An ISO 9001 Company

Bharat Heavy Electricals Limited

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

ENQUIRY **NOTICE INVITING TENDER**	Phone: +91 431 257 76 53 Fax : +91 431 252 00 31 Email : skaruna@bheltry.co.in Web : www.bhel.com

TWO PART BID	**Enquiry Number:**	**Enquiry Date:**	**Due date for submission of quotation:**
	2851400014	**27.01.2014**	**01.03.2014**

You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order.

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

S. No	Description	Qty
10	**Vertical Panel Bending Machine as per the Technical Specification, General Guidelines Instructions & Compliance Form for Commercial Conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)**	**01 No.**

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

1. **Compliance Form No. IMP 02 and IND 02A as applicable to the vendor to be filled in and enclosed along with the offer failing which, their offer will not be considered for evaluation.**
2. **EMD for this Tender will be Rs.2,00,000/-.**
3. **All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.**

All updates, amendments, corrigenda etc (if any) will be posted only on the above websites from time to time, as and when required, until tender is opened. There will be no publication of such updates, amendments corrigenda etc. Through newspapers or any other media. BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats 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 above .

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

VERTICAL PANEL BENDING MACHINE
PART – A

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 "**Vertical Type 3 Roll Steel Plate Bending or Tubular Membrane Panel Bending Machines or Vertical type 3 or 4 Roll Plate rolling machines".** Vendor shall indicate the actual number of years of experience in the field.	
1.2	Only those vendors (**OEMs**) should quote, who have commissioned in the last 10 years (as on the original date of tender opening) at least **ONE** "Vertical Type 3 Roll Plate bending machine capable of bending steel plates of width 2000mm x thick 40mm or more, **OR** Boiler Membrane Wall (tubular)Panel Bending Machines of width 2000mm or more, **OR** Vertical type 3 or 4 Roll Plate rolling machines capable of rolling steel plates of width 2000mm x thick 40mm or more" **EITHER** (i) In at least one country other than the country of origin to establish vendor's global business activity. **OR** (ii) In India and the referred machines is presently working satisfactorily for more than one year from the date of commissioning (as on the original date of tender opening). The name and contact addresses of the customers to whom the above Machines were supplied to be furnished with details.	
1.3	Vendor has to submit at least ONE PERFORMANCE CERTIFICATE for satisfactory performance of the machine as 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) from their customers in India or in any other country outside the country of origin, supplied and commissioned in the last 10 years. 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.	

S NO.	REQUIREMENTS	VENDOR'S RESPONSE
1.4	BHEL reserves the right to verify the information provided by the Vendor for the referred 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 Vertical Type 3 Roll Steel Plate Bending or Tubular Membrane Panel Bending Machines or Vertical type 3 or 4 Roll Plate rolling machines has been supplied in the past.	
2.2	Specify details of Vertical Type 3 Roll Steel Plate Bending or Tubular Membrane Panel Bending Machines or Vertical type 3 or 4 Roll Plate rolling machines 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	**Machine** 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	Equipment Serial Number	
5.2	Total Connected load in Horse Power / kW	
5.3	Max. Width & thickness that can be Vertically bend / roll of Plate /Panel	
5.4	Other Brief specification of machines	
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

VERTICAL PANEL BENDING MACHINE FOR BOILER MEMBRANE WALL

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 **VERTICAL PANEL BENDING MACHINE** for BHEL complying with the specification as below.

<table>
<tr><th>S. No.</th><th colspan="2">PARTICULARS AND BHEL SPECIFICATIONS</th><th>Vendor's OFFER</th></tr>
<tr><td>1.0</td><td>APPLICATION</td><td>The proposed machine is intended for bending boiler membrane wall panels formed by welding tubes with fins in between. The panels are used in High Pressure Power Boilers. The details of bending are given in Annexure – 1.
The panels are to be positioned vertically and bent between rollers by moving the rollers through Electric Drive.</td><td></td></tr>
<tr><td>1.1</td><td>Configuration of Bending</td><td>Panel is loaded vertically width side and inserted between the support rollers and forming beam. The forming beam is pulled towards the support rollers to attain the required bend in the panel. The handling of panel is done by EOT crane.</td><td></td></tr>
<tr><td>2.0</td><td colspan="2">PANEL SPECIFICATIONS and RADII OF BENDS:</td><td></td></tr>
<tr><td>2.1</td><td colspan="2">TUBE DIAMETER/THICKNESS /RADII:</td><td></td></tr>
<tr><td></td><td colspan="2"><table>
<tr><th>S.No.</th><th>OD, in mm</th><th>THICKNESS, in mm</th><th>Tube Centre Line Radius of Bend</th></tr>
<tr><td>1</td><td>38.1</td><td>7.65 to 11.0</td><td>140 mm / 241.5mm</td></tr>
<tr><td>2</td><td>51.0</td><td>5.6 to 7.6 (Rifle / Plain Tubes)</td><td>248mm / 400.5mm</td></tr>
<tr><td>3</td><td>63.5</td><td>4.8 to 10.0 (Rifle / Plain Tubes)</td><td>407mm</td></tr>
<tr><td>4</td><td>76.1</td><td>4.57 to 5.5</td><td>413mm</td></tr>
</table></td><td></td></tr>
<tr><td>2.2</td><td colspan="2">TUBE OUTER DIAMETER AND THICKNESS:
All are OD (Outer Diameter) Controlled tubes with thickness tolerance of Max. +12 %</td><td></td></tr>
<tr><td>2.3</td><td colspan="2">TUBES MATERIAL: a. Carbon Steel : SA192, SA210A1, SA210C (ASTM)
b. Alloy Steel: SA209T1, SA213T11, SA213T12, SA213T22, SA213T23 (ASTM)</td><td></td></tr>
<tr><td>2.4</td><td colspan="2">FIN SPECIFICATIONS:</td><td></td></tr>
<tr><td>2.4.1</td><td colspan="2">Fin Width : 10mm to 110 mm</td><td></td></tr>
<tr><td>2.4.2</td><td colspan="2">Fin Thickness: 5 mm to 12 mm</td><td></td></tr>
</table>

S. No.	PARTICULARS AND BHEL SPECIFICATIONS		Vendor's OFFER
2.4.3	**Fin Material:** **a. Carbon Steel :** IS2062 Gr A **b. Alloy Steel:** ASTM A576GR1015		
2.5	**Maximum Bending Angle : 135 degree** (refer Annexure-2)		
2.6	**Panel Sizes :**		
2.6.1	**Length:** **Min. 4000 mm** **Max. 25000 mm** **Width:** **Min. 500 mm** **Max. 2500 mm** **Weight:** **Min. 1 Ton** **Max. 9 Tons** **No. of Tubes:** **Min. 4 Nos** **Max. 46 Nos**		
2.7	**Minimum straight distance between bends** – refer Annexure - 1. Vendor to consider minimum straight distance for designing the machine. Vendor to confirm.		
2.8	**Panel Formation :** Welding process involved in forming the tube panels is by MIG / MAG – Flux Cored Arc Welding **with 4mm & 5 mm fillet size**		
2.9	**Section modulus**	Vendor to specify the max. section modulus in cm3 in Steel that can be bent in the machine.	
3.0	**JOB DETAILS: Refer Annexure 1**		
4.0	**QUALITY TOLERANCES FOR Bend Panel**		
4.1	VISUAL DEFECTS		
4.1.1	It shall be free from harmful surface visual defects such as tool marks and depressions etc		
4.2	FLATNESS		
4.2.1	Cold Bending operation	Flat Land width over the bend portion does not exceed 12.5mm.	
4.3	BENDING ANGLE TOLERANCE	± 0.5 deg	
4.4	BEND RADIUS TOLERANCE	± 3 mm	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS		Vendor's OFFER
5.0	**MACHINE CONFIGURATION**		
5.1	This machine will have two **VERTICAL PLAIN** support rollers and one **VERTICAL PLAIN** pressing / forming beam with curved roller surface for attaining the radius of bend parallel to Support Rollers. A support beam to be provided for supporting at the bend region. The rollers and forming beam shall be mounted on a **Rigid Box like frame** such that the support rollers can be moved towards each other or away from each other depending on the radius of the bending required.	Vendor to note & specify	
5.2	The movement of the Vertical Pressing / Forming beam shall be through Electro-mechanical drive. Movement shall be parallel to floor. The forming beam shall be pulled towards the support rollers by a movable frame along with support beam and not pushing type.	Vendor to Confirm	
5.3	The movement of the vertical support rollers shall be motorized movement to adjust the distance between rollers. Movement shall be parallel to the floor. The rollers shall move towards each other or away from each other simultaneously equidistant from the centre between the rollers.	Vendor to Confirm	
5.5	Minimum straight distance between bends – refer Annexure - 1. Vendor to consider for designing the machine. Vendor to confirm.	Vendor to Confirm	
6.0	**MACHINE PARAMETERS:**		
6.1	Panel Bending - Capacity in Tons.	Vendor to specify	
6.2	Speed of bending - Maximum	Vendor to specify	
6.3	Capacity calculation to be submitted with the offer	Vendor to specify	
6.4	Bending – Width side vertically loaded panel.	Vendor to specify	
6.5	Electric motor Capacity in kW	Vendor to specify	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS		Vendor's OFFER
7.0	**DETAILS OF VARIOUS COMPONENTS OF MACHINE**		
7.1	**MACHINE FRAME - 1 Set**		
7.1.1	Machine frame shall be fabricated with steel plates of suitable thickness for rigid construction to withstand the forces during bending. General arrangement of the frame with thickness of plates and dimensions of base, side supports, power screw mounting, motor mounting etc to be submitted with the offer.	Vendor to Confirm	
7.1.2	The machine base shall have the provision to mount the support rollers, Forming beam, supporting beam and sliding arrangement etc. The arrangement shall be shown in the GA drawing.	Vendor to Confirm	
7.1.3	Details of slide ways to be provided for support rollers and forming beam. Suitable protection of slideways to be provided.	Vendor to specify	
7.1.4	Panel Working height (Bottom most point of Panel during bending from floor level) to be indicated in the GA drg.	Vendor to specify	
7.1.5	A steel rule with 'mm' graduation shall be fixed throughout the length of the base frame to indicate the position of support rollers.	Vendor to Confirm	
7.1.6	Angular scale in 'degrees' with least count of 1 degree to be provided on the base frame to indicate the bent angle of the panel	Vendor to Confirm	
7.1.7	Suitable Lifting hooks shall be provided to handle the frame with EOT crane.	Vendor to Confirm	
7.1.8	Material of construction to be specified by the vendor.	Vendor to Specify	
7.2	**Mounting & dismounting of Pressing / forming beam Arrangement**		
7.2.1	A swing arm to be provided at the top of the frame to open for removing the panel after bending operation or for changing the rollers (Pressing/ forming beam)	Vendor to confirm	
7.2.2	Swing arm movement shall be by Pneumatic / Electric mode	Vendor to specify	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS		Vendor's OFFER
7.2.3	Details of Mounting & Dismounting of Pressing / forming beam arrangement shall be provided.	Vendor to specify	
7.2.4	Mounting & Dismounting of Pressing / forming beam shall be simple and quick changing type.	Vendor to confirm	
7.3	**SUPPORT ROLLERS – 2 Nos**		
7.3.1	Support Rollers shall be of plain type. Groove type not acceptable.	Vendor to Confirm	
7.3.2	Dimension details of Support Roller. Diameter, height and thickness of pipe used.	Vendor to specify	
7.3.3	Support Rollers shall be free in rotation to avoid any marking on Panels during bending operation	Vendor to note & confirm	
7.3.4	Material of Support Roller to be specified.	Vendor to specify	
7.3.5	Support Rollers shall have suitable provision to mount on the base frame.		
7.3.6	Rollers shall be provided with lifting hooks for handling with crane.	Vendor to Confirm	
7.3.7	Distance between Support Rollers (Center to Center) - Motorized adjustment. Minimum: Vendor to specify Maximum: around 1500 mm	Vendor to note & specify	
7.4	**PRESSING / FORMING BEAM – 1 Set**		
7.4.1	Forming beam shall be of Box type construction or Beam type construction with suitable thickness of plates for rigidity.	Vendor to Confirm	
7.4.2	Forming Die with required Radius to be fixed on to the beam that can be dismantled. Curved surface shall be plain. Groove type not acceptable.	Vendor to Confirm	
7.4.3	Design and Material of plates and thickness to be specified	Vendor to specify	
7.4.4	Forming beam shall have suitable provision to mount on the base frame.	Vendor to Confirm	
7.4.5	Forming beam shall be provided with lifting hooks for handling with crane.	Vendor to Confirm	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS		Vendor's OFFER
7.5	**SUPPORT BEAM – 1 No**		
7.5.1	Support beam shall be of Box type construction with suitable thickness of plates for rigidity.	Vendor to Confirm	
7.5.2	The supporting beam is to provide support the panel at the bend portion (refer Annexure – 2)	Vendor to Confirm	
7.5.3	Support beam to be coupled with Pressing / Forming beam to move in tandem during bending.	Vendor to specify	
7.6	**MOVABLE ROLLER TROLLEY – 4 Nos**		
7.6.1	Movable roller trolley is used for supporting the panel during bending. The height of the supporting platform shall be in line with the base frame height of the machine.	Vendor to confirm & specify	
7.6.2	Construction details of movable roller trolley shall be provided.	Vendor to specify	
7.6.3	Each Trolley shall have Four swivel Castor Wheels (heavy duty). Each trolley may be designed to carry a load of around 2 Tons.	Vendor to confirm & specify	
7.6.4	Each trolley shall be provided with four supports with 1m height.	Vendor to confirm & specify	
7.7	**REMOTE PENDANT - 1 Unit**		
7.7.1	Remote Pendant Hand held type operator control for operating the machine by Manual mode to be provided	Vendor to confirm	
7.7.2	Pendant control with push button type controls with 15m cable to be provided.	Vendor to Confirm	
7.7.3	Pendant control shall be housed in dust proof enclosure.	Vendor to confirm	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS		Vendor's OFFER
7.7.4	The controls for 1) Movement of support rollers, 2) Movement of forming beam and support beam (inching mode), 3) Opening & Closing of swing arm, 4) Emergency Stop And any other controls that may be required may be specified.	Vendor to confirm	
7.8	**Pressing / forming Beam stoke mechanism**		
7.8.1	The pressing beam shall be moved back and forth by Two synchronised Power Screw mechanism. The drive to the Power Screw shall be through Electric Motor through a suitable power transmission system.	Vendor to confirm	
7.8.2	Maximum stroke of main Pressing / forming beam- Approx. 800 mm. Based on the design calculation, the stroke to be specified.	Vendor to specify	
7.8.3	Design calculation for Power transmission to be submitted.	Vendor to specify	
7.8.4	Design calculation for Power Screw to be submitted.	Vendor to specify	
7.8.5	Details of Power Screw to be provided	Vendor to specify	
7.8.6	Suitable Heavy duty gear box to be chosen. Details of Make, Model, Gear Ratio etc of Gear box to be provided.	Vendor to specify	
7.8.7	Main Motor kW (Continuous Rating) to be specified	Vendor to specify	
7.8.8	The end of stroke accuracy of forming beam (position and parallelism) shall be within ± 1 mm. During approach and return, the parallelism of forming beam will be in the range of ± 2 mm.	Vendor to confirm & specify	
7.8.9	Limit switch to be provided on the base frame to set the angle to be bent. This shall limit the bending beyond the set angle. The limit switch shall be interlocked with main motor.	Vendor to confirm & specify	
7.8.10	Dust proof enclosure to be provided for Power Screw arrangement.	Vendor to specify	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS		Vendor's OFFER
8.0	**LUBRICATION :**		
8.1	Machine lubrication: Automatic centralized lubrication system with timer control and suitable metering cartridges to be supplied.	Vendor to confirm	
8.2	First filling of Lubrication Oil & Grease shall be vendor's. Indian equivalent shall be mentioned.	Vendor to specify	
9.0	**PNEUMATIC SYSTEM: (If Applicable)**		
9.1	The pneumatic operated elements of the machine shall work efficiently with BHEL compressed air supply at a pressure of 4.5 to 5 kg/cm2.	Vendor to confirm	
9.2	BHEL will provide compressed air at only one point near / on the machine. Vendor shall provide suitable filter-regulator-lubrication (FRL) unit, fitted with hand wheel valve, at this point.	Vendor to confirm	
9.3	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.	Vendor to confirm	
10.0	**ELECTRICAL & ELECTRONICS SYSTEMS**		
10.1	415 V 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 Vendor. All cables, connections, circuit breakers etc. required for connecting BHEL's power supply to the machine shall be in the scope of vendor.	Vendor to confirm	
10.2	Tropicalization**:** All electrical / electronic equipment shall be tropicalized and shall have IP54 degree of protection	Vendor to confirm	
10.3	All electrical & electronic control cabinets & panels should be vermin and dust proof.	Vendor to confirm	
10.4	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to confirm	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS		Vendor's OFFER
10.5	All electrical and electronic panels should be provided with fluorescent lamps for sufficient illumination and power receptacles of 220 Volts, 5/15 Amp AC. All adapters /receptacles should have compatibility with Indian equivalents.	Vendor to confirm	
10.6	Control panel shall have built in 230V, 5 amps, 3 pin plug.	Vendor to confirm	
10.7	Motors & other electrical components shall conform to IEC or Indian Standards	Vendor to confirm	
10.8	All alarm tripping logics and control logics incorporated in the machine to be listed out by the vendor.	Vendor to confirm	
10.9	Control circuit voltage should be 24 V DC.	Vendor to confirm	
10.10	Vendor should ensure the proper earthing for the machine and its peripherals.	Vendor to confirm	
10.11	Cables shall be routed through totally enclosed cable trays. There shall not be cable trenches.	Vendor to Confirm	
10.12	Type of drives used for motors to be indicated.		
10.13	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.	Vendor to Confirm	
10.14	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. Specification to be submitted.	Vendor to Confirm	
10.15	Encoders, limit switch, feed back devices shall be suitably placed for easier accessibility rigidly.	Vendor to Confirm	
10.16	All components/devices/terminals are to be incorporated with ferrules.	Vendor to Confirm	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS		Vendor's OFFER
11.0	**Controls:**		
11.1	Type of controls provided	Vendor to specify	
11.2	Machine shall be operated in Manual mode	Vendor to specify	
11.3	Forming beam Stroke Control to be provided - The operator shall be able to set the stroke length by inching mode.	Vendor to specify	
11.4	A digital display of the Pressing Stroke length to be provided	Vendor to confirm	
12.0	**PREFERRED MAKES OF COMPONENTS**		
12.1	Lubrication system used in the machine should be of SKF/CENLUB or reputed make acceptable to BHEL	Vendor to confirm	
12.2	All Pneumatic components used in the machine should be of FESTO/SMC makes only	Vendor to confirm	
12.3	All motors shall be from makers like SIEMENS, ABB, Allen Bradley, Crompton Greaves, Kirloskar, Hindustan, Bharat Bijlee, GEC Allen Bradley, Mitsubishi, Toshiba, Baldor or any other internationally reputed makes conforming to IEC/IS Standards, acceptable to BHEL. Electrical motors should be of Energy efficient EFF1/IE2 class.	Vendor to confirm	
12.4	All electrical items shall be of from SEW / ROCKWELL Allen Bradley/ Telemechanique / Delta/ L&T/ Siemens/ GE or reputed makes acceptable to BHEL.	Vendor to confirm	
12.5	Encoders and digital display units shall be of HEIDENHAIN / FAGER /ASM make	Vendor to confirm	
12.6	All components/devices/terminals are to be incorporated with numbered ferrules.	Vendor to confirm	
12.7	All Reduction gear Box should be of ELECON / BONFIGLIOLI / MAKISHINKO/ SUMITOMO/ SEW or reputed make acceptable to BHEL	Vendor to confirm	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS		Vendor's OFFER
12.8	All the CHAINS, CONNECTING LINKS & SPROCKETS should be of : DIAMOND / ROLLON / SKF / TUSABAKI or reputed make acceptable to BHEL	Vendor to confirm	
12.9	All the BEARING / PILLOW BLOCKS / PLUMMER BLOCKS should be of : SKF / FAG / NTN / TIMKEN / KO or reputed make acceptable to BHEL	Vendor to confirm	
13.0	**MACHINE LIGHTS**		
13.1	Machine Spot Lights for sufficient illumination to be provided for clear visibility at the bending area.	Vendor to Confirm	
13.2	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents.	Vendor to Confirm	
13.3	A magnetic base 24- volt portable spotlight with sufficiently long cable should be provided.	Vendor to Confirm	
14.0	**DRAWING APPROVAL**		
14.1	GA drawings, Machine detailed constructional (main & sub assembly) drawings with dimensions Pneumatic / Lubrication / Electrical / Electronic circuits with detailed BOM, are to be submitted within 45 days from the date of ordering (in case of an order) for approval by BHEL before start of manufacturing. BHEL shall provide approval within 15 days after all the clarifications sought have been submitted by supplier.		
15.0	**TOOLINGS:**		
15.1	a) **Forming Die Radius 121 mm – 1 Set** b) **Forming Die Radius 222.5 mm – 1 Set** c) **Forming Die Radius 375 mm – 1 Set**		

S. No.	PARTICULARS AND BHEL SPECIFICATIONS	Vendor's OFFER
16.0	**FOUNDATION:**	
16.1	Vendor to indicate whether Civil foundation is required.	
16.2	If the foundation is required then vendor to submit Civil Foundation layout drawing with details of static & dynamic loads, within one month after BHEL approval of manufacturing drawings. The shop floor at BHEL works has 200mm concrete thickness with M15 concrete mix. Based on the submitted foundation layout, BHEL shall prepare Civil Foundation drawing. Civil foundation work is under the scope of BHEL. If there is NO foundation, then the machine shall be suitably anchored to the shop floor.	
16.3	**Machine Levelling & Anchoring System**: Complete anchoring system including foundation bolts, anchoring materials, fixators, levelling shoes, anti-vibratory pads etc. shall be supplied with the machine.	
17.0	**AMBIENT CONDITIONS & THERMAL STABILITY**	
17.1	Total machine and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies. Ambient Conditions: Temperature: +5 to +50 Degree Celsius and Relative Humidity: 90% maximum, both do not occur simultaneously.	
17.2	The entire equipment shall be Tropicalized in Design and Construction	
17.3	The offered equipment, has to work in a normal fabrication shop environment in ambient conditions.	
17.4	The machine, including attachments and accessories, should be suitable for 24 hrs. Continuous operation to its full capacity for 24 hour a day and 7 days a week throughout a year. Vendor to ensure and confirm the same.	
18.0	**ENVIRONMENTAL PERFORMANCE OF THE MACHINE:**	
18.1	Maximum noise level shall be 85 dB (A) at normal load condition, 1 metre away from the machine with correction factor for back ground noise, if necessary. Vendor to confirm	
18.2	If any safety / environmental protection enclosure is required it shall be built in the machine by the vendor. Vendor to confirm.	

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18.3	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant. Vendor to confirm	
19.0	**SAFETY**	
19.1	All safety features and safety interlocks provided in the machine shall be listed out by the vendor.	
19.2	Vendor to specify the safety features incorporated in the machine during pressing	
20.0	**TOOLS FOR OPERATION & MAINTENANCE:**	
20.1	Necessary tools like Torque Wrench, Spanners, Keys, Grease guns etc. for operation & maintenance of the machine should be supplied. List of such tools shall be submitted with offer.	
21.0	**SPARES (to be recommended by the vendor)**	
21.1	Item wise breakup of mechanical, Pneumatic , electrical and electronic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis shall be offered by vendor. The list to include following, in addition to BHEL recommended spares: **(Unit Price of each item of spare should be offered)**	
21.2	**Mechanical & Pneumatic Spares:** Bearings, Couplings, Gears and all types of Pumps, Valves / Pressure switches / transducers/ gauges / Flow Switches / Filters / Cylinder seal kit / All O- rings & Oil seals, ,etc. <u>The vendor has to quote the following essential Spares compulsorily</u>: a) For Mechanical wearing components due to linear movements & rotation, couplings, bearings etc. - 2 Sets	

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21.3	**Electrical / Electronic / Control System Spares:** All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, <u>Essential Spares for vendor has to quote compulsorily</u> **Each type** of display unit, limit switches, push buttons, indicating lamps HMI etc., - **2 sets** each	
21.4	All types of spares for total machine and accessories should be available for at least **seven** years after supply of the machine. If machine or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure these in advance, if required	
22.0	**DOCUMENTATION:**	
	The following documents in English language should be supplied along with the machine: **Hard Copies - 3 Sets** **In CD form - 1 Set** **Vendor to confirm** 1. Operating manuals of Machine & its Control System 2. One set of approved drawings (GA, mechanical, electrical, pneumatic & lubrication) 3. Maintenance manuals with drawings of machine assemblies / sub-assemblies with parts list 4. Electrical circuit diagrams with bill of materials, component layout drawings for operator and control panels clearly indicating arrangement of electrical components in the panels 5. Pneumatic circuit diagrams with bill of materials 6. Lubrication circuit diagram with bill of materials 7. Maintenance & Interface manuals, Installation support guides etc for Machine Control System 8. Manufacturing drawings for all tooling's ordered with machine under **clause 15.1** 9. Catalogues, O&M manuals for all bought out items used in the machine. 10. Detailed specification of all rubber items / Pneumatic/ lubrication fittings 11. Complete master list of parts used in the machine	

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23.0	**MACHINE PRE-DESPATCH INSPECTION AND ACCEPTANCE:**	
	Complete machine shall be assembled and offered for inspection and performance trials to test the design capabilities of the machine, by BHEL Engineers before Dispatch at Supplier's works. Acceptance Criteria during pre-dispatch inspection: a) Physical Inspection and Design/Constructional/Dimensional Compliance as per the approved drawings. b) All the features of the machine construction shall be operated and shown in good working condition as per the Technical Specification and Drawings approved by BHEL. c) The panel for testing will be supplied by BHEL.	
24.0	**MACHINE INSPECTION AND TESTS TO BE CARRIED FOR COMMISSIONNG AT BHEL WORKS**	
	After the machine has been commissioned, a few idle runs have to be done to demonstrate the good working condition of the machine. Successful proving of BHEL components by the Vendor shall be considered as part of commissioning. Acceptance Criteria during commissioning: a) Physical Inspection and Design/Constructional/Dimensional Compliance. Ensuring proper working of all components and accessories of the machine erected. b) Prove out trials to be conducted on the panels given by BHEL with the toolings supplied along with the machine. c) Quality tests will be conducted by BHEL, on the bends made during prove-out trials at BHEL and the results should be within the tolerance limits as per Clause 4.0.	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS	Vendor's OFFER
25.0	**COMMISSIONING**	
25.1	The supplier shall depute his engineer(s) for supervising & execution of the commissioning of the machine at BHEL works and prove-out trials Supplier shall be responsible for carrying out the commissioning of the Vertical Panel Bending Machine. Required technical personnel and labour required for the same shall be provided by the vendor. Tools, tackles, required for the same shall be a arranged for by the vendor.	
25.2	Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by vendor in their foundation / layout drawings.	
25.3	Successful proving of BHEL components by the Vendor shall be considered as part of commissioning. All tests, as mentioned at Specification Clause No. 24.0 (Machine Acceptance) shall form part of the commissioning activity.	
25.4	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colors of paint used.	
26.0	**TRAINING**	
26.1	The supplier shall train Three BHEL's Engineers in Operation and Maintenance (Mechanical, Pneumatics, Electrical/ Electronics) of the Machine at supplier's works for a period of 1 working days.	
26.2	Travel, board & lodging for the BHEL Engineers who will be visiting supplier's works for pre-dispatch inspection and training, shall be borne by BHEL. Vendor to note.	
26.3	The supplier shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance (Mechanical, Pneumatics Electrical/ Electronics) during commissioning of the Machine at BHEL works for not less than 2 working days.	

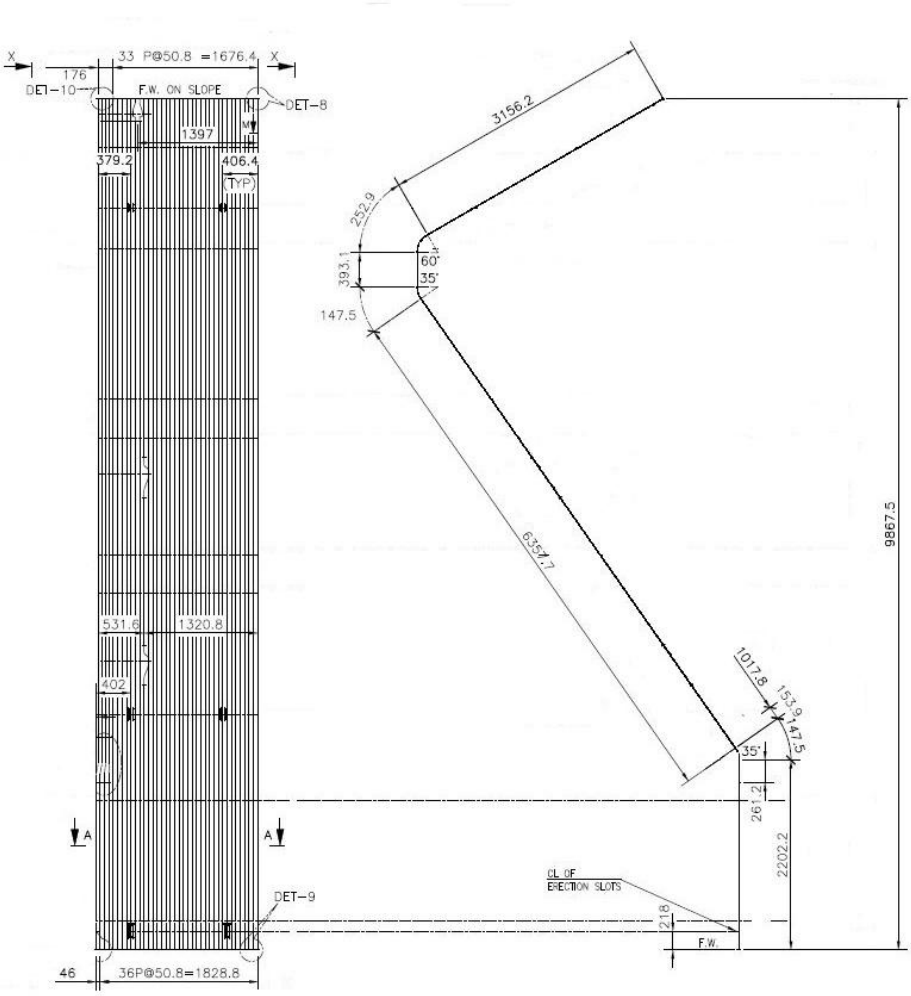
S. No.	PARTICULARS AND BHEL SPECIFICATIONS	Vendor's OFFER
26.4	The training shall include the following: a. Safety b. Operation of the machine c. Trouble-Shooting, d. All special features of the machine e. Electrical / Mechanical / Electronics systems	
27.0	**PAINTING:**	
27.1	The heavier machine parts are to be heat-treated after fabrication (including castings and forgings) and shot blasted for surface preparation prior to painting.	
27.2	One coat of Primer with 25microns of DFT (Dry Film Thickness)	
27.3	Finish coat by Polyurethane Paint. Colour shade: RAL 6011 (Reseda Green)	
28.0	**PACKING**	
28.1	Sea worthy and Rigid packing for all items of complete machine, all Accessories and other supplied items to avoid any damage/loss in transit. All loose and small parts to be packed in sealed boxes. All electrical and electronic items to be packed separately to prevent any damage during transit. Vendor to confirm	
29.0	**GENERAL POINTS**	
29.1	Make and Model of the machine to be mentioned. Detailed catalogs of the machine to be sent with the offer.	
29.2	SI system shall be followed for machining dimensioning	
29.3	Complete description of all systems & sub-systems shall form part of the technical bid.	
29.4	A schematic diagram showing the layout of the machine & associated systems with salient dimensions shall be submitted along with the offer.	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS	Vendor's OFFER
29.5	The operating sequence of the machine with broad outline of various operations involved should be furnished with the offer.	
29.6	Quality plan followed in Vendor's works	
29.7	Standards for Design, Manufacture and testing of the machine shall be in accordance with internationally accepted standards.	
29.8	The factor of safety considered for designing the machine, for certain load bearing components shall be furnished with the offer.	
29.9	Floor area required (Length, Width, Height) for complete machine & accessories	
29.10	Total connected load in kVA	
29.11	Total weight of the machine	
29.12	Weight of heaviest part of machine	
29.13	Weight of the heaviest assembly/subassembly of Machine	
29.14	Dimensions of largest part/ subassembly/ assembly of the machine	
30.0	**GUARANTEE**	
30.1	Equipment has to be guaranteed for its performance, for a minimum of 12 months from the date of commissioning OR 18 months from the date of supply whichever is earlier	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS	Vendor's OFFER
31.0	**SCOPE OF SUPPLY**	
31.1	**Supplier Scope** 1. Design, Manufacture, Supply, Commissioning and prove out of Vertical Panel Bending Machine 2. Toolings & Spares as per PO 3. All anchoring & foundation bolts – if required, levelling plates for the complete machine 4. First fill of Lubrication Oil, Grease 5. Levelling Instruments, Power Tools / Hand Tools for erection. 6. Welding machines and consumables required for erection 7. Commissioning Engineer with erection crew 8. Job Quality and Prove-out	
31.2	**BHEL Scope** 1. Drawings approval 2. Panels for trials and prove out 3. EOT Crane inside shop 4. Single Compressed air point at the location indicated in the drawing 5. Single Electrical Supply point at the location indicated in the drawing	

Enclosures: **Annexure-1 - Bend Panel Configurations**
Annexure-2 – Schematic Top View

Annexure - 1

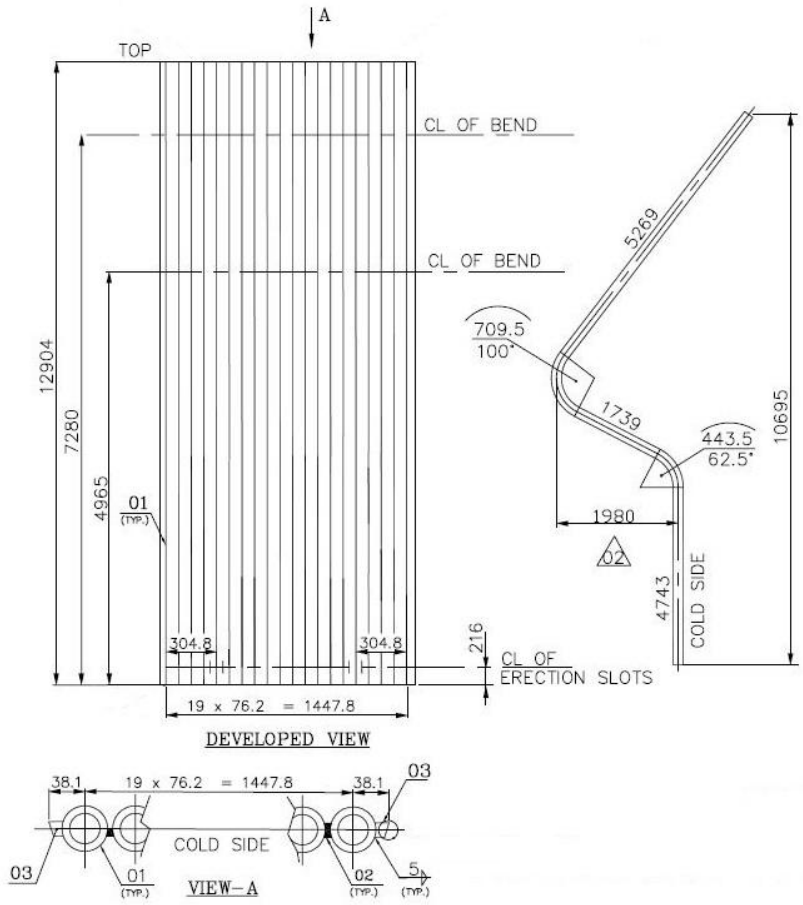


Note:

1. **Tube - D 38.1 x 8.0 mm**
2. **Bend Radius - R 241.5 mm**

DRG NO: PEFP-VPB- 01/04

Annexure -1

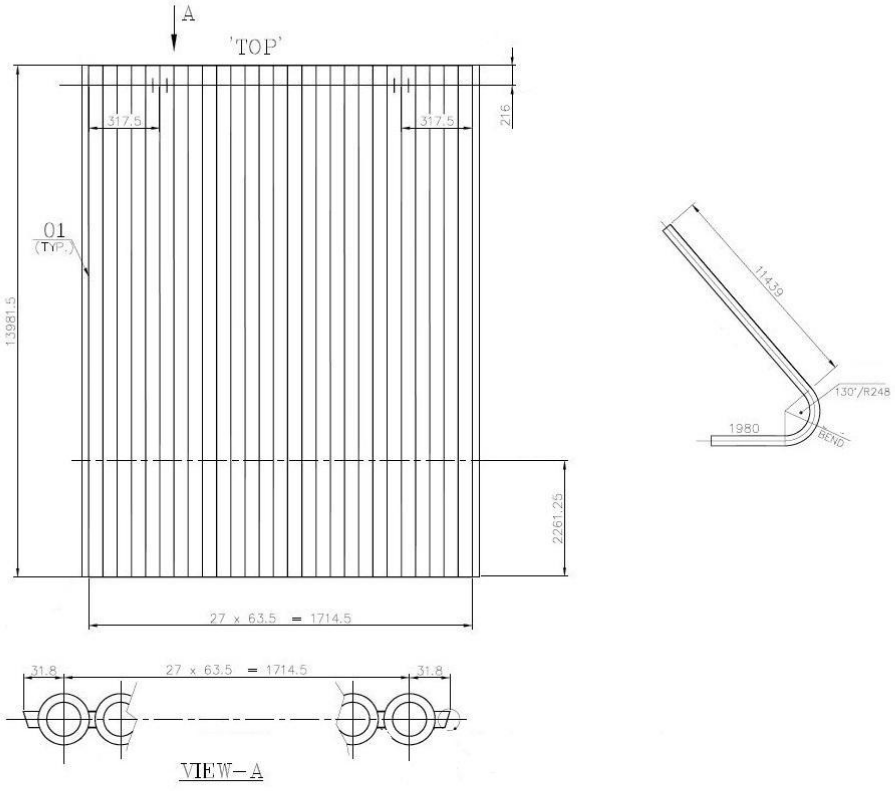


Note:

1. **Tube - D 63.5 x 4.80 mm**
2. **Bend Radius - R160 mm**

DRG. NO:PEFP-VPB- 02/04

Annexure-1



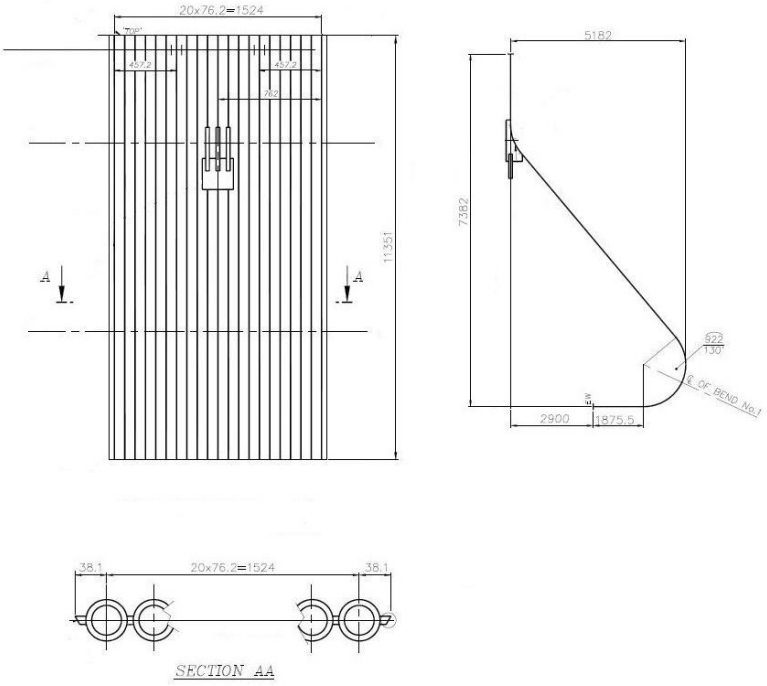
Note:

1) Tube - D51 x 6 mm

2) Bend Radius - R248 mm

DRG.NO:PEFP-VPB- 03/04

Annexure-1



NOTE:

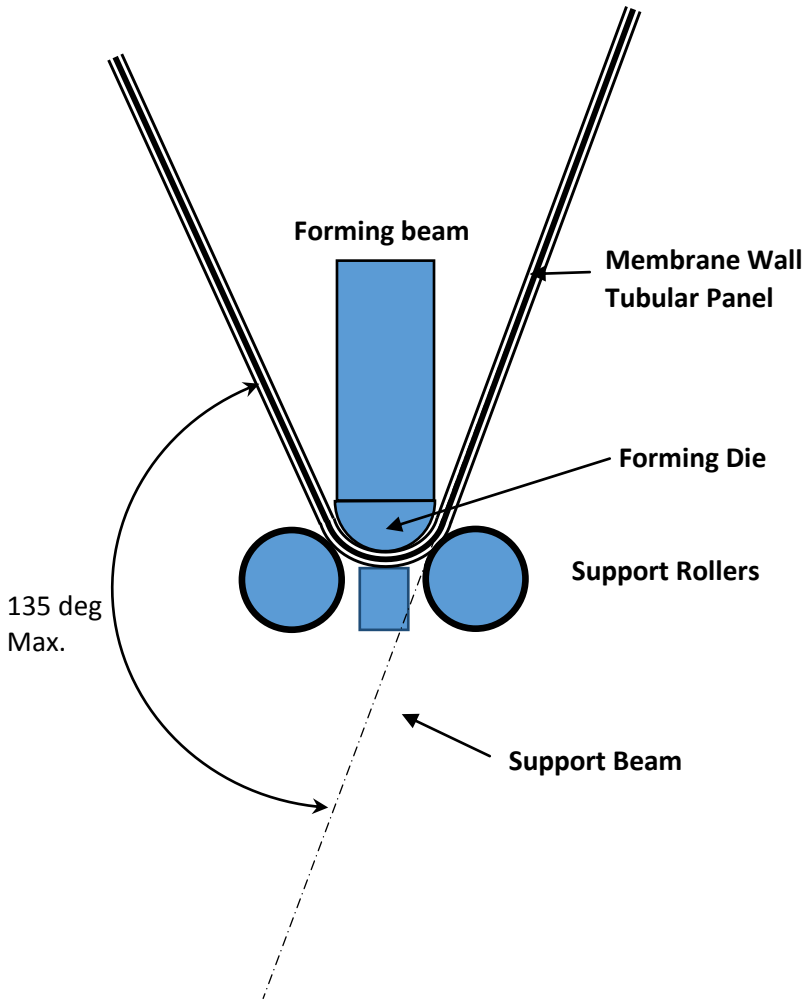
1) Tube - D 63.5 X 6 mm

2) Bend Radius - R406.4 mm

DRG.NO:PEFP-VPB- 04/04

Annexure - 2

VERTICAL PANEL BENDING SCHEMATIC – TOP VIEW



BHEL TIRUCHIRAPPALLI