed conveyor.	Bidder to Confirm	
30.1.11	A centralized Operator Control Desk shall be provided to operate the water fall tube storage rack. Controls to be provided for loading the tube bundles on to the selected deck and also to select the tube from the racks.	Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
30.1.12	The water fall rack shall be in line with the tube butt welding machine.	Bidder to Confirm	
30.1.13	The ratings of various motors used on Water Fall rack shall be specified. Bidder to Specify whether the system used for loading and unloading of tubes is electric / pneumatic / hydraulic.	Bidder to Specify	
30.1.14	The water fall rack shall have provisions for easy access (for the maintenance staff) to various mechanisms (hydraulic /electric /pneumatic) mounted in the system for maintenance.	Bidder to Confirm	
30.1.15	Safety guards and safety interlocks shall be provided.	Bidder to Confirm	
30.1.16	Foundation required for Water fall rack shall be mentioned.	Bidder to Specify	
30.2	**Simple tube storage In-feed rack for 1 No STBW machine**		
30.2.1	Sloping tube storage rack one each on either side of the INFEED roller conveyor shall be provided. The slope shall be toward the INFEED roller conveyor.	Bidder to Confirm	
30.2.2	The width of each rack shall be around 2m. A flat portion of 0.5m for tube bundle loading by EOT crane and then a gentle slope to be provided.	Bidder to Confirm	
30.2.3	Length of tubes – Minimum : 2m and Maximum : 15m	Bidder to Confirm	
30.2.4	The storage racks shall be provided with tube stopper such that the tubes do not roll and fall down	Bidder to Confirm	
30.2.5	Tube kick-off arrangement to be provided to load the tube on to the INFEED Tube Conveyor. Kick off mechanism shall be with a set of Lift & Pick and Roll & Drop type pneumatically operated levers.	Bidder to Confirm	
30.2.6	The complete width of the machine including the widths of storage racks end to end shall not exceed 4.5m. Bidder shall design accordingly and indicate in the GA drawing submitted with offer.	Bidder to Confirm	
30.2.7	Safety guards and safety interlocks shall be provided.	Bidder to Confirm	
30.3	Standard size of sprockets to be used. Gear Box make:Radicon / Elecon / Allryod / SEW / Bonfiglioli/Compton Greaves are preferred.	Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
31.0	**HYDRAULICS**		
31.1	The System should be centralized, modular / stacked valve construction having minimum number of pipes / pipe joints and located at suitable location with easy accessibility of components for maintenance.	Bidder to Furnish Details	
31.2	Pumps, valves, accessories etc shall be of Bosch-Rexroth / Vickers or equivalent reputed make acceptable to BHEL. (Details to be submitted). The seals used in cylinders shall be of Merkel / Parker / Bushak + Shamban / Hunger / Simrit make.	Bidder to Confirm & furnish details	
31.3	Each pump should have an independent motor. Tandem pumps shall be avoided.	Bidder to Confirm	
31.4	Suitable filtration system should be provided with Duplex / standby filter units. It is preferable to use re-usable type of filter elements in the system. The filter unit shall be of Hydac / Parker / Rexroth or equivalent reputed make acceptable to BHEL. (Details to be submitted).	Bidder to Confirm & furnish details	
31.5	The flexible hoses used in the system shall be of Gates / Aeroquip / Parker or any other reputed make acceptable to BHEL.	Bidder to Specify	
31.6	Failure indication for oil level, temperature, pressure, filter clogging should be provided	Bidder to Confirm & furnish details	
31.7	Automatic shut off provision during hose failures, chiller failure, low oil level etc. Pump unloading feature during idle running to be provided for energy conservation. Details should be submitted.	Bidder to Specify	
31.8	Cooling system of sufficient capacity to maintain complete Hydraulic System at a temperature not exceeding 50 deg C irrespective of the ambient conditions.	Bidder to Confirm & furnish details	
31.9	It should be possible to replace hydraulic elements like valves, manifolds etc without disturbing the associated pipelines. The positioning of hydraulic elements should allow easy maintenance	Bidder to furnish details	
31.10	Maximum Operating Pressure of hydraulic system	Bidder to Specify	
31.11	Main Pump flow in lpm and Motor Power in kW	Bidder to Specify	
31.12	Reservoir capacity (in litres)	Bidder to Specify	
31.13	All oil pipelines shall be of seamless steel and should undergo pickling process.	Bidder to Confirm	
31.14	One hand held minimess pressure gauge of suitable range with minimess hose (1.0 to 1.5m length) to be supplied along with the power pack. Check points to be provided in the system.	Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
31.15	All cylinders used in the machine should have standard bore and rod sizes. The piston rod shall be hard chrome plated.	Bidder to furnish details	
31.16	The Power pack should be designed taking into account the energy efficiency (Hi-low pump system, proper unloading during idling, etc.). The motor used for pumps shall be energy efficient ones.	Bidder to furnish details	
31.17	All the pipe / hose end fittings shall be of standard weld nipple with O-ring seating type (DIN 3865 or equivalent). No ferrule joints are to be used in the hydraulic system. All threaded connections shall be of metric sizes.	Bidder to Confirm	
31.18	The oil to be used shall be of standard ISO Viscosity Grades – 32 / 46 / 68	Bidder to Specify	
31.19	The maximum pressure of the system should preferably not to exceed 310 bar	Bidder to Specify	
31.20	The control voltages for all the Solenoids of the valves shall be of 24-V DC and all solenoid operated DC valves should have manual over-ride provision and light indicating solenoids.	Bidder to Specify	
31.21	The pipelines to be painted with standard colours as per the colour coding accepted internationally for hydraulic systems.	Bidder to furnish details	
31.22	All hydraulic pipelines, hoses and electrical control cables to be neatly laid out with proper clamps and flexible hose conveyors wherever required.	Bidder to Confirm	
31.23	Suitable leakage oil collection metallic tray to be provided wherever required.	Bidder to Confirm	
31.24	All the components in the hydraulic power pack shall be provided with identification numbers, as per the hydraulic circuit and should be pasted with metallic identification number plates.	Bidder to Confirm	
31.25	Hydraulic oil will be supplied by BHEL during commissioning at BHEL works. Bidder to provide the oil during pre-dispatch inspection.	Bidder to Confirm	
32.0	**COOLING SYSTEM**		
32.1	Chiller Unit for Cooling of Sub-Systems: Suitable Capacity Refrigerant / Radiator type Chilling Units are to be provided for the cooling of Hydraulic Power Pack Oil etc. Bidder to give Complete Technical Details on these Chilling Units	Bidder to Specify	
32.2	Interlock System for Chilling Units Coolant Flow Suitable flow sensors are to be provided to have an interlock with welding circuit, to avoid failure of flow of cooling medium	Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
33.0	**LUBRICATION :**		
33.1	Machine lubrication: Bidder to furnish details of the type of lubrication provided for all the movable parts in the machine.	Bidder to Confirm	
33.2	All greasing points to be provided at convenient location for the operators to fill grease periodically.	Bidder to Confirm	
33.3	First filling of Lubrication Oil to be supplied by the supplier. Indian equivalent shall be mentioned.	Bidder to Specify	
33.4	First filling of Grease should be supplied by Bidder. Indian equivalent shall be mentioned.	Bidder to Specify	
34.0	**PNEUMATIC SYSTEM:**		
34.1	The pneumatic operated elements of the machine shall work efficiently with BHEL compressed air supply at a pressure of 4.5 to 5.0 kg/cm2 in ¾ inch line.	Bidder to Confirm	
34.2	If higher air pressure is required for efficient operation of the machine, Bidder shall furnish the information for Air Compressor/Booster of suitable capacity.	Bidder to Specify	
34.3	Bidder to Specify the total air volume required for efficient operation of the complete machine.	Bidder to Confirm	
34.4	Refrigerated Air Drier to be provided to eliminate moisture content from the compressed air at the designed flow and pressure rating.	Bidder to Confirm	
34.5	BHEL will provide compressed air at only one point near / on the machine. Bidder shall provide suitable filter-regulator-lubrication (FRL) unit and in addition a hand wheel valve at this point	Bidder to Confirm	
34.6	Hydraulic, Pneumatic & Lubricating oil piping should be preferably metallic except places where flexible piping is essential. All the pipes required for the same shall be included in the standard scope of the machine.	Bidder to Confirm	
34.7	Pneumatic components shall be of FESTO/SMC/PARKER.	Bidder to Specify	
35.0	**ELECTRICAL & ELECTRONICS SYSTEMS**		
35.1	415V with a voltage fluctuation of +/- 10%, 50HZ with a fluctuation of +/-3%, 3 Phase AC (3 wire system without neutral) power supply will be provided by BHEL at a single point near the machine, as per layout recommended by Bidder. All cables, connections, circuit breakers etc. required for connecting BHEL's power supply to the machine shall be in the scope of Bidder.	Bidder to Confirm	
35.2	Tropicalization**:** All electrical / electronic equipment shall be tropicalized.	Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
35.3	Control circuit voltage shall not exceed 24V DC	Bidder to Confirm	
35.4	All electrical components in the cabinets should be mounted on DIN Rail	Bidder to Confirm	
35.5	All electrical and electronic panels including operator's panel should be provided with fluorescent lamps for sufficient illumination and power receptacles of 220Volts, 5/15 Amp AC. All adapters /receptacles should have compatibility with Indian equivalents.	Bidder to Confirm	
35.6	All cables moving with traversing axes should be installed in caterpillar / Drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer.	Bidder to Confirm	
35.7	Bidder should ensure the proper earthing for the machine and its peripherals.	Bidder to Confirm	
35.8	Cables shall be routed through totally enclosed cable trays. There shall not be cable trenches.	Bidder to Confirm	
35.9	All electrical & electronic control cabinets & panels should be vermin and dust proof. All Electric enclosures shall have IP 54 protection	Bidder to Confirm	
35.10	Motors and drives shall be of Fanuc / Siemens / Allen Bradley / ABB / Indramat / SEW or any other reputed makes acceptable to BHEL conforming to IS / IEC Standards (Bidder should indicate make and type in the offer- Energy Efficient Motor)	Bidder to Confirm	
35.11	All electrical items shall be of from SEW / ROCKWELL Allen Bradley/ Telemechanique/Siemens/L&T/ABB or reputed makes acceptable to BHEL.	Bidder to Confirm	
35.12	All the motor control variable frequency drives should have input and output chokes with braking resistor.	Bidder to Confirm	
35.13	All indication lamps should be provided with LED Indication Lamp.	Bidder to Confirm	
35.14	All components/devices/terminals are to be incorporated with numbered ferrules.	Bidder to Confirm	
35.15	External wiring from / to control panel, control desk, external motors etc shall be by means of screened multi-core cables.	Bidder to Confirm	
35.16	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.	Bidder to Confirm	
35.17	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.	Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
35.18	Air Conditioners with Dehumidifiers of suitable capacity to be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions. **Make:**Rittal / Warner & Finley or any other reputed make acceptable to BHEL. Detailed specifications to be submitted.	Bidder to Specify	
35.19	Suitable Servo Voltage stabilizer for Butt Welding Machine & Ultra isolation transformer for programmable controls shall be quoted for each machine separately.	Bidder to Confirm	
36.0	**MACHINE LIGHTS**		
36.1	Machine Spot Lights and suitable fluorescent light or metal halide lamps to be provided for sufficient illumination in the welding zone and in the pit where bottom torches are mounted.	Bidder to Confirm	
36.2	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Bidder to Confirm	
37.0	**MACHINE FOUNDATION& DRAWING APPROVAL:**		
37.1	GA drawings, Machine detailed constructional drawings with dimensions, Civil Foundation layout drawings, Hydraulic / Pneumatic / Electrical / Electronic circuits with BOM, are to be submitted within 45 days from the date of ordering (in case of an order) for approval by BHEL.	Bidder to Confirm	
37.2	Bidder shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Letter of Intent (LOI). Complete details like static and dynamic loads etc required for foundation design shall be submitted by the Bidder within three months after getting BHEL's approval.	Bidder to Confirm	
37.3	BHEL shall design and construct complete foundation for the machine as per the Bidder's recommendation	Bidder to Confirm	
37.4	Complete anchoring system including foundation bolts, anchoring materials, fixators, levelling shoes, chemical for anchoring etc should be supplied	Bidder to Specify	

S. No	PARTICULARS	SPECIFICATION/DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
38.0	**MACHINE SPARES:**		
38.1	List of spares with itemized break-up of mechanical, hydraulic, pneumatic, electrical and electronic spares used in the machine in sufficient quantity as per recommendation of Bidder for 2 years of trouble free operation on three shifts continuous running basis shall be furnished by Bidder along with offer. The list is to include following, in addition to other recommended spares: **(Unit Price for each item of spare shall be offered)**	Bidder to Confirm	
38.2	**Mechanical, Hydraulic, Pneumatic Spares:** All types of Pumps, Valves, Pressure Switches, Transducers, Flow Switches, Filters, Seals, O-rings, Hydraulic Hoses, hoses, bearings, sprockets, chains etc.	Bidder to Confirm	
38.3	**Electrical / Electronic / PLC Spares:** All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, Spares for PLC, Servo Motors for Feed Drives, Power Module & Control Cards for Main Drive as well as Feed Drives etc.	Bidder to Confirm	
38.4	Welding Consumable spares such as Contact tips, Gas nozzles, Tip adapters, Other torch spares for at least 3 months continuous operation shall be provided.	Bidder to Confirm	
38.5	Spare Torches, Torch cables and Wire feed conduits, Wire feed rollers may also be offered.	Bidder to Confirm	
38.6	All types of spares for total machine and accessories shall be available for at least ten years after supply of the machine. If machine or control is likely to become obsolete in this period, the Bidder should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure these in advance, if required	Bidder to Confirm	
38.7	Bidder to Confirm that complete list of spares for machine and accessories, along with item part no / specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine	Bidder to Confirm	
38.8	A set of Service Tools for dismantling and assembling of machine components such as roller sets etc. may be quoted.	Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/ DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
39.0	**DOCUMENTATION:**		
39.1	The following documents in English language should be supplied along with the machine: **Hard Copies - 3 Sets Bidder to Confirm** **In CD form - 1 Set** 1. GA Drawing of the complete STBW station with conveyor/tube handling system. 2. GA Drawing of Individual Mechanisms 3. GA & Sub-Assembly Drawings for sub-systems for maintenance purpose. 4. Operating manuals of Machine & its PLC System 5. Programming manuals of Machine & its PLC System 6. Maintenance manuals with all drawings of machine assemblies / sub-assemblies with parts list 7. All Electrical circuit diagrams with bill of materials 8. Hydraulic circuit diagrams with bill of materials 9. Pneumatic circuit diagrams with bill of materials 10. Maintenance & Interface manuals for Machine Control System 11. Preventive Maintenance check list for Electrical and Mechanical System 12. Trouble shooting chart for Main and all sub systems 13. Complete PCB Schematics indicating check points for Electronic controls. 14. Catalogues, O&M manuals for all bought out items used in the machine. 15. Operating Manuals, Maintenance Manuals & Catalogues for all supplied Accessories. 16. Detailed specification of all rubber items / hydraulic / lubrication fittings 17. PLC program print-outs with comments in English 18. PLC program and data on CD, Flash Memory Card. 19. Complete back up of hard disk on GHOST CD and clear written Instructions(3 copies) to take back up and reloading of a new hard disk. 20. Complete list of Alarm log, Error code, error messages & remedies and on line fault diagnostics to be provided by the Bidder. 21. Complete list of spares for machine, along with item part no /specification / type / model and make & address of the sub-Bidder.		

S. No	PARTICULARS	SPECIFICATION/ DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
40.0	**MACHINE PRE-DISPATCH INSPECTION & ACCEPTANCE AT SUPPLIER'S WORKS:**		
40.1	Complete STBW stations with all sub-systems and accessories shall be assembled and offered for inspection by BHEL Engineers at supplier's works.	Bidder to Confirm	
40.2	All systems of the machine have to be operated and demonstrated to the BHEL Engineers in proper working condition.	Bidder to Confirm	
40.3	Supplier has to establish parameters for radiographic quality weld joints with the following tube specifications: a) OD 47.63mm x Th. 6.0mm / SA213 T11 with 0.8mm ER80S-B2 wire by Pulsed GMAW process 10 Joints b) OD 63.5mm x Th. 12mm / SA213 347H (110mm insert) + OD 63.5mm x Th. 12mm / SA213 T22 with 0.8mm ER Ni Cr3 wire by Pulsed GMAW process – 10 Joints	Bidder to Confirm	
40.4	Edge prepared tubes will be supplied by BHEL. The welding consumables have to be arranged by the supplier. All the other consumables have to be arranged by supplier.	Bidder to Confirm	
40.5	Supplier has to arrange for conducting Radiography test on joints and will be evaluated as per BHEL quality standards given in Annexure-I. All the joints should pass the test.	Bidder to Confirm	
40.6	The welded tubes are to be returned back to BHEL along with the machine consignment.	Bidder to Confirm	
41.0	**PROVE-OUT AND ACCEPTANCE AT BHEL WORKS:**		
41.1	After the machine Erection is completed and Energizing the machine at BHEL works, all systems of the machine have to be operated and demonstrated in proper working condition.	Bidder to Confirm	
41.2	**Quality test:** The following joints have to be produced without defects as per the quality standards in Annexure-I: a) OD 44.5mm x Th. 8.0mm / SA210 Gr. C with 0.8mm ER70S-A1 wire by Pulsed GMAW process-10 Joints	Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/ DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
41.2 Cont..	b) OD 47.63mm x Th. 6.0mm / SA213 T11 with 0.8mm ER80S-B2 wire by Pulsed GMAW process- 10 Joints c) OD 63.5mm x Th. 12mm / SA213-347H (110mm insert) + OD 63.5mm x Th. 12mm / SA213 T22 with 0.8mm ER Ni Cr3 wire by Pulsed GMAW process- 10 Joints d) Inconel Alloy tubes if available during commissioning may be welded with ER Ni Fe-7A,ER Ni cr-3 with wire sizes 0.8,1.0,1.2 mm by GMAW and GTAW process-10 joints for establishing the process.		
41.3	**Productivity prove out:** Supplier to prove out the productivity with defect free Radiography quality weld joints, for following tubes of 10 or 12m length for one shift of 8 hours as per clause 3.1: 80 joints / shift of OD 47.63mm x Th. 6.0mm / SA213 T11 with 0.8mm ER80S-B2 wire by Pulsed GMAW process to build a length of 24 Mts.	Bidder to Confirm	
41.4	All consumables and tubes will be supplied by BHEL.	Bidder to Confirm	
41.5	Edge prepared tubes, welding consumables, gas etc will be supplied by BHEL.	Bidder to Confirm	
41.6	Radiography test will be conducted on joints in RTR station online with the STBW machine, and will be evaluated as per BHEL quality standards given in Annexure-I. All the joints should pass the test.	Bidder to Confirm	
42.0	**TRAINING:**		
42.1	The supplier shall train TWO BHEL Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and Programming) of the Machine for FIVE working days at supplier's works after the pre-dispatch inspection.	Bidder to Confirm	
42.2	Bidder to clearly mention whether the training is offered free of cost or chargeable. If chargeable, the Bidder has to quote on manday basis.	Bidder to Specify	
42.3	Airfare, board & lodging for the BHEL Engineers who will be visiting supplier's works for pre-dispatch inspection and training, shall be borne by BHEL.	Bidder to note	
42.4	The Supplier shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance (Mechanical, Electrical/ Electronics and PLC System) during commissioning of the Machine at BHEL works for TEN working days.	Bidder to Confirm	

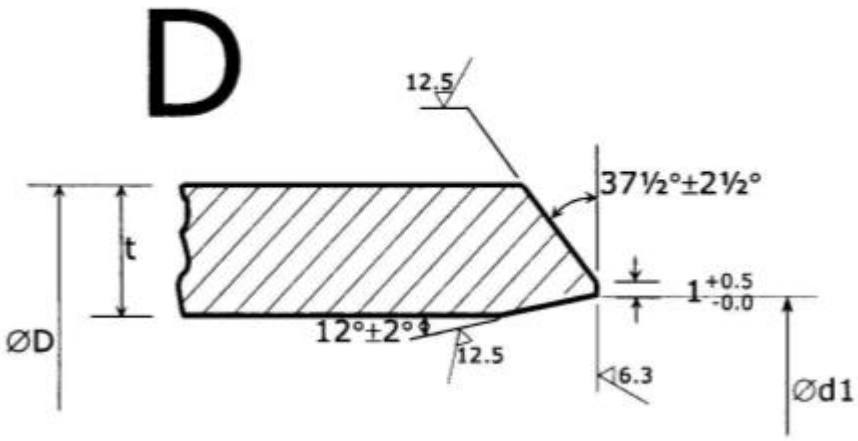
S. No	PARTICULARS	SPECIFICATION/ DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
42.5	**The training shall include specialized coaching in** i) Safety ii) Operation of the machine iii) PC based System & Operation, iv) Trouble-Shooting, v) Software Application vi) All special features of the machine vii) Electrical / Mechanical / Electronics systems	Bidder to Confirm	
42.6	Competent, English speaking experts shall be arranged by the Bidder during training for satisfactory & effective training of BHEL personnel	Bidder to Confirm	
43.0	**ERECTION & COMMISSIONING**		
43.1	Supplier to take full responsibility for Supervision of the erection and for startup, testing and commissioning of machine, its controls and accessories. Supplier shall send suitable qualified Engineers and Erection crew for supervision of Erection and Commissioning at PEFP, BHEL, Bhandara for Three Machines.Erection crew is not required for One machine to be installed at BHEL, Trichy. Commissioning Engineers who will be deputed to BHEL shall be English speaking or English interpreters have to be arranged by the supplier for the entire duration from start of erection till the machines are commissioned and handed over to BHEL with complete training.	Bidder to Confirm	
43.2	Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by Bidder in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL.	Bidder to Confirm	
43.3	Successful proving of BHEL components by the Bidder shall be considered as part of commissioning. All tests, as mentioned (Machine Acceptance) shall form part of the commissioning activity.	Bidder to Confirm	
43.4	Commissioning spares, required for commissioning of the machine shall be supplied free of cost	Bidder to Confirm	
43.5	Test Mandrels, Instruments and other necessary equipment including Laser equipment, if required, to carry out all above activities should be brought by the Bidder.	Bidder to Confirm	

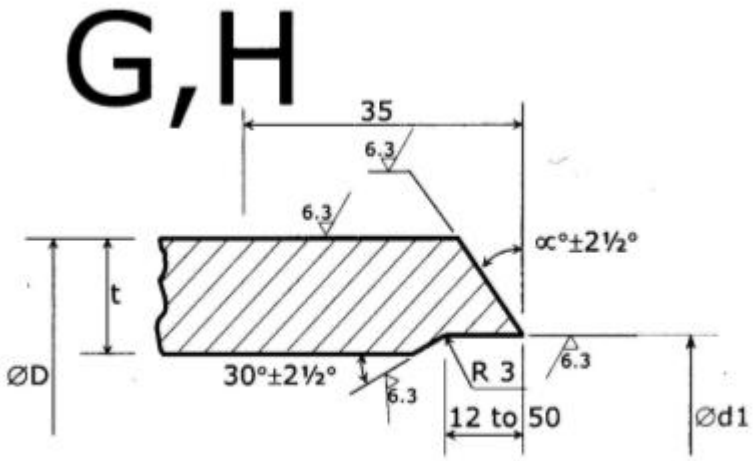
S. No	PARTICULARS	SPECIFICATION/ DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
43.6	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the Bidder. For this purpose, the Bidder should supply sufficient quantity of touch-up paint of various colours of paint used.	Bidder to Confirm	
44.0	**IN-BUILT SAFETY ARRANGEMENTS**		
44.1	Following safety features in addition to other standard safety features should be provided on the machine:		
44.2	STBW Machine shall have Safety Guards / Sliding Doors for protection against the welding arc / splash / flashing for the Machine Operators. Safety Doors to have visible glasses for clear vision also. Bidder to submit details on this arrangement offered.	Bidder to Specify	
44.3	A detailed list of all alarms / indications provided on machine should be submitted by the Bidder.	Bidder to Specify	
44.4	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator's movement for effective use of machine.	Bidder to Confirm	
44.5	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, work piece and the operator due to the malfunctioning or mistakes.	Bidder to Specify	
44.6	Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on the display and operator panels) should be available.	Bidder to Confirm	
44.7	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations and suitably guarded.	Bidder to Confirm	
44.8	Emergency Switches should be provided at suitable locations as per International Norms.	Bidder to Confirm	
44.9	All lubricated parts like Bed, guide ways shall have provision for collecting the used Lubrication oil from machine guide ways and preventing them from spilling over on to the ground.	Bidder to Confirm	
45.0	**THERMAL STABILITY FOR AMBIENT CONDITIONS & ENVIRONMENTAL PERFORMANCE OF THE MACHINE:**		
45.1	The machine shall be suitable for an ambient temperature of +45 deg C and relative humidity of 90% respectively, but both do not occur simultaneously.	Bidder to Confirm	
45.2	The Bidder should ensure trouble free operation of the machine with Thermal Stability of the complete machine and accuracy requirements of BHEL components, keeping in view of ambient conditions as mentioned above.	Bidder to Confirm	

S. No	PARTICULARS	SPECIFICATION/ DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
45.3	The machine, including sub-systems, attachments and accessories, should be suitable for continuous operation on three shifts a day.	Bidder to Confirm	
45.4	If any safety / environmental protection enclosure is required it shall be built in the machine by the Bidder.	Bidder to Confirm	
45.5	Paint of the machine should be oil / coolant resistant and should not peel off	Bidder to Confirm	
45.6	Maximum noise level shall be 85 dB (A) at normal load condition.	Bidder to Confirm	
46.0	**PAINTING:**		
46.1	Painting of entire Machine / Electrical Panels: **RAL 6011 Apple Green** (Polyurethane Paint) **Heat resistant paint** on the inside of the machine in the welding zone.	Bidder to Confirm	
47.0	**MACHINE PACKING:**		
47.1	Sea worthy & rigid packing for all items of complete machine, PLC System, all accessories and other supplied items to avoid any damage/loss in transit. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes	Bidder to Confirm	
48.0	**GUARANTEE:**		
48.1	Performance Guarantee to be given for 12 months from the date of commissioning OR 18 months from the date of dispatch whichever is earlier.	Bidder to Confirm	
49.0	**GENERAL:**		
49.1	Machine Model No.	Bidder to Specify	
49.2	Total connected load (KVA):	Bidder to Specify	
49.3	Total air volume in cu.m/min	Bidder to Specify	
49.4	Floor area required (Length, Width, Height) for complete machine & accessories	Bidder to Specify	
49.5	Total weight of the machine (approx)	Bidder to Specify	
49.6	The general arrangement drawing showing the machine & associated systems with salient dimensions shall be submitted along with the offer. The drawing should be clear and legible	Bidder to provide compulsorily	

S. No	PARTICULARS	SPECIFICATION/ DESCRIPTION	VENDOR'S OFFER / CONFIRMATION[with Complete Technical Details]
50.0	**SCOPE OF SUPPLY**		
50.1	**SUPPLIER'S SCOPE**		
	1. Design, Manufacture, Supply, Erection, Commissioning and prove out of 2. STBW machine as per clause 1.0 3. Tooling's 4. Accessories 5. Hydraulic Oil, grease, tooling during pre-dispatch inspection 6. All anchoring & foundation bolts, levelling plates for the complete machine. 7. Levelling Instruments, Power Tools / Hand Tools / Special tools for erection of the machine. 8. Crane required for handling outside shop, if any. 9. Commissioning Engineers for supervision of erection and commissioning 10. Manpower for erection only for 3 machines to be installed at PEFP, Bhandara 11. First Fill of Hydraulic Oil 12. Job Quality and Productivity Prove-out	Bidder to Confirm	
50.2	**BHEL SCOPE**		
	1. Drawings approval 2. Civil foundation work as per manufacturer's drawing 3. EOT crane facility inside shop 4. Tubes for trials and prove out 5. Single Compressed air point at the location indicated in the drawing 6. Single Electrical Supply point at the location indicated in the drawing 7. Welding machines and consumables required for erection if any	Bidder to Confirm	

Annexure





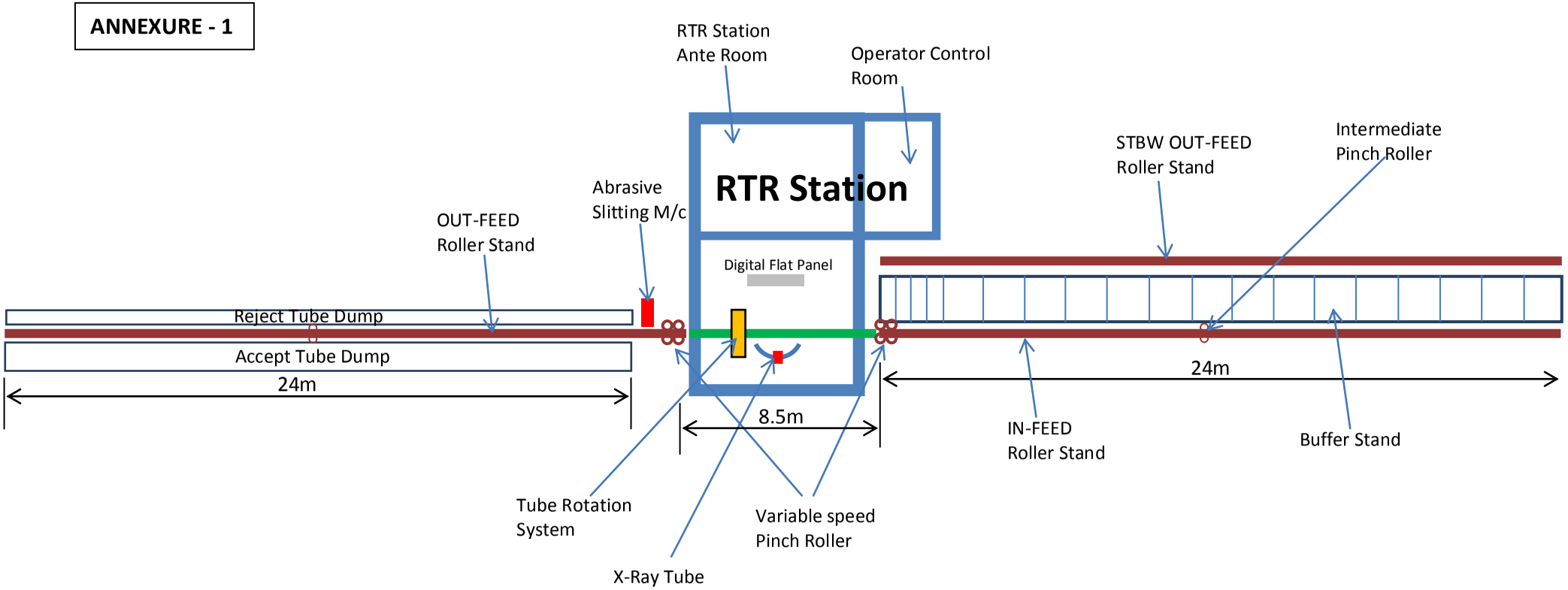
∝ = 45° for t≤ 5.6mm – G Style
∝ = 37½° for t>5.6mm – H Style

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

TUBE HANDLINGSYSTEM FOR RTR STATION – 24m

SCHEMATIC SKETCH OF LAYOUT

ANNEXURE - 1



BHEL, Triuchirappalli